Ecological site F128XY500WV
Thermic Limestone And Dolomite 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.

MLRA notes

Major Land Resource Area (MLRA): 128X–Southern Appalachian Ridges and Valleys

MLRA 128, partially shown as the gray shaded area on the accompanying figure, falls into the East and Central Farming and Forest Region. This MLRA is in Tennessee (36 percent), Alabama (27 percent), Virginia (25 percent), and Georgia (12 percent). It makes up about 21,095 square miles (54,660 square kilometers).

Most of this MLRA is in the Tennessee Section of the Valley and Ridge Province of the Appalachian Highlands. The thin stringers in the western part of the area are mostly in the Cumberland Plateau Section of the Appalachian Plateaus Province of the Appalachian Highlands. A separate area of the MLRA in northern Alabama is in the Highland Rim Section of the Interior Low Plateaus Province of the Interior Plains. The western side of the area is dominantly hilly to very steep and is rougher and much steeper than the eastern side, much of which is rolling and hilly. Elevation ranges from 660 feet (200 meters) near the southern end of the area to more than 2,400 feet (730 meters) in the part of the area in the western tip of Virginia. Some isolated linear mountain ridges rise to nearly 4,920 feet (1,500 meters) above sea level.

The MLRA is highly diversified. It has many parallel ridges, narrow intervening valleys, and large areas of low, irregular hills. The bedrock in this area consists of alternating beds of limestone, dolomite, shale, and sandstone of early Paleozoic age. Ridgetops are capped with more resistant carbonate and sandstone layers, and valleys have been eroded into the less resistant shale beds. These folded and faulted layers are at the southernmost extent of the Appalachian Mountains. The narrow river valleys are filled with unconsolidated deposits of clay, silt, sand, and gravel.

Classification relationships

This site falls into the "Southern Limestone/Dolomite Valleys and Low Rolling Hills" ecoregional classification developed by the Environmental Protection Agency (Authors: Glenn Griffith, James Omernik, Sandra Azevedo).

The USGS-based Southeast GAP Analysis Project classifies this area under two major forest types: South-Central Interior Mesophytic Forest (CES202.887) and Southern Ridge and Valley/Cumberland Dry Calcareous Forest (CES202.457).

Ecological site concept

This PES constitutes a high percentage of this MLRA. This site is primarily forested with mixed hardwoods, currently dominated by oak and hickory. It is characterized by rolling topography with gently sloping to very steep upland hills. Ridges are typically wider and lower in elevation than other ridges in the MLRA. Some of the oldest and most highly leached soils of the MLRA occur on this ecological site.

*Some of this PES may eventually be incorporated into the already approved "Cherty Dolomite Uplands" ESD. Some of the limestone areas will support more calciphitic forest species than the more acidic dolomite derived soils.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Fagus grandifolia*
Shrub	(1) *Hydrangea quercifolia*
Herbaceous	Not specified

Physiographic features

This ecological site occurs on summits, shoulders, and backslopes on dissected uplands weathered from limestone and dolomite. The topography ranges from ridges to rolling hills.

This site can generate runoff to adjacent, downslope ecological sites. This site does not flood.

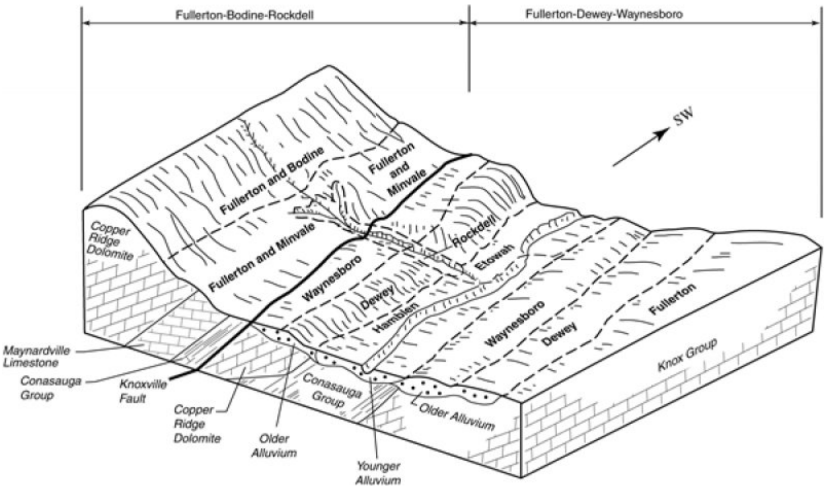


Figure 1. Block Diagram of Fullerton Soils

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Hill (3) Interfluve
Flooding frequency	None
Ponding frequency	None
Elevation	443–2,129 ft
Slope	0–70%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

This area falls under the humid, mesothermal climate classification (Thornwaite, 1948). Precipitation is fairly evenly distributed throughout the year, with little or no water deficiency during any season. The average annual precipitation in most of this area is 45 to 55 inches. It increases to the south. Maximum precipitation occurs in midwinter and midsummer, and the minimum occurs in autumn. Most rainfall occurs as high-intensity, convective thunderstorms. Snowfall may occur in winter. Average annual temperatures range from 46 to 70 degrees F, increasing to the south. The freeze-free period averages 205 days and is longest in the southern part of the area and shortest at higher elevations to the north. The growing season corresponds to climate. Local climate can be variable and microclimates factor into the distribution of plants. In general, topographic features such as slope aspect, landform, steepness, and position of the ridges and valleys are important site variables in the distribution of vegetation across the landscape (Martin, 1989).

Table 3. Representative climatic features

Frost-free period (average)	187 days
Freeze-free period (average)	213 days
Precipitation total (average)	55 in

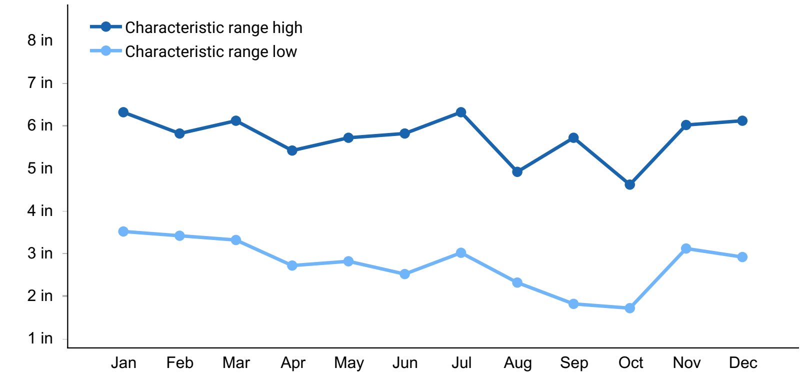


Figure 2. Monthly precipitation range

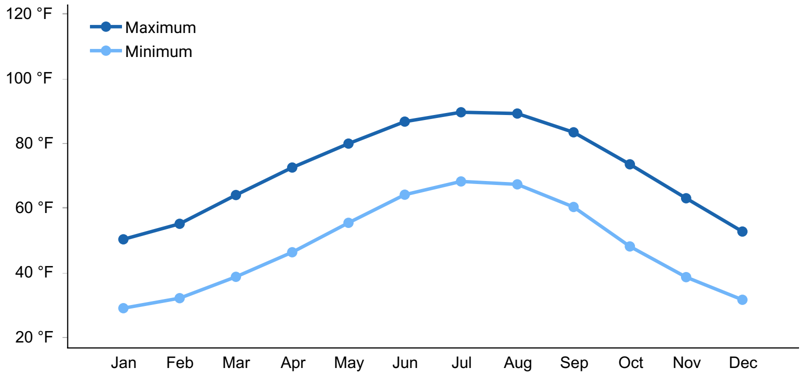


Figure 3. Monthly average minimum and maximum temperature

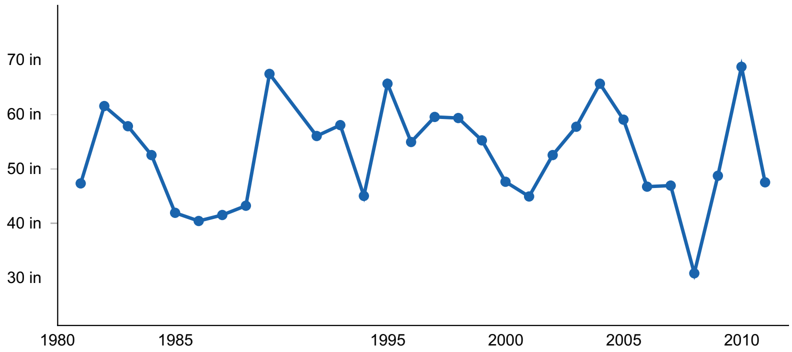


Figure 4. Annual precipitation pattern

Climate stations used

- (1) GADSDEN [USC00013154], Gadsden, AL
- (2) TALLADEGA [USC00018024], Talladega, AL
- (3) DALTON [USC00092493], Dalton, GA
- (4) KNOXVILLE MCGHEE TYSON AP [USW00013891], Alcoa, TN
- (5) ROME [USC00097600], Rome, GA
- (6) ATHENS [USC00400284], Athens, TN
- (7) CLEVELAND FLTR PLT [USC00401808], Charleston, TN
- (8) SEVIERVILLE [USC00408179], Kodak, TN

Influencing water features

This site is not influenced by water features.

Soil features

These soils formed primary in residuum or colluvium on uplands underlain by limestone or dolomite. The slopes range from 0 to 70 percent. They are moderately deep to very deep (20 to more than 60 inches) to bedrock, and are well to somewhat excessively drained. The available water capacity of these soils ranges from low to high. The depth to a seasonal high water table is more than 6 feet. They are not subject to flooding or ponding. The soil reaction ranges from extremely acid to slightly alkaline (pH from 3.5 to 7.8).

The soil series associated with this site are: Baxter, Bland, Bodine, Bradyville, Braxton, Claiborne, Clarksville, Collegedale, Decatur, Dellrose, Dewey, Dunmore, Fullerton, Minvale, Pailo, Talbott

Parent Material Kind: residuum, creep deposits, colluvium, alluvium

Parent Material Origin: chert; limestone and dolomite; limestone and shale; limestone, argillaceous; limestone, cherty; limestone, unspecified; sandstone and shale; sedimentary, unspecified

Table 4. Representative soil features

Parent material	(1) Residuum–chert (2) Creep deposits–dolomite (3) Colluvium–cherty limestone
Surface texture	(1) Gravelly loam (2) Stony clay loam (3) Very gravelly
Drainage class	Well drained to somewhat excessively drained
Permeability class	Very slow to very rapid
Soil depth	20–51 in
Surface fragment cover <=3"	0–60%
Surface fragment cover >3"	0–60%
Available water capacity (0-40in)	2.7–7.5 in
Soil reaction (1:1 water) (0-40in)	4.6–5.8
Subsurface fragment volume <=3" (Depth not specified)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0–30%

Ecological dynamics

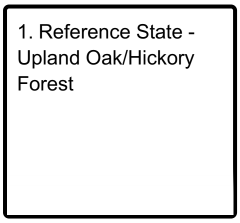
Most of the soil is cleared and used largely for growing hay and pasture. A few areas are used for growing corn, tobacco, cotton, and small grains. The native vegetation was mixed hardwood forest. Toward the south, a small acreage is in pine plantations.

This ecological site is of large extent.

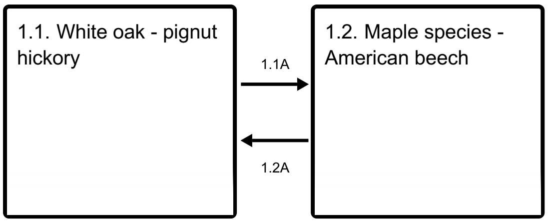
A VegBank NatureServe plot in Alabama classifies *Quercus alba* - *Fagus grandifolia* / *Hydrangea quercifolia* - *Viburnum acerifolium* / *Carex picta* - *Polystichum acrostichoides* Forest on a Decatur and Cumberland clay loams, 6 to 10 percent slopes, severely eroded mapunit. This is probably a good reference community. However, where soils are derived more from limestone and pH is higher, a more calcareous vegetation community may emerge. In such cases *Quercus muehlenbergii* - *Carya carolinae-septentrionalis* / Acer (barbatum, leucoderme) - *Juniperus* *virginiana* var. virginiana / *Croton alabamensis* Woodland would be more representative. DeSelm noted some barrens on this PES, probably where limestone rock outcrop occurs.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State - Upland Oak/Hickory Forest

The reference state for this ecological site is characterized by a closed-canopy hardwood forest dominated by oaks and hickories. In order for this reference state to be maintained, the oak/hickory species must be present in multiple age classes. In most cases red maple, sugar maple and American beech are colonizing the midstory and understory. A species composition shift toward these more mesophytic species is widely recognized throughout the eastern United States (McEwan et al., 2011). The reference state described here represents a condition dependent on complex, multiple disturbances, some of which are human caused. In order to get oak to succeed and recruit into the next stand, advanced oak regeneration must be present before a major canopy disturbance. Oaks must be able to reach a size that is competitive (through smaller-scale disturbances such as fire or herbicide of midstory, or tree planting with vigorous seedlings or saplings), then there needs to be a canopy disturbance. There may need to be additional disturbances to get rid of competition.

Community 1.1
White oak - pignut hickory

This phase is dominated by oaks and hickories in the overstory currently, but mid-story composition is shifting toward more shade and moisture-loving species. The understory is relatively rich in herbaceous diversity (including vines) but tree regeneration overwhelmingly favors the shade-tolerant species. For this phase to regenerate back to oak and hickory, numerous complex and site-specific factors may be necessary. These include acorn production, seedling establishment, advanced regeneration from seedlings, and timely release (Brose et al., 2013). Several types of management can be employed to this end including prescribed fire, mechanical and chemical competition control, site preparation, and planting. However, depending on the stand and its history, management for oak/hickory is typically intensive and often requires multiple treatments over time (~10 - 25 years), (Loftis, 2004). Without intensive management, in most cases, stands will naturally succeed to a more mesophytic forest type dominated by shade tolerant species (the maples and American beech). Dendroecology studies in nearby, very similar old-growth forest stands indicate that oak species have dominated stands for the past 300 years. They speculate that the recent proliferation of maples in the understory will inhibit regeneration of oak and pine under the current disturbance regime (Hart et al., 2012). Oak and hickory can regenerate in canopy gaps formed by uprooted trees, but only on very dry sites, indicating that gap-phase dynamics will favor maple overall (Hart and Kupfer, 2011). The American chestnut was an important part of this ecological site prior to decimation by the chestnut blight, but it is unclear how abundant it would have been. Colloquial estimates based on local names like "Chestnut Ridge" indicate that it may have been prolific. Sprouts from old chestnut stumps were noted often during field sampling. Sprouts rarely survive to flowering age, but can often reach as much as 8 inches diameter at breast height (DBH) before they succumb to the blight. Rarely, an American chestnut sprout will reach larger size classes and survive to flower.

Forest overstory. The overstory of this community is dominated by oak and hickory species, most commonly white oak and pignut hickory. Other species include tuliptree, black oak, northern red oak, chestnut oak, blackjack oak, shagbark hickory (Carya carolinae-septentrionalis), mockernut hickory (Carya alba), scarlet oak (Quercus coccinea) and blackgum (Nyssa sylvatica), among others.

Midstory species include sourwood (Oxydendrum arboreum), sassafras (Sassafras albidum), eastern redbud (Cercis canadensis), flowering dogwood (Cornus florida), Carolina buckthorn (Frangula caroliniana), and common serviceberry (Amelanchier arborea). Shade tolerant hardwoods are a natural part of the dynamic of this ecological site, but have become more dominant in the midstory of most stands than they might naturally be due to lack of disturbance over time. Shade tolerant species include American beech, sugar maple and red maple.

Please note that species are reported by height class. Some species occur in multiple height classes, and accordingly, have multiple entries.

Forest understory. Herbaceous diversity is high overall, but not as high as in other associated ecological sites (not yet described). Occurrence and abundance vary based on topography and are lowest on ridges and south-facing shoulders and side slopes and highest on lower north-facing side slopes. Commonly occurring species include feathery false lily of the valley (Maianthemum racemosum), littlebrownjug (Hexastylis arifolia), mayapple (Podophyllum peltatum), cutleaf toothwort (Cardamine concatenata), the bellworts (Uvularia spp.), American cancer root (Conopholis americana), trefoil (Desmodium spp.), jack in the pulpit (Arisaema triphyllum), sweet cicely (Osmorhiza spp.), trailing arbutus (Epigaea repens), the violets (Viola spp.), wood sorrel (Oxalis montana), black cohosh (Actaea racemosa), forest licorice bedstraw (Calium circaezans), and yellow wakerobin (Trillium luteum).

Native vines are important in this ecological site; although, it is unclear how much disturbance plays a role in their abundance. Poison ivy (Toxicodendron radicans), for example, tends to do better in disturbed areas and can often be an indication of a past disturbance, such as grazing, if found in proliferation. Other important vines include greenbriar (Smilax spp.), muscadine (Vitis rotundifolia), Virginia creeper (Parthenocissus quinquefolia), and crossvine (Bignonia capreolata).

Table 5. Soil surface cover

Tree basal cover	3-5%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0%
Litter	60-89%
Surface fragments >0.25" and <=3"	0-5%
Surface fragments >3"	2-15%
Bedrock	0%
Water	0%
Bare ground	0%

Table 6. Woody ground cover

Downed wood, fine-small (<0.40" diameter; 1-hour fuels)	0-5%
Downed wood, fine-medium (0.40-0.99" diameter; 10-hour fuels)	0-5%
Downed wood, fine-large (1.00-2.99" diameter; 100-hour fuels)	0-7%
Downed wood, coarse-small (3.00-8.99" diameter; 1,000-hour fuels)	0-7%
Downed wood, coarse-large (>9.00" diameter; 10,000-hour fuels)	0-6%
Tree snags** (hard***)	–

Tree snags** (soft***)	–
Tree snag count** (hard***)	0-10 per acre
Tree snag count** (hard***)	0-20 per acre

*** Decomposition Classes: N - no or little integration with the soil surface; I - partial to nearly full integration with the soil surface.**

**** >10.16cm diameter at 1.3716m above ground and >1.8288m height--if less diameter OR height use applicable down wood type; for pinyon and juniper, use 0.3048m above ground.**

***** Hard - tree is dead with most or all of bark intact; Soft - most of bark has sloughed off.**

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	11-20%	0-1%	0-5%
>0.5 <= 1	–	1-20%	0-2%	1-5%
>1 <= 2	–	0-5%	–	–
>2 <= 4.5	1-5%	1-5%	–	–
>4.5 <= 13	1-5%	1-5%	–	–
>13 <= 40	2-25%	–	–	–
>40 <= 80	2-45%	–	–	–
>80 <= 120	30-75%	–	–	–
>120	20-30%	–	–	–

Community 1.2
Maple species - American beech

This community phase has not yet been attained in most cases because forests currently dominated by oaks and hickories are in transition. Without management or large-scale disturbance, stands will naturally succeed to more mesophytic species composition in the overstory and the oaks and hickories will lose their dominance over time. Small-scale gap dynamics caused by tree throws would likely be a natural part of this state and would favor the maple component in forest stands (Hart et al. 2012). A recent study of red maple on the nearby Cumberland Plateau found that canopy accession strategy and climate-growth relationships are critical factors in the shift from state 1.1 to state 1.2 (Hart et al., 2012). Red maples are gap-opportunists and can take advantage of smaller-scale disturbances such as tree-throws. Oaks in contrast, seem to have needed high frequency, intense disturbances to establish their current dominance in the forest. Red maples do best in times of cool, wet springs preceded by wet autumns and warm winters (Hart et al. 2012). Depending on climate conditions in the coming years, the weather may or may not favor their continued establishment. Red maple might also cause local environmental changes that facilitate perpetuation of favorable conditions for regeneration such as modification of understory light levels and soil characteristics (Nowacki and Abrams 2008). The denser canopies might reduce understory temperature and increase relative humidity, which would also favor the more shade-tolerant, moisture loving state (Alexander and Arthur 2010). Prescribed fire has been suggested as a management tool to reverse the trend. While it may be a useful tool in some cases and most likely in combination with other management approaches, using fire alone is unlikely to produce the desired results in most stands (Clark and Schweitzer 2013).

Forest overstory. The forest overstory is dominated by mature maples and American beech. Tree throws create small-scale gap dynamics in the forest, which favor recruitment of the maples and in some cases, yellow poplar. Oaks and hickories will always be a part of the species composition in this state, but will not be dominant.

Forest understory. Forest understory composition will be similar to community phase 1.1, dominated by native herbs, forbs, and vines. Shade tolerant trees will be present in the regeneration. Spring ephemeral wildflowers will be prolific in places.

Pathway 1.1A
Community 1.1 to 1.2

Time (typically >100 years) with little or no large-scale disturbance will favor shade tolerant, late successional species including sugar maple, red maple and American beech.

Pathway 1.2A
Community 1.2 to 1.1

Establishment of advanced oak regeneration (natural or planted) is critical to recruiting oak back into the overstory. If that is desirable, a combination of natural and managed steps will likely be required to favor oak. Depending on the residual stand, management recommendations might include timber stand improvement, mechanical or chemical treatment of unwanted species, and prescribed fire. Consultation with a professional forester is recommended prior to implementation of any management practice, especially the use of prescribed fire. Arthur et al. (2012) discusses conditions when fire should and should not be used in oak management.

Conservation practices

Prescribed Burning
Tree/Shrub Site Preparation
Tree/Shrub Establishment
Upland Wildlife Habitat Management
Forest Trails and Landings
Forest Stand Improvement
Fuel Break
Forest Management Plan - Written
Forest Management Plan - Applied

Additional community tables

Table 8. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
pignut hickory	CAGL8	*Carya glabra*	Native	30–65	5–50	4.2–20	–
white oak	QUAL	*Quercus alba*	Native	50–100	1–50	7–32.1	–
tuliptree	LITU	*Liriodendron tulipifera*	Native	50–85	1–40	9.6–22.5	–
northern red oak	QURU	*Quercus rubra*	Native	50–100	5–25	21–27	–
sugar maple	ACSA3	*Acer saccharum*	Native	20–60	10–25	3.4–25	–
sourwood	OXAR	*Oxydendrum arboreum*	Native	20–40	5–20	4.3–9.5	–
black oak	QUVE	*Quercus velutina*	Native	50–105	1–20	9.8–25	–
American beech	FAGR	*Fagus grandifolia*	Native	40–80	6–20	6.5–23.4	–
red maple	ACRU	*Acer rubrum*	Native	20–50	1–10	2–25	–
blackgum	NYSY	*Nyssa sylvatica*	Native	20–45	1–5	2.6–13.2	–
sassafras	SAAL5	*Sassafras albidum*	Native	5–20	0–2	3.8–4.2	–
eastern redcedar	JUVI	*Juniperus virginiana*	Native	5–20	0–1	0–2.9	–

Table 9. Community 1.1 forest understory composition

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

Common Name	Symbol	Scientific Name	Nativity	(Ft)	(%)
Grass/grass-like (Graminoids)					
panicgrass	PANIC	*Panicum*	Native	0–0.5	0–1
Forb/Herb					
littlebrownjug	HEAR6	*Hexastylis arifolia*	Native	0–0.5	1–5
mayapple	POPE	*Podophyllum peltatum*	Native	0–1	1–5
feathery false lily of the valley	MARAR	*Maianthemum racemosum ssp. racemosum*	Native	0–1	1–2
sweetroot	OSMOR	*Osmorhiza*	Native	0–1	0–1
mountain woodsorrel	OXMO	*Oxalis montana*	Native	0–0.3	0–1
Jack in the pulpit	ARTR	*Arisaema triphyllum*	Native	0–0.5	0–1
ticktrefoil	DESMO	*Desmodium*	Native	0–0.5	0–1
cankerweed	PRSE	*Prenanthes serpentaria*	Native	1–2	0–1
trillium	TRILL	*Trillium*	Native	0–0.5	0–1
bellwort	UVULA	*Uvularia*	Native	0–0.5	0–1
violet	VIOLA	*Viola*	Native	0–0.5	0–1
trailing arbutus	EPRE2	*Epigaea repens*	Native	0–0.1	0–1
licorice bedstraw	GACI2	*Galium circaezans*	Native	0–0.5	0–1
black bugbane	ACRAR	*Actaea racemosa var. racemosa*	Native	0–1	0–1
Fern/fern ally					
Christmas fern	POAC4	*Polystichum acrostichoides*	Native	0–2	1–3
Shrub/Subshrub					
paper mulberry	BRPA4	*Broussonetia papyrifera*	Introduced	1–13	0–1
farkleberry	VAAR	*Vaccinium arboreum*	Native	0.5–1	0–1
farkleberry	VAAR	*Vaccinium arboreum*	Native	1–2	0–1
farkleberry	VAAR	*Vaccinium arboreum*	Native	2–4.5	0–1
farkleberry	VAAR	*Vaccinium arboreum*	Native	4.5–13	0–1
red buckeye	AEPA	*Aesculus pavia*	Native	1–4	0–1
Chinese privet	LISI	*Ligustrum sinense*	Introduced	0–0.5	0–1
Tree					
red maple	ACRU	*Acer rubrum*	Native	0–0.5	1–10
eastern redbud	CECA4	*Cercis canadensis*	Native	0–0.5	1–5
eastern redbud	CECA4	*Cercis canadensis*	Native	4.5–13	1–5
sugar maple	ACSA3	*Acer saccharum*	Native	1–2	1–5
sugar maple	ACSA3	*Acer saccharum*	Native	2–4.5	1–5
sugar maple	ACSA3	*Acer saccharum*	Native	4.5–13	1–5
red maple	ACRU	*Acer rubrum*	Native	4.5–13	1–4
black oak	QUVE	*Quercus velutina*	Native	1–2	2–4
American beech	FAGR	*Fagus grandifolia*	Native	2–4	2–4
pignut hickory	CAGL8	*Carya glabra*	Native	4.5–13	1–3
pignut hickory	CAGL8	*Carya glabra*	Native	0–0.5	1–3
sugar maple	ACSA3	*Acer saccharum*	Native	0–0.5	1–3
sugar maple	ACSA3	*Acer saccharum*	Native	0.5–1	1–2
white ash	FRAM2	*Fraxinus americana*	Native	0.5–1	1–2
pignut hickory	CAGL8	*Carya glabra*	Native	1–2	0–2

pignut hickory	CAGL8	*Carya glabra*	Native	1–2	0–2
American beech	FAGR	*Fagus grandifolia*	Native	4.5–13	1–2
sourwood	OXAR	*Oxydendrum arboreum*	Native	0–0.5	0–2
American beech	FAGR	*Fagus grandifolia*	Native	0.5–1	1–2
blackgum	NYSY	*Nyssa sylvatica*	Native	4.5–13	1–2
common hackberry	CEOC	*Celtis occidentalis*	–	0.5–1	0–1
pawpaw	ASTR	*Asimina triloba*	Native	5–13	0–1
white oak	QUAL	*Quercus alba*	Native	0–0.5	0–1
American beech	FAGR	*Fagus grandifolia*	Native	1–2	0–1
black cherry	PRSE2	*Prunus serotina*	Native	0–0.5	0–1
elm	ULMUS	*Ulmus*	Native	5–13	0–1
sourwood	OXAR	*Oxydendrum arboreum*	Native	0.5–1	0–1
red maple	ACRU	*Acer rubrum*	Native	0.5–1	0–1
red maple	ACRU	*Acer rubrum*	Native	1–2	0–1
red maple	ACRU	*Acer rubrum*	Native	2–4.5	0–1
sweetgum	LIST2	*Liquidambar styraciflua*	Native	0–0.5	0–1
sourwood	OXAR	*Oxydendrum arboreum*	Native	2–4.5	0–1
sourwood	OXAR	*Oxydendrum arboreum*	Native	4.5–13	0–1
sassafras	SAAL5	*Sassafras albidum*	Native	0–0.5	0–1
sassafras	SAAL5	*Sassafras albidum*	Native	0.5–1	0–1
sassafras	SAAL5	*Sassafras albidum*	Native	1–2	0–1
sassafras	SAAL5	*Sassafras albidum*	Native	2–4.5	0–1
black oak	QUVE	*Quercus velutina*	Native	0–0.5	0–1
black oak	QUVE	*Quercus velutina*	Native	0.5–1	0–1
blackgum	NYSY	*Nyssa sylvatica*	Native	0–0.5	0–1
pignut hickory	CAGL8	*Carya glabra*	Native	2–4.5	0–1
white ash	FRAM2	*Fraxinus americana*	Native	1–2	0–1
white ash	FRAM2	*Fraxinus americana*	Native	2–4.5	0–1
flowering dogwood	COFL2	*Cornus florida*	Native	1–2	0–1
flowering dogwood	COFL2	*Cornus florida*	Native	2–4.5	0–1
northern red oak	QURU	*Quercus rubra*	Native	0–0.5	0–1
tuliptree	LITU	*Liriodendron tulipifera*	Native	0–0.5	0–1
tuliptree	LITU	*Liriodendron tulipifera*	Native	0.5–1	0–1
tuliptree	LITU	*Liriodendron tulipifera*	Native	1–2	0–1
yellow buckeye	AEFL	*Aesculus flava*	Native	2–4.5	0–1
flowering dogwood	COFL2	*Cornus florida*	Native	0–0.5	0–1
flowering dogwood	COFL2	*Cornus florida*	Native	0.5–1	0–1
sweetgum	LIST2	*Liquidambar styraciflua*	Native	1–2	0–1
sweetgum	LIST2	*Liquidambar styraciflua*	Native	2–4.5	0–1
white ash	FRAM2	*Fraxinus americana*	Native	0–0.5	0–1
Carolina buckthorn	FRCA13	*Frangula caroliniana*	Native	4.5–13	0–1
slippery elm	ULRU	*Ulmus rubra*	Native	0.5–2	0–1
Vine/Liana					
muscadine	VIRO3	*Vitis rotundifolia*	Native	0–2	1–5

Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	0–13	1–3
Japanese honeysuckle	LOJA	*Lonicera japonica*	Introduced	0–1	0.5–2
greenbrier	SMILA2	*Smilax*	Native	0–5	1–2
crossvine	BICA	*Bignonia capreolata*	Native	0–5	1–2
Oriental bittersweet	CEOR7	*Celastrus orbiculatus*	Introduced	0–1	0–1
winter creeper	EUFO5	*Euonymus fortunei*	Introduced	0–1	0–1
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	0–13	0–1
Nonvascular					
American cancer-root	COAM	*Conopholis americana*	Native	0–0.5	1–5

Contributors

Belinda Esham Ferro

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	
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:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state**

for the ecological site:

17. **Perennial plant reproductive capability:**