USDA Natural Resources Conservation Service

# Ecological site F149BY003MA
# Well Drained Lake Plain

Last updated: 9/09/2024
Accessed: 05/12/2025

## 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 deep, well-drained sandy material underlain by silty lacustrine deposits on level plains. Representative soil is Hinesburg.
The reference community is a “coastal forest/woodland” (Swain and Kearsley 2011). Occurring in protected areas along the coast, these forests are predominately oaks with red maple and white pine. Coastal forests also may include more southern species such as American Holly, honeylocust, blacklocust, black gum, and sassafras.

## Associated sites

| | |
|---|---|
| F149BY003MA | **Well Drained Lake Plain**<br>Wet Lake Plain |

## Similar sites

| | |
|---|---|
| F149BY009MA | **Well Drained Dense Till Uplands**<br>Well-drained Dense Till |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Quercus velutina*<br>(2) *Pinus strobus* |
| Shrub | (1) *Ilex opaca* |
| Herbaceous | (1) *Thelypteris noveboracensis* |

## Physiographic features

Lake plains are nearly level flats with little or no relief, situated along the northern reaches of the mid and lower regions of Cape Cod.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Lake plain > Lake plain<br>(2) Delta<br>(3) Glacial lake (relict) |
| Runoff class | Low to very high |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 10–1,000 ft |
| Slope | 0–15% |
| Water table depth | 18–72 in |
| 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. Occupying a low position in the landscape, lake plains may experience cold air pockets.

**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) | 45-49 in |
| Frost-free period (actual range) | 156-157 days |
| Freeze-free period (actual range) | 197-209 days |
| Precipitation total (actual range) | 44-50 in |
| Frost-free period (average) | 157 days |
| Freeze-free period (average) | 203 days |
| Precipitation total (average) | 47 in |

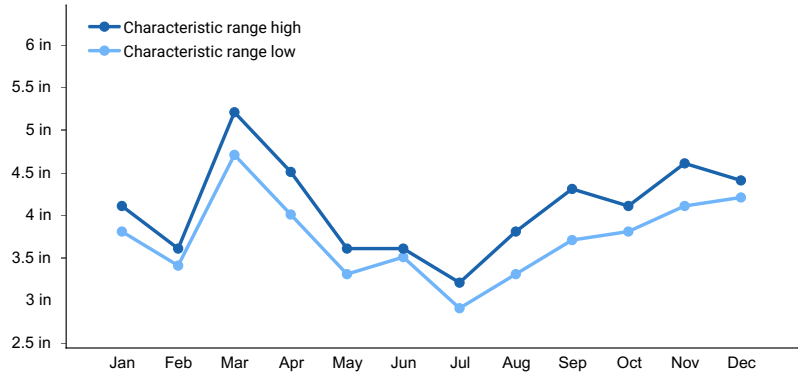



**Figure 1. Monthly precipitation range**

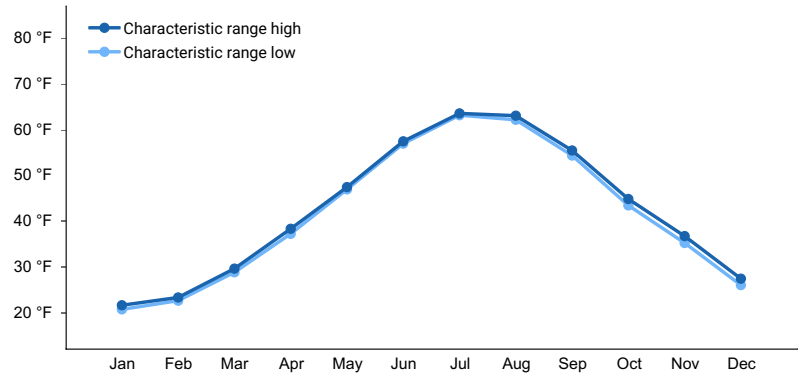



**Figure 2. Monthly minimum temperature range**

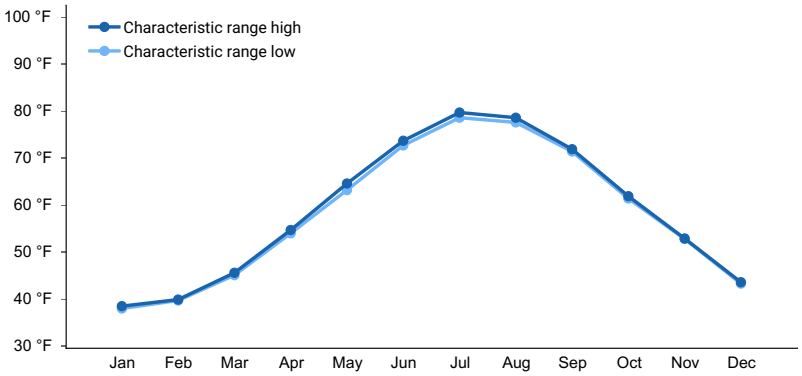



**Figure 3. Monthly maximum temperature range**

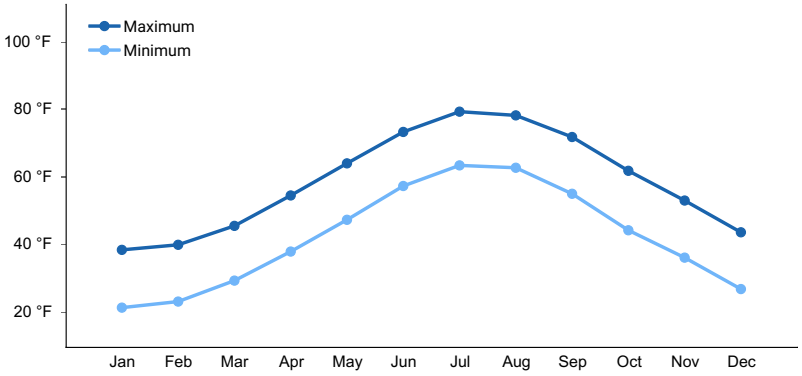



**Figure 4. Monthly average minimum and maximum temperature**

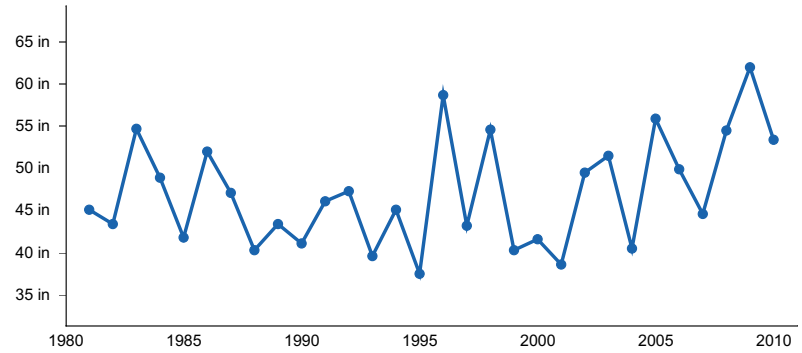



**Figure 5. Annual precipitation pattern**

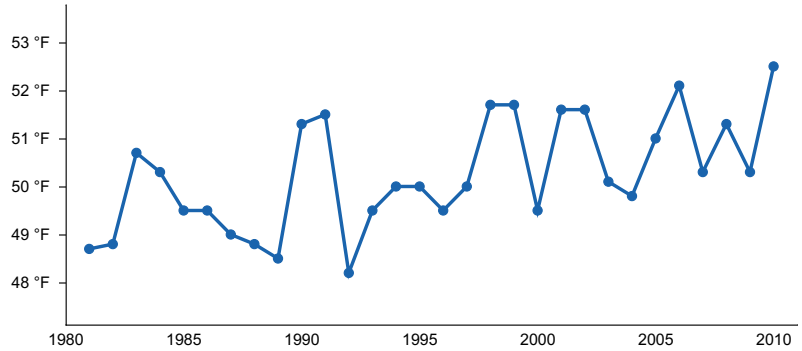



**Figure 6. Annual average temperature pattern**

## Climate stations used

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

## Influencing water features

No associated water features to report.

## Wetland description

No associated water features to report.

## Soil features

The site consists of very deep, well-drained soils formed in glacial lakes and outwash. Representative soil is Hinesburg.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Glaciolacustrine deposits<br>(2) Glaciofluvial deposits |
| Surface texture | (1) Sandy loam<br>(2) Fine sandy loam |
| Family particle size | (1) Sandy over loamy |
| Drainage class | Well drained |
| Permeability class | Very slow to slow |
| Depth to restrictive layer | 72 in |
| Surface fragment cover <=3" | 0% |

| | |
|---|---|
| Surface fragment cover >3" | 0% |
| Available water capacity (Depth not specified) | 4 in |
| Soil reaction (1:1 water) (0-40in) | 3.5–7.3 |
| Subsurface fragment volume <=3" (Depth not specified) | 5–7% |
| Subsurface fragment volume >3" (Depth not specified) | 1–2% |

## Ecological dynamics

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

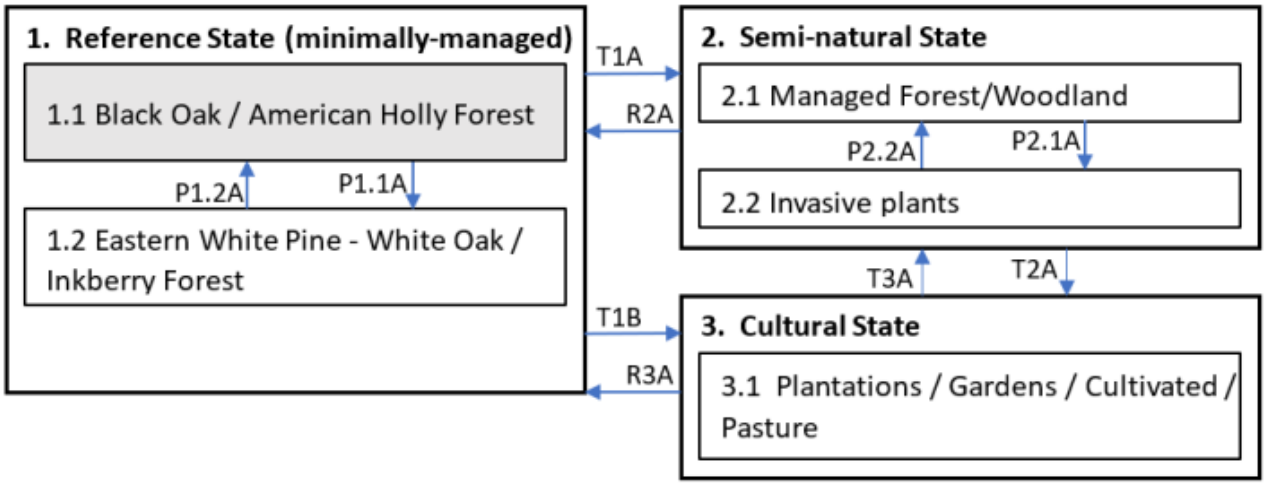
The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003). Terrestrial ecological systems are specifically defined as a group of plant community types (associations) that tend to co-occur 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). 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.

The Well-drained Lake Plain ecological site occurs on well-drained flats and in slight depressions in protected areas, and in this MLRA, along the coast. It is characterized mainly by coastal forests, and variants of the coastal forest that transition to maritime forests closer to the ocean. These coastal forests are predominantly oaks with red maples and occasionally white pine. Coastal forests also may include more southern species such as American holly, (*Ilex opaca*), honeylocust (*Gleditsia triacanthos*), black locust (*Robinia pseudoacacia*), blackgum (*Nyssa sylvatica*), and sassafras (*Sassafras albidum*). (Note: Sites considered "maritime" in nature are in immediate proximity to estuarine or marine environments and strongly subjected to frequent salt spray, wind exposure, and sand movement, giving the upright woody vegetation a more stressed and sometimes contorted appearance. Whereas sites considered "coastal" are situated further inland, yet still influenced by coastal process, just less so.) These well-drained lake plains are not well-described but may in part, include vegetation within the Northern Atlantic Coastal Plain Hardwood Forest system (CES203.475) and in part by the Northern Atlantic Coastal Plain Maritime Forest (CES203.302) system (NatureServe 2017), depending on proximity to the ocean. Areas cleared of trees support meadows or old-fields. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]).

## State and transition model

## 149BY003 – Well-drained Lake Plain




| *Transition* | *Drivers/practices* |
|---|---|
| T1A | disturbance, invasive plant establishment |
| T1B, T2A | cutting, land clearing, plant establishment, wind erosion control |
| R2A, R3A | herbaceous weed treatment, plant removal, plant establishment, successional management |
| T3A | abandonment, disturbance, invasive plant establishment |
| P1.1A | succession |
| P1.2A | disturbance |
| P2.1A | invasive plant establishment |
| P2.2A | invasive plant management |
| P3.1 | changing land management |

### State 1
### Reference State (Well-drained Lake Plains)

Coastal forests in somewhat protected areas along the coast are predominantly: • North Atlantic Coastal Oak / Holly Forest (Black Oak / American Holly Forest [*Quercus velutina* / *Ilex opaca* Forest – CEGL006378]) In areas transitioning to a sandier substrate may include: • Coastal White Pine - White Oak Forest (Eastern White Pine - White Oak / Inkberry Forest [*Pinus strobus* - *Quercus alba* / *Ilex glabra* Forest – CEGL006382]) A variant of the well-drained lake plain in close proximity to the ocean may include: • Northeastern Maritime Forest (Black Cherry - Sassafras - Canadian Serviceberry - Black Oak / Roundleaf Greenbrier Forest [*Prunus serotina* - *Sassafras albidum* - *Amelanchier canadensis* - *Quercus velutina* / *Smilax rotundifolia* Forest – CEGL006145]) Other low stature vegetation may include the broadly-defined and widely distributed ruderal meadow or old field vegetation: • Little Bluestem Old-field Meadow (Little Bluestem - (Broomsedge Bluestem) - Goldenrod species Ruderal Meadow, [*Schizachyrium scoparium* - (*Andropogon virginicus*) - Solidago spp. Ruderal Meadow – CEGL006333]) whether possible community-types may include frost-pocket vegetation has to be determined. (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]) Canopy dominants include black oak (*Quercus velutina*), white oak (*Quercus alba*), red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*). Occasionally American beech (*Fagus grandifolia*) may be present. American holly (*Ilex opaca*) is typically abundant in the subcanopy with lessor amounts of Canadian serviceberry (*Amelanchier canadensis*), and sassafras (*Sassafras albidum*). Common shrubs include highbush blueberry (*Vaccinium corymbosum*), American witchhazel (*Hamamelis virginiana*), and northern arrowwood (*Viburnum recognitum*). Patches of mountain laurel (*Kalmia latifolia*) may be profuse. Vines include such species as poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), roundleaf greenbrier (*Smilax rotundifolia*), cat greenbrier (*Smilax glauca*), and grapes (Vitis spp.). Forbs include starflower (*Trientalis borealis*), Swan's sedge (*Carex swanii*), and New York fern (*Thelypteris noveboracensis*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]).

### 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 coastal forest is common on sandy outwash plains that may transition from well-drained silts and sandyloams yet remain sheltered from more extreme maritime exposure. These forests are dominated by white pine (*Pinus strobus*), white oak (*Quercus alba*), and black oak (*Quercus velutina*) in the canopy with occasional pitch pine (*Pinus rigida*) in low abundance. The shrub layer is characterized by inkberry (*Ilex glabra*), with lessor amounts of highbush blueberry (*Vaccinium corymbosum*) and blue huckleberry (*Gaylussacia frondosa*). Herb layer includes wintergreen [shinleaf] (Pyrola spp.), rattlesnake plantain (Goodyera spp.), and several ferns. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]).

### Pathway P1.1A
### Community 1.1 to 1.2

Succession

### Pathway P1.2A
### Community 1.2 to 1.1

Disturbance

## 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

Honey locust (*Gleditsia triacanthos*) removal follow severe coastl storm and salt kill.

### Community 2.2
### Invasive plants

Black locust (*Robinia pseudoacacia*), Norway Maple (*Acer platanoides*), tree-of-heaven (*Ailanthus altissima*). winged burningbush (*Euonymus alatus*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), oriental bittersweet (Celatrus orbiculatus), garlic mustard (*Alliaria petiolata*), major celindine (*Chelidonium majus*), ground ivy (*Glechoma hederacea*), and European lily-of-the-valley (*Convallaria majalis*) can characterize the herb layer, which may also include native plants.

### Pathway P2.1A
### Community 2.1 to 2.2

Invasive plant establishment

### Pathway P2.2A
### Community 2.2 to 2.1

Invasive plant management

### State 3
### Cultural State _ areas where the native vegetation is completely transformed.

Cultivated / Pasture / Garden

### Community 3.1
### cultivated/pasture/garden?

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

Forest management, disturbance, invasive plant establishment

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

disturbance, clearing, cutting, brush removal

**Conservation practices**

| |
|---|
| Brush Management |
| Land Clearing |

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

tree removal, wildlife mgmt., invasive plant control, brush removal, native plant establishment

**Conservation practices**

| |
|---|
| Tree/Shrub Establishment |
| Upland Wildlife Habitat Management |
| Forest Stand Improvement |
| Restoration and Management of Natural Ecosystems |
| Native Plant Community Restoration and Management |

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

land clearing, cutting, vegetation removal

**Conservation practices**

| |
|---|
| Land Clearing |

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

selective plantings, succession, vegetation management

**Conservation practices**

| |
|---|
| Restoration and Management of Natural Ecosystems |
| Native Plant Community Restoration and Management |
| Invasive Plant Species Control |

### Restoration pathway T3A
### State 3 to 2

succession, vegetation management

## Additional community tables

## Inventory data references

Site Development and Testing Plan
Future work is needed, as described in a future 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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Joshua Hibit

## Approval

Nels Barrett, 9/09/2024

## 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 | 05/21/2020 |
| 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:**

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