USDA Natural Resources Conservation Service

Ecological site F133BY011TX
Deep Sandy Terrace

Last updated: 9/21/2023
Accessed: 05/19/2024

General information

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

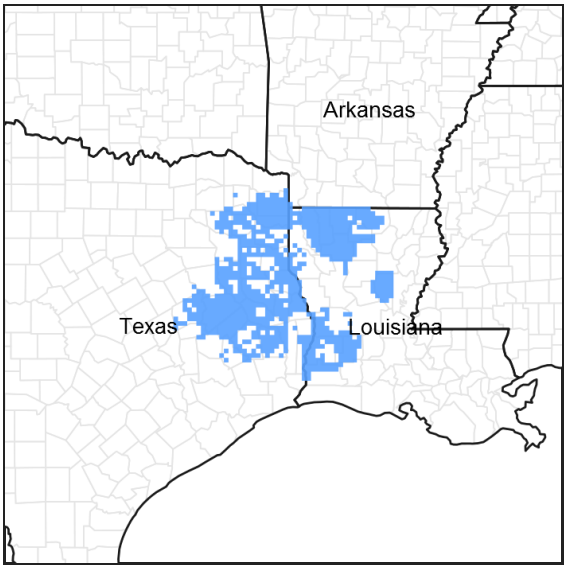


Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 133B–Western Coastal Plain

Major Land Resource Area (MLRA) 133B, Western Coastal Plain is in eastern Texas, western Louisiana, and the southwest corner of Arkansas. The area is dominated by coniferous forest covering 45,450 square miles (29,088,000 acres). The region is a hugely diverse transition zone between the eastern deciduous forests and the central grasslands to the west.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 133B

Ecological site concept

The Deep Sandy Terrace site has deep sandy soils with little horizon development. This, coupled with their position on terraces, form the unique plant communities.

Associated sites

F133BY008TX	**Northern Deep Sandy Upland** Sites are on a higher landscape position and have more clay content in the subsurface horizons.
F133BY009TX	**Southern Deep Sandy Upland** Sites are on a higher landscape position and have more clay content in the subsurface horizons.
F133BY010TX	**Very Deep Sandy Upland** Sites are on a higher landscape position.
F133BY012TX	**Wet Terrace** Sites have poor drainage patterns and are overall wetter. Associated plant species are able to withstand prolonged wetness.
F133BY013TX	**Terrace** Sites have more associated clay content resulting in more robust vegetative communities.
F133BY014TX	**Creek Bottomland** Sites are on a lower landscape position in bottomlands. Sites flood and have vegetation more associated with wetness.
F133BY016TX	**Sandy Bottomland** Sites are in a lower landscape position in bottomlands. Sites flood regularly and have vegetation associated with wetness.

Similar sites

F133BY009TX	**Southern Deep Sandy Upland** Sites are on a higher landscape position and have more clay content in the subsurface horizons.
F133BY010TX	**Very Deep Sandy Upland** Sites are on a higher landscape position.
F133BY013TX	**Terrace** Sites have more associated clay content resulting in more robust vegetation communities.

Table 1. Dominant plant species

Tree	(1) *Quercus incana* (2) *Quercus stellata*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site consists of very deep soils formed in in sandy coastal plain sediments on nearly level or gently sloping stream terraces. Slope is dominantly 1 to 3 percent, but ranges from 0 to 5 percent. A water table may exist from 48 to 80 inches during the late fall and early winter.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Terrace
Runoff class	Negligible to very low
Elevation	30–305 m
Slope	1–3%
Water table depth	122–203 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified

Elevation	Not specified
Slope	0–5%
Water table depth	Not specified

Climatic features

The climate of the Western Coastal Plain (MLRA 133B) is humid subtropical with hot summers and mild winters. Canadian air masses that move southward across Texas and Louisiana over the Gulf of Mexico in winter produce cool, cloudy, rainy weather with only rare cold waves that moderate in one or two days. Precipitation is distributed fairly evenly throughout the year and is most often in the form of slow and gentle rains.

Spring weather can be variable. March is relatively dry while thunderstorm activities increase in April and May. Occasional slow-moving thunderstorms or other weather disturbances may dump excessive amounts of precipitation on the area. Fall has moderate temperatures. Fall experiences an increase of precipitation and frequently has periods of mild, dry, sunny weather. Heavy rain may occur early in the fall because of tropical disturbances, which move westward from the gulf. Tropical storms are a threat to the area in the summer and fall but severe storms are rare. Prolonged droughts and snowfall are rare.

The total annual precipitation ranges from 39 inches in the western part of the region to 60 inches in the eastern part of the region. Approximately 50 percent of the rainfall occurs between April and September, which includes the growing season for most crops. Thunderstorms occur on about 50 days each year and most occur during the summer.

The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night and the average at dawn is about 90 percent. The sun shines 70 percent of the time in summer and 50 percent in winter. The prevailing wind is from the south-southeast. Average wind-speed is highest at 11 miles per hour in spring.

Table 4. Representative climatic features

Frost-free period (average)	219 days
Freeze-free period (average)	252 days
Precipitation total (average)	1,397 mm

Climate stations used

- (1) GILMER 4 WNW [USC00413546], Gilmer, TX
- (2) RUSK [USC00417841], Rusk, TX
- (3) MAGNOLIA [USC00034548], Magnolia, AR
- (4) MINDEN [USC00166244], Minden, LA
- (5) SHERIDAN [USC00036562], Sheridan, AR
- (6) CALHOUN RSCH STN [USC00161411], Calhoun, LA
- (7) CARTHAGE [USC00411500], Carthage, TX
- (8) HUNTSVILLE [USC00414382], Huntsville, TX
- (9) TOLEDO BEND DAM [USC00419068], Anacoco, TX
- (10) CALION L&D [USC00031140], El Dorado, AR
- (11) JENA 4 WSW [USC00164696], Trout, LA
- (12) DEKALB [USC00412352], Simms, TX

Influencing water features

The soils are very deep, sandy, and excessively well drained, but may have a high water table up to 48 inches in the late fall and early winter.

Wetland description

Wetland are not associated with this site.

Soil features

The two representative soils are Bienville and Hainesville. Both are sandy and classified as psammentic paleudalfs and lamellic quartzipsamments, respectively. The deep sands exist through all the horizons. There is very little clay percent increase as depth increases. The soils drain somewhat excessively and their permeability is moderate to moderately rapid.

Table 5. Representative soil features

Parent material	(1) Alluvium–sandstone
Surface texture	(1) Sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–6.5
Subsurface fragment volume <=3" (Depth not specified)	0–2%
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 – Southern Arkansas, western Louisiana, and eastern Texas have been deemed the Pineywoods because of the vast expanse of pine trees. The region represents the western edge of the southern coniferous belt. Historically, the area was covered by pines with mixed hardwoods, sparse shrubs, and a diverse understory of grasses and forbs. Fire played a significant role in reducing the woody competition that generally out-competes the herbaceous understory layer. Fire suppression 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 Deep Sandy Terrace ecological site was a Bluejack Oak/Post Oak (*Quercus incana*/*Quercus stellata*) Forest. Remnants of this presumed historic plant community still exist where natural conditions are replicated through conservation management techniques. 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 understory of grasses and forbs.

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.

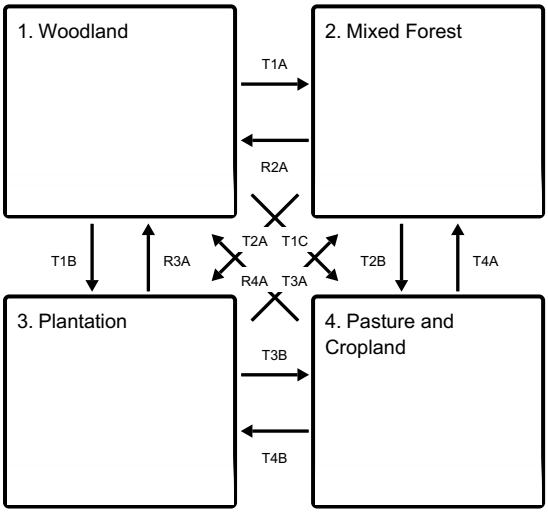
Current Management and State – Today much of the remnant forest is gone, replaced by pine plantations, crops, and pastures. The areas that were not converted have been fire-suppressed so long that loblolly pine and fire intolerant hardwoods populate the overstory structure. Currently, U.S. Forest Service properties are the best place to view the remnant sites. 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 Western Gulf Plain. Fire occurred naturally from lightning strikes and by Native Americans for game movement. The reference community developed with a frequency of fire every 5 to 10 years. Fires usually occurred in early spring, removing senescent vegetation, recycling nutrients and minerals, and spurring new plant growth. Late summer 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 often 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 - Fire suppression, no management

T1B - Clearcut, site preparation, tree planting

T1C - Clearcut, grass/crop planting

R2A - Selective timber harvest, prescribed burns

T2A - Clearcut, site preparation, tree planting

T2B - Clearcut, grass/crop planting

R3A - Gap-phase regeneration or clearcut with tree planting

T3A - Clearcut, no management

T3B - Clearcut, grass/crop planting

R4A - Tree planting, mid-story shrub control, prescribed burns

T4A - Fire suppression, no management

T4B - Clearcut, site preparation, tree planting

State 1 submodel, plant communities

1.1. Bluejack Oak/Post Oak Woodland

State 2 submodel, plant communities

2.1. Pine/Hardwood Forest

State 3 submodel, plant communities

3.1. Pine/Hardwood Plantation

State 4 submodel, plant communities

4.1. Planted Pasture and Row Crop

State 1
Woodland

State 1 has a low overstory cover of bluejack oak, post oak, and shortleaf pine (*Pinus echinata*). Longleaf pine (*Pinus palustris*) may be found in the southernmost areas of the MLRA. The understory is sparsely vegetated with grasses and forbs. Much of the woodland floor naturally lacks vegetation, and patches of sandy-bare ground are always visible. Saplings and some shrubs are in the area, but make up a small percentage of the mid-story canopy. Natural disturbances of fires, lightning strikes, hurricanes (wind throw), ice events (rare), and beetle infestations aid in maintaining the uneven-age structure. The natural canopy spacing is kept intact by the natural droughtiness and periodic fires ranging from 5 to 10 years.

Community 1.1
Bluejack Oak/Post Oak Woodland

The lack of clay in the soil profile reduces the amount of nutrients that can accumulate in the soil. The pine trees may also have a yellowish tint to their needles resulting from lack of nutrients. Ground cover is sparse and much of the surface is bare ground or covered by lichens. Common understory species include: little bluestem (*Schizachyrium scoparium*), eastern prickley pear (Opuntia humifosa), tapered rosette grass (*Dichanthelium acuminatum*), and Texas bullnettle (Cnidoscolus texana). Shrub species will be sparse as well, but include: yaupon (*Ilex vomitoria*) and farkleberry (*Vaccinium arboreum*).

State 2
Mixed Forest

The Mixed Forest community represents a steady-state for the Deep Sandy Terraces. Without fire or management, the site begins to lose the vegetative indicators that make the ecological site unique. The plant communities will stay constant without disturbance or intervention.

Community 2.1
Pine/Hardwood Forest

The understory dominance state has crossed a threshold in which normal environmental events cannot transition the community back to State 1. 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. Hardwood litter usually covers the ground, also retarding fire in this state. 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. The canopy closure is usually filled in by the reference state 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 more overstory species, further closing the canopy. Because the site lacks the diversity of State 1, the wildlife diversity will be limited to generalist species, species required a closed canopy, and those seeking refuge. This ecological state requires management to restore the reference community. Selective timber harvest to reduce the basal area is the first step to allow the understory to return. More frequent than natural prescribed burns (3 to 5 years) will help suppress the hardwood regeneration, but only after understory fuel levels are adequate. Intense summer fires may also be required. The suppression of overstory seedlings will allow the reference plant community to establish.

State 3
Plantation

The Plantation State is a result of conversion activities. The landowner has maximized silviculture production by planting a monoculture of tree species.

Community 3.1
Pine/Hardwood Plantation

In the immediate years following the initial plantation tree planting, the understory community will resemble 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
Pasture and Cropland

The Pasture and Cropland State is a result of conversion 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 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 is 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 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 State 1 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 (3 to 5 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 trees.

Transition T2B
State 2 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 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 prepared and planted to either an improved grass or row crops.

Restoration pathway R4A
State 4 to 1

This restoration path can be accomplished by planting a mix of bluejack oak and post oak species to their natural frequencies, trying to attain a mature overstory canopy. Management will be required to control unwanted species by burning, mowing, and/or herbicides. Controlling introduced pasture grasses is difficult, with complete control likely not attainable. The herbaceous understory will take time to develop, but this process can be expedited if adapted plant material is available.

Transition T4A
State 4 to 2

This community transition is caused by neglecting the plantation understory. Without fire, mowing, or herbicides, the brush canopy becomes a dense thicket.

Transition T4B
State 4 to 3

The Plantation State is a result of conversion activities. The landowner has maximized silviculture production by planting a monoculture of tree species.

Additional community tables

Inventory data references

These site descriptions were developed as part a Provisional Ecological Site project using historic soil survey manuscripts, available site descriptions, and low intensity field traverse sampling. Future work to validate the information is needed. This will include field activities to collect low, medium, and high-intensity sampling, soil correlations, and analysis of that data. A final field review, peer review, quality control, and quality assurance review of the will be needed to produce the final document.

Other references

Ajilvsgi, G. 2003. Wildflowers of Texas. Revised edition. Shearer Publishing, Fredericksburg, TX.

Ajilvsgi, G. 1979. Wildflowers of the Big Thicket. Texas A&M University Press, College Station, TX.

Allen, J. A., B. D. Keeland, J. A. Stanturf, and A. F. Kennedy Jr. 2001. A guide to bottomland hardwood restoration. Technical report, USGS/BRD/ITR-2000-0011.

Bray, W. L. 1904. Forest resources of Texas. Bureau of Forestry Bulletin 47, Government Printing Office, Washington D.C.

Diggs, G. M., B. L. Lipscomb, M. D. Reed, and R. J. O'Kennon. 2006. Illustrated flora of East Texas. Second edition. Botanical Research Institute of Texas & Austin College, Fort Worth, TX.

Jones, S. D., J. K. Wipff, and P. M. Montgomery. 1997. Vascular plants of Texas: a comprehensive checklist including synonymy, bibliography, and index. University of Texas Press, Austin.

NatureServe. 2002. International classification of ecological communities: Terrestrial vegetation of the United States. National forests in Texas final report. NatureServe, Arlington, VA.

Nixon, E. S. 2000. Trees, shrubs & woody vines of East Texas. Second edition. Bruce Lyndon Cunningham Productions, Nacogdoches, TX.

Picket, S. T. and P. S. White. 1985. The ecology of natural disturbance and patch dynamics. Academic Press,

Orlando, FL.

Randall, J. M., and J. Marinelli. 1996. Invasive plants: weeds of the global garden. Volume 149. Brooklyn Botanic Garden, Brooklyn, NY.

Roberts, O. M. 1881. A description of Texas, its advantages and resources with some account of their development past, present and future. Gilbert Book Company, Saint Louis, MO.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database.

Stanturf, J. A., S. H. Schoenholtz, C. J. Schweitzer, and J. P. Shepard. 2001. Achieving restoration success: Myths in bottomland hardwood forests. Restoration Ecology, 9:189-200.

Stringham, T. K., W. C. Krueger, and P. L. Shaver. 2003. State and transition modeling: An ecological process approach. Journal of Range Management 56:106-113.

Truett, J. C. 1984. Land of bears and honey: A natural history of East Texas. The University of Texas Press, Austin, TX.

U.S. Army Corps of Engineers. 2010. Regional supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0). U.S. Army Corps of Engineers, Engineer Research and Development Center, Environmental Laboratory ERDC/EL TR-10-20.

USDA-NRCS Ag Handbook 296 (2006).

Van Kley, J. E., R. L. Turner, L. S. Smith, and R. E. Evans. 2007. Ecological classification system for the national forests and adjacent areas of the West Gulf Coastal Plain. Second approximation. Stephen F. Austin University and The Nature Conservancy, Nacogdoches, TX.

Vines, R. A. 1960. Trees, shrubs, and woody vines of the Southwest. University of Texas Press, Austin, TX.

Watson, G. E. 2006. Big Thicket Plant Ecology. Third Edition. University of North Texas Press, Denton, TX.

Contributors

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Approval

Bryan Christensen, 9/21/2023

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	09/03/2021
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:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**
