

Ecological site R080BY155TX Redland 26-33" PZ

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

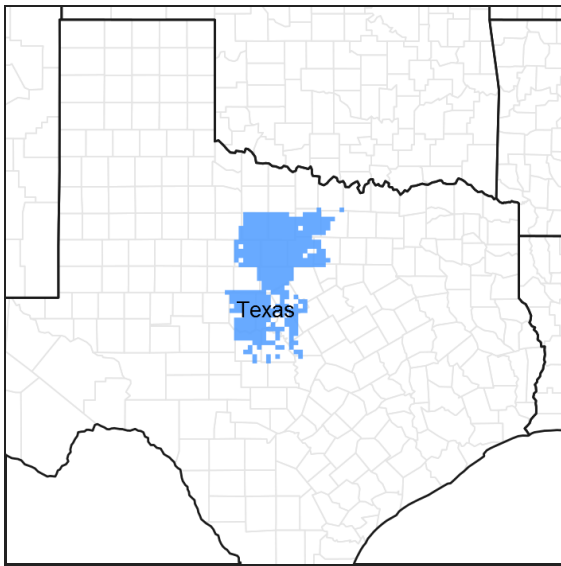


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 080B–Texas North-Central Prairies

MLRA 80B consists of gently rolling, dissected plains with very steep hillsides and sideslopes and narrow flood plains associated with small streams. Loamy and clayey soils range from very shallow to deep and developed in sandstones, shales, and limestones of Pennsylvanian age.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur over shallow non-calcareous clay loam soils on uplands. The reference vegetation includes native perennial tall and midgrasses with numerous forbs and scattered oaks. Without periodic fire or brush management, woody species may increase and dominate the site.

Associated sites

R080BY148TX	Deep Redland 26-33" PZ Deeper soils. Similar plant community.
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Similar sites

R085AY183TX	Redland 30-38" PZ Similar Redland site in MLRA 85.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus stellata</i> (2) <i>Quercus fusiformis</i>
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Schizachyrium scoparium</i>

Physiographic features

This site occurs on linear to convex side slopes, nose slopes, and crests of dip slopes and ridges in the Texas North-Central Prairies. This site is characteristically a water distributing site. Slopes are typically less than 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Dip slope (2) Ridge
Runoff class	Negligible to high
Elevation	750–2,400 ft
Slope	0–2%
Aspect	Aspect is not a significant factor

Climatic features

The climate is subtropical subhumid and is characterized by hot humid summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost generally occurs about November 5 and the last freeze of the season usually occurs about March 19. The average frost free period ranges from 215 days in the northern counties, to 240 days in the south.

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

Approximately 75% of annual rainfall occurs between April 1 and October 31. Rainfall during the months of April through September typically occurs during thunderstorms which tend to be intense and brief, resulting in large amounts of rain in a short time. The wettest months of the year are May, June, September, and October. The driest months during the growing season are July and August. The winter months of November, December, January, and February are the driest months overall.

Average annual precipitation for the entire MLRA is approximately 28 inches. There is a noticeable difference in the average annual precipitation in the northern counties in comparison to the southern and western counties of this Major Land Resource Area. Jack, Clay, Young, and Palo Pinto Counties all have an average annual precipitation of more than 31 inches. Stephens, Eastland, McCulloch, and San Saba Counties all have an average annual precipitation of less than 28 inches.

Winters tend to be mild, with occasional periods of very cold temperatures which can be accompanied by strong northerly winds and freezing precipitation. Snow is infrequent and significant accumulations are rare. These periods of very cold weather are generally short-lived. Summers tend to be hot and dry. Drought conditions are common during most summers. Air temperatures of more than 95oF are common from mid-June through September. In the northern counties nearest to the Red River, temperatures are generally slightly cooler during winter months and slightly warmer during summer months than in the other counties in the North Central Prairie.

Table 3. Representative climatic features

Frost-free period (characteristic range)	184-200 days
Freeze-free period (characteristic range)	211-225 days
Precipitation total (characteristic range)	30-32 in
Frost-free period (actual range)	183-204 days
Freeze-free period (actual range)	210-226 days
Precipitation total (actual range)	29-33 in
Frost-free period (average)	193 days
Freeze-free period (average)	217 days
Precipitation total (average)	31 in

Climate stations used

- (1) SAN SABA 7NW [USC00417994], Richland Springs, TX
- (2) BROWNWOOD 2ENE [USC00411138], Early, TX
- (3) EASTLAND [USC00412715], Eastland, TX
- (4) MINERAL WELLS AP [USW00093985], Millsap, TX
- (5) BRECKENRIDGE [USC00411042], Breckenridge, TX
- (6) GRAHAM [USC00413668], Graham, TX
- (7) JACKSBORO [USC00414517], Jacksboro, TX

Influencing water features

Theses sites may both receive water and shed water via overland flow during rain events. The presence of good ground cover and deep rooted grasses can help facilitate water infiltration into the soil. These sites are not associated with wetlands.

Wetland description

NA

Figure 7-1 The hydrologic cycle with factors that affect hydrologic processes

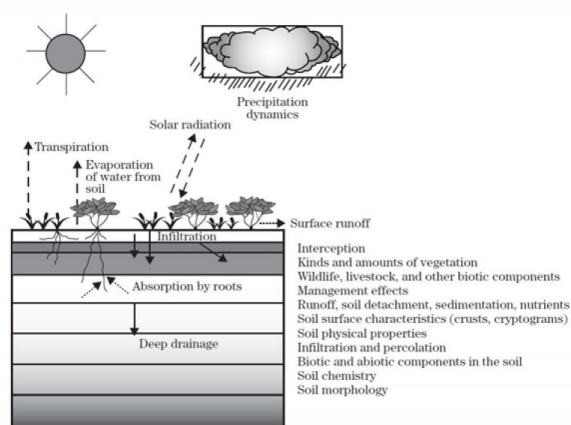


Figure 8.

Soil features

Representative soil components for this ecological site include: Hensley

The site is characterized by shallow, noncalcareous, well drained soils.

Table 4. Representative soil features

Parent material	(1) Residuum–limestone
Surface texture	(1) Stony loam (2) Very stony loam (3) Extremely stony loam (4) Loam
Drainage class	Well drained
Permeability class	Slow
Soil depth	10–20 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–15%
Available water capacity (0-40in)	2–3 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–50%

Ecological dynamics

The plant communities that can occur on this site range from a Tallgrass/Midgrass dominant, live oak (*Quercus fusiformis*) and post oak (*Quercus stellata*) savannah to a midgrass savannah, to an Ashe juniper (*Juniperus ashei*) and mesquite (*Prosopis glandulosa* var. *glandulosa*) dominated mixed-grass and/or shortgrass community, to a thick canopy Ashe juniper/mesquite/shrub short and annual grass and forb complex community. This wide diversity of plant communities occurring on this site is in direct response to type of grazing management, the inherent selection of this site by all kinds of grazing animals due to its fertility in relation to other neighboring sites, reaction to fire regimes, extermination of the prairie dogs, and the impacts of droughts on the different hydrologies associated with each of the steady states.

The reference plant community is a tallgrass/midgrass savannah of live oak and post oak that have a canopy of approximately 20 percent. The tallgrasses are big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium* var. *scoparium*), and Indiangrass (*Sorghastrum nutans*). These grasses dominate the site with a number of midgrasses such as sideoats grama (*Bouteloua curtipendula* var. *curtipendula*), tall dropseed (*Sporobolus asper* var. *asper*), cane bluestem (*Bothriochloa barbinodis* var. *barbinodis*), silver bluestem (*Bothriochloa laguroides* ssp. *torreyana*), vine mesquite (*Panicum obtusum*), and cool-season grasses such as Canada wildrye (*Elymus canadensis* var. *canadensis*), Texas bluegrass (*Poa arachnifera*), and Texas wintergrass (*Nassella leucotricha*). There are numerous perennial forbs that share the landscape. Such plants include Maximilian sunflower (*Helianthus maximiliani*), bush sunflower (*Simsia calva*), Englemann's daisy (*Engelmannia peristenia*), dotted

gayfeather (*Liatris punctata* var. *punctata*), blacksamson (*Echinacea angustifolia*), bundleflowers (*Desmanthus* sp.), heath aster (*Chaetopappa ericoides*), western ragweed (*Ambrosia psilostachya*), and legumes such as prairie clover (*Dalea* sp.), trailing wildbean (*Strophostyles helvula*), least snoutbean (*Rhynchosia minima*), tickclover (*Desmodium* sp.), and scurfpea (*Pedimelum* sp.). Besides the live oak and post oak, there are numerous other woody plants such as Texas oak (*Quercus buckleyi*), bigelow oak (*Quercus sinuata* var. *breviloba*), elm (*Ulmus* sp.), hackberry (*Celtis laevigata*), redbud (*Cercus canadensis* var. *texensis*), bumelia (*Sideroxylon lanuginosum* ssp. *oblongifolium*), sumacs (*Rhus* sp.), elbowbush (*Forestiera pubescens*), agarito (*Mahonia trifoliata*), greenbriar (*Smilax* sp.), vine ephedra (*Ephedra antisyphilitica*), bush honeysuckle (*Lonicera albiflora*), catclaw mimosa (*Mimosa aculeaticarpa* var. *biuncifera*), and dalea (*Dalea* sp.) .

In the reference plant community, tall and midgrasses dominated the shortgrasses due to their ability to capture sunlight and shade them. The tall and midgrasses also had deeper root systems that allowed them to capture the deep moisture while the shortgrasses had shorter root systems and could capture only the more shallow moisture. Many of the deep-rooted grasses also have more root hairs that allow them to be more efficient at extracting moisture from very dry soil. Due to these differences, the tall and midgrasses maintained their dominance over the shortgrasses as they could produce much more food and maintain a high state of health and vigor even in times of drought.

When European settlers arrived, the area was inhabited by bison, whitetail deer, turkey, quail, dove, many song birds, rabbits, squirrel, prairie dogs, lizards and snakes. Fire was a major factor in maintaining the site in the reference savannah state. Lightning fires and fires set by Native Americans would burn for days without stopping. Hundreds of thousands of acres would burn as there was nothing but wide spread rivers or a change in weather to stop them. This repeated burning kept the ecological site in a savannah state, with only the large tall trees being spared a top kill. The re-sprouting shrubs, the fresh green growth of the grass and forbs made this range a sea of lush growth that attracted the grazing and browsing animals and provided them highly nutritious forage.

There were no fences. The bison were free to roam and migrate from south to north in the summer and north to south as the winter season was nearing. This area provided the winter grazing for the bison herds that had ventured north for the summer. They came by the thousands and grazed the range as they moved around. Antelope were on the range, and grazed and roamed at their desire, seeking the best nutrition they could find in the forbs and grasses. Prairie dogs lived in groups on the site. They kept the woody shrubs cut down as a means of protection from hawks, eagles, coyotes, bob-cats, and cougar. Recent research has shown that they would not let a mesquite stand overnight that was planted in or around their town.

European settlers started settling this area in the early 1800's with a major thrust just before and after the civil war. The first settlers moved about from ranch to ranch as no one owned land. After the grass was grazed to a point of "being gone", they would move to another place where the grass was good and start another ranch. When the grass "came back" on the ranch they had left, a new rancher would move in and take over that ranch.

In 1880, barbed wire was introduced into this area. The land had also come under private ownership. The fencing stopped the open range, where livestock had wandered to be guided only by the line riders. Now the forces of contained livestock grazing started to have its toll on the plant communities. The wild fires that once systematically burned over the land were either put out or burned with less intensity due to reduced fine fuel due to the heavier and continuous grazing.

Depending on how the rancher managed, the plant communities started to change. If the rancher allowed fire to continue to control the Ashe juniper and mesquite seedlings, they could manage their land as the tall and midgrass savannah community. If fire was not allowed to maintain the invading brush species, the Ashe juniper and mesquite would spread over the range as the many other shrubs natural to the site rapidly expanded in canopy. If the brush species were burned prior to achieving approximately 6 feet in height, fire could be used to reclaim the land. If the brush was allowed to exceed 6 feet, then fire could no longer control the brush and the range entered a new steady state that would require more than just fire to reclaim it. The manager would have to use machinery or apply herbicides to manage the brush to a desired canopy.

Also, the manager would have to apply a well thought out prescribed grazing plan to maintain the vigor and health of the grasses and forbs that they desired on the range. As the stocking rates exceeded the carrying capacity of the land and the natural graze-rest cycles were broken by continuous grazing, the palatable and highly selected tallgrasses were grazed to the point that they could no longer produce sufficient food in their leaves to maintain their

health and vigor. Records of stocking rates show that on much of the land, there was a cow to 2 acres. When the tallgrasses were grazed to the point that they had little leaf area left, they stopped supplying the root system with food, as all available food produced was going to grow more leaf area to enhance the food manufacturing process. If the overgrazing continued, the root system of the overgrazed plants continued to be used up and shrink, as respiration continued in the root system that required energy. In time, with continued close grazing, the tallgrasses would become not a deep rooted, healthy plant, but a shallow rooted, small leaf area, weak plant that was set up for doom during the next drought. This process was intensified due to the natural droughts that occur in the area. These tallgrasses were now not in a dominant position to the midgrasses, but in a position of being dominated by the midgrasses on the site. This shift has led to the decrease of tallgrass species and an increase of mid and shortgrasses. These midgrasses were sideoats grama, cane bluestem, silver bluestem and vine mesquite. At the same time this was occurring with the grasses, the palatable forbs were being overgrazed and killed out of the plant community.

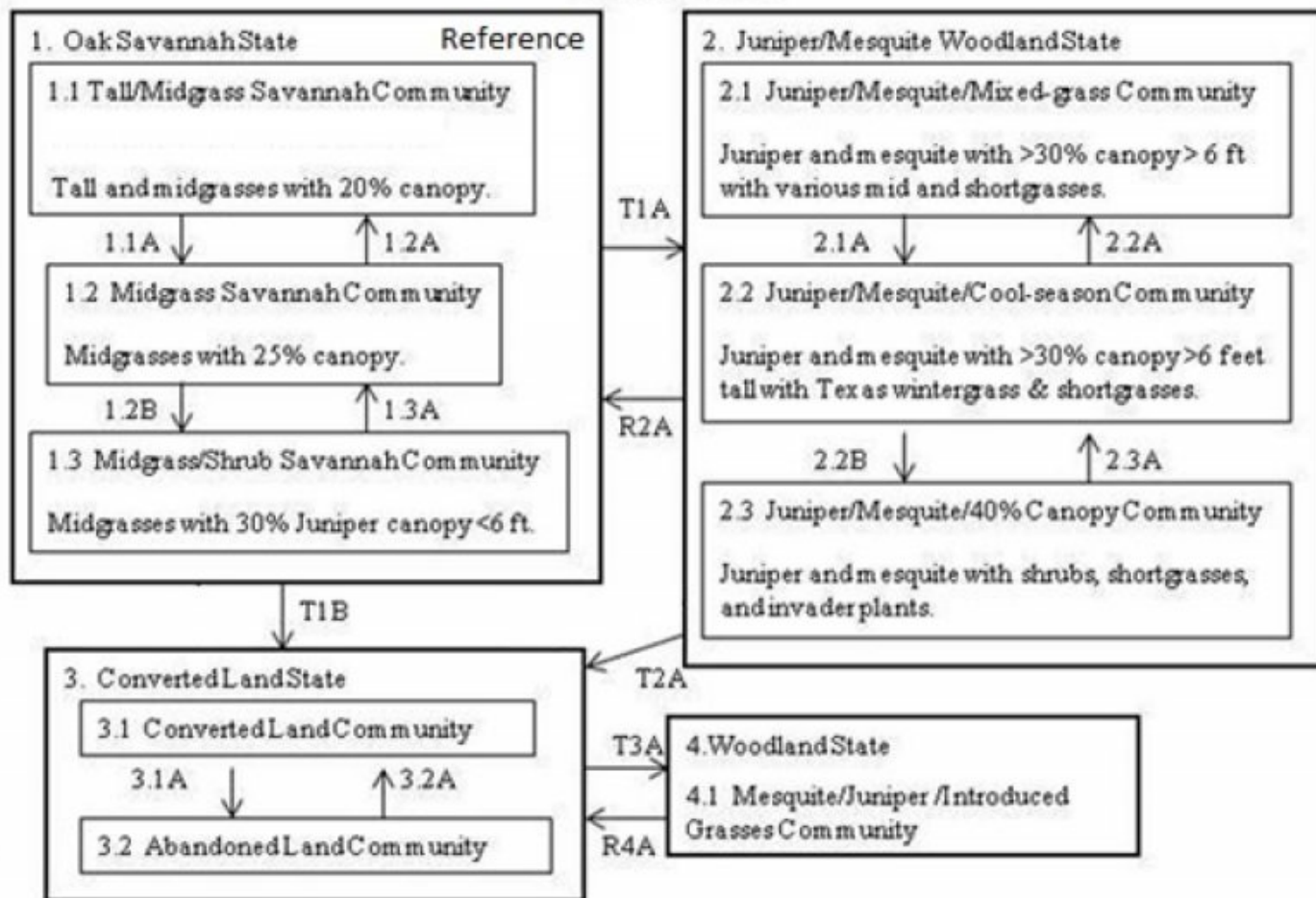
If the new steady state of juniper and mesquite and mixed grasses was overgrazed and no brush was controlled, the site would evolve to a canopy of 30 to 50 percent, with mainly buffalograss, Texas wintergrass and other shortgrasses in the understory. If this management was allowed to continue, the site would change to a dense canopy of juniper and mesquite, shortgrasses and invading forbs and annual cool-season grasses.

Since the soils of this site are very productive and fertile, much of this site has been plowed and put into cropland. In many instances, this land has either been reseeded to native grasses, introduced grasses or just turned out to let come back what could. Many times this turned out land, also known as Abandoned or "Go Back Land", was planted to native or introduced grasses when it was found that it was not very productive growing the annual grasses and forbs.

After the land was planted to native or introduced grasses and forbs, management of the land to control the invasion of ash juniper and mesquite from neighboring lands was a must if the manager desired to keep the open land. This could be accomplished with prescribed burning or other means of brush management. Also, to maintain the stand of native or introduced grasses planted, a prescribed grazing plan must be designed and applied that meets the needs of the plants, the animals and the managers objectives.

State and transition model

Redland 26-33" PZ
R080BY155TX



LEGEND

- 1.1A Heavy Continuous Grazing Prescribed Burning
- 1.2A Prescribed Grazing Prescribed Burning
- 1.2B Heavy Continuous Grazing Prescribed Burning
- 1.3A Prescribed Grazing Prescribed Burning
- T1A Heavy Continuous Grazing No Fire, Prairie Dog Removal
- T1B Plow, Crop Cultivation, Range Planting, Pasture Planting, Idle, Abandonment
- 2.1A Heavy Continuous Grazing No Fire, No Brush Management
- 2.2A Prescribed Grazing Prescribed Burning Brush Management
- 2.2B Heavy Continuous Grazing No Fire, No Brush Management
- 2.3A Prescribed Grazing Prescribed Burning Brush Management
- T2A Prescribed Grazing, Brush Management, Pasture Planting, Crop Cultivation
- R2A Prescribed Grazing, Prescribed Burning, Brush Management, Range Planting
- 3.1A Idle, Abandonment, No Brush Management
- 3.2A Range Planting, Pasture Planting, Crop Cultivation, Pest Management, Nutrient Management, Prescribed Grazing, Prescribed Burning, Brush Management
- T3A Heavy Continuous Grazing No Fire, No Brush Management
- R4A Prescribed Grazing, Brush Management, Range Planting Prescribed Burning

State 1

Oak Savannah State - Reference

The reference plant community for this site is a tall and midgrass savannah. The dominant tallgrass is little bluestem, with lesser amounts of Indiangrass and big bluestem. Midgrasses are sideoats grama, tall dropseed, cane and silver bluestem, and vine-mesquite. Some cool-season grasses include Texas wintergrass, Canada wildrye, and Texas bluegrass. The site has numerous forbs associated with it. Natural fires and prairie dogs maintained the area as a savannah of 20 percent canopy with live oak, post oak and shrubs scattered throughout.

Annual production ranges from 2500 to 5000 pounds per acre. The Midgrass Savannah Community occurred as continuous overgrazing caused the tallgrasses to be selected out of the plant community, giving rise to the increase of the midgrasses. Woody canopy for this community is around 25%. This can still be managed back to the reference community by applying sound grazing management practices through a prescribed grazing plan. Annual production ranges from 1600 to 4000 pounds per acre. The tallgrasses were reduced and replaced by the expansion of the midgrasses which led to the Midgrass/Shrub Savannah Community. The plant community could still be managed back to plant community 1.1 through the use of natural forces impacting the site. Prescribed Burning could still be used successfully because the low growing shrubs and Ashe juniper and mesquite were less than 6 feet tall. Annual production ranges from 1450 to 3850 pounds per acre.

Dominant plant species

- post oak (*Quercus stellata*), tree
- big bluestem (*Andropogon gerardii*), grass

Community 1.1 Tall/Midgrass Savannah Community

This community represents the reference plant community for the Redland Ecological Site. It is a tall and midgrass savannah. The dominant tallgrass is little bluestem, with lesser amounts of Indiangrass and big bluestem. Midgrasses are sideoats grama, tall dropseed, cane and silver bluestem, and vine-mesquite. Some cool-season grasses include Texas wintergrass, Canada wildrye, and Texas bluegrass. The site has numerous forbs associated with it. They are largely composed of maximilian sunflower, bushsunflower, englemann's daisy, dotted gayfeather, blacksamson, Louisiana sagewort, halfshrub sundrop, bundleflowers, native legumes, heath aster, Western ragweed and others. Natural fires and prairie dogs maintained the area as a savannah of 20 percent canopy with live oak, post oak and shrubs scattered throughout. The shrubs were re-sprouting types that could respond to the fire. Elbowbush, hackberry, vine ephedra, agarito, greenbriar, bush honeysuckle and bumelia were scattered throughout the site. There were also Texas oak, bigelow oak, hackberry, redbud and elm occurring on the site. Fire being natural to the site kept the woody plants in check and prevented their spread on the site. As discussed in the Ecological Dynamics of the Site, the fire and the prairie dog kept the mesquite, prickly pear and tasajillo under control and prevented their spread throughout the site until the area was settled. Settlement brought many changes. Overgrazing by fenced livestock, fire prevention, and eradication of the prairie dogs all had a profound impact on the plant community and rapidly changed it to a brush-land steady state of invaded mesquite and Ashe juniper with the live oak, post oak, bigelow oak, scrub live oak, agarito, forbs, and mixed grasses native to the site. Within the reference state, the plant community changes in response to over grazing, drought and fire. If the area continues to burn but is overgrazed, it would change to plant community Midgrass Savannah (1.2). If it is overgrazed and the fire controlled, it would develop into a mid-grass savannah with the rapid expansion of the low growing shrubs and invasion of Ashe juniper and mesquite will lead to the Midgrass/Shrub Savannah Community (1.3). In both cases these plant communities could be managed back to plant community (1.1) through the use and management of the natural forces of grazing management and prescribed burning.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2000	3000	4000
Tree	250	375	500
Forb	125	187	250
Shrub/Vine	125	188	250
Total	2500	3750	5000

Figure 10. Plant community growth curve (percent production by month). TX3025, Tall/Midgrass Savannah w/ 20% canopy. Historic Climax Plant Community - Tall and midgrass savannah with 20 percent canopy..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	2	10	20	24	10	5	10	10	3	2

Community 1.2 Midgrass Savannah Community



Figure 11. 1.2 Midgrass Savannah Community

As the ranchers fenced and concentrated the grazing, they many times overstocked the range and did not allow for any rest of the plants. Fire still burned the area either naturally or as a prescription. The continuous overgrazing caused the tallgrasses to be selected out of the plant community, giving rise to the increase of the midgrasses. Woody canopy for this community is around 25%. This can still be managed back to community 1.1 by applying sound grazing management practices through a prescribed grazing plan. Annual production ranges from 1600 to 4000 pounds per acre.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1040	2031	2600
Tree	240	469	600
Forb	160	312	400
Shrub/Vine	160	313	400
Total	1600	3125	4000

Figure 13. Plant community growth curve (percent production by month). TX3020, Midgrass Savannah, 10% canopy. Midgrass savannah with 10 percent canopy cover. Continuous overgrazing led to the decline of tall grasses and the rise of the midgrass species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	2	10	20	24	10	5	10	10	3	2

Community 1.3 Midgrass Savannah 30% Canopy Community

As the manager controlled the natural fires, removed the prairie dog from the site and mismanaged the grazing , the shrubs on the site expanded and Ashe juniper and mesquite invaded the site. The tallgrasses were reduced and replaced by the expansion of the midgrasses. The plant community could still be managed back to the reference plant community 1.1 through the use of natural forces impacting the site. Prescribed Burning could still be used successfully because the low growing shrubs and Ashe juniper and mesquite were less than 6 feet tall. A Prescribed Grazing Plan could be developed and applied that would allow the plant community to move back to a Tallgrass/ Midgrass Savannah plant community (1.1). Annual production ranges from 1450 to 3800 pounds per acre.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	725	1450	1900
Tree	290	580	760
Forb	217	435	570
Shrub/Vine	218	435	570
Total	1450	2900	3800

Figure 15. Plant community growth curve (percent production by month). TX3021, Midgrass savannah with 30% canopy of mesquite. Midgrass savannah with 30 percent canopy of mesquite that are over 6 feet tall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	15	20	20	5	5	14	7	3	2

Pathway 1.1A Community 1.1 to 1.2

With heavy continuous grazing and prescribed burning, the Tall/Midgrass Savannah Community can be shifted to the Midgrass Savannah Community.

Conservation practices

Prescribed Burning

Pathway 1.2A Community 1.2 to 1.1

With Prescribed Grazing and Prescribed Burning conservation practices, the Midgrass Savannah Community can be reverted back to the Tall/Midgrass Savannah Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

Pathway 1.2B Community 1.2 to 1.3

With heavy continuous grazing and Prescribed Burning, the Midgrass Savannah Community shifts to the Midgrass/Shrub Savannah Community.

Conservation practices

Prescribed Burning

Pathway 1.3A Community 1.3 to 1.2

With Prescribed Grazing and Prescribed Burning, the Midgrass/Shrub Savannah Community will revert back to the Midgrass Savannah Community.

Conservation practices

Prescribed Burning

State 2 Juniper/Mesquite Woodland State

If the manager does not control the spread of Ashe juniper and mesquite, they will grow beyond the size that fire will control. Juniper and mesquite now encompass greater than 30 percent canopy with trees over six feet tall. When this occurs, a new steady state has been entered. It will take some form of energy such as mechanical or herbicides to reduce the canopy of the Ashe juniper and mesquite if so desired. This plant community is the Juniper/Mesquite/Mixed-grass Community. Annual production ranges from 1300 to 3100 pounds per acre. This new community is now Juniper/Mesquite/Cool-season Community (2.2). The midgrasses will start to die out due to the selective overgrazing and the increase in shade. The shorter and shade tolerant grasses such as Texas wintergrass, buffalograss, and forbs will dominate the understory along with the shade tolerant shrubs. Prescribed burning will help to reduce the canopy, but will not normally remove the Ashe juniper and mesquite from the site. Annual production ranges from 1050 to 2600 pounds per acre. As denser canopy of Ashe juniper, mesquite, persimmon and lotebush developed, this new plant community is now the Juniper/Mesquite/40% Canopy Community (2.3). Forbs such as annual broomweed, western ragweed, prairie coneflower, horehound, eryngo and snow-on-the- mountain increase or invade the site. Annual grasses such as little barley, rescue grass, and Japanese brome increase rapidly on the site, as the mid and short grasses are almost gone, leaving much bare ground that is open to cool-season annual grass germination. Annual production ranges from 500 to 2200 pounds per acre.

Dominant plant species

- Ashe's juniper (*Juniperus ashei*), tree
- honey mesquite (*Prosopis glandulosa*), shrub
- brome (*Bromus*), grass

Community 2.1 Juniper/Mesquite/Mixed-grass Community



Figure 16. 2.1 Juniper/Mesquite/Mixed Grasses Community

If the manager does not control the spread of Ashe juniper and mesquite, they will grow beyond the size that fire will control. When this occurs, a new steady state has been entered. This steady state is the Juniper/Mesquite Woodland State. It will take some form of energy such as mechanical or herbicides to reduce the canopy of the Ashe juniper and mesquite if so desired. The understory of grasses and forbs and shrubs have changed in response to the grazing management and reduction of fire by moving more to a midgrass plant community that has less production from the reference community forbs. The natural shrubs have increased in canopy cover. Annual production ranges from 1300 to 3100 pounds per acre.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	585	1170	1395
Tree	390	780	930
Shrub/Vine	195	390	465
Forb	130	260	310
Total	1300	2600	3100

Figure 18. Plant community growth curve (percent production by month). TX3022, Cedar/Mesquite/Mixed grasses. "Cedar, Mesquite, and mixed grasses along with 30 percent canopy greater than 6 feet tall."

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	15	20	20	5	5	14	7	3	2

Community 2.2 Juniper/Mesquite/Cool-season Community



Figure 19. 2.2 Juniper/Mesquite/Cool-season Community

If this plant community (2.2) is continued to be managed with no fire and continuous overgrazing, the canopy of Ashe juniper and mesquite will continue to increase. The midgrasses will start to die out due to the selective overgrazing and the increase in shade by woody species. The shorter and more shade tolerant grasses such as Texas wintergrass, buffalograss, sedges, and forbs will dominate the understory along with the shade tolerant shrubs. Prescribed burning will help to reduce the canopy, but will not normally remove the Ashe juniper and mesquite from the site. If the manager desires to remove these invading woody species, they will have to use mechanical or herbicide methods followed up with prescribed burning or maintenance with mechanical or herbicides. Annual production ranges from 1050 to 2600 pounds per acre.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	367	735	910
Tree	368	735	910
Forb	158	315	390
Shrub/Vine	157	315	390
Total	1050	2100	2600

Figure 21. Plant community growth curve (percent production by month). TX3023, Cedar/Mesquite/shortgrasses with 30% canopy >6 ft. Continuous invasion of cedar and mesquite. Little midgrasses remaining. Increase of cool season grasses and shortgrasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4	6	10	15	20	20	5	2	5	5	5	3

Community 2.3 Juniper/Mesquite/40% Canopy Community

If the Juniper/Mesquite/40% Canopy Community (2.3) continues to be managed with no fire and overgrazing, it will continue to change to a denser canopy of Ashe juniper, mesquite, persimmon and lotebush. Forbs such as annual broomweed, western ragweed, prairie coneflower, horehound, eryngo and snow-on-the-mountain increase or invade the site. Annual grasses such as little barley, rescuegrass, and Japanese brome increase rapidly on the site, as the mid and shortgrasses are almost gone, leaving much bare ground that is open to cool-season annual grass germination. Management at this point requires brush management, seeding, prescribed grazing and periodic fire. Prescribed burning would be difficult except for a summer burn. Even then it would have to be repeated often to get much control of the brush species. Annual production ranges from 500 to 2200 pounds per acre. Many times this land is cleared of brush and managed as cropland.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	225	765	990
Shrub/Vine	100	340	440
Forb	100	340	440
Grass/Grasslike	75	255	330
Total	500	1700	2200

Figure 23. Plant community growth curve (percent production by month). TX3024, Cedar/Mesquite with 40% canopy. "Cedar/Mesquite with 40% + canopy >6 feet tall w/short grasses, and invading forbs and grasses."

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	5	10	15	20	5	3	2	10	10	10	5

Pathway 2.1A Community 2.1 to 2.2



Juniper/Mesquite/Mixed-grass Community



Juniper/Mesquite/Cool-season Community

With heavy continuous grazing, no fires and no brush management practices, the Juniper/Mesquite/Mixed-grass Community will shift to the Juniper/Mesquite/Cool-season Community.

Pathway 2.2A Community 2.2 to 2.1



Juniper/Mesquite/Cool-season Community



Juniper/Mesquite/Mixed-grass Community

With the implementation of various conservation practices such as Prescribed Grazing, Prescribed Burning, Brush Management, the Juniper/Mesquite/Cool-season Community will shift back to the Juniper/Mesquite/Mixed-grass Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Pathway 2.2B Community 2.2 to 2.3

With heavy continuous grazing, no fires, and no brush management, the Juniper/Mesquite/Cool-season Community will shift to the Juniper/Mesquite/40% Canopy Community.

Pathway 2.3A Community 2.3 to 2.2

With Prescribed Grazing, Prescribed Burning, and Brush Management, the Juniper/Mesquite/40 Canopy will shift back to the Juniper/Mesquite/Cool-season Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 3 Converted Land State

Due to the natural fertility and moderate water holding capacity of these soils, much of this Ecological site is managed as cropland. There are other plant communities in the cultivated state where range planting of native plants can be used to manage toward the Converted Land Community. Each of these steady states has lost the seed source of the native plants that inhabited the site as they were destroyed by farming. The Abandoned or Go Back Land will have some of the native plants back, but will need to be seeded in most instances to establish plants such as big bluestem, Indiangrass, switchgrass, little bluestem and sideoats gama.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 3.1 Converted Land Community

Due to the natural fertility and moderate water holding capacity of these soils, some of this ecological site is managed as cropland. There are several plant communities where range planting of native plants can be used to manage in the Converted Land State. They are Cropland and Go Back Land (3.2). Each of these cultivated communities has lost the seed source of the native plants that inhabited the site as they were destroyed by farming. The Go Back Land will have some of the native plants back, but will need to be seeded again in most instances to establish plants such as little bluestem, big bluestem, Indiangrass and sideoats gama. Forbs such as Maximilian sunflower, Englemann's daisy, and Illinois bundleflower should be included in the seeding mix. Other forbs should be included if seed are available. If seed are available, desirable shrubs should be planted depending on the objectives of the manager. A Prescribed Grazing plan must be developed and applied that meets the needs of the plants, the animals, and the objectives of the manager. Prescribed Burning or some form of Brush Management must be applied on a regular basis to maintain the site in the state that meets the objectives of the manager. If these

things are not done, the seeding will be a failure, Ashe juniper, mesquite and associated shrubs will take over the site once more, and the time and money expended will be lost. Seeding the site to introduced grasses creates a cultivated community that most likely will not return to state 1. It is created when the manager decides to plant introduced grasses such as KR bluestem (*Bothriochloa ischaemum*), Kleingrass (*Panicum coloratum*), or Old World bluestem (*Bothriochloa* spp.) in the place of or with native plants. This can occur when cultivated communities such as Cropland and Go Back land (3.2) or when seeding any of the communities found in the Juniper/Mesquite Woodland State (2). These grasses must be managed with a Prescribed Grazing Plan that meets the plants needs, as well as the needs of the animals and the manager's needs. Prescribed Burning or Brush Management must be applied or the site will be overcome with Ashe juniper, mesquite, persimmon or lotebush. When managing these areas for wildlife habitat, the manager may desire to leave selected brush for cover or browse. Some managers plant a monoculture of introduced plants and then manage them with agronomic practices such as fertilizing and weed control.

Table 11. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1400	2800	3400
Forb	350	700	850
Shrub/Vine	0	0	0
Tree	0	0	0
Total	1750	3500	4250

Figure 25. Plant community growth curve (percent production by month). TX3003, Native Seeding. Native Seeding of grasses and forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	15	20	20	5	5	14	7	3	2

Figure 26. Plant community growth curve (percent production by month). TX3249, Introduced Seeding. Introduced seed mixtures used instead of native grass seed mixtures. This method will least likely reach the Historic Climax Community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	15	20	20	5	5	14	7	3	2

Community 3.2 Abandoned Land Community

Managers many times make the decision to not farm this land any longer and turn it out to grow what ever it will. Normally, annual grasses and forbs come on the land at first. Later, mid-grasses such as silver bluestem and cane bluestem and buffalograss move in on the sight. The bluestem seed blow into the area from neighboring pastures and the buffalograss is usually brought in by seed and/ or stolons in mud on the cows' feet. In time, little bluestem will come in as well as the perennial forbs such as western ragweed. Many annual forbs come in such as annual broomweed. Shrubs start to invade the site as livestock, coyotes, rabbits, and etc. scatter the seed. Mesquite, Ashe juniper, lotebush, persimmon, prickly pear, and elm move onto the site quite rapidly.

Table 12. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	100	600	1000
Forb	80	480	800
Shrub/Vine	10	60	100
Tree	10	60	100
Total	200	1200	2000

Figure 28. Plant community growth curve (percent production by month). TX3026, Go Back Land Vegetation. Go Back Land vegetation. Forbs dominate site with some grasses coming back..

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

Pathway 3.1A Community 3.1 to 3.2

When the land is left idled and/or abandonment along with no brush management, the Converted Land Community will shift to the Abandoned Land Community (3.2).

Pathway 3.2A Community 3.2 to 3.1

With the implementation of Range Planting, Pasture Planting, Crop Cultivation, Pest Management, Nutrient Management, Prescribed Grazing, Prescribed Burning, Brush Management, the Abandoned Land Community reverts back to the Converted Land Community.

Conservation practices

Brush Management
Prescribed Burning
Forage and Biomass Planting
Prescribed Grazing
Range Planting
Nutrient Management
Integrated Pest Management (IPM)

State 4 Woodland State

The Mesquite/Juniper/Introduced Grasses Community is created when the Ashe juniper, mesquite and persimmon are not managed prior to the time they reach 6 feet in height as well as introduced grass encroachment; a new steady state has been established. Fire will not now control these plants, so if the manager desires to manage the woody species, they must use mechanical means or herbicides combined with prescribed burning.

Dominant plant species

- Ashe's juniper (*Juniperus ashei*), tree
- post oak (*Quercus stellata*), tree
- honey mesquite (*Prosopis glandulosa*), shrub
- brome (*Bromus*), grass

Community 4.1 Mesquite/ Juniper/Introduced Grasses Community

If the Ashe juniper, mesquite and persimmon are not managed prior to the time they reach 6 feet in height, a new steady state has been established. Fire will not now control these plants, so if the manager desires to manage the woody species, they must use mechanical means or herbicides combined with prescribed burning. If the introduced grasses are not managed properly, they will become weak and unhealthy and be replaced with shortgrasses such as buffalograss and/or annual grasses and forbs. A prescribed grazing plan should be developed and applied that meets the needs of the plants, the needs of the animals, and the needs of the manager. Annual production ranges from 1200 to 3000 pounds per acre.

Table 13. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	780	1625	1950
Forb	180	375	450
Shrub/Vine	120	250	300
Tree	120	250	300
Total	1200	2500	3000

Figure 30. Plant community growth curve (percent production by month). TX3247, Mesquite/Cedar and Introduced Seeding. Mesquite and Cedar are mixed in introduced grass species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	15	20	20	5	5	14	7	3	2

**Transition T1A
State 1 to 2**

With heavy continuous grazing, no fires, and prairie dog removal, the Oak Savannah State will transition into the Juniper/Mesquite Woodland State.

**Transition T1B
State 1 to 3**

With Plow, Crop Cultivation, Range Planting, Pasture Planting, Idle, and Abandonment, the Oak Savannah State transitions into the Converted Land State.

**Restoration pathway R2A
State 2 to 1**

With Prescribed Grazing, Prescribed Burning, Brush Management and Range Planting, the Juniper/Mesquite Woodland State will be restored back into the Oak Savannah State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

**Transition T2A
State 2 to 3**

With Prescribed Grazing, Brush Management, Pasture Planting, Crop Cultivation, the Juniper/Mesquite Woodland State will transition into the Converted Land State.

**Transition T3A
State 3 to 4**

With heavy continuous grazing, no fires and no brush management, the Converted Land State will transition into the Woodland State.

Restoration pathway R4A State 4 to 3

With Prescribed Grazing, Brush Management, and Prescribed Burning, the Woodland State can be restored to the Converted Land State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Additional community tables

Table 14. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Tallgrasses			1000–2000	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0–2000	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–2000	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	0–2000	–
2	Midgrasses			500–1000	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	0–250	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–250	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides ssp. torreyana</i>	0–250	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	0–250	–
	Texas cupgrass	ERSE5	<i>Eriochloa sericea</i>	0–250	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0–250	–
	purpletop tridens	TRFL2	<i>Tridens flavus</i>	0–250	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	0–250	–
	Drummond's dropseed	SPCOD3	<i>Sporobolus compositus var. drummondii</i>	0–250	–
3	Cool-season Grasses			350–700	
	sedge	CAREX	<i>Carex</i>	0–175	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–175	–
	Texas wintergrass	NALE3	<i>Nassella leucotricha</i>	0–175	–
	Texas bluegrass	POAR	<i>Poa arachnifera</i>	0–175	–
4	Shortgrasses			125–250	
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	0–60	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–60	–
	tall grama	BOHIP	<i>Bouteloua hirsuta var. pectinata</i>	0–60	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	0–60	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	0–60	–
5	Shortgrasses			25–50	
	purple threeawn	ARPUP6	<i>Aristida purpurea var. purpurea</i>	0–50	–
	Wright's threeawn	ARPUW	<i>Aristida purpurea var. wrightii</i>	0–50	–

Each

Forb					
6	Forbs			125–250	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–60	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–60	–
	aster	ASTER	<i>Aster</i>	0–60	–
	Berlandier's sundrops	CABEB2	<i>Calylophus berlandieri ssp. berlandieri</i>	0–60	–
	prairie clover	DALEA	<i>Dalea</i>	0–60	–
	bundleflower	DESMA	<i>Desmanthus</i>	0–60	–
	ticktrefoil	DESMO	<i>Desmodium</i>	0–60	–
	blacksamson echinacea	ECANA	<i>Echinacea angustifolia var. angustifolia</i>	0–60	–
	Engelmann's daisy	ENGEL	<i>Engelmannia</i>	0–60	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	0–60	–
	coastal indigo	INMI	<i>Indigofera miniata</i>	0–60	–
	Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	0–60	–
	Indian breadroot	PEDIO2	<i>Pediomelum</i>	0–60	–
	smartweed leaf-flower	PHPO3	<i>Phyllanthus polygonoides</i>	0–60	–
	least snoutbean	RHMI4	<i>Rhynchosia minima</i>	0–60	–
	wild petunia	RUELL	<i>Ruellia</i>	0–60	–
	pitcher sage	SAAZG	<i>Salvia azurea var. grandiflora</i>	0–60	–
	awnless bushsunflower	SICA7	<i>Simsia calva</i>	0–60	–
	amberique-bean	STHE9	<i>Strophostyles helvola</i>	0–60	–
Shrub/Vine					
7	Shrubs			125–250	
	eastern redbud	CECA4	<i>Cercis canadensis</i>	0–60	–
	Texas redbud	CECAT	<i>Cercis canadensis var. texensis</i>	0–60	–
	clapweed	EPAN	<i>Ephedra antisyphilitica</i>	0–60	–
	stretchberry	FOPU2	<i>Forestiera pubescens</i>	0–60	–
	western white honeysuckle	LOAL	<i>Lonicera albiflora</i>	0–60	–
	algerita	MATR3	<i>Mahonia trifoliolata</i>	0–60	–
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa var. biuncifera</i>	0–60	–
	Texas red oak	QUBU2	<i>Quercus buckleyi</i>	0–60	–
	bastard oak	QUSIB	<i>Quercus sinuata var. breviloba</i>	0–60	–
	sumac	RHUS	<i>Rhus</i>	0–60	–
	gum bully	SILAO	<i>Sideroxylon lanuginosum ssp. oblongifolium</i>	0–60	–
	greenbrier	SMILA2	<i>Smilax</i>	0–60	–
Tree					
8	Trees			250–500	
	Texas live oak	QUFU	<i>Quercus fusiformis</i>	0–500	–
	post oak	QUST	<i>Quercus stellata</i>	0–500	–
	elm	ULMUS	<i>Ulmus</i>	0–500	–

Animal community

Bison and prairie dog were inhabitants of this site when the area was settled by European man. They have been removed from the site as explained in the Ecological Dynamics portion of this site description.

This site is used for the production of domestic livestock and to provide habitat for native wildlife. Cow-calf and stocker operations are the primary livestock enterprises. Sheep and goat operations have been used in the past, but currently are very few. Sustainable stocking rates have declined over the years due to a change in the plant community. As the tall and midgrasses have been removed by continuous overgrazing and the invasion of ash juniper, mesquite, and lotebush, the production of plants desired by cattle have been drastically reduced in some situations.

Determining the stocking rate for an area is very site specific. Therefore, to determine the correct stocking rate, an on site evaluation must be made. Forage production by the different plant species must be determined. This is then evaluated to determine the harvestable forage per acre by calculating the amount of forage produced that is desired and harvested by the livestock and wildlife on the site.

Wildlife present gets first choice. They are always there and you can only control their numbers by hunting. You cannot move them from pasture to pasture like livestock, except as they relate to your livestock movements. So, when calculating stocking rates, calculate the forage used by the wildlife first and then calculate the stocking rate for the livestock based on what desired forage is left. Also, the manager's objectives for managing the plant community as well as meeting the needs of his livestock and wildlife must be considered in the forage inventory and Prescribed Grazing Plan. (See guidance in the NRCS National Range and Pasture Handbook on calculating safe starting stocking rates.)

As the plant community changes, the stocking rate for one animal species may decrease while the amount of desired forage for other animals may increase. For instance, as grass production decreases, and the forbs and shrub/vine production increases, the production for food and cover for quail and whitetail deer are increasing. Therefore, the early stages of (4) Cedar/Mesquite with Mid-grasses, 30 % Canopy steady state may be outstanding for quail and deer. In the manager's scheme, he or she may desire to maintain all or part of their land in this steady state to meet their overall wildlife and domestic livestock plan.

Smaller mammals on the site include rodents, jackrabbit, cottontail rabbit, raccoon skunks, opossum, and armadillo. Mammalian predators include coyote, red fox, gray fox, and bobcat. Species of snakes and lizards are native to the site.

Many species of birds are found on this site including game birds, song birds and birds of prey. Major game birds that are economically important are Rio Grande turkey, bobwhite quail, and mourning dove. Turkey prefers plant communities with substantial amounts of shrubs and trees interspersed with grassland. Quail prefer plant communities with a combination of low shrubs, bunch grass, bare ground and low successional forbs. The different song birds vary in their habitat preferences. In general, habitat that provides a large variety of grasses, forbs, shrubs, vines and trees and a complex of grassland, savannah, shrubland and woodland 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. The different plant communities of the site will sustain different species of raptors.

Feral hogs are present on this site in many instances. They can cause much damage to the site as they up root the desirable plants. They can be controlled by trapping and hunting.

Hydrological functions

The hydrologic group is D and the runoff class is high. The drainage class is well drained. Permeability class is very slow. The soil is underlain by slightly fractured limestone at less than 20 inches. There is no water table within 6 feet of the surface. Site does not pond water and the area does not flood.

The Tallgrass/Midgrass Savannah, 10% Canopy had a very favorable influence on the infiltration and deep percolation of rainfall. As the site is overgrazed there is a reduction in the tallgrasses and midgrasses. As this change occurs, organic matter in the soil is reduced. This has a negative impact on infiltration and water holding capacity of the soil. More runoff is generated from rainfall, and erosion becomes more evident. When the soil is dry, it cracks. This allows rapid infiltration at first, but as the cracks close, infiltration is greatly reduced. Light showers

tend to be ineffective on this site.

As the site is invaded by ashe juniper and mesquite, the water cycle is further altered. Interception of rainfall by tree canopies is increased which reduces the amount of rainfall reaching the surface. Stem flow is increased due to the funneling effect of the canopy, which increases soil moisture at the base of the tree. Increased transpiration, especially when evergreen species such as live oak and juniper dominate, provides less chance for deep percolation into aquifers. As woody species increase, grass cover decreases, which causes some of the same effects as overgrazing. Brush management combined with good grazing management can help restore the natural hydrology of the site.

Recreational uses

This site has the appeal of the wide open spaces. The abundant tall and mid grasses with the scattered live oak and post oak and shrubs provides excellent fall color variations. This site produces excellent wildlife foods, there fore is a choice for bird watching, viewing deer, turkey, and quail, as well as hunting.

Wood products

Honey mesquite, oaks, and ashe juniper can be used for firewood and the specialty wood industry.

Other products

None.

Other information

None.

Inventory data references

417 data collected on the site with emphasis form 1979 until 1985.

Type locality

Location 1: Montague County, TX

References

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Other references

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Contributors

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Approval

Bryan Christensen, 9/19/2023

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

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

Author(s)/participant(s)	Colin Walden, Soil Survey Region 9
Contact for lead author	colin.walden@ok.usda.gov
Date	02/15/2018
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Minimal evidence of current or past rill formation.

2. **Presence of water flow patterns:** Few water flow patterns on steep areas. Short and stable, not incising.

-
3. **Number and height of erosional pedestals or terracettes:** No pedestals or terracettes present.
-
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground less than 10 percent. Bare areas small and not connected.
-
5. **Number of gullies and erosion associated with gullies:** No gullies present.
-
6. **Extent of wind scoured, blowouts and/or depositional areas:** No wind scoured areas.
-
7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement less than 3 feet. Vegetative cover should restrict litter movement over long distances. Only herbaceous litter less than .25 inches expected to move.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability scores of 5 or greater expected.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Hensley series :A--0 to 10 cm (0 to 4 in); brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure, surface crusty when dry; hard, friable
- See official description for specific soil component.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Presence of native tallgrasses and midgrasses allow for good infiltration across the landscape.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction under reference conditions. Beware texture change of Bt horizon not product of compaction.
-
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: Tallgrasses/Midgrasses (group 1 & 2)
- Sub-dominant: Forbs (6)
- Cool Season Grasses (3)
- Trees (8)

Other: All other groups

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Possible mortality only during prolonged drought. Less than 5%.
-

14. **Average percent litter cover (%) and depth (in):** Litter expected to be at 75% cover at average .25 inch depth.
-

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production 3,750 lb/ac. Ranging from 2,500 to 5,000 lbs.
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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 and Juniper(ashe juniper/eastern redcedar) most common invaders.
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17. **Perennial plant reproductive capability:** Plants should be capable of reproducing every year with exception of prolonged growing season drought.
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