USDA Natural Resources Conservation Service

Ecological site R078AY126TX
Shallow Clay 25-28" PZ

Last updated: 9/15/2023
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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.

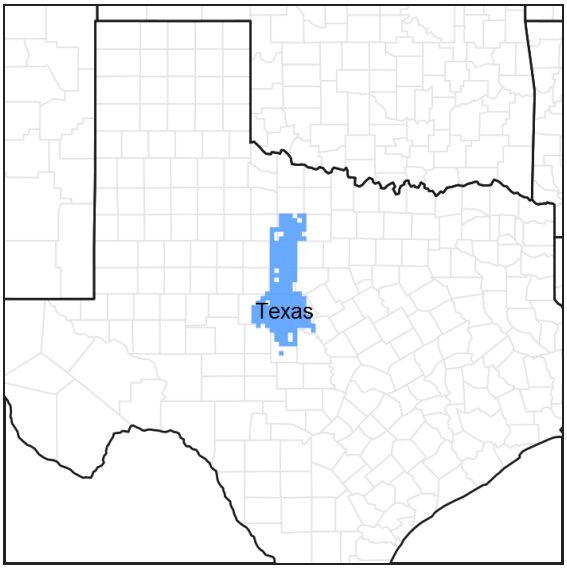


Figure 1. Mapped extent

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): 078A–Rolling Limestone Prairie

MLRA 78A is characterized by erosional plains with terraces adjacent to perennial and intermittent streams. Loamy and clayey soils range from shallow to deep over limestones and shales of Permian and Pennsylvanian age. Loamy soils are also associated with stream terraces.

LRU notes

NA

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 on shallow clay soils on uplands. The reference vegetation consists of midgrasses and shortgrasses with forbs and very few woody species. Abusive grazing practices can lead to a shift in the plant

community.

Associated sites

R078AY120TX	**Clay Slopes 25-28" PZ** Clay Slopes occupies the same general landscape and frequently occurs adjacent to and intermingled with the Shallow Clay site.
R078AY128TX	**Very Shallow 25-28" PZ** The site differs in species composition and productivity. Soils are shallow and plant-soil-air-moisture relationships are less favorable.

Similar sites

R078AY123TX	**Rocky Hill 25-28" PZ** Rocky Hill has significantly steeper slope, somewhat shallower soils, and more rock on the soil surface. The Rocky Hill site has slightly more annual production potential because of the presence of more tallgrass species.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Bothriochloa barbinodis*

Physiographic features

These gently to steep sloping soils in the Shallow Clay ecological site occur on escarpments and plains in the Rolling Limestone Prairie. These soils were formed in residuum from gray or olive claystone bedrock of Pennsylvanian or Permian age. Slopes range from 1 to 8 percent. Elevation ranges from 1000 to 2350 feet.

Table 2. Representative physiographic features

Landforms	(1) Breaks > Hillslope
Elevation	1,000–2,350 ft
Slope	1–8%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate of MLRA 78A is subtropical subhumid, with hot, dry summers and mild, dry winters. The Precipitation is similar north to south throughout the area, but decreases slightly from east to west. Temperature is similar east to west, but warmer from north to south. The area is clear to partly cloudy 80 percent of the time during the summer and 60 percent during the winter. Prevailing winds usually occur from a southerly direction and from north to northwest during passage of fall and winter cool fronts. March and April are the windiest months of the year.

Most precipitation occurs during the warmer months from April to October, in the form of rainfall during thunderstorms, often of short duration and high intensity, with considerable variation in amounts of rain and the area covered. Lightening, strong winds and hail frequently accompany the thunderstorms. Occasional tornadoes are not uncommon. Precipitation distribution is bimodal, with peaks occurring in May-June and September-October. The annual precipitation is about 25 to 28 inches. Timeliness and amount of rainfall are critical to plant growth. Rainfall events of one-fourth inch or less have limited effectiveness. High temperatures and dry winds reduce precipitation effectiveness. Snowfall represents only a small part of the annual precipitation. Snowfall of one inch or more occurs about one in five years, while snowfall of greater than five inches occurs only about one in ten years. Snow cover generally is of short duration (i.e. one to three days). Probability of snowfall is greater in the northern part of MLRA

78A.

Rainfall in the region is highly erratic, usually with more years below than above average. Periodic droughts of both temporary and prolonged duration are common to the area, although not predictable. Some of the more severe droughts of the past century in this region occurred during 1918-1919, early 1930's, early to mid 1950's, and mid to late 1990's. High temperatures and dry winds accentuate the effects of drought. The extremes in climate have greater influence on plant communities than averages. Historic wet and dry cycles of extended duration likely influenced the evolution of drought hardiness and other survival traits in the endemic flora and fauna of the area.

Temperatures range from 31 degrees F in January to 96 degrees F in July, based on the 30-year average from 1971-2000, although considerably lower and higher temperatures for these months, respectively, have been recorded for some years. Periods of excessive heat, exceeding 100 degrees F, are not uncommon during July and August. Temperatures in the winter are generally mild, but abrupt and large drops in temperature can occur when polar air masses plunge southward across the area. The duration of freezing temperatures usually does not last more than three to five days. Temperatures in the spring are mild, both daytime and nighttime. Summer temperatures are hot, with highs generally in the 80's to mid 90's during the daytime, cooling down to the upper 70's during the night. Fall is usually pleasant with mild, sunny days and crisp, cool nights, as cool northers periodically begin moving south this time of year. The area has a frost-free period of approximately 225 to 233 days and a freeze-free period of about 248 to 259 days. The primary growing season for warm-season plants is approximately 233 to 246 days, increasing from north to south. The first frost generally occurs around November 15 and the last frost occurs around March 15. These dates will vary from north to south and from year to year.

The average relative humidity ranges from 35 to 50 percent in mid-afternoon as diurnal air temperature nears maximum. As nighttime air temperature drops, relative humidity rises, averaging 70 to 80 percent by dawn.

Table 3. Representative climatic features

Frost-free period (characteristic range)	197-210 days
Freeze-free period (characteristic range)	222-244 days
Precipitation total (characteristic range)	27-29 in
Frost-free period (actual range)	195-216 days
Freeze-free period (actual range)	221-260 days
Precipitation total (actual range)	27-30 in
Frost-free period (average)	204 days
Freeze-free period (average)	235 days
Precipitation total (average)	28 in

Climate stations used

- (1) CONCHO PK/IVIE RSVR [USC00411934], Millersview, TX
- (2) PUTNAM [USC00417327], Baird, TX
- (3) ALBANY [USC00410120], Albany, TX
- (4) THROCKMORTON 7NE [USC00419016], Throckmorton, TX
- (5) COLEMAN [USC00411875], Coleman, TX

Influencing water features

N/A.

Wetland description

N/A

Soil features

The soil series in the Shallow Clay ecological site consist of shallow to moderately deep, well drained, impermeable to very slowly permeable soils.

Major Soil Taxonomic Units correlated to this site include: Owens and Vernon.

Table 4. Representative soil features

Parent material	(1) Residuum–claystone
Surface texture	(1) Clay (2) Stony clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow
Soil depth	14–30 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2–5 in
Calcium carbonate equivalent (0-40in)	2–15%
Electrical conductivity (0-40in)	0–1 mmhos/cm
Sodium adsorption ratio (0-40in)	0–10
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	4–12%
Subsurface fragment volume >3" (Depth not specified)	2–8%

Ecological dynamics

The reference plant community for the Shallow Clay ecological site is a midgrass/shortgrass prairie. Evidence of the historic vegetation can be found in the journals and records of explorers, military expeditions, boundary survey teams, and early scientists who studied the vegetation.

Climate is a major factor influencing vegetation on the site. Long-term droughts lasting multiple years or growing seasons are infrequent, but when they do occur, they can have a negative impact on the vegetation. If abusive grazing occurs during or immediately following the drought period, the results can be devastating. The effects of erratic seasonal moisture and short-term dry spells lasting a few months are not as severe as those caused by long-term droughts. However, the lower the ecological status of the site, the greater the negative impact will be during drought periods regardless of duration.

Fire is also an important part of the ecosystem. Historic fires on this site were not as intense as they were on most associated sites because of the structure of the vegetation, and the relatively low amount of fine fuel to sustain the fires. The shorter height of the grasses and the scarcity of forbs and woody plants contributed to these less intense fires. However, fires of moderate to low intensity did play a key role in refreshing and reinvigorating the old growth vegetation and keeping weeds and brush suppressed.

Lack of fire allows herbaceous vegetation to become senescent and may eventually lead to the loss of the most

desirable species. Seedlings of non-native brush species and invasive weeds may encroach on the site from adjacent sites

Prior to settlement, this site was subject to periodic grazing and browsing by vast herds of bison, wild cattle, wild horses, and deer. At times these grazing and browsing episodes were intense and severe, but periods of heavy use were followed by long periods of non-use as the herds migrated to fresh grazing areas before returning to previously grazed areas. The grazed areas had an opportunity to rest, regrow, regain vigor, and reproduce prior to the next grazing event. Intervals between grazing periods were frequently influenced by the amount of time that had elapsed since the last fire on the area.

As the region was settled, fire was reduced or eliminated and grasslands were fenced off to control movement and facilitate grazing by domestic livestock. As a result of abusive grazing or lack of grazing and/or the elimination of fire, in association with extreme climatic events, the historic plant community has been altered on most Shallow Clay sites.

This site usually occurs as small, isolated, and widely scattered areas within larger areas of other soils. Because of their dense clay subsoils, ponds and dams are often built on this site. This site is frequently overgrazed because it may be the only location of surface water in a pasture. The site is usually very slow to recover from overgrazing because of its dense, shallow soils. As the reference midgrasses decrease on the site, they are replaced by early successional midgrasses, a significant increase in the shortgrasses, as well as annual grasses and forbs. Further deterioration leads to the loss of the perennial midgrass plant community as shortgrasses, annual forbs, and annual grasses, begin to dominate the site. If disturbances are severe enough for an extended period of time, annual species dominate and bare ground is extensive. This provides the opportunity for less desirable woody species such as mesquite, lotebush, pricklypear, and tasajillo to encroach from adjacent sites.

Selective individual removal of unwanted trees and shrubs is relatively easy and more practical when brush plants initially appear on the site. The increase of brush can be fairly rapid and the plants per acre will soon become too numerous for individual control to be feasible. Once woody plants become mature or develop into dense stands, control is expensive, uneconomical, impractical, and difficult to achieve. Brush management is most successful using a systems approach. Initial treatment by mechanical methods can be followed by using approved herbicides, and using prescribed fire as a maintenance technique. Prescribed grazing with a reasonable stocking rate can sustain the grass species composition and production at a near reference level.

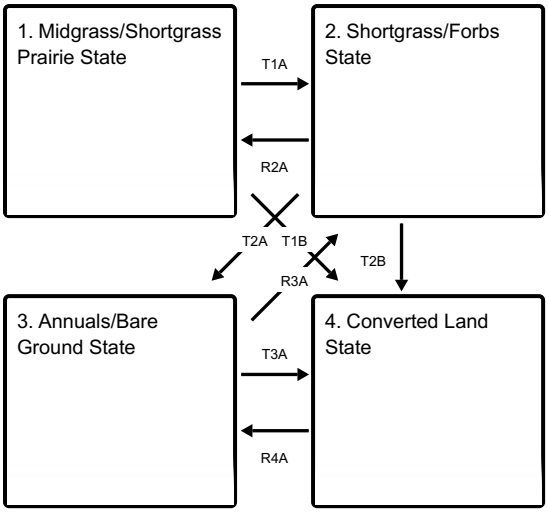
Changes in plant communities and vegetation states on the Shallow Clay site are result of the combined influences of natural events (rainfall, temperature, droughts, etc.) and the accompanying management systems implemented on the area (prescribed fire, grazing management, and brush management).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and Transition Model:

State and transition model

Ecosystem states



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

T1B - Extensive soil disturbance followed by seeding

R2A - Adequate rest from defoliation, followed by reintroduction of historic disturbance regimes

T2A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

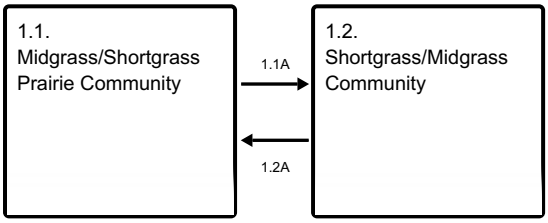
T2B - Extensive soil disturbance followed by seeding

R3A - Adequate rest from defoliation and removal of woody canopy

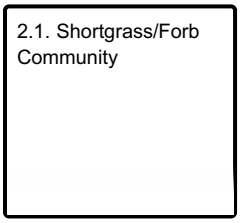
T3A - Extensive soil disturbance followed by seeding

R4A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

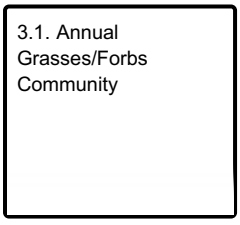
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities

4.1.
Converted/Abandoned
Land Community

State 1
Midgrass/Shortgrass Prairie State

The Midgrass/Shortgrass Prairie Community is the reference community for the Shallow Clay ecological site. In reference conditions, the site is dominated by sideoats grama with lesser amounts of other midgrasses. Little bluestem is found in areas where favorable moisture conditions exist or where inclusions of more advanced soil development have occurred. Buffalograss, curlymesquite, and hairy grama are sub-dominant shortgrasses. Blue grama is a minor, but significant, part of the reference shortgrass component on this site. Perennial forbs are scattered across the site. Shrubs are a minor component of the plant community. In the Shortgrass/Midgrass Community, sideoats grama declines and shortgrasses such as buffalograss and curlymesquite, dominate the site along with other midgrasses. More annual grasses and forbs begin to appear on the site. Mesquite, lotebush, pricklypear, and tasajillo begin to invade from adjacent sites and the shrub canopy begins to gradually increase.

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- cane bluestem (*Bothriochloa barbinodis*), grass

Community 1.1
Midgrass/Shortgrass Prairie Community

Figure 8. 1.1 Midgrass/Shortgrass Prairie Community

Figure 9. 1.1 Midgrass/Shortgrass Prairie Community (2)

The reference plant community for the Shallow Clay ecological site is a midgrass/shortgrass prairie. This is the reference community. In reference conditions, the site is dominated by sideoats grama with lesser amounts of other midgrasses including cane and silver bluestem, Arizona cottontop, Texas wintergrass, dropseeds, and vine mesquite. Little bluestem is found in areas where favorable moisture conditions exist or where inclusions of more advanced soil development have occurred. Buffalograss, curlymesquite, and hairy grama are sub-dominant shortgrasses. Blue grama is a minor, but significant, part of the historic shortgrass component on this site. Perennial forbs are scattered across the site. Shrubs are a minor component of the plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	750	1500	2250
Forb	200	300	400
Shrub/Vine	50	100	150
Total	**1000**	**1900**	**2800**

Figure 11. Plant community growth curve (percent production by month). TX2529, Midgrass/Shortgrass - No Shrubs/Trees. Midgrass/Shortgrass-sideoats grama, vine mesquite, Texas wintergrass, buffalograss, curlymesquite/no shrubs or trees. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	4	10	25	25	4	3	10	10	3	2

Community 1.2
Shortgrass/Midgrass Community

Figure 12. 1.2 Shortgrass/Midgrass Community

Figure 13. 1.2 Shortgrass/Midgrass Community (2)

Figure 14. 1.2 Shortgrass/Midgrass Community (3)

Sideoats grama declines because of disturbance or neglect as a result of uncontrolled grazing, lack of fire, extended drought, or other factors. Shortgrasses such as buffalograss and curlymesquite, dominate the site along with midgrasses such as silver bluestem, dropseeds, and slim and rough tridens. Threeawns and Texas grama increase significantly. More annual grasses and forbs begin to appear on the site. Mesquite, lotebush, pricklypear, and tasajillo begin to invade from adjacent sites and the shrub canopy begins to gradually increase.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	550	1200	1850
Forb	300	400	500
Shrub/Vine	50	100	150
Total	**900**	**1700**	**2500**

Figure 16. Plant community growth curve (percent production by month). TX2530, Shortgrass/Midgrass - No Shrubs/Trees. Shortgrass/Midgrass - buffalograss, curlymesquite, Texas wintergrass, sideoats grama, vine mesquite/no shrubs or trees..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	4	7	15	18	15	5	5	10	10	5	3

Pathway 1.1A
Community 1.1 to 1.2

Midgrass/Shortgrass Prairie Community

Shortgrass/Midgrass Community

Uncontrolled or mismanaged grazing for an extended period of time, elimination of fire from the ecosystem, and/or the effects of extended drought may result in a shift away from a midgrass dominated plant community to a shortgrass dominated plant community. Sideoats grama, Arizona cottontop, vine mesquite, and little bluestem decline and are replaced by shortgrasses and lower successional midgrasses.

Pathway 1.2A
Community 1.2 to 1.1

Shortgrass/Midgrass Community

Midgrass/Shortgrass Prairie Community

A viable population of midgrasses such as sideoats grama, Arizona cottontop, vine mesquite, and little bluestem still exists on this site to enable the midgrass dominant plant community to recover naturally with adequate rainfall, implementation of prescribed grazing and re-introduction of periodic fire into the ecosystem.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Shortgrass/Forbs State

The Shortgrass/Forb Community is composed of perennial shortgrasses, including buffalograss, curlymesquite, and threeawns which dominate the site along with annual forbs and grasses. Invading shrubs such as mesquite, lotebush, and pricklypear increase in density and canopy, but their growth habit is stunted because of shallow soils, limited rooting depth, and lack of available moisture. A few individual plants of sideoats grama and Arizona cottontop remain in isolated areas, but silver bluestem, dropseeds, and white tridens are the most common midgrasses.

Dominant plant species

- mesquite (*Prosopis*), shrub
- lotebush (*Ziziphus obtusifolia*), shrub
- buffalograss (*Bouteloua dactyloides*), grass
- curly-mesquite (*Hilaria belangeri*), grass

Community 2.1
Shortgrass/Forb Community

Figure 17. 2.1 Shortgrass/Forb Community

Figure 18. 2.1 Shortgrass/Forb Community (2)

This plant community is the result of prolonged periods of damaging disturbances and neglect which may include continuous abusive grazing and total lack of prescribed fire or brush management. Perennial shortgrasses, including buffalograss, curlymesquite, and threeawns dominate the site along with annual forbs and grasses. Invading shrubs such as mesquite, lotebush, and pricklypear increase in density and canopy, but their growth habit is stunted because of shallow soils, limited rooting depth, and lack of available moisture. A few individual plants of sideoats grama and Arizona cottontop remain in isolated areas, but silver bluestem, dropseeds, and white tridens are the most common midgrasses.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	400	500	600
Forb	400	500	600
Shrub/Vine	100	150	200
Total	**900**	**1150**	**1400**

Figure 20. Plant community growth curve (percent production by month). TX2531, Shortgrass/Annuals/Mesquite and Shrubs . Shortgrass/Annuals/Mesquite and Shrubs – buffalograss, curlymesquite, broomweed, annual forbs and grasses, mesquite, lotebush..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	4	8	16	18	12	4	4	10	12	6	3

State 3
Annuals/Bare Ground State

Annual forbs such as broomweed are abundant in the Annual Grass/Forb Community. Stunted mesquite, lotebush, and pricklypear are scattered across the site. In the lowest stages of degradation, there is a significant amount of bare ground, and scalded areas are obvious. Some of the scalds are the result of geologic erosion while others are the result of long-term abuse and mismanagement. This plant community is a terminal state that will not return to historic plant communities because of total degradation of the soil, and complete loss of most of the higher successional native plant species.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- mesquite (*Prosopis*), shrub

Community 3.1
Annual Grasses/Forbs Community

Figure 21. 3.1 Annual Grasses/Forbs Community

Figure 22. 3.1 Annual Grasses/Forbs Community (2)

Continued lack of fire and brush management along with uncontrolled grazing results in a plant community dominated by annual forbs and grasses. Annual forbs such as broomweed are abundant. Stunted mesquite, lotebush, and pricklypear are scattered across the site. In the lowest stages of degradation, there is a significant amount of bare ground, and scalded areas are obvious. Some of the scalds are the result of geologic erosion while others are the result of long-term abuse and mismanagement. This plant community is a terminal state that will not return to historic plant communities because of total degradation of the soil, and complete loss of most of the higher successional native plant species.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	250	250	300
Forb	200	250	300
Shrub/Vine	100	150	200
Total	**550**	**650**	**800**

Figure 24. Plant community growth curve (percent production by month). TX2530, Shortgrass/Midgrass - No Shrubs/Trees. Shortgrass/Midgrass - buffalograss, curlymesquite, Texas wintergrass, sideoats grama, vine mesquite/no shrubs or trees..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	4	7	15	18	15	5	5	10	10	5	3

State 4

Converted Land State

The soils of this site are poorly suited to cultivation or conversion to pastureland because of poor soil-moisture-plant relationship, shallow root zones, and moderate slopes that are susceptible to erosion. A small amount of this site has been cultivated in the past, but very few acres are still planted to annual crops. Those limited areas of cropland remaining are planted to wheat or forage sorghum, but yields are usually low. King Ranch bluestem has been seeded on some areas that were formerly cropland.

Community 4.1
Converted/Abandoned Land Community

Figure 25. 4.1 Converted/Abandoned Land Community

The soils of this site are poorly suited to cultivation or conversion to pastureland because of poor soil-moisture-plant relationship, shallow root zones, and moderate slopes that are susceptible to erosion. A small amount of this site has been cultivated in the past, but very few acres are still planted to annual crops. Those limited areas of cropland remaining are planted to wheat or forage sorghum, but yields are usually low. King Ranch bluestem has been seeded on some areas that were formerly cropland. Most of the acres of this site that were cultivated in the past have been abandoned because of very low yields and poor economics. Abandoned croplands and reseeded areas tend to revert back to a more natural state through the process of secondary succession. This is a very slow process that takes decades or centuries dependent on the status of the area at the time it is abandoned. The first plants to establish are annual forbs and grasses followed by early successional shortgrasses and midgrasses. If managed properly, some of these abandoned areas may eventually begin to approximate the diversity and complexity of the historic Shallow Clay ecosystem. Midgrasses and perennial forbs may begin to establish if the area is carefully managed. However, it is highly unlikely that abandoned lands can ever return to reference vegetation within a reasonable period of time.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	450	650	850
Forb	300	250	200
Shrub/Vine	50	100	150
Total	**800**	**1000**	**1200**

Figure 27. Plant community growth curve (percent production by month). TX2527, Converted Land Community. Planted into monocultures of introduced grasses and cropland species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3	5	14	23	20	5	4	12	8	3	2

Figure 28. Plant community growth curve (percent production by month). TX2528, Abandoned Land Community. Abandoned croplands, pasturelands,

and seeded areas. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	4	8	16	18	12	4	4	10	12	6	3

Transition T1A
State 1 to 2

Abusive grazing is the result of overstocking and continuous grazing for an extended period of time. The consequences of abusive grazing, the lack of fire, and failure to carry out maintenance brush management practices may be intensified by drought conditions. As a result of this level of mismanagement, there is no longer a viable population of late successional grasses. Little bluestem is eliminated and only scattered plants of sideoats grama, Arizona cottontop, vine mesquite still exist. The site is characterized by shortgrasses, encroachment of annual grasses and forbs, an increase in shrubs, and an increase in bare ground.

Transition T1B
State 1 to 4

This is generally not a recommended alternative on this site because the site is poorly suited to use as cropland or conversion to pastureland. Some areas have been seeded to King Ranch bluestem. Seedbed preparation and planting to the desired crop, introduced grass, or native grass is required if this conversion is attempted. Most areas that were cultivated or seeded to introduced species in the past have been abandoned and are now open land dominated by bare ground, annual grasses and forbs, early successional perennial grasses and forbs, and stunted shrubs. The site is highly susceptible to water erosion. This is a terminal state because the soil has been altered and the historic plant species no longer exist on the site.

Restoration pathway R2A
State 2 to 1

A prescribed grazing management strategy that emphasizes sustainable stocking rates, rotational grazing, and grazing deferment periods is required to enhance the recovery process in order to return to a midgrass plant community. Periodic prescribed burning is needed to keep woody species under control and encourage diversity in the grass and forb plant community. Brush management with mechanical and/or chemical treatments may be necessary in areas where unwanted woody species have become too dense. Individual plant treatment may be a viable option at this stage. Range planting is needed to re-introduce the desired midgrass and scattered tallgrass species back into the plant community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

When abusive grazing continues for an extended period of time, fire is eliminated from the ecosystem, and no brush management is carried out, the site is characterized by bare ground, annual grasses and forbs, early successional perennial grasses and forbs, and stunted shrubs. The site is highly susceptible to water erosion.

Transition T2B
State 2 to 4

This is generally not a recommended alternative on this site because the site is poorly suited to use as cropland or conversion to pastureland. Some areas have been seeded to King Ranch bluestem. Brush management, seedbed

preparation and planting to the desired crop, introduced grass, or native grass is required if this conversion is attempted. Most areas that were cultivated or seeded to introduced species in the past have been abandoned and are now open land dominated by bare ground, annual grasses and forbs, low successional perennial grasses and forbs, and stunted shrubs. The site is highly susceptible to water erosion. This is a terminal state because the soil has been altered and the historic plant species no longer exist on the site.

Restoration pathway R3A
State 3 to 2

In order to have any possibility of recovery from this state, a carefully planned and implemented prescribed grazing management strategy must be implemented, extensive brush management is required, and range planting is necessary to re-introduce perennial grasses and forbs to the plant community. Since the site is droughty and subject to erosion, this is a difficult, risky, and expensive consideration. If the reseeded areas become established, a prescribed burning management program is needed to maintain balance, diversity, and vigor in the plant community. This is usually not a practical alternative because of the risks and expense involved.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T3A
State 3 to 4

This is generally not a recommended alternative on this site because the site is poorly suited to use as cropland or conversion to pastureland. Brush management, seedbed preparation and planting to the desired crop, introduced grass, or native grass is required if this conversion is attempted. Some areas have been seeded to King Ranch bluestem. Most areas that were cultivated or seeded to introduced species in the past have been abandoned and are now open land dominated by bare ground, annual grasses and forbs, low successional perennial grasses and forbs, and stunted shrubs. The site is highly susceptible to water erosion.

Restoration pathway R4A
State 4 to 3

Abusive grazing, lack of fire, lack of brush management, and abandonment are factors that result in these previously treated areas reverting to areas that are dominated by bare ground, annual grasses and forbs, low successional perennial grasses and forbs, and stunted shrubs. The site is highly susceptible to water erosion. In this scenario, this is a terminal state because the soil has been altered and the reference plant species no longer exist on the site.

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**			550–1800	
	sideoats grama	BOCU	*Bouteloua curtipendula*	300–900	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	50–250	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–250	–
	vine mesquite	PAOB	*Panicum obtusum*	0–150	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–150	–

	Arizona cottontop	DICA6	*Digitaria californica*	0–100	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	0–100	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–100	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	0–100	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–100	–
	white tridens	TRAL2	*Tridens albescens*	0–50	–
	Rio Grande bristlegrass	SERER	*Setaria reverchonii ssp. ramiseta*	0–50	–
2	**Cool-season grass**			50–150	
	Texas wintergrass	NALE3	*Nassella leucotricha*	50–150	–
3	**Tallgrass**			0–300	
	little bluestem	SCSC	*Schizachyrium scoparium*	0–300	–
4	**Short/Midgrasses**			200–550	
	buffalograss	BODA2	*Bouteloua dactyloides*	50–250	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–250	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	50–250	–
	curly-mesquite	HIBE	*Hilaria belangeri*	50–250	–
	hooded windmill grass	CHCU2	*Chloris cucullata*	0–150	–
	Hall's panicgrass	PAHAH	*Panicum hallii var. hallii*	0–100	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–100	–
	slim tridens	TRMUM	*Tridens muticus var. muticus*	0–100	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	0–50	–
	Texas grama	BORI	*Bouteloua rigidiseta*	0–50	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–50	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–50	–
Forb					
5	**Forbs**			100–300	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–50	–
	milkvetch	ASTRA	*Astragalus*	0–50	–
	American star-thistle	CEAM2	*Centaurea americana*	0–50	–
	prairie clover	DALEA	*Dalea*	0–50	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–50	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–50	–
	buckwheat	ERIOG	*Eriogonum*	0–50	–
	Leavenworth's eryngo	ERLE11	*Eryngium leavenworthii*	0–50	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–50	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	0–50	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–50	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–50	–
	blazingstar	MENTZ	*Mentzelia*	0–50	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–50	–
	pony beebalm	MOPE	*Monarda pectinata*	0–50	–
	plantain	PLANT	*Plantago*	0–50	–
	cochlear cartilage	RACO11	*Ramalina cochlearis*	0–50	–

	lichen				
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–50	–
	Drummond's skullcap	SCDR2	*Scutellaria drummondii*	0–50	–
	twoleaf senna	SERO8	*Senna roemeriana*	0–50	–
	awnless bushsunflower	SICA7	*Simsia calva*	0–50	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–50	–
	fineleaf fournerved daisy	TELI3	*Tetraneuris linearifolia*	0–50	–
	slender greenthread	THSI	*Thelesperma simplicifolium*	0–50	–
	Texas vervain	VEHA	*Verbena halei*	0–50	–
Shrub/Vine					
6	**Shrubs/Vines/Trees**			50–150	
	gum bully	SILA20	*Sideroxylon lanuginosum*	0–100	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	0–50	–
	black prairie clover	DAFR2	*Dalea frutescens*	0–50	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	0–50	–
	catclaw acacia	ACGRG3	*Acacia greggii var. greggii*	0–50	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–50	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–25	–
	pricklypear	OPUNT	*Opuntia*	0–25	–
	clapweed	EPAN	*Ephedra antisyphilitica*	0–25	–
	yucca	YUCCA	*Yucca*	0–25	–
Tree					
7	**Trees**			0–50	
	hackberry	CELTI	*Celtis*	0–50	–

Animal community

Historically, the Shallow Clay site was occasionally utilized by a variety of mammals, reptiles, and birds. Several historical references and journals written in the 18th and 19th century by explorers, survey parties, and military expeditions refer to herds of bison, wild cattle, wild horses, and antelope roaming freely across the North Central Prairie and adjacent regions.

Today the site is primarily used by bob-white quail because of the scattered vegetation, amount of open ground, and presence of scattered, low-growing shrubs. The site may be utilized intermittently by deer, dove, species of grassland birds, and small fur-bearing mammals, but it is not a preferred site for most wildlife because of the relatively low and uniform structure of the vegetation, as well as the lack of trees, shrubs, and forbs. With the exception of quail, most wildlife only use this site incidentally in association with the use of more suitable adjacent sites. Animal species and populations fluctuate as the vegetation cycles through temporary phases and different ecological stages.

Livestock grazing should be controlled by implementing grazing management systems that incorporate frequent and timely deferment periods to prevent abusive grazing.

Hydrological functions

When herbaceous vegetation and ground cover are maintained in a healthy and vigorous status, water infiltration into the soil profile is increased, resulting in less runoff. However, infiltration rates are generally low and permeability is slow. Vegetation on this site is often sparse and interspersed with significant areas of bare ground.

Overland water flow can cause significant erosion hazards particularly during intense rainfall periods. A thick, healthy grass cover will improve water quality because it serves as a filter or trap to reduce sediments and pollutants before the water flows offsite.

Recreational uses

Because of the scarcity of trees and shrubs, the level terrain, characteristics of the soil, and the uniformity of the plant community, recreational use of this site is incidental and is generally associated with recreational use of adjacent sites. This site provides limited opportunities for outdoor activities such as hiking, camping, and horseback riding. Quail and dove hunting offer the most potential for recreation on this site.

Wood products

Insignificant.

Other products

Insignificant.

Other information

Insignificant.

Inventory data references

Vegetation data for this site was obtained from existing Range Site Descriptions, SCS-RANGE -417 Production and Composition Records for Native Grazing Lands, and on-site inventories by the author and local experts including ranchers, natural resource specialists from federal and state agencies, and personnel from cooperating agencies and organizations. A total of 8 SCS-RANGE-417's containing data collected from 3 counties during the period 12/30/1981 to 12/12/1986 were reviewed for this site.

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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)	Lem Creswell, Zone RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	11/28/2008

Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** Deposition or erosion is uncommon during normal rainfall events, but may occur in limited areas during intense rainfall events.

3. **Number and height of erosional pedestals or terracettes:** Uncommon for this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect no more than 20% bare ground scattered randomly throughout the site.

5. **Number of gullies and erosion associated with gullies:** Few rills should occur. Some gullies may exist on side drains into intermittent streams.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Little or no litter movement or deposition during normal rainfall events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface in HCPC is resistant to erosion. Stability range is expected to be 5-6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0-6 inche of light olive brown clay loam with weak subangular block structure, very. SOM is 1-4%. See soil survey for more information.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The midgrass/shortgrass prairie has scattered perennial forbs and very few shrubs. Little litter accumulation is expected. Moderate amounts of bare ground, shallow soils, and slow permeability provides for moderate infiltration and moderate runoff.

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season midgrasses

    Sub-dominant: Warm-season tallgrasses > Warm-season shortgrasses >

    Other: Cool-season grasses > Forbs > Shrubs/Vines > Trees

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Perennial grasses will naturally exhibit a minor amount (less than 5%) of senescence and some mortality every year.

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1000 to 2800 pounds per acre.

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Mesquite, lotebush, pricklypear, yucca, tasajillo, King Ranch bluestem, annual broomweed.

17. **Perennial plant reproductive capability:** All perennial species should be capable of reproducing every year unless disrupted by extended drought, overgrazing, wildfire, insect damage, or other events occuring immediately prior to, or during the reproductive phase.