

Ecological site F127XY012WV Convergent Uplands

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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.

This narrative was created from the Landfire Biophysical Setting (BpS) description

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 Unglaciaded Allegheny Plateau

Subsection: 211Ga – Allegheny High Plateau

211Gb – Allegheny Deep Valleys

Province: 221 - Eastern Broadleaf Province (in part)

Section: 221E - Southern Unglaciaded 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) South-Central Interior Mesophytic Forest (1321)

NatureServe's description (2007) for the equivalent ecological system CES 202.887

South-Central Interior Mesophytic Forest & CES 202.373 Southern and Central Appalachian Cove Forest

South-Central Interior Mesophytic Forest
Component Associations

Association Unique ID Association Name

CEGL002411 *Fagus grandifolia* - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest

CEGL004741 *Acer saccharum* - *Carya ovata* - *Juglans nigra* / *Symphoricarpos orbiculatus* / *Galium circaezans* Forest

CEGL004767 *Tsuga canadensis* - (*Liriodendron tulipifera*, *Fagus grandifolia*) / (*Magnolia macrophylla*, *Ilex opaca*) / *Polystichum acrostichoides* Forest

CEGL005043 *Tsuga canadensis* - *Fagus grandifolia* - *Acer saccharum* / (*Hamamelis virginiana*, *Kalmia latifolia*) Forest

CEGL005222 *Liriodendron tulipifera* - *Tilia americana* var. *heterophylla* - *Aesculus flava* - *Acer saccharum* / (*Magnolia tripetala*) Forest

CEGL006144 *Quercus alba* - *Fagus grandifolia* Western Allegheny Plateau Forest

CEGL006201 *Acer saccharum* - *Liriodendron tulipifera* - *Fraxinus americana* / *Staphylea trifolia* Forest

CEGL006237 *Acer saccharum* - *Fraxinus americana* - *Tilia americana* - *Liriodendron tulipifera* / *Actaea racemosa* Forest

CEGL007200 *Fagus grandifolia* Ridge and Valley Forest

CEGL007201 *Fagus grandifolia* - *Liriodendron tulipifera* / *Euonymus americanus* / *Athyrium filix-femina* ssp. *asplenioides* Forest

CEGL007213 *Quercus alba* - *Fagus grandifolia* / *Hydrangea quercifolia* - *Viburnum acerifolium* / *Carex picta* - *Polystichum acrostichoides* Forest

CEGL007220 *Liriodendron tulipifera* / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest

CEGL007233 *Quercus alba* - *Quercus rubra* - *Carya ovalis* / *Acer saccharum* / *Polystichum acrostichoides* Forest

CEGL007698 *Quercus rubra* - *Acer saccharum* - *Tilia americana* var. *heterophylla* - *Aesculus flava* - (*Cladrastis kentukea*) Forest

CEGL007879 *Juglans nigra* / *Verbesina alternifolia* Ruderal Forest

CEGL007881 *Fagus grandifolia* - *Quercus alba* / *Cornus florida* Forest

CEGL008428 *Quercus alba* - (*Liriodendron tulipifera*, *Liquidambar styraciflua*) / *Calycanthus floridus* / *Athyrium filix-femina* Forest

CEGL008488 *Quercus rubra* - *Tilia americana* var. *heterophylla* - *Carya carolinae-septentrionalis* / *Acer* (*barbatum*, *leucoderme*) / *Hydrangea quercifolia* Forest

Southern and Central Appalachian Cove Forest

Component Associations

Association Unique ID Association Name

CEGL004293 *Impatiens* (*capensis*, *pallida*) - *Monarda didyma* - *Rudbeckia laciniata* var. *humilis* Herbaceous Vegetation

CEGL004296 *Diphylleia cymosa* - *Saxifraga micranthidifolia* - *Laportea canadensis* Herbaceous Vegetation

CEGL004982 *Betula alleghaniensis* - *Tilia americana* var. *heterophylla* / *Acer spicatum* / *Ribes cynosbati* / *Dryopteris marginalis* Forest

CEGL006186 *Liriodendron tulipifera* - *Quercus rubra* - *Fraxinus americana* / *Asimina triloba* / *Actaea racemosa* - *Uvularia perfoliata* Forest

CEGL006237 *Acer saccharum* - *Fraxinus americana* - *Tilia americana* - *Liriodendron tulipifera* / *Actaea racemosa* Forest

CEGL006304 *Liriodendron tulipifera* - *Pinus strobus* - *Tsuga canadensis* - *Quercus* (*rubra*, *alba*) / *Polystichum acrostichoides* Forest

CEGL006472 *Tilia americana* var. *heterophylla* - *Aesculus flava* - *Acer saccharum* / *Cystopteris bulbifera* - *Asarum canadense* Forest

CEGL007102 *Pinus strobus* - *Tsuga canadensis* / *Rhododendron maximum* - (*Leucothoe fontanesiana*) Forest

CEGL007136 *Tsuga canadensis* / *Rhododendron maximum* - (*Clethra acuminata*, *Leucothoe fontanesiana*) Forest

CEGL007220 *Liriodendron tulipifera* / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest

CEGL007233 *Quercus alba* - *Quercus rubra* - *Carya ovalis* / *Acer saccharum* / *Polystichum acrostichoides* Forest

CEGL007291 *Liriodendron tulipifera* - *Tilia americana* var. *heterophylla* - (*Aesculus flava*) / *Actaea racemosa* Forest

CEGL007543 *Liriodendron tulipifera* - *Betula lenta* - *Tsuga canadensis* / *Rhododendron maximum* Forest

CEGL007693 *Tsuga canadensis* - *Halesia tetraptera* - (*Fagus grandifolia*, *Magnolia fraseri*) / *Rhododendron maximum* / *Dryopteris intermedia* Forest

CEGL007695 *Aesculus flava* - *Acer saccharum* - (*Fraxinus americana*, *Tilia americana* var. *heterophylla*) / *Hydrophyllum canadense* - *Solidago flexicaulis* Forest

CEGL007710 *Liriodendron tulipifera* - *Fraxinus americana* - (*Tilia americana*, *Aesculus flava*) / *Actaea racemosa* - *Laportea canadensis* Forest

CEGL007711 *Tilia americana* var. *heterophylla* - *Fraxinus americana* - (*Ulmus rubra*) / *Sanguinaria canadensis* - (*Aquilegia canadensis*, *Asplenium rhizophyllum*) Forest

CEGL007878 *Quercus rubra* - *Tilia americana* var. *heterophylla* - (*Halesia tetraptera* var. *monticola*) / *Collinsonia canadensis* - *Prosartes lanuginosa* Forest

CEGL008407 *Tsuga canadensis* - (*Fagus grandifolia*, *Tilia americana* var. *heterophylla*) / *Magnolia tripetala* Forest

CEGL008412 *Acer* (*nigrum*, *saccharum*) - *Tilia americana* / *Asimina triloba* / *Jeffersonia diphylla* - *Caulophyllum thalictroides* Forest

CEGL008510 *Liriodendron tulipifera* - *Quercus rubra* - *Magnolia acuminata* / *Cornus florida* Forest

CEGL008512 *Tsuga canadensis* - *Quercus prinus* - *Liriodendron tulipifera* / *Kalmia latifolia* - (*Rhododendron catawbiense*) Forest

Ecological site concept

These sites generally occur on uplands with MAAT > 45 degree F and median elevation

The vegetation for this site ascribes to the following NatureServe's systems (2007): South-Central Interior Mesophytic Forest (CES202.887) and Southern and Central Appalachian Cove Forest (CES202.373)

Associated sites

F127XY013WV	Divergent Uplands Divergent Uplands
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Table 1. Dominant plant species

Tree	(1) <i>Acer saccharum</i> (2) <i>Liriodendron tulipifera</i>
Shrub	(1) <i>Asimina triloba</i> (2) <i>Hamamelis virginiana</i>
Herbaceous	(1) <i>Actaea racemosa</i> (2) <i>Polystichum acrostichoides</i>

Physiographic features

These sites are formed from colluvium on mountain slopes, valley bottoms, and coves.

Table 2. Representative physiographic features

Runoff class	Low to very high
Elevation	49–1,080 m
Slope	3–90%
Water table depth	Not specified
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The climate is characteristic 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 are typically no water features associated with this site , except perhaps a low water table or runnelling.

Soil features

Representative soils include: Albrights, Belmont, Blackthorn, Blairton, Brinkerton Variant, Brownsville, Buchanan, Cavode, Clarksburg, Cookport, Ernest, Germania, Guyandotte, Highsplint, Jefferson, Kedron, Laidig, Layland, Macove, Meckesville, Nicholson, Oriskany, Pineville, Pipestem, Portville, Sees, Shelocta, Shouns, Tygart.

Table 4. Representative soil features

Parent material	(1) Colluvium
Surface texture	(1) Silt loam (2) Stony silt loam (3) Silty clay loam (4) Gravelly loam

Drainage class	Somewhat poorly drained to somewhat excessively drained
Permeability class	Very slow to moderate
Soil depth	46–183 cm
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	1–95%
Available water capacity (Depth not specified)	7.62–17.78 cm
Soil reaction (1:1 water) (Depth not specified)	3.5–8.4
Subsurface fragment volume ≤3" (Depth not specified)	2–45%
Subsurface fragment volume >3" (Depth not specified)	1–70%

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:Vegetation Description](http://www.landfire.gov/index.php:Vegetation%20Description)

A diverse closed-canopy forest with dominant species including: beech (*Fagus grandifolia*), tulip-poplar (*Liriodendron tulipifera*), American basswood (*Tilia americana* var. *heterophylla*), sugar maple (*Acer saccharum*), yellow buckeye (*Aesculus flava*), *Magnolia acuminata*, and *Juglans nigra*, red oak (*Quercus rubra*), white oak (*Q. alba*) and formerly American chestnut (*Castanea dentata*) (Braun 1950, Muller 1982). The oak component tends to grade from white oaks in the southern areas to red and black oaks in the northern geographic range of this forest type. *Tsuga canadensis* may be a minor component of some stands. Trees may grow very large in undisturbed areas. In the northern areas, both white (*Fraxinus americana*) and green ash (*Fraxinus pennsylvanica*) can be up to 10-15% of forest type (C. Emanuel, personal communication). This forest type developed primarily on mesic, sheltered landscapes positions (e.g., lower slopes, coves, ravines) but also occurred on some dry-mesic slopes, where presumably fire was infrequent (Wade et al. 2000).

Adjacency or Identification Concerns

Mapping mixed mesophytic forests would likely focus on specific topographic positions, such as coves, valley bottoms typically v-shaped (excluding broad u-shaped floodplains), lower north and east facing slopes; sometimes west and south facing lower slopes where moisture permits; wet-mesic to mesic conditions on the landscape; rich fertile conditions/sites; shaded topographic positions (Nowacki personal communication). On side slopes, mixed mesophytic forest interbraid with oak-hickory forests, with mixed-mesophytic occurring in v-notches and coves (drainages) and oak-hickory on interfluves.

Uncharacteristic types (structure/composition/etc.) that may frequently occur today in this BpS include: non-native invasive species (plants, animals, insects, pathogens, etc.), deer herbivory (limiting species composition and structure), and historical fire suppression.

This forest type grades into Northeastern Interior Dry-Mesic Oak Forest (1303) - where this forest type grades into northern sites when soils are drier (shallower soils, sandier parent material), and as elevation is increased. In contrast the South-Central Interior Mesophytic Forest (1320) has gentler slopes with soils featuring a higher water holding capacity.

Issues or Problems

Though Küchler (1964) mapped and described this region as mixed-mesophytic, witness tree data (from early land surveys) and studies of old-growth forests suggest that mixed-oak forests were more abundant than mixed-mesophytic forests in many areas prior to European settlement (Beatley 1959, McCarthy et al. 1987, Abrams et al. 1995, Dyer 2001, McCarthy et al. 2001, Rentch et al. 2003). Delineating the potential boundaries of 'mixed-mesophytic' forest type today should recognize that this boundary is influenced by human management interactions: historic logging and high-grading, the absence of fire, deer populations (herbivory), and non-native invasive species (plants, animals, insects and disease).

Native Uncharacteristic Conditions

Tree of Heaven (*Ailanthus altissima*) is a significant invader in these sites, due to its ability to persist in fairly intact canopy as well as its high water demand (K. Brown, personal communication).

State and transition model

Ecosystem states

1. Reference State
(minimally-managed)

State 1 submodel, plant communities

1.1. *Liriodendron tulipifera* - *Tilia americana* var. *heterophylla* - *Aesculus flava* - *Acer saccharum* / (*Magnolia tripetala*) Forest

1.2. *Liriodendron tulipifera* - *Pinus strobus* - *Tsuga canadensis* - *Quercus rubra* / *Polystichum acrostichoides* Forest

State 1

Reference State (minimally-managed)

BpS Dominant and Indicator Species Symbol Scientific Name Common Name FAGR *Fagus grandifolia* American beech LITU *Liriodendron tulipifera* Tuliptree ACSA3 *Acer saccharum* Sugar maple TIAMH *Tilia americana* var. *heterophylla* American basswood QURU *Quercus rubra* Northern red oak JUNI *Juglans nigra* Black walnut CADE12 *Castanea dentata* American chestnut TSCA *Tsuga canadensis* Eastern hemlock

Disturbance Description The mixed-mesophytic forest type is fire regime class III, surface fires with return intervals 30-100yrs+ (Wade et al. 2000). Mixed severity fires will occur approximately every 500yrs opening the canopy with increased mortality. This effect may also be achieved by recurrent, severe insect defoliations or droughts. Straight-line winds or microbursts may cause blow-downs on a scale of 1 to 100ac. Due to the mesic nature of these forests, stand replacement fires happen very infrequently. Ice storm damage is a more common disturbance than fire in this system, and yet ice storm frequency directly feeds into fuel loading at these sites. The oaks found within this forest type are susceptible to Gypsy Moth, but these effects are not included in this model since it is a recent invasive. Another prominent current issue is Oak Decline, but its impact on reference conditions is not known. The reference state is a combination of several vegetation associations of the following systems as described by NatureServe(2007): • CES 202.887 South-Central Interior Mesophytic Forest • CES 202.373 Southern and Central Appalachian Cove Forest Due to the heterogeneity and the broadness of this provisional ecological site, the plant communities listed are not intended to cover every situation nor the full range of conditions and species. There are no transition pathways designated between the communities in the reference state because the differences in vegetation are more controlled by landscape position or inherent soil fertility than management or disturbance.

Community 1.1

***Liriodendron tulipifera* - *Tilia americana* var. *heterophylla* - *Aesculus flava* - *Acer saccharum* / (*Magnolia tripetala*) Forest**

The Northern Mixed Mesophytic Forest (CEGL005222) is representative of the South-Central Interior Mesophytic Forest system (CES202.887). It is found primarily in the Central Appalachians, Western Allegheny Plateau, and Cumberland Plateau ecoregions of the United States. Stands occur on cool, moist slopes and steep ravines or bottoms, most often in colluvium. The tree canopy is often tall, closed and contains a variety of tree

species, including *Acer saccharum*, *Fagus grandifolia*, *Fraxinus americana*, *Liriodendron tulipifera*, *Prunus serotina*, *Quercus alba*, and *Quercus rubra*. Trees indicative of the type include *Aesculus flava* and *Tilia americana* var. *heterophylla*. *Magnolia acuminata* occurs locally. *Acer rubrum* and *Betula lenta* may be common in areas with a more recent harvest history. Frequent vines and shrubs include *Aristolochia macrophylla*, *Asimina triloba*, *Carpinus caroliniana*, *Hamamelis virginiana*, *Lindera benzoin*, *Parthenocissus quinquefolia*, *Staphylea trifolia*, *Toxicodendron radicans*, *Vitis aestivalis* var. *bicolor*, and more locally *Magnolia tripetala*, *Cercis canadensis*, and *Rhododendron maximum*. The herbaceous layer is extremely rich, including *Actaea racemosa*, *Adiantum pedatum*, *Arisaema triphyllum*, *Asarum canadense*, *Botrychium virginianum*, *Caulophyllum thalictroides*, *Claytonia virginica*, *Cryptotaenia canadensis*, *Dicentra canadensis*, *Dryopteris marginalis*, *Erythronium americanum*, *Galium triflorum*, *Geranium maculatum*, *Hepatica nobilis* var. *acuta*, *Hydrophyllum canadense*, *Hydrophyllum virginianum*, *Osmorhiza* spp., *Laportea canadensis*, *Polystichum acrostichoides*, *Prosartes lanuginosa*, *Sanguinaria canadensis*, *Sedum ternatum*, *Tiarella cordifolia*, *Trillium erectum*, *Trillium grandiflorum*, *Viola canadensis*, and many others. Spring ephemeral herbs which bloom before tree leaf-out may be abundant. (Source: NatureServe 2007)

Community 1.2

Liriodendron tulipifera - Pinus strobus - Tsuga canadensis - Quercus rubra / Polystichum acrostichoides Forest

The Central Appalachian Acidic Cove Forest 9CEGL006304) is representative of the Central Appalachian Acidic Cove Forest system (CES202373). This community occurs at lower elevations, generally below 915 m (3000 feet), on the lower slopes and bottoms of ravines and coves. Sites may be underlain by bedrock or colluvial and alluvial deposits of various sedimentary or metasedimentary rocks, granitic rocks, or metabasalt. The overstory is codominated by variable mixtures of *Liriodendron tulipifera*, *Pinus strobus*, *Tsuga canadensis*, *Quercus rubra*, *Quercus velutina*, and *Quercus alba*. This forest generally has a moderate to strong evergreen component, but *Pinus strobus* varies from absent to widely scattered to codominant, and *Tsuga canadensis* has been greatly reduced in many areas by recent outbreaks of the hemlock woolly adelgid and may be restricted to the understory. Less frequent overstory associates include *Acer rubrum*, *Betula lenta*, *Carya tomentosa* (= *Carya alba*), *Carya glabra*, *Fagus grandifolia*, *Fraxinus americana*, *Nyssa sylvatica*, and *Quercus montana* (= *Quercus prinus*). The subcanopy is of variable cover and may include *Acer pensylvanicum*, *Acer rubrum*, *Amelanchier arborea*, *Cercis canadensis*, *Cornus florida*, *Ostrya virginiana*, *Oxydendrum arboreum*, *Nyssa sylvatica*, *Pinus strobus*, and *Tsuga canadensis*. The shrub layer is typically patchy or open and characterized by *Viburnum acerifolium*, *Rubus* spp., *Corylus americana*, *Hamamelis virginiana*, *Hydrangea arborescens*, *Ilex opaca*, and *Lindera benzoin*. The herb layer is usually patchy to moderately dense. Frequent patch-dominants include *Amphicarpaea bracteata*, *Dennstaedtia punctilobula*, *Eurybia divaricata*, and *Polystichum acrostichoides*. Other constant but low-cover herbs include *Botrychium virginianum*, *Desmodium nudiflorum*, *Dioscorea quaternata*, *Galium triflorum*, *Maianthemum racemosum* ssp. *racemosum*, *Medeola virginiana*, *Mitchella repens*, *Stellaria pubera*,

Viola hastata, and *Dryopteris intermedia*. (Source: NatureServe)

Dominant plant species

- northern red oak (*Quercus rubra*), tree
- white oak (*Quercus alba*), tree
- red maple (*Acer rubrum*), tree
- sugar maple (*Acer saccharum*), tree

Additional community tables

Table 5. Community 1.2 forest overstory composition

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

Table 6. Community 1.2 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

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

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

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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	05/21/2025

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:

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:**
