USDA Natural Resources
Conservation Service

Ecological site R080BY151TX
Loamy Bottomland 26-33" PZ

Last updated: 9/19/2023
Accessed: 05/18/2024

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.

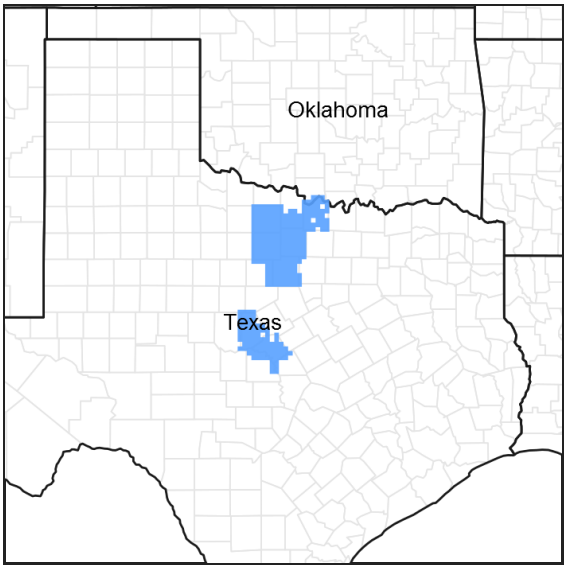


Figure 1. Mapped extent

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): 080B–Texas North-Central Prairies

MLRA 80B consists of gently rolling, dissected plains with very steep hillsides and sideslopes and narrow flood plains associated with small streams. Loamy and clayey soils range from very shallow to deep and developed in sandstones, shales, and limestones of Pennsylvanian age.

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 deep, loamy alluvial soils on floodplains. The reference vegetation consists of native tallgrasses with a variety of forbs and scattered trees. The trees are typically more prevalent closest to the stream or creek. Without fire or other brush management, woody species may encroach on the site and eventually dominate the ecosystem. These sites can be very productive yet are often prone to flooding.

Associated sites

R080BY146TX	**Clay Loam 26-33" PZ** Frequently adjacent and upslope of the Loamy Bottomland site.
R080BY155TX	**Redland 26-33" PZ** Occasionally adjacent to and upslope of the Loamy Bottomland site.
R080BY159TX	**Sandy Loam 26-33" PZ** Frequently adjacent to and upslope of the Loamy Bottomland site.

Similar sites

R080BY144TX	**Clayey Bottomland 26-33" PZ** Similar landscape position but with clayey soils. Similar species and production. Somewhat lower production: tallgrasses and trees comprise a smaller proportion of the species composition.

Table 1. Dominant plant species

Tree	(1) *Carya illinoinensis*
Shrub	Not specified
Herbaceous	(1) *Panicum virgatum* (2) *Sorghastrum nutans*

Physiographic features

This site occurs on linear flood plains and flood-plain steps in the Texas North-Central Prairies. This site is characteristically a water receiving site. Slopes are typically less than 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain (2) Alluvial plain > Flood-plain step
Runoff class	Negligible to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Elevation	229–732 m
Slope	0–2%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is subtropical subhumid and is characterized by hot humid summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost generally occurs about November 5 and the last freeze of the season usually occurs about March 19. The average frost free period ranges from 215 days in the northern counties, to 240 days in the south.

The average relative humidity in mid-afternoon is about 60 percent in the summer months. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the southwest and highest windspeeds occur during the spring months.

Approximately 75% of annual rainfall occurs between April 1 and October 31. Rainfall during the months of April through September typically occurs during thunderstorms which tend to be intense and brief, resulting in large

amounts of rain in a short time. The wettest months of the year are May, June, September, and October. The driest months during the growing season are July and August. The winter months of November, December, January, and February are the driest months overall.

Average annual precipitation for the entire MLRA is approximately 28 inches. There is a noticeable difference in the average annual precipitation in the northern counties in comparison to the southern and western counties of this Major Land Resource Area. Jack, Clay, Young, and Palo Pinto Counties all have an average annual precipitation of more than 31 inches. Stephens, Eastland, McCulloch, and San Saba Counties all have an average annual precipitation of less than 28 inches.

Winters tend to be mild, with occasional periods of very cold temperatures which can be accompanied by strong northerly winds and freezing precipitation. Snow is infrequent and significant accumulations are rare. These periods of very cold weather are generally short-lived. Summers tend to be hot and dry. Drought conditions are common during most summers. Air temperatures of more than 95oF are common from mid-June through September. In the northern counties nearest to the Red River, temperatures are generally slightly cooler during winter months and slightly warmer during summer months than in the other counties in the North Central Prairie.

Table 3. Representative climatic features

Frost-free period (characteristic range)	184-200 days
Freeze-free period (characteristic range)	211-225 days
Precipitation total (characteristic range)	762-813 mm
Frost-free period (actual range)	183-204 days
Freeze-free period (actual range)	210-226 days
Precipitation total (actual range)	737-838 mm
Frost-free period (average)	193 days
Freeze-free period (average)	217 days
Precipitation total (average)	787 mm

Climate stations used

- (1) SAN SABA 7NW [USC00417994], Richland Springs, TX
- (2) BROWNWOOD 2ENE [USC00411138], Early, TX
- (3) EASTLAND [USC00412715], Eastland, TX
- (4) MINERAL WELLS AP [USW00093985], Millsap, TX
- (5) BRECKENRIDGE [USC00411042], Breckenridge, TX
- (6) GRAHAM [USC00413668], Graham, TX
- (7) JACKSBORO [USC00414517], Jacksboro, TX

Influencing water features

This site is adjacent to 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

Site specific evaluations are necessary to determine wetland locations.

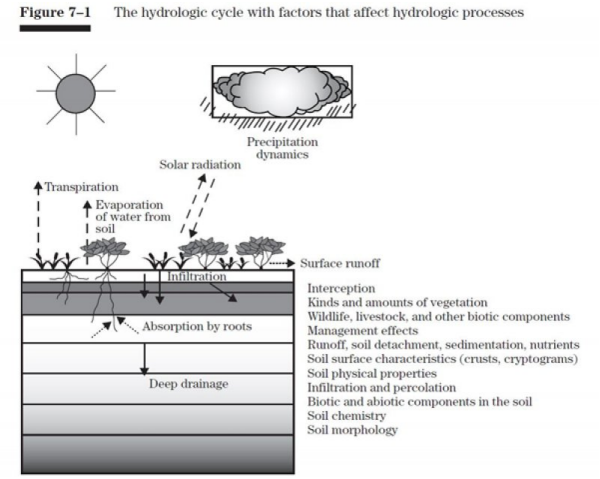


Figure 8.

Soil features

Representative soil components for this ecological site include: Bosque, Frio, Gowen, Pulexas

The site is characterized by very deep loamy well drained soils on floodplains.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone, sandstone, and shale
Surface texture	(1) Loam (2) Clay loam (3) Silty clay loam (4) Fine sandy loam
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	183 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	20.32–27.94 cm
Calcium carbonate equivalent (0-101.6cm)	0–40%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–3%

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. One such observation is from the journal of Captain Randolph Marcy who

was exploring the area of the Little Wichita River in 1852. Marcy was referring to the river bottom and the adjacent overflow bottomland in this description: “The soil in the valley is very productive, the timber consisting of overcup, white oak, elm, hackberry and wild china is large and abundant, and the adjoining prairie is covered with a heavy growth of the very best grass”.

Loamy Bottomlands were historically broad, level to gently sloping water courses and drainageways 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 introduced crops and grasses have 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 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 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 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.

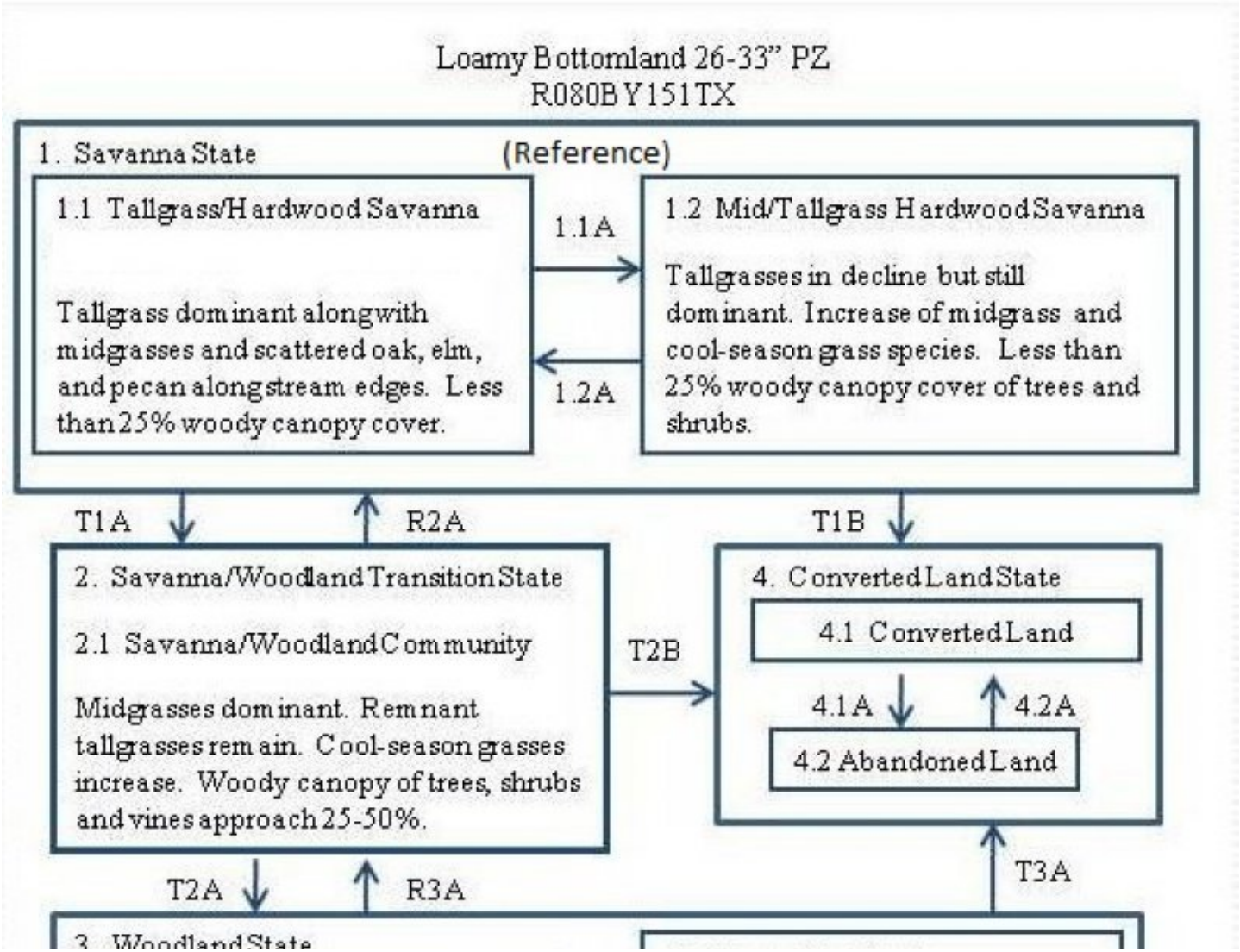
Selective individual removal of undesirable trees and shrubs is relatively easy and more practical when brush plants initially appear on the site. The increase of brush can be fairly rapid and the plants per acre will soon become too numerous for individual control to be feasible. Once woody plants become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

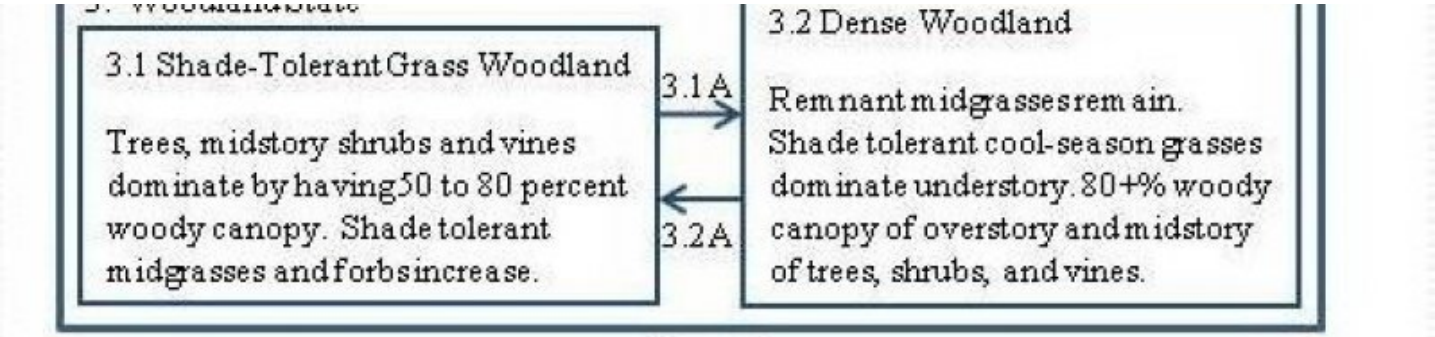
Changes in plant communities and vegetation states on the Loamy Bottomland site are result of the combined influences of natural events (floods, overflow, rainfall, temperature, droughts, etc.) and the accompanying management systems implemented on the area (prescribed fire, grazing management, and brush 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 Transitional Pathways:
The State and Transition Diagram which follows provides information on some of the most typical pathways that the vegetation on this site can follow as the result of natural events, management inputs, and application of conservation treatments. There may be other plant communities that can exist on this site under certain conditions. Consultation with local experts and professionals is recommended prior to application of practices or management strategies in order to ensure that specific objectives will be met.

State and transition model





Legend

1.1A – Uncontrolled Grazing, Flooding, No Fire
1.2A – Prescribed Grazing, Prescribed Burning
T1A – Abusive Grazing, Flooding, No Fire, No Brush Management,
R2A – Prescribed Grazing, Prescribed Burning, Brush Management
T2A – Abusive Grazing, No Fire, No Brush Management
R3A - Prescribed Grazing, Prescribed Burning, Brush Management
3.1A – Abusive Grazing, No Fire, No Brush Management
3.2A – Prescribed Grazing, Prescribed Burning, Brush Management
T1B – Crop Cultivation, Pasture Planting, Range Planting, Tree Planting
T2B – Brush Management, Crop Cultivation, Pasture Planting, Range Planting, Tree Planting
T3A – Land Clearing, Crop Cultivation, Pasture Planting, Range Planting, Tree Planting
4.1A – Abusive Grazing, No Brush Management, Idle Land
4.2A - Prescribed Grazing, Pasture/Range/Cropland Management, Crop Cultivation, Pasture Planting, Range Planting

State 1
Savanna State - Reference

The reference plant community for the Loamy Bottomland ecological site is a Tallgrass/Hardwood Savanna Community. In pristine conditions, the site is dominated by warm-season perennial tallgrasses. Warm-season midgrasses 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. Bushy bluestem, cattail, and mare's tail are frequently present on the edges of the wetter areas on this site. Annual production ranges from 3800 to 9000 pounds per acre. In the Mid/Tallgrass Hardwood Savannah, tallgrasses begin to decline. 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. 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 and juniper from adjacent sites occurs. Annual production ranges from 3000 to 7500 pounds per acre.

Dominant plant species

- pecan (*Carya illinoinensis*), tree
- switchgrass (*Panicum virgatum*), grass

Community 1.1
Tallgrass/Hardwood Savanna Community

Figure 9. 1.1 Tallgrass/Hardwood Savanna Community

The reference plant community for the Loamy Bottomland ecological site is a Tallgrass/Hardwood Savanna Community. In pristine conditions, the site is dominated by warm-season perennial tallgrasses such as Indiangrass, switchgrass, big bluestem, eastern gamagrass, and little bluestem. Warm-season midgrasses such as sideoats grama, knotroot bristlegrass, tall dropseed, meadow dropseed, silver bluestem, vine mesquite, and purpletop 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, Virginia wildrye, Texas bluegrass, broadleaf woodoats, Scribner's rosettegrass, sedges, flatsedge, rush, and fimbry. 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 are frequently present on the edges of the wetter areas on this site. The most common forbs are Engelmanndaisy, Maximilian sunflower, heath aster, gaura, false gaura, verbena, sagewort, 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, bois d'arc, willow, bumelia, plum, sumacs, hawthorn, redbud, grape, ivy treebine, Virginia creeper, greenbriar, and coralberry. Annual production ranges from 3800 to 9000 pounds per acre.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3363	5828	8070
Forb	448	673	1009
Shrub/Vine	224	392	504
Tree	224	392	504
Total	**4259**	**7285**	**10087**

Figure 11. Plant community growth curve (percent production by month). TX3032, 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
Mid/Tallgrass Hardwood Savanna Community

Figure 12. 1.2 Mid/Tallgrass Hardwood Savanna Community

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. Little bluestem begins to dominate the site along with silver bluestem, Texas wintergrass, dropseeds, buffalograss, and threeawns. Desirable perennial forbs are 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 and juniper 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. Annual production ranges from 3000 to 7500 pounds per acre.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2466	4371	5941
Forb	336	785	1233
Shrub/Vine	336	560	785
Tree	224	336	448
Total	**3362**	**6052**	**8407**

Figure 14. Plant community growth curve (percent production by month). TX3033, Midgrass/Tallgrass Hardwood Savannah Community. Little bluestem and warm-season perennial midgrasses 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

Mid/Tallgrass Hardwood Savanna Community

With uncontrolled grazing pressure, flooding, and no fires, the Tallgrass/Hardwood Savanna Community will shift to the Mid/Tallgrass Hardwood Savanna Community.

Pathway 1.2A
Community 1.2 to 1.1

Mid/Tallgrass Hardwood Savanna Community

Tallgrass/Hardwood Savanna Community

With the implementation of Prescribed Grazing and Prescribed Burning conservation practices, the Mid/Tallgrass Hardwood Savanna Community can be reverted back to the Tallgrass/Hardwood Savanna Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Savanna/Woodland Transition State

In the Savanna/Woodland Community, the vegetation community no longer has 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 continues to dominate the site. Trees, shrubs, and vines increase further in density and woody canopy. Mesquite, juniper, pricklypear, tasajillo, 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. Annual production ranges from 2700 to 5600 pounds per acre.

Dominant plant species

- pecan (*Carya illinoinensis*), tree
- Ashe's juniper (*Juniperus ashei*), tree
- honey mesquite (*Prosopis glandulosa*), shrub
- wildrye (*Elymus*), grass
- Texas wintergrass (*Nassella leucotricha*), grass

Community 2.1
Savanna/Woodland Transition Community

Figure 15. 2.1 Savanna/Woodland Transition Community

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 silver bluestem, Texas wintergrass, and dropseeds dominate the site. Trees, shrubs, and vines increase in density and canopy. Mesquite, juniper, pricklypear, tasajillo, and 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. Annual production ranges from 2700 to 5600 pounds per acre.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1681	2466	3363
Forb	560	897	1233
Shrub/Vine	448	785	1009
Tree	336	448	673
Total	**3025**	**4596**	**6278**

Figure 17. Plant community growth curve (percent production by month). TX3034, Grassland/Woodland Transition Bottomland Community. 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

In the Shade-Tolerant Grass Woodland Community, the plant community is 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 begin to form dense thickets. 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. Annual production ranges from 2400 to 4500 pounds per acre. When the overstory and midstory canopy become greater than 80%, warm-season grasses and forbs exist only as remnants, leading to a new plant community, the Dense Woodland Community. This community generally consists of widely scattered individual plants in low vigor. Shade-tolerant forbs, grasses, and grass-like plants dominate the sparse understory vegetation. Annual production ranges from 1400 to 2800 pounds per acre.

Dominant plant species

- elm (*Ulmus*), tree
- netleaf hackberry (*Celtis laevigata var. reticulata*), tree
- Ashe's juniper (*Juniperus ashei*), tree
- wildrye (*Elymus*), grass

Community 3.1
Shade-Tolerant Grass Woodland Community

Figure 18. 3.1 Shade-Tolerant Grass Woodland Community

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. Annual production ranges from 2400 to 4500 pounds per acre.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1121	1569	1905
Shrub/Vine	560	897	1121
Forb	560	897	1121
Tree	448	560	897
Total	**2689**	**3923**	**5044**

Figure 20. Plant community growth curve (percent production by month). TX3035, Tree/Shrub Shade Tolerant 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 21. 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. Annual production ranges from 1400 to 2800 pounds per acre.

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 23. Plant community growth curve (percent production by month). TX3036, 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

Shade-Tolerant Grass Woodland Community

Dense Woodland Community

With abusive grazing, no fires, and no brush management, the Shade-Tolerant Grass Woodland Community will shift to the Dense Woodland Community.

Pathway 3.2A
Community 3.2 to 3.1

Dense Woodland Community

Shade-Tolerant Grass Woodland Community

With the use of various conservation practices including Prescribed Grazing, Prescribed Burning, and Brush Management, the Dense Woodland Community can be reverted back to the Shade-Tolerant Grass Woodland Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

State 4
Converted Land State

Because of their inherent fertility and the fact that these sites receive extra water, many bottomlands have been converted to other uses which give rise to the Converted Land Community. 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. Recently many acres that were once cultivated has 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 such as bermudagrass, Kleingrass, and Old World bluestems. Some degraded native bottomlands have been reseeded to monocultures or mixtures of commercially available native grasses. It is highly unlikely that abandoned cropland, pastureland, or seeded areas can ever return to the reference plant community within a reasonable time. Annual production ranges from 4000 to 9000 pounds per acre. Abandoned croplands and reseeded areas tend to revert back to a more natural state through the process of secondary succession. This community is known as the Abandoned Land Community. 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, but is highly unlikely that abandoned lands can ever return to climax vegetation within a reasonable period of time. Annual production ranges from 1000 to 4000 pounds per acre.

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 4.1
Converted Land Community

Figure 24. 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. Recently, many acres that were once cultivated have now 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 such as bermudagrass, Kleingrass, and Old World bluestems. 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. Native species that have been planted in monocultures or mixture include eastern gamagrass, switchgrass, and Indiangrass. 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 the reference plant community 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. Annual production ranges from 4000 to 9000 pounds per acre.

Table 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4035	6613	9079
Forb	224	336	560
Shrub/Vine	112	224	336
Tree	112	112	112
Total	**4483**	**7285**	**10087**

Figure 26. Plant community growth curve (percent production by month). TX3037, Converted Land Community. Planted to monocultures of introduced species, or monocultures or mixtures of commercially available native tallgrasses. .

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

Figure 27. 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, but is highly unlikely that abandoned lands can ever return to the reference plant community within a reasonable period of time. Annual production ranges from 1000 to 4000 pounds per acre.

Table 11. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	1513	2690
Forb	448	673	897
Shrub/Vine	224	448	673
Tree	112	168	224
Total	**1120**	**2802**	**4484**

Figure 29. Plant community growth curve (percent production by month). TX3038, 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 Land Community **Abandoned Land Community**

With abusive grazing, no brush management, and idled/abandonment, the Converted Land Community will shift to the Abandoned Land Community.

Pathway 4.2A
Community 4.2 to 4.1

Abandoned Land Community Converted Land Community

With Prescribed Grazing, Pasture/Range/Cropland Management, Crop Cultivation, Pasture Planting, Range Planting, Nutrient Management and Pest Management conservation practices, the Abandoned Land Community can be shifted back to the Converted Land Community.

Conservation practices

Brush Management
Conservation Crop Rotation
Prescribed Burning
Prescribed Grazing
Range Planting
Nutrient Management
Integrated Pest Management (IPM)

Transition T1A
State 1 to 2

With abusive grazing, flooding, no fires, and no brush management program, the Savanna State will transition into the Savanna/Woodland Transition State.

Restoration pathway R2A
State 2 to 1

With the use of various conservation practices such as Prescribed Grazing, Prescribed Burning, and Brush Management, the Savanna/Woodland Transition State can be restored to the Savanna State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

With continued abusive grazing pressure, no fires and no brush management, the Savanna/Woodland Transition State will transition into the Woodland State.

Transition T2B
State 2 to 4

With the implementation of Brush Management, Crop Cultivation, Pasture Planting, Range Planting, Tree Planting, Nutrient Management, and Pest Management conservation practices, the Savanna/Woodland Transition State will transition into the Converted Land State.

Restoration pathway R3A

State 3 to 2

With Prescribed Grazing, Prescribed Burning, and Brush Management practices, the Woodland State can be restored to the Savanna/Woodland Transition State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T3A
State 3 to 4

The transition from the Woodland State to the Converted Land State occurs when land clearing, crop cultivation, pasture planting, range planting, tree planting, nutrient management and pest management conservation practices are implemented.

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**			1681–3923	
	big bluestem	ANGE	*Andropogon gerardii*	112–3923	–
	switchgrass	PAVI2	*Panicum virgatum*	392–3923	–
	Indiangrass	SONU2	*Sorghastrum nutans*	392–3923	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	0–3923	–
2	**Tallgrasses**			336–2018	
	little bluestem	SCSC	*Schizachyrium scoparium*	336–2018	–
3	**Midgrasses**			560–1233	
	sideoats grama	BOCU	*Bouteloua curtipendula*	112–1009	–
	vine mesquite	PAOB	*Panicum obtusum*	0–504	–
	purpletop tridens	TRFL2	*Tridens flavus*	0–224	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	0–112	–
	bristlegrass	SETAR	*Setaria*	0–112	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–112	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	0–112	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–112	–
	white tridens	TRAL2	*Tridens albescens*	0–112	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0–112	–
	cylinder jointtail grass	COCY	*Coelorachis cylindrica*	0–112	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	0–112	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	0–112	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	0–112	–
	bushy bluestem	ANGL2	*Andropogon glomeratus*	0–112	–

	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–112	–
4	**Shortgrasses**			112–224	
	buffalograss	BODA2	*Bouteloua dactyloides*	0–224	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	0–45	–
	rosette grass	DICHA2	*Dichanthelium*	0–45	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–45	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–45	–
	crowngrass	PASPA2	*Paspalum*	0–45	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–45	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–45	–
5	**Grasslike Plants**			112–224	
	sedge	CAREX	*Carex*	0–224	–
	flatsedge	CYPER	*Cyperus*	0–224	–
	fimbry	FIMBR	*Fimbristylis*	0–224	–
	rush	JUNCU	*Juncus*	0–224	–
6	**Cool-season Grasses**			224–448	
	Indian woodoats	CHLA5	*Chasmanthium latifolium*	0–448	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–448	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–448	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	0–448	–
	Texas bluegrass	POAR	*Poa arachnifera*	0–448	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	56–224	–
Forb					
7	**Forbs**			392–1009	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–224	–
	great ragweed	AMTR	*Ambrosia trifida*	0–224	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–224	–
	purple poppymallow	CAIN2	*Callirhoe involucrata*	0–224	–
	American star-thistle	CEAM2	*Centaurea americana*	0–224	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	0–224	–
	whitemouth dayflower	COER	*Commelina erecta*	0–224	–
	Queen Anne's lace	DACA6	*Daucus carota*	0–224	–
	prairie clover	DALEA	*Dalea*	0–224	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0–224	–
	ticktrefoil	DESMO	*Desmodium*	0–224	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–224	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–224	–
	buckwheat	ERIOG	*Eriogonum*	0–224	–
	Leavenworth's eryngo	ERLE11	*Eryngium leavenworthii*	0–224	–
	beeblossom	GAURA	*Gaura*	0–224	–

	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–224	–
	evening primrose	OENOT	*Oenothera*	0–224	–
	woodsorrel	OXALI	*Oxalis*	0–224	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	0–224	–
	false gaura	STLI2	*Stenosiphon linifolius*	0–224	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–224	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	0–224	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–224	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	0–224	–
	Texas vervain	VEHA	*Verbena halei*	0–224	–
	white crownbeard	VEVIV	*Verbesina virginica var. virginica*	0–224	–
	spiny cocklebur	XASP2	*Xanthium spinosum*	0–224	–
Shrub/Vine					
8	**Shrubs**			168–392	
	common buttonbush	CEOC2	*Cephalanthus occidentalis*	0–224	–
	hawthorn	CRATA	*Crataegus*	0–224	–
	stretchberry	FOPU2	*Forestiera pubescens*	0–224	–
	Carolina buckthorn	FRCA13	*Frangula caroliniana*	0–224	–
	plum	PRUNU	*Prunus*	0–224	–
	sumac	RHUS	*Rhus*	0–224	–
	gum bully	SILA20	*Sideroxylon lanuginosum*	0–224	–
9	**Vines**			56–112	
	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	–
	coralberry	SYOR	*Symphoricarpos orbiculatus*	0–112	–
	grape	VITIS	*Vitis*	0–112	–
Tree					
10	**Trees**			224–504	
	pecan	CAIL2	*Carya illinoinensis*	0–504	–
	eastern redbud	CECA4	*Cercis canadensis*	0–504	–
	sugarberry	CELAL	*Celtis laevigata var. laevigata*	0–504	–
	netleaf hackberry	CELAR	*Celtis laevigata var. reticulata*	0–504	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–504	–
	black walnut	JUNI	*Juglans nigra*	0–504	–
	Osage-orange	MAPO	*Maclura pomifera*	0–504	–
	Texas red oak	QUBU2	*Quercus buckleyi*	0–504	–
	Texas live oak	QUFU	*Quercus fusiformis*	0–504	–
	bur oak	QUMA2	*Quercus macrocarpa*	0–504	–
	post oak	QUST	*Quercus stellata*	0–504	–
	black willow	SANI	*Salix nigra*	0–504	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	0–504	–
	winged elm	ULAL	*Ulmus alata*	0–504	–

	American elm	ULAM	*Ulmus americana*	0–504	–
	slippery elm	ULRU	*Ulmus rubra*	0–504	–

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. 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 North Central 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 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. 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. The reference plant community of 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 is another activity on bottomland sites which include permanent water features.

Wood products

Mature hardwood trees can be a source of wood for lumber, furniture, or crafts 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 19 SCS-RANGE-417's containing data collected from six counties during the period 12/30/1981 to 12/12/1986 were reviewed for this site.

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

Bob and Mickey Burleson, landowners – Temple, TX
Paul Burns, rancher – Austin, TX
Colonel Burns Ranch – Brown County, TX
Fort Richardson State Park – Jacksboro, TX
Matt Gregory, NRCS – Jacksboro, TX
Rhett Johnson, ranch manager – Granbury, TX
Ricky Marks, NRCS – Brownwood, TX
Dalton Merz, rancher – Holland, TX
Nathan Merz, NRCS – Mineral Wells, TX
Misty Pearcy, NRCS – Brownwood, TX

Contributors

Dan Caudle, DMC Resource Management, Weatherford, Texas
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Approval

Bryan Christensen, 9/19/2023

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, Zone RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	09/17/2007
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Minor rilling could occur for brief periods as result of intense rainfall or upstream flooding events.

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2. **Presence of water flow patterns:** Water flow patterns are common and follow old stream meanders. Deposition or erosion may occur as a result of intense rainfall or upstream flooding events.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes are rare to non-existent on this site.

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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 randomly distributed throughout.

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5. **Number of gullies and erosion associated with gullies:** Some gullies may be present on side drains into perennial and intermittent 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):** Under normal rainfall, little litter movement should be expected. Litter of all sizes may move long distances in flooding events.

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0-40 inches thick that has moderate medium granular structure. SOM is approximately 1-6%. See soil survey for more info.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Dense herbaceous vegetation with very little bare ground, and and a significant overstory canopy provide 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):** No evidence of compaction.

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 midgrasses > Trees >

    Other: Shrubs > Forbs > Vines

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses exhibit some mortality and decadence because of their growth habits and normal life cycles.

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):** 3800 to 9000 lbs/ac

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 pricklypear, tasajillo, lotebush, sumacs, sumpweed, ragweed, broomweed, cocklebur, threeawns, Bermudagrass, Johnsongrass are all potential invasive species on this site.

---

17. **Perennial plant reproductive capability:** Plants should be healthy, vigorous and capable of reproducing unless recently impacted by extreme drought, abusive grazing or wildfire.
