USDA Natural Resources Conservation Service

Ecological site R085AY181TX
Loamy Bottomland 30-38" PZ

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General information

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

Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 085A–Grand Prairie

The Grand Prairie MLRA is characterized by predominately loam and clay loam soils underlain by limestone and shale. Topography transitions from steeper ridges and summits of the Lampasas Cut Plain on the southern end to the more rolling hills of the Fort Worth Prairie to the north. The Arbuckle Mountain area in Oklahoma is also within this MLRA.

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 over deep loamy soils on floodplains. The reference vegetation consists of native tallgrasses and forbs with very few shrubs and bottomland hardwood trees. In the absence of fire or other brush management, woody species may increase and dominate the site. Many of these areas are still in crop production or may have been planted back to an introduced pasture species. This is one of the most productive sites in the area.

Associated sites

R085AY179TX	**Clayey Slope 30-38** Usually located upland from the Loamy Bottomland site.

Similar sites

R085AY178TX	**Clayey Bottomland 30-38" PZ** Similar landform with fine textured soils.
R085BY050OK	**Loamy Bottomland 38-42 PZ** Similar site in Arbuckle Uplift in Oklahoma

Table 1. Dominant plant species

Tree	(1) *Carya illinoinensis*

Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Panicum virgatum*

Physiographic features

This site occurs on nearly level to very gently sloping soils on flood plains. Slope ranges from 0 to 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Elevation	152–579 m
Slope	0–2%
Water table depth	102 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is subhumid subtropical and is characterized by hot 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 should occur around November 5 and the last freeze of the season should occur around March 19.

The average relative humidity in mid-afternoon is about 60 percent. 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 south and highest windspeeds occur during the spring months.

Approximately two-thirds of annual rainfall occurs during the April to September period. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. The driest months are usually July and August.

Table 3. Representative climatic features

Frost-free period (characteristic range)	194-208 days
Freeze-free period (characteristic range)	216-243 days
Precipitation total (characteristic range)	813-965 mm
Frost-free period (actual range)	190-209 days
Freeze-free period (actual range)	209-245 days
Precipitation total (actual range)	787-991 mm
Frost-free period (average)	201 days
Freeze-free period (average)	230 days
Precipitation total (average)	889 mm

Climate stations used

- (1) BENBROOK DAM [USC00410691], Fort Worth, TX
- (2) CLEBURNE [USC00411800], Cleburne, TX

- (3) WHITNEY DAM [USC00419715], Clifton, TX
- (4) DENTON MUNI AP [USW00003991], Ponder, TX
- (5) DECATUR [USC00412334], Decatur, TX
- (6) EVANT 1SSW [USC00413005], Evant, TX
- (7) BROWNWOOD 2ENE [USC00411138], Early, TX
- (8) LAMPASAS [USC00415018], Lampasas, TX

Influencing water features

These sites occur on soils formed in alluvial sediments from flood events. Flooding frequencies may vary but the impacts of flooding can have significant effects on the plant community. These site receive water from overland flow off of adjacent sites uphill.

Wetland description

Site specific evaluations are required to determine the presence of wetlands.

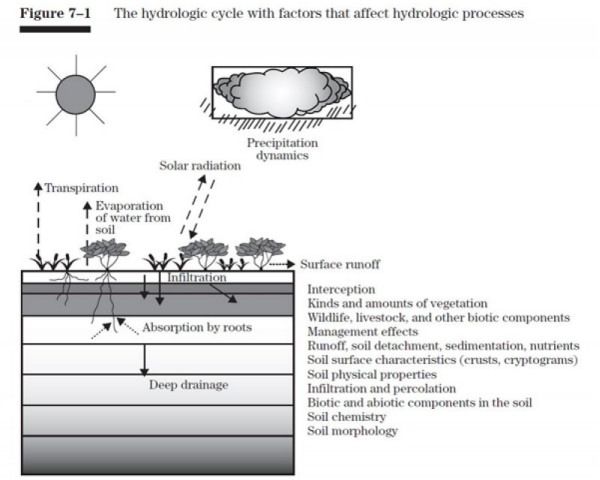


Figure 8.

Soil features

Representative soil components for this ecological site include: Boerne, Bosque, Frio, Lamkin, and Sunev

The site is characterized by very deep loamy calcareous soils. The soils are very deep, well drained, moderately slowly permeable soils that formed in calcareous loamy and clayey alluvium.

Table 4. Representative soil features

Parent material	(1) Alluvium–mudstone (2) Alluvium–limestone
Surface texture	(1) Loam (2) Clay loam (3) Silty clay loam
Drainage class	Well drained
Permeability class	Moderately slow to moderate
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)	2–40%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The reference plant community for the Loamy Bottomland site is a tallgrass prairie. The grasses are primarily little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), and big bluestem (*Andropogon gerardii*). Little bluestem, big bluestem, and Indiangrass are the most commonly occurring grass species for this site. Switchgrass (*Panicum virgatum*), eastern gamagrass (*Tripsacum dactyloides*) and sideoats grama (*Bouteloua curtipendula*) occur as well. Few shrubs and trees are present in this community. The woody component consists of live oak (*Quercus virginiana*), Pecan (*Carya illinoinensis*), elm species (Ulmus spp.), plum species (Prunus spp.), hackberry (*Celtis occidentalis*) and bumelia (*Sideroxylon lanuginosum*). Most woody plants are confined to areas along drainages. The grasses are palatable and nutritious and the site can provide year round grazing.

To a large extent, the way the site changes depends on the location relative to the distance from the West Cross Timbers Major Land Resource Area (MLRA 84C). Sites generally tend to change in the absence of fire toward a woodland community (plants native to the site increase in density) while sites with abusive grazing practices tends to change to a mesquite dominated site. Woody plants have increased over the past 100 to 150 years on many of the loamy bottomland sites. Where there is a seed source close by, Ashe juniper (*Juniperus ashei*), eastern redcedar (*Juniperus virginiana*) and mesquite (*Prosopis glandulosa*) will readily invade the site. The juniper first occurs under fences, trees and other places where songbirds rest. In this way, fences have aided in the spread of juniper. Moreover, the juniper seedling survival is greatest when a good cover of grass exists and there is no fire.

Grazing management with cattle alone probably has minimal effect on the proliferation of woody plants, but a good cover of perennial grasses is likely to minimize the seed-to-soil contact to establish. Mesquite seedpods are relished by livestock and the seeds pass through the digestive tract intact with enhanced germination had they just fallen off the tree onto the ground. In this manner, livestock help distribute the seeds. This places the seed pods in an ideal medium for germination and establishment when moisture conditions are right. Mesquite tends to be more of a problem than juniper on this site.

Fire plays a role in the ecology of the site which is true for most of the grasslands. The main effect of fire on this site is to hold woody shrubs and cactus (Opuntia spp.) in check. The grass species such as little bluestem, big bluestem and Indiangrass are considered to be fire enhanced.

Pre-settlement fires that suppressed woody plants were severe because of the amount of grass fuel being available. Fires, in conjunction with grazing, usually created more diversity on this site for a year or two post-burn. Some forbs also need spring moisture which is perhaps a major triggering factor. Prescribed fire is an important tool to promote plant diversity. Fire did not produce much mortality in older and resprouting woody plants. After brush has been controlled with herbicides or mechanically, fire can be used effectively to suppress regrowth. Small juniper is easily killed by fire. Fuel loads are the most limiting factor for the effective use of fire on this site. Once woody plants become mature (larger) or develop into dense stands, suppression with fire is limited. Woody plant suppression using safe approved herbicides or mechanical treatment is generally more practical, with fire playing a role as follow-up.

With abusive grazing practices, the vigorous Indiangrass and big bluestem will become lower in vigor while little bluestem will increase. Then secondary successional species, such as silver bluestem (Bothriochola laguroides),

will begin to increase along with an increase of woody plants if fire or brush management is not used. Little bluestem is a tough, resistant species tolerant of some heavy grazing. But at some point, a threshold is crossed and the ground cover is opened up resulting in bare places where weedy species can establish. Western ragweed (*Ambrosia psilostachya*), crotons (*Croton setigerus*), and cool-season annuals will quickly invade if the principal species are in a weakened condition. Prescribed fire is a tool to control the spread of woody plants. Selective individual removal of mesquite and/or juniper is easy and economical 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. Prescribed grazing with a reasonable stocking rate can sustain the grass species composition and production at the reference community level. The site can be abused to the point that the perennial warm-season grasses thin out and lower successional grasses and annual forbs begin to dominate. This process of degradation usually takes many years and is further exacerbated by summer drought and above average winter moisture.

Climate is a major factor influencing vegetation on the site. Long-term droughts that occur only three to four times in a century can effect some change in plant communities, when coupled with abusive grazing. Short-term droughts are common and usually do not have a lasting effect in changing stable plant communities, although annual production will be affected. The effects of seasonal moisture and short-term dry spells become more pronounced after the site crosses thresholds to an alternative state. Plant communities that consist of warm-season perennial grasses, such as little bluestem and associated species of the reference community, are able to persist and withstand climatic extremes with only minor shifts in the overall plant community. But, when brush canopy shades the ground, cool-season species are favored. Once a state of brush and cool-season plants is reached, recovery to a good perennial warm-season grass cover is unlikely without major input of brush management and reseeding.

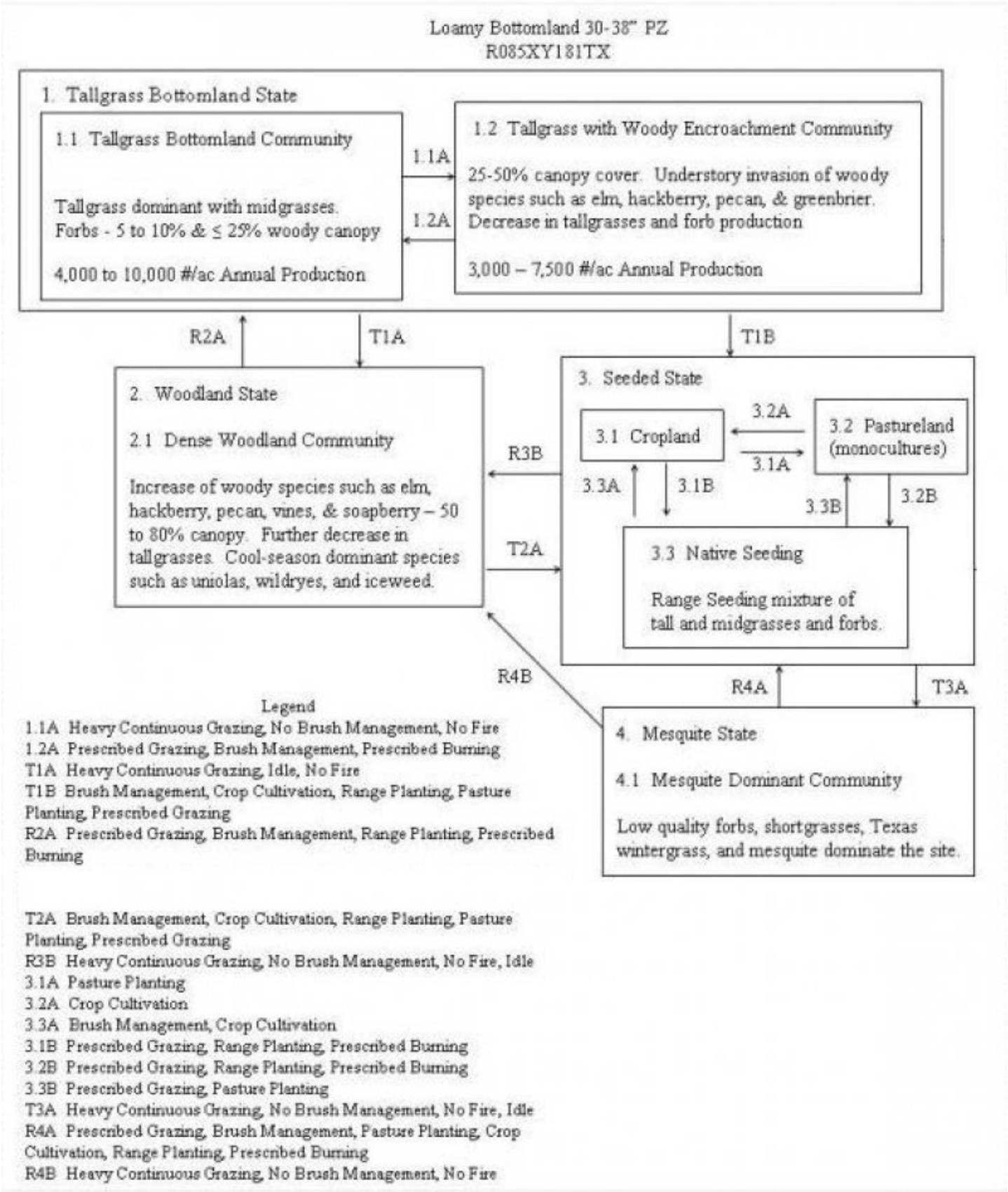
In summary, the change in states of vegetation depend on the collective influence of grazing management, prescribed fire and brush management applied over many years, as well as the rate of invasion and establishment of woody species.

State and Transitional Pathways (S&T): Narrative

The following diagram suggests some pathways that the vegetation on this site might take in response to the various conservation treatments or natural stimuli that may occur over time. There may be other states which may occur that are not shown on this diagram. This S & T Model was developed to show significant changes in the plant community that can occur due to management and natural factors; or be changed by implementing certain practices. The plant communities described in the S & T Model are commonly observed on this site in the MLRA 85. Before making plans for plant community manipulation for specific purposes, consult local professionals.

As vegetative changes occur, certain thresholds can be crossed. Change may occur slowly, or fairly quickly. Once a certain point is reached during the transition of one community to another, a return to the first state may not be possible without the input of some form of energy. This required input often means intervention with practices that are not part of the natural processes. An example might be the application of herbicide to control some woody species in order to reduce the density and canopy cover and to encourage more grass and forbs growth. Merely adjusting grazing practices would not accomplish any significant change in a plant community once certain thresholds are crossed. The amount of energy required to effect change in community would depend on the present vegetative state and the plant community desired by the landowner.

State and transition model



State 1
Tallgrass Bottomland State - Reference

Dominant plant species

- pecan (*Carya illinoinensis*), tree
- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass

Community 1.1
Tallgrass Bottomland Community

Figure 9. 1.1 Tallgrass Bottomland Community

The interpretive plant community for this site is the Reference Plant Community. This community is a Tallgrass Bottomland Community (1.1). The community is dominated by warm-season perennial tallgrasses such as little bluestem, big bluestem, switchgrass, eastern gamagrass and Indiangrass. Other major perennial grass species such as sideoats grama and silver bluestem are well dispersed through the site. Perennial forbs such as sunflowers (Helianthus spp.), prairie clovers (Dalea spp.), bundleflowers (Desmanthus spp.), and daleas (Dalea spp.) are well represented throughout the community. This plant community evolved with a short duration of heavy use by large herbivores followed by long rest periods due to herd migration, usually following a fire. This state can go directly to the Woodland Community in the absence of fire or brush management to assist in suppressing the brush species and still have the tallgrass component present in the community. With heavy grazing pressure and the removal of fire, this community will change into a Tallgrass with woody encroachment community (1.2) or Woodland Community (2.1). The changes within the grassland communities can change fairly rapid while the communities having an increase of woody plants are somewhat slower.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3363	5884	8406
Shrub/Vine	448	785	1121
Tree	448	785	1121
Forb	224	392	560
Total	**4483**	**7846**	**11208**

Figure 11. Plant community growth curve (percent production by month). TX6011, Warm-season perennial tallgrass prairie. The community is dominated by warm-season perennial tallgrasses with few shrubs, trees and forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Community 1.2
Tallgrass with Woody Encroachment Community

Figure 12. 1.2 Tallgrass with Woody Encroachment Community

This plant community occurs with heavy yearlong grazing by large herbivores and without the application of fire or brush management practices. The tallgrasses will start to disappear from the plant community. Invader brush species such as mesquite, juniper, and prickly pear cactus becomes established. Cedar elm (*Ulmus crassifolia*), bumelia, and hackberry also start to increase. Texas wintergrass (*Nassella leucotricha*) increases as brush canopy increases. It is more shade tolerant since most of growth occurs during the cool season when brush has lost its leaves. The plant community consists of 25 to 50% percent canopy of woody plants. Continuous heavy grazing by domestic livestock has accelerated the shift towards the Woodland Community (2.1). The tallgrass bottomland with woody encroachment (1.2) can revert back to the tallgrass bottomland with conservation practices such as prescribed burning and/or prescribed grazing. Without prescribed burning and/or prescribed grazing, this plant community would continue to shift toward the Woodland Community (2.1).

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1513	2645	3783
Shrub/Vine	673	1177	1681
Tree	673	1177	1681
Forb	504	885	1261
Total	**3363**	**5884**	**8406**

Figure 14. Plant community growth curve (percent production by month). TX6016, Tallgrass Prairie with Woody Encroachment. Tallgrasses with increasing amounts of woody species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Pathway 1.1A
Community 1.1 to 1.2

Tallgrass Bottomland Community

Tallgrass with Woody Encroachment Community

With heavy continuous grazing, no brush management, and no fires, the Tallgrass Bottomland Community would shift to the Tallgrass with Woody Encroachment Community.

Pathway 1.2A
Community 1.2 to 1.1

Tallgrass with Woody Encroachment Community

Tallgrass Bottomland Community

With the application of conservation practices such as Prescribed Grazing, Brush Management, and Prescribed Burning, the Tallgrass with Woody Encroachment Community can revert back to the Tallgrass Bottomland Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2
Woodland State

Dominant plant species

- pecan (*Carya illinoinensis*), tree
- elm (*Ulmus*), tree
- sugarberry (*Celtis laevigata*), tree
- wildrye (*Elymus*), grass
- Texas wintergrass (*Nassella leucotricha*), grass

Community 2.1
Dense Woodland Community

Figure 15. 2.1 Dense Woodland Community

The Dense Woodland Community (2.1) consists of mixed grasses with greater than 50 percent canopy of woody plants. As this community ages, the woody canopy continues to increase. Texas wintergrass, threeawns (Aristida spp) and annuals continue to increase. At this point, shade is a driving factor in the understory plant community. Warm-season perennial tallgrasses such as Indiangrass and switchgrass have all but disappeared. Continuous heavy grazing by domestic livestock has accelerated the shift. The shift to this state has occurred due to the absence of fire or other means of keeping the canopy open. This state can be reverted back to near historic condition by some means of brush suppression coupled with seeding and good grazing management. Without this treatment, the site will continue to shift toward more dense stands of brush.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Forb	841	1328	1821
Grass/Grasslike	841	1328	1821
Shrub/Vine	841	1328	1821
Tree	841	1328	1821
Total	**3364**	**5312**	**7284**

Figure 17. Plant community growth curve (percent production by month). TX6014, Mesquite/Juniper/Brushland Community. Consist of mixed grasses with greater than 50 percent canopy of woody plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3	8	20	25	19	5	3	10	4	1	1

State 3
Seeded State

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 3.1
Cropland Community

Extensive conversion of the Loamy Bottomland ecological site to cropland (primarily cotton and corn) occurred from the middle 1800s to the early 1900s. Some remains in cropland today – typically small grain production for stocker-cattle grazing. While restoration of this site to a semblance of the tallgrass prairie is possible with range planting, prescribed grazing, and prescribed burning - complete restoration of the reference community in a reasonable time is very unlikely due to deterioration of the soil structure and organisms. If cropping is abandoned, this land is usually planted to introduced grasses and forbs and managed as pastureland.

Figure 19. Plant community growth curve (percent production by month). TX6102, Cool-Season Annual Grasses & Legumes. Oats, Rye, Wheat, Ryegrass, Clover and Vetch planted..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
11	13	19	21	19	0	0	0	0	0	8	9

Community 3.2
Pastureland Community

This community is the result of mechanical brush control and reseeding using one or more introduced grass species. Introduced species such as kleingrass (*Panicum coloratum*) or one of the old world bluestems (*Bothriochloa ischaemum* var.) such as WW Spar or WB Dahl may be a part of the seed mixture. Due to the lack of diversity of plant species and presence of introduced species it will take a long time if ever for this state to again reach the reference state.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3587	5828	8406
Forb	224	392	560
Total	**3811**	**6220**	**8966**

Figure 21. Plant community growth curve (percent production by month). TX6015, Open Seeded Grassland Community. This state is usually the result of mechanical brush control and reseeding using one or more native grass species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Community 3.3
Native Seeded Grassland Community

Figure 22. 3.3 Native Seeded Grassland Community

This state is usually the result of mechanical brush control and reseeding using one or more native grass species. An introduced species such as kleingrass (*Panicum coloratum*) or one of the old world bluestems, (*Bothriochloa ischaemum* var.) such as WW Spar or WB Dahl, may be a part of the seed mixture. This community can also be created from cropland planted to native grass species. Due to the lack of diversity of plant species, soil degradation, and presence of introduced species, it will take a long time if ever for this state to again reach the reference state.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3587	6277	8967
Shrub/Vine	448	785	1121
Tree	224	392	560
Forb	224	392	560
Total	**4483**	**7846**	**11208**

Figure 24. Plant community growth curve (percent production by month). TX6015, Open Seeded Grassland Community. This state is usually the result of mechanical brush control and reseeding using one or more native grass species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Pathway 3.1A
Community 3.1 to 3.2

With Pasture Planting, the Cropland Community can be converted into the Pastureland Community (monocultures).

Conservation practices

Forage and Biomass Planting

Pathway 3.1B
Community 3.1 to 3.3

With Prescribed Grazing, Range Planting, and Prescribed Burning, the Cropland Community can be converted into the Native Seeding Community.

Conservation practices

Prescribed Burning
Prescribed Grazing
Range Planting

Pathway 3.2A
Community 3.2 to 3.1

With Crop Cultivation, the Pastureland Community can be converted into a Cropland Community.

Pathway 3.2B
Community 3.2 to 3.3

With Prescribed Grazing, Prescribed Burning, and Range Planting, the Pastureland Community can be converted into the Native Seeding Community.

Conservation practices

Prescribed Burning
Prescribed Grazing
Range Planting

Pathway 3.3A
Community 3.3 to 3.1

With Brush Management and Crop Cultivation, the Native Seeding Community can be converted into a Cropland Community.

Conservation practices

Brush Management

Pathway 3.3B
Community 3.3 to 3.2

With Prescribed Grazing and Pasture Planting, the Native Seeding Community can be converted into the Pastureland Community.

Conservation practices

Forage and Biomass Planting
Prescribed Grazing

State 4
Mesquite State

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), tree
- Texas wintergrass (*Nassella leucotricha*), grass

Community 4.1
Mesquite Dominant Community

Figure 25. 4.1 Mesquite Dominant Community

This plant community is a mesquite dominated shrubland community (greater than 25% woody canopy) (4.1). Other species may be present in small amounts include cedar elm, hackberry, and liveoak. With the dominance of mesquite along with continuous heavy grazing, prickly pear cactus may become a major plant in the community. The herbaceous understory is almost nonexistent. Shade tolerant species such as Texas wintergrass tends to be the dominant grass at the sites where mesquite is the dominant woody plant. Continuous grazing by domestic livestock has accelerated the shift. This community can also develop from abandoned cropland. The tallgrass prairie can be restored by mechanical or chemical treatment of the mesquite. Integrated treatments over time of chemical, mechanical, seeding, and prescribed burning will be needed to restore this site to close to the reference community.

Table 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	1681	2802	3923
Grass/Grasslike	841	1401	1961
Forb	504	841	1177
Shrub/Vine	336	560	785
Total	**3362**	**5604**	**7846**

Figure 27. Plant community growth curve (percent production by month). TX6014, Mesquite/Juniper/Brushland Community. Consist of mixed grasses with greater than 50 percent canopy of woody plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3	8	20	25	19	5	3	10	4	1	1

Transition T1A
State 1 to 2

With heavy continuous grazing, idle and no fires, the Tallgrass Bottomland State shifts to the Woodland State.

Transition T1B
State 1 to 3

With Brush Management, Crop Cultivation, Range Planting, Pasture Planting, and Prescribed Grazing conservation practices, the Tallgrass Bottomland State shifts to the Seeded State.

Restoration pathway R2A
State 2 to 1

With the implementation of Prescribed Grazing, Brush Management, Range Planting, Prescribed Burning conservation practices, the Woodland State can revert back to the Tallgrass Bottomland State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

With Brush Management, Crop Cultivation, Range Planting, Pasture Planting, and Prescribed Grazing conservation practices, the Dense Woodland State shifts to the Seeded State.

Restoration pathway R3B
State 3 to 2

With heavy continuous grazing, no brush management, and land being idled, the Seeded State shifts to the Woodland State.

Transition T3A
State 3 to 4

With heavy continuous grazing, no brush management, and idled land, the Seeded State shifts to the Mesquite State.

Restoration pathway R4B
State 4 to 2

With heavy continuous grazing, no brush management, and no fires, the Mesquite State shifts to the Woodland State.

Restoration pathway R4A
State 4 to 3

With Prescribed Grazing, Brush Management, Pasture Planting, Crop Cultivation, Range Planting, and Prescribed Burning conservation practices, the Mesquite State could revert to the Seeded State.

Conservation practices

Brush Management
Prescribed Burning
Forage and Biomass Planting
Prescribed Grazing
Range Planting

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrass**			897–2242	
	little bluestem	SCSC	*Schizachyrium scoparium*	897–2242	–
2	**Tallgrasses**			1793–4483	
	big bluestem	ANGE	*Andropogon gerardii*	448–4483	–
	switchgrass	PAVI2	*Panicum virgatum*	448–4483	–
	Indiangrass	SONU2	*Sorghastrum nutans*	448–4483	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	448–4483	–
3	**Midgrasses**			448–1121	
	sideoats grama	BOCU	*Bouteloua curtipendula*	67–1121	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	67–1121	–
	Canada wildrye	ELCA4	*Elymus canadensis*	67–1121	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	67–1121	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	67–1121	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	67–1121	–
4	**Mid/Shortgrasses**			224–560	
	purple threeawn	ARPUP9	*Aristida purpurea var. perplexa*	0–560	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–560	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–560	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–560	–
	tall grama	BOHIP	*Bouteloua hirsuta var. pectinata*	0–560	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–560	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	0–560	–
	seep muhly	MURE2	*Muhlenbergia reverchonii*	0–560	–
	vine mesquite	PAOB	*Panicum obtusum*	0–560	–
	Texas bluegrass	POAR	*Poa arachnifera*	0–560	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	0–560	–
	white tridens	TRAL2	*Tridens albescens*	0–560	–
	slim tridens	TRMU	*Tridens muticus*	0–560	–
Forb					
5	**Forbs**			224–560	
	Texas broomweed	AMAM3	*Amphiachyris amoena*	0–560	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–560	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–560	–
	crested pricklypoppy	ARPO2	*Argemone polyanthemos*	0–560	–
	American star-thistle	CEAM2	*Centaurea americana*	0–560	–
	whitemouth dayflower	COER	*Commelina erecta*	0–560	–
	croton	CROTO	*Croton*	0–560	–
	prairie clover	DALEA	*Dalea*	0–560	–

	purple prairie clover	DAPU5	*Dalea purpurea*	0–560	–
	Illinois ticktrefoil	DEIL2	*Desmodium illinoense*	0–560	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0–560	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–560	–
	buckwheat	ERIOG	*Eriogonum*	0–560	–
	Leavenworth's eryngo	ERLE11	*Eryngium leavenworthii*	0–560	–
	justiceweed	EULE	*Eupatorium leucolepis*	0–560	–
	snow on the mountain	EUMA8	*Euphorbia marginata*	0–560	–
	beeblossom	GAURA	*Gaura*	0–560	–
	Dakota mock vervain	GLBI2	*Glandularia bipinnatifida*	0–560	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–560	–
	bluet	HOUST	*Houstonia*	0–560	–
	coastal indigo	INMI	*Indigofera miniata*	0–560	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–560	–
	dotted blazing star	LIPU	*Liatris punctata*	0–560	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–560	–
	beebalm	MONAR	*Monarda*	0–560	–
	cobaea beardtongue	PECO4	*Penstemon cobaea*	0–560	–
	prairie coneflower	RUFUP	*Rudbeckia fulgida var. palustris*	0–560	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	0–560	–
	compassplant	SILA3	*Silphium laciniatum*	0–560	–
	Carolina horsenettle	SOCA3	*Solanum carolinense*	0–560	–
	amberique-bean	STHE9	*Strophostyles helvola*	0–560	–
	false gaura	STLI2	*Stenosiphon linifolius*	0–560	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–560	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	0–560	–
Shrub/Vine					
6	**Shrubs/Vines**			448–1121	
	catclaw acacia	ACGR	*Acacia greggii*	0–1121	–
	snailseed	CODI	*Cocculus diversifolius*	0–1121	–
	stretchberry	FOPU2	*Forestiera pubescens*	0–1121	–
	Carolina buckthorn	FRCA13	*Frangula caroliniana*	0–1121	–
	Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	0–1121	–
	plum	PRUNU	*Prunus*	0–1121	–
	fragrant sumac	RHAR4	*Rhus aromatica*	0–1121	–
	winged sumac	RHCO	*Rhus copallinum*	0–1121	–
	greenbrier	SMILA2	*Smilax*	0–1121	–
Tree					
7	**Trees**			448–1121	
	pecan	CAIL2	*Carya illinoinensis*	0–1121	–
	hackberry	CELTI	*Celtis*	0–1121	–
	Ashe's juniper	JUAS	*Juniperus ashei*	0–1121	

	Ashe's juniper	JUAS	*Juniperus ashei*	0–1121	–
	Pinchot's juniper	JUPI	*Juniperus pinchotii*	0–1121	–
	eastern redcedar	JUVI	*Juniperus virginiana*	0–1121	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	0–1121	–
	plum	PRUNU	*Prunus*	0–1121	–
	live oak	QUVI	*Quercus virginiana*	0–1121	–
	black willow	SANI	*Salix nigra*	0–1121	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	0–1121	–
	bully	SIDER2	*Sideroxylon*	0–1121	–
	cedar elm	ULCR	*Ulmus crassifolia*	0–1121	–
	Hercules' club	ZACL	*Zanthoxylum clava-herculis*	0–1121	–

Animal community

Migratory bison herds grazed this site historically. Deer and turkey were found mostly along the wooded streams occasionally feeding on the adjacent open prairie. Large predators such as wolves, coyotes, mountain lions and black bear roamed throughout the area. Today, white-tailed deer, turkey, bobwhite quail, bobcats and coyotes along with resident and migratory birds and small mammals find use this site for at least a portion of their habitat needs. As the tallgrass community changes through the various vegetative states, the quality of the habitat may improve for some species such as songbirds, deer and goats and decline for others such as cattle.

Domestic livestock are the dominant grazer of the site today. Lower successional level may meet some wildlife species requirements very well, but may not be nearly as productive for livestock grazing purposes. Neither may it be as capable of satisfying important ecological functions such as nutrient cycling, hydrologic protection, plant community stability or soil protection.

Management practices such as brush management, prescribed burning and prescribed grazing will be required in order to maintain a vegetative state in optimum habitat quality for the desired animal species.

Hydrological functions

Peak rainfall periods occur in April, May, June, September and October. Rainfall amounts may be 3 to 10 inches per event be intense. Periods of 60 plus days of little or no rainfall during the growing season are common. The site contributes runoff to the various draws, creeks, and streams that are common in the MLRA as well as serve as a riparian buffer. If the perennial grass cover is maintained in good vigor, then maximum infiltration occurs and runoff is reduced. This site is subject to periodic overflow from flooding which deposits water-borne sediment if the grass cover is adequate. More water getting into the ground means a more productive plant community. Overall watershed protection and nutrient cycling are enhanced by the tallgrass community.

The hydrology of this site may be manipulated with management to yield higher runoff volumes or greater infiltration. Management for less herbaceous cover will favor higher surface runoff while dense herbaceous cover favors water infiltration. Potential movement of soil (erosion), pesticides and both organic and inorganic nutrients (fertilizer) should always be considered when managing for higher volumes of surface runoff.

Recreational uses

Hunting, hiking, camping, equestrian, bird watching and off road vehicle use.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

Information presented here has been derived from NRCS clipping data and field observations of range trained personnel: James Luton RMS, Montague; William Donham, DC, Weatherford; Kent Ferguson RMS, Weatherford; Dan Caudle.

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Acknowledgments

Site Development and Testing Plan:

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

Rangeland health reference sheet

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

Author(s)/participant(s)	Lem Creswell, Zone RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	01/16/2006
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. Current or past formation of rills are not present.

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2. **Presence of water flow patterns:** None. This site rarely has flow patterns. Some are expected to be around surface obstacles.

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3. **Number and height of erosional pedestals or terracettes:** None. Some very minor pedestalling may occur in the shallow, lower production portions of the sites. Rarely should they be over 1/4 inch height.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 10 percent bare ground. Small and non-connected areas.

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5. **Number of gullies and erosion associated with gullies:** Drainages are represented as natural stable channels; vegetation is common and no signs of erosion.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Minimal and short. Less than 6 inches. Only associated with water flow patterns following extremely high intensity rainfall.

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Very dark grayish brown clay loam surface. Soil Organic Matter is 1 to 4 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High canopy, basal cover and density with small interspaces make rainfall impact negligible. This site has well drained soils, slowly permeable with 0 to 2 percent slopes which allows negligible run off and erosion.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None to minimal, not restrictive to water movement and root penetration.

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: warm-season shortgrasses > forbs = cool-season grasses > trees > shrubs/vines

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal under normal weather conditions. Grasses almost always show some decadence and mortality.

14. **Average percent litter cover (%) and depth (in):** Litter is dominantly herbaceous and covers all plant and rock interspaces.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 4000 to 10,0000 pounds per acre. 4000 pounds in below average moisture years, 7000 pounds in "normal" years and 10,000 pounds in above average years.

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:** Ashe juniper, prickly pear and mesquite are the primary invaders.

17. **Perennial plant reproductive capability:** All perennial plants are capable of reproduction except during periods of prolonged drought conditions, heavy natural herbivory and intense wildfires.