USDA Natural Resources Conservation Service

Ecological site RX141X401
Clay

Last updated: 10/03/2024
Accessed: 11/21/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 141X–Tug Hill Plateau

MLRA 141 is entirely in New York and makes up about 1,173 square kilometers (3,037 square kilometers). It consists of a relatively small but unique upland that lies just off the eastern end of Lake Ontario and west of the Black River Valley and Adirondack Mountain region. It is essentially a north- and east-facing glaciated cuesta scarp and is underlain by thick Wisconsin till and small areas of outwash. Most of the plateau is woodland, so forestry and recreation are the primary uses, but small isolated dairy operations and hobby farms are located around the perimeter.

The area is bordered on the east by the Black River Valley, on the north by the St. Lawrence Lowland, on the west by the Ontario Lowland, and on the south by the Upper Mohawk Valley. The northern and eastern boundaries of MLRA 141 are distinct where they contact the physiographically dissimilar southwestern part of MLRA 142 (St. Lawrence-Champlain Plain). The western and southern boundaries are also distinct where they contact the physiographically dissimilar MLRA 101 (Ontario-Erie Plain and Finger Lakes Region)

Ecological site concept

This site occurs on the remnants of gently-sloping glacial lake beds, lake plains and terraces. Soils have clay textures and very few rock fragments throughout the profile. These are somewhat poorly- to moderately well-drained, with a seasonally-high water table within 36 inches of the soil surface. Tree species are diverse, typically with conifers such as red spruce, larch, and white pine more abundant than hardwoods, which include red maple and grey birch.

Similar sites

RX141X304	**Wet Clay Flat** Clay ecological sites maintain similar vegetative composition, soil properties, and physiography as Wet Clay Flats

Table 1. Dominant plant species

Tree	(1) *Picea rubens* (2) *Pinus strobus*
Shrub	(1) *Ilex montana* (2) *Alnus incana ssp. rugosa*
Herbaceous	(1) *Osmunda cinnamomea* (2) *Carex trisperma*

Legacy ID

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Bench (2) Lake plain (3) Ridge (4) Till plain
Runoff class	Very high
Flooding frequency	None
Ponding frequency	None
Elevation	92–305 m
Water table depth	20–30 cm
Aspect	Aspect is not a significant factor

Climatic features

Throughout the year precipitation is evenly distributed around most of this area with slightly less rainfall occurring around the lower margins of the plateau. Rainfall occurs as high-intensity, convective thunderstorms during the summer. Lake-effect snowfall is heavy from late autumn to early spring with the summit of the plateau having the lowest temperatures and the shortest freeze-free periods.

Climate stations Watertown and Old Forge are adjacent to the MLRA and were used to tabulate additional representative climate data.

Table 3. Representative climatic features

Frost-free period (characteristic range)	92-124 days
Freeze-free period (characteristic range)	129-159 days
Precipitation total (characteristic range)	1,194-1,346 mm
Frost-free period (actual range)	86-131 days
Freeze-free period (actual range)	119-164 days
Precipitation total (actual range)	1,118-1,448 mm
Frost-free period (average)	108 days
Freeze-free period (average)	143 days
Precipitation total (average)	1,270 mm

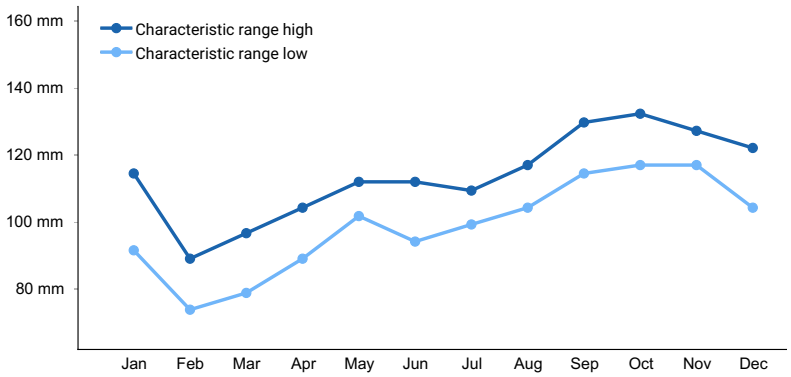


Figure 1. Monthly precipitation range

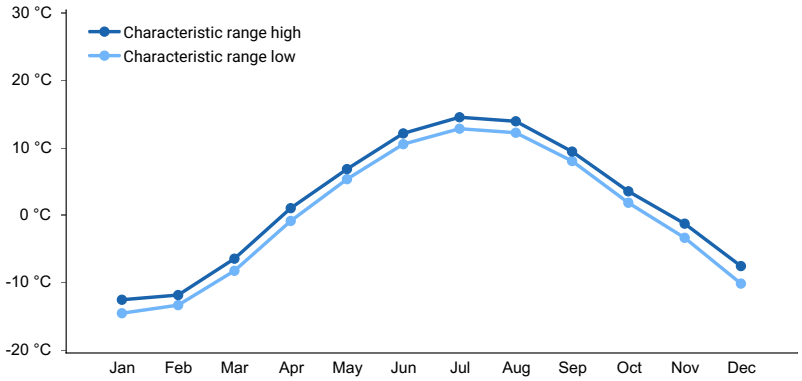


Figure 2. Monthly minimum temperature range

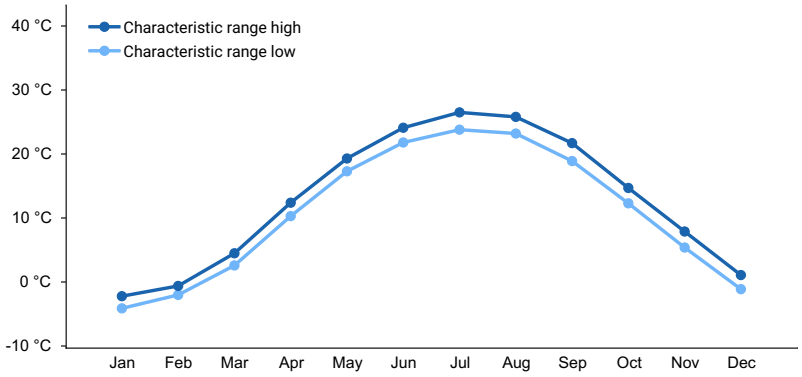


Figure 3. Monthly maximum temperature range

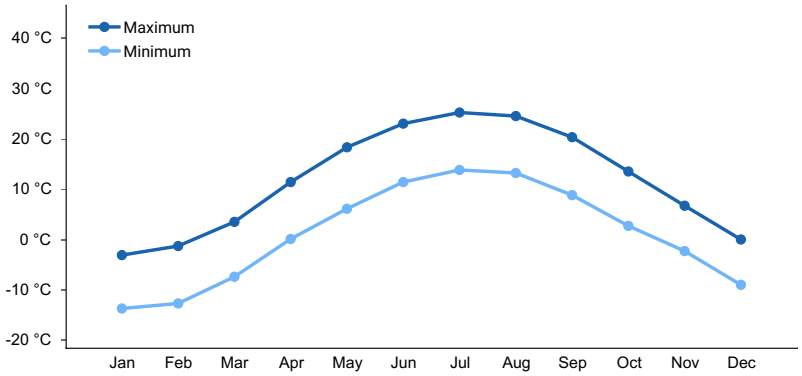


Figure 4. Monthly average minimum and maximum temperature

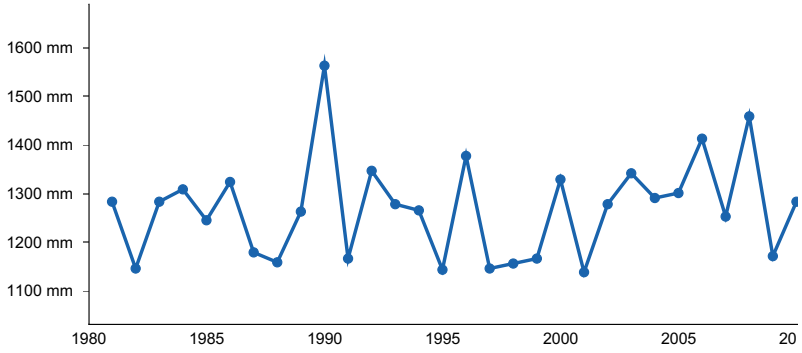


Figure 5. Annual precipitation pattern

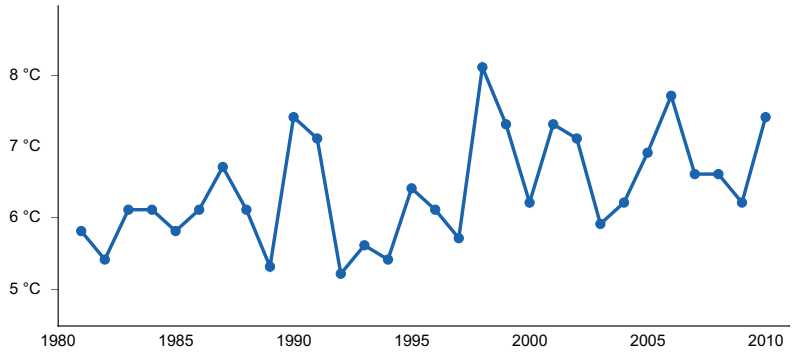


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BOONVILLE 4 SSW [USC00300785], Boonville, NY
- (2) CAMDEN [USC00301110], Camden, NY
- (3) WATERTOWN [USC00309000], Watertown, NY
- (4) OLD FORGE [USC00306184], Eagle Bay, NY

Influencing water features

Soil features

Table 4. Representative soil features

Parent material	(1) Glaciolacustrine deposits (2) Till–calcareous shale
Surface texture	(1) Silty clay (2) Clay
Permeability class	Very slow
Soil depth	76–183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (12.7-15.2cm)	Not specified
Soil reaction (1:1 water) (13-21.3cm)	Not specified
Subsurface fragment volume <=3" (0-15.2cm)	Not specified
Subsurface fragment volume >3" (0cm)	Not specified

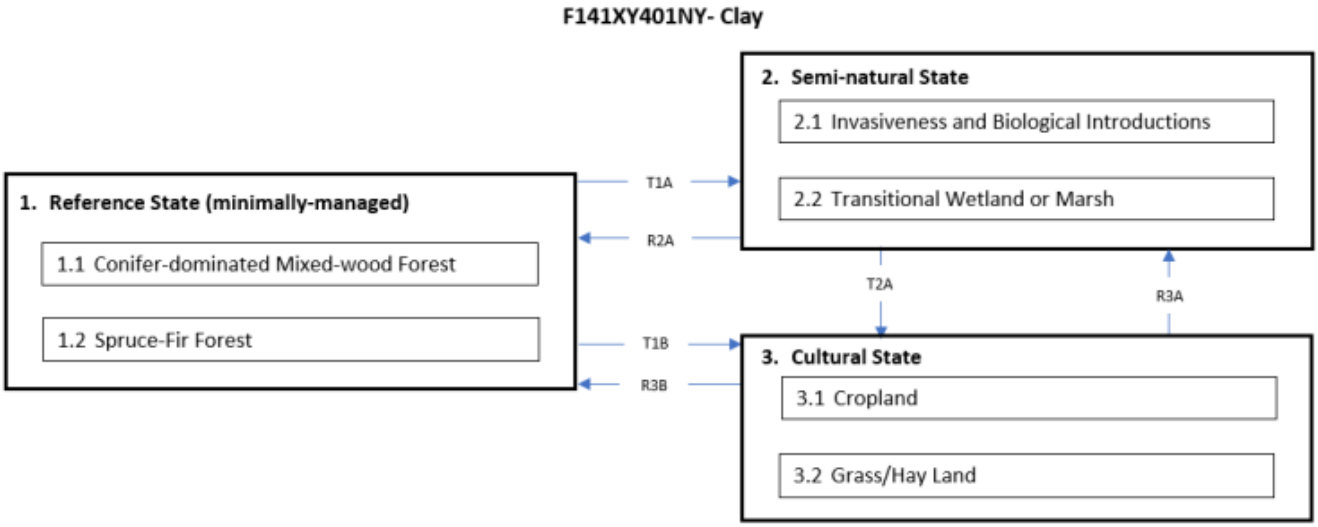
Ecological dynamics

Caveat: The vegetation information contained in this section and is only provisional, based on concepts, and future projects support validation through 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) and localized associations provided by the New York Natural Heritage Program (Edinger et al. 2014).

This site typically supports stands of conifer-dominated mixed-wood. Tree species are diverse, typically with conifers such as red spruce, larch, and white pine more abundant than hardwoods, which include red maple and grey birch. Logging and blowdowns create open patches where herbaceous and mid-seral communities occur following disturbance. Insects and disease may weaken trees on this site as well. The lack of rocks and relatively higher soil nutrient levels of this site are conducive to land use conversion from forest land to cropland, hayland, or

pasture.

State and transition model



Transition	*Drivers/practices*
T1A	climate change, hydrological alteration, significant increase in flooding events and annual precipitation, introduction of invasive species, pests, and pathogens
R2A	remediation of hydrologic alteration, management of invasive species, pests, and pathogens, restoration of key native plant species, restoration of terrestrial habitat
T1B, T2A	landscape alteration, mechanical soil disturbance, landscape clearing, seeding, planting
R3A, R3B	seeding, planting, restoration of compacted soil, establishment of key native plant species

State 1
Reference State (minimally-managed)

Community 1.1
Conifer-dominated Mixed-wood Forest

This site is a matrix forest system of montane spruce-fir which often forms a mosaic of strongly coniferous patches and mixed patches, with occasional smaller inclusions of northern hardwoods, but is overall more than 50% coniferous. *Picea rubens* and *Abies balsamea* are the dominant conifers. Gaps formed by wind, snow, ice, and harvesting are the major replacement agents; fires may be important but only over a long return interval. NatureServe Element Code: CES201.565

Dominant resource concerns

- Ponding and flooding
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

Community 1.2
Spruce-Fir Forest

A conifer or sometimes mixed swamp that occurs on acidic muck to shallow peat. This community typically occurs in a drainage basin, in some cases filling the basin, but also can occur at the edge of a lake or pond, or along gentle slopes of islands where there is some nutrient input from groundwater discharge or subsurface flow. These swamps are usually dense, with a fairly closed canopy (80 to 90% cover). The dominant trees are usually red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*); either one may be dominant in a stand or they may be codominant. In the

Catskills, balsam fir may be absent with red maple (*Acer rubrum*) becoming codominant. In the Adirondacks, black spruce (*Picea mariana*) or white spruce (*P. glauca*) may replace red spruce as a dominant tree. Other trees with low percent cover include yellow birch (*Betula alleghaniensis*), white pine (*Pinus strobus*), black ash (*Fraxinus nigra*), tamarack (*Larix laricina*), northern white cedar (*Thuja occidentalis*), and eastern hemlock (*Tsuga canadensis*). The shrub layer is often sparse; characteristic and dominant shrubs include mountain holly (Nemopanthus mucronatus) along with sapling canopy trees. Other less frequently occurring shrubs include alders (*Alnus viridis* ssp. crispa, *A. incana* ssp. rugosa), blueberries (*Vaccinium corymbosum*, *V. myrtilloides*), wild raisin (*Viburnum nudum* var. cassinoides), mountain ash (*Sorbus americana*), and winterberry (*Ilex verticillata*). Characteristic herbs are cinnamon fern (*Osmunda cinnamomea*), sedges (*Carex trisperma*, *C. folliculata*), goldthread (*Coptis trifolia*), bunchberry (*Cornus canadensis*), starflower (*Trientalis borealis*), common wood-sorrel (*Oxalis montana*), creeping snowberry (*Gaultheria hispidula*), and dewdrop (*Dalibarda repens*). The nonvascular layer is often dominated by peat mosses, including *Sphagnum girgensohnii*, *S. centrale*, and *S. angustifolium*. Other characteristic bryophytes include the leafy liverwort *Bazzania trilobata* and big red stem moss (*Pleurozium schreberi*). (Edinger et al. 2014)

Resilience management. New York Natural Heritage Program State Rank: S3- Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State. Spruce-fir swamps occur in lowlands where they may grade into either spruce flats or balsam flats (upland forests). A spruce-fir swamp is distinguished from spruce flats by the lower elevation of the swamp, wetland soils, presence in the swamp of patches of peat mosses (Sphagnum spp.), and the absence of black cherry (*Prunus serotina*), a characteristic species of spruce flats and balsam flats. This site may be occasionally flooded by beaver activity.

Dominant resource concerns

- Ponding and flooding
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

State 2
Semi-natural State

Shifts in ecological site composition, functionality, and dynamics driven by natural disturbances, processes, and pressures (may have some anthropogenic drivers). More research is needed to determine the extent of the Semi-natural state associated with this ecological site.

Dominant resource concerns

- Ponding and flooding
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

Community 2.1
Invasiveness and Biological Introductions

Introduction of invasive species, pathogens, and/or pests resulting in shifts in ecological site composition, functionality, and dynamics. More research is needed to determine the extent of these effects on the semi-natural state associated with this ecological site.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

Community 2.2
Transitional Wetland or Marsh

Site is dominated largely by herbaceous vegetation with sparse and scattered mixed-wood species due to ponding or flooding from beaver activity.

Dominant resource concerns

- Ponding and flooding
- Seasonal high water table
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

State 3
Cultural State

Shifts in ecological site composition, functionality, and dynamics that are primary driven by anthropogenic disturbances and pressures (may have some associated natural drivers). More research is needed to determine the extent of the cultural state associated with this ecological site.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates

Community 3.1
Cropland

Site cleared and used for crop cultivation and production

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates

Community 3.2
Grass/Hay Land

Site transformed into grazing site or hay production.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

Transition T1A
State 1 to 2

climate change, hydrological alteration, significant increase in flooding events and annual precipitation, introduction of invasive species, pests, and pathogens

Conservation practices

Monitoring and Evaluation

Transition T1B
State 1 to 3

landscape alteration, mechanical soil disturbance, landscape clearing, seeding, planting

Conservation practices

Cover Crop
Land Clearing
Precision Land Forming
Irrigation Land Leveling
Land Smoothing
Prescribed Grazing
Grazing management to improve wildlife habitat
Conversion of cropped land to grass-based agriculture

Restoration pathway R2A
State 2 to 1

remediation of hydrologic alteration, management of invasive species, pests, and pathogens, restoration of key native plant species, restoration of terrestrial habitat

Conservation practices

Critical Area Planting
Restoration and Management of Rare and Declining Habitats
Early Successional Habitat Development/Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Monitoring and Evaluation

Transition T2A
State 2 to 3

landscape alteration, mechanical soil disturbance, landscape clearing, seeding, planting

Conservation practices

Cover Crop
Land Clearing
Precision Land Forming
Irrigation Land Leveling
Land Smoothing
Spoil Spreading

Restoration pathway R3B
State 3 to 1

seeding, planting, restoration of compacted soil, establishment of key native plant species

Conservation practices

Critical Area Planting
Restoration and Management of Rare and Declining Habitats
Early Successional Habitat Development/Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Monitoring and Evaluation

Restoration pathway R3A
State 3 to 2

seeding, planting, restoration of compacted soil, establishment of key native plant species

Conservation practices

Restoration and Management of Rare and Declining Habitats
Early Successional Habitat Development/Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Monitoring and Evaluation

Additional community tables

Inventory data references

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.

Other references

Comer, P., D. Faber-Langendoen, R. Evans, S. Grawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schultz, K. Snow, and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Gawler, S. and A. Cutko. 2010. Natural Landscapes of Maine: A Guide to Natural Communities and Ecosystems. Maine Natural Areas Program, Maine Department of Conservation, Augusta, Maine.

NatureServe. 2021. NatureServe Explorer: An online encyclopedia of life [web application]. NatureServe, Arlington, Virginia. https://explorer.natureserve.org/. (accessed 10 July. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil

Series Descriptions. Available online. (accessed 11 Aug. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Climate Research Station Data. Available online. (accessed 23 June. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for [MLRA 141, Maine]. Available online. (accessed 14 Oct. 2021).

USNVC [United States National Vegetation Classification]. 2017. United States National Vegetation Classification Database V2.01. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. Available The U.S. National Vegetation Classification (usnvc.org) (accessed 2 July. 2021).

Contributors

Christopher Mann

Approval

Greg Schmidt, 10/03/2024

Acknowledgments

Nels Barrett and Nick Butler provided considerable review of this ecological site concept.

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	11/21/2024
Approved by	Greg Schmidt
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

---

17. **Perennial plant reproductive capability:**
