Ecological site F127XY013WV
Divergent Uplands

Last updated: 9/27/2024
Accessed: 10/12/2024

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.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 127X–Eastern Allegheny Plateau and Mountains

This ecosite is found in mountains, plateau in MLRA 127: Eastern Allegheny Plateau and Mountains. This site occupies the Allegheny Mountain Section of the Appalachian Highlands of the Appalachian Plateau Province. The deeply dissected plateau in this area terminates in a high escarpment, the Allegheny Front, in the eastern part of the area. Steep slopes are dominant, but level to gently rolling plateau remnants are conspicuous in the northern part of the area. The area is dominantly forest, containing large blocks of state forest, game lands, and national forest. Less than one-tenth of the MLRA consists of urban areas.

Classification relationships

USDA-NRCS (USDA2 2006):
Land Resource Region (LRR): N—East and Central Farming and Forest Region
Major Land Resource Area (MLRA): 127—Eastern Allegheny Plateau and Mountains
USDA-FS (Cleland et al. 2007)
Province: 211 – Northeastern Mixed Forest Province (in Part)
Section: 211G - Northern Unglaciated Allegheny Plateau
Subsection: 211Ga – Allegheny High Plateau

211Gb – Allegheny Deep Valleys
Province: 221 - Eastern Broadleaf Province (in part)
Section: 221E - Southern Unglaciated Allegheny Plateau (in part)
Subsection: 221Ea - Pittsburgh Low Plateau
Province: M221 – Central Appalachian Broadleaf Forest – Coniferous Forest - Meadow Province (in part)
Section: M221B - Allegheny Mountains
Subsection: M221Ba – Northern High Allegheny Mountains
M221Bb – Western Allegheny Mountains
M221Bc – Southern High Allegheny Mountains
M221Bd – Eastern Allegheny Mountain and Valley
M221Be – Western Allegheny Mountain and Valley
M221Bf – Allegheny Mountain Plateau
Section: M221C - Northern Cumberland Mountains
Subsection: M221Ca – Western Coal Fields

This site crosswalks to Landfire biophysical setting (BpS) Northeastern Interior Dry-Mesic Oak Forest

NatureServe's description (2007) for the equivalent ecological system CES202.592 -- Northeastern Interior Dry-Mesic Oak Forest notes this system is found from central New England west through OH and PA and south to VA.
Component Associations
Association Unique ID Association Name
CEGL002059 *Quercus alba* - *Quercus rubra* - Quercus prinus - *Acer saccharum* / Lindera benzoin Forest
CEGL002067 *Quercus alba* - *Quercus rubra* - Carya (alba, ovata) / Cornus florida Acidic Forest
CEGL002068 *Quercus alba* - *Quercus rubra* - Carya ovata Glaciated Forest
CEGL004793 Quercus muehlenbergii - Quercus (alba, rubra) - Carya cordiformis / Viburnum prunifolium Forest
CEGL006057 Quercus prinus - *Quercus rubra* / *Hamamelis virginiana* Forest
CEGL006216 *Quercus alba* - *Carya glabra* - *Fraxinus americana* / Cercis canadensis / Muhlenbergia sobolifera - Elymus hystrix Forest
CEGL006241 Quercus bicolor / Vaccinium corymbosum / Carex stipata Forest
CEGL006293 *Pinus strobus* - Quercus (rubra, velutina) - *Fagus grandifolia* Forest
CEGL006301 *Quercus rubra* - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum Forest
CEGL006304 *Liriodendron tulipifera* - *Pinus strobus* - Tsuga canadensis - Quercus (rubra, alba) / *Polystichum acrostichoides* Forest
CEGL006336 Quercus (alba, rubra, velutina) - Carya spp. / Viburnum acerifolium Forest
CEGL006454 Quercus (rubra, velutina, alba) - *Betula lenta* - (*Pinus strobus*) Forest
CEGL006921 *Fagus grandifolia* - *Betula lenta* - Quercus (alba, rubra) / Carpinus caroliniana Forest
CEGL008475 *Quercus alba* - *Quercus rubra* - Carya alba / Cornus florida / Vaccinium stamineum / *Desmodium nudiflorum* Piedmont Forest
CEGL008514 *Quercus rubra* - Quercus prinus - *Carya ovalis* / (Cercis canadensis) / Solidago (caesia, curtisii) Forest
CEGL008516 Quercus prinus - *Quercus rubra* - *Carya ovalis* / Carex pensylvanica - (Calamagrostis porteri) Forest
CEGL008517 *Quercus rubra* - *Acer saccharum* / Ostrya virginiana / Cardamine concatenata Forest
CEGL008518 *Quercus rubra* - Carya (ovata, ovalis) - *Fraxinus americana* / Actaea racemosa - Hydrophyllum virginianum Forest
CEGL008528 *Tilia americana* - *Fraxinus americana* / *Acer pensylvanicum* - Ostrya virginiana / Parthenocissus quinquefolia - Impatiens pallida Woodland

See also NatureServe's description (2007):
Allegheny-Cumberland Dry Oak Forest and Woodland CES202.359
Component Associations
Association Unique ID Association Name
CEGL004761 Pinus echinata - Quercus prinus - Quercus (coccinea, velutina) Forest
CEGL004786 Quercus prinus - Carya (alba, glabra, ovata) / Juniperus virginiana var. virginiana Forest
CEGL005023 Quercus prinus - Quercus (alba, coccinea, velutina) / Viburnum acerifolium - (Kalmia latifolia) Forest
CEGL006557 Pinus rigida - *Quercus coccinea* / Vaccinium angustifolium Woodland
CEGL007119 Pinus virginiana - Pinus (rigida, echinata) - (Quercus prinus) / Vaccinium pallidum Forest
CEGL007231 *Quercus alba* - *Quercus velutina* - Carya (ovata, alba, glabra) - Pinus sp. Forest

CEGL007240 *Quercus alba* - *Quercus rubra* - Carya ovata / Cercis canadensis - Juniperus virginiana var. virginiana Forest
CEGL007244 Quercus falcata - *Quercus alba* - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest
CEGL007247 Quercus falcata - Quercus (coccinea, stellata) / Vaccinium (pallidum, stamineum) Forest
CEGL007261 Quercus prinus - Carya spp. - *Quercus velutina* / Vaccinium arboreum / Iris verna var. smalliana Forest
CEGL007269 Quercus prinus - *Quercus rubra* - Carya (ovata, glabra) - Pinus virginiana Forest
CEGL007517 *Pinus strobus* - *Quercus alba* - (Carya alba) / Gaylussacia ursina Forest
CEGL007519 *Pinus strobus* - Quercus (coccinea, prinus) / (Gaylussacia ursina, Vaccinium stamineum) Forest
CEGL007700 Quercus prinus - Quercus spp. / Vaccinium arboreum - (Kalmia latifolia, Styrax grandifolius) Forest
CEGL007795 *Quercus alba* - Carya alba - (*Quercus velutina*) / *Desmodium nudiflorum* - (Carex picta) Forest
CEGL008406 Quercus stellata - Pinus virginiana / (Schizachyrium scoparium, Piptochaetium avenaceum) Woodland
CEGL008430 *Quercus alba* - (Quercus prinus) / (Hydrangea quercifolia) - Viburnum acerifolium / Carex picta - Piptochaetium avenaceum Forest
CEGL008431 Quercus prinus - (*Quercus coccinea*) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum Forest
CEGL008443 *Quercus alba* - Quercus stellata / Ostrya virginiana - Acer barbatum / Chasmanthium sessiliflorum Forest
CEGL008521 *Quercus alba* - Quercus (coccinea, velutina, prinus) / Gaylussacia baccata Forest
CEGL008567 *Quercus alba* - Quercus falcata / Vaccinium (arboreum, hirsutum, pallidum) Forest

Ecological site concept

From Landfire http://www.landfire.gov/index.php:

This ecological section comprises part of the Appalachian Plateaus geomorphic province (USDA Forest Service 1995). It is a maturely dissected plateau characterized by high hills, sharp ridges, and narrow valleys. Bedrock is overlain by Quaternary residuum on the ridges and hilltops, colluvium on the slopes, and either or both alluvium and Pleistocene lacustrine materials in the valleys. Udalfs, Udults, and Ochrepts dominate, in combination with mesic soil temperature regime, an udic soil moisture regime, and mixed or illitic mineralogy. Soils formed in parent materials are divided into five groups: residual material, which developed in place by the weathering of underlying bedrock; colluvial material which weathered from bedrock strata transported by water and gravity to the lower slopes; alluvium, lacustrine sediments and outwash deposited by water; and loess deposited by wind. Precipitation averages 35 to 45in (900 to 1,150mm0150mm); it occurs mainly during summer, winter, and spring. Rain on snow is common during winter and early spring. Summers are dry with low humidity. Temperature averages 52 degrees F (11 degrees C). The growing season is 120 to 180 days. This ecological section is characterized by a relatively high density of streams, with gradients ranging from high, steep headwaters streams to low gradient rivers that flow into the OH River.

These sites generally occur on uplands with divergent convex slopes.

Associated sites

F127XY012WV	**Convergent Uplands** Convergent Uplands

Similar sites

F127XY003WV	**Acidic Shale Upland Oak/Heath** F127XY003WV Acidic Shale Upland Oak/Heath is an associated site

Table 1. Dominant plant species

Tree	(1) *Quercus montana* (2) *Quercus alba*

Shrub	(1) *Vaccinium* (2) *Viburnum*
Herbaceous	Not specified

Physiographic features

This ecological site occupies hillsides and mountainsides.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountainside (2) Upland > Hill
Runoff class	Very low to very high
Elevation	40–1,134 m
Slope	2–100%
Water table depth	25–183 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The climate is characteristic of of other ecological sites of high elevation areas in the Eastern Allegheny Plateau and Mountains with a warm to hot, humid summers climate with cold winters and moderate snowfall. Rainfall occurs mostly as high intensity convective thunderstorms.

Table 3. Representative climatic features

Frost-free period (characteristic range)	105-133 days
Freeze-free period (characteristic range)	139-161 days
Precipitation total (characteristic range)	1,041-1,346 mm
Frost-free period (actual range)	86-143 days
Freeze-free period (actual range)	128-182 days
Precipitation total (actual range)	965-1,448 mm
Frost-free period (average)	119 days
Freeze-free period (average)	151 days
Precipitation total (average)	1,219 mm

Climate stations used

- (1) KANE 1NNE [USC00364432], Kane, PA
- (2) RIDGWAY [USC00367477], Ridgway, PA
- (3) EMPORIUM [USC00362629], Emporium, PA
- (4) CLEARFIELD LAWRENCE AP [USW00054792], Clearfield, PA
- (5) PRINCE GALLITZIN SP [USC00367167], Patton, PA
- (6) LAUREL SUMMIT [USC00364839], Boswell, PA
- (7) JOHNSTOWN CAMBRIA CO AP [USW00004726], Johnstown, PA
- (8) EBENSBURG SEWAGE PLT [USC00362470], Ebensburg, PA
- (9) TERRA ALTA #1 [USC00468777], Terra Alta, WV
- (10) MC HENRY 2 NW [USC00185832], Friendsville, MD
- (11) MT DAVIS [USC00366022], Fort Hill, PA
- (12) PARSONS 1 NE [USC00466867], Hambleton, WV
- (13) KUMBRABOW [USC00464971], Huttonsville, WV

- (14) RICHWOOD 1SSE [USC00467513], Richwood, WV
- (15) MCROSS 3 E [USC00465875], Charmco, WV
- (16) BLUESTONE LAKE [USC00460939], Hinton, WV
- (17) ATHENS [USC00460355], Athens, WV

Influencing water features

There is typically no water features associated with this ecological site.

Soil features

Representative soils include: Belmont, Calvin, Caneyville, Cateache, Cavode, Chilhowie, Clifftop, Clymer, Cookport, Cookport Variant, Coolville, Culleoka, Dekalb, Dormont, Duffield, Dunmore, Dystrochrepts, Elliber, Ernest, Faywood, Fenwick, Frankstown, Frederick, Gilpin, Hartleton, Hazleton, Hustontown, Latham, Leck Kill, Leetonia, Lily, Lodi, Lowell, Marrowbone, Nallen, Opequon, Peabody, Rayne, Tilsit, Udorthents, Ungers, Upshur, Westmoreland, Wharton.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone and siltstone (2) Residuum–shale and siltstone (3) Residuum–sedimentary rock
Surface texture	(1) Silt loam (2) Stony silt loam (3) Channery silt loam (4) Channery sandy loam
Drainage class	Somewhat poorly drained to somewhat excessively drained
Permeability class	Very slow to moderate
Soil depth	41–183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–60%
Available water capacity (Depth not specified)	2.54–20.32 cm
Soil reaction (1:1 water) (Depth not specified)	3.2–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–48%
Subsurface fragment volume >3" (Depth not specified)	0–70%

Ecological dynamics

Information contained in this section was adapted from several sources. The information presented is representative of very complex vegetation communities. Key indicator plants, animals 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 aspect. The reference plant community is not necessarily the management goal. The species lists are 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.

From Landfire http://www.landfire.gov/index.php:

This ecological section comprises part of the Appalachian Plateaus geomorphic province. It is a maturely dissected plateau characterized by high hills, sharp ridges, and narrow valleys. Bedrock is overlain by Quaternary residuum on the ridges and hilltops, colluvium on the slopes, and either or both alluvium and Pleistocene lacustrine materials

in the valleys. Udalfs, Udults, and Ochrepts dominate, in combination with mesic soil temperature regime, an udic soil moisture regime, and mixed or illitic mineralogy. Soils formed in parent materials are divided into five groups:residual material, which developed in place by the weathering of underlying bedrock; colluvial material which weathered from bedrock strata transported by water and gravity to the lower slopes; alluvium, lacustrine sediments and outwash deposited by water; and loess deposited by wind. Precipitation averages 35 to 45in (900 to 1,150mm0150mm); it occurs mainly during summer, winter, and spring. Rain on snow is common during winter and early spring. Summers are dry with low humidity. Temperature averages 52 degrees F (11 degrees C). The growing season is 120 to 180 days. This ecological section is characterized by a relatively high density of streams, with gradients ranging from high, steep headwaters streams to low gradient rivers that flow into the OH River.

NatureServe (2007) provides the following description pertaining to this ecological system CES202.592 -- Northeastern Interior Dry-Mesic Oak Forest . These oak-dominated forests are one of the matrix forest systems in the northeastern and north-central US. Occurring in dry-mesic settings, they are typically closed-canopy forests, though there may be areas of patchy-canopy woodlands. They cover large expanses at low to mid elevations, where the topography is flat to gently rolling, occasionally steep. Soils are acidic and relatively infertile but not strongly xeric.

Vegetation Description
The vegetation consisted of forests dominated by oaks of dry-mesic conditions, especially white oak (*Quercus alba*) and red oak (*Quercus rubra*), and, on drier sites, chestnut oak (Quercus prinus), black oak (*Quercus velutina*), and scarlet oak (*Quercus coccinea*). Scarlet oak is absent at the northern edge of the system range. Along with oaks are varying amounts of hickory (Carya spp.), red maple (*Acer rubrum*), and other species such as white pine (*Pinus strobus*) and white ash (*Fraxinus americana*). American chestnut (*Castanea dentata*) was a prominent tree in these forests before chestnut blight eradicated it as a canopy constituent (NatureServe 2007). Common shrubs include mountain laurel (Kalmia spp.), greenbriar (Smilax spp.), blueberries (Vaccinium spp.), and huckleberries (Gaylussacia spp.). In the Ridge and Valley region, bear oak is an important shrub component. Herbs, forbs, and ferns are usually sparse to moderate in density. Areas experiencing frequent fire had a greater abundance of grasses and sedges.

State and transition model

Ecosystem states

1. Reference State (minimally-managed)

State 1 submodel, plant communities

1.1. Quercus montana - Quercus rubra / Hamamelis virginiana Forest

State 1
Reference State (minimally-managed)

BpS Dominant and Indicator Species Symbol Scientific Name Common Name QUAL *Quercus alba* White oak QUVE *Quercus velutina* Black oak QUPR2 Quercus prinus Chestnut oak QURU *Quercus rubra* Northern red oak QUCO2 *Quercus coccinea* Scarlet oak ACRU *Acer rubrum* Red maple PIST *Pinus strobus* Eastern white pine CARYA Carya Hickory Disturbance Description This system is naturally dominated by stable, uneven-aged forests, with canopy dynamics dominated by gap-phase regeneration. Most oaks are long-lived with typical age of mortality ranging from 200 to 400yrs. Scarlet and black oaks are shorter-lived with typical ages being approximately 50 to 100yrs, while white oaks can live as long as 600yrs. Extreme wind or ice storms occasionally create larger canopy openings. The dry-mesic oak forest is predominantly Fire Regime I, characterized by low-severity surface fires.

Historically, indigenous fires accounted for over 95% of the ignitions over these landscapes. Vegetation types varied based on fire frequency and intensity. Grassland prairies burned often (annually, biennially) and were probably associated with flat-to-slightly rolling terrain that effectively carried fire. These grasslands, deliberately maintained by Native Americans for hunting purposes, were probably scattered throughout the forest matrix. Oak-hickory tree-sprout and shrub thickets occurred where fire frequency was a bit less, probably 3-9yrs. Also, sprout conditions would arise immediately after catastrophic burns that would top-kill tree-dominated communities. Savannas and woodlands developed within a moderate burning regime, with fire return intervals averaging every 5 to 15yrs. Closed-canopy oak-hickory forests would develop where fire return intervals stretched beyond 15yrs. Shade-tolerant, fire-sensitive maples (and associated late-successional trees) would regenerate and form understories beneath oak-hickory canopies when fire was excluded over several decades. With continued fire exclusion, maple and other late successional species would gradually replace overstory oaks and hickories through gap capture (Sutherland and Hutchinson 2003). A mosaic of vegetation types comprised oak-hickory landscapes contingent on fire history (Cutter and Guyette 1994). In a recent study on fire history of a red oak stand in West VA it was found that fire intervals ranged from 7 to 32yrs from 1846 to 2002 with a median of approximately 16yrs, and prior to the fire control era ranged from 7 to 15yrs (Schuler and McClain, 2003). Schuler and McClain stated that these observations did not deviate significantly from previous research in the oak forests of OH, MD, and Missouri. -- the above description was taken from RA model R6OAHI -- Oak Hickory.

Community 1.1
Quercus montana - Quercus rubra / Hamamelis virginiana Forest

Central Appalachian Dry-Mesic Chestnut Oak - Northern Red Oak Forest (CEGL007057) occurs on upper slopes. The canopy is codominated by *Quercus montana* and *Quercus rubra*. Associated canopy species include *Liriodendron tulipifera*, *Acer rubrum*, *Carya glabra*, *Carya ovalis*, *Carya tomentosa*, *Acer saccharum*, *Tilia americana*, *Fagus grandifolia*, and *Betula lenta*. The tall-shrub layer is most often characterized by *Hamamelis virginiana* and *Acer pensylvanicum*. The lower shrub layer is patchy and contains a mixture of scrambling vines, ericads, and non-ericaceous species. The herbaceous layer is usually sparse but may include *Dryopteris marginalis*, *Dioscorea quaternata*, *Eurybia divaricata*, *Ageratina altissima*, *Polygonatum biflorum*, *Solidago caesia*, *Festuca subverticillata*, *Thelypteris noveboracensis*, *Sanicula trifoliata*, *Prenanthes altissima*, *Polystichum acrostichoides*, *Desmodium nudiflorum*, *Galium latifolium*, *Houstonia purpurea*, and *Maianthemum racemosum*. This association is more or less intermediate in site conditions and composition between oak / heath forests of exposed, xeric, infertile sites and richer cove or montane oak-hickory forests of sheltered, fertile sites. (Source: NatureServe 2007).

Dominant plant species

- American beech (*Fagus grandifolia*), tree
- red maple (*Acer rubrum*), tree
- northern red oak (*Quercus rubra*), tree
- striped maple (*Acer pensylvanicum*), tree
- sugar maple (*Acer saccharum*), tree
- black cherry (*Prunus serotina*), tree
- eastern hayscented fern (*Dennstaedtia punctilobula*), other herbaceous

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)

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.

Other references

Landfire http://www.landfire.gov/index.php

Braun, E.L. 1950. Deciduous forests of eastern North America. Hafner Publishing Company, New York, NY. 596 pp.

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Greller, A. M. 1988. Deciduous forest. In: M.G. Barbour and W. D. Billings, eds. North American terrestrial vegetation. Cambridge University Press, NY. 287-326.

NatureServe. 2007. International Ecological classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, USA. Data current as of 08 June 2007.

Schuler, T.M. and W.R. McClain. 2003. Fire history of a ridge and valley oak forest. Newtown Square, PA. USDA Forest Service, Northeastern Forest Service.

Sutherland, E.K., T.F. Hutchinson and D.A.Yaussy. 2003. Introduction, study area description, and experimental design (Chapter 1). Newtown Square, PA. USDA Forest Service, Northeastern Research Station.

Contributors

Jason Teets

Approval

Greg Schmidt, 9/27/2024

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	10/12/2024
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:**