USDA Natural Resources Conservation Service

Ecological site R081BY337TX
Low Stony Hill 23-31 PZ

Last updated: 9/19/2023
Accessed: 05/11/2025

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.

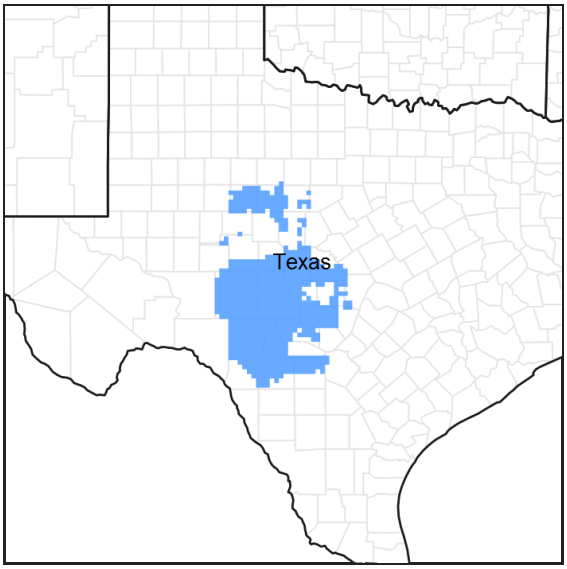


Figure 1. Mapped extent

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): 081B–Edwards Plateau, Central Part

This area is entirely in south-central Texas. It makes up about 11,125 square miles (28,825 square kilometers). The towns of Fredericksburg, Junction, Menard, Rocksprings, and Sonora are in this MLRA. Interstate 10 crosses the middle part of the area. A few State parks and State historic sites are in this MLRA.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 81B

Ecological site concept

The Low Stony Hill sites are comprised of shallow soils with lithic contact. The sites are filled with gravels, cobbles, and flagstones and occur on undulating hills with less than 20 percent slopes.

Associated sites

R081BY328TX	**Deep Redland 23-31 PZ** The Deep Redland site are on similar positions but deep soils with red subsoil with fewer fragments and Post oak trees.
R081BY332TX	**Gravelly Redland 23-31 PZ** The Gravelly Redland site are on similar positions but have red subsoil and more than 20 inches deep to limestone.
R081BY340TX	**Redland 23-31 PZ** The Redland site are on similar positions but have red subsoil with fewer fragments and Post oak trees.
R081BY326TX	**Clay Loam 23-31 PZ** The Clay Loam site will be encountered down the slope from the Low Stony Hills site.
R081BY350TX	**Steep Rocky 23-31 PZ** The Steep Rocky site occurs in much the same areas but on slopes greater than 20 percent.
R081BY320TX	**Adobe 23-31 PZ** The Adobe site are in similar positions but has softer bedrock.

Similar sites

R081BY343TX	**Shallow 23-31 PZ** The fact that both of these sites are shallow in nature and are underlain by limestone make them similar.
R081BY350TX	**Steep Rocky 23-31 PZ** The Steep Rocky site has the same soils but on slopes greater than 20 percent.

Table 1. Dominant plant species

Tree	(1) *Quercus virginiana*
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

The Low Stony Hill is on gently undulating to hilly uplands with an indurated limestone horizon. Rock outcrops are common in areas over eight percent slopes. The slopes range from 1 to 15 percent. Runoff is low to high due to the differences in the slopes that can occur. This site is usually found on hills and plateaus. The elevation ranges from 1,000 feet to 2,800 feet above sea level, with most common elevations 1,200 to 2,500 feet. The site is used almost entirely for rangeland due to the stony and shallow soils.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Ridge (2) Plateau > Plain
Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	1,200–2,500 ft
Slope	1–15%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified

Ponding frequency	Not specified
Elevation	1,000–2,800 ft
Slope	0–20%

Climatic features

The climate in the MLRA 81B is subtropical subhumid on the eastern portion and subtropical steppe on the western portion of the MLRA. Winters are dry, and the summers are hot and humid. The precipitation increases from west to east and the temperatures increase from north to south. The area usually receives 65 to 70 percent sunshine each year. The majority of the rainfall occurs during the warm months of April to October. Most precipitation comes from thunderstorms that vary in the amount of water received and the areas covered. Spring is characterized by fluctuating patterns, but mild temperatures prevail. July and August are relatively dry and hot with little weather variability day-to-day. As summer progresses through fall, an increase of precipitation usually occurs in the eastern portions while a decrease of precipitation occurs to the west. Winter temperatures are mild, but polar Canadian air masses bring rapid drops in temperature. These cold spells last 2 or 3 days. Prevailing winds are southerly with March and April the windiest months.

Table 4. Representative climatic features

Frost-free period (characteristic range)	210-260 days
Freeze-free period (characteristic range)	240-280 days
Precipitation total (characteristic range)	25-28 in
Frost-free period (actual range)	210-260 days
Freeze-free period (actual range)	240-280 days
Precipitation total (actual range)	24-30 in
Frost-free period (average)	230 days
Freeze-free period (average)	260 days
Precipitation total (average)	27 in

Climate stations used

- (1) BRADY [USC00411017], Brady, TX
- (2) EDEN [USC00412741], Eden, TX
- (3) FREDERICKSBURG [USC00413329], Fredericksburg, TX
- (4) FT MCKAVETT [USC00413257], Fort Mc Kavett, TX
- (5) HUNT 10 W [USC00414375], Hunt, TX
- (6) JUNCTION KIMBLE CO AP [USW00013973], Junction, TX
- (7) JUNCTION 4SSW [USC00414670], Junction, TX
- (8) MENARD [USC00415822], Menard, TX
- (9) ROCKSPRINGS 1S [USC00417706], Rocksprings, TX
- (10) SAN SABA [USC00417992], San Saba, TX

Influencing water features

No wetlands or streams are found on this site.

Wetland description

N/A

Soil features

The soils are well drained internally, but permeability is moderately slow to moderate. The parent materials are

residuum weathered from limestone. The surface layer is dark grayish-brown, calcareous clay, clay loam, or silty clay about 4 to 20 inches thick. The bedrock underneath the surface layer is 12 to 70 inches thick. Cobbly, very cobbly, and stony surface texture modifiers indicate fragments in the soil profile that makes it difficult to cultivate for cropland and pastureland. The available water capacity is low and averages 5 to 40 percent calcium carbonate. Soils correlated with this ecological site include: Eckrant, Harper, Oplin, and Tarrant.

Table 5. Representative soil features

Parent material	(1) Residuum–limestone
Surface texture	(1) Very cobbly clay (2) Cobbly silty clay (3) Very cobbly clay loam
Family particle size	(1) Clayey-skeletal (2) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	4–20 in
Soil depth	4–20 in
Surface fragment cover <=3"	10–30%
Surface fragment cover >3"	5–35%
Available water capacity (0-40in)	0.1–2.1 in
Calcium carbonate equivalent (0-40in)	5–40%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (4-40in)	10–30%
Subsurface fragment volume >3" (4-40in)	15–60%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Slow to moderate
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-40in)	Not specified
Calcium carbonate equivalent (0-40in)	Not specified
Electrical conductivity (0-40in)	Not specified

Sodium adsorption ratio (0-40in)	Not specified
Soil reaction (1:1 water) (0-40in)	Not specified
Subsurface fragment volume <=3" (4-40in)	Not specified
Subsurface fragment volume >3" (4-40in)	Not specified

Ecological dynamics

The Low Stony Hill uniquely developed because of the soils, topographic location, climate, periodic droughts, and fire. The resulting plant community complex is a savannah of mid and tallgrasses, associated forbs, and scattered mottes of woody species. The dominant grasses are little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indiangrass (Sorgastrum nutans), feathery bluestems (Bothriochloa spp.), and sideoats grama (*Bouteloua curtipendula*). Typical associated forbs include velvet bundleflower (Desmanthus spp.), Engelmann's daisy (*Engelmannia peristenia*), gaura (Gaura spp.), and dotted gayfeather (*Liatris punctata*). Trees include oaks, primarily live oak (*Quercus virginiana*), and hackberry (Celtis spp.). A large variety of shrubs include Vasey shin oak (*Quercus pungens* var. vaseyana), sumacs (Rhus spp.), greenbriar (Smilax spp.), elbowbush (Foresteria pubescens), Texas persimmon (Diosopyros texana), and algerita (Mahonia trifoliata).

Historically, the grassland savannah community was kept open by fires set periodically by lightning or Native Americans. The endemic woody plants, which historically covered less than 10 percent of the soil surface, were either resistant to fire or located where fires were less frequent or intense. Hydrologically the site was more mesic than the climatic regime indicates because of the stony soils. Periodic overgrazing by migrating herds of bison and endemic herds of pronghorn antelope probably occurred during droughts. However, long rest periods after drought due to movement out of the area by bison and antelope, or die off during drought, allowed the resilient grassland/savannah vegetation to re-establish itself and maintain the structure.

The demise of the Native American Indians and cessation of periodic intense fires changed the ecological dynamics of the vegetation. With European settlement in the 1800's, the frequency and intensity of fire diminished and intense grazing by cattle, sheep and goats began a transition towards a short-grass savannah with increasing woody species. The major forces influencing the transition to a woodland are continued overgrazing by livestock and the decrease in frequency and intensity of fire. As livestock and wildlife numbers increase and grazing use exceeds the plants ability to sustain defoliation, the more palatable, and generally more productive, species decline in stature, productivity, and density.

If excessive grazing continues ecologic retrogression occurs. As retrogression proceeds, the mid and tallgrasses give way to less palatable species such as curlymesquite (*Hilaria belangeri*), tridens (Tridens spp.), dropseeds, lovegrasses (Eragrostis spp.), feathery bluestems, and Texas wintergrass (Nassella leoucotricha). The higher-quality forbs are replaced with less palatable species such as sages (Salvia spp.), orange zexmenia, gaura, leafflower (Clematis spp.), and annuals. The woody species that had been kept in check by fire and grass competition, such as oak (Quercus spp.) and cedar (Juniperus spp.), begin increasing in number and density. Less palatable shrubby species such as prickly pear, agarita, javelinabush, sumacs, shin oak, elbowbush, kidneywood, mescalbean (*Sophora secundiflora*), and Texas persimmon increase in cover and stature. The site also becomes open to invasion of species from adjacent sites, such as redberry juniper (*Juniperus pinchotii*), Ashe juniper (*Juniperus asheii*) and mesquite (Prosopsis glandulosa). The decrease in density of tallgrass vegetation and increase in density and cover of woody vegetation brings a new community phase, a Midgrass/Oak/Mixed-brush Savannah Community (1.2). In this phase, ecological processes have changed little and the pathway to back toward the reference community can be initiated by proper grazing and prescribed burning. Grazing alone will not reverse the retrogression. Some form of woody plant control, such as fire or individual plant treatment, must accompany it.

In the Midgrass/Oak/Mixed-Brush Savannah Community, the transition to a woodland community is reversible with proper grazing management, prescribed burning and brush management. Production of vegetation has shifted from mostly herbaceous to woodier, although herbaceous vegetation biomass is still the largest amount. This phase is recognized for its advantage to browsers, so, historically, goat and sheep husbandry increased along with other

browsing animals such as white-tailed deer. If heavy grazing continued, woody species such as oaks, junipers, and mesquite along with unpalatable shrubs became dominant. Eventually catclaw (Acacia spp.), algerita, pricklypear, and yucca (Yucca spp.) invade. Shin oak may also dominate in some areas. With continued heavy grazing, midgrasses are largely replaced by buffalograss (*Bouteloua dactyloides*), curlymesquite, three-awns (Aristida spp.), hairy grama (*Bouteloua hirsuta*), hairy tridens (Tridens pilosum), and annuals. Loss of herbaceous cover and increased bare ground precludes effective burning and encourages accelerated erosion. When woody plant cover reaches 30 to 40 percent, and warm-season grasses provide less than 50 percent of the forage, the transition to the Woodland State (2) is complete.

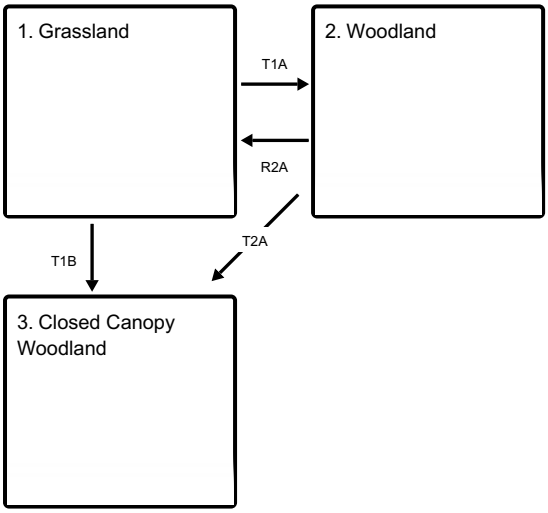
In the Oak/Juniper Woodland Community (2.1), woody vegetation, mostly less palatable species, such as oak, juniper, mesquite, Texas persimmon, algerita, pricklypear, yucca and condalia dominate. Grass and forb species diversity and production continues to decline while shrub and weedy annuals increase. Grass species composition is influenced by shade and moisture competition from woody vegetation and livestock species. When browsers and forb preferring species such as goats, sheep, and deer (white-tailed or exotics) prevail, low palatability grasses, forbs, and shrubs dominate the understory. When, grazing is primarily by cattle, the most desirable grasses are replaced by weeds and shrubs. The process is intensified during periodic droughts unless animal numbers are reduced.

Continued overstocking by livestock and deer, affected by periodic droughts, eventually brings about a community phase in which oaks and juniper and/or mesquite are so dominant that only remnants of grassland vegetation remain in the interspaces. This is identified as the Closed Canopy/Toxic Plant Community (3.1). Oaks, juniper, and sometimes mesquite dominate the overstory. The shrub component often contains pricklypear, algerita, shin oak, javelinabush (Condalia eriocoides), and Texas persimmon. The understory and interspaces support remnants of reference community vegetation, generally in low vigor and productivity. Desertification including erosion, loss of soil organic matter, and more xeric microclimate conditions is taking place. The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs. Restoration of the Closed Canopy/Toxic Plant Community (3.1) requires extensive brush control, reseeding and grazing management.

When the Closed Canopy/Toxic Plant Community is restored, the restored grass oak/shrub savannah is initially not as productive as the original midgrass/oak savannah because of soil losses and reduced water and nutrient cycling. Even with extensive brush management, the return to the open grassland savannah vegetation must be aided by reseeding with native plant species. Full recovery and maintenance of the reference community requires continued proper grazing management and brush management.

State and transition model

Ecosystem states



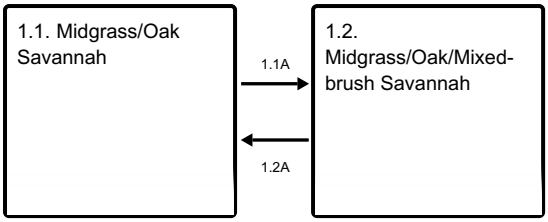
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

T1B - Absence of disturbance and natural regeneration over time

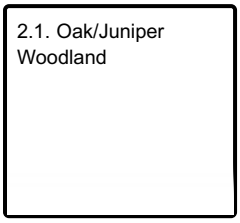
R2A - Reintroduction of historic disturbance return intervals

T2A - Absence of disturbance and natural regeneration over time

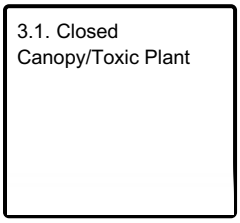
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland

Dominant plant species

- live oak (*Quercus virginiana*), tree
- little bluestem (*Schizachyrium scoparium*), other herbaceous
- sideoats grama (*Bouteloua curtipendula*), other herbaceous

Community 1.1
Midgrass/Oak Savannah

Figure 8. 1.1 Midgrass/Oak Savannah Community

The reference community is a fire-induced open grassland savannah reflecting the influence of frequent fires on vegetation development. Live oak and occasionally bumelia (*Sideroxylon lanuginosum*), hackberry trees, and numerous shrubby species, make up the woody overstory. Associated with these locations were other shrubby species. Together this woody plant complex occupies 10 percent or less. The species vary due to soil differences, fire history, and climatic cycles. The grassland vegetation provides a continuous cover of grasses and forbs. Little bluestem is most abundant on more mesic sites in the eastern while sideoats grama was more abundant in the western side of the region. Big bluestem, Indiangrass (Sorgastrum nutans), or Eastern gamagrass (*Tripsacum*

dactyloides) often dominates on deeper soils or during or during wet cycles. The reference community hosts a diverse amount of grasses and forbs. Most energy and nutrient cycling is contained in the narrow grass/soil interface and evapotranspiration is minimal. Water percolation below the grass-rooting zone occurs only at rock outcrops and fissures in the limestone layer. Overland flow of water is minimal.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1600	2300	3000
Forb	200	288	375
Tree	100	144	188
Shrub/Vine	100	144	187
Total	**2000**	**2876**	**3750**

Figure 10. Plant community growth curve (percent production by month). TX3605, Midgrass/Oak Savannah with less 10% canopy. Warm season rangeland with peaks in annual production from herbaceous layer in May and in September..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	3	5	13	22	15	5	3	15	7	5	4

Community 1.2
Midgrass/Oak/Mixed-brush Savannah

Figure 11. 1.2 Midgrass/Oak/Mixed-brush Savannah Community

The Midgrass/Oak savannah community is the first phase of transition towards the Woodland State. Woody species, especially juniper and mesquite, are invading but not seriously impacting forage production. Overgrazing and fire suppression has reduced the more palatable species and opened the grass cover for the invasion of less palatable or more aggressive species. The oaks, junipers, mesquite, pricklypear, agarito, sumacs, condalias, and several other shrubby species increase in density and size. Less palatable grasses and forbs are replacing the reference species. Midgrasses mostly replace tallgrasses and shortgrasses such as tridens, Texas wintergrass, buffalograss, curly mesquite, three-awns, and less palatable forbs. Nutrient and energy cycling is shifting toward woody plants and evapotranspiration losses are increasing. Proper grazing and brush management can easily reverse the transition toward the Oak/Juniper Woodland Community (2.1). Without brush management and proper grazing, the woody species will continue to thickitize until the woody species dominate.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1300	1870	2435
Tree	300	435	565
Forb	200	285	375
Shrub/Vine	200	285	375
Total	**2000**	**2875**	**3750**

Figure 13. Plant community growth curve (percent production by month). TX3606, Midgrass/Oak/Mixedbrush Savannah. Warm season species begin growth in late April. Their peak growth is in late May with a lesser peak in September. Cool season species initiate fall/winter growth after September solstice and rains..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	3	5	13	22	15	5	3	15	7	5	4

Pathway 1.1A
Community 1.1 to 1.2

Midgrass/Oak Savannah

Midgrass/Oak/Mixed-brush Savannah

Heavy abusive grazing, no fires, and no brush management shifts from the Midgrass/Oak Savannah Community to the Midgrass/Oak/Mixed-brush Savannah Community.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Oak/Mixed-brush Savannah

Midgrass/Oak Savannah

With the implementation of prescribed grazing and prescribed burning conservation practices, the Midgrass/Oak/Mixed-brush Savannah Community can revert back to the Midgrass/Oak Savannah Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Woodland

Dominant plant species

- oak (*Quercus*), tree
- juniper (*Juniperus*), tree
- acacia (*Acacia*), shrub

Community 2.1
Oak/Juniper Woodland

Figure 14. 2.1 Oak/Juniper Woodland Community

The Oak/Juniper Woodland Community (2.1) is a woodland plant community with 30 to 40 percent woody plant canopy cover. Oak, juniper, or mesquite, are the dominants in the overstory. Pricklypear, algerita, shin oak, javelinabush, Texas persimmon, and several other shrubby species are common in the understory. Few of the original grasses and forbs are present. Llittle bluestem and/or sideoats grama provide less than 15 percent of the forage base. Texas wintergrass is often the most common grass. Annual grasses and forbs are the majority of the forage resource. The moisture regime is more xeric than normal because of evapotranspiration losses. There is little ground water recharge or overland flow except during heavy rainfall events. Major energy and economic inputs are required to change the Oak/Juniper Woodland community back to reference state. Brush management, prescribed grazing, prescribed burning, and perhaps range seeding will be necessary at a major expense. Planned land use will dictate the practices applied and their intensity. Unless brush management and grazing management is applied, the woodland canopy continues to thicken. Once the canopy exceeds 50 percent very little herbaceous biomass is produced and only shade tolerant species survive in the understory. At this point the Oak/Juniper Woodland Community becomes the Closed Canopy/Toxic Plant Community (3.1).

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	800	1140	1500
Tree	700	1000	1315
Shrub/Vine	400	570	750
Forb	100	140	185
Total	**2000**	**2850**	**3750**

Figure 16. Plant community growth curve (percent production by month). TX3607, Oak/Juniper/Mixedbrush Woodland 30-40% canopy. The mix of warm and cool season plants extends the green growing period to yearlong. Peak biomass production in April and May with a lesser peak in September and October..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	5	8	13	18	12	5	3	12	10	7	4

State 3
Closed Canopy Woodland

Dominant plant species

- oak (*Quercus*), tree
- juniper (*Juniperus*), tree

Community 3.1
Closed Canopy/Toxic Plant

Figure 17. 3.1 Closed Canopy/Toxic Plant Community

The Closed Canopy/Toxic Plant Community occurs when oaks (generally in mottes), juniper and/or mesquite exceed 50 percent canopy cover. In this state, the herbaceous understory consists of shade-tolerant grasses such as Texas wintergrass, red grama (*Bouteloua trifida*), hairy erioneuron (*Erioneuron pilosum*), forbs, and annuals. Juniper and/or mesquite often dominate the overstory, although live oak or Vasey shin oak may dominate in some areas. Shrubs such as pricklypear, elbowbush, Texas persimmon, algerita, and condalia persist. Desertification is taking place. Soil erosion has taken place on steeper areas during the transition. The soil/atmosphere microclimate is more xeric due to transpiration loses. Soil litter buildup is occurring under the woody canopy. Restoration of the site requires major brush management and range seeding followed by prescribed grazing management.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	1000	1450	1875
Grass/Grasslike	500	713	937
Shrub/Vine	400	570	750
Forb	100	142	188
Total	**2000**	**2875**	**3750**

Figure 19. Plant community growth curve (percent production by month). TX3608, Closed Canopy Oak/Juniper Woodland. Yearlong green forage due to shrubs and cool season species growth in winter and spring. Peak rainfall period from April through September provides most production during summer growing season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	7	8	14	18	12	6	4	13	2	7	4

Transition T1A
State 1 to 2

Heavy abusive grazing and no fire will lead the transition from the Grassland State to the Woodland State.

Transition T1B
State 1 to 3

Heavy abusive grazing, no fire, and no brush management shifts from the Grassland State to the Closed Canopy Woodland State.

Restoration pathway R2A
State 2 to 1

With the application of various conservation practices including prescribed grazing, prescribed burning, brush management, IPT, and Range Planting, the Woodland State can attempt to revert back to the Grassland State.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Transition T2A
State 2 to 3

The shift from the Woodland State to the Closed Canopy Woodland State occurs due to heavy abusive grazing, no brush management, brush invasion, and no fires.

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrass**			500–937	
	little bluestem	SCSC	*Schizachyrium scoparium*	500–937	–
2	**Tallgrasses**			300–562	
	big bluestem	ANGE	*Andropogon gerardii*	300–562	–
	Indiangrass	SONU2	*Sorghastrum nutans*	300–562	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	300–562	–
3	**Midgrasses**			400–750	
	sideoats grama	BOCU	*Bouteloua curtipendula*	400–750	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	400–750	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	400–750	–
	green sprangletop	LEDU	*Leptochloa dubia*	400–750	–
	vine mesquite	PAOB	*Panicum obtusum*	400–750	–
4	**Midgrasses**			200–375	
	threeawn	ARIST	*Aristida*	200–375	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	200–375	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	200–375	–
	grama	BOUTE	*Bouteloua*	200–375	–
	bristlegrass	SETAR	*Setaria*	200–375	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	200–375	–
	tridens	TRIDE	*Tridens*	200–375	–
5	**Shortgrasses**			100–188	
	Grass, annual	2GA	*Grass, annual*	100–188	–

	buffalograss	BODA2	*Bouteloua dactyloides*	100–188	–
	fall witchgrass	DICO6	*Digitaria cognata*	100–188	–
	hairy woollygrass	ERPI5	*Erioneuron pilosum*	100–188	–
	curly-mesquite	HIBE	*Hilaria belangeri*	100–188	–
	Hall's panicgrass	PAHA	*Panicum hallii*	100–188	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	100–188	–
6	**Cool Season grasses**			100–188	
	sedge	CAREX	*Carex*	100–188	–
	Canada wildrye	ELCA4	*Elymus canadensis*	100–188	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	100–188	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	100–188	–
Forb					
7	**Forbs**			200–375	
	Forb, annual	2FA	*Forb, annual*	200–375	–
	Indian mallow	ABUTI	*Abutilon*	200–375	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	200–375	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	200–375	–
	Berlandier's sundrops	CABE6	*Calylophus berlandieri*	200–375	–
	prairie clover	DALEA	*Dalea*	200–375	–
	zarzabacoa comun	DEIN3	*Desmodium incanum*	200–375	–
	bundleflower	DESMA	*Desmanthus*	200–375	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	200–375	–
	Engelmann's daisy	ENGEL	*Engelmannia*	200–375	–
	eastern milkpea	GARE2	*Galactia regularis*	200–375	–
	snakeweed	GUTIE	*Gutierrezia*	200–375	–
	trailing krameria	KRLA	*Krameria lanceolata*	200–375	–
	dotted blazing star	LIPU	*Liatris punctata*	200–375	–
	Texas skeletonplant	LYTE	*Lygodesmia texana*	200–375	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	200–375	–
	beardtongue	PENST	*Penstemon*	200–375	–
	scurfpea	PSORA2	*Psoralidium*	200–375	–
	snoutbean	RHYNC2	*Rhynchosia*	200–375	–
	mealycup sage	SAFA2	*Salvia farinacea*	200–375	–
	awnless bushsunflower	SICA7	*Simsia calva*	200–375	–
	Santa Cruz Island winged rockcress	SIFI	*Sibara filifolia*	200–375	–
	blue-eyed grass	SISYR	*Sisyrinchium*	200–375	–
	fuzzybean	STROP	*Strophostyles*	200–375	–
	greenthread	THELE	*Thelesperma*	200–375	–
	creepingoxeye	WEDEL	*Wedelia*	200–375	–
Shrub/Vine					
8	**Shrubs**			100–188	
	acacia	ACACI	*Acacia*	100–188	–
	eastern redbud	CECA4	*Cercis canadensis*	100–188	–

	Texas crabgrass	DITE	*Digitaria texana*	100–188	–
	Texas kidneywood	EYTE	*Eysenhardtia texana*	100–188	–
	stretchberry	FOPU2	*Forestiera pubescens*	100–188	–
	algerita	MATR3	*Mahonia trifoliolata*	100–188	–
	Texas sacahuista	NOTE	*Nolina texana*	100–188	–
	pricklypear	OPUNT	*Opuntia*	100–188	–
	pungent oak	QUPU	*Quercus pungens*	100–188	–
	bastard oak	QUSIB	*Quercus sinuata var. breviloba*	100–188	–
	sumac	RHUS	*Rhus*	100–188	–
	gum bully	SILA20	*Sideroxylon lanuginosum*	100–188	–
	greenbrier	SMILA2	*Smilax*	100–188	–
	seaside goldenrod	SOSE	*Solidago sempervirens*	100–188	–
	queen's-delight	STSY	*Stillingia sylvatica*	100–188	–
Tree					
9	**Trees**			100–188	
	Texas redbud	CECAT	*Cercis canadensis var. texensis*	100–188	–
	hackberry	CELTI	*Celtis*	100–188	–
	littleleaf leadtree	LERE5	*Leucaena retusa*	100–188	–
	Bush oak	QUBU	*Quercus ×bushii*	100–188	–
	Lacey oak	QULA	*Quercus laceyi*	100–188	–
	live oak	QUVI	*Quercus virginiana*	100–188	–
	Eve's necklacepod	STAF4	*Styphnolobium affine*	100–188	–
	elm	ULMUS	*Ulmus*	100–188	–

Animal community

This site is used to produce domestic livestock and to provide habitat for native wildlife. Cow-calf operations are the primary livestock enterprise, although stocker cattle are also grazed. Sheep, Angora goats, and Spanish goats were formerly raised in large numbers. Sheep are still present in reduced numbers, while meat goats are now present in fairly high numbers. Boer goats have been introduced, either purebred or crossed with Spanish goats, to obtain a larger meat animal. Reports indicate that Boers do not browse as heavily as earlier breeds.

Sustainable stocking rates have declined drastically over the past 100 years due to deterioration of the reference plant community. An assessment of vegetation is needed to determine the site’s current carrying capacity. Calculations used to determine livestock stocking rate should be based on forage production remaining after determining use by resident wildlife, then refined by frequent careful observation of the plant community’s response to animal foraging.

A large diversity of wildlife is native to this site. In the reference plant community, migrating bison, grazing primarily during wetter periods, pronghorn, white-tailed deer and turkey were the more predominant herbivore species. With the subsequent transformation of the plant community, due primarily to the influence of man and climate change, the kind and proportion of wildlife species have been altered.

Except for a few domestic herds, bison have been eliminated. With the eradication of the screwworm fly, increase in woody vegetation and man-suppressed natural predation, deer numbers have increased and are often in excess of carrying capacity. Where deer numbers are excessive, overbrowsing and overuse of preferred forbs causes deterioration of the plant community. Progressive management of deer populations through hunting can keep populations in balance and provide an economically important ranching enterprise. Achieving a balance between brushy cover and more open plant communities on this and adjacent sites is important to deer management. Competition among deer, sheep, and goats must be a consideration in livestock and wildlife management to

prevent damage to the plant community.

Various species of exotic wildlife have been introduced on the site, including deer such as axis, sika, fallow, and red; antelope such as sable, oryx, blackbuck, and nilgai, and sheep such as barbados (mouflon) and aoudad with various degrees of success. Their numbers must be included along with livestock and native wildlife, primarily white-tailed deer, in any management plan. Feral hogs may feed on the site. They can be damaging to the plant community if their numbers are not managed. Smaller mammals include many kinds of rodents, jackrabbit, cottontail, raccoon, ringtail, skunk, and armadillo. Mammalian predators include coyote, red fox, gray fox, bobcat, and mountain lion. Wolves were common in earlier times, bears resided in some areas, and an occasional jaguar or ocelot was encountered. Many species of snakes and lizards are native to the site.

Many species of birds are found on this site including game birds, songbirds, and birds of prey. Major game birds that are economically important are turkey, bobwhite quail, scaled (blue) quail and mourning dove. Turkeys prefer plant communities with substantial amounts of shrubs and trees interspersed with grassland. Quail prefer a combination of low shrubs, bunch grass (critical for nesting cover), bare ground, and low successional forbs. The different species of songbirds vary in their habitat preferences. Habitat on this site that provides a large diversity of grasses, forbs, and shrubs will support a good variety and abundance of songbirds. Birds of prey are important to keep the numbers of rodents, rabbits, and snakes in balance. Different species of raptors benefit from a diverse plant community as well.

Hydrological functions

The Low Stony Hill site is a well-drained, shallow, stony upland. Its soils are moderately to slowly permeable. Under reference conditions, the savannah vegetation intercepts and utilizes much of the incoming rainfall. The impermeable limestone layer holds water in easy reach of grasses. Only during extended rains is there much runoff. Because of shallow slopes and good ground cover, runoff is slow and clear. Rock outcrops and fissures in the indurated limestone allow limited deep percolation to ground water. The presence of the impermeable layer, stones and rock outcrops enhance the effectiveness of rainfall, especially during small rainfall events. Changes from savannah to woodland has little effect on the water regime, except some accelerated erosion and organic matter loss during the transition. Evapotranspiration loss changes little from the savannah to the woodland, although water pathways do. The shift in water use from savannah vegetation to its use by woodland vegetation is significant.

Recreational uses

The Low Stony Hill site is well suited for many outdoor recreational uses including recreational hunting, hiking, camping, equestrian, and bird watching. The site, along with other adjacent sites, such as Steep Rocky and Clay Loam, provide diverse scenic beauty.

Wood products

Posts and specialty wood products are made from juniper, mesquite, and oak.

Other products

Jams and jellies are made from many fruit bearing species. Seeds are harvested from many plants for commercial sale. Many grasses and forbs are harvested by the dried-plant industry for sale in dried flower arrangements Honeybees are utilized to harvest honey from the many flowering plants.

Inventory data references

Information presented here has been derived from limited NRCS clipping data, field observations of range-trained personnel, and from research of historic observations.

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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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Contact for lead author	325-944-0147
Date	06/09/2005
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 patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall events but may occur during intense rainfall events.

3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes would have been uncommon for the site when occupied by the reference plant community.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 5 percent bare ground. Small and non-connected areas.

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):** Under normal rainfall, little litter movement should be minimal and short; however, litter of all sizes may move long distances.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface under reference conditions are 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):** Soil is dark brown flaggy silty clay loam with surface depth up to six inches with sub-rounded to angular pebbles, cobbles, and stones. The soil has a strong fine granular structure. SOM is one to four percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High canopy, basal cover and density with small interspaces should make rainfall impact negligible. The stones in the profile capture moisture and enter through soil profile. This site has well

drained soils, very shallow to shallow with one to five percent slopes which may allow noticeable runoff and erosion.

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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):** No evidence of compaction.

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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: Warm-season tallgrasses

    Sub-dominant: Warm-season midgrasses Forbs

    Other: Cool-season midgrasses Trees Warm-season shortgrasses Shrubs

    Additional: Forbs make up 10 percent of species composition, shrubs and trees compose up to 12 percent species composition.

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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 groups in the reference community.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,500 pounds per acre for below average moisture years, 3,000 pounds per acre for average moisture years and 4,500 pounds per acre for above average moisture years.

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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:** Ashe juniper, mesquite, prickly pear, bermudagrass, johnsongrass, and King Ranch bluestem.

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