USDA Natural Resources Conservation Service

# Ecological site R150BY648TX Southern Coastal Sand

Last updated: 9/22/2023
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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): 150B–Gulf Coast Saline Prairies

MLRA 150B is in the West Gulf Coastal Plain Section of the Coastal Plain Province of the Atlantic Plain and entirely in Texas. It makes up about 3,420 square miles. It is characterized by nearly level to gently sloping coastal lowland plains dissected by rivers and streams that flow toward the Gulf of Mexico. Barrier islands and coastal beaches are included. The lowest parts of the area are covered by high tides, and the rest are periodically covered by storm tides. Parts of the area have been worked by wind, and the sandy areas have gently undulating to irregular topography because of low mounds or dunes. Broad, shallow flood plains are along streams flowing into the bays. Elevation generally ranges from sea level to about 10 feet, but it is as much as 25 feet on some of the dunes. Local relief is mainly less than 3 feet. The towns of Groves, Texas City, Galveston, Lake Jackson, and Freeport are in the northern half of this area. The towns of South Padre Island, Loyola Beach, Corpus Christi, and Port Lavaca are in the southern half. Interstate 37 terminates in Corpus Christi, and Interstate 45 terminates in Galveston.

## Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 150B

## Ecological site concept

Southern Coastal Sands are sandy-textured ecological sites positioned in front and behind Coastal Dunes in areas of mean annual precipitation less than 41 inches. Southern Coastal Sands do not pond and have a water table below 40 inches.

## Associated sites

| | |
|---|---|
| R150BY650TX | **Low Coastal Sand**<br>This site is located on the barrier flat on a slightly lower position on the landscape. |
| R150BY713TX | **Coastal Swale**<br>This site is located in elongated open depressions on the barrier island. These areas will pond for long periods. |
| R150BY714TX | **Coastal Dune**<br>This site is on convex areas adjacent to the bay and are loamy or clayey throughout. |
| R150BY552TX | **Tidal Flat**<br>This site is lower in the landscape and is subject to tidal action. |

## Similar sites

| | |
|---|---|
| R150BY530TX | **Northern Coastal Sand**<br>This site is located in a higher precipitation regime. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Quercus virginiana* |
| Shrub | (1) *Amorpha* |
| Herbaceous | (1) *Schizachyrium scoparium*<br>(2) *Uniola paniculata* |

## Physiographic features

This site occurs on nearly level to very gently sloping low stabilized dunes on barrier flats, dune complexes, or strand plains.
It also occurs on very gently sloping sandy areas of spoil islands.

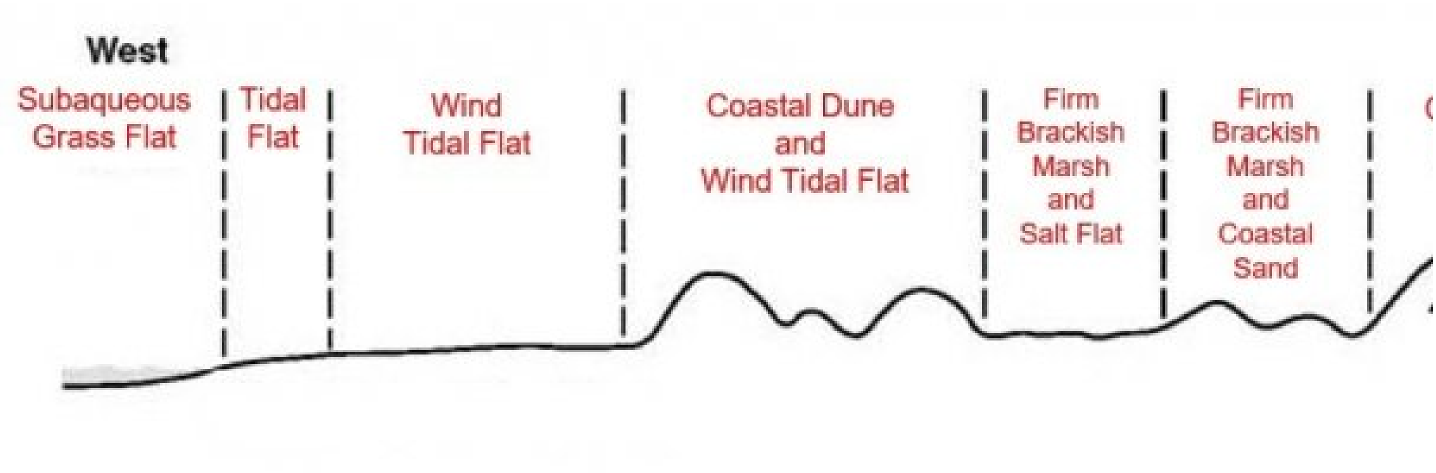



**Figure 2.**

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Dune field > Parabolic dune<br>(2) Barrier island > Dune<br>(3) Dune field > Sand sheet |
| Runoff class | Negligible to low |
| Flooding duration | Very brief (4 to 48 hours) |
| Flooding frequency | Rare to occasional |
| Ponding frequency | None |
| Elevation | 3–50 ft |
| Slope | 0–5% |
| Water table depth | 100–137 in |
| Aspect | Aspect is not a significant factor |

## Climatic features

The climate is predominately maritime, controlled by the warm and very moist air masses from the Gulf of Mexico. The climate along the upper coast of the barrier islands is subtropical subhumid and the climate on the lower coast of Padre Island is subtropical semiarid (due to high evaporation rates that exceed precipitation). Almost constant sea breezes moderate the summer heat along the coast. Winters are generally warm and are occasionally interrupted by incursions of cool air from the north. Spring is mild and damaging wind and rain may occur during spring and summer months. Tropical cyclones or hurricanes can occur with wind speeds of greater than 74 mph and have the potential to cause flooding from torrential rainstorms. Despite the threat of tropical storms, the storms are rare. Throughout the year, the prevailing winds are from the southeast to south-southeast.

The average annual precipitation is 45 to 57 inches in the northeastern half of this area, 26 inches at the extreme southern tip of the area, and 30 to 45 inches in the rest of the area. Precipitation is abundant in spring and fall in the southwestern part of the area and is evenly distributed throughout the year in the northeastern part. Rainfall typically occurs as moderate-intensity, tropical storms that produce large amounts of rain during the winter. The average annual temperature is 68 to 74 degrees F. The freeze-free period averages 340 days and ranges from 315 to 365 days.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 365 days |
| Freeze-free period (characteristic range) | 365 days |
| Precipitation total (characteristic range) | 26-32 in |
| Frost-free period (actual range) | 365 days |
| Freeze-free period (actual range) | 365 days |
| Precipitation total (actual range) | 26-34 in |
| Frost-free period (average) | 365 days |
| Freeze-free period (average) | 365 days |
| Precipitation total (average) | 29 in |

## Climate stations used

- (1) PORT ISABEL CAMERON AP [USW00012957], Los Fresnos, TX
- (2) PORT ISABEL [USC00417179], Port Isabel, TX
- (3) PORT MANSFIELD [USC00417184], Port Mansfield, TX
- (4) PADRE IS NS [USC00416739], Padre Island Ntl Seashor, TX
- (5) CORPUS CHRISTI NAS [USW00012926], Corpus Christi, TX

## Influencing water features

This site receives some water from runoff and seepage from adjacent sites during wet periods. During the winter and early spring the water table in some areas ranges from 40 to 60 inches below the surface.

## Wetland description

These areas have non-hydric soils but some areas may have small areas of hydric soils. Onsite investigation needed to determine local conditions.

## Soil features

The soils are very deep, light-colored, excessively to somewhat poorly drained, strongly acid to strongly alkaline, fine sands and loamy fine sands. The depth of the surface horizon ranges from 6 to 35 inches and the depth of the soil profile is greater than 80 inches. Surface runoff is negligible to low. Because of seepage from adjoining sites and the relative landscape position, a water table is present in this soil at a depth of 40 to 60 inches during wet periods. Soils correlated to this site include: Padre, Panam, Rockport, and Twinpalms.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Eolian sands–igneous, metamorphic and sedimentary rock |
| Surface texture | (1) Fine sand<br>(2) Loamy fine sand |
| Family particle size | (1) Sandy |
| Drainage class | Somewhat poorly drained to excessively drained |
| Permeability class | Moderate to rapid |
| Soil depth | 80 in |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0% |
| Available water capacity (0-60in) | 2–3 in |
| Calcium carbonate equivalent (0-60in) | 0–15% |
| Electrical conductivity (0-60in) | 0–2 mmhos/cm |
| Sodium adsorption ratio (0-60in) | 0–8 |
| Soil reaction (1:1 water) (0-60in) | 5.1–9 |
| Subsurface fragment volume <=3" (18-60in) | 0–20% |
| Subsurface fragment volume >3" (0-60in) | 0% |

## Ecological dynamics

The Texas coastline is composed of barrier islands, peninsulas, bays, estuaries, and natural or man-made passes. These mobile environments are constantly reshaped by the process of erosion and accretion. Hurricane activity can significantly change the island's environment. The Padre Island region is subdivided into habitats based on landform and vegetation. The Coastal Sand ecological lies on the bay side of the foredunes. The landforms vary from almost level to a series of low ridges and hummocky surfaces. The variety of vegetation is greater than other inland sites. The overall aspect is a grassland plain.

The plant communities are dynamic, and composition may vary dramatically with variations in annual rainfall, grazing, and fire. This landscape is typically a vegetated barrier flat unless impacted by recent hurricane activity. Because of southern proximity and nearness to the Gulf of Mexico, extreme climatic variations ranging from extended drought to hurricanes are possible. Bare ground may predominate during droughts or following hurricanes while a midgrass prairie may predominate under proper management and non-droughty periods.

This site has historically been an open prairie comprised of a midgrass plant community. The co-dominant grasses are seacoast bluestem (*Schizachyrium scoparium*) and gulfdune paspalum (*Paspalum monostachyum*). Other important associated grasses include broomsedge bluestem (*Andropogon virginicus*), brownseed paspalum (*Paspalum plicatulum*), and marshhay cordgrass (*Spartina patens*). Also present is a diverse understory community of perennial legumes and other forbs.

Changes in the referenced community occur when continued overuse by livestock results in a midgrass prairie community. This community is the result of the decline of seacoast bluestem, gulfdune paspalum, and other perennial grasses. An increase in forbs such as camphor daisy (*Rayjacksonia phyllocephala*), partridge pea (*Chamaecrista fasciculata*), and crotons (Croton spp.) are common. Three-awns (Aristida spp.), thin paspalum (*Paspalum setaceum*), and red lovegrass (*Eragrostis secundiflora* spp. oxylepis) increase in abundance with heavy grazing but decline on severely grazed rangeland.

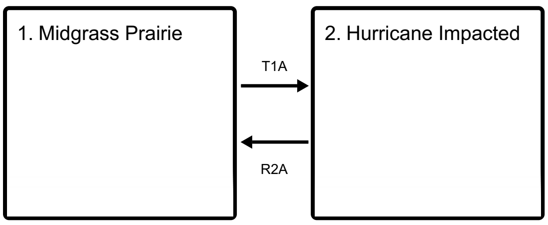
Further degradation of the plant community will result in a community dominated by annuals. Severe overgrazing of this plant community causes seacoast bluestem to be virtually absent. Sandbur (Cenchrus spp.), fringed signalgrass (*Urochloa ciliatissima*), annual panicums (Panicum spp.), camphor daisy, and other forbs dominate this plant community. Some prickly pear (Opuntia spp.) will increase as well. Severe overuse causes a large amount of bare ground, which results in blowing sand. Blowing sand further accelerates community degradation.

The intensity of a hurricane plays a large role in the plant community. Due to the extensive creeping rhizomes and ability to tolerate high salinity levels, gulfdune paspalum can survive a moderately-intensive hurricane while other species cannot. Following a hurricane, the plant community will consist of gulfdune paspalum and various annual pioneer plants. Following a severe hurricane, vegetation will be virtually devoid. Length of recovery to reference conditions will depend on the severity and the ability to defer from grazing or other major natural disturbance.

Active sand dunes occur on this site. Overuse by livestock exacerbates dune formation. Continuous dunes sometimes cover several square miles. The dunes add to landscape diversity but can pose management problems because they migrate across the landscape and may cover fences, roads, equipment, and buildings. Cutting native hay near a sand dune and mulching the dune with the hay while lightly incorporating the hay into the soil is an effective method of stabilizing dunes.

## State and transition model

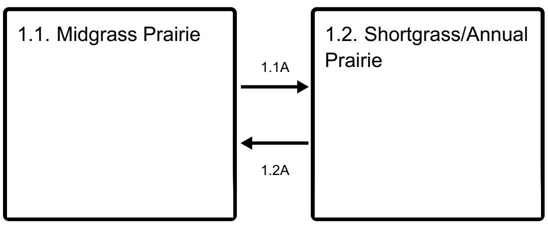
**Ecosystem states**




**T1A** - Loss of vegetative cover

**R2A** - Natural recovery over time

**State 1 submodel, plant communities**



**State 2 submodel, plant communities**

2.1. Hurricane Impacted

## State 1
## Midgrass Prairie

### Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- gulfdune paspalum (*Paspalum monostachyum*), grass

## Community 1.1
## Midgrass Prairie

**Figure 9. 1.1 Midgrass Prairie**

The reference community consists of a midgrass prairie with co-dominants of seacoast bluestem the and gulfdune paspalum. Seacoast bluestem occurs on moderately drained flats and swales. Gulfdune paspalum declines dramatically in the drier microhabitats of well-drained flats and ridges where seacoast bluestem becomes the primary dominant species. Other important associated grasses included broomsedge bluestem, brownseed paspalum, and marshhay cordgrass. The reference community also supports a diverse understory of perennial legumes and forbs. Heavy grazing and elimination of fire results in a change in the plant community composition from an open midgrass dominated prairie to a shortgrass prairie. Severe overgrazing of this plant community causes seacoast bluestem to be virtually absent. Severe overuse results in a large amount of bare ground, which results in blowing sand. Blowing sand further accelerates community degradation. Storms and hurricanes can produce washouts and areas devoid of vegetation.

**Table 5. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 885 | 2985 | 4185 |
| Forb | 280 | 480 | 580 |
| Shrub/Vine | 35 | 35 | 35 |
| Tree | 0 | 0 | 0 |
| **Total** | **1200** | **3500** | **4800** |

**Figure 11. Plant community growth curve (percent production by month). TX7751, Midgrass Prairie Community. Open grassland plain composed of**

**mid-grasses with seacoast bluestem and gulfdune paspalum dominate the site..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 5 | 15 | 20 | 15 | 10 | 10 | 15 | 6 | 4 | 0 |

### Community 1.2
### Shortgrass/Annual Prairie

This community is comprised of red lovegrass, thin paspalum, and threeawns. The transition occurs due to overgrazing and lack of fires. Overgrazing of seacoast bluestem and gulfdune paspalum leads an increase in shortgrasses and annual species. This site can revert back to the reference community with prescribed grazing and periodic prescribed burning. Other species common include partridge pea, annual crotons, rosinweed, sunflowers, panicums, and prickly pear. There is also an increase of bare ground in this plant community, making it susceptible to the formation of dunes.

### Pathway 1.1A
### Community 1.1 to 1.2

The transition to Community 1.2 occurs because of overgrazing, lack of fire, or naturally occurring drought conditions.

### Pathway 1.2A
### Community 1.2 to 1.1

The restoration back to Community 1.1 requires prescribed grazing, the return of prescribed fire, and/or more average rainfall conditions returning.

### State 2
### Hurricane Impacted

Vegetation severely reduced or absent

### Community 2.1
### Hurricane Impacted

This plant community is caused by the destructive forces of hurricanes. The vegetation has been burned due to high winds laden with coastal water. Vegetation has also been buried under thick sediment deposits of sand. Some areas are scoured and devoid of vegetation and may temporarily suffer complete vegetative loss. This community can be restored back to the Midgrass Prairie State (1) given enough time for the vegetation to recover. Usually, deferment and time are the best options for recovery.

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

Transition to State 2 is caused by the associated effects of Hurricanes. This includes storm surges, wind scouring of plants, and burial of vegetation by sediment deposition.

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

Restoration back to the Midgrass Prairie State (1) typically requires time and deferment of grazing. Time for recovery depends on the severity of the hurricane.

## Additional community tables

**Table 6. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Tallgrasses** | | | 780–2580 | |
| | gulfdune paspalum | PAMO4 | *Paspalum monostachyum* | 780–2580 | – |
| | little bluestem | SCSC | *Schizachyrium scoparium* | 780–2580 | – |
| 2 | **Midgrass** | | | 140–320 | |
| | broomsedge bluestem | ANVI2 | *Andropogon virginicus* | 140–320 | – |
| 3 | **Midgrass** | | | 140–320 | |
| | brownseed paspalum | PAPL3 | *Paspalum plicatulum* | 140–320 | – |
| 4 | **Midgrass** | | | 140–320 | |
| | saltmeadow cordgrass | SPPA | *Spartina patens* | 140–320 | – |
| 5 | **Cool-season grass** | | | 140–320 | |
| | Scribner's rosette grass | DIOLS | *Dichanthelium oligosanthes var. scribnerianum* | 140–320 | – |
| 6 | **Warm-season grasses** | | | 140–320 | |
| | Grass, perennial | 2GP | *Grass, perennial* | 140–320 | – |
| | Wright's threeawn | ARPUW | *Aristida purpurea var. wrightii* | 140–320 | – |
| **Forb** | | | | | |
| 7 | **Forbs** | | | 140–320 | |
| | false indigo | AMORP | *Amorpha* | 140–320 | – |
| 8 | **Forbs** | | | 140–320 | |
| | partridge pea | CHFA2 | *Chamaecrista fasciculata* | 140–320 | – |
| | American snoutbean | RHAM | *Rhynchosia americana* | 140–320 | – |
| 9 | **Forbs** | | | 140–320 | |
| | ragweed | AMBRO | *Ambrosia* | 140–320 | – |
| | wild indigo | BAPTI | *Baptisia* | 140–320 | – |
| | croton | CROTO | *Croton* | 140–320 | – |
| | hydrocotyle | HYDRO2 | *Hydrocotyle* | 140–320 | – |
| | phlox | PHLOX | *Phlox* | 140–320 | – |
| | groundcherry | PHYSA | *Physalis* | 140–320 | – |
| | camphor daisy | RAPH2 | *Rayjacksonia phyllocephala* | 140–320 | – |
| **Shrub/Vine** | | | | | |
| 10 | **Shrubs/Vines** | | | 35 | |
| | pricklypear | OPUNT | *Opuntia* | 35 | – |
| | honey mesquite | PRGL2 | *Prosopis glandulosa* | 35 | – |
| | live oak | QUVI | *Quercus virginiana* | 35 | – |
| | willow | SALIX | *Salix* | 35 | – |

## Animal community

The animal communities of the Coastal Prairie communities are influenced by fresh and salt water inundations. Cattle and many species of wildlife make extensive use of the site. White-tailed deer may be found scattered across the prairie and are found in heavier concentrations where woody cover exists. Feral hogs are present and at times become abundant. Coyotes are abundant and fill the mammalian predator niche. Rodent populations rise during drier periods and fall during periods of inundation. Alligators are locally abundant and make frequent use of the marshes depending on salt concentrations in the marshes.

The region is a major flyway for waterfowl and migrating birds. Hundreds of thousands of ducks, geese, and sandhill cranes abound during winter. Whooping cranes are an important endangered species that occur in the area, especially near Aransas National Wildlife Refuge. Northern harriers are common predatory birds seen patrolling marshes. Curlews, plovers, sandpipers, and willets are shorebirds that make use of the tidal areas. Seagulls and terns are plentiful throughout the year trolling the shores as well. Further inland, rails, gallinules, and moorhens make use of the brackish marshes.

## Hydrological functions

Infiltration into the sandy soils of this site is rapid. However, because of the level terrain and proximity to the Gulf of Mexico, this site may be inundated periodically.

## Recreational uses

The Padre Island National Seashore is a popular tourist designation throughout the year. Because the National Seashore endeavors to preserve Padre Island in its natural state, visiting the island is very much like stepping back into the past. Birdwatching and saltwater fishing are other recreational uses.

## Inventory data references

A team of Rangeland Management Specialists and Soil Scientists, with years of coastal field experience, made on-site field visits to build this ecological site description.

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## Contributors

Vivian Garcia, RMS, NRCS, Corpus Christi, TX

## Approval

Bryan Christensen, 9/22/2023

## 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) | |
| Contact for lead author | |
| Date | 04/23/2025 |

| | |
|---|---|
| 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:**

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