USDA Natural Resources Conservation Service

Ecological site F149BY010MA
Moist Till Uplands

Last updated: 9/17/2024
Accessed: 05/13/2025

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.

MLRA notes

Major Land Resource Area (MLRA): 149B–Long Island-Cape Cod Coastal Lowland

149B—Long Island-Cape Cod Coastal Lowland

This area is in the Embayed Section of the Coastal Plain Province of the Atlantic Plain. It is part of the partially submerged coastal plain of New England. It is mostly an area of nearly level to rolling plains, but it has some steeper hills (glacial moraines). Ridges border the lower plains. The Peconic and Carmans Rivers are on the eastern end of Long Island. The parts of this area in Massachusetts and Rhode Island have no major rivers. This entire area is made up of deep, unconsolidated glacial outwash deposits of sand and gravel. A thin mantle of glacial till covers most of the surface. Some moraines form ridges and higher hills in this area of generally low relief. Sand dunes and tidal marshes are extensive along the coastline.

Classification relationships

USDA-NRCS (USDA, 2006):
Land Resource Region (LRR): S—Northern Atlantic Slope Diversified Farming Region
Major Land Resource Area (MLRA): 149B—Long Island-Cape Cod Coastal Lowland
USDA-FS (Cleland et al., 2007):
Province: 221 Eastern Broadleaf Forest Province
Section: 221A Lower New England
Subsection: 221Ab Cape Cod Coastal Lowland and Islands
Subsection: 221An Long Island Coastal Lowland and Moraine

Ecological site concept

The site consists of very deep, moderately well drained soils formed in loamy glacial till on uplands. They are nearly level to gently sloping soils on broad hill tops and toeslopes on moraines. Slope ranges from 0 to 8 percent. Representative soil is Moshup.
The reference plant community is considered to be a wetland transition community. Common trees include black oak, red oak, white oak, tulip tree, American beech, hickories, and red maple. Pitch pine is subdominant. Common shrubs spicebush and highbush blueberry. Post settlement clearing of forests and an increase in fire has led to a dominance of pitch pine over oaks on terminal moraines within Cape Cod (Parshall et al. 2003). In the absence of severe or frequent fire, oaks replaces pitch pine while other hardwoods such as beech and hickories become a larger component of the forests on more mesic sites (Parshall et al. 2003).

Associated sites

F149BY011MA	**Well Drained Till Uplands** Well-drained Till Uplands

Similar sites

F149BY006NY	**Well Drained Outwash** Well-drained Outwash

Table 1. Dominant plant species

Tree	(1) *Quercus velutina* (2) *Pinus rigida*
Shrub	(1) *Lindera benzoin*
Herbaceous	Not specified

Physiographic features

The site occurs on broad hill tops and toeslopes on moraines and is not subject to flooding/ponding.

Table 2. Representative physiographic features

Landforms	(1) Upland > Moraine (2) Hill
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	0–80 m
Slope	0–15%
Water table depth	61 cm
Aspect	Aspect is not a significant factor

Climatic features

Coastal regions' climate generally considered maritime, experiences a more moderate climate than inland, i.e., cooler summers and warmer winters and delayed onset of spring. However, coastal regions do experience the brunt of extreme weather such as nor'easters and tropical storms, e.g., hurricanes.

Table 3. Representative climatic features

Frost-free period (characteristic range)	156-157 days
Freeze-free period (characteristic range)	199-207 days
Precipitation total (characteristic range)	1,143-1,245 mm
Frost-free period (actual range)	156-157 days
Freeze-free period (actual range)	197-209 days
Precipitation total (actual range)	1,118-1,270 mm
Frost-free period (average)	157 days
Freeze-free period (average)	203 days
Precipitation total (average)	1,194 mm

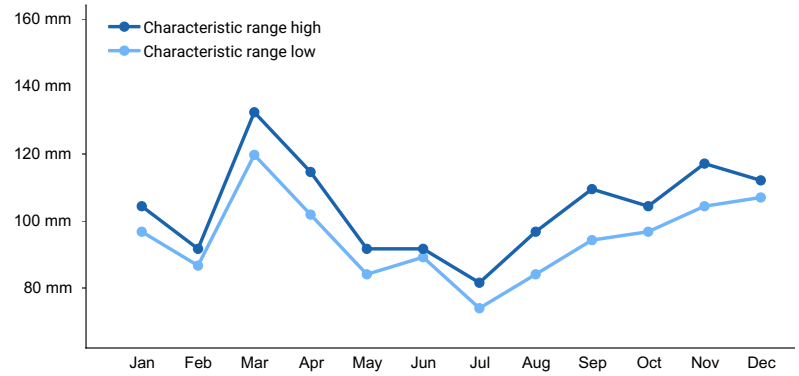

Figure 1. Monthly precipitation range

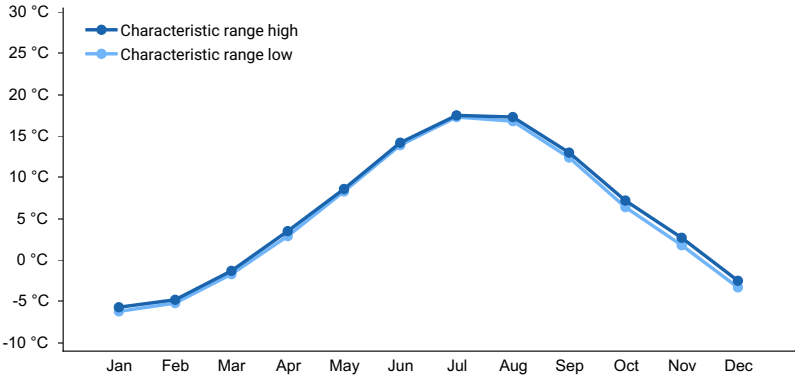

Figure 2. Monthly minimum temperature range

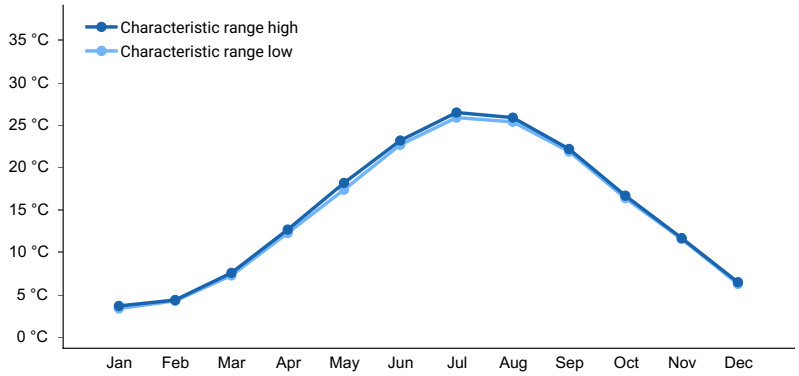

Figure 3. Monthly maximum temperature range

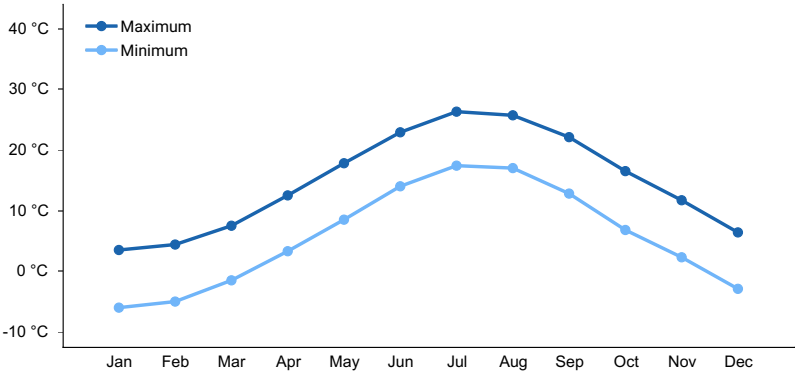

Figure 4. Monthly average minimum and maximum temperature

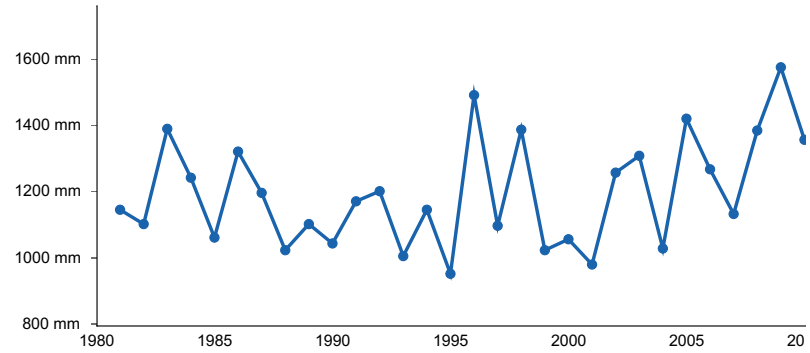

Figure 5. Annual precipitation pattern

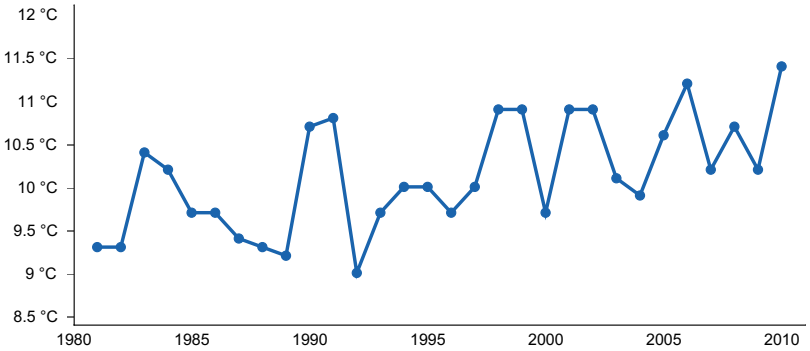

Figure 6. Annual average temperature pattern

Climate stations used

- (1) HYANNIS [USC00193821], Hyannis, MA
- (2) EAST WAREHAM [USC00192451], East Wareham, MA

Influencing water features

N/A

Wetland description

N/A

Soil features

The site consists of very deep, moderately well drained soils formed in loamy glacial till and marine deposits. Representative soil is Moshup.

Table 4. Representative soil features

Parent material	(1) Till (2) Marine deposits
Surface texture	(1) Loam
Family particle size	(1) Fine-loamy (2) Coarse-loamy
Drainage class	Moderately well drained
Depth to restrictive layer	183 cm
Soil depth	183 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0–2%
Available water capacity (Depth not specified)	15.24 cm
Soil reaction (1:1 water) (Depth not specified)	3.5–5.5
Subsurface fragment volume <=3" (Depth not specified)	5–20%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, not yet validated with field work.*]

The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003). Terrestrial ecological systems are specifically defined as a group of plant community types (associations) that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. They are intended to provide a classification unit that is readily mappable, often from terrain and remote imagery, and readily identifiable by conservation and resource managers in the field. A given system will typically manifest itself in a landscape at intermediate geographic scales of tens-to-thousands of hectares and will persist for 50 or more years. A vegetation association is a plant community that is much more specific to a given soil, geology, landform, climate, hydrology, and disturbance history. It is the basic unit for vegetation classification and recognized by the US National Vegetation Classification (US FDGC 2008; USNVC 2017). Each association will be named by the diagnostic and often dominant species that occupy the different height strata (tree, shrub, and herb). Within the NatureServe Explorer database, ecological systems are numbered by a community Ecological System Code (CES) and individual vegetation associations are assigned an identification number called a Community Element Global Code (CEGL).

[*Caveat] The information presented is representative of very complex vegetation communities. Key indicator plants and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and geography. The reference plant community is not necessarily the management goal. The drafts of species lists are merely representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

This ecological site, set in moderately-well-drained moist till, is characterized by somewhat mesic plant communities with coastal affinities from Long Island, New York, north to Cape Cod, Massachusetts. These plant communities coincide with Northern Atlantic Coastal Plain Dry Oak-Hardwood Forest system(CES203.475). The prevailing ecological processes are related to coastal influences, such as a coastal climate and storms, and if within close proximity to the coast, maritime effects of wind exposure, salt spray, and sand movement. Oaks (Quercus) typically predominate in the forest canopy, including black oak (*Q. velutina*), red oak (*Q. rubra*), white oak (*Q. alba*), scarlet oak (*Q. coccinea*), and chesnut oak (*Q. montana*) or sometimes pines (Pinus) such as white pine (*Pinus strobus*) or pitch pine (*Pinus rigida*) or admixtures thereof. Oaks were found to be dominant on terminal moraines within Cape Cod while pines dominated sandy outwash sites (Parshall et al. 2003). American holly (*Ilex opaca*) or inkberry (*Ilex glabra*) can be present. Threats include road vehicles, and may include invasive plants such as, but not limited to, black locust (*Robinia pseudoacacia*), tree-of-heaven (*Ailanthus altissima*), autumn olive (*Elaeagnus umbellata*), white poplar (*Populus alba*), multiflora rose (*Rosa multiflora*), Honeysuckles, (Lonicera spp.), oriental bittersweet (Celatrus orbiculatus), japanese knotweed (*Polygonum cuspidatum*) wineberry (*Rubus phoenicolasius*), Asiatic tearthumb (*Polygonum perfoliatum*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]).

State and transition model

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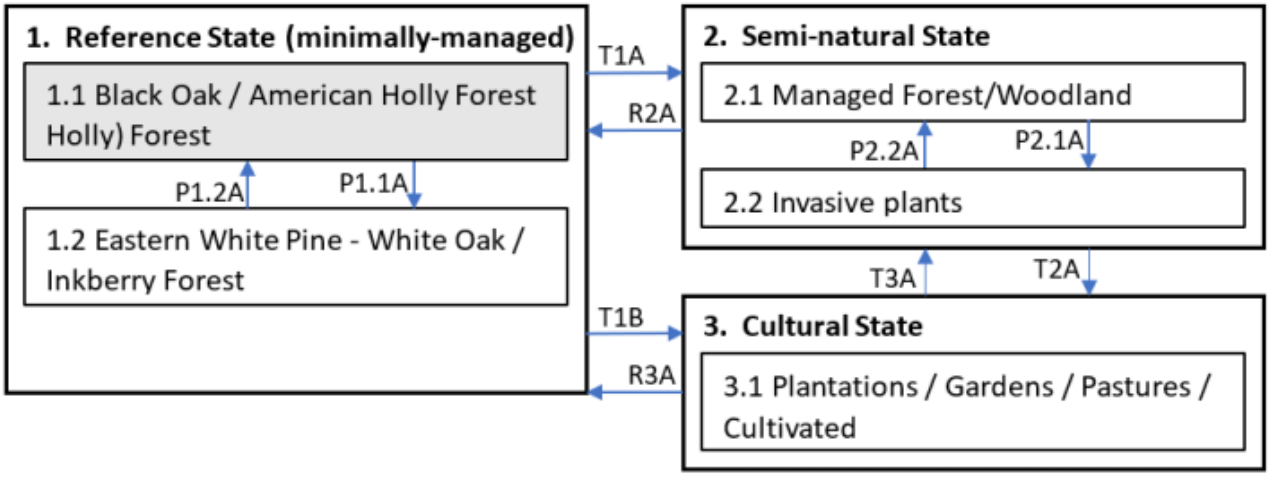

Transition	*Drivers/practices*
T1A	disturbance, invasive plant establishment
T1B, T2A	cutting, land clearing, plant establishment
R2A, R3A	herbaceous weed treatment, plant removal, plant establishment, successional management
T3A	abandonment, disturbance, invasive plant establishment
P1.1A	disturbance
P1.2A	succesion
P2.1A	Invasive plant establishment
P2.2A	Invasive plant removal
P3.1	Changing land management

State 1
Reference State (Moist Till)

The predominant plant communities of the Moist Till ecological site Reference State (miniamally-managed) include: • North Atlantic Coastal Oak / Holly Forest, (Black Oak / American Holly Forest), [*Quercus velutina* / *Ilex opaca* Forest] - CEGL006378 • Coastal White Pine - White Oak Forest, (Eastern White Pine - White Oak / Inkberry Forest), [*Pinus strobus* - *Quercus alba* / *Ilex glabra* Forest], - CEGL006382 • Northeastern Dry Oak - Hickory Forest, Oak (White Oak, Northern Red Oak, Black Oak) - Hickory species / Mapleleaf Viburnum Forest), [Quercus (alba, rubra, velutina) - Carya spp. / *Viburnum acerifolium* Forest], - CEGL006336 (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]).

Community 1.1
Black Oak / American Holly Forest

North Atlantic Coastal Oak / Holly Forest, (Black Oak / American Holly Forest), [*Quercus velutina* / *Ilex opaca* Forest] - CEGL006378 This forest occurs on mesic, moderately well-drained silts and sandy loams in low areas on the landscape that are sheltered from direct maritime influences. Canopy dominants include Oaks (Quercus) predominately black oak (*Q. velutina*) and white oak (*Q. alba*),as well as American beech (*Fagus grandifolia*), red maple (*Acer rubrum*), and blackgum (*Nyssa sylvatica*). American holly (*Ilex opaca*) is abundant in the subcanopy. Other associated species of lessor cover include Canada serviceberry (*Amelanchier canadensis*), and sassafras

(*Sassafras albidum*). Shrubs are common and include highbush blueberry (*Vaccinium corymbosum*), American witchhazel (*Hamamelis virginiana*), smooth arrowood (*Viburnum recognitum*) [= *V. dentatum* var. lucidum], and mountain laurel (*Kalmia latifolia*). Vines are common but not usually abundant, and include such species as poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), roundleaf greenbrier (*Smilax rotundifolia*), cat greenbrier (*Smilax glauca*), and grapes (Vitis spp.). Characteristic herbs include starflower (*Trientalis borealis*), Swan's sedge (*Carex swanii*), and New York fern (*Thelypteris noveboracensis*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political state): Coastal Forest/Woodland (Swain Swain 2016) [MA] Coastal oak-holly forest (Edinger et al. 2014) [NY]

Community 1.2
Eastern White Pine - White Oak / Inkberry Forest

Coastal White Pine - White Oak Forest, (Eastern White Pine - White Oak / Inkberry Forest), [*Pinus strobus* - *Quercus alba* / *Ilex glabra* Forest], - CEGL006382 This forest is dominated by white pine (*Pinus strobus*), white oak (*Quercus alba*), and black oak (*Quercus velutina*) in the canopy with occasional pitch pine (*Pinus rigida*). The shrub layer is characterized by highbush blueberry (*Vaccinium corymbosum*), blue huckleberry (*Gaylussacia frondosa*), and inkberry (*Ilex glabra*). The herb layer contains wintergreens (Pyrola spp.), Indianpipe (*Monotropa uniflora*), checkered rattlesnake-plantain (*Goodyera tesselata*), and several ferns, New York fern (*Thelypteris noveboracensis*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political state): Coastal Forest/Woodland (Swain Swain 2016) [MA] Successional southern hardwoods (Edinger et al. 2014) [NY]

Pathway P1.1A
Community 1.1 to 1.2

Disturbance, greater fire frequency, coastal proximity

Pathway P1.2A
Community 1.2 to 1.1

Succession, reduced fire frequency

State 2
Semi-natural State

Vegetation on lands somewhat conditioned by land use, e.g., managed native plant communities or invasive plant communities.

Community 2.1
Managed Forest Woodland

Community 2.2
Invasive Plant Community

White poplar (*Populus alba*), winged burningbush (*Euonymus alatus*), Japanese knotweed (*Lonicera japonica*), oriental bittersweet (Celatrus orbiculatus)

Pathway P2.1A
Community 2.1 to 2.2

Invasive plant establishment

Pathway P2.2A
Community 2.2 to 2.1

Invasive plant management

Conservation practices

Invasive Plant Species Control

State 3
Cultural State

Landscapes heavily conditioned by land use, e.g., Plantations/gardens

Community 3.1
Plantations/gardens/cultivated/pasture

Transition T1A
State 1 to 2

Disturbance, invasive plant establishment

Conservation practices

Forest Land Management

Transition T1B
State 1 to 3

Cutting, land clearing, plant establishment

Conservation practices

Brush Management
Land Clearing

Restoration pathway R2A
State 2 to 1

Herbaceous weed treatment, plant removal, plant establishment, successional management

Conservation practices

Brush Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Forest Land Management
Invasive Plant Species Control
Monitoring and Evaluation

Transition T2A
State 2 to 3

Cutting, land clearing, plant establishment

Conservation practices

Land Clearing
Invasive Plant Species Control

Herbaceous Weed Control

Restoration pathway R3A
State 3 to 1

Herbaceous weed treatment, plant removal, plant establishment, successional management

Conservation practices

Brush Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Invasive Plant Species Control
Monitoring and Evaluation
Herbaceous Weed Control

Transition T3A
State 3 to 2

Abandonment, disturbance, invasive plant establishment

Additional community tables

Inventory data references

Site Development and Testing Plan
Future work is needed, as described in a project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified vegetation ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

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Contributors

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Approval

Nels Barrett, 9/17/2024

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	05/23/2020
Approved by	Nels Barrett
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:**
