USDA Natural Resources
Conservation Service

Ecological site F145XY005MA
Moist Lake Plain

Last updated: 9/27/2024
Accessed: 05/11/2025

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): 145X–Connecticut Valley

Major Land Resource Area (MLRA): 145 – Connecticut Valley (USDA-NRCS, 2006).
The nearly level floor of the Connecticut Valley makes up most of the area. Nearly level to sloping lowlands are at the outer edges of the river valley. These lowlands are broken by isolated, north- to south-trending trap-rock ridges that are hilly and steep. Elevation ranges from sea level to 100 meters (330 feet) in the lowlands and from 50 to 100 meters (650 to 1,000 feet) on ridges. The geology of this rift valley is a late Triassic and early Jurassic sandstone, shale, and conglomerate sequence. Tilted basalt flows along rift zones form the trap rock ridges exhibiting the greatest landscape relief. Glaciation accounts for glacial lake deposits, outwash, and till. Following glacial retreat, wind-deposited loess caps some areas. Recent alluvium deposits form well-developed flood plain along the Connecticut River. These deposits created some of the most productive agricultural soils in New England. The dominant soils are entisols and inceptisols with a mesic temperature regime in combination with parent materials such as glacial lakebeds, glacial outwash, glacial till, and recent alluvium. From north-to-south within the Connecticut Valley, the climate transitions from humid-continental to humid temperate with pronounced seasons and frequent storms. The forests are predominately central hardwoods to the south and transition hardwoods to the north. Significant habitats include trap rock ridges, sandplains, and floodplains of the Connecticut River and major tributaries. Much of the area is currently in residential and urban development and agriculture. While much of the areas is also forested, habitat loss and fragmentation are widespread throughout the Connecticut Valley.

Classification relationships

USDA-NRCS (USDA, 2006):
Land Resource Region (LRR): R – Northeastern Forage and Forest Region
Major Land Resource Area (MLRA): 145 – Connecticut Valley

USDA-FS (Cleland et al, 2007):
Province: 221 – Eastern Broadleaf Forest
Section: 221A – Lower New England
Subsection: 221Af –Lower Connecticut River Valley
Province: M211 – Adirondack New England Mixed Forest – Coniferous Forest – Alpine Meadow (in part)
Section: M211B– New England Piedmont (in part)
Subsection: 211Bb – Southern Piedmont (in part)

Ecological site concept

The Moist Lake Plain ecological site consists of deep, moderately well-drained to somewhat poorly drained soils formed in clayey glacio-lacustrine sediments. Geographically, these areas were once occupied by former glacial Lake Hitchcock in MA and northcentral CT, as well other former glacial lakes within the CT valley. Representative soils include Amostown and Dartmouth. The typical vegetation is somewhat of a mixed mesophytic forest. The reference community is quite variable and may be typified by an oak-tulip tree forest and/or oak- hemlock forest

and/or an upland/wetland transitional forest. Semi-rich site may include sugar maple -ash forests. This ecological site is not well described and may be combined with the Semi-Rich Moist Lake Plain ecological site in future updates.

Associated sites

F145XY007MA	**Well Drained Lake Plain**

Similar sites

F145XY001MA	**Silty High Floodplain**
F145XY002MA	**Silty Low Floodplain**

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Liriodendron tulipifera*
Shrub	(1) *Hamamelis virginiana* (2) *Viburnum acerifolium*
Herbaceous	(1) *Thelypteris noveboracensis* (2) *Maianthemum racemosum*

Physiographic features

The site is on nearly level to gently sloping outwash plains, deltas, or terraces, and are not subject to flooding/ponding. Slopes commonly are 0 to 8 percent, but range up to 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Lake plain > Outwash plain (2) Valley > Terrace (3) Delta
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	0–1,148 ft
Slope	0–15%
Water table depth	15–30 in
Aspect	Aspect is not a significant factor

Climatic features

The regional climate of the Connecticut Valley transitions north to south, from humid-continental to humid temperate, respectively, with pronounced seasons and frequent storms. (Beck et al., 2018; Bailey, 2014).

Climate change is occurring, and the resiliency of any ecological site will depend upon the direct and indirect effects upon component species and shifting atmospheric and soil conditions. On these ecological sites, central hardwoods – pine forests are at a low vulnerability risk to climate change with impacts considered both negative and positive. Warmer seasonal temperatures and a prolonged growing season will be beneficial for increasing productivity of central hardwoods, especially trees with southern affinities such as oaks, hickory, and tuliptree. However, climate extremes may introduce earlier leaf phenologies susceptible to frost damage and general plant weakening. Although central hardwoods – pine forests are adaptable to warmer climate shifts, fragmentation and invasive species can amplify any adverse effects of climate change. Several invasive species will continue to be a threat. (Janowiak et al, 2018).

Table 3. Representative climatic features

Frost-free period (characteristic range)	112-131 days
Freeze-free period (characteristic range)	142-169 days
Precipitation total (characteristic range)	42-46 in
Frost-free period (actual range)	110-138 days
Freeze-free period (actual range)	141-182 days
Precipitation total (actual range)	39-46 in
Frost-free period (average)	122 days
Freeze-free period (average)	157 days
Precipitation total (average)	44 in

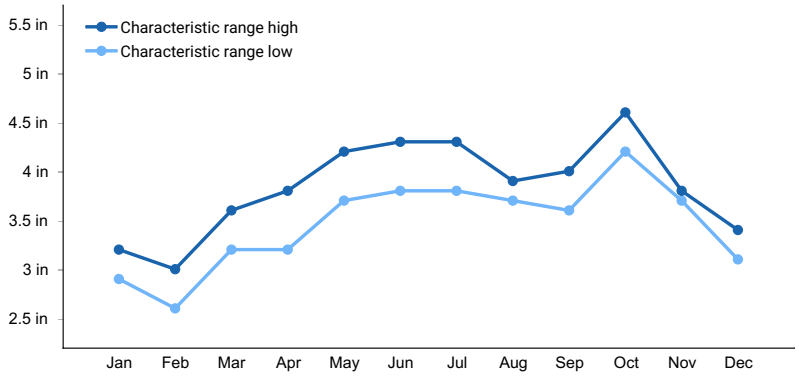


Figure 1. Monthly precipitation range

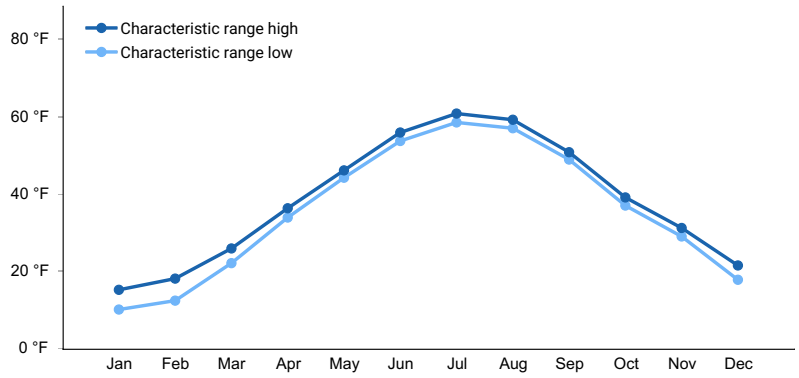


Figure 2. Monthly minimum temperature range

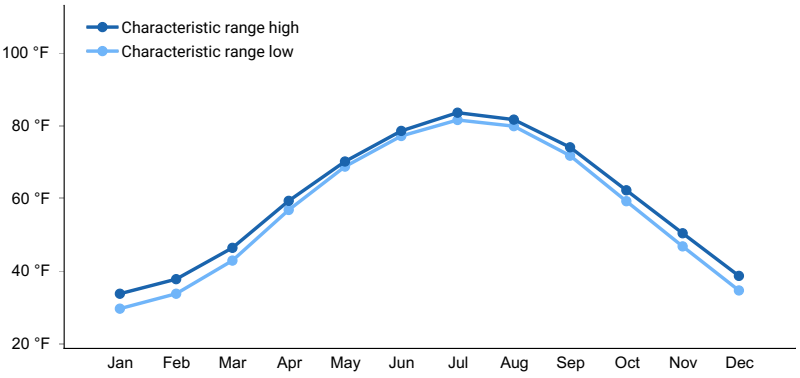


Figure 3. Monthly maximum temperature range

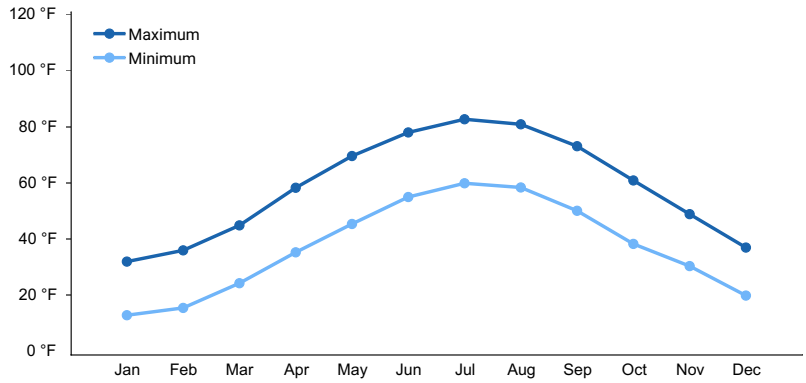


Figure 4. Monthly average minimum and maximum temperature

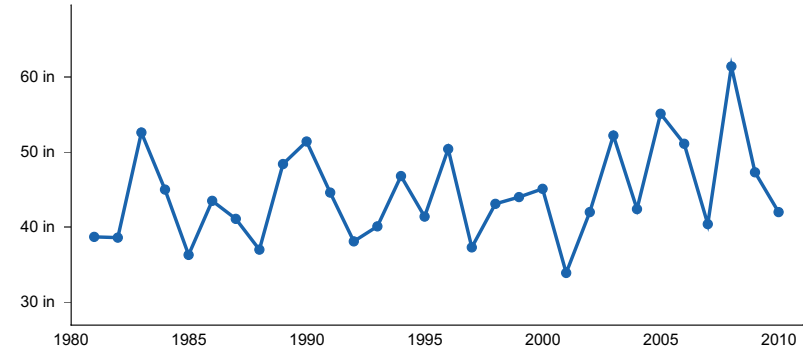


Figure 5. Annual precipitation pattern

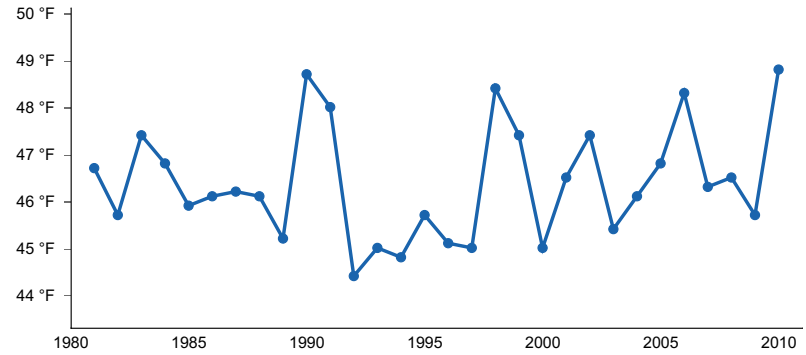


Figure 6. Annual average temperature pattern

Climate stations used

- (1) WALPOLE 3 [USC00278858], Walpole, NH
- (2) AMHERST [USC00190120], Amherst, MA
- (3) HARTFORD BRADLEY INTL AP [USW00014740], Suffield, CT
- (4) LEBANON MUNI AP [USW00094765], Lebanon, NH

Influencing water features

NONE

Wetland description

NONE

Soil features

The site consists of moderately to very deep, moderately well drained soils formed in water deposited materials. Representative soils are Amostown, and Dartmouth.

Table 4. Representative soil features

Parent material	(1) Glaciolacustrine deposits–mica schist (2) Glaciofluvial deposits
Surface texture	(1) Fine sandy loam (2) Silt loam
Family particle size	(1) Coarse-loamy (2) Coarse-silty (3) Coarse-silty over clayey
Drainage class	Moderately well drained
Permeability class	Very slow to slow
Depth to restrictive layer	24–72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5–9 in
Soil reaction (1:1 water) (0-40in)	4.4–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

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 called ASSOCIATIONS that tend to [co-]occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. Any 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, sapling, shrub, and herb). Within the NatureServe Explorer database (NatureServe, 2015), 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).

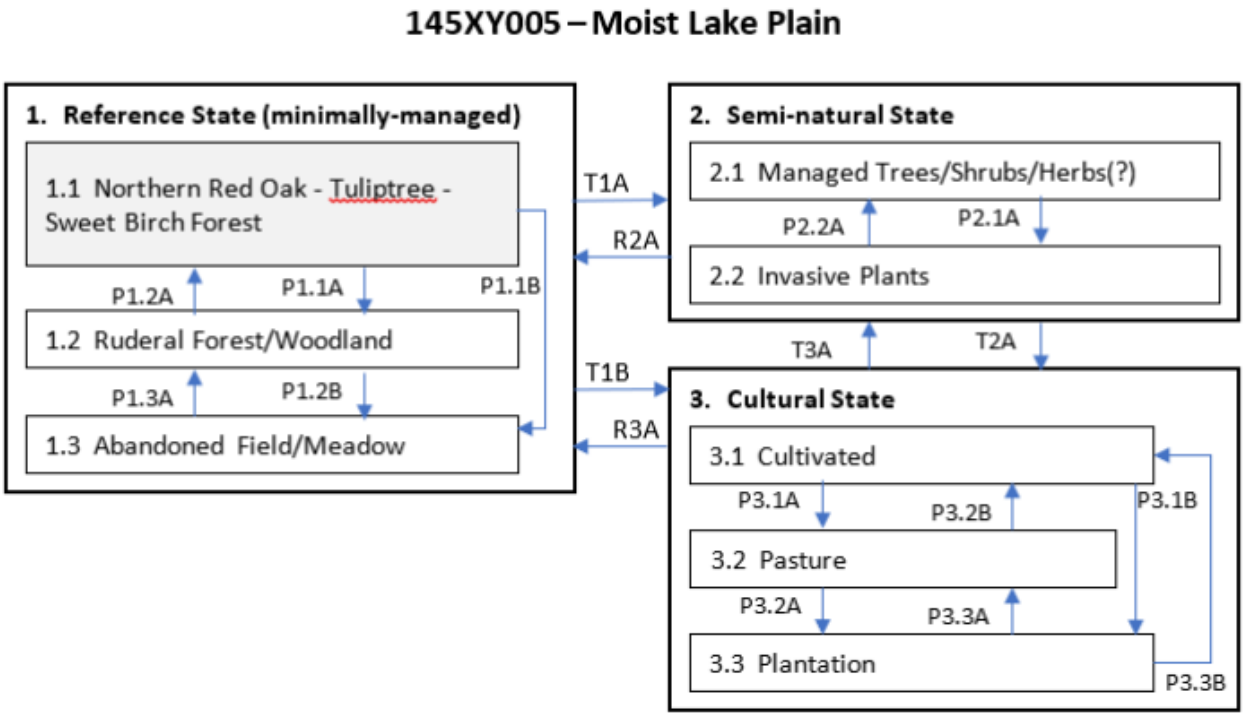
Additional and more localized vegetation information can be provided by the various State Heritage Programs. Additional insights to the vegetation were provided by: "The Vegetation of Connecticut: A Preliminary Classification" (Metzler and Barrett, 2006), "Classification of the Natural Communities of Massachusetts" (Swain and Kersley 2011), "Wetland, Woodland, Wildland" (Thompson and Sorenson 2000), and "Natural Communities of New Hampshire, 2nd Ed." (Spurduto and Nichols, 2011).

The Moist Lake Plain ecological site is characteristic of the Appalachian (Hemlock)-Northern Hardwood Forest system (CES202.593). The vegetation is often a mosaic of forest, woodland, shrub land, and herbaceous communities. The reference community is an oak-tulip tree forest. This forest may experience canopy gaps formed by storm extremes ranging from windthrows to downbursts to ice-storms. Excessive deer browse may be an issue. Fires are typically suppressed, and otherwise less common in these mesic lake plain environments compared to drier upland environments. Logging is a widespread management activity. These sites have one or more of the

following invasive plants: garlic mustard (*Alliaria petiolata*), Japanese barberry (*Berberis thunbergii*), Morrow's honeysuckle (*Lonicera morrowii*), multiflora rose (*Rosa multiflora*), and Norway maple (*Acer platanoides*). Excessive deer browse is a threat. The Moist Lake Plains ecological site is very similar to the Semi-Rich Moist Lake Plains ecological site, which may be lumped together when updated with additional field work. These ecological sites are not well described.

Other ecological states, a Semi-natural State and a Cultural State are recognized. The Semi-natural State would expect plant communities where ecological processes primarily operate with some conditioning by land management, e.g., managed forests, or plant communities that are an artifact of land management e.g., predominately invasive plants. The Cultural State is a completely converted or transformed state heavily or completely conditioned by land management, e.g., cultivated lands, pasture/haylands, vineyards, and plantations, etc. Generally, the form of vegetation in the Semi-natural State or the Cultural State is not able to be specified until field work is conducted.

State and transition model



Transition	*Drivers/practices*
T1A	Forest mgmt., Disturbance
T1B, T2A	Disturbance/cutting/clearing, Brush removal
R2A, R3A	Restoration & Mgmt, Forest Stand Improvement, Early Successional Habitat Development, Upland Wildlife Mgmt, Invasive spp. Control, Plant establishment
T3A	Abandonment, Plant establishment, Forest mgmt.
P2.1A	Disturbance, Invasive species establishment
P2.2A	Invasive spp. Control, Forest mgmt..
P1.3A, P1.2A	Abandonment, succession
P3.1A, P3.2A, P3.3A, P3.1B, P3.2B, P3.3B	Changing agricultural phases
P1.1A, P1.1B, P1.2B	Disturbance, Early Successional Habitat Development

State 1
Reference State (minimally-managed)

The reference state is quite variable, containing several plant communities, including: • Lower New England Oak – Tulip Tree Forest (CEGL008573, formerly CEGL006125(?)) *Quercus rubra* - *Liriodendron tulipifera* - *Betula lenta* Forest (Translated) Northern Red Oak - Tuliptree - Sweet Birch Forest • Upland/Wetland Transitional Forest (CEGL006000) *Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea* Forest Translated Name: Northern Red Oak - Yellow Birch / Cinnamon Fern Forest Northern reaches may include: • Red Oak - Hemlock - Mixed Hardwood Forest (CEGL006566) *Quercus rubra* - *Tsuga canadensis* - *Liriodendron tulipifera* / *Hamamelis virginiana* Forest (Translated) Northern Red Oak - Eastern Hemlock - Tuliptree / American Witch-hazel Forest • Transitional Northern Sugar Maple - Ash Rich Mesic Forest (CEGL006637) *Acer saccharum* - *Tilia americana* / *Acer pensylvanicum* / *Caulophyllum thalictroides* Forest (Translated) Sugar Maple - American Basswood / Striped Maple / Blue Cohosh Forest

Community 1.1
Northern Red Oak - Tuliptree - Sweet Birch Forest (CEGL008573)

Lower New England Oak – Tulip Tree Forest (CEGL008573, formerly CEGL006125(?)) *Quercus rubra* - *Liriodendron tulipifera* - *Betula lenta* Forest (Translated) Northern Red Oak - Tuliptree - Sweet Birch Forest This forest is somewhat of a mixed mesophytic forest, the canopy dominants are red oak (*Quercus rubra*) and tuliptree (Liriodendron tulipfera) mixed among red maple (*Acer rubrum*), American Beech (*Fagus grandifolia*), and sweet birch (*Betula lenta*). Less commonly, eastern hemlock (*Tsuga canadensis*) and sugar maple (*Acer saccharum*) may occur. Shrubs include witchhazel (*Hamamelis virginiana*), mapleleaf viburnum (Viburnum acerifloium), and northern spicebush (*Lindera benzoin*). And/or, in the northern reaches of the area, striped maple (*Acer pensylvanicum*). Characteristic ground layer includes wild geranium (*Geranium maculatum*), red trillium (*Trillium erectum*), Jack-n-the-puplit (*Arisaema triphyllum*), false Soloman's seal (Maianthemum racemose), New York fern (Parathelypteris noveboracensis), Indian cucumber (*Medeola virginiana*), white wood-aster (*Eurybia divaricata*), sessileleaf bellwort, (*Uvularia sessilifolia*), and two-leaved toothwort (*Cardamine diphylla*) flat-branched clubmoss (Dendrolycopodium obscurum) (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2022]). Cross-referenced plant community concepts (typically by political state): CT: American beech -white oak – tulip tree Forest (Metzler and Barret, 2006) MA: Oak-tuliptree Forest (Swain and Kearsley, 2001) NH: Oak – tuliptree Forest (Sperduto and Nichols, 2011)

State 2
Semi-natural State

The Semi-natural State would expect plant communities where ecological processes are primarily operating with some land conditioning in the past or present, e.g., managed forests, or plant communities that are an artifact of land management e.g., predominately invasive plants.

Community 2.1
Managed forest/woodland [vegetation]

Community 2.2
Invasive plants

Pathway P2.1A
Community 2.1 to 2.2

Disturbance, Invasive species establishment

Pathway P2.2A
Community 2.2 to 2.1

Invasive spp. Control, Forest mgmt..

State 3
Cultural State

The Cultural State is a completely converted or transformed state, heavily or completely conditioned by land management, e.g., cultivated lands, pasture/haylands, vineyards, and plantations, etc.

Community 3.1
Cultivated

Community 3.2
Pasture

Community 3.3
Plantation

Transition T1A
State 1 to 2

Invasion, disturbance

Transition T1B
State 1 to 3

Disturbance/cutting/clearing, Brush removal

Restoration pathway R2A
State 2 to 1

Invasive species removal, native outplanting, restoration management

Transition T2A
State 2 to 3

Disturbance/cutting/clearing, Brush removal

Restoration pathway R3A
State 3 to 1

Restoration management

Transition T3A
State 3 to 2

Abandonment, Plant establishment, Forest mgmt.

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

Nels Barrett, Ph.D.

Approval

Nels Barrett, 9/27/2024

Acknowledgments

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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	05/11/2025
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:

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:**

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17. **Perennial plant reproductive capability:**
