USDA Natural Resources
Conservation Service

Ecological site R078AY121TX
Loamy Bottomland 25-28" PZ

Last updated: 9/12/2023
Accessed: 05/19/2024

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.

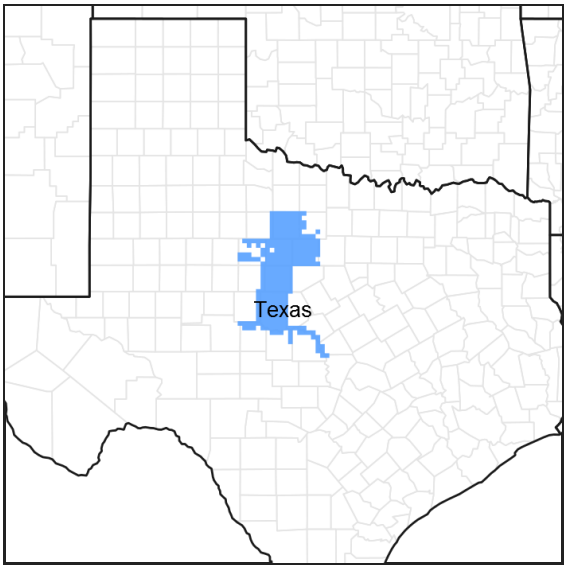


Figure 1. Mapped extent

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): 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

This site occurs on deep loamy soils on floodplains. The reference vegetation consists of tallgrasses, forbs, and some trees and shrubs. Abusive grazing practices can lead to a decline in the palatable tallgrasses. In the absence

of fire or other brush management, woody species canopy may increase across the site.

Associated sites

R078AY117TX	**Clayey Upland 25-28" PZ** Frequently adjacent to and upslope of the Loamy Bottomland site.
R078AY119TX	**Clay Loam 25-28" PZ** Frequently adjacent to and upslope of the Loamy Bottomland site.
R078AY120TX	**Clay Slopes 25-28" PZ** Occasionally adjacent to and upslope of the Loamy Bottomland site.
R078AY126TX	**Shallow Clay 25-28" PZ** Occasionally adjacent to and upslope of the Loamy Bottomland site.
R078AY605TX	**Sandy Loam 25-28" PZ** Frequently adjacent to and upslope of the Loamy Bottomland site.

Similar sites

R078CY094TX	**Clayey Bottomland 23-30" PZ** Similar landscape position, clayey soils. Similar species composition. Somewhat lower production: tallgrasses and trees comprise a smaller proportion of the species composition.
R080BY151TX	**Loamy Bottomland 26-33" PZ** Adjoining MLRA to the east. Similar species composition. Somewhat higher production: tallgrasses and trees comprise a larger proportion of the species composition.
R078CY103TX	**Loamy Bottomland 23-31" PZ** Adjoining MLRA to the west. Similar species composition. Somewhat lower production: tallgrasses and trees comprise a smaller proportion of the species composition

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Panicum virgatum* (2) *Populus deltoides*

Physiographic features

These nearly level soils in the Loamy Bottomland ecological site occur on draws, floodplain step, floodplains, and river valleys in the Rolling Limestone Prairie. The soil floods unless protected, as seldom as once in about 10 years and as often as one to three times a year. These soils were formed in loamy and clayey calcareous alluvium. Slopes range from 0 to 2 percent. Elevation ranges from 950 to 2250 feet.

Table 2. Representative physiographic features

Landforms	(1) Plains > Flood plain (2) Plains > Flood-plain step (3) Plains > River valley
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	290–686 m
Slope	0–2%
Water table depth	183 cm

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)	199-212 days
Freeze-free period (characteristic range)	225-251 days
Precipitation total (characteristic range)	711-737 mm
Frost-free period (actual range)	196-217 days
Freeze-free period (actual range)	223-262 days
Precipitation total (actual range)	686-762 mm
Frost-free period (average)	206 days
Freeze-free period (average)	239 days

Precipitation total (average)	711 mm

Climate stations used

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

Influencing water features

This site is adjacent to, or a part of rivers and streams. It receives floodwaters and overflow from watercourses as well as runoff from adjacent sites in higher positions on the landscape. Some soils in this site are hydric and may be wetlands, or the soils may contain inclusions of other hydric soils that usually occur as oxbows or stream meanders.

Wetland description

NA

Soil features

The soil series in the Loamy Bottomland ecological site consist of very deep, well drained, moderately slowly to moderately permeable soils over calcareous alluvium.

Major Soil Taxonomic Units correlated to this site include: Clairemont, Clearfork, Frio, Gageby, Rioconcho, and Wheatwood.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Clay loam (2) Silty clay loam (3) Silty clay
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–21.59 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–4%

Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The reference plant community for the Loamy Bottomland ecological site is a tallgrass/hardwood savanna. Evidence of the historic vegetation in the bottomlands can be found in the journals and records of explorers, military expeditions, and boundary survey teams.

Loamy Bottomland sites were historically broad, level to gently sloping water courses and drainage ways that allowed runoff, overflows, and floodwaters to spread out and meander across wide expanses. In the modern era, humans have greatly altered and impacted these natural communities. Construction of dams, channelization, cultivation, sedimentation, and conversion to monocultures of crops and introduced grasses has permanently altered the natural ecological processes on most of these sites.

The Loamy Bottomland ecological site has a unique dynamic as compared to upland sites. In their natural settings, bottomlands are subject to occasional to frequent flooding events. Structure and composition of the plant community can change drastically in a short period of time depending on the frequency, intensity, and duration, and timing of floods. Vegetation may vary from sparse to dense dependent upon the recency and severity of the last flood. Flooding may result in scouring of the soil surface in some areas. The exposed soil surface provides an opportunity for seeds or plant materials from off-site to germinate and/or become established. Sediment and debris deposits from flood events may cover existing vegetation and may result in the introduction of transported seeds and plant materials from other locations to the bottomland site.

Rainfall intensity, duration, and flooding cycles play a key role in determining how the vegetation communities occur. A single major flood event can create, alter, or relocate the plant community in a matter of a few hours. Deposition of sediment and debris is common during floods and following high intensity rainfall. Seeds and plant materials from upstream vegetation are frequently deposited and become established on the site.

Climate is also 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 was an important part of the bottomland ecosystem. These historic fires were usually severe because of the amount of grass fuel available to carry the fire. The intensity of fires kept shrubs and sapling trees suppressed and allowed grasses and forbs to flourish. Tallgrass species are fire tolerant and are enhanced by periodic burning. Forbs usually increase for a year or two following these fires before the grasses become dominant again.

Lack of fire allows the native trees and shrubs to increase in density and non-native woody species to encroach until the site eventually becomes a woodland plant community. The increase in overstory and midstory canopy results in a major shift in the plant community because canopy cover greatly influences the kind and amounts of herbaceous understory plants that exist on the site. As canopy increases, more cool-season and shade tolerant perennial and annual plants occupy the site.

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. Many times the site may have burned in between grazing events which would entice the grazers to return.

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 tallgrass plant community has been eliminated or severely reduced on most Loamy Bottomland sites. Further deterioration leads to the loss of the perennial warm-season

midgrass and forb plant community and an increase in short grasses, annuals, and bare ground. This provides the opportunity for less desirable woody species such as mesquite and juniper to encroach into the bottomlands from adjacent upland sites.

Abusive grazing and lack of fire can eventually result in an impenetrable thicket of trees, shrubs, and woody vines with a dense overstory and midstory canopy, significant amounts of bare ground, and only a few scattered shade tolerant perennials, annual grasses and forbs, sedges and rushes.

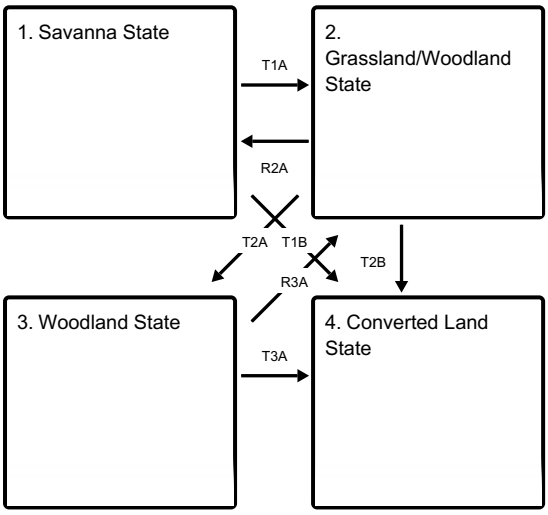
Selective individual removal of undesirable trees and shrubs is relatively easy and more practical when brush plants initially appear on the site. The increase of brush can be fairly rapid and the plants per acre will soon become too numerous for individual control to be feasible. Once woody plants become 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 historic climax level.

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

Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

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

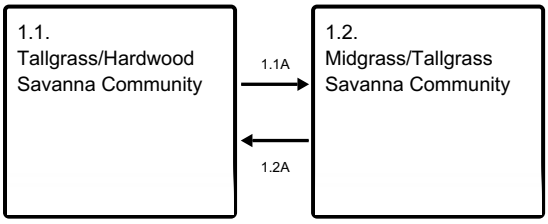
T2A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

T2B - Extensive soil disturbance followed by seeding

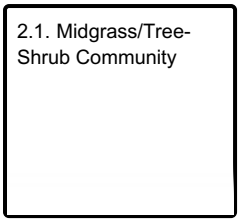
R3A - Adequate rest from defoliation and removal of woody canopy

T3A - Extensive soil disturbance followed by seeding

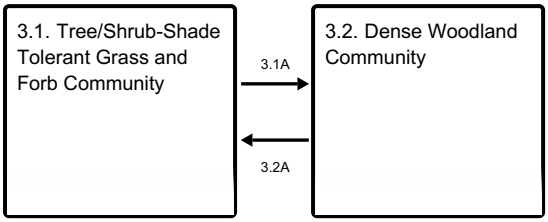
State 1 submodel, plant communities



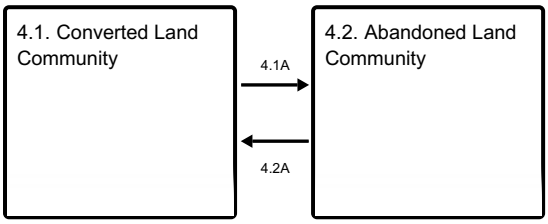
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



State 1
Savanna State

The reference plant community for the Loamy Bottomland ecological site is a tallgrass/hardwood savanna. The site is dominated by warm-season perennial tallgrasses such as switchgrass, Indiangrass, big bluestem, eastern gamagrass, and little bluestem. Warm-season midgrasses such as sideoats grama, vine mesquite, bristlegrass, purpletop, dropseeds, white tridens, and silver bluestem are also abundant. The Loamy Bottomland site historically has a significant amount of trees, shrubs, and vines. The shaded and moist environment enables cool-season and shade tolerant perennial grasses and grass-like plants to occupy the site. Although the general plant type composition is similar to the original plant community, obvious shifts in plant species and structure of the Midgrass/Tallgrass Savanna Community begin to occur. As they begin to disappear, tallgrasses are replaced by a significant increase in warm-season perennial midgrasses, forbs, and annual grasses. Sideoats grama, vine mesquite, Texas wintergrass, and little bluestem begin to dominate the plant community. The diverse perennial forb community is replaced by a dramatic increase in ragweed and an invasion of sumpweed, broomweed, and other annual forbs. Woody species canopy of midstory shrubs and vines gradually begins to increase. Invasion of unwanted brush species such as mesquite from adjacent sites may begin to occur at this stage. As the woody canopy increases slightly, cool-season grasses and forbs and shade tolerant plants increase noticeably.

Dominant plant species

- eastern cottonwood (*Populus deltoides*), tree
- switchgrass (*Panicum virgatum*), grass

Community 1.1
Tallgrass/Hardwood Savanna Community

Figure 8. 1.1 Tallgrass/Hardwood Savanna Community

Figure 9. 1.1 Tallgrass/Hardwood Savanna Community (2)

Figure 10. 1.1 Tallgrass/Hardwood Savanna Community (3)

The Loamy Bottomland ecological site encompasses the channel as well as the first and second banks of the drainageway. It is a very productive and diverse site. The reference plant community for the Loamy Bottomland ecological site is a tallgrass/hardwood savanna. In pristine conditions, the site is dominated by warm-season perennial tallgrasses such as switchgrass, Indiangrass, big bluestem, eastern gamagrass, and little bluestem. Warm-season midgrasses such as sideoats grama, vine mesquite, bristlegrass, purpletop, dropseeds, white tridens, and silver bluestem are also abundant. The Loamy Bottomland site historically has a significant amount of trees, shrubs, and vines. The shaded and moist environment enables cool-season and shade tolerant perennial grasses and grass-like plants to occupy the site. Those may include Texas wintergrass, Canada wildrye, western wheatgrass, Texas bluegrass, and Scribner’s rosettegrass. Shortgrasses such as buffalograss, low panicums, and threeawns, as well as grass-like plants including sedges, flatsedge, rush, and fimbry are minor components of the plant community. The grasses are palatable and nutritious and the site provides abundant, high quality forage for year-round grazing. Bushy bluestem, cattail, and mare’s tail may occur on the edges of the wetter areas on this site.

The most common forbs are Maximilian sunflower, heath aster, gaura, false gaura, Engelmann daisy, verbena, partridgepea, bundleflowers, spiderwort, dayflower, evening primrose, pitcher sage, tickclover, ironweed, verbena, daleas, giant ragweed, and western ragweed. Trees, shrubs, and vines are an important component of the Loamy Bottomland site. The major woody plants and vines on this site include pecan, elm, live oak, post oak, Texas red oak, cottonwood, hackberry, soapberry, willow, bumelia, plum, sumacs, hawthorn, redbud, buttonbush, grape, ivy treebine, Virginia creeper, greenbriar, and coralberry.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2914	4932	7173
Forb	392	673	953
Tree	224	448	841
Shrub/Vine	280	448	560
Total	**3810**	**6501**	**9527**

Figure 12. Plant community growth curve (percent production by month). TX2522, Tallgrass/Hardwood Bottomland Community. Warm-season perennial tallgrasses with some hardwood trees and shrubs (<25% canopy) and a wide variety of forbs. .

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

Community 1.2
Midgrass/Tallgrass Savanna Community

Figure 13. 1.2 Midgrass/Tallgrass Savanna Community

Figure 14. 1.2 Midgrass/Tallgrass Savanna Community (2)

Tallgrasses begin to decline because of disturbance or neglect as a result of lack of fire, no grazing, flooding, short-term or sporadic heavy grazing, or other factors. Although the general plant type composition is similar to the original plant community, obvious shifts in plant species and structure of the plant community begin to occur. As they begin to disappear, tallgrasses are replaced by a significant increase in warm-season perennial midgrasses, forbs, and annual grasses. Sideoats grama, vine mesquite, Texas wintergrass, and little bluestem begin to dominate the plant community. Silver bluestem, white tridens, dropseeds, buffalograss, and threeawns increase significantly. The diverse perennial forb community is replaced by a dramatic increase in ragweed and an invasion of sumpweed, broomweed, and other annual forbs. Woody species canopy gradually begins to increase. This is especially true of the midstory shrubs and vines. Invasion of unwanted brush species such as mesquite from adjacent sites may begin to occur at this stage. As the woody canopy increases slightly, cool-season grasses and forbs and shade tolerant plants increase noticeably.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2130	4035	5716
Forb	336	673	1009
Tree	280	560	897
Shrub/Vine	336	560	785
Total	**3082**	**5828**	**8407**

Figure 16. Plant community growth curve (percent production by month). TX2523, Midgrass/Tallgrass/Hardwood Savanna Community. Sideoats grama, vine mesquite, other warm-season midgrasses, and Texas wintergrass dominate the site with some trees and shrubs (<25% canopy) and a wide variety of forbs. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	5	14	22	20	5	4	13	8	4	2

Pathway 1.1A
Community 1.1 to 1.2

Tallgrass/Hardwood Savanna Community

Midgrass/Tallgrass Savanna Community

Abusive grazing, elimination of fire from the ecosystem, and periodic flooding are the primary factors that cause the reference plant community to shift away from a site dominated by tallgrass species toward a midgrass dominated plant community. Eastern gamagrass, Indiangrass, big bluestem, and switchgrass are highly preferred forage species on this site. As they are selectively and repeatedly grazed by livestock, midgrasses and aggressive forbs become more competitive and begin to replace tallgrasses. The elimination or interruption of the natural fire cycle also contributes to an imbalance in the original plant community. Without periodic fire, the tallgrasses become senescent, unhealthy, and less productive. Lack of fire tends to favor the more aggressive and competitive midgrasses, shortgrasses, annuals, and woody species. Periodic flooding events can abruptly and drastically alter the plant community on this site as the natural vegetation is washed away or covered with silt, debris, or standing water for extended periods of time.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Tallgrass Savanna Community

Tallgrass/Hardwood Savanna Community

A significant number of individual plants of the tallgrass species are still present, and a viable seed source still exists to enable the original plant community to recover if sound management practices are followed. The implementation of a prescribed grazing management strategy and re-introduction of fire into the ecosystem will reverse the shift away from the original plant community. Re-establishment of the original tallgrass plant community can be accomplished by maintaining a reasonable and sustainable stocking rate, as well as using a grazing system to control the timing, frequency, and duration of livestock grazing. A strategically planned and implemented prescribed burning program will accelerate the process, and is essential in maintaining the balanced and diverse tallgrass savanna plant community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2
Grassland/Woodland State

The Midgrass/Tree-Shrub Community has crossed a threshold because there is no longer a sufficient seed source of the tallgrasses, and woody encroachment has reached a point that natural recovery to the reference plant community is no longer possible. Only remnant tallgrasses remain in isolated and protected areas. Midgrasses including Texas wintergrass, silver bluestem, and dropseeds dominate the site. Common bermudagrass may invade the site in open areas. Trees, shrubs, and vines increase in density and canopy. Mesquite, pricklypear, tasajillo, buttonbush, and a number of other shrubs invade the area from adjacent sites. In this phase, woody canopy is greater than 25% but less than 50%, allowing herbaceous plants to continue to produce fairly well and provide good ground cover.

Dominant plant species

- mesquite (*Prosopis*), shrub
- pricklypear (*Opuntia*), shrub
- Texas wintergrass (*Nassella leucotricha*), grass
- silver bluestem (*Bothriochloa saccharoides*), grass

Community 2.1
Midgrass/Tree-Shrub Community

Figure 17. 2.1 Midgrass/Tree-Shrub Community

Figure 18. 2.1 Midgrass/Tree-Shrub Community (2)

At this stage, the vegetation community has crossed a threshold because there is no longer a sufficient seed source of the tallgrasses, and woody encroachment has reached a point that natural recovery to the reference plant community is no longer possible. This state is a result of prolonged periods of damaging disturbances and neglect which may include continuous abusive grazing and total lack of prescribed fire or brush management, or the effects of flood events. Only remnant tallgrasses remain in isolated and protected areas. Midgrasses including Texas wintergrass, silver bluestem, and dropseeds dominate the site. Common bermudagrass may invade the site in open areas. Trees, shrubs, and vines increase in density and canopy. Mesquite, pricklypear, tasajillo, buttonbush, and a number of other shrubs invade the area from adjacent sites. In this phase, woody canopy is greater than 25% but less than 50%, allowing herbaceous plants to continue to produce fairly well and provide good ground cover. Cool-season and shade tolerant grasses and forbs increase significantly. Forbs such as western ragweed, giant ragweed, sumpweed, frostweed, and Baldwin's ironweed are the major broad-leaved plants on the site.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1457	2466	3475
Forb	392	673	1121
Tree	280	785	1121
Shrub/Vine	560	785	785
Total	**2689**	**4709**	**6502**

Figure 20. Plant community growth curve (percent production by month). TX2524, Bottomland Grassland-Woodland Transition. Warm-season midgrasses and short grasses with cool-season and shade tolerant vegetation increasing. Trees and shrubs increasing in canopy and density (25-50% canopy)..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	14	26	22	6	4	13	6	2	2

State 3
Woodland State

The Tree-Shrub/Shade Tolerant Grass Community dominated by an overstory of hardwood trees including many species of elms, oaks, hackberry, and western soapberry. Vines such as greenbriar, grape, Virginia creeper, and ivy treebine increase significantly. Midstory shrubs including lotebush, bumelia, and sumacs begin to form dense thickets. Mesquite, juniper, pricklypear, and tasajillo become well established. Woody canopy is from 50% to 80% and warm-season perennial grasses begin to disappear from the site. Shade tolerant and cool season grasses and forbs become a major part of the plant community. When the overstory and midstory canopy become greater than 80%, warm-season grasses and forbs exist only as remnants, generally consisting of widely scattered individual

plants in low vigor. Shade tolerant forbs, grasses, and grass-like plants dominate the sparse understory vegetation. Some areas may have a dense mat of leaves and decomposing vegetation covering the soil surface.

Dominant plant species

- elm (*Ulmus*), tree
- oak (*Quercus*), tree
- hackberry (*Celtis*), tree

Community 3.1
Tree/Shrub-Shade Tolerant Grass and Forb Community

Figure 21. 3.1 Tree/Shrub-Shade Tolerant Grass and Forb

Continued lack of fire and brush management along with uncontrolled grazing results in a plant community dominated by an overstory of hardwood trees including many species of elms, oaks, hackberry, and western soapberry. Vines such as greenbriar, grape, Virginia creeper, and ivy treebine increase significantly. Midstory shrubs including lotebush, bumelia, and sumacs begin to form dense thickets. Mesquite, juniper, pricklypear, and tasajillo become well established. Woody canopy is from 50% to 80% and warm-season perennial grasses begin to disappear from the site. Shade tolerant and cool season grasses and forbs become a major part of the plant community.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1233	2130	2914
Tree	224	448	897
Shrub/Vine	336	504	560
Forb	224	336	448
Total	**2017**	**3418**	**4819**

Figure 23. Plant community growth curve (percent production by month). TX2525, Tree/Shrub-Shade Tolerant Grass and Forb Community. Trees and shrubs dominate the site (50% - 80% canopy). Cool-season and shade tolerant grasses and forbs dominate the understory vegetation..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	14	26	22	6	4	13	6	2	2

Community 3.2
Dense Woodland Community

Figure 24. 3.2 Dense Woodland Community

When the overstory and midstory canopy become greater than 80%, warm-season grasses and forbs exist only as remnants, generally consisting of widely scattered individual plants in low vigor. Shade tolerant forbs, grasses, and grass-like plants dominate the sparse understory vegetation. On most bottomland sites in this state, there is an abundance of bare ground. Some areas may have a dense mat of leaves and decomposing vegetation covering the soil surface.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	560	841	1121
Shrub/Vine	448	673	897
Forb	336	504	673
Grass/Grasslike	224	336	448
Total	**1568**	**2354**	**3139**

Figure 26. Plant community growth curve (percent production by month). TX2526, Bottomland-Hardwood Woodland Community. Trees and shrubs dominate the site (>80% canopy). Cool-season and shade tolerant vegetation dominates the understory. Dense mats of leaves and decomposing vegetation occur in some areas. Large areas of bare ground are common..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	5	15	37	17	5	4	8	4	1	1

Pathway 3.1A
Community 3.1 to 3.2

Tree/Shrub-Shade Tolerant Grass and Forb Community

Dense Woodland Community

Continued abusive grazing, lack of fire, and lack of brush management will cause this site to become a dense hardwood woodland with a combined tree and shrub canopy that may exceed 80%. It is impractical to consider trying to convert this plant community back to the original tallgrass savanna plant community. The sparse and widely scattered herbaceous understory vegetation consists primarily of annual grasses and forbs, shade tolerant plants, and sedges and rushes. Areas of bare ground are susceptible to erosion and vulnerable to the invasion of weedy species. In most situations, livestock grazing is not a viable alternative except for allowing controlled, short-term access.

Pathway 3.2A
Community 3.2 to 3.1

Dense Woodland Community

Tree/Shrub-Shade Tolerant Grass and Forb Community

It is possible, to reduce the density and canopy of trees and shrubs and to establish more herbaceous vegetation, but it will require drastic and very expensive treatments. Mechanical brush management is necessary to reduce the density and overhead canopy of trees and shrubs. Range planting will be required to re-establish warm-season tallgrasses and midgrasses. If livestock grazing is the objective, a sound grazing management system must then be implemented to control the timing, frequency, and duration of livestock grazing to prevent the site from regressing back to a lower state. A strategically planned and implemented prescribed burning program will be essential to maintaining the re-established plant community for wildlife or livestock objectives.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

State 4
Converted Land State

In the past, thousands of acres of Loamy Bottomland were cleared, plowed and planted to annual crops such as cotton and corn. Row crops are still being planted on many of these cultivated acres. Some of the acres converted to cropland are planted to wheat and oats for grazing today. In the more recent past, many acres that were once cultivated have been seeded or planted to introduced grasses. Additionally, thousands of bottomland acres have been cleared and converted from native rangeland to intensively managed pasturelands and haylands planted to monocultures of introduced species, primarily bermudagrass. 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. If managed properly, some of these abandoned areas may eventually begin to approximate the diversity and complexity of the native Loamy Bottomland ecosystem. However, it is highly unlikely that abandoned lands can ever return to reference vegetation within a reasonable period of time.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 4.1
Converted Land Community

Because of their inherent fertility and the fact that these sites receive extra water, many bottomlands have been converted to other uses. In the past, thousands of acres of Loamy Bottomland were cleared, plowed and planted to annual crops such as cotton and corn. Row crops are still being planted on many of these cultivated acres. Some of the acres converted to cropland are planted to wheat and oats for grazing today. In the more recent past, many acres that were once cultivated have been seeded or planted to introduced grasses. Additionally, thousands of bottomland acres have been cleared and converted from native rangeland to intensively managed pasturelands and haylands planted to monocultures of introduced species, primarily bermudagrass. Areas converted to cropland, pastureland, or hayland are intensively managed with annual cultivation and/or frequent use of herbicides, pesticides, and commercial fertilizers to increase production. Refer to Forage Suitability Group Descriptions to learn

more about adapted species, management, and production potentials on pasturelands and haylands. Some degraded native bottomlands have been reseeded to monocultures or mixtures of commercially available native grasses. If managed properly, many of these areas can eventually begin to approximate the diversity and complexity of the native Loamy Bottomland ecosystem. It is highly unlikely that abandoned cropland, pastureland, or seeded areas can ever return to climax vegetation within a reasonable time. Organic matter, soil structure, and micro-organisms have been destroyed or severely damaged and native vegetation has been eliminated or severely reduced on these areas.

Table 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2914	4932	7173
Forb	392	673	953
Tree	224	448	841
Shrub/Vine	280	448	560
Total	**3810**	**6501**	**9527**

Figure 28. 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

Community 4.2
Abandoned Land Community

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. If managed properly, some of these abandoned areas may eventually begin to approximate the diversity and complexity of the native Loamy Bottomland ecosystem. However, it is highly unlikely that abandoned lands can ever return to reference vegetation within a reasonable period of time.

Table 11. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	560	841	1121
Shrub/Vine	448	673	897
Forb	336	504	673
Grass/Grasslike	224	336	448
Total	**1568**	**2354**	**3139**

Figure 30. 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

Pathway 4.1A
Community 4.1 to 4.2

Converted lands generally need to be intensively managed to maintain their productivity and quality. If weed control is not applied, adequate fertility is not maintained, abusive grazing is allowed, or the area is abandoned, these converted lands will be dominated by “pioneer” plants such as annual grasses and forbs, early successional

grasses, seedlings from non-native shrubs and trees, etc.

Pathway 4.2A
Community 4.2 to 4.1

Abandoned lands can be converted back to cropland, introduced pasture, or seeded monoculture of native or introduced grasses by seedbed preparation to destroy the existing herbaceous vegetation, followed by seeding or planting the desired crop or grass species. Weed control and adequate fertilization must be done as needed to maintain a healthy system. If livestock grazing is the objective, a sound grazing management system must then be implemented to control the timing, frequency, and duration of livestock.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Nutrient Management
Integrated Pest Management (IPM)

Transition T1A
State 1 to 2

Overstocking and heavy grazing pressure for an extended period of time in combination with lack of fire and lack of brush management will eventually result in a drastic change in the plant community on this site. The effect of these uncontrolled grazing practices and absence of needed treatments is that tallgrasses are almost completely eliminated from the site, except for a few widely scattered remnant plants in remote or protected areas. Tallgrasses become a minor component of the plant community and are no longer a viable population. Midgrasses become dominant as forbs, annuals, and shrub species begin to increase on the site. Woody canopy may increase to as much as 50% in this state. Cool-season and shade tolerant grasses, especially Texas wintergrass, increase as the woody canopy increases. Periodic flooding events can abruptly and drastically alter the plant community on this site as the natural vegetation is washed away or covered with silt, debris, or standing water for extended periods of time.

Transition T1B
State 1 to 4

Conversion of this site from the reference plant community to cropland, introduced pasture, or seeded monoculture of native or introduced grasses will require seedbed preparation to destroy the existing herbaceous vegetation, followed by seeding or planting the desired crop or grass species.

Restoration pathway R2A
State 2 to 1

A significant amount of energy and money are required in order for this plant community to be converted back to a more natural state. Brush management is needed in order to remove excessive midstory shrub growth and reduce the overhead canopy. The targeted species should be the invasive woody species as well as the overly aggressive and competitive native species that are not desired for wildlife habitat. Range planting is needed to re-establish a viable population of tallgrasses. These expensive treatments must be followed by establishment of a sound grazing management system to control the timing, frequency, and duration of livestock grazing to prevent the site from regressing back to a lower state. A strategically planned and implemented prescribed burning program is essential to maintaining the re-established plant community.

Conservation practices

Brush Management
Prescribed Burning

Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

Abusive grazing is a result of severe overstocking and continuous heavy grazing pressure for several years. When grazing practices are abusive, periodic fire is eliminated from the site, and brush management is not carried out, the ultimate result will be a site that is dominated by trees and shrubs with extensive areas of bare ground. The combined overstory and midstory canopy of trees and shrubs may range from 50-80%. Higher successional warm-season midgrasses are replaced by lower successional midgrasses, shortgrasses, forbs, and shade tolerant grasses. Periodic flooding events can abruptly and drastically alter the plant community on this site as the natural vegetation is washed away or covered with silt, debris, or standing water.

Transition T2B
State 2 to 4

Conversion of this site from the grassland/woodland state to cropland, introduced pasture, or seeded monoculture of native or introduced grasses will require brush management, seedbed preparation to destroy the existing herbaceous vegetation, followed by seeding or planting the desired crop or grass species.

Restoration pathway R3A
State 3 to 2

Once the site has reached this phase, it is very difficult and expensive to try to convert this plant community back to the original tallgrass savanna plant community. Brush management treatments are needed to remove unwanted shrubs and trees, and reduce overhead canopy. These practices are difficult and expensive. Opening up the canopy will encourage re-establishment of higher successional warm-season midgrasses and tallgrasses if a viable seed source is still present. If livestock grazing is the objective, it will probably be necessary to follow the brush management treatments with range planting to re-establish a more diverse and productive herbaceous plant community. A sound grazing management system must then be implemented to control the timing, frequency, and duration of livestock grazing to prevent the site from regressing back to a lower state. A strategically planned and implemented prescribed burning program will be essential to maintaining the re-established plant community for wildlife or livestock objectives.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Transition T3A
State 3 to 4

Conversion of this site from the tree-shrub/cool-season grass state to cropland, introduced pasture, or seeded monoculture of native or introduced grasses, will require land clearing, seedbed preparation to destroy the existing herbaceous vegetation, followed by seeding or planting the desired crop or grass species.

Additional community tables

Table 12. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					

1	**Tallgrasses**			673–4147	
	switchgrass	PAVI2	*Panicum virgatum*	336–2466	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	0–2466	–
	Indiangrass	SONU2	*Sorghastrum nutans*	336–2018	–
	big bluestem	ANGE	*Andropogon gerardii*	0–1681	–
	little bluestem	SCSC	*Schizachyrium scoparium*	336–1121	–
2	**Midgrasses**			1233–1681	
	sideoats grama	BOCU	*Bouteloua curtipendula*	280–1121	–
	vine mesquite	PAOB	*Panicum obtusum*	112–841	–
	streambed bristlegrass	SELE6	*Setaria leucopila*	0–168	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	0–168	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–168	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	0–168	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–168	–
	white tridens	TRAL2	*Tridens albescens*	0–168	–
	purpletop tridens	TRFL2	*Tridens flavus*	0–168	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0–168	–
	bushy bluestem	ANGL2	*Andropogon glomeratus*	0–168	–
3	**Cool-season grasses**			336–897	
	Texas wintergrass	NALE3	*Nassella leucotricha*	280–897	–
	Canada wildrye	ELCA4	*Elymus canadensis*	112–560	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	0–168	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–168	–
	Texas bluegrass	POAR	*Poa arachnifera*	0–168	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–168	–
4	**Shortgrasses/Grass-likes**			336–448	
	buffalograss	BODA2	*Bouteloua dactyloides*	56–448	–
	sedge	CAREX	*Carex*	0–56	–
	flatsedge	CYPER	*Cyperus*	0–56	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–56	–
	fimbry	FIMBR	*Fimbristylis*	0–56	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–56	–
	rush	JUNCU	*Juncus*	0–56	–
	panicgrass	PANIC	*Panicum*	0–56	–
	crowngrass	PASPA2	*Paspalum*	0–56	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–56	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–56	–
Forb					
5	**Forbs**			392–953	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–168	–
	great ragweed	AMTR	*Ambrosia trifida*	0–168	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–168	–

	purple poppymallow	CAIN2	*Callirhoe involucrata*	0–168	–
	American star-thistle	CEAM2	*Centaurea americana*	0–168	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	0–168	–
	whitemouth dayflower	COER	*Commelina erecta*	0–168	–
	Queen Anne's lace	DACA6	*Daucus carota*	0–168	–
	prairie clover	DALEA	*Dalea*	0–168	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0–168	–
	ticktrefoil	DESMO	*Desmodium*	0–168	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–168	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–168	–
	buckwheat	ERIOG	*Eriogonum*	0–168	–
	beeblossom	GAURA	*Gaura*	0–168	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–168	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–168	–
	annual marsh elder	IVAN2	*Iva annua*	0–168	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	0–168	–
	evening primrose	OENOT	*Oenothera*	0–168	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	0–168	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	0–168	–
	false gaura	STLI2	*Stenosiphon linifolius*	0–168	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–168	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	0–168	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–168	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	0–168	–
	Texas vervain	VEHA	*Verbena halei*	0–168	–
	white crownbeard	VEVI3	*Verbesina virginica*	0–168	–
	spiny cocklebur	XASP2	*Xanthium spinosum*	0–168	–
Shrub/Vine					
6	**Shrubs**			224–448	
	common buttonbush	CEOC2	*Cephalanthus occidentalis*	0–280	–
	hawthorn	CRATA	*Crataegus*	0–280	–
	stretchberry	FOPU2	*Forestiera pubescens*	0–280	–
	Carolina buckthorn	FRCA13	*Frangula caroliniana*	0–280	–
	plum	PRUNU	*Prunus*	0–280	–
	sumac	RHUS	*Rhus*	0–280	–
	bully	SIDER2	*Sideroxylon*	0–280	–
7	**Vines**			56–112	
	heartleaf peppervine	AMCO2	*Ampelopsis cordata*	0–112	–
	sorrelvine	CITR2	*Cissus trifoliata*	0–112	–
	Carolina coralbead	COCA	*Cocculus carolinus*	0–112	–
	Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	0–112	–
	greenbrier	SMILA2	*Smilax*	0–112	

	greenbrier	SMILA2	*Smilax*	0–112	–
	coralberry	SYOR	*Symphoricarpos orbiculatus*	0–112	–
	grape	VITIS	*Vitis*	0–112	–
Tree					
8	**Trees**			224–841	
	pecan	CAIL2	*Carya illinoinensis*	0–336	–
	sugarberry	CELAL	*Celtis laevigata var. laevigata*	0–336	–
	netleaf hackberry	CELAR	*Celtis laevigata var. reticulata*	0–336	–
	eastern cottonwood	PODE3	*Populus deltoides*	0–336	–
	post oak	QUST	*Quercus stellata*	0–336	–
	Nuttall oak	QUTE	*Quercus texana*	0–336	–
	live oak	QUVI	*Quercus virginiana*	0–336	–
	black willow	SANI	*Salix nigra*	0–336	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	0–336	–
	winged elm	ULAL	*Ulmus alata*	0–336	–
	American elm	ULAM	*Ulmus americana*	0–336	–
	cedar elm	ULCR	*Ulmus crassifolia*	0–336	–

Animal community

Historically, the Loamy Bottomland site was inhabited permanently and intermittently by a wide variety of mammals, reptiles, amphibians, birds, and invertebrates. The diversity in the kind, amount, and structure of the vegetation as well as the usually dependable presence of water made this a preferred site for animals as well as humans. 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, deer, and antelope roaming freely across the Rolling Limestone Prairie and adjacent regions. These free-ranging animals used the bottomlands as sources of forage, water, shelter, and escape. Small fur-bearing mammals such as raccoons, opossum, fox, beaver, coyote, squirrels, skunks, rabbits, and rodents also inhabited the area in and around bottomlands. Wild turkey, quail, dove, and a wide variety of birds found ideal habitat for nesting, food, and water. Reptiles and amphibians found a variety of habitats and conditions to meet their needs as well.

Currently, the site is utilized by deer, wild turkey, quail, dove, numerous species of birds, a wide variety of small fur-bearing mammals, reptiles and amphibians, and invertebrates. Feral hogs are also frequent visitors to the site in some areas. Animal species and populations fluctuate as the vegetation cycles through temporary phases and different ecological stages.

Livestock tend to prefer this site for grazing and tend to concentrate on these areas because of the quality and quantity of forage available as well as the presence of water and the presence of trees for shade and windbreaks during critical periods. In order to prevent overuse, livestock grazing should be controlled by implementing grazing management systems that incorporate frequent and timely deferment periods to prevent abusive grazing.

Hydrological functions

The Loamy Bottomland site is a key component in the hydrologic functions of the entire ecosystem. Soils are well-drained, moderately permeable, and runoff is slow. Some areas have a high water table, frequently within 20 feet of the surface. The site receives runoff, overflow, and floodwaters from adjacent sites and serves as a tributary to major watercourses. Bottomlands deliver these waters to draws, creeks, streams, rivers, ponds, and lakes downstream. When herbaceous vegetation and ground cover are maintained in a healthy and vigorous status, water infiltration into the soil profile and deep percolation into groundwater is increased significantly, resulting in less runoff. A thick, healthy grass cover also results in improved water quality because it serves as a filter or trap to reduce sediments and pollutants before the water flows offsite.

Recreational uses

When there is no threat of flooding, Loamy Bottomland sites can be outstanding recreational areas. In its natural state, The Loamy Bottomland site has an abundance of stately trees, tall grasses, and a wide variety of wildflowers. These scenic areas offer outdoor activities including photography, shaded picnic areas, bird watching, hiking, camping, horseback riding, and off-road vehicle use. Because of the diversity of habitats, bottomlands are usually prime areas for hunting deer, turkey, and squirrels. Fishing and canoeing are other activities on bottomland sites which include permanent water features.

Wood products

Mature hardwood trees can be a source of wood for lumber, furniture, crafts, fence posts, or firewood, for individual use. Commercial harvest of bottomland trees is not economically feasible, and is not recommended on the site in this Major Land Resource Area.

Other products

This site has a wide variety of trees, shrubs, and vines that produce fruits, nuts, berries and other byproducts. Native pecans, walnuts, acorns, grapes, and plums are usually plentiful. Grape vines, willows, cane, and other pliable materials found in bottomlands are frequently used in decorative crafts, basket making, etc. Some of the grasses and forbs found on this site are used in dried floral arrangements (woodoats, bristlegrass, bushy bluestem, cattail, eryngo, etc.).

Other information

None.

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 six counties (Shackelford and Throckmorton) during the period 12/30/1981 to 12/12/1986 were reviewed for this site.

Other references

Ajilvsgi, Geyata. Wildflowers of Texas. Sharer Publishing, Bryan, TX. 1984.

Bachand, Richard. The American Prairie: Going, Going, Gone? National Wildlife Federation. Rocky Mountain Natural Resource Center. Boulder, CO. 2001.

Coffey, Chuck R., and Russell Stevens. Grasses of Southern Oklahoma and North Texas: A Pictorial Guide. The Samuel Roberts Noble Foundation, Ardmore, OK. 2004

Diggs, George M., Jr., Barney L. Lipscomb, and Robert J. O’Kennon. Illustrated Flora of North Central Texas. Botanical Research Institute of Texas. Fort Worth, TX 1999.

Egan, Dave and Evelyn A. Howell. The Historical Ecology Handbook…A Restorationist’s Guide to Reference Ecosystems. Island Press, Washington, DC. 2001.

Flores, Dan. “Indian Use of Range Resources” presented at 20th Annual Ranch Management Conference. Lubbock, TX, September 30, 1983.

Frost, Cecil C. Presettlement Fire Frequency Regimes of the United States: A First Approximation. Tall Timber Fire Ecology Conference Proceedings, No. 20. Tall timbers Research Station. Tallahassee, FL. 1998.

Gleason, Jerry. Personal communication. 2008

Gould, Frank W., The Grasses of Texas. Texas A&M University Press, College Station, TX. 1975.

Hatch, Stephan L., Kancheepuram N. Gandhi, and Larry E. Brown. Checklist of the Vascular Plants of Texas. Texas Agricultural Experiment Station MP-1655. College Station, TX. 1990

Hatch, Stephan L., Jennifer Pluhar. Texas Range Plants. Texas A&M University Press, College Station, TX. 1993.

Kelton, Elmer. “History of Rancher Use of Range Resources” presented at 20th Annual Ranch Management Conference. Lubbock, TX, September 30, 1983.

Kirkpatrick, Zoe Merriman. Wildflowers of the Western Plains. University of Texas Press. Austin, TX. 1992.

Larrabee, Aimee and John Altman. Last Stand of the Tallgrass Prairie. Sterling Publishing Co., New York, NY. 2001.

North Rolling Plains Resource Conservation and Development. Common Rangeland Plants of the Texas Panhandle. Pampa, TX. 2008.

Packard, Stephen and Cornelia F. Mutel. The Tallgrass Restoration Handbook for Prairies, Savannas, and Woodlands. Island Press, Washington, DC. 1997.

Parker, W.B. Through Unexplored Texas In The Summer and Fall of 1854. The Texas State Historical Commission. Austin, TX 1984

Shiflet, Thomas N. et. Al. Rangeland Cover Types of the United States. Society for Range Management. Denver, CO. 1994.

Smith, Jared G. Grazing Problems in the Southwest and How to Meet Them. United States Department of Agriculture Division of Agrostology. Washington, DC. 1899.

Texas Almanac 2008-2009. Dallas Morning News. Dallas, TX. 2008.

Tyrl, Ronald J., Terrence G. Bidwell, and Ronald E. Masters. Field Guide to Oklahoma Plants. Oklahoma State University, Stillwater, OK. 2002.

United States Department of Agriculture Natural Resources Conservation Service, National Plant Data Center, Baton Rouge, LA. The PLANTS Database. http://plants.usda.gov 2007.

United States Department of Agriculture Natural Resources Conservation Service, Ag Handbook 296. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. 2006.

United States Department of Agriculture Natural Resources Conservation Service, Temple, TX. Loamy Bottomland Ecological Site Description R080BY151TX. 2008

United States Department of Agriculture Natural Resources Conservation Service, Temple, TX. Loamy Bottomland Ecological Site Description R078CY103TX. 2006.

United States Department of Agriculture Soil Conservation Service, Washington, DC. Web Soil Survey http://websoilsurvey.nrcs.usda.gov/app/. 2007

United States Department of Agriculture Soil Conservation Service, Temple, TX. Published Soil Surveys: Throckmorton, Shackelford, Callahan, Coleman and Concho Counties. Various publication dates.

United States Department of Agriculture Soil Conservation Service, Temple, TX. Range Site Descriptions for the

Rolling Plains, Rolling Limestone Prairie, and North Central Prairie MLRAs. Various publication dates.

Vines, Robert A. Trees of North Texas. University of Texas Press, Austin, TX. 1982

Weniger, Del. The Explorers' Texas. Eakin Publications. Austin, TX. 1984.

Weniger, Del. Cacti of the Southwest. University of Texas Press, Austin, TX. 1978.

Williams, Gerald W. References On The American Indian Use Of Fire in Ecosystems. United States Department of Agriculture – Forest Service, Washington, DC. 2005.

ACKNOWLEDGEMENTS: I would like to express my thanks and appreciation to the following people for their cooperation, assistance, and support in the development of this Ecological Site Description:

Kimberly Burr, USDA Natural Resources Conservation Service, Albany, TX
Jerry Gleason, USDA Natural Resources Conservation Service, Throckmorton, TX
Sammy Wilson, USDA Natural Resources Conservation Service, Baird, TX

Reviewers:
Lem Creswell, RMS, NRCS, Weatherford, Texas
Nathan Haile, RSS, NRCS, Weatherford, Texas
Justin Clary, RMS, NRCS, Temple, Texas
Mark Moseley, RMS, NRCS, Boerne, Texas

Contributors

Dan Caudle, Weatherford, Texas
Joe B. Norris, RMS, NRCS, Abilene, Texas
PES Edits by Tyson Morley, MLRA Soil Scientist, Altus, Oklahoma

Approval

Bryan Christensen, 9/12/2023

Acknowledgments

Site Development and Testing Plan:

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

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

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

Author(s)/participant(s)	Lem Creswell, RMS, NRCS, Weatherford, Texas

Contact for lead author	817-596-2865
Date	11/19/2008
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:** Water flow patterns are common and follow old stream meanders. 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:** Pedestals or terracettes would have been 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:** Some gullies may be present on side drains into perennial and intermitttent streams. Gullies should be vegetated and stable.

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

7. **Amount of litter movement (describe size and distance expected to travel):** This is a flood plain with occasional out of bank flow. Under normal rainfall, little litter movement should be expected; however, litter of all sizes may move long distances depending on obstructions.

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 wind 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):** 0-64 inches thick that has moderate, medium, course blocky structure. SOM is approximately 1-6%. See soil survey for specific soil.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Under HCPC, the bottomland of warm season tall and midgrasses and forbs with adequate litter and little bare ground provides for maximum infiltration and little runoff under normal rainfall events.

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 tallgrasses >

    Sub-dominant: Warm-season midgrasses > Cool-season grasses > Trees > Forbs > Shrubs/Vines

    Other:

    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 with some overstory litter.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 3400-8500 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, saltcedar, pricklypear, tasajillo, bermudagrass, Johnsongrass, cocklebur, sumpweed.

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.