USDA Natural Resources Conservation Service

Ecological site R083AY023TX
Sandy Loam

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General information

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

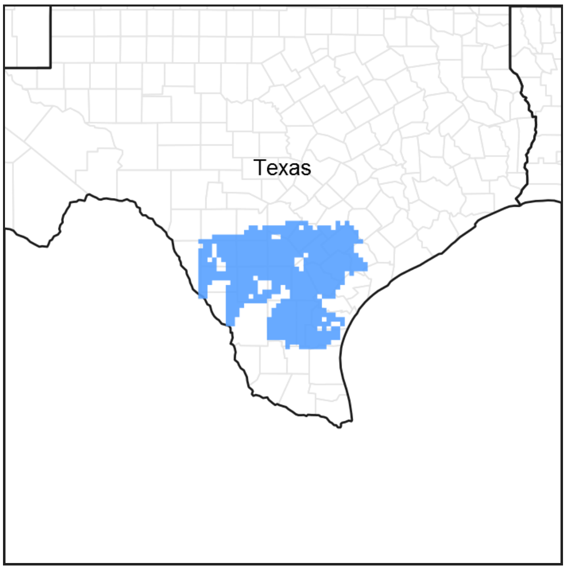

Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 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 Sandy Loam ecological site typically has a fine sandy loam or very fine sandy loam surface. Sandy clay loam subsoil horizons are generally present 12 inches below the surface.

Associated sites

R083AY002TX	**Shallow Ridge**
R083AY004TX	**Shallow Sandy Loam**
R083AY024TX	**Tight Sandy Loam**
R083AY007TX	**Lakebed**
R083AY010TX	**Vega**
R083AY011TX	**Claypan Prairie**
R083AY019TX	**Gray Sandy Loam**
R083AY020TX	**Sand Hills**
R083AY021TX	**Sandy**

Similar sites

R083BY023TX	**Sandy Loam**
R083CY023TX	**Sandy Loam**
R083DY023TX	**Sandy Loam**
R083EY023TX	**Sandy Loam**

Table 1. Dominant plant species

Tree	(1) *Prosopis glandulosa*
Shrub	(1) *Acacia* (2) *Opuntia*
Herbaceous	(1) *Schizachyrium* (2) *Trichloris*

Physiographic features

The Sandy Loam ecological site was formed from loamy residuum and alluvium. These soils are on nearly level to gently sloping interfluves on coastal plains. Slopes range from 0 to 5 percent. Elevation ranges from 200 to 1,000 feet. This area is comprised of inland, dissected coastal plains.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Interfluve (2) Coastal plain > Ridge
Runoff class	Negligible to medium
Flooding frequency	None
Ponding frequency	None
Elevation	75–1,000 ft
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

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

Table 3. Representative climatic features

Frost-free period (characteristic range)	223-251 days
Freeze-free period (characteristic range)	263-365 days
Precipitation total (characteristic range)	25-32 in
Frost-free period (actual range)	208-263 days
Freeze-free period (actual range)	254-365 days
Precipitation total (actual range)	24-37 in
Frost-free period (average)	235 days
Freeze-free period (average)	314 days
Precipitation total (average)	29 in

Climate stations used

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

Influencing water features

Water is not a typically influencing factor on these sites.

Wetland description

N/A

Soil features

The soils in this site are moderately deep to very deep, well drained with moderate to moderately slow permeability. The surface horizon is typically 12 inches with a fine sandy loam texture over a sandy clay loam subsoil. Soil series correlated to this site include: Colmena, Duval, Goliad, Premont, Raisin, Runge, Weesatche, and Willacy.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock (2) Residuum–sedimentary rock
Surface texture	(1) Fine sandy loam (2) Very fine sandy loam (3) Sandy clay loam (4) Loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	20–80 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–6 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–6 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–9%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

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

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

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

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

While shrublands on Sandy Loam sites have traditionally been viewed as degraded from a livestock production standpoint, it is important to recognize that they are not necessarily degraded from the ecological perspectives of primary productivity, nutrient cycling and biodiversity. The productivity of shrublands may be comparable to the grassland they replaced. In addition, shrubs modify soils and microclimate to increase levels of organic matter and nutrients in the upper four inches of the soil profile. This nutrient enrichment by shrubs can offset grazing-induced losses of soil nutrients and contribute to enhance grass production when shrub cover is reduced by natural or management-induced means. While the development of shrub communities may have adverse impacts on grasses and grassland fauna, other plants and animals may benefit. Thus, while ecosystem biodiversity certainly changes, it does not necessarily decrease with a shift from grass to woody plant domination on Sandy Loam sites.

State and transition model

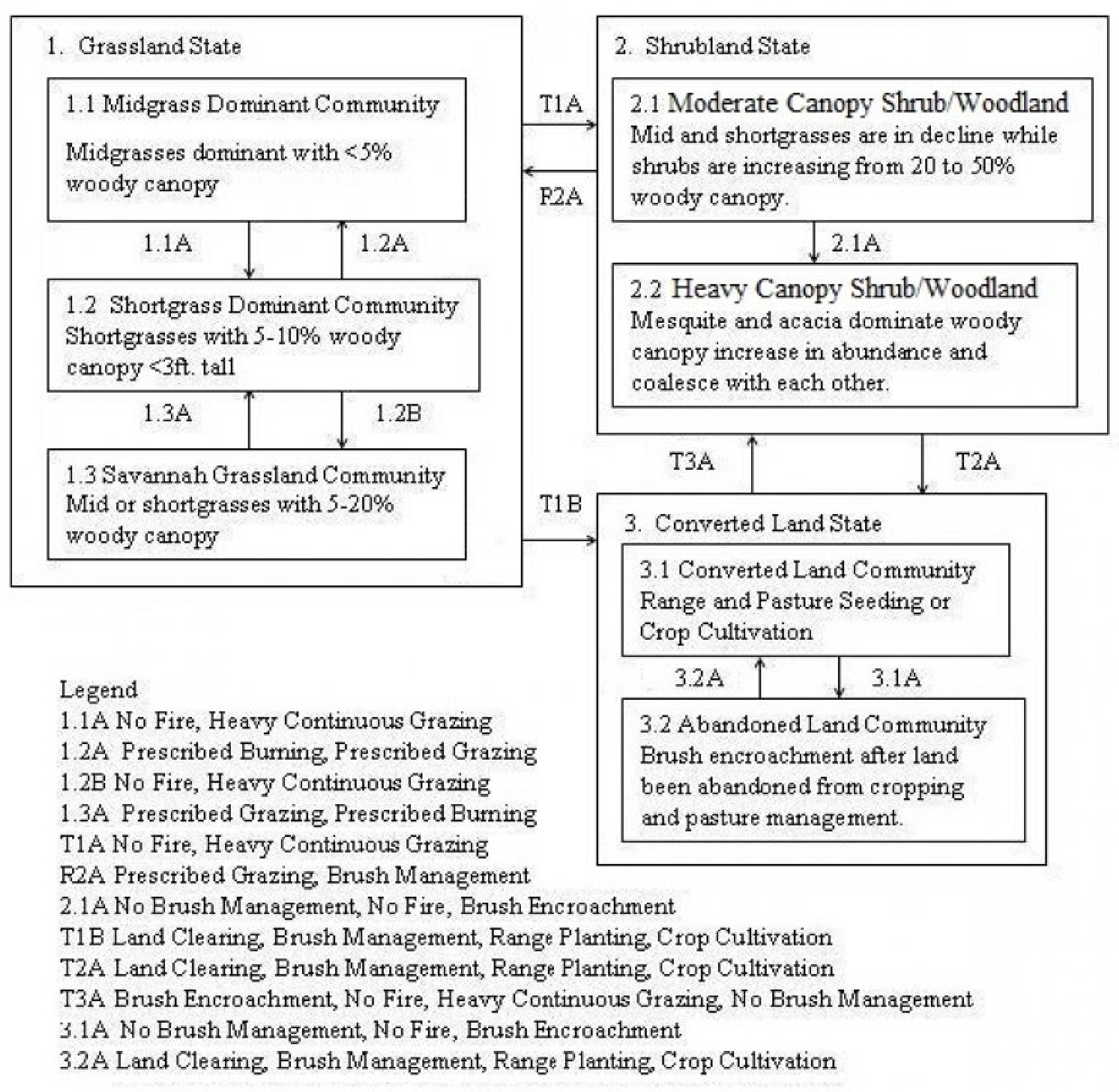

Figure 8. STM

State 1
Grassland

Dominant plant species

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

Community 1.1
Midgrass Dominant

The reference plant community for this ecological site is a Midgrass Dominant Grassland Community (1.1) with less than five percent woody plant cover. Dominant grasses are two to four feet tall and bare ground is minimal. Little bluestem is prevalent in the eastern portion of the region with four-flower trichloris and Arizona cottontop becoming more abundant in the drier western region. Woody plants, when present, consist primarily of mesquite, but may also include various acacia species. They would be small and obscured by grasses. The majority of production occurs in late spring and early summer when temperatures and moisture are typically most suitable for growth. As conditions become warmer and drier, grasses become dormant and substantial litter accumulation occurs, making the site prone to fire. Recurrent fire, every 5 to 10 years, favors persistence of the dominant grasses and keeps the cover of woody plants low. In years without fire, leaf litter decomposes and adds organic matter to the soil, thus enhancing its fertility and water holding capacity. The dominant grasses are also highly productive belowground and are relatively deeply rooted. Extensive root systems bind the soil to minimize erosion while enabling the dominant grasses to access stored soil moisture, thus stabilizing aboveground production. With their high ground cover and large root systems, the dominant grasses tend to monopolize light, water, and nutrients and competitively exclude other plants.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1980	2800	3960
Shrub/Vine	110	150	220
Forb	110	150	220
Tree	0	0	0
Total	**2200**	**3100**	**4400**

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
Shortgrass Dominant

With the onset of heavy continuous grazing, mid-height grasses give way to shortgrasses (typically less than one foot tall) such as hooded windmillgrass and pink pappusgrass (in western areas). Perennial forbs such as orange zexmenia also increase in relative abundance. With continued grazing, these give way to red grama (*Bouteloua trifida*) and hairy grama (*Bouteloua hirsuta*), threeawns, slim tridens (*Tridens muticus*) and annual forbs. Drought interacts with grazing to trigger midgrass to shortgrass transitions. Termite activity often increases during low rainfall periods to further decrease production and ground cover. The shortgrass/forb communities are much less productive than the mid-grass communities they replace. Plants also tend to be less palatable. Because grazing causes reductions in root production and rooting depth, aboveground production becomes more erratic and more dependent on rainfall as plants are less effective at accessing stored soil water. Plants in this state become susceptible to uprooting by grazers. Reductions in aboveground cover and root biomass make this community more prone to runoff and erosion. Reductions in ground cover leads to higher soil temperatures that, in conjunction with reductions in leaf and root biomass inputs, cause declines in soil organic matter. This reduces soil water holding capacity and fertility that further affect species composition and production. Grazing reduces the competitive dominance of midgrasses thus increasing species diversity on the site. Woody plants are more conspicuous in this community and their growth is accelerated. Fire frequency/intensity in this community is lowered because fine fuel levels are lowered. As a result, woody plants are free to increase in size, density, and total cover.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1600	2300	3100
Shrub/Vine	150	200	280
Forb	160	210	270
Tree	0	0	0
Total	**1910**	**2710**	**3650**

Figure 12. Plant community growth curve (percent production by month). TX4526, Shortgrass Dominant with 5-10% woodies. Shortgrass savannah plant structure with the woody species canopy being as much as 10%, but being less than 3 feet tall..

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 1.3
Savannah Grassland

In the absence of fire, Savannah Grassland (1.3) with 5 to 20 percent woody cover can develop in either the mid or shortgrass grassland community. Woody plants such as mesquite can establish in a matrix of competitive, late seral grasses, but their establishment and growth rates will be greater on retrogressed and grazed sites. As established woody plants develop they modify soils and microclimate to facilitate establishment of other shrubs such as brasil (*Condalia hookeri*), lime prickly ash, and agarito (Berberis trifoliolata). Discrete mixed-brush clusters thus begin to develop in the grassy matrix, giving the landscape a parkland appearance. However, woody plants in this state are not of sufficient size, leaf area, or density to affect herbaceous plants. Thus, ground cover remains mid or shortgrass dominated, depending on grazing pressure. Conversion of these savannahs to grassland can be achieved with prescribed burning (individual plant treatments could be considered, but woody cover is too low to warrant conventional large-scale chemical or mechanical brush management). Conversion of shortgrass savannah to midgrass dominated grasslands requires long-term relaxation of grazing pressure in conjunction with prescribed burning.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1600	2300	3100
Shrub/Vine	250	325	500
Forb	160	210	270
Tree	0	0	0
Total	**2010**	**2835**	**3870**

Figure 14. 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

With relaxation of grazing, midgrasses can regain dominance on the site and undesirable trends in soil organic matter, fertility, temperature, and erosion can be arrested and reversed. Growth of established woody plants will slow and it will become more difficult for new plants to establish. Restoration of fine fuel biomass and continuity enable use of prescribed fire to reduce the stature and cover of established woody plants. The extent to which the original midgrass community can be re-established will depend on the extent to which soil physical and chemical properties were altered during retrogression.

Pathway 1.2B
Community 1.2 to 1.3

If heavy continuous grazing continues with the exclusion of fire, the phase will transition to the Savannah Grassland Community (1.3).

Pathway 1.3A
Community 1.3 to 1.2

Conversion of these savannahs back to grassland can be achieved with prescribed burning and brush management. Conversion of the Savannah Grassland (1.3) to the Shortgrass (1.2) and eventually the Midgrass Dominant Community (1.1) requires long-term relaxation of grazing pressure in conjunction with prescribed burning.

State 2
Shrubland

Dominant plant species

- mesquite (*Prosopis*), shrub
- acacia (*Acacia*), shrub

Community 2.1
Moderate Canopy Shrubland/Woodland

Figure 15. 2.1 Moderate Canopy Shrubland/Woodland

Lack of fire and continued heavy grazing causes a shift from the Savannah Grassland (1.3) to the Shrubland State (2). The transition may be abrupt, triggered by losses of grass cover during drought and rapid establishment by woody plants in post-drought periods. As the density, height and canopy area of mesquite and acacia is maximized, understory shrubs such as brasil, lime prickly ash, spiny hackberry and agarito continue to grow and become dominant. Herbaceous composition and production in zones between shrub clusters and groves depends on grazing history and is comparable to that of mid-grass or shortgrass/annual forb communities. However, extensive bare ground occurs beneath shrub canopies where herbaceous production is dramatically reduced due to shading and competition for water and nutrients by shallow-rooted woody plants. Use of prescribed fire can be very difficult in the Shrubland State, as shrub clusters and groves disrupt fine fuel continuity, making it difficult for fires to spread. Low productivity of herbaceous patches translates into low fuel loads, thus fires may not be hot enough to carry through shrub patches. Furthermore, relaxation of grazing does not guarantee that prescribed fire can be used. In some years, there may not be enough rainfall to generate sufficient fuel. In other years, fuel production may be high but warm temperatures may keep plants green and too moist for effective prescribed winter burns. Prescribed summer fires burn hotter and more effective than winter burns, but are more difficult to control.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1350	1800	2400
Shrub/Vine	500	650	800
Forb	100	150	200
Tree	0	0	0
Total	**1950**	**2600**	**3400**

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

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

Community 2.2
Heavy Canopy Shrub/Woodland

Figure 18. 2.2 Heavy Canopy Shrub/Woodland

In the absence of fire and brush management, a highly stable shrubland or woodland community develops as woody patches increase in abundance and coalesce with each other. Mesquite and acacia overstory plants that dominate the preceding community (2.1) may begin to die due to natural causes, leaving a diverse mixed-shrub community characterized by shrubs such as brasil, lime prickly ash, and spiny hackberry. Woody canopy exceeds 50 percent. Herbaceous plants are primarily composed of native shortgrasses and forbs. Ground cover and herbaceous production beneath shrub canopies is minimal. Aggressive brush management is required to transitions from this state. Prescribed burning may not be possible until woody cover is reduced by herbicides or mechanical treatments to the point that grasses (fine fuels) can establish. Establishment of native grasses is difficult and dependent upon natural seeding from remnant patches, as their seed banks in shrub patches may be depleted.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	750	1400	1800
Shrub/Vine	500	750	1000
Forb	50	100	150
Tree	0	0	0
Total	**1300**	**2250**	**2950**

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

Community with >50% Woodies.

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

Pathway 2.1A
Community 2.1 to 2.2

Moderate Canopy Shrubland/Woodland → **Heavy Canopy Shrub/Woodland**

Continued heavy grazing coupled with lack of fire will cause this community to transition to the Heavy Canopy Shrub/Woodland Community (2.2). Brush density and height will continue to increase and shade the ground.

State 3
Converted Land

Dominant plant species

- buffelgrass (*Pennisetum ciliare*), grass
- kleingrass (*Panicum coloratum*), grass

Community 3.1
Converted Land

Much of the eastern portion of MLRA 83A has been converted to cropland, primarily grain sorghum and cotton dating back to the 1950's. Much of this cropland has been abandoned and seeded to native or introduced grasses such as buffelgrass (*Pennisetum ciliare*), kleingrass (*Panicum coloratum*), or hybrid bermudagrass (Cynodon spp.). Others were abandoned and are undergoing secondary succession and consist of a mixture of native and introduced grasses, forbs, and shrubs. The composition and abundance of these varies, depending on time since field abandonment and proximity to seed sources. With heavy grazing, no brush management and no fire, these seeded states will quickly revert to shrublands. Seeding with native grasses following brush management is a possibility with a variety of seed available from commercial sources. Grazing should not be initiated until the stand is well established. Newly seeded stands are prone to invasion by unwanted species and woody plants, so proper grazing and brush/weed management are required for their maintenance. The rate of woody plant re-establishment will depend on the brush management practice used to initially clear the site, seedbed preparation technique, and proximity to undisturbed shrub stands. Stands seeded to native grasses are also susceptible to invasion by non-native, introduced pasture grasses such as King Ranch bluestem (*Bothriochloa ischaemum*), Guinea grass (*Urochloa maxima*), buffelgrass and bermudagrass. These exotic species may be very difficult to eliminate once established. Native grasslands or shrublands may be converted to tame grass, depending upon objectives by reducing shrub cover and seeding with buffelgrass and kleingrass. Bermudagrass is also used where irrigation and fertilization are options. Prescribed grazing and brush management (typically individual plant treatment or prescribed burning) are required to prevent re-establishment of a shrubland complex. Production of these introduced forage grasses may exceed that of native grasses, hence their popularity with livestock producers. However, the extent to which introduced grasses provide better forage than native grasses is debatable, especially when their adverse effects on wildlife are taken into account. Exotic pasture grasses can invade and take over native grass stands, thus causing undesirable losses of local biodiversity. Conversion of introduced pasture to native grassland is difficult and typically requires aggressive and costly management intervention. Given the potentially adverse long-term effects of exotic grasses on native grassland flora and fauna, their use should be critically and carefully considered.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2000	3000	4000
Forb	100	50	25
Shrub/Vine	0	0	0
Tree	0	0	0
Total	**2100**	**3050**	**4025**

Figure 22. 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 23. Plant community growth curve (percent production by month). TX4531, Converted Land - Introduced Grass Seeding. Seeding Coverted Land into Introduced grass species..

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

Community 3.2
Abandoned Land

Abandoned croplands and land seeded with exotic or native grasses are prone to encroachment by woody plants and with heavy grazing or the absence of fire will revert to shrublands. These changes are potentially triggered by recruitment and growth of shrub plants in periods following drought. The shrub seedlings that appear in seeded pastures may be true seedlings established from seeds dispersed to the site by wind, water, animals, or from seeds which persist in the soil seed bank long after woody cover has been reduced by brush management practices. Other seedlings may actually be sprouts arising from woody plant stems, roots, burls, and lignotubers that remain following brush management. These tend to grow faster and have higher establishment rates than true seedlings. Nearly all shrubs on this site have this capability of vegetative regeneration, therefore it is the primary source of woody plants that re-establish following brush management. Proper grazing and brush management are required to prevent woody plant from dominating the site. Production is highly variable for the site in this condition.

Figure 24. 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

Once the woody canopy exceeds approximately 20 percent and is taller than three feet the site transitions to the Shrubland State (2). 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 Grassland State (1).

Transition T1B
State 1 to 3

The Grassland 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

Aggressive brush and grazing management is required to revert the system back to the Grassland State. Re-seeding may be necessary if the grassy matrix is dominated by shortgrasses and annual forbs. Herbaceous production following brush management can be elevated owing to shrub-induced enhancements of soil nutrients. However, most shrubs are capable of regenerating by sprouting, so treatment effects are short lived. Allowances for follow-up treatments should be made. In the absence of follow-up treatments, woody cover and density may increase relative to pre-treatment conditions with adverse effects on forage production and wildlife.

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

Animal community

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

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

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

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

Tree/Shrubland 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

The Midgrass Community (1.1) water cycle functions well with good infiltration and deep percolation of rainfall. The water cycle functions best in the Midgrass Community (1.1) and degrades as the vegetation community declines. Rapid rainfall infiltration, high soil organic matter, good soil structure and good porosity accompany high bunchgrass cover. Surface runoff quality will be high and erosion and sedimentation rates will be low. High rates of infiltration will allow water to move below the rooting zone during periods of heavy rainfall.

A shift to the Shortgrass Community (1.2) means reduced plant and litter cover, which impairs the water cycle. Infiltration will decrease and runoff will increase due to reduced ground cover, rainfall splash, soil capping, reduced organic matter, and poor structure. With a combination of a sparse ground cover and intensive rainfall, this site can contribute to an increased frequency and severity of flooding within a watershed. Soil erosion is accelerated, quality of surface runoff is poor and sedimentation increases.

Domination of the site by woody species further degrades the water cycle in the Shrubland State (2). Interception of rainfall by tree canopies increases, which reduces the amount of rainfall reaching the surface and being available to understory plants. Increased stem flow, due to the funneling effect of the canopy, will increases soil moisture at the base of trees, especially on mesquite. Increases in woody canopy create declines in grass cover, which creates similar causes impacts as those described for improper grazing above. Return of the Shrubland State (2) to the Midgrass Community (1.1) through brush management and good grazing management can help improve hydrologic function of the site.

Under the dense canopy of the shrubland, leaf litter builds up. This increases soil organic matter, builds structure, improves infiltration, and reduces surface erosion. These conditions improve the function of the water cycle compared to lower levels of canopy cover. Water flow patterns are common and follow old stream meanders. Deposition and erosion is uncommon for normal rainfall but may occur during intense rainfall events.

Recreational uses

Hunting, bird watching, and eco-tourism are all common activities.

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

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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	05/11/2025
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:**

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):**

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

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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:**

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17. **Perennial plant reproductive capability:**
