# Ecological site F152BY009TX
# Sandy Terrace

Last updated: 9/22/2023
Accessed: 04/26/2024

## 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): 152B–Western Gulf Coast Flatwoods

Major Land Resource Area (MLRA) 152B, Western Gulf Coast Flatwoods, is in eastern Texas and western Louisiana. Locally termed the Flatwoods, the area is dominated by coniferous forest covering 5,681 square miles (14,714 square kilometers). The region is a hugely diverse transition zone between the northern and eastern mixed forests and southern and western coastal prairies and grasslands.

## Classification relationships

Major Land Resource Area (MLRA) (USDA-Natural Resources Conservation Service, 2006)

## Ecological site concept

The Sandy Terrace ecological site has deep sandy soils greater than 80 inches (203 centimeters) with little horizon development. The upland landscape, coupled with properties associated with the depth of the sand, forms its unique plant community.

## Associated sites

| | |
|---|---|
| F152BY008TX | **Acid Baygall**<br>Soils have a spodic horizon and are extremely acid. Sites are not open and have dense thickets of large gallberry. |
| F152BY010TX | **Terrace**<br>Soils have an increase in clay causing more water availability to plants. Sites have higher plant productivity potentials. |

## Similar sites

| | |
|---|---|
| F152BY010TX | **Terrace**<br>Soils have an increase in clay, causing more water availability to plants. Sites have higher plant productivity potentials. |
| F152BY012TX | **Well Drained Bottomland**<br>Soils are on a lower landscape position and flood frequently. |
| F152BY006TX | **Well Drained Loamy Upland**<br>Soils have an increase in clay, causing more water availability to plants. Sites have higher plant productivity potentials, typically with higher canopy covers, higher basal areas, and more robust herbaceous plant communities. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Pinus palustris*<br>(2) *Quercus incana* |
| Shrub | Not specified |
| Herbaceous | (1) *Schizachyrium scoparium*<br>(2) *Cnidoscolus texanus* |

## Physiographic features

The ecological site includes areas on nearly level to gently sloping soils on terraces and uplands. Slopes range from 0 to 5 percent. Elevation ranges from 25 to 151 feet. The topography of the area includes terraces.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Coastal plain > Terrace |
| Runoff class | Negligible |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 25–151 ft |
| Slope | 0–5% |
| Aspect | Aspect is not a significant factor |

## Climatic features

The Western Gulf Coast Flatwoods (MLRA 152B) is within the humid subtropical climate zone. The region boasts one of the highest rainfall averages in the southern United States, over 60 inches (152 centimeters) annually. This is due to the gulf currents that carry humid air to the region, where it condenses and precipitates. Rainfall averages are fairly consistent month by month, ranging from the lowest of 3.5 inches (8.9 centimeters) in March and the highest of 5.6 inches (14.3 centimeters) in June.

The area is prone to severe thunderstorms and tornadoes when the proper conditions exist, generally in the springtime. Sometimes excessive rainfall occurs, leading to flooding. Hurricanes also strike the region, generally in late summer or early fall. These extreme weather events can be quite destructive, toppling trees, and serves to naturally reset the vegetation to primary succession. The higher humidity of the region amplifies the feeling of heat

during the summer. Prolonged droughts and snowfall events are rare.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 249 days |
| Freeze-free period (average) | 289 days |
| Precipitation total (average) | 63 in |

## Climate stations used

- (1) CLEVELAND [USC00411810], Cleveland, TX
- (2) LIBERTY [USC00415196], Liberty, TX
- (3) LUMBERTON [USC00415435], Silsbee, TX
- (4) TOWN BLUFF DAM [USC00419101], Jasper, TX
- (5) DE QUINCY [USC00162361], Dequincy, LA
- (6) ELIZABETH [USC00162800], Oakdale, LA
- (7) WILDWOOD [USC00419754], Kountze, TX
- (8) OBERLIN FIRE TWR [USC00166938], Oberlin, LA
- (9) ORANGE 9 N [USC00416680], Orange, TX
- (10) DE RIDDER [USC00162367], Deridder, LA

## Influencing water features

The soils are comprised of deep sands and are very permeable. Water drains through quickly and therefore does not have an influence on the site. Rather, lack of water is the most influential.

## Wetland description

The soils associated with this site are non-hydric. Some sites have small areas that are hydric. These areas are typically in depressions or low lying flats that remain wet for long periods. Onsite investigation is needed to make an accurate determination on the local conditions.

## Soil features

The soils of this site are deep and characterized by sands throughout the entire soil profile, measured to 80 inches (203 centimeters). The soils show little soil development indicative of the entisols soil order. These soils have a thin surface horizon that has the most organic carbon. The subsequent subsoil layers have little organic carbon and are mostly distinguished by color changes. Sand content is generally greater than 90 percent unweatherable minerals; clay and silt content ranges from 5 to 10 percent. The Turkey series is a representative soil and consists of very deep, somewhat excessively drained, moderately rapid permeable soils that formed in sandy deposits from the Deweyville Formation. The series is classified as a Thermic, coated Typic Quartzipsamment. Other soils are included within the ecological site and all are defined by deep sands throughout all horizons. Besides the Turkey series, the Alaga series and the McNeely series are included in the Sandy Terrace ecological site.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium–igneous, metamorphic and sedimentary rock |
| Surface texture | (1) Fine sand |
| Family particle size | (1) Sandy |
| Drainage class | Somewhat excessively drained |
| Permeability class | Moderately rapid to rapid |
| Soil depth | 80 in |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0% |

| | |
|---|---|
| Available water capacity (0-60in) | 2–4 in |
| Calcium carbonate equivalent (0-60in) | 0% |
| Electrical conductivity (0-60in) | 0–1 mmhos/cm |
| Sodium adsorption ratio (0-60in) | 0–2 |
| Soil reaction (1:1 water) (0-60in) | 3.5–5 |
| Subsurface fragment volume <=3" (Depth not specified) | 0% |
| Subsurface fragment volume >3" (Depth not specified) | 0% |

## Ecological dynamics

The information in this ecological site description (ESD), including the state-and-transition model (STM), was developed using archeological and historical data, professional experience, and scientific studies. The information is representative of a complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals, and ecological processes are described to inform land management decisions.

Introduction – In southeastern Texas and southwestern Louisiana the transition from coastal grasslands to the large expanse of coniferous forest has been deemed the “Flatwoods”. As the name suggests, the region is relatively flat and, with many transitional areas, highly diverse in flora and fauna. Historically, the area was covered by pines with mixed hardwoods, sparse shrubs, and a diverse understory of grasses and forbs. Fire and drainage patterns play a significant role in shaping the plant communities and their development. Fire suppression, drainage alterations, and land conversion have reduced the amount of historical communities in existence today.

Background – Prior to settlement by the Europeans, the reference state for the Sandy Terraces were Longleaf Pine/Bluejack Oak Woodlands. Remnants of this presumed historic plant community still exist where natural conditions are intact. Evidence of the reference state is found in accounts of early historic explorers to the area, historic forest and biological survey teams, as well as recent ecological studies in the last 30 years. The age of this woodland community varies, and has a diverse flora.

Settlement Management – As human settlement increased throughout the area, so did the increase in logging and grazing by domestic livestock. The logging became so extensive that by the 1930’s most of the region had been cut-over. Replanting trees to historic communities was not common and early foresters began planting loblolly pine (*Pinus taeda*) for its quick growth. As more people colonized they began suppressing fire, which allowed dense thickets of shrubs to replace the herbaceous understory.

Current Management and State – Today much of the historic forest is gone, replaced by pine plantations, crops, and pastures. The areas that were not converted have been fire-suppressed so long that loblolly pine and fire intolerant hardwoods populate the overstory structure. Currently, federally-managed properties are the best place to view the remnant sites (National Park Service, U.S. Fish and Wildlife Service, etc.). Some private individuals have begun restoring communities through selective tree planting and retention of communities that remain. Other restoration efforts include mimicking natural-disturbance regimes through gap-phase regeneration on plantation sites.

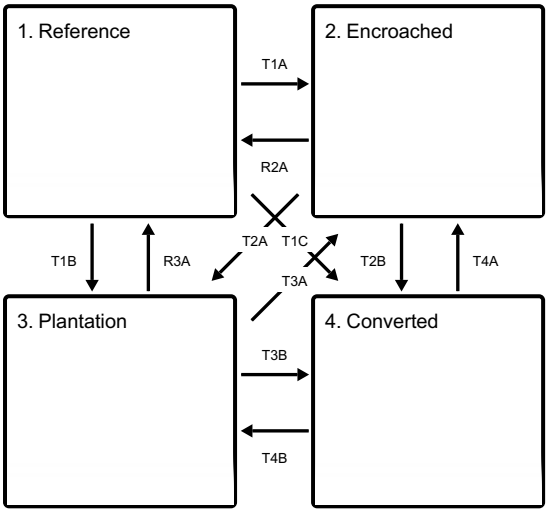
Fire Regimes – Fire was a natural and important disturbance throughout the region. Fire occurred naturally from lightning strikes, by Native Americans for game movement, and eventually early European settlers. Fires throughout the Flatwoods occurred at two different times. Early in the year, they would occur during late winter and early spring, removing senescent vegetation, recycling nutrients and minerals, and spurring new plant growth. Late summer and early fall fires occurred as well, but with a different community effect. Summer fires burned hotter and with more intensity, greatly suppressing the shrub canopy layer. The summer fires also shifted the ecological site transitional

state by decreasing grass densities and increasing forb densities. The topography, fuel loads, and other conditions caused patchy burns throughout the region resulting in mosaic patterns of plant communities and a heterogeneous landscape.

Disturbance Regimes – Extreme weather events occur occasionally throughout the region. Tornados uproot trees and open canopies in the spring months. In the late summer and early fall, hurricanes or tropical depressions can make landfall, dumping excessive amounts of rain and toppling trees with high winds. Another cause of large canopy openings is the effects of the southern pine beetle (Dendroctonus frontalis). Starting in the late 1950's, beetle outbreaks have occurred every 6 to 9 years (although a major attack has not occurred in some time); usually when the trees are stressed due to multiple environmental factors.

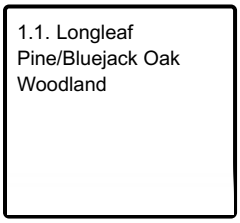
## State and transition model

**Ecosystem states**

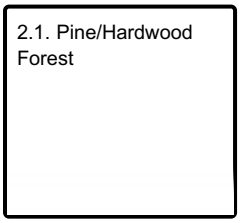



**T1A** - Absence of disturbance, coupled with natural regeneration over time
**T1B** - Merchantable timber is harvested by clearcut and site is planted to a monoculture of pine trees
**T1C** - Removal of native vegetation and introduction of improved forage species or annual crops
**R2A** - Reduction of overstory canopy using fire and selective thinning
**T2A** - Merchantable timber is harvested by clearcut and site is planted to a monoculture of pine trees
**T2B** - Merchantable timber harvested by clearcut, followed by planting of improved forage species or annual crops
**R3A** - Selective harvest combined with reintroduction of natural disturbances and native species
**T3A** - Lack of natural/anthropogenic disturbance and natural regeneration over time
**T3B** - Timber harvest by clearcut, followed by planting improved forage species or annual crops
**T4A** - Lack of natural/anthropogenic disturbance and natural regeneration over time
**T4B** - Site is planted to a monoculture of pine trees

**State 1 submodel, plant communities**




**State 2 submodel, plant communities**



**State 3 submodel, plant communities**

3.1. Pine Plantation

**State 4 submodel, plant communities**

4.1. Planted Pasture and Row Crop

## State 1
## Reference

The Sandy Terrace ecological site is a Longleaf Pine/Bluejack Oak Woodland. The deep sandy soils greatly reduce the water-holding capacity of the site. Nutrients accumulate better in soils with higher clay content in their profile, so the Sandy Terraces are usually nutrient deficient. This creates a droughtier environment than the surrounding uplands, decreasing the amount of biomass produced and increasing the amount of bare ground. The amounts of fine-fuel litter accumulation allow fires to burn frequently (3 to 5 years). All of these factors contribute to the openness of the site, generally 50 to 70 percent canopy cover. In parallel, sites typically have basal areas of 75 to 95 square feet per acre.

### Dominant plant species

- bluejack oak (*Quercus incana*), tree
- longleaf pine (*Pinus palustris*), tree

## Community 1.1
## Longleaf Pine/Bluejack Oak Woodland

The overstory canopy is dominated by longleaf pine with bluejack oak intermingled. An occasional post oak (*Quercus stellata*) or blackjack oak (*Quercus marilandica*) may be seen, but not in abundance. The ecological site is dotted with patches of bare ground and some litter accumulation, depending on the amount of time since the last fire. Like longleaf pines, species that can withstand dry, sandy, nutrient-lacking environments, occupy the area. Little bluestem (Schizachrium scoparium), threeawns (Aristada sp.), and rosette grasses (Dichanthelium sp.) are common throughout the ecological site. Other species include Louisiana yucca (*Yucca louisianensis*), Texas bullnettle (*Cnidoscolus texanus*), and noseburns (Tragia sp.).

## State 2
## Encroached

A long-term lack of fire and management has caused the community to cross a threshold, resulting in an Encroached State (2). The crossing of this threshold represents a closure in the overstory canopy, which limits the productivity of the ground layer. The limited ground layer does not provide enough fuel to harbor a burn with the intensity found in State 1. Fire-intolerant hardwoods have become part of the overstory. The overstory trees are overstocked and limit the growth of neighboring species. The overstocking reduces tree growth and causes stress, making them vulnerable to attacks from insects and/or diseases. Longleaf recruitment may be nonexistent due to lack of light and bare ground. Loblolly pine will especially take advantage of the current conditions. The plant communities will stay in this constant state and continue to age without disturbance or intervention.

### Community 2.1
### Pine/Hardwood Forest

The understory plant layer only contains remnants of the reference community and possibly no reference community indicator species. Shade-tolerant grasses, such as longleaf woodoats (*Chasmanthium sessiliflorum*), forbs, and greenbriers (Smilax sp.) may be the only ground-layer species. Added litter accumulation lessens the impact of the droughty soil at the surface. As more litter occurs, water retention is slightly higher. This helps in the establishment of species not adapted to the naturally droughty soils, further changing the makeup of the plant communities. Because the site lacks the diversity of the reference state, the wildlife diversity will be limited to generalist species, species requiring a closed canopy, and those seeking refuge.

## State 3
## Plantation

The Plantation State is a result of conversion activities. The landowner has maximized silviculture production by planting a monoculture of pine species, usually loblolly pine, but sometimes slash pine (Pinus ellioti) is planted.

### Community 3.1
### Pine Plantation

In the immediate years following the initial plantation tree planting, the understory community will resemble the reference state (State 1). During this early growth period, the landowner will typically remove unwanted hardwoods and herbaceous plants to reduce competition with the planted pine trees. As the overstory canopy closes, less understory management is required due to sunlight restrictions to the ground layer.

## State 4
## Converted

The Converted state is a result of pasture planting or cropping activities. The landowner has maximized agriculture production by planting a monoculture of introduced grass species or agricultural row crops.

### Community 4.1
### Planted Pasture and Row Crop

Typical introduced pasture grass species include bahiagrass (*Paspalum notatum*) and different varieties of bermudagrass (*Cynodon dactylon*). The grasses are grown for livestock production through direct grazing or baling hay for later use. Agricultural row crops are grown for food and fiber production. Many farmers use herbicides to reduce unwanted plant competition which yields a plant community unrepresentative of the reference (State 1) or subsequent vegetative states.

### Transition T1A
### State 1 to 2

The transition from a State 1 to the Encroached (State 2) is a result of time and long periods (greater than 10 years) of no fire and/or forest management practices. Without fire to suppress tree seedlings, biomass and diversity are lost from the grass and forb layers of the system.

### Transition T1B
### State 1 to 3

The transition is due to the land manager maximizing silviculture potential. Merchantable timber is harvested by clearcut. Then, the site is prepared and planted to a monoculture of pine trees.

### Transition T1C
### State 1 to 4

The transition is due to the land manager maximizing agricultural production. Merchantable timber is harvested by clearcut. Then, the site is prepared and planted to either an improved grass or row crops.

### Restoration pathway R2A
### State 2 to 1

Restoration of this community to the reference state begins with a selective timber harvest. Removing unwanted trees opens up the canopy, allowing sunlight penetration to the ground. Years of overstory growth have limited the fuel necessary to have an effective fire. Time will be needed to encourage understory growth. Once the herbaceous layer has established, more frequent than natural burns (1 to 2 years) may be required to suppress the woody vegetation.

### Transition T2A
### State 2 to 3

The transition is due to the land manager maximizing silviculture potential. Merchantable timber is harvested by clearcut. Then, the site is prepared and planted to a monoculture of pine trees.

### Transition T2B
### State 2 to 4

The transition is due to the land manager maximizing agricultural potential. Merchantable timber is harvested by clearcut. Then, the site is prepared and planted to either an improved grass or row crops.

### Restoration pathway R3A
### State 3 to 1

When restoring a plantation, the land manager can either clearcut the timber, prepare the site, and plant trees. Otherwise, gap-phase regeneration is possible through selective timber harvests. This involves replanting the desired overstory species in small openings within the current structure of the woodland. The benefit is a slow progression of restoration instead of starting from primary succession.

### Transition T3A
### State 3 to 2

This community transition is caused by neglecting the plantation understory. Without fire, mowing, or herbicides, unwanted understory saplings can begin to grow into the overstory.

### Transition T3B
### State 3 to 4

The transition is due to the land manager maximizing agricultural production. Merchantable timber is harvested by clearcut. Then, the site is prepared and planted to either an improved grass or row crops.

### Transition T4A
### State 4 to 2

This community transition is caused by neglecting crop or pasture. Without continuation of agricultural management, first-successional herbaceous plants will occupy the ground layer, followed by shrubs, and eventually shade-loving, fire-intolerant overstory species.

### Transition T4B
### State 4 to 3

The transition is due to the land manager maximizing silviculture production. The site prepared and planted to a monoculture of pine trees.

## Additional community tables

**Table 5. Community 1.1 forest overstory composition**

| Common Name | Symbol | Scientific Name | Nativity | Height (Ft) | Canopy Cover (%) | Diameter (In) | Basal Area (Square Ft/Acre) |
|---|---|---|---|---|---|---|---|
| **Tree** | | | | | | | |
| longleaf pine | PIPA2 | *Pinus palustris* | Native | – | – | – | – |
| bluejack oak | QUIN | *Quercus incana* | Native | – | – | – | – |
| blackjack oak | QUMA3 | *Quercus marilandica* | Native | – | – | – | – |
| post oak | QUST | *Quercus stellata* | Native | – | – | – | – |

**Table 6. Community 1.1 forest understory composition**

| Common Name | Symbol | Scientific Name | Nativity | Height (Ft) | Canopy Cover (%) |
|---|---|---|---|---|---|
| **Grass/grass-like (Graminoids)** | | | | | |
| little bluestem | SCSC | *Schizachyrium scoparium* | Native | – | – |
| silver bluestem | BOSA | *Bothriochloa saccharoides* | Native | – | – |
| threeawn | ARIST | *Aristida* | Native | – | – |
| lovegrass | ERAGR | *Eragrostis* | Native | – | – |
| rosette grass | DICHA2 | *Dichanthelium* | Native | – | – |
| **Forb/Herb** | | | | | |
| noseburn | TRAGI | *Tragia* | Native | – | – |
| Texas bullnettle | CNTE | *Cnidoscolus texanus* | Native | – | – |
| soft greeneyes | BEPU2 | *Berlandiera pumila* | Native | – | – |
| hairy bedstraw | GAPI2 | *Galium pilosum* | Native | – | – |
| queen's-delight | STSY | *Stillingia sylvatica* | Native | – | – |
| **Fern/fern ally** | | | | | |
| western brackenfern | PTAQ | *Pteridium aquilinum* | Native | – | – |
| **Shrub/Subshrub** | | | | | |
| farkleberry | VAAR | *Vaccinium arboreum* | Native | – | – |
| feltleaf willow | SAAL | *Salix alaxensis* | Native | – | – |
| Gulf Coast yucca | YULO | *Yucca louisianensis* | Native | – | – |
| **Tree** | | | | | |
| longleaf pine | PIPA2 | *Pinus palustris* | Native | – | – |
| bluejack oak | QUIN | *Quercus incana* | Native | – | – |
| blackjack oak | QUMA3 | *Quercus marilandica* | Native | – | – |
| post oak | QUST | *Quercus stellata* | Native | – | – |
| **Vine/Liana** | | | | | |
| cat greenbrier | SMGL | *Smilax glauca* | Native | – | – |
| southern dewberry | RUTR | *Rubus trivialis* | Native | – | – |

## Wood products

These soils occur in the Woodland Suitability Group 3s3. These sandy soils are on uplands and have a moderate potential for pine management. The 50-year site index for loblolly pine averages 85 feet (57 feet on a 25-year curve) but ranges from 80 feet to 95 feet, depending on slope position. The yield from a natural, unmanaged stand of loblolly pine, over a 50-year period, is approximately 280 board feet (Doyle Rule), 2.24 tons, or 80 cubic feet per acre per year. Management can substantially increase this yield. Because these soils are loose when dry, access and equipment operability is poor during such periods when rutting is possible. They are well suited for access and equipment operability during wet periods. These soils are also well suited for roads and log landings but can have erosion problems as slopes increase. Adequate water control devices for roads, such as wing ditches and water bars, should be installed on the steeper slopes. Seedling mortality may be slight to moderate. Proper planting depth and compaction will be important. Herbaceous weed control may be needed. Attention should be given to the possible leaching of fertilizers and of chemicals when herbicides are used for site preparation. Choose appropriate chemicals and application methods to prevent the possible contamination of ground water.

## Inventory data references

This site description was developed as part of the provisional ecological site initiative using historic soil survey manuscripts, available range site descriptions, and low intensity field sampling.

## Type locality

| Location 1: Hardin County, TX | |
|---|---|
| UTM zone | N |
| UTM northing | 30.349484 |
| UTM easting | -94.236016 |
| General legal description | Roy E. Larsen Sandylands Sanctuary |

## Other references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## Contributors

Tyson Hart

## Approval

Bryan Christensen, 9/22/2023

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## 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) | |
| Contact for lead author | |
| Date | 09/21/2021 |
| Approved by | Bryan Christensen |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:**

   _____

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

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

   _____

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

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:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth ( in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**