Ecological site F143XY303ME
Acidic Swamp

Last updated: 10/07/2024
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): 143X–Northeastern Mountains

MLRA 143, known as the Northeastern Mountains, covers approximately 23 million acres of mountains, hills, and valleys in northern Maine, New Hampshire, Vermont, New York, and Massachusetts. The area is sparsely populated, with less than five percent of the land area developed for agriculture, residential, and urban development. About 90 percent of the area is forested, most of which is actively managed for timber. Elevations are mostly between 1,000 to 4,000 feet, with a few isolated peaks more than 5,000 feet above sea level. The present day mountains are but remnants of a much larger ancient range that has been eroding for approximately 500 million years. Bedrock consists of mostly very old metamorphic rock (gneiss, schist, slate, marble, quartzite, etc.) with younger intrusions of igneous rock (e.g. granite and granodiorite) from the Triassic and Cretaceous periods. MLRA 143 differs somewhat geologically from its neighboring MLRAs (142, 144A, 144B, 145, and 146), which have greater amounts of nutrient-rich sedimentary rock. Compared to MLRA 143, they are all lower in elevation, with longer growing seasons large areas that were once submerged by the ocean following glaciation.

The characteristic landforms and soils of northern New England were derived from the massive continental ice sheet that engulfed the region during North America’s most recent glaciation. Mighty glaciers, embedded with sediment and rock fragments, scoured bedrock and compacted mineral beds in a steady march south and east toward the Atlantic Ocean. The softer sedimentary rocks were pulverized into fine silts and clays under the immense weight of ice a mile thick, while the more resistant igneous and metamorphic rocks were sculpted into steep mountains and hills or plucked and dragged along the base of the glacier. With a warming climate, the ice retreated northward, depositing a thin layer of unsorted glacial till sediment atop the newly-exposed bedrock and compacted mineral beds. Deeper mounds of unsorted till formed small hills, kames, moraines and drumlins. Enormous chunks of ice detached as the glacier retreated, melting slowly in place and forming many kettle lakes and basins where water and fine sediments collect. Raging torrents of glacial meltwater dissected much of the barren landscape, entraining coarse and fine sediments, carving river valleys, and leaving well-sorted deposits of mostly sand and gravel along the watercourse. By 10,000 years ago the ice sheet had fully receded from MLRA 143. Silty floodplains developed along perennial rivers, many of which occupy the same channels that once gushed with sediment-rich glacial meltwater. Over time, wet basins accumulated fine sediment, some dried out, and still others became acidified by organic matter inputs from colonizing vegetation.

In terms of climate, MLRA 143 is distinguished from neighboring MLRAs by a shorter growing season and the occurrence of cryic soil temperature regimes at high elevations. The majority of MLRA 143 averages 32 to 44 inches of precipitation annually with a five to six month growing season and frigid winter temperatures. However, the higher elevations may receive up to double the annual precipitation of the lower elevations, and have a three to four month growing season with extremely cold winters. As the northernmost MLRA in the region with the coldest temperatures and shortest growing season, the Northeastern Mountains have less overall tree diversity, fewer pine and oak trees, and more abundant spruce and fir trees than neighboring MLRAs.

Classification relationships

This site occurs in Ecological Site Group 3 (Wooded Wetlands) of MLRA 143 (The Northeastern Mountains), in the Northeastern Forage and Forest Region (Land Resource Region R).

The Northeastern Forage and Forest LRR includes all of Maine, New Hampshire, Vermont, Rhode Island, and Connecticut, as well as large portions of Massachusetts, New York, New Jersey, Pennsylvania, and Ohio. Its southern boundary marks the extent of the Wisconsin ice sheet, which engulfed the entire LRR as recently as 10,000 to 15,000 years ago. Erosional and depositional processes associated with glaciation created many of the topographic patterns that distinguish MLRAs within the Northeastern region. Harder granitic and metamorphic bedrock to the north were more resistant to glacial erosion, resulting in the relatively nutrient poor mountains of MLRA 143; whereas nutrient-rich sedimentary bedrock of MLRAs 139, 140, and 146 resulted in relatively flat, fertile landscapes ideal for cultivation. Other areas were depressed below sea-level by the sheer mass of the glacier, resulting in pockets of marine sediments which distinguish MLRAs 142, 144A, 144B, and 145.

Precipitation is sufficient to support productive forestland throughout the Northeastern region. Still, a latitudinal temperature gradient from mesic to frigid soil temperatures results in a general transition from central hardwoods and pine in the southern MLRAs to northern hardwoods and spruce-fir forests farther north (no true boreal forests exist in the region). Elevations are generally low throughout the Northeastern region, with the exception of MLRA 143 which has many high mountain ecosystems with cryic temperature regimes and alpine vegetation above the tree line.

Ecological site concept

This site occurs in relatively flat areas (0-5% slopes) near the bottom of watersheds where water saturates both organic soils and coarse-textured mineral soils for most of the year. Soils are deep, poorly- to very poorly-drained and relatively more acidic than other wooded wetlands. The water table is seasonally high (within 18 inches of the surface) and typically dries out in late summer and fall. This site may have pit and mound topography, with ponding and organic matter accumulation in the low areas, and drier soil conditions on the mounds where most trees and shrubs are rooted. Black spruce, rhodora, Labrador tea, and other heath shrubs are abundant, with balsam fir, larch, black ash, and grey birch as common associates. Diverse herbs, shrubs, and bryophytes dominate the understory.

Associated sites

F143XY220ME	**Semi-Acidic Peat Wetland Complex** The Semi-acidic Peat Wetland Complex site may occur downslope of the Acidic Swamp site, where water stagnates and lack of available soil oxygen and/or nutrients limits tree growth to less than 20% cover.
F143XY230ME	**Acidic Peat Wetland Complex** The Acidic Peat Wetland Complex site may occur downslope of the Acidic Swamp site, where water stagnates and lack of available soil oxygen and/or nutrients limits tree growth to less than 20% cover.

Similar sites

F143XY304ME	**Wet Flat** The Wet Flat site occurs in flat areas and is drier than the Acidic Swamp site, with all soils poorly-drained rather than poorly- to very-poorly drained. As a result Wet Flat is characterized by more red spruce, rather than black spruce dominance.

Table 1. Dominant plant species

Tree	(1) *Picea mariana* (2) *Abies balsamea*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs in low-lying areas where large amounts of water collects and saturates sandy soil deposits, such as outwash and coarse till plains. Slopes are less than 5% and elevations range from 10 to 2800 feet. Soils are

saturated, often with surface ponding up to 6 inches deep in places, and with a water table at or just below the soil surface for most of the year. However, during the driest periods from June to September the water table may drop to more than 12 inches below the surface in places.

Table 2. Representative physiographic features

Landforms	(1) Delta (2) Depression
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	10–2,800 ft
Slope	0–5%
Ponding depth	0–6 in
Water table depth	0–12 in
Aspect	Aspect is not a significant factor

Climatic features

As the northernmost MLRA in the region, this site experiences frigid and snowy winters, warm rainy summers, and a relatively short five to six month growing season. Precipitation is considerably constant from month to month; however, areas of higher elevations may receive up to double the annual precipitation of the lower elevations and have a three to four month growing season with extremely cold winters.

Table 3. Representative climatic features

Frost-free period (characteristic range)	79-90 days
Freeze-free period (characteristic range)	118-125 days
Precipitation total (characteristic range)	41-43 in
Frost-free period (actual range)	79-98 days
Freeze-free period (actual range)	117-129 days
Precipitation total (actual range)	40-44 in
Frost-free period (average)	86 days
Freeze-free period (average)	122 days
Precipitation total (average)	42 in

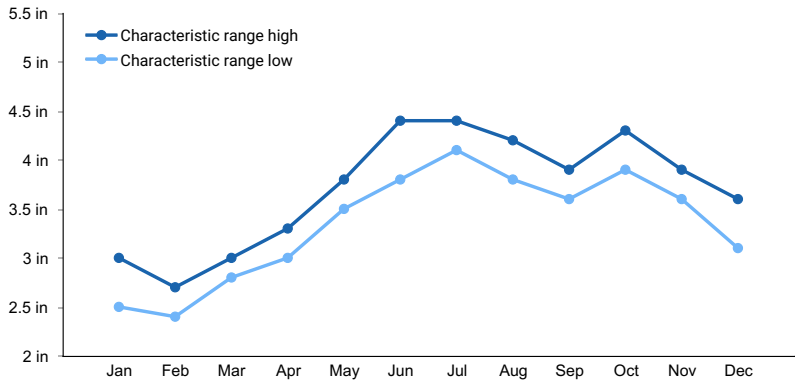

Figure 1. Monthly precipitation range

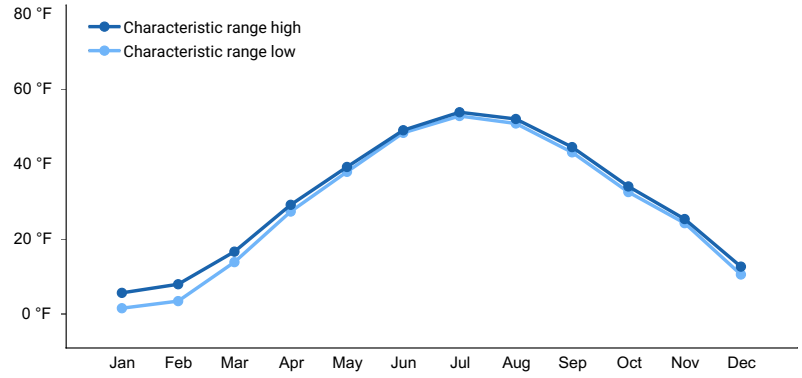

Figure 2. Monthly minimum temperature range

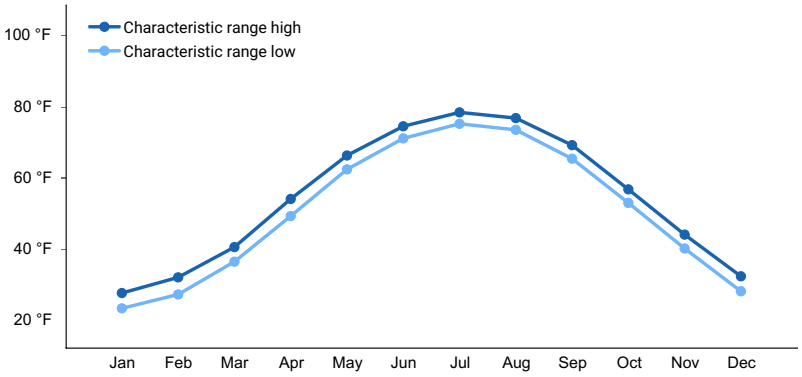

Figure 3. Monthly maximum temperature range

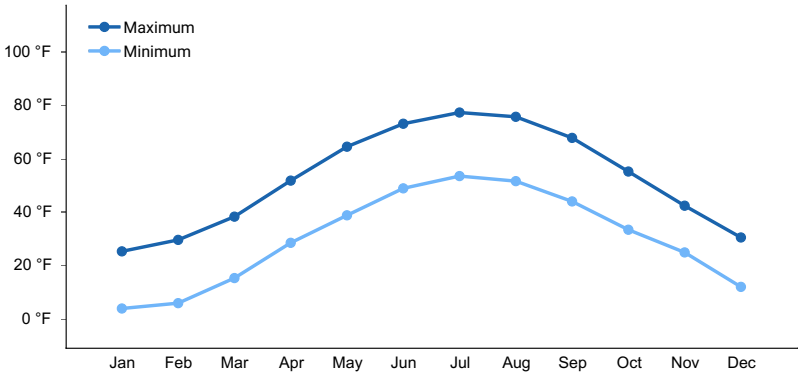

Figure 4. Monthly average minimum and maximum temperature

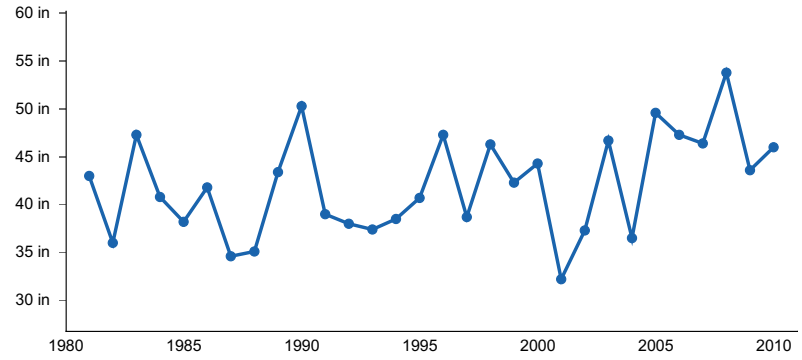

Figure 5. Annual precipitation pattern

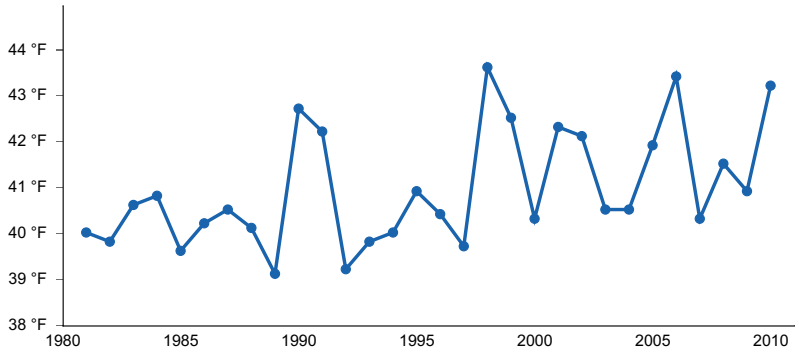

Figure 6. Annual average temperature pattern

Climate stations used

- (1) LAKE PLACID 2 S [USC00304555], Lake Placid, NY
- (2) NEWCOMB [USC00305714], Newcomb, NY
- (3) EUSTIS [USC00172700], Eustis, ME
- (4) PLYMOUTH [USC00276945], Campton, NH
- (5) MORRISVILLE 4 SSW [USC00435376], Morrisville, VT

Influencing water features

Large amounts of water enter this site as run-on from the watershed above. Gentle slopes allow water to pass laterally through the soil on this site before exiting downslope to even wetter, flatter sites below. Despite the sandy soils through which water flows freely, water saturates this site for much of the year. However, due to the porous nature of the substrate, the water table can fluctuate greatly during the growing season, permitting soil aeration needed to sustain its characteristic plant community.

Soil features

The soils of this site are poorly- to very poorly-drained and formed in coarse outwash or till that was re-worked by glacial meltwater. Often there are pockets of deep organic soils in wet depressions within this site. The soil surface is usually 2-10 inches of organic (muck and peat) underlain by sandy or coarse-loamy mineral deposits. These soils may or may not have large amounts of rock.

Table 4. Representative soil features

Parent material	(1) Glaciolacustrine deposits–gneiss (2) Glaciofluvial deposits
Surface texture	(1) Sand (2) Sand
Family particle size	(1) Sandy
Drainage class	Poorly drained to very poorly drained
Permeability class	Slow
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (4-7in)	Not specified
Soil reaction (1:1 water) (3.5-6.5in)	Not specified
Subsurface fragment volume <=3" (2-6in)	Not specified

Subsurface fragment volume >3" (0in)	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 et al., 2003) and localized associations provided by the New York Natural Heritage Program (Edinger et al., 2014), Maine Natural Areas Program (Gawler and Cutko, 2010), New Hampshire Natural Heritage Program (Sperduto and Nichols, 2011), and Massachusetts Division of Fisheries and Wildlife (Swain, 2020).

This site is dominated by black spruce, often with larch, balsam fir, red maple, and white pine present in small amounts. Most trees are rooted in the poorly-drained soil mounds rather than the very poorly-drained soil depressions. The understory is diverse with sphagnum moss, creeping snowberry, and three-seed sedge common.

Treethrow, altered hydrology, and logging are common disturbances on this site. Small openings created by treethrow are typically colonized by species already present in the community and eventually return to cedar dominance. Persistent ponding caused by beavers, man-made structures (such as roads, dams, etc.), or increased runoff in the watershed above can cause water levels to rise and kill cedar trees, resulting in an open ponded or marsh condition. If hydrology is restored to reference conditions, the site is likely to transition through a marsh and/or early seral forest phase before eventually returning to black spruce dominance.

Logging is not common due to the poor productivity of this site, and is limited to very dry years or winter harvest methods due to the wetness of this site. Tree removal may result in an early seral phase dominated by balsam fir, grey birch, red maple, and other colonizers before eventually reverting to black spruce dominance. In some areas, this site has been logged and converted to perennial grass hay land.

State and transition model

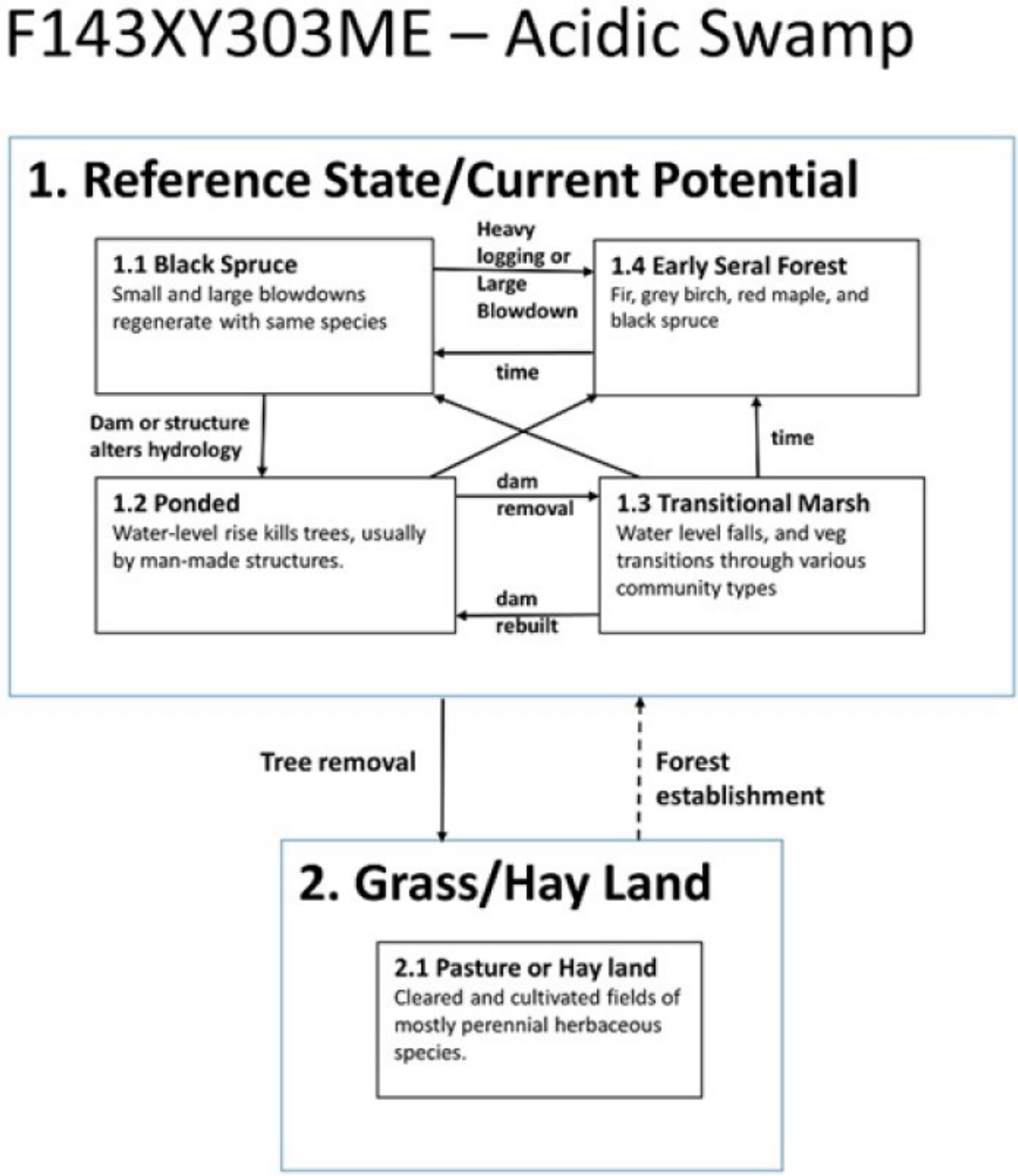

Figure 7. STM

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 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

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Contributors

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Approval

Greg Schmidt, 10/07/2024

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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	05/12/2025
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:

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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:**
