USDA Natural Resources
Conservation Service

Ecological site R085AY180TX
Deep Redland 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 on deep, neutral clay and clay loam soils over limestone bedrock. The reference vegetation includes native tallgrasses and forbs with scattered post oaks and other oak species. In the absence of fire or other brush management, woody species may increase and dominate the site. Many of these site have been or are still in crop production.

Associated sites

R085AY179TX	**Clayey Slope 30-38** Occurs adjacent to the Deep Redland ecological site. However, the Clay Loam site does not have any oak species growing on the site.

Similar sites

R085AY183TX	**Redland 30-38" PZ** The Redland Ecological Site is shallower and has less production potential than the Deep Redland site.

Table 1. Dominant plant species

Tree	(1) *Quercus stellata* (2) *Quercus buckleyi*
Shrub	Not specified

Herbaceous	(1) *Andropogon gerardii* (2) *Sorghastrum nutans*

Physiographic features

This site occurs on interfluves of hillslopes and treads of stream terraces in the Grand Prairie. Slopes are typically 0 to 3 percent.

Table 2. Representative physiographic features

Landforms	(1) Hills > Hillslope (2) Hills > Ridge (3) Alluvial plain > Stream terrace
Runoff class	High to very high
Elevation	152–579 m
Slope	0–3%
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 both receive water from upland sites and shed water to lower areas. The presence of deep rooted tallgrass species helps to facilitate infiltration into the soil profile. They are not associated with wetlands.

Wetland description

NA

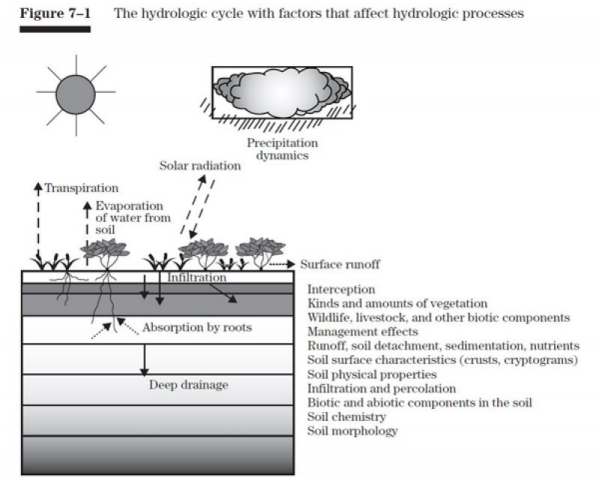


Figure 8.

Soil features

Representative soil components for this ecological site include: Caradan, Crawford, Lindale, Lindy, and Mingo

The site is characterized by moderately deep to very deep, noncalcareous, loamy to clayey soils.

Table 4. Representative soil features

Parent material	(1) Residuum–limestone (2) Alluvium–mudstone (3) Alluvium–limestone (4) Residuum–mudstone
Surface texture	(1) Clay loam (2) Loam (3) Silty clay loam (4) Clay (5) Silty clay
Drainage class	Moderately well drained
Permeability class	Very slow to slow
Soil depth	51–102 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	5.08–22.86 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%

Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–6
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

The reference plant community for the Deep Redland site is a tallgrass savannah (1.1) and was inhabited by grassland wildlife species such as bison, grassland birds and small mammals. The grasses are primarily little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*) and switchgrass (*Panicum virgatum*). Smaller amounts of Eastern gamagrass (*Tripsacum dactyloides*), purpletop (*Tridens flavus*) and sideoats grama (*Bouteloua curtipendula*) occur as well. The savannah woody plants consist primarily of post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*).

Animal impacts and fire were a key to maintaining the open tallgrass with the broadly spaced oak trees. Large herds of buffalo were thought to intensely graze this site and then not come back to it for many months or even years usually following the fire frequency. The collective influence of large concentrated buffalo herds and natural fires prevented woody plant encroachment from occurring. Pre-settlement fires were anticipated to be severe and occurred anytime the grass was dry. These fires prevented the encroachment of Ashe juniper (*Juniperus ashei*) and other woody species, but usually did not produce much mortality in older oaks.

Indians inhabited the prairies for nearly three centuries prior to 1800 using mounted horses imported from Spanish explorers. These same explorers brought domesticated cattle as early as 1690 into Texas. By the late 1700’s, especially in South Texas, these wild and free-ranging livestock began competing with the native ruminants such as buffalo, elk, pronghorn antelope and white-tailed deer for forage consumption. By 1845, European settlers stopped wild fires and at the same time many herds both wild and domestic began to populate streams and major rivers. These wild herds continued to expand especially after the extirpation of the buffalo in the 1870’s. In 1867 a railhead was established in Abilene, Kansas which caused a thriving livestock industry to be born. By the early 1880’s, the Texas prairies became more and more overstocked. By 1885 livestock were fenced, further concentrating livestock and causing a deterioration of the plant communities due to overgrazing and droughts. By the 1920’s, large prairie land areas were already plowed and cultivated. Early farmers had to protect their crops from being burned, so controlling fire was even more important for them than for the livestock operators. With the cessation of fire, prairies soon gave way to woodland and shrubland in many areas. Overgrazing and drought reduced grass vigor and left little ground cover or litter to carry even an occasional fire.

Climate and soils are also important and limiting factors affecting grass vegetation on the site. Drought was a part of the original savannah as well. Fire, along with the incidental grazing, created diversity in this site for a year or two post-burn and by stimulating forbs if the timing was right. Some forbs respond to spring moisture which is also a major factor in creating diversity in the plant community.

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 sideoats grama, silver bluestem (*Bothriochloa laguroides*), Texas wintergrass (*Nassella leucotricha*) and buffalograss (*Bouteloua dactyloides*) will begin to increase along with an increase of woody plants. At some point, the ground cover is opened up resulting in bare places where weedy species can establish which may signify that a threshold has been crossed. Plants such as Texas wintergrass, buffalograss, western ragweed (*Ambrosia psilostachya*), prairie coneflower (*Ratibida columnifera*), and cool-season annuals will quickly invade if the principal species are in a weakened condition. The site can be abused to the point that the perennial warm-season grasses thin out and lower successional grasses along with 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. Once a state of brush and cool-season

annuals is reached, recovery to a perennial warm-season grass cover is unlikely without major input with brush management and reseeding.

Birds consume the seed of many woody species and help spread them in their droppings. This is an excellent environment for seedlings complete with moisture and nutrients. Grazing management with only cattle probably has minimal effect on the proliferation of woody plants, but they can also spread mesquite beans in droppings. Species like juniper can actually increase faster with a good cover of perennial grasses. However for mesquite, a good cover of grasses minimizes the seed-to-soil contact needed to establish. Prescribed grazing with a reasonable stocking rate can sustain the grass species composition and production at a near reference community level.

Long term droughts that occur only three to four times in a century can effect some change in historic plant communities, especially when coupled with abusive grazing. Short term droughts are common and usually do not have a lasting effect in changing stable plant communities, although production will be affected.

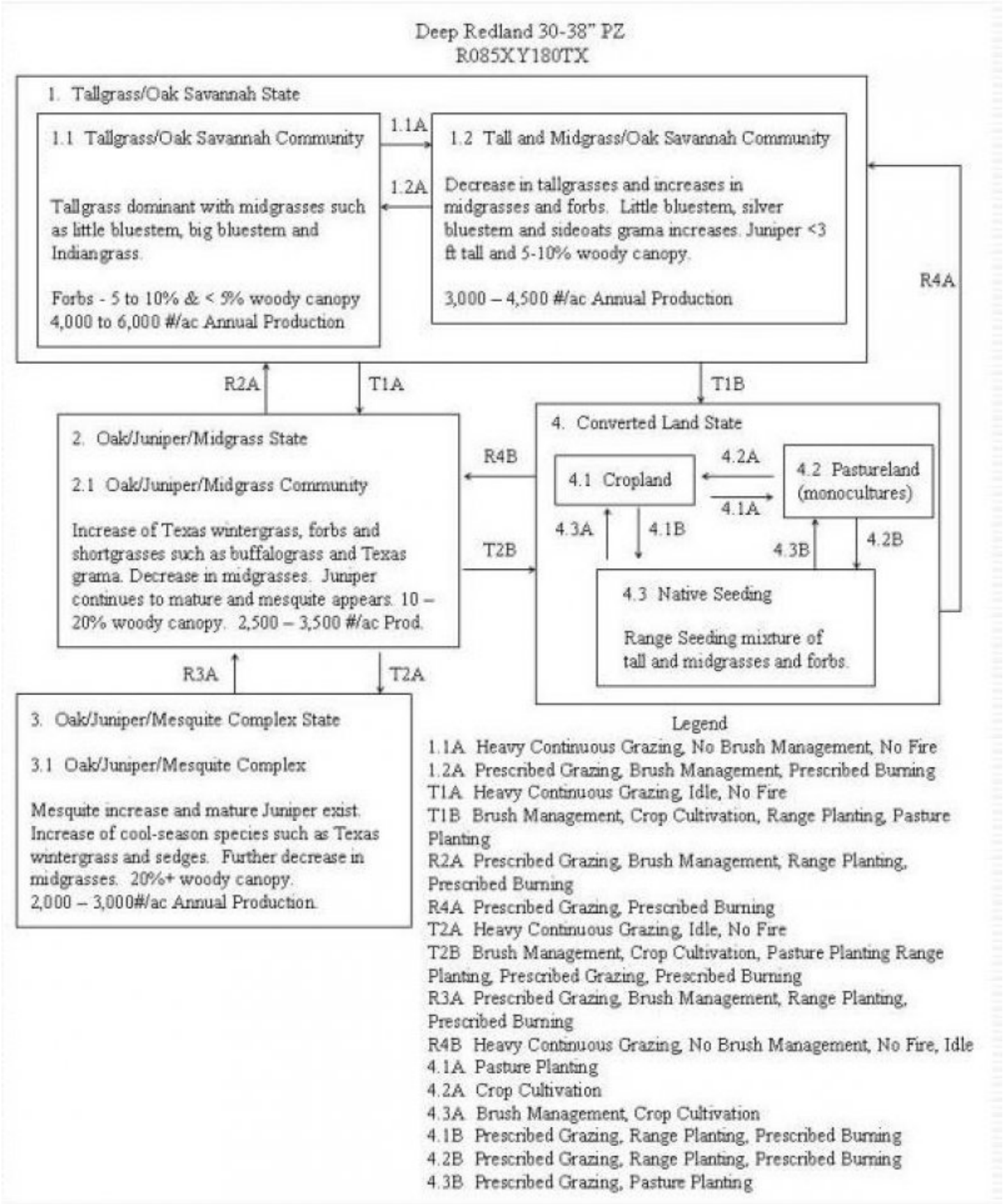
In summary, the change in states of vegetation depends on the climate and management applied over many years. The effects of seasonal moisture and short term dry spells become more pronounced after the site crosses a threshold to a lower ecological condition, Plant communities that consist of warm-season perennial grasses such as little bluestem and the associated species of the reference community are able to persist and withstand climatic extremes with only minor shifts in the overall plant community.

State and Transitional Pathways: Narrative

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

As a site changes in plant community makeup, the changes may be due many factors. Change may occur slowly or in some cases, fairly rapidly. As vegetative changes occur, certain thresholds are crossed. This means that 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 often means intervention with practices that are not part of natural processes. An example might be the application of herbicide to control some woody species in order to reduce its population and encourage more grass and forbs growth. Merely adjusting grazing practices would probably 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 desired change.

State and transition model



State 1
Tallgrass/Oak Savannah State - Reference

Dominant plant species

- post oak (*Quercus stellata*), tree
- big bluestem (*Andropogon gerardii*), grass

Community 1.1
Tallgrass/Oak Savannah Community

The interpretive plant community for this site is a Tallgrass/Oak Savannah Community (1.1). The community for the site is a fire-grazing climax savannah composed of warm-season perennial tallgrasses such as little bluestem, big bluestem and Indiangrass and scattered post oaks. The overstory shades less than a 10 percent of the site and consists primarily of post oak but may include Bigelow oak (*Quercus sinuata* var. breviloba), Texas oak (*Quercus buckleyi*), blackjack oak, and several associated species. Other major perennial tallgrass and midgrass species such as switchgrass, sideoats grama and silver bluestem are well dispersed through the site. Perennial forbs such as sunflowers (Helianthus spp.), prairie clovers (Dalea and Pediomelum spp.), bundleflowers (Desmanthus spp.), and daleas (Dalea spp.) are well represented throughout the community. Reoccurring fires and grazing by bison were natural processes that maintained this historic community in a tallgrass and oak savannah state. Likewise, the removal of these processes is a disturbance that began to cause change in the plant community. As fire is eliminated and overstocking becomes continual, this plant community begins to change from an oak savannah community to an oak-grassland community invaded by Ashe juniper and other woody species. Introduction of prescribed fire at appropriate time intervals and implementation of prescribed grazing can maintain the Tallgrass/Oak Savannah Community (1.1). Ashe juniper encroachment can be easily controlled with prescribed fire until the plant reaches approximately 3 to 4 feet in height. Without treatment, the Ashe juniper will continue to increase in density and stature and move towards the Oak/Juniper Midgrass Community (2.1). With heavy grazing pressure and the removal of fire, the historic community will change into a Tall and Midgrass/Oak Savannah Community (1.2), an Oak/juniper/Midgrass Community (2.1) or Oak/Juniper/Mesquite Complex (3.1). The changes within the grassland part of this community can change fairly rapid while the woody plants communities are somewhat slower. The Tallgrass/Oak Savannah State (1.1) can be converted to Cropland (4.1) Pastureland (4.2) or Native Seeding (4.3).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4035	5044	6053
Forb	224	280	336
Shrub/Vine	135	168	202
Tree	90	112	135
Total	**4484**	**5604**	**6726**

Figure 10. Plant community growth curve (percent production by month). TX6020, Tallgrass Oak Savannah Community. The plant community is a fire climax savannah composed of warm-season perennial tallgrasses and scattered post oaks..

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
Tall and Midgrass/Oak Savannah Community

Figure 11. 1.2 Tall and Midgrass/Oak Savannah Community

This transition state occurs without fire or brush management with heavy yearlong grazing. The tall grasses will start to disappear from the plant community and be replaced by midgrasses such as sideoats grama, which will increase. Invading brush species such as Ashe juniper appears and becomes established. Greenbriar (*Smilax bona-nox*), cedar elm (*Ulmus crassifolia*), bumelia (*Sideroxylon lanuginosum*), and hackberry (Celtis spp.) also start to increase. Texas wintergrass (*Nassella leucotricha*) increases as brush canopy increases. The plant community consists of less than 10 percent canopy of woody plants. Continuous grazing by domestic livestock and fire suppression has accelerated the shift towards the Oak/Juniper/Mesquite Complex (3.1). Selective individual removal of mesquite (*Prosopis glandulosa*) and/or juniper is easy and economical when a few plants begin to show up on the site. However, the increase of number of plants can be fairly rapid and the number of woody plants per acre will soon become too numerous for individual control to be feasible. The Tall and Midgrass/Oak Savannah Community (1.2) can revert back to the Tallgrass/Oak Savannah Community (1.1) with prescribed burning and/or prescribed grazing. Without prescribed burning and/or prescribed grazing, this plant community would continue to shift toward the Oak/Juniper/Midgrass Community (2.1) or the Oak/Juniper/Mesquite Complex (3.1). The Tallgrass and Midgrass/Oak Savannah Community (1.2) can be converted into Cropland (4.1), Pastureland (4.2) or Native Seeding (4.3). The seeded state with prescribed burning and prescribed grazing management practices could revert back to the Tall and Midgrass/Oak Savannah Community (1.2).

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2354	2942	3531
Forb	504	633	757
Shrub/Vine	336	420	504
Tree	168	207	252
Total	**3362**	**4202**	**5044**

Figure 13. Plant community growth curve (percent production by month). TX6021, Tall & Midgrass/Oak Savannah Community. The tallgrasses will start to disappear and be replaced by midgrasses. Invader brush species appears and becomes established..

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

With heavy continuous grazing, no brush management, and no fire, the Tallgrass/Oak Savannah Community would shift to the Tall/Midgrass/Oak Savannah Community.

Pathway 1.2A
Community 1.2 to 1.1

With the implementation of Prescribed Grazing, Brush Management and Prescribed Burning conservation practices, the Tall & Midgrass/Oak Savannah Community can be reverted back to the Tallgrass/Oak Savannah Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2
Oak/Juniper/Midgrass State

Dominant plant species

- post oak (*Quercus stellata*), tree
- Ashe's juniper (*Juniperus ashei*), tree
- sideoats grama (*Bouteloua curtipendula*), grass
- Texas wintergrass (*Nassella leucotricha*), grass

Community 2.1
Oak/Juniper/Midgrass Community

Figure 14. 2.1 Oak/Juniper/Midgrass Community

The Oak/Juniper/Midgrass Community (2.1) consists of mid grasses with 10 to 20 percent canopies of woody plants. As the plant community ages, brush canopy continues to increase and midgrasses such as sideoats grama decreases and Texas wintergrass and buffalograss (Buchloe dactyloides) increase. Without fire, Ashe juniper becomes the dominant invader plant while mesquite appears and becomes established. Warm-season perennial tall grasses such as Indiangrass and switchgrass have all but disappeared. Continuous 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 brush suppression coupled with heavy grazing by domestic livestock. The grass species are increasingly annual cool-season species. This state can still be reverted back to near historic condition by some means of brush suppression and good grazing management. Without these treatments, the site will continue to shift toward more dense stands of brush and become the Oak/Juniper/Mesquite Complex (3.1) state.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1681	2018	2354
Forb	560	673	785
Shrub/Vine	280	336	392
Tree	280	336	392
Total	**2801**	**3363**	**3923**

Figure 16. Plant community growth curve (percent production by month). TX6022, Oak/Juniper/Midgrass Community. Consists of midgrasses with ten to twenty 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
Oak/Juniper/Mesquite Complex State

Dominant plant species

- post oak (*Quercus stellata*), tree
- Ashe's juniper (*Juniperus ashei*), tree
- honey mesquite (*Prosopis glandulosa*), tree
- Texas wintergrass (*Nassella leucotricha*), grass

Community 3.1
Oak/Juniper/Mesquite Complex

Figure 17. 3.1 Oak/Juniper/Mesquite Complex

This plant community is an Oak/ Juniper/ Mesquite Complex (3.1) having greater than 20% woody canopy dominated by Ashe juniper and honey mesquite. Other species present in small amounts are cedar elm, hackberry, and live oak (*Quercus virginiana*). The herbaceous understory is almost nonexistent. Shade tolerant species such as Texas wintergrass tends to dominate the site where mesquite is the major woody plant. When the juniper canopy increases toward a cedar breaks type community, grasses have almost disappeared. Continuous grazing by domestic livestock has accelerated the shift. The reference community can be restored by prescribed burning and grazing but will require many years of burning currently due to the light fuel load of fine fuel and the absence of a seed source for the tall grasses. In general, the uses of fire on mature (larger) or a dense stand of woody plants does not have the same positive effects as burning in tallgrass communities. Chemical control alone is usually a good option for treatment on a large scale especially where a seed source is present. Mechanical treatment of this site along with range planting is a good option when seeding is necessary. After brush has been controlled mechanically or with herbicides, fire can then be used to suppress re-growth. Fuel loads are often the most limiting factor for the effective use of prescribed fire on this site. Due to the presence of shade, the amount of grass cover is

greatly reduced which in turn reduces forage production.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	633	757
Forb	280	353	420
Shrub/Vine	168	207	252
Tree	168	207	252
Total	**1120**	**1400**	**1681**

Figure 19. Plant community growth curve (percent production by month). TX6023, Oak/Juniper/Mesquite Complex. Oak/Juniper/Mesquite complex having greater than twenty percent woody canopy dominated by juniper and mesquite..

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 4
Converted Land State

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass
- yellow bluestem (*Bothriochloa ischaemum*), grass

Community 4.1
Cropland Community

Extensive conversion of the Deep Redland 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 savannah 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 21. 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

Figure 22. Plant community growth curve (percent production by month). TX6103, Warm-Season Annual Grasses & Legumes. Forage Sorghum, Grain Sorghum, Haygrazer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	8	20	25	20	10	10	5	2	0	0

Community 4.2
Pastureland Community

This state is usually the result of mechanical brush control and reseeding using one or more native grass species. Introduced species such as Kleingrass (*Panicum coloratum*) or one of the old world bluestems (Bothriochloa spp.) such as WW Spar and W B Dahl may also 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 lot of time and expense for this state to reach the

reference state for the Deep Redland site.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4259	5268	6277
Forb	224	336	448
Total	**4483**	**5604**	**6725**

Figure 24. Plant community growth curve (percent production by month). TX6104, Introduced Pasture Seeding. Grass species such as bermudagrass, kleingrass, old world bluestems and other introduced grassland species are planted..

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 4.3
Native Seeding Community

This community is usually the result of mechanical brush control and reseeding using one or more native grass species. Various native species such as switchgrass, eastern gamagrass, little bluestem and big bluestem may be a part of the seed mixture. The seeded state, if planted to natives with prescribed burning and prescribed grazing practices could after many years revert back into the Tall and Midgrass/Oak Savannah Community (1.2). However recruitment of oak may take as much as 50 years. Due to the lack of diversity of plant species compared to the historic climax it will take a long time if ever for this seeded state to again reach the historic community. If there are any introduced and invasive species that becomes established in this native seeding plant community, this will inhibit the return to the reference state.

Table 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4147	5184	6221
Forb	224	280	336
Shrub/Vine	67	84	101
Tree	45	56	67
Total	**4483**	**5604**	**6725**

Figure 26. 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 4.1A
Community 4.1 to 4.2

The Cropland Community can be converted into the Pastureland Community (monocultures) with the use of Pasture Planting.

Conservation practices

Forage and Biomass Planting

Pathway 4.1B
Community 4.1 to 4.3

The Cropland Community can be converted into the Native Seeding Community with the use of Prescribed Grazing, Range Planting, and Prescribed Burning.

Conservation practices

Prescribed Burning
Prescribed Grazing
Range Planting

Pathway 4.2A
Community 4.2 to 4.1

The Pastureland Community (monocultures) can be shifted to the Cropland Community through the use of Crop Cultivation practices.

Pathway 4.2B
Community 4.2 to 4.3

The Pastureland Community (monocultures) can be converted into the Native Seeding Community through the use of Prescribed Grazing, Range Planting, and Prescribed Burning.

Conservation practices

Prescribed Burning
Range Planting
Prescribed Grazing

Pathway 4.3A
Community 4.3 to 4.1

Brush Management and Crop Cultivation can assist in reverting the Native Seeding Community into the Cropland Community.

Conservation practices

Brush Management

Pathway 4.3B
Community 4.3 to 4.2

Prescribed Grazing and Pasture Planting can shift the Native Seeding Community into the Pastureland (monocultures) Community.

Conservation practices

Forage and Biomass Planting
Prescribed Grazing

Transition T1A
State 1 to 2

With the use of Heavy Continuous Grazing, Idle, and No Fire, the Tallgrass/Oak Savannah State can shift to the

Oak/Juniper/Midgrass State.

Transition T1B
State 1 to 4

With the implementation of various practices such as Brush Management, Crop Cultivation, Range Planting, and Pasture Planting, The Savannah State shifts to the Converted Land State.

Restoration pathway R2A
State 2 to 1

The Oak/Juniper/Midgrass State could be reverted back to the Tallgrass/Oak Savannah State through the implementation of Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

With heavy continuous grazing, land being idled, and no fires, the Oak/Juniper/Midgrass State can shift to the Oak/Juniper/Mesquite Complex State.

Transition T2B
State 2 to 4

With various conservation practices such as Brush Management, Crop Cultivation, Pasture Planting, Range Planting, Prescribed Grazing, and Prescribed Burning applied, the Oak/Juniper/Midgrass State can shift to the Converted Land State.

Restoration pathway R3A
State 3 to 2

Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning are some conservation practices that are necessary to shift the Oak/Juniper/Mesquite Complex State to the Oak/Juniper/Midgrass State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Restoration pathway R4A
State 4 to 1

With Prescribed Grazing and Prescribed Burning, the Converted Land State can be reverted back to the Tallgrass/Oak Savannah State.

Conservation practices

Prescribed Burning
Prescribed Grazing

Restoration pathway R4B
State 4 to 3

With heavy continuous grazing, no brush management, no fires, and land being idled, the Converted Land State can shift to the Oak/Juniper/Midgrass State.

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	**Tallgrasses**			2466–3699	
	big bluestem	ANGE	*Andropogon gerardii*	392–3699	–
	switchgrass	PAVI2	*Panicum virgatum*	392–3699	–
	little bluestem	SCSC	*Schizachyrium scoparium*	392–3699	–
	Indiangrass	SONU2	*Sorghastrum nutans*	392–3699	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	392–3699	–
	purpletop tridens	TRFL2	*Tridens flavus*	392–3699	–
2	**Midgrasses**			673–1009	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	112–1009	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	112–1009	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	112–1009	–
	vine mesquite	PAOB	*Panicum obtusum*	112–1009	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	112–1009	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	112–1009	–
3	**Cool-season Grasses**			448–673	
	sedge	CAREX	*Carex*	112–673	–
	Canada wildrye	ELCA4	*Elymus canadensis*	112–673	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	112–673	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	112–673	–
4	**Midgrasses**			224–336	
	plains lovegrass	ERIN	*Eragrostis intermedia*	56–336	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	56–336	–
	white tridens	TRAL2	*Tridens albescens*	56–336	–
5	**Shortgrasses**			224–336	
	purple threeawn	ARPUP9	*Aristida purpurea var. perplexa*	0–336	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–336	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–336	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–336	–
	Heller's rosette grass	DIOL	*Dichanthelium oligosanthes*	0–336	–

	curly-mesquite	HIBE	*Hilaria belangeri*	0–336	–
Forb					
6	**Forbs**			213–325	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–325	–
	sagebrush	ARTEM	*Artemisia*	0–325	–
	yellow sundrops	CASE12	*Calylophus serrulatus*	0–325	–
	whitemouth dayflower	COER	*Commelina erecta*	0–325	–
	prairie clover	DALEA	*Dalea*	0–325	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–325	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0–325	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0–325	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–325	–
	beeblossom	GAURA	*Gaura*	0–325	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–325	–
	bluet	HOUST	*Houstonia*	0–325	–
	coastal indigo	INMI	*Indigofera miniata*	0–325	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–325	–
	dotted blazing star	LIPU	*Liatris punctata*	0–325	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–325	–
	yellow puff	NELU2	*Neptunia lutea*	0–325	–
	beardtongue	PENST	*Penstemon*	0–325	–
	groundcherry	PHYSA	*Physalis*	0–325	–
	snoutbean	RHYNC2	*Rhynchosia*	0–325	–
	wild petunia	RUELL	*Ruellia*	0–325	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	0–325	–
	Texas star	SACA3	*Sabatia campestris*	0–325	–
	false gaura	STLI2	*Stenosiphon linifolius*	0–325	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–325	–
7	**forbs**			11–22	
	American star-thistle	CEAM2	*Centaurea americana*	0–22	–
	croton	CROTO	*Croton*	0–22	–
	Leavenworth's eryngo	ERLE11	*Eryngium leavenworthii*	0–22	–
	snow on the mountain	EUMA8	*Euphorbia marginata*	0–22	–
	hoary false goldenaster	HECA8	*Heterotheca canescens*	0–22	–
	groundcherry	PHYSA	*Physalis*	0–22	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–22	–
	Texas star	SACA3	*Sabatia campestris*	0–22	–
	twoleaf senna	SERO8	*Senna roemeriana*	0–22	–
	fanpetals	SIDA	*Sida*	0–22	–
Shrub/Vine					
8	**Shrubs/Vines**			135–202	
	Texas redbud	CECAT	*Cercis canadensis var. texensis*	0–202	–
	jointfir	EPHED	*Ephedra*	0–202	

	jointfir	EPHED	*Ephedra*	0–202	–
	stretchberry	FOPU2	*Forestiera pubescens*	0–202	–
	western white honeysuckle	LOAL	*Lonicera albiflora*	0–202	–
	algerita	MATR3	*Mahonia trifoliolata*	0–202	–
	plum	PRUNU	*Prunus*	0–202	–
	fragrant sumac	RHAR4	*Rhus aromatica*	0–202	–
	winged sumac	RHCO	*Rhus copallinum*	0–202	–
	saw greenbrier	SMBO2	*Smilax bona-nox*	0–202	–
Tree					
9	**Trees**			90–135	
	hackberry	CELTI	*Celtis*	0–135	–
	Texas red oak	QUBU2	*Quercus buckleyi*	0–135	–
	Texas live oak	QUFU	*Quercus fusiformis*	0–135	–
	blackjack oak	QUMA3	*Quercus marilandica*	0–135	–
	post oak	QUST	*Quercus stellata*	0–135	–
	bully	SIDER2	*Sideroxylon*	0–135	–
	elm	ULMUS	*Ulmus*	0–135	–
	Hercules' club	ZACL	*Zanthoxylum clava-herculis*	0–135	–

Animal community

The Tallgrass/Oak Savannah Community (1) is habitat for migratory bison herds. Deer and turkey were mostly found along the wooded streams occasionally feeding on the open savannah. Large predators such as wolves, coyotes, mountain lions and black bears roamed throughout the area. White-tailed deer, turkey, bobcats and coyotes along with resident and migratory birds and small mammals can find suitable habitat today. Domestic livestock is the dominant grazer of the site. As the savannah changes through the various vegetative states towards the shrubland state, the quality of the habitat may improve for some species and decline for others. Management must be applied to maintain a vegetative state in optimum habitat quality for the desired animal species. Prescribed fire is sometimes used as a tool to promote diversity, mainly for wildlife.

Hydrological functions

Peak rainfall periods occur in April, May, June, September and October. Rainfall amounts may be high (3 to 10 inches per event) and events may be intense. The soils of this site are deep. Periods of 60 plus days of little or no rainfall during the growing season are common. During periods of good rainfall with good grass cover, water infiltrates to the limestone rock below and moves to lower elevations and emerges as seeps and springs. The hydrology of this site may be manipulated with management to yield higher runoff volumes or greater infiltration to groundwater. Management for less herbaceous cover will favor higher surface runoff while dense herbaceous cover improves the water cycle. 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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Bryan Christensen, 9/21/2023

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	02/20/2006
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Matched what is expected for the site; minimal evidence of past or current rills; vegetation common and no signs of erosion.

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2. **Presence of water flow patterns:** This site has minimal flow patterns and minimal evidence of past or current soil deposition or erosion.

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3. **Number and height of erosional pedestals or terracettes:** Some very minor pedestalling may occur. 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:** None.

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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. < 6 inches. Only

associated with water flow patterns following extremely high intensity rainfall.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is stabilized by organic matter, decomposition products and/or a biological crust.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Very dark grayish brown clay surface 8 to 20 inches thick with very strong very fine subangular blocky and granular structure. Fragments of gravels, cobbles, and stones range from 10 to 80 percent in the soil profile. SOM is 1 to 4 percent.

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

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

---

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

    Dominant: Warm-season tallgrasses >>

    Sub-dominant: Warm-season midgrasses >

    Other: warm-season shortgrasses > forbs = 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.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 4000 to 6000 #/acre. 4000 pounds in below average moisture years, 5000 pounds in "normal" years and 6000 pounds in above average moisture 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.

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