Ecological site R083AY012TX
Loamy Draw

Last updated: 9/19/2023
Accessed: 04/25/2024

General information

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

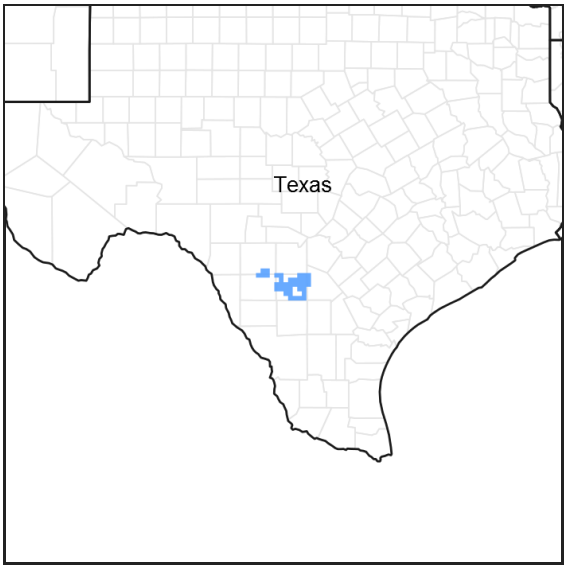

Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 083A–Northern Rio Grande Plain

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

Classification relationships

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

Ecological site concept

The Ramadero site is very deep with loamy soils. The sites are on upland drains and are in a water receiving position. This typically allows better moisture availability than nearby uplands.

Associated sites

R083AY005TX	**Shallow**
R083AY022TX	**Loamy Sand**
R083AY027TX	**Western Clay Loam**
R083AY026TX	**Eastern Clay Loam**

Similar sites

R083BY012TX	**Ramadero**
R083CY012TX	**Ramadero**
R083DY012TX	**Ramadero**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Celtis ehrenbergiana* (2) *Prosopis*
Herbaceous	(1) *Setaria vulpiseta* (2) *Digitaria californica*

Physiographic features

These nearly level soils are found on long narrow upland drainageways of the Coastal Plains. Surfaces are concave to linear and slopes are commonly less than one percent. These soils formed in alkaline loamy alluvium. Slopes range from 0 to 1 percent. Elevation ranges from 200 to 1,000 feet. Runoff is low to medium. Flooding is occasional to frequent with very brief to brief durations. This area is comprised of inland, dissected coastal plains.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Drainageway
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Elevation	200–1,000 ft
Slope	0–1%
Aspect	Aspect is not a significant factor

Climatic features

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

Table 3. Representative climatic features

Frost-free period (characteristic range)	226-240 days

Freeze-free period (characteristic range)	262-365 days
Precipitation total (characteristic range)	25 in
Frost-free period (actual range)	225-256 days
Freeze-free period (actual range)	254-365 days
Precipitation total (actual range)	25-26 in
Frost-free period (average)	235 days
Freeze-free period (average)	302 days
Precipitation total (average)	25 in

Climate stations used

- (1) CHARLOTTE 5 NNW [USC00411663], Charlotte, TX
- (2) PEARSALL [USC00416879], Pearsall, TX
- (3) FOWLERTON [USC00413299], Fowlerton, TX
- (4) DILLEY [USC00412458], Dilley, TX
- (5) UVALDE 3 SW [USC00419268], Uvalde, TX

Influencing water features

This site is in a water receiving position on the landscape. It provides an avenue in which to transport water from the uplands to the bottomlands.

Wetland description

N/A

Soil features

The Ramadero site is very deep, well drained and moderately permeable. These soils formed in alkaline loamy alluvium. The surface layer is brown to very dark grayish brown sandy clay loam. The surface alkalinity ranges from neutral to moderately alkaline. The representative soil series for the Ramadero ecological site are Ramadero and Tela.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock
Surface texture	(1) Sandy clay loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6–7 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–4 mmhos/cm

Sodium adsorption ratio (0-40in)	0–8
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	2–4%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The plant communities that can be found on this site range from a midgrass dominant to a brush covered site with bare ground. This diversity in plant communities is in direct response to grazing management, fire, and drought. The reference plant community is composed of predominantly midgrasses such as multi-flowered false Rhodesgrass (Chloris pluriflora), plains bristlegrass (*Setaria macrostachya*), Southwestern bristlegrass (*Setaria scheelei*), Arizona cottontop (*Digitaria californica*), silver bluestem (*Bothriochloa laguroides*), and big cenchrus (*Cenchrus myosuroides*) with a small percentage of woody species, including mesquite (*Prosopis glandulosa*), spiny hackberry (Celtis pallida), sugar hackberry (*Celtis laevigata*), and elm (Ulmus spp.). There are also numerous perennial forbs including Engelmann's daisy (*Engelmannia peristenia*), bushsunflower (*Simsia calva*), yellow neptunia (*Neptunia lutea*), sensitivebriar (Mimosa spp.), and annual forbs. Historically, the site was maintained by periodic grazing by roaming herds of wildlife, and numerous fires that were set by lightning and the native Americans. Runoff of rainfall is slow, with the site receiving extra water from neighboring sites, allowing the soil profile to fill to capacity. Fertility is high.

In the reference plant community, the midgrasses dominate the shortgrasses due to their ability to capture sunlight and shade the shorter grasses. The midgrasses also had deeper root systems that allowed them to retain the deep moisture while the shortgrasses had shorter root systems and could capture only the 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 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.

Fire occurred on a regular basis as there was normally good fine fuel, and when a fire started it burned for days as there was nothing but rivers or denuded low producing ecological sites to stop it. These fires maintained the woody component to a small percentage of the total production, as well as canopy. Fire assisted in maintaining a good component of perennial forbs on the site by opening the ground cover to allow their establishment and regeneration and breaking the dormancy of the seeds.

When the stocking rates exceeded the carrying capacity of the land and the natural graze-rest cycles are broken by continuous grazing, the midgrasses are grazed to the point that they could no longer produce the food in their leaves to maintain their health and vigor. When they are grazed to the point of little leaf area, they stop 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 continues, the root system of the overgrazed plants continued to be used up and shrink, as respiration continues in the root system that required energy. In time, with continued close grazing, the midgrasses will not be a deep rooted healthy plant, but a very shallow rooted, small leaf area, weak plant that was set up for doom during the next drought. This midgrass plant was now in a sub-dominant position to the shortgrasses. This then lead to the demise of the midgrasses and an increase of the shortgrasses as they replace the midgrasses. These shortgrasses include hooded windmillgrass (*Chloris cucullata*), pappusgrass (*Pappophorum bicolor*), buffalograss (*Bouteloua dactyloides*), and curly-mesquite (*Hilaria belangeri*). If heavy continuous grazing occurs, tumble windmillgrass (Chloris verticellata), whorled dropseed (*Sporobolus pyramidatus*), Hall's panicum (*Panicum hallii*), perennial three-awn (Aristida spp.), and tumblegrass (*Schedonnardus paniculatus*) increase on the site.

As this reduction of midgrasses and expansion of shortgrasses occurs, fire return intervals diminish as well. This offers opportunity for woody plants such as mesquite, whitebrush (*Aloysia gratissima*), huisache (Acacia smallii), lotebush (Zizyphus obtusifolia), and spiny hackberry to proliferate and dominate the site. With their domination, they now capture the sunlight first and permeate the soil profile with their root systems. This places the shortgrasses and the remnants of midgrasses in a sub-dominant position. The area is now a Shrubland site with a canopy of brush

that exceeds 20 percent. The understory will range from a cover of short and midgrasses to bare ground. This is now a new state that will exist until energy is applied to reduce the brush back to its original state and a maintenance program is established. The area may need to be seeded with native plant species and a grazing management program established to maintain the health and vigor of the forage component.

State and transition model

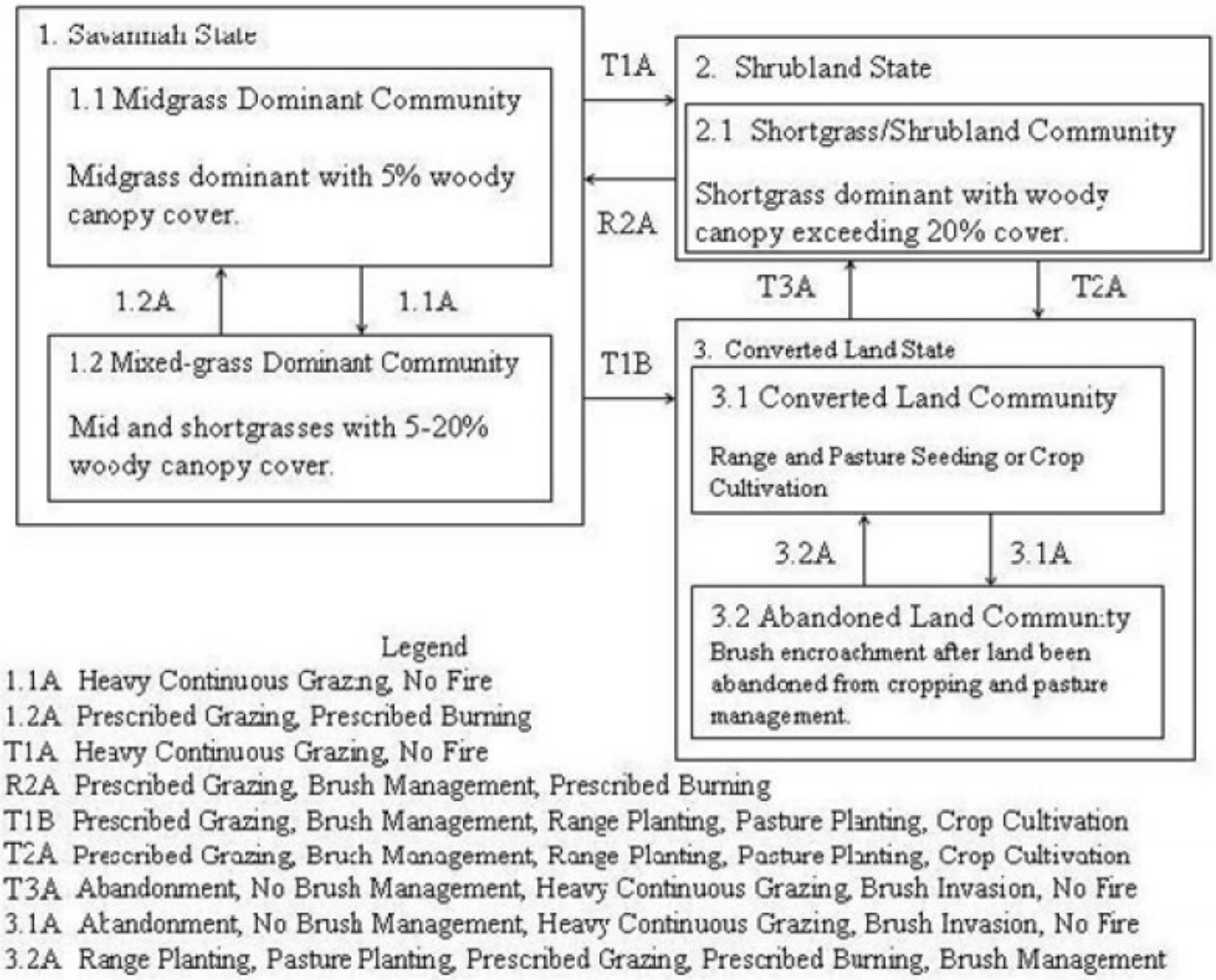

Figure 8. STM

State 1
Savannah

Dominant plant species

- large-spike bristlegrass (*Setaria macrostachya*), grass
- multiflower false Rhodes grass (*Trichloris pluriflora*), grass

Community 1.1
Midgrass Dominant

This community represents the reference plant community. The community is a fire climax, midgrass plant community that has less than a five percent canopy of woody plants. The grasses are multi-flowered false Rhodesgrass, plains bristlegrass, Southwestern bristlegrass, Arizona cottontop, sideoats grama (*Bouteloua curtipendula*), silver bluestem, lovegrass tridens (*Tridens eragrostoides*), big cenchrus, hooded windmillgrass, vine

mesquite (*Panicum obtusum*), pappusgrass, buffalograss, and curlymesquite. The woody plants are mesquite, spiny hackberry, sugar hackberry, and elm. Forbs are Engelmann's daisy, bushsunflower, yellow neptunia, sensitivebriar, and numerous annuals. Recurrent fire and occasional grazing by small herds of bison (Bos bison) and other wildlife were natural components of the ecosystem.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2175	4050	5400
Shrub/Vine	200	225	300
Forb	125	225	300
Tree	0	0	0
Total	**2500**	**4500**	**6000**

Figure 10. Plant community growth curve (percent production by month). TX4525, Midgrass Dominant, 5% woodies. Midgrass plant community with less than a 5 percent canopy of woody plants. Growth occurs with peak in spring and fall seasons..

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

Community 1.2
Mixed-grass Dominant

This phase of the Savannah State still exhibits a savannah plant structure with the woody species canopy being as high as 20 percent. This is a result of fire being removed as a component of the site. Heavy continuous grazing takes many of the midgrasses out of the site and they are replaced by shortgrasses such as hooded windmillgrass, pappusgrass, buffalograss, and curly-mesquite. If heavy continuous grazing occurs, tumble windmillgrass, whorled dropseed, Hall’s panicum, perennial three-awn, and tumblegrass increase on the site. Other common woody increasers and invaders to the site are mesquite, whitebrush, huisache, lotebush, and spiny hackberry.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1000	2000	3000
Shrub/Vine	600	500	500
Forb	250	500	500
Tree	0	0	0
Total	**1850**	**3000**	**4000**

Figure 12. Plant community growth curve (percent production by month). TX4527, Mixed-Grass Savannah with 5-20% Woodies. Mixed-Grass Savannah Community with the woody canopy cover may be as high as 20%..

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

Pathway 1.1A
Community 1.1 to 1.2

The reference community (1.1) will transition to the Shortgrass Dominant Community (1.2) with lack of fire, continued overgrazing, insufficient rest cycles, and/or natural disturbances, like prolonged drought.

Pathway 1.2A
Community 1.2 to 1.1

This phase can still be managed back to the Midgrass Dominant Community (1.1) but will take the reintroduction of fire to the ecosystem or some method of brush management that allows selective removal of the plants. A prescribed grazing plan will be essential to reverse the trend toward the Shrubland State. Increasing the midgrasses in the plant community over an extended time will take the application of sound grazing management principles.

State 2
Shrubland

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub
- sugarberry (*Celtis laevigata*), shrub

Community 2.1
Shortgrass/Shrubland

This plant community is a result of a transition from the Savannah State (1) to the Shrubland State (2). This threshold is passed when the woody canopy restricts herbaceous growth and insufficient fuel is produced to carry a fire that will control the woody canopy. The understory is very limited in production due to the competition for sunlight, water, and nutrients. There is an increase in mesquite, whitebrush, huisache, lotebush, and spiny hackberry to the point that they dominate the site. At this point there is very little understory production. There is much bare ground that has crusted to the point that there is little water infiltration and little seedling emergence. Water infiltration does occur directly under some of the woody species such as mesquite as it moves down the trunk of the tree to the base. During the growing season, light showers are captured in the canopy of the shrubs and evaporate. Energy flow and nutrient capture is predominantly by the shrubs. Winter rains can produce understory forage by the cool-season annual forbs and grasses.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	675	1200	2250
Grass/Grasslike	200	750	1000
Forb	25	50	250
Tree	0	0	0
Total	**900**	**2000**	**3500**

Figure 14. Plant community growth curve (percent production by month). TX4535, Shortgrass/Shrubland Community, 20-50% woodies. Shortgrasses and Shrubs dominate the plant community..

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

State 3
Converted Land

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 3.1
Converted Land

Any of the prior plant communities can be converted to alternative plants through brush management and seeding.

The site can be planted to either native mixtures or to introduced plants depending upon management objective. Introduced grasses commonly seeded on the site include bermudagrass (*Cynodon dactylon*) and kleingrass (*Panicum coloratum*). The introduced species will require a concerted management effort to keep the stands pure because of the seedbank of woody species. Native plantings will require some form of brush removal such as individual plant treatment, prescribed fire, broadcast treatments, or mechanical treatments to maintain a grassland.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2500	4500	6000
Shrub/Vine	0	0	0
Tree	0	0	0
Forb	0	0	0
Total	**2500**	**4500**	**6000**

Figure 16. Plant community growth curve (percent production by month). TX4530, Converted Land Community. Community converted into warm-season grass seed mixtures..

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

Figure 17. Plant community growth curve (percent production by month). TX4531, Converted Land - Introduced Grass Seeding. Seeding Coverted Land into Introduced grass species..

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

Community 3.2
Abandoned Land

This plant community develops from agriculture that has been abandoned. Due to the lack of fire or some other method of brush management, shrub seedlings establish and spread. If the seedlings are not controlled, this plant community will transition to the Shrubland State (2) and will require some form of brush management via machinery or herbicides to reduce the canopy. Production on the Abandoned Land Community depends on the grazing management and brush management that has been applied since seeding, and the canopy of the shrubs invading or spreading on the site. As the canopy of the shrubs expands, grasses and forb production will be reduced accordingly.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2175	4050	5400
Shrub/Vine	200	225	300
Forb	125	225	300
Tree	0	0	0
Total	**2500**	**4500**	**6000**

Figure 19. Plant community growth curve (percent production by month). TX4534, Converted Land - Woody Seedlings Encroachment. Woody seedling encroachment on converted lands such as abandoned cropland, native seeded land, and introduced seeding lands..

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

Pathway 3.1A
Community 3.1 to 3.2

The transition from can occur when crop fields are left to fallow without management. Generally, pastureland will transition to the Shrubland State (2) and not to the Abandoned Land Community (3.2).

Pathway 3.2A
Community 3.2 to 3.1

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

Transition T1A
State 1 to 2

If heavy continuous grazing occurs with the exclusion of fire, the phase will transition to the Shrubland State (2). Drought will hasten the process. Once the woody canopy exceeds approximately 20 percent, a threshold is crossed. In this case, energy in the form of heavy equipment and/or herbicides will be required along with prescribed grazing to shift the plant community back to the Savannah State (1). Once the woody plants pass this threshold, grazing management alone will not reverse the woody plant population.

Transition T1B
State 1 to 3

The Savannah State (1) can be converted to the Converted Land State (3) by controlling the brush and seeding to native or introduced grasses. It may also be plowed and converted to cropland.

Restoration pathway R2A
State 2 to 1

Brush management is the key driver in restoring the Shrubland State (2) back to the Savannah State (1). Reduction in woody canopy below 20 percent will take large energy inputs depending on the canopy cover. A prescribed grazing plan and prescribed burning plan will keep the state functioning.

Transition T2A
State 2 to 3

The Shrubland State (2) can be converted to the Converted Land State (3) by controlling the brush and seeding to native or introduced grasses. It may also be plowed and converted to cropland.

Transition T3A
State 3 to 2

If the Abandoned Land Community (3.2) is left alone, eventually the woody plants will create a moderate to heavy canopy. At this point, the desired understory grasses, forbs, and/or crops will be shaded out and the site will transition into a Shrubland State (2).

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			1000–3100	
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	1000–2500	–
	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	1000–2000	–
	southwestern bristlegrass	SESC2	*Setaria scheelei*	500–1500	–
2	**Midgrasses**			750–1600	
	Arizona cottontop	DICA8	*Digitaria californica*	500–1200	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	500–1200	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	500–1200	–
	vine mesquite	PAOB	*Panicum obtusum*	250–1000	–
	big sandbur	CEMY	*Cenchrus myosuroides*	250–750	–
	hooded windmill grass	CHCU2	*Chloris cucullata*	250–750	–
	lovegrass tridens	TRER	*Tridens eragrostoides*	100–500	–
	pink pappusgrass	PABI2	*Pappophorum bicolor*	250–500	–
3	**Shortgrasses**			125–300	
	buffalograss	BODA2	*Bouteloua dactyloides*	50–300	–
	curly-mesquite	HIBE	*Hilaria belangeri*	50–300	–
4	**Cool-season grasses**			100–400	
	Forb, annual	2FA	*Forb, annual*	100–400	–
Forb					
5	**Forbs**			125–300	
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	25–125	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	25–125	–
	yellow puff	NELU2	*Neptunia lutea*	25–125	–
	awnless bushsunflower	SICA7	*Simsia calva*	25–125	–
	Forb, annual	2FA	*Forb, annual*	0–50	–
Shrub/Vine					
6	**Shrubs/Vines**			200–300	
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	50–150	–
	netleaf hackberry	CELAR	*Celtis laevigata var. reticulata*	50–150	–
	mesquite	PROSO	*Prosopis*	50–150	–
	elm	ULMUS	*Ulmus*	50–150	–

Animal community

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

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

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

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

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

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

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

Hydrological functions

This can be described as an upland drainage. The site occupies a position to receive both water and sediment, but rarely ponds water due to being well drained. The runoff water, along with the sediment received, makes this site productive in terms of plant biomass when compared to surrounding sites upslope. When the site is in the Shrubland State (2), much of the small rainfall events are trapped in the canopy only to evaporate before reaching the soil. In higher rainfall events, the rain is channeled down to the ground via the trunks and stems of the woody plants, fostering the development of cool-season plants.

Recreational uses

The primary recreational activities include hunting and birdwatching.

Inventory data references

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

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Approval

Bryan Christensen, 9/19/2023

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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.

Author(s)/participant(s)	
Contact for lead author	
Date	04/25/2024
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

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

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

---

5. **Number of gullies and erosion associated with gullies:**

---

6. **Extent of wind scoured, blowouts and/or depositional areas:**

---

7. **Amount of litter movement (describe size and distance expected to travel):**

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

---

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

---

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:

    Sub-dominant:

    Other:

    Additional:

---

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

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**