USDA Natural Resources Conservation Service

Ecological site R078BY093TX
Wet Bottomland 19-26" PZ

Last updated: 9/15/2023
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.

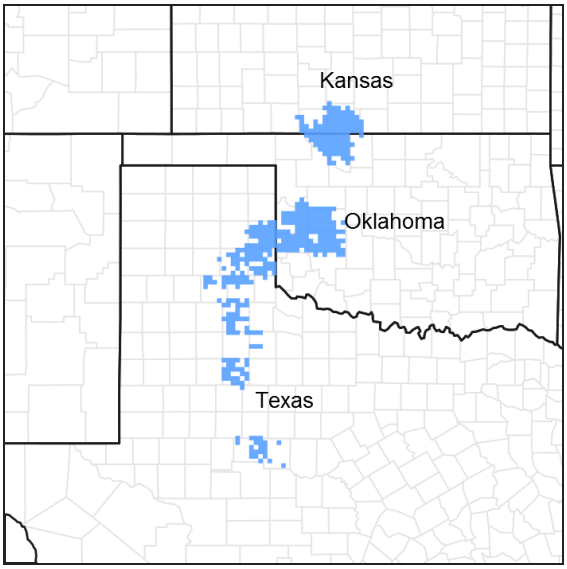


Figure 1. Mapped extent

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): 078B–Central Rolling Red Plains, Western Part

MLRA 78B is characterized by strongly dissected, rolling plains with prominent ridges and valleys and rolling to steep irregular topography. Loamy soils are generally well drained, range from shallow to deep, and developed in sediments of Triassic and Permian age.

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 subirrigated loamy soils on bottomlands. These soils have a high water table within three feet of the surface for long periods during the year. Reference vegetation consists of tallgrasses with some midgrasses,

forbs, and woody species. Abusive grazing practices can lead to a shift in the plant community. Frequency of fires or alternative brush management can alter the amount of woody species on the site. Water table fluctuations and increases in salinity may also lead to changes in the plant community.

Associated sites

R078BY074TX	**Draw 19-26" PZ** Upstream from Wet Bottomland site.
R078BY082TX	**Loamy Sand 19-26" PZ** Adjacent and uphill from Wet Bottomland site.

Similar sites

R078BY080TX	**Loamy Bottomland 19-26" PZ** Similar physiographic position, but without the high water table.

Table 1. Dominant plant species

Tree	(1) *Salix nigra*
Shrub	Not specified
Herbaceous	(1) *Panicum virgatum*

Physiographic features

These soils are on sub-irrigated nearly level bottomlands and gently sloping foot-slopes. Slopes range from 0 to 1 percent. Slope gradients are mostly less than 1 percent, but some are as much as 3 percent. Elevation ranges from 1550 to 2700 feet. These soils are usually wet and are saturated at some period during the year. A water table is within 1/2 to 3 feet most of the year except during infrequent floods when it is ponded.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain
Runoff class	Negligible
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Long (7 to 30 days)
Ponding frequency	Frequent
Elevation	472–823 m
Slope	0–1%
Ponding depth	0–30 cm
Water table depth	0–30 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of the western rolling plains is dry, sub-humid with hot summers and mild winters. Temperatures often reach 100 degrees F for several consecutive days during summer. Cold spells with temperatures less than 20 degrees F only last short periods of time. The soil is not frozen below the 3-inch depth for more than 2 to 3 days. Humidity is low during the winter and early spring months. Sometimes relative humidity is high enough to make summer days uncomfortable. Most of the precipitation comes in the form of rain and occurs during the spring and early summer principally. May is the wettest month followed by June. July and August are dryer and much hotter. Rainfall often comes as intense showers of relatively short duration. Rainfall rate per hour is often high and runoff is significant. Infiltration is diminished due to lack of opportunity time. The growing season begins in April and ends

with the first killing frost in Nov. There is little snowfall with the average being about 10 inches. Rainfall averages about 22 inches.

There is a 70% chance that yearly precipitation will fall between 16 and 24 inches. About 55% of the time, the yearly rainfall is below the mean. Dry spells during the growing season are common and long-term droughts occur in cycles of about 20 years. Native vegetation is principally warm season.

Table 3. Representative climatic features

Frost-free period (characteristic range)	189-194 days
Freeze-free period (characteristic range)	204-222 days
Precipitation total (characteristic range)	584-610 mm
Frost-free period (actual range)	184-201 days
Freeze-free period (actual range)	202-223 days
Precipitation total (actual range)	559-635 mm
Frost-free period (average)	192 days
Freeze-free period (average)	213 days
Precipitation total (average)	584 mm

Climate stations used

- (1) WELLINGTON [USC00419565], Wellington, TX
- (2) PADUCAH [USC00416740], Paducah, TX
- (3) JAYTON [USC00414570], Jayton, TX
- (4) SNYDER [USC00418433], Snyder, TX
- (5) ROBERT LEE [USC00417669], Robert Lee, TX

Influencing water features

Not available.

Wetland description

NA

Soil features

The Wet Bottomland ecological site consists of very deep, poorly drained, moderately slowly permeable soils formed in sandy alluvium and colluviums in partly filled valleys. These valleys are usually adjacent to areas of upland sands. Runoff is slow.

Major Soil Taxonomic Units correlated to this site include: Sweetwater soils.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Clay loam (2) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained
Permeability class	Very slow to moderately slow
Soil depth	152–203 cm

Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
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)	7.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The reference plant community of the Wet Bottomland Ecological Site developed under the prevailing climate over time along with the soils in their topographic location. Underground water originating from the exposed Ogallala formation upstream provided wet soil conditions and encouraged tallgrass production. Trees and shrubs occupy locations protected from the frequent and intense fires that occurred throughout the region before European settlement.

The Tallgrass/Midgrass Community (1.1) is characterized by sedges and rushes where the water table is near the surface and tallgrasses, midgrasses, forbs and scattered woody species as the water table becomes deeper. The endemic woody plants, which historically provided five percent or less of the plant production, are either resistant to fire or occupy areas where fires were less frequent or intense. See the Composition and Production table for species composition and Plant Preference tables for botanical names of plants mentioned in text by common name.

The demise of the Native American Indians, expansion of the livestock industry and cessation of periodic intense fires changed the ecological dynamics of the vegetation on the Wet Bottomland site. After European settlement in the late 1800’s, the frequency and intensity of fire diminished and intense grazing by cattle and sheep began a transition from the reference community towards a woodland state with increasing woody species. Although recent climatic warming trends and increases in atmospheric carbon dioxide may be enhancing vegetation change, the major forces influencing transition from the reference plant community to a woodland state are continuous overgrazing by livestock and the decrease in frequency and intensity of fire.

As livestock and wildlife numbers increase and grazing use exceeds the plants ability to sustain defoliation, the more palatable and generally more productive species decline in stature, productivity and density. The more palatable and accessible tallgrasses and forbs give way to midgrasses, such as sideoats grama and vine mesquite. Unpalatable sedges and rushes tend to increase in wetter areas. The better quality forbs are replaced with less palatable species. The woody species that had been kept in check by fire and grass competition begin increasing in number and density. The site also becomes open to invasion of species from adjacent sites. The increase in density and stature of the woody vegetation brings about a new plant community, the Midgrass/Tallgrass Community (1.2).

In the Midgrass/Tallgrass Community (1.2), ecological processes have changed little and the pathway back to the reference community can be accomplished without major energy inputs. Good grazing management alone will not reverse the trend towards the Woodland State. Some form of woody plant control, such as prescribed burning and selective, mechanical brush control must accompany it. Due to the high water table and occasional flooding, chemical brush control should not be used on wet bottomland sites.

The plant community has shifted to a more woody plant community, but grass and forb herbage is still the largest

component of annual production. This phase is more compatible to browsers and woodland animals. Accordingly, pronghorn antelope decreased and deer numbers increased.

If the combination of abusive grazing by livestock and wildlife continues, as it did on most areas of this site through the middle of the twentieth century, less palatable grasses, forbs, shrubs and trees become dominant to the detriment of taller and more palatable species. Trees and shrubs will spread and become larger with midgrasses, shortgrasses and annuals replacing the reference community dominants. Loss of herbaceous cover and increased bare ground precludes effective burning and encourages accelerated erosion. Soil and litter movement will occur during floods and water infiltration into the soil decreases. Increases in soil salinity often encourage salt tolerant species. When woody plant canopy reaches 20 to 25 percent and the grass component provides less than 50 percent of the herbage production, the transition into a woodland state is complete. The first stage of the woodland state is the Midgrass/Shrubs Community (2.1). Once this threshold is crossed, proper grazing management and prescribed burning alone cannot return the Midgrass/Shrubs Community (2.1) to the Grassland State (1).

The endemic cottonwoods, willows and hackberry dominate the overstory in the Midgrass/Shrubs Community (2.1). However, western soapberry and non-native species such as Chinese elm and salt cedar often invade and form thickets. Once established, the trees and shrubs can become dominant, even without grazing, if they are not controlled. Occasionally saline conditions are set up, resulting in increased amounts of prairie cordgrass, alkali sacaton and inland saltgrass. Salt cedar is particularly invasive where saline conditions develop. Midgrass and forb diversity and production continues to decline while shrubs, salt-tolerant grasses and weedy annuals increase as the canopy becomes denser. The herbaceous component is further reduced through shading and competition from woody vegetation.

Continued abusive grazing by livestock and deer, along with periodic droughts, eventually brings about a plant community in which woody plants are so dominant that only remnants of grassland vegetation remain in the interspaces. This plant community type is identified as the Woody Bottomland Community (2.2). The understory and interspaces support remnants of reference vegetation, generally in low vigor and productivity due to shading and competition for water and nutrients. Erosion, loss of soil organic matter and saline conditions prevail. The plant community is so degraded that it cannot reverse retrogression without extensive energy and management inputs.

Restoring the Woody Bottomland Community (2.2) to the grassland state requires extensive accelerated management practices, such as mechanical brush control, range planting, prescribed grazing and prescribed burning. The unique characteristics of the Wet Bottomland Site and the great differences from adjacent sites make special management necessary. Often it may be beneficial to fence this site to manage or limit access by grazing animals. Haying of the tallgrasses is an alternative to grazing. With extensive accelerated practices, time and proper management, this plant community can again resemble the reference community in productivity and functioning of ecological processes. Generally, the Midgrass/Tallgrass (1.2) or Midgrass/Shrubs (2.1) Communities will provide adequate habitat for livestock and wildlife.

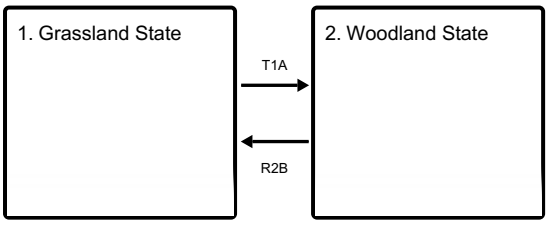
NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

STATE AND TRANSITIONAL PATHWAYS:

Narrative:
The following diagram depicts the states and pathways described in the Ecological Dynamics section. There may be other states and transitions not shown. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

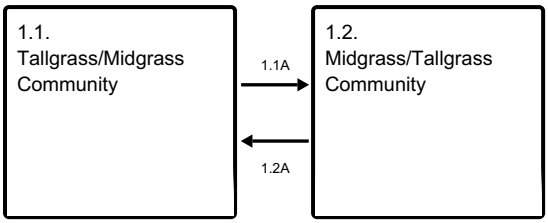
Ecosystem states



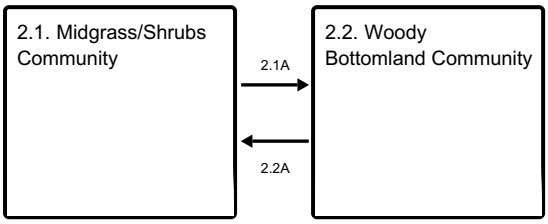
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Grassland State

The Tall/Midgrass Community was dominated by tall and midgrasses species when European settlers first arrived. The presence of a high water table and infrequent flooding greatly influenced the plant community. Woody plants, primarily cottonwood, hackberry, willow, and American elm were widely scattered along the stream course and draws. Shrubs and vines such as bumelia, plum, indigobush and grape were present but kept suppressed by periodic fires and grass competition. The herbaceous component accounted for 85 to 95 percent of the site's primary annual production, with tallgrasses accounting for 40 to 50 percent of the herbage production. Alkali sacaton and inland saltgrass occurred in small amounts where saline conditions developed. Canada wildrye and western wheatgrass were common cool-season grasses. Common forbs included Maximilian sunflower, Illinois bundleflower, prairie clover and Engelmanndaisy. Annual total production ranges from 5,000 to 9,000 pounds per acre. The Midgrass/Tallgrass Community (1.2) is now being encroached by indigenous or invading woody species that had been held at low densities by repeated fires and competition from a vigorous grass component. Numerous woody species, including willow, hackberry, and cottonwood, are increasing in density. The woody canopy varies between 10 and 25 percent depending on severity of grazing, time since last burn, and availability of invading species. Brushy species, such as bumelia, indigobush, plum, and willow baccharis may also increase. The preferred tallgrasses are being replaced by the more grazing resistant midgrasses. Characteristic grasses are little bluestem, sideoats grama, tall and meadow dropseed, vine mesquite and alkali sacaton. Sedges and rushes are characteristic species where the water table remains near the surface. Most of the perennial forbs found in the historic climax remain in this plant community. In this community, the increasing woody species are generally less than five feet tall. Annual total production ranges from 4,500 to 8,000 pounds per acre.

Dominant plant species

- black willow (*Salix nigra*), tree
- switchgrass (*Panicum virgatum*), grass

Community 1.1
Tallgrass/Midgrass Community

Figure 8. 1.1 Tallgrass/Midgrass Community

The reference plant community for the Wet Bottomland Ecological Site is dominated by tall and midgrasses. This plant community evolved under the influence of grazing, periodic fire and a dry sub-humid climate. The presence of a high water table and infrequent flooding greatly influences the plant community. Woody plants, primarily cottonwood, hackberry, willow, and American elm are widely scattered along the stream course and draws. Shrubs and vines such as bumelia, plum, indigobush and grape are present but are kept suppressed by periodic fires and grass competition. The herbaceous component accounts for 85 to 95 percent of the site's primary annual production, with tallgrasses such as switchgrass, Indiangrass, sand bluestem, eastern gamagrass and prairie cordgrass accounting for 40 to 50 percent of the herbage production. Sand bluestem, switchgrass and Indiangrass are confined to areas with deeper soils away from the shallow water table zone and are locally dominant. Sedges, rushes, eastern gamagrass, prairie cordgrass and tall dropseed dominate on areas with a continuous high water table. Secondary grasses are sideoats grama, vine mesquite, knotroot bristlegrass and muhly. Alkali sacaton and inland saltgrass occur in small amounts where saline conditions have developed. Canada wildrye and western wheatgrass are common cool-season grasses. Common forbs include Maximilian sunflower, Illinois bundleflower, prairie clover and Engelmanndaisy. (See Plant Community Composition and Annual Production table below). The site is highly productive due to fertile soils and high water availability. Soil erosion is low due to the abundant plant cover, litter, and slow runoff. Runoff is reduced due to the dense tallgrass cover. The vegetative ground cover helps disperse and slow down runoff thus holding soil in place and enhancing infiltration into the slowly permeable soils. Concentrated water flow patterns are rare. Without proper grazing management that adjusts animal numbers, including deer, to annual forage production and judicious prescribed burning, the Tallgrass/Midgrass Community will transition to the Midgrass/Tallgrass Community (1.2).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4932	6904	8877
Forb	280	392	504
Shrub/Vine	280	392	504
Tree	112	157	202
Total	**5604**	**7845**	**10087**

Figure 10. Plant community growth curve (percent production by month). TX2051, Tallgrass/Midgrass Plant Community. Warm-season tallgrasses and midgrasses with peak growth in May & June and September & October..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	6	9	20	22	8	6	12	10	2	2

Community 1.2
Midgrass/Tallgrass Community

Figure 11. 1.2 Midgrass/Tallgrass Community

The tallgrass dominated grassland is now being encroached by indigenous or invading woody species that had been held at low densities by repeated fires and competition from a vigorous grass component. Numerous woody species, including willow, hackberry, and cottonwood, are increasing in density. Continuous overgrazing by livestock has reduced grass cover, exposed some soil and reduced fine fuel for fire. The woody canopy varies between 10 and 25 percent depending on severity of grazing, time since last burn, and availability of invading species. Brushy species, such as bumelia, indigobush, plum, and willow baccharis may also increase. The preferred tallgrasses are being replaced by the more grazing resistant midgrasses. Characteristic grasses are little bluestem, sideoats grama, tall and meadow dropseed, vine mesquite and alkali sacaton. Sedges and rushes are characteristic species where the water table remains near the surface. Most of the perennial forbs found in the historic climax remain in this plant community. In this community, the increasing woody species are generally less than five feet tall and are subject to control by improved grazing management, prescribed burning and selective mechanical brush control. Due to the high water table and periodic flooding, chemical brush management is not recommended. Annual total production ranges from 4,500 to 8,000 pounds per acre depending on precipitation amounts and the water table. Production continues to be high because of the tallgrass species and available water. Total production of the site is still dominated by grass and grass-like species. Grazing has reduced plant cover, litter and mulch. Bare ground exposes the soil to water erosion. There could be some mulch and litter movement during rainstorms. But, due to gentle slopes and grass cover, little soil movement occurs. The changes in plant species composition are small initially, but unless proper grazing and prescribed burning are applied; the woody species will continue to increase in size and density. As overgrazing continues, the tallgrasses give way to midgrasses. When the canopy of the woody plants becomes dense enough (>25 %) and tall enough (> 5 feet) to suppress grass growth and resist fire damage, a threshold in ecological succession is crossed. The Midgrass/Tallgrass Community (1.2) transitions into the Midgrass/Shrubs Community (2.1), which is also the first stage of the Woodland State. Once this threshold has been passed, normal range management practices, such as proper grazing and prescribed burning cannot reverse the transition to woody plant dominance. Accelerated management practices, such as mechanical brush control and re-seeding of native grass species are required to reverse regression and prevent domination of the woody plant community.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4035	5828	7173
Shrub/Vine	504	729	897
Tree	252	364	448
Forb	252	364	448
Total	**5043**	**7285**	**8966**

Figure 13. Plant community growth curve (percent production by month). TX2052, Midgrass/Tallgrass Plant Community. Warm-season midgrasses and tallgrasses with peak growth in May-June and September-October..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	6	9	20	22	8	6	12	10	2	2

Pathway 1.1A
Community 1.1 to 1.2

Tallgrass/Midgrass Community

Midgrass/Tallgrass Community

The Tallgrass/Midgrass Community will shift to the Midgrass/Tallgrass Community due to heavy continuous grazing pressure, no fires, and brush invasion of willows and hackberry trees.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Tallgrass Community

Tallgrass/Midgrass Community

With the application of conservation practices such as Prescribed Grazing and Prescribed Burning, the Midgrass/Tallgrass Community may be able to shift back to the Tallgrass/Midgrass Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Woodland State

The Midgrass/Shrubs Community (2.1) presents a 25 percent or greater woody plant canopy dominated by cottonwood, hackberry and willows. Plum, western soapberry, baccharis and indigobush, are also increasing in density and size. There is a decline in the diversity of the grassland component and an increase in woody species and annual forbs. In the more saline areas inland saltgrass and alkali sacaton may dominate. Remnants of reference community grasses and forbs and unpalatable invaders occupy the interspaces between trees and shrubs. Cool-season grasses, such as Canada wildrye, Texas bluegrass and western wheatgrass, can be found under and around woody plants. The Woody Bottomland Community (2.2) is dominated by several woody species including willows, baccharis, and hackberry. Western soapberry, salt cedar, and Chinese elm have increased tremendously in the past few decades. They often form dense woodlands on the site where grazing has been heavy and continuous and fires have been excluded. Salt cedar, along with baccharis, is particularly problematic where salinity has increased. Common understory shrubs are buttonbush, indigobush, and plum. Shortgrasses, cool-season grasses and low quality annual and perennial forbs occupy the tree interspaces. The brush canopy increases in density while shortgrasses, such as threeawns, red grama, and sedges replace the more palatable mid and shortgrasses.

Dominant plant species

- cottonwood (*Populus*), tree
- hackberry (*Celtis*), shrub
- willow (*Salix*), shrub

- threeawn (*Aristida*), grass

Community 2.1
Midgrass/Shrubs Community

Figure 14. 2.1 Midgrass/Shrubs Community

The Midgrass/Shrubs Community presents a 25 percent or greater woody plant canopy dominated by cottonwood, hackberry and willows. Plum, western soapberry, baccharis and indigobush, are also increasing in density and size. This plant community is the result of continuous heavy grazing by livestock and deer and the differential response of plants to defoliation. There is a decline in the diversity of the grassland component and an increase in woody species and annual forbs. In the more saline areas inland saltgrass and alkali sacaton may dominate. Primary production has decreased due to the decline in soil structure and organic matter and has shifted toward the woody component. All, except the more palatable woody species, have increased in size. Baccharis and Chinese elm may invade and where salinity problems exist, salt cedar may increase dramatically. Remnants of reference community grasses and forbs and unpalatable invaders occupy the interspaces between trees and shrubs. Cool-season grasses, such as Canada wildrye, Texas bluegrass and western wheatgrass, can be found under and around woody plants. Because of grazing pressure and competition for nutrients and water from the woody plants, the grassland component shows lack of plant vigor and productivity. Common herbaceous species are threeawns, sedges, sagewort, goldenrod and western ragweed. As the grassland vegetation declines, more soil is exposed to crusting and erosion. During this phase, soil and water erosion can be high. High interception losses by the increasing woody canopy combined with evaporation and runoff can reduce the effectiveness of rainfall. Soil organic matter and structure decline in the interspaces but may improve under woody plant cover. Some soil loss could occur during heavy flooding events. Annual primary production is approximately 3,500 to 7,000 pounds per acre. In this stage, production is balanced between herbaceous plants and woody plants. Browsing animals such as deer find fair food value if browsing has not been excessive. Forage quality for cattle is low. Proper grazing management alone will not return this plant community back to the grassland state as a major threshold has been crossed. Brush management and probably re-seeding to native grass species will be required. If heavy grazing continues with no brush management, the transition towards a dense woodland community will continue.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2214	2774	3531
Shrub/Vine	981	1541	1961
Tree	588	925	1177
Forb	588	925	1177
Total	**4371**	**6165**	**7846**

Figure 16. Plant community growth curve (percent production by month). TX2053, Midgrass\Shrub Plant Community. Midgrass-Shrub plant community with summer growth plus increasing cool season component..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	8	9	18	22	8	6	12	8	4	2

Community 2.2
Woody Bottomland Community

Figure 17. 2.2 Woody Bottomland Community

The Woody Bottomland Community (2.2) is the result of continued overgrazing by livestock and no control of woody species. Several woody species may dominate the site. Willows, baccharis, and hackberry were the early dominants. Western soapberry, salt cedar, and Chinese elm have increased tremendously in the past few decades. They often form dense woodlands on the site where grazing has been heavy and continuous and fires have been excluded. Salt cedar, along with baccharis, is particularly problematic where salinity has increased. Common understory shrubs are buttonbush, indigobush, and plum. Shortgrasses, cool-season grasses and low quality annual and perennial forbs occupy the tree interspaces. Characteristic grasses found in this plant community are alkali sacaton, saltgrass, threeawns and sedges. Representative forbs include dotted gayfeather, western ragweed, prairie coneflower and Baldwin ironweed. With continued heavy grazing by livestock and deer, the brush canopy increases in density while shortgrasses, such as threeawns, red grama, and sedges replace the more palatable mid and shortgrasses. The tree and shrub canopy intercepts rainfall. Increased evapotranspiration losses create a more xeric microclimate. Reduced soil fauna and litter exposes more soil surface to erosion in the woody plant interspaces. Surface crusting is common where plant cover and soil conditions have deteriorated. However, within the woody canopy, hydrologic processes stabilize and soil organic matter and mulch begin to increase and eventually stabilize under the mature woodland plant community. Without major brush control and management inputs, this plant community cannot be shifted to near reference conditions. The brush species will continue to thicken until the community stabilizes with the climate and soil. The woody overstory can reach 80 to 90 percent ground cover with less than 25 percent of the herbage being produced by a weakened grassland component. With continued livestock grazing, the mature phase of the Woody Bottomland Plant Community provides cover for wildlife, but only limited amounts of preferred forage or browse is available for livestock or wildlife. Returning the Woody Bottomland phase back to the grassland state requires extensive and expensive reclamation practices. Range planting, prescribed grazing and prescribed burning, must follow intensive mechanical brush control. Land use other than livestock production might dictate alternative reclamation approaches to create the plant community that best fits the intended use.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	1177	1569	1961
Tree	1009	1345	1681
Grass/Grasslike	841	1121	1401
Forb	336	448	560
Total	**3363**	**4483**	**5603**

Figure 19. Plant community growth curve (percent production by month). TX2054, Woodland Community (Bottomlands). Wooded bottomland plant community with summer growth plus increasing cool-season component..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	8	9	18	22	8	6	12	8	4	2

Pathway 2.1A
Community 2.1 to 2.2

Midgrass/Shrubs Community

Woody Bottomland Community

With heavy continuous grazing, no brush management, no fires, and salinity increase, the Midgrass/Shrub Community will shift to the Woody Bottomland Community.

Pathway 2.2A
Community 2.2 to 2.1

Woody Bottomland Community

Midgrass/Shrubs Community

With the application of various conservation practices including Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning, the Woody Bottomland Community may be able to revert back to the Midgrass/Shrubs Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T1A
State 1 to 2

The Grassland State will transition into the Woodland State with the use of heavy continuous grazing, no brush management, no fires, and salinity increase.

Restoration pathway R2A
State 2 to 1

The Midgrass/Shrubs Community can be restored back to the Grassland State with the use of various conservation practices including Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning.

Conservation practices

Brush Management
Prescribed Burning

Prescribed Grazing
Range Planting

Restoration pathway R2B
State 2 to 1

The Woody Bottomland Community can be restored back to the Grassland State with the use of various conservation practices including Prescribed Grazing, Reclamation, Brush Management, Range Planting, and Prescribed Burning.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrasses**			2522–4539	
	sand bluestem	ANHA	*Andropogon hallii*	504–4539	–
	switchgrass	PAVI2	*Panicum virgatum*	504–4539	–
	Indiangrass	SONU2	*Sorghastrum nutans*	504–4539	–
	prairie cordgrass	SPPE	*Spartina pectinata*	504–4539	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	504–4539	–
2	**Midgrasses**			1121–2018	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–2018	–
	saltgrass	DISP	*Distichlis spicata*	0–2018	–
	muhly	MUHLE	*Muhlenbergia*	0–2018	–
	vine mesquite	PAOB	*Panicum obtusum*	0–2018	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–2018	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–2018	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–2018	–
3	**Cool-season Grasses**			448–807	
	Canada wildrye	ELCA4	*Elymus canadensis*	0–807	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–807	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–807	–
	Carolina canarygrass	PHCA6	*Phalaris caroliniana*	0–807	–
	Texas bluegrass	POAR	*Poa arachnifera*	0–807	–
	annual rabbitsfoot grass	POMO5	*Polypogon monspeliensis*	0–807	–
	Canada wildrye	ELCA4	*Elymus canadensis*	448–807	–
	foxtail barley	HOJU	*Hordeum jubatum*	448–807	–

	western wheatgrass	PASM	*Pascopyrum smithii*	448–807	–
	Carolina canarygrass	PHCA6	*Phalaris caroliniana*	448–807	–
	Texas bluegrass	POAR	*Poa arachnifera*	448–807	–
	annual rabbitsfoot grass	POMO5	*Polypogon monspeliensis*	448–807	–
4	**Grasslikes**			841–1513	
	sedge	CAREX	*Carex*	841–1513	–
	rush	JUNCU	*Juncus*	841–1513	–
Forb					
5	**Forbs**			280–504	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–504	–
	great ragweed	AMTR	*Ambrosia trifida*	0–504	–
	whitemouth dayflower	COER	*Commelina erecta*	0–504	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–504	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0–504	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–504	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–504	–
	annual marsh elder	IVAN2	*Iva annua*	0–504	–
	lespedeza	LESPE	*Lespedeza*	0–504	–
	dotted blazing star	LIPU	*Liatris punctata*	0–504	–
	cardinalflower	LOCA2	*Lobelia cardinalis*	0–504	–
	evening primrose	OENOT	*Oenothera*	0–504	–
	turkey tangle fogfruit	PHNO2	*Phyla nodiflora*	0–504	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	0–504	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	0–504	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–504	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	0–504	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	0–504	–
	hoary verbena	VEST	*Verbena stricta*	0–504	–
Shrub/Vine					
6	**Shrubs/Vines**			280–504	
	false indigo bush	AMFR	*Amorpha fruticosa*	280–504	–
	saltwater false willow	BAAN	*Baccharis angustifolia*	280–504	–
	common buttonbush	CEOC2	*Cephalanthus occidentalis*	280–504	–
	roughleaf dogwood	CODR	*Cornus drummondii*	280–504	–
	bully	SIDER2	*Sideroxylon*	280–504	–
Tree					
7	**Trees**			112–202	
	netleaf hackberry	CELAR	*Celtis laevigata var. reticulata*	112–202	–
	little walnut	JUMI	*Juglans microcarpa*	112–202	–
	eastern cottonwood	PODE3	*Populus deltoides*	112–202	–
	black willow	SANI	*Salix nigra*	112–202	–
	American elm	ULAM	*Ulmus americana*	112–202	–

Animal community

Many types of wildlife used the historical climax plant community (HCPC) of the Wet Bottomland Ecological Site. Many types of grassland insects, reptiles, birds and mammals frequented the site, either as their base habitat or from the adjacent sites. Small mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunk, opossum and armadillo. Predators include coyote, red fox, gray fox, bobcat and occasionally mountain lion. Game birds, songbirds, and birds of prey were indigenous or frequent users. Most are still plentiful. Bison and pronghorn antelope are no longer present. Whitetail and Mule deer utilize the site in its various states. Deer, turkey and quail particularly favor the habitat provided by the Midgrass/Tallgrass (1.2) and Midgrass/Shrubs (2.1) plant communities. Deer, turkey, quail and dove hunting is an important sport, or commercial enterprise, providing considerable income to land owners.

This site is preferred by cattle and is very suited to primary grass eaters. As retrogression occurs and woody plants invade, it becomes better habitat for deer and other wildlife because of the browse and cool season grasses. Livestock should be stocked in proportion to the available grass, forb and browse forage, keeping deer competition for forbs and browse in mind. If the animal numbers are not kept in balance with herbage and browse production through grazing management and good wildlife population management, the late woodland phase will have little to offer as habitat except cover.

Hydrological functions

The Wet Bottomland Ecological Site is unique in that it has an underground supply of water from the exposed Ogallala formation upstream. Hydrophilic plants are abundant and the site is a productive riparian habitat. The site is on very deep, poorly drained, moderately permeable soils in lowlands with nearly level to gentle slopes. Runoff is slow due to gentle slope and good grass cover. Excellent vegetation growth can be expected because of high water availability. A water table near the surface is common and during wet seasons the site may be under water for short periods. The site is not arable. However, haying may be an alternative. The site contributes to the stability of the overall riparian system that occurs along streams of the region.

Recreational uses

The Wet Bottomland Site is well suited for many outdoor recreational uses including hunting, hiking, camping, equestrian use and bird watching. This site along with adjacent upland sites provides diverse scenic beauty.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

Information presented here has been derived from the revised Wet Bottomland Range Site, literature, limited NRCS clipping data (417s), field observations and personal contacts with range-trained personnel. Photos by J.L. Schuster.

Other references

1. Archer S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. In Ecological implications of livestock herbivory in the West, pp.13-68. Edited by M. Vavra, W. Laycock, R. Pieper, Society for Range Management Publication. , Denver, CO.

2. Archer, Steve and F.E. Smeins.1991. Ecosystem-level Processes, Chapter 5 in: Grazing Management: An Ecological Perspective edited by R. K. Heitschmidt and J.W. Stuth. Timber Press, Portland, Oregon.
3. Frost, C. C. 1998. Pre-settlement fire frequency regions of the United States: A first approximation. Tall Timbers Fire Ecology Conference Proceedings No. 20
4. Thurow T.L., 1991. Hydrology and erosion. Chapter 6 in: Grazing Management: An Ecological Perspective Edited by: R.K. Heitschmidt and J.W. Stuth. Timber Press, Portland, Oregon.
5. USDA/NRCS Soil Survey Manuals for Donley Counties, Texas.
6. Vines, RA. 1984. Trees of Central Texas. University of Texas Press. Austin, Texas.
7. Plant symbols, common names and scientific names according to USDA/NRCS Texas Plant List (Unpublished)
8. Bestelmeyer, B. T., J.R. Brown, K. M. Havsted, R. Alexander, G. Chavez and J. E. Hedrick. 2003. Development and use of state-and-transition models for rangelands. J. Range Management. 56(2): 114-126.

Special thanks to the following NRCS personnel for assistance and guidance with development of this ESD: Clint Rollins and J.R. Bell (retired), NRCS Amarillo & Justin Clary, NRCS Temple, Texas.

Technical Review:
Mark Moseley, Rangeland Management Specialist, San Antonio, Texas
Clint, Rollins, Rangeland Management Specialist, Amarillo, Texas
Steve Glasgow, State Grazing Lands Specialist, Stillwater, Oklahoma
Justin Clary, Rangeland Management Specialist, Temple, Texas

Contributors

Dr. Joe Schuster, Range & Wildlife Habitat Consultants, Bryan, Texas
Joe Norris, RMS, NRCS, Abilene, TX
PES Edits by Tyson Morley, MLRA Soil Scientist, Altus, Oklahoma

Approval

Bryan Christensen, 9/15/2023

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)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
Contact for lead author	806-791-0581
Date	09/04/2007

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

Indicators

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

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

3. **Number and height of erosional pedestals or terracettes:** Common due to concentrated water flow.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-15% along banks, up to 50% in channeled areas.

5. **Number of gullies and erosion associated with gullies:** None to slight.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Frequent and extensive during heavy rainfall events.

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Silty clay loam; firm surface; high SOM.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Extensive basal cover, density with small interspaces should make rainfall impact minimal. This site has moderately permeable soil, runoff is slow and available water holding capacity is medium.

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 >

Other: Cool-season grasses > Trees = Shrubs/vines = Forbs

Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Mortality and decadence is moderate due to high herbaceous vegetative canopy.

---

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

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 5,000 to 9,000 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:** Willow baccharis, salt cedar, and Russian olive can be invasive.

---

17. **Perennial plant reproductive capability:** All plant species should be capable of reproduction except during prolonged drought conditions, heavy natural herbivory or intense wildfires.
