

Ecological site F147XY008PA

Shallow Mixed Sedimentary Upland

Last updated: 9/27/2024
Accessed: 08/30/2026

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): 147X–Northern Appalachian Ridges and Valleys

Major Land Resource Area 147 is in the Middle section of the Valley and Ridge Province of the Appalachian Highlands. Characteristic features include folded and faulted parallel ridges and valleys that are carved out of anticlines, synclines, and thrust blocks. The variability of weathering of the underlying bedrock has resulted in resistant sandstone and shale ridges separated by less resistant limestone and shale narrow to moderately broad valleys. The ridges are strongly sloping to extremely steep and have narrow, rolling crests, and the valleys are mainly level to strongly sloping. The Great Valley is a salient feature of the eastern portion and runs the entire length of the MLRA where it is called the Shenandoah Valley in the south. The western side of the MLRA is dominantly hilly to very steep and is rougher and much steeper than the rolling hills to the east. Parts of the northernmost section of the MLRA were subjected to pre-Illinoian glaciation (>770,000 years ago). Anthracite coal underlies some areas in the north and has been mined since the 1700's. Elevation in MLRA 147 generally ranges from 330 to 985 feet (100 to 300 meters) in the valleys and from 1,310 to 2,625 feet (400 to 800 meters) on the ridges and mountains. It is as high as 2,955 feet (900 meters) on some mountain crests and is nearly 4,430 feet (1,350 meters) on a few isolated, linear mountain ridges. Local relief in the valleys is about 15 to 165 feet (5 to 50 meters). The ridges rise about 660 feet (200 meters) above the adjoining valleys. (USDA, 2006).

Classification relationships

This ecological site is found in Major Land Resource Area 147- Northern Appalachian Ridges and Valleys. MLRA 147 is located within Land Resource Region S - Northern Atlantic Slope Diversified Farming Region (USDA 2006), and in United States Forest Service ecoregion M221A – Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province (Bailey 1995). In addition, MLRA 147 falls within area #67 of EPA Ecoregion Level III – the Ridge and Valley (USEPA 2013). The Shallow Mixed Sedimentary Upland occurs in 67b and 67d of EPA Ecoregion IV – Northern Shale Valleys, and Northern Dissected Ridges, respectively (Woods et. al, 1996).

Ecological site concept

The Shallow Mixed Sedimentary Upland ecological sites occur throughout MLRA 147 on noncalcareous to acidic sedimentary geology primarily composed of shales, siltstones, and fine-grained sandstones. Depth to bedrock is less than 40 inches (100cm) and most sites are well drained to excessively drained, characteristics which favors xeric (dry) oak and hickory species over more mesic (moisture requiring) maple, ashes, and poplars. These landscapes are distinguished from the higher elevation ridges in that those areas are underlain by coarse textured quartzitic sandstones that have fewer nutrients, higher boulder and stone content, are well drained, but tend to be deeper to bedrock. Uplands within MLRA 147 at lower elevations are primarily underlain by limestone, dolomite, and calcareous sedimentary geology. The latter landscapes typically have higher base saturation, higher available water capacity, and higher soil fertility. Within the Shallow Mixed Sedimentary Upland ecological sites, steep, convex, south and southwest facing slopes generally have shallower soils and bare rock outcrops, and can host a shale barrens plant community characterized by sparse trees, sometimes stunted vegetation, and species that are endemic or near endemic to these dry habitats. Linear to concave or slightly convex north and northeast facing slopes are typically deeper to bedrock and can support full forest cover dominated by oaks and pines.

Associated sites

F147XY002PA	Mixed Sedimentary Upland Deep Acid Mixed Sedimentary Upland
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Table 1. Dominant plant species

Tree	(1) <i>Quercus montana</i> (2) <i>Carya glabra</i>
Shrub	(1) <i>Cornus florida</i> (2) <i>Vaccinium pallidum</i>
Herbaceous	Not specified

Physiographic features

The Shallow Mixed Sedimentary Upland ecological sites occur in uplands on noncalcareous to acidic mixed sedimentary geology primarily composed of shales, siltstones, and fine-grained sandstones. Depth to bedrock is less than 40 inches (51cm). Typical landscapes are rolling hills in narrow valleys, and some mountains. The ecological site generally occupies the upper sideslope, shoulder, and summit positions on convex hills and less commonly is found on footslopes. Most sites are well drained to excessively drained. They are not subject to flooding or ponding.

The landscapes that underlie this ecological site can be variable in their slope and aspect. Steep, convex, south and southwest facing slopes generally have shallower soils, thinner tree canopies, and will more likely host a barrens type of plant community, while linear to concave or slightly convex north and northeast facing slopes are usually slightly deeper and can support full forest cover.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope
Runoff class	Very low to very high
Elevation	30 – 1,180 m
Slope	0 – 80 %
Water table depth	40 – 50 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of this region is temperate and humid. The Ridge and Valley Province is not rugged enough for a true mountain type of climate but it does have many of the characteristics of such a climate (Daily 1971). The influence of the high and low topography on air movement causes somewhat greater temperature extremes than are experienced in the Piedmont region to the east. The differences in elevation also affect the length of the frost free season on the ridges versus that in the valleys. The cooler temperatures and the shorter freeze-free periods occur at the higher elevations and in the more northern latitudes. The maximum precipitation occurs from early spring through mid-summer, and the minimum occurs in January and February. The average annual snowfall ranges from 16 to more than 51 inches (40 to 130 centimeters). The average annual temperature is 44 to 57 degrees F (7 to 14 degrees C). A portion of this region that extends from Maryland southward through most of the Shenandoah Valley in Virginia falls within a rain shadow cast by the Appalachian Mountains to the west and the Blue Ridge Mountains to the east. The mountains on either side block moist flowing air from either the east or the west causing the valleys to be drier. Average annual precipitation in this shadow area can average 34 to 36 in/year (86 to 91cm) compared to 40 to 42 in/year (102 - 107 cm) for the rest of the region (PRISM 2013).

Data for mean annual precipitation, frost-free and freeze-free periods and monthly precipitation for this ecological site are shown below.

The original data used in developing the tables was obtained from the USDA-NRCS National Water & Climate Center (2015) climate information database for 11 weather stations throughout MLRA 147 at elevations in which this ecological site occurs. All climate station monthly averages for maximum and minimum temperature and precipitation were then added together and averaged to make this table.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-140 days
Freeze-free period (characteristic range)	170-180 days
Precipitation total (characteristic range)	940-1,090 mm
Frost-free period (actual range)	120-150 days
Freeze-free period (actual range)	150-180 days
Precipitation total (actual range)	910-1,120 mm
Frost-free period (average)	140 days
Freeze-free period (average)	170 days
Precipitation total (average)	990 mm

- (1) LEBANON 2 W [USC00364896], Lebanon, PA
- (2) EDINBURG [USC00442663], Edinburg, VA
- (3) HOT SPRINGS [USC00444128], Hot Springs, VA
- (4) MATHIAS [USC00465739], Lost City, WV
- (5) HANCOCK [USC00184030], Hancock, MD
- (6) STATE COLLEGE [USC00368449], State College, PA
- (7) GATHRIGHT DAM [USC00443310], Covington, VA
- (8) BEAR GAP [USC00360457], Coal Township, PA
- (9) EVERETT [USC00362721], Everett, PA
- (10) DALE ENTERPRISE [USC00442208], Dayton, VA
- (11) ROMNEY 1 SW [USC00467730], Romney, WV

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

The representative soil series associated with this site are: Weikert, Sequoia, Rough, Ramsey, Montevallo, Lehew, Klinesville, Gilpin, Gainesboro, Calvin, and Berks. These soils have formed in place, having weathered from mixed geologies of acidic shales, sandstones, and siltstones. Berks, Weikert, and Gilpin have been mapped extensively throughout the Appalachian Highlands on several different geologic formations and on all slope aspects.

Depth to bedrock is generally less than 40 inches and can be as shallow as 6 inches. The shallowest soils tend to be found on steep, noticeably convex slopes and shoulders. Deeper soils are found in concave or linear areas, or towards the lower portion of the hillslopes. Bedrock is usually standing somewhat on end and is fractured allowing water to drain freely through the soil. The soils are typically very

channery or very gravelly with greater than 40% rock fragment volume. Subsurface textures are silt loam, loam, or fine sandy loam. Field soil pH generally ranges from 4.8 to 5.0 within the upper 15 inches. An occasional inclusion of calcareous shale will cause the pH in very localized areas to be 6.0 to 6.5.

Surface soil textures are silt loams, loams, or fine sandy loams.

Table 4. Representative soil features

Parent material	(1) Residuum – acid shale
Surface texture	(1) Channery silt loam (2) Very channery loam (3) Flaggy fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Rapid
Soil depth	20 – 100 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	0.76 – 14.73 cm
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 5.7
Subsurface fragment volume <=3" (Depth not specified)	0 – 50 %
Subsurface fragment volume >3" (Depth not specified)	0 – 80 %

Ecological dynamics

Information contained in this section was adapted from several sources, including field work, the Landfire Biophysical Settings layer (Landfire 2010), NatureServe (NatureServe 2009; NatureServe 2017), and the Natural Heritage Programs of Pennsylvania (Zimmerman

et al. 2012), Virginia (Fleming et al. 2013), West Virginia (WVDNR 2014), and Maryland (Harrison 2004). 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.

State Correlation: This site will be correlated in: MD,PA,VA,WV

The Shallow Mixed Sedimentary Upland Ecological Site is located in the Ridge and Valley region of the Appalachian Highlands, an area that has undergone extensive human disturbance since pre and post-European settlement times (Braun 1950). The topography and landscape position range from rolling hills to steep slopes on acidic shale, sandstone, and siltstone. Depth to bedrock ranges from 10 to 40 inches (25 to 100 cm). These sites tend to create dry, xeric conditions with moderate to low forest productivity. The reference forest is an oak and hickory dominated community and is part of the Central Appalachian Dry Oak-Pine Forest System which covers large areas in the low to mid elevation central Appalachians and middle Piedmont (CES202.591 from NatureServe 2015; Landfire 2010). Although this system includes a number of diverse plant communities, a Chestnut Oak - Pignut Hickory community was consistently observed with field work in mature forests on these shale uplands. In addition to the oak-hickory forest, these landscapes included patches of Eastern White Pine-Chestnut Oak forest and a more open Virginia Pine-Oak shale woodland.

The forest is mostly closed-canopy but can include patches of open woodlands. It is dominated by a variable mixture of dry-site oak and pine species, most typically *Quercus prinus* (chestnut oak), *Pinus virginiana* (Virginia pine), and *Pinus strobus* (eastern white pine), but sometimes *Quercus alba* (white oak) and/or *Quercus coccinea* (scarlet oak). In addition, there is a high cover of *Carya* spp. (hickory), especially *Carya glabra* (pignut hickory). *Quercus velutina* (black oak) and *Quercus rubra* (red oak) may also be present. Heath shrubs such as *Vaccinium pallidum* (blue ridge blueberry), *Gaylussacia baccata* (black huckleberry), and *Kalmia latifolia* (mountain laurel) are moderate to sparse, but may be thicker on gentle ridge crests, where litter and humus tend to accumulate. Disturbance agents include fire, wind throw, and ice damage. Increased site disturbance generally leads to secondary forest vegetation with a greater proportion of *Pinus virginiana* (Virginia pine) and weedy hardwoods such as *Acer rubrum* (red maple).

The Oak-Hickory forest and Pine-Oak Forest intergrade into one another with some areas containing more pine, others having primarily oak, and still others containing significant amounts of both. Low intensity fire and canopy disturbance tends to favor oak regeneration. Fire exclusion may favor the succession of oak dominated forests to ones dominated by pine.

Pine-Oak shale barren woodlands occupy parts of this ecological site where slopes are distinctly convex, steep, typically of south or southwest aspect, and where soil cover is minimal. Canopy cover is less than 70 percent and dominants are *Pinus virginiana* (Virginia pine), *Juniperus virginiana* (eastern red cedar) (often subordinate but occasionally dominant), *Quercus rubra* (northern red oak), and *Quercus prinus* (chestnut oak). Shale barren endemics may be found on these sites including *Paronychia montana* (mountain nailwort), *Antennaria virginica* (shale barren pussytoes), *Allium oxyphilum* (lillydale onion), *Packera antennariifolia* (shale barren ragwort), *Oenothera argillicola* (shale barren evening primrose), *Solidago arguta* (Atlantic goldenrod), *Scutellaria ovata* (heartleaf skullcap), and *Trifolium virginicum* (Kates mountain clover).

Oak forests historically have been maintained by periodic fire. Fire suppression since the early 20th century in the eastern United States is believed to be leading to the overall replacement of oaks with fire-sensitive, non-oak species like maples, beeches, birches, tulip poplars, and black cherry (Brose et. al., 2008). Oak forest regeneration is also hindered by heavy deer browsing (Latham etl al. 2005). Deer will selectively consume many native species including oak seedlings and acorns over less palatable species like hay-scented fern and several non-native species including Japanese barberry, Eurasian species of honeysuckle, and garlic mustard. Despite these factors, oak forests in shallow mixed sedimentary upland areas, seem to be maintaining their dominance. Large oak roots are able to survive in xeric uplands and can resprout multiple times, thus enabling these landscapes to continually reproduce and accumulate oak seedlings. This accumulation of reproduction results from the combined effects of periodic seed production, the relatively large food reserves in acorns that sustain seedlings through the first year, the high sprouting capacity of seedlings, drought tolerance and the ability of seedlings to persist under at least moderate shade. In the eastern United States, the accumulation of oak reproduction generally increases with decreasing site quality and over story density (Johnson 2009).

Other states observed on these ecological sites include a cleared agricultural pasture state, an old field state and an invaded woodland state where non-native species occupy significant areas of the understory. These non-natives may have detrimental effects on the reproduction and advanced recruitment of the reference tree species. One such invasive species *Multiflora rose* (*rosa multiflora*) is often present in the shrub layer.

Various field guides were used for identification of vegetation. Current taxonomy and nomenclature were verified using the Plants of Pennsylvania (Rhoads and Block 2007) and the USDA Plants database (2015).

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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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

Bailey, Robert G. 1995. Description of the ecoregions of the United States 2d ed. Rev. and expanded (1st ed. 1980). Misc. Publ. No. 1391 (rev.), Washington, DC: USDA Forest Service. 108p. with separate map at 1:7,500,000.

Braun, E. Lucy. 1950. Deciduous Forests of Eastern North America. Philadelphia and Toronto: The Blakiston Company.

Brose, P. H., K.W. Gottschalk, S. B. Horsley, P.D. Knopp, J. N. Kochenderfer, B. J. McGuinness, G.W. Miller, T.E. Ristau, S. H. Stoleson, and S.L. Stout. 2008. Prescribing regeneration treatments for mixed-oak forests in the Mid-Atlantic region. Gen. Tech. Rep. NRS-33. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 100 p.)

Daily, Paul. 1971. Climate of Pennsylvania, in Climatology of the United States No. 60-36, Climates of the States. Washington, DC: U.S. Government Printing Office.

Duiker, S. W. and J.C. Myers, 2005. Better Soils with the NoTill System, A Publication to Help Farmers Understand the Effect of No-Till Systems of the Soil. USDA Natural Resources Conservation Service.

Dyer, James, M. 2010. Land-use legacies in a central Appalachian forest differential response of trees and herbs to historic agricultural practices. Applied Vegetation Science 13:195-206.

Fleming, G.P., K.D. Patterson, K. Taverna, and P.P. Coulling. 2013. The natural communities of Virginia: classification of ecological community groups. Second approximation. Version 2.6. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA.

FOTG-Field Office Technical Guide, Section IV-Practice Standards and Specifications, USDA, Natural Resources Conservation Service, <https://efotg.sc.egov.usda.gov/>

Harrison, J.W. 2004. Classification of vegetation communities of Maryland: First iteration. NatureServe and Maryland Natural Heritage Program, Wildlife and Heritage Service, Maryland Department of Natural Resources. Annapolis, MD.

- Johnson, P.S., S.R. Shifley, and R.Rogers. 2009. Regeneration Ecology II: Population Dynamics. The Ecology and Silviculture of oaks, 2nd Ed., Chapter 3: 134-187.
- Keever, Catherine. 1953. Present Composition of Some Stands of the Former Oak-Chestnut Forest in the Southern Blue Ridge Mountains. *Ecology* 34(1): 44-54.
- LANDFIRE: LANDFIRE Biophysical Settings. (2010, January 01 - last update). U.S. Department of Interior, Geological Survey. [Online]. Available: <http://landfire.cr.usgs.gov/viewer/> [2015, June 5].
- NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009.
- NatureServe 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. (Accessed: December 2017).
- PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>, created February 26, 2013.
- Rhoads, Anne and Timothy Block. 2007. The Plants of Pennsylvania. 2nd ed. Philadelphia: Univ. of Pennsylvania Press.
- U.S. Department of Agriculture, Natural Resources Conservation Service. 2015. The PLANTS Database (<http://plants.usda.gov>, 12 March 2015). National Plant Data Team, Greensboro, NC 27401-4901 USA.
- United States Department of Agriculture, Natural Resources Conservation Service , Geospatial Data Gateway, <https://gdg.sc.egov.usda.gov/GDGHome.aspx>, Accessed December 2015.
- United States Department of Agriculture, Natural Resources Conservation Service, National Water and Climate Center, <http://www.wcc.nrcs.usda.gov>, Accessed February 2016.
- United States Department of Agriculture, Natural Resources Conservation Service, 2006. Land Resource Regions and Major land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296, 669p.
- United States Department of Agriculture, Natural Resources Conservation Service, 2015. National Soils Information System.
- Woods, A.J., J.O. Omernik, D.D. Brown, C.W. Kiilsgaard. 1996. Level IV Ecoregions of EPA Region 3. US Environmental Protection Agency National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. Map scale 1:250,000.
- WVDNR [West Virginia Division of Natural Resources]. 2014. Plots2-WV database of community ecology plots. West Virginia Natural Heritage Program, WVDNR, Elkins, WV.
- Zimmerman, E., T. Davis, G. Podniesinski, M. Furedi, J. McPherson, S. Seymour, B. Eichelberger, N. Dewar, J. Wagner, and J. Fike (editors). 2012. Terrestrial and Palustrine Plant Communities of Pennsylvania, 2nd Edition. Pennsylvania Natural Heritage Program, Pennsylvania Department of Conservation and Natural Resources, Harrisburg, Pennsylvania.

Approval

Nels Barrett, 9/27/2024

Acknowledgments

This current draft provisional ecological site (PES) report is a generalized description of landform, climate, physiography, soils and associated vegetation. Future work is needed to validate this information and further refine the report into an ecological site description (ESD). An ESD will include detailed plant floristic inventory data on the reference state and most commonly occurring alternate states, interpretations for different land use, site productivity data, as well as descriptions of the ecological dynamics. The following people assisted with the development of this provisional ecological site report: Yuri Plowden, Ecological Site Specialist, NRCS, Mill Hall, PA Aron Sattler, 6-MIL Soil Survey Project Leader, NRCS, Mill Hall, PA Nels Barrett, Ph.D, Regional Ecological Site Specialist, NRCS, Amherst, MA Mike McDevitt, Soil Scientist, NRCS, Mill Hall, PA Ephraim Zimmerman, Ecological Assessment Manager, Western PA Conservancy, Pittsburgh, PA Greg Podniesinski, Chief PA DCNR, Natural Heritage Section, Harrisburg, PA Kevin Godsey, Ecological Site Specialist, NRCS, Springfield, MO Don Flegel, Resource Soil Scientist, NRCS, Harrisonburg, VA Jared Beard, State Soil Scientist, NRCS, Morgantown, WV Joseph Kraft, State Soil Scientist, NRCS, Harrisburg, PA Benjamin Marshall, 3-FRE Soil Survey Project Leader, NRCS, Frederick, MD Rob Pate, Resource Soil Scientist, NRCS, Beckley, WV Carl Robinette, Soil Scientist (retired), NRCS, Maryland John Chibirka, Resource Soil Scientist, NRCS, Leesport, PA Jessica McPherson, Special Projects Ecologist, Western PA Conservancy, Pittsburgh, PA Frederick (Bud) Sechler, Ecological Information Specialist, PA DCNR, Natural Heritage Section, Harrisburg, PA Rocky Gleason, inventory East Coordinator, PA DCNR, Natural Heritage Section, Harrisburg, PA

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	08/30/2026
Approved by	
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:
