Ecological site F134XY011MO
Sandy Protected Backslope Forest

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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): 134X–Southern Mississippi Valley Loess

The Southern Mississippi Valley Loess (outlined in red on the map; northern portion only) is a relatively narrow strip of the coastal plain bordering the Mississippi River valley, that is blanketed with loess. The northern part of this MLRA, discussed here, is locally referred to as Crowley's Ridge. Elevation ranges from about 300 feet on the footslopes to nearly 600 feet on the highest ridges. Loess caps the summits and upper slopes, and Pliocene-aged sand and gravel deposits of the coastal plain influence soils on lower, steeper slopes.

Classification relationships

Terrestrial Natural Community Type in Missouri (Nelson, 2010):
The reference state for this ecological site is most similar to a Dry-Mesic Sand Forest.

Missouri Department of Conservation Forest and Woodland Communities (Missouri Department of Conservation, 2006):
The reference state for this ecological site is most similar to a Mixed Oak Forest.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to a Quercus stellata - Quercus velutina - Quercus alba -

(Quercus falcata) / Croton Michauxii Sand Woodland (CEGL002396).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This Ecological Site occurs in the Crowley's Ridge Subsection.

Ecological site concept

Sandy Protected Backslope Forests are within the green areas on the map (Missouri portion only; distributions farther south are currently under review). They occupy the northerly and easterly aspects of steep, dissected slopes, and are mapped in complex with the Sandy Exposed Backslope Woodland ecological site. These sites are on the easternmost uplands of Crowley's Ridge in Stoddard and Dunklin counties, Missouri. They are directly downslope from Loess Backslope ecological sites, and are mapped in complex with them. Soils are very deep and sandy. The reference plant community is forest dominated by white oak and northern red oak, with minor amounts of beech, tulip poplar and bitternut hickory.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus pagoda*
Shrub	(1) *Euonymus americanus* (2) *Asimina triloba*
Herbaceous	(1) *Epifagus virginiana* (2) *Osmunda cinnamomea*

Physiographic features

This site is on upland backslopes, with slopes of 15 to 35%. It is on protected aspects (north, northeast, and east), which receive significantly less solar radiation than the exposed aspects. The site receives runoff from upslope summit and shoulder sites, and generates runoff to adjacent, downslope ecological sites. This site does not flood.

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Slope	15–35%
Aspect	N, NE, E

Climatic features

The Crowley's Ridge subsection of the Southern Mississippi Valley Loess MLRA has a continental type of climate marked by strong seasonality. In winter, dry-cold air masses, unchallenged by any topographic barriers, periodically swing south from the northern plains and Canada. If they invade reasonably humid air, snowfall and rainfall result. In summer, moist, warm air masses, equally unchallenged by topographic barriers, swing north from the Gulf of America and can produce abundant amounts of rain, either by fronts or by convectional processes. In some summers, high pressure stagnates over the region, creating extended droughty periods. Spring and fall are transitional seasons when abrupt changes in temperature and precipitation may occur due to successive, fast-moving fronts separating contrasting air masses.
The Crowley's Ridge subsection experiences regional differences in climates, but these differences do not have obvious geographic boundaries or major climatic variations. Regional climates grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line from north to south. Both mean annual temperature and precipitation exhibit minor gradients along this line.
The average annual precipitation in Crowley's Ridge subsection is 48 to 50 inches. The average annual temperature is 53 to 57 degrees F. Mean January minimum temperature follows the north-to-south gradient. Mean July maximum temperatures show little variation across the area.
Mean annual precipitation varies along the same gradient as temperature. The precipitation decreases gradually

throughout the summer, except for a moderate increase in midsummer as high-intensity, convective thunderstorms. Minor amounts of snow fall occur nearly every winter, but the snow cover lasts for only a few days.
During years when precipitation comes in a fairly normal manner, moisture is stored in the top layers of the soil during the winter and early spring, when evaporation and transpiration are low. During the summer months the loss of water by evaporation and transpiration is high, and if rainfall fails to occur at frequent intervals, drought will result. Drought directly affects plant and animal life by limiting water supplies, especially at times of high temperatures and high evaporation rates.
Superimposed upon the basic subsection climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. In regions of appreciable relief, for example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Slope orientation is an important topographic influence on microclimate. Summits and south-and-west-facing slopes are regularly warmer and drier than adjacent north- and-east-facing slopes. Finally, the climate within a canopied forest is measurably different from the climate of a more open grassland or savanna areas.

Source: University of Missouri Climate Center - http://climate.missouri.edu/climate.php; Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin, United States Department of Agriculture Handbook 296 - http://soils.usda.gov/survey/geography/mlra/

Table 3. Representative climatic features

Frost-free period (characteristic range)	167-182 days
Freeze-free period (characteristic range)	198-215 days
Precipitation total (characteristic range)	46-47 in
Frost-free period (actual range)	163-186 days
Freeze-free period (actual range)	193-220 days
Precipitation total (actual range)	45-47 in
Frost-free period (average)	175 days
Freeze-free period (average)	207 days
Precipitation total (average)	46 in

Climate stations used

- (1) MALDEN MUNI AP [USC00235207], Malden, MO
- (2) ADVANCE 1 S [USW00093825], Advance, MO

Influencing water features

Soil features

These soils have acidic subsoils that are low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is coastal plain sediments. They are sandy throughout. These soils are not affected by seasonal wetness. Soil series associated with this site include Eustis.

Table 4. Representative soil features

Surface texture	(1) Fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%

Available water capacity (0-40in)	3 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	4.5–5.5
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

In this region dominated by historic fire-prone prairies, savannas and open woodlands, Alfic Chert Protected Backslope Forests occur in the most protected landscape positions on lower, steep slopes in the deeper valleys furthest from the prairie uplands. While the upland prairies and savannas had an estimated fire frequency of 1-3 years, Alfic Chert Protected Backslope Forests burned less frequently (estimated 5-20 years) and with lower intensity.

The composition and structure of the Alfic Chert Backslopes varies in relation to slope aspect. Exposed, south and west facing slopes are more droughty and fire-prone than are the protected north and east facing slopes, which are relatively cool and moist. Consequently, a separate Ecological Site is recognized on the exposed aspects (Alfic Chert Exposed Backslope Woodlands), which forms a complex with the Protected Backslope Forests. These two ecological sites intergrade on neutral, northwest and southeast exposures.

The north and east facing slopes of the Alfic Chert Protected Backslope Forests have a well-developed forest canopy and subcanopy dominated by white oak with an abundant forest ground flora.

Historically, grazing by native herbivores and periodic fires kept understory conditions more open. In addition, Alfic Chert Protected Backslope Forests are subject to occasional disturbances from wind and ice, which periodically open the canopy up by knocking over trees or breaking substantial branches of canopy trees. The role of wind and ice in this region has been apparent during the early 2000s. Such canopy disturbances allow more light to reach the ground and favor reproduction of the dominant oak species.

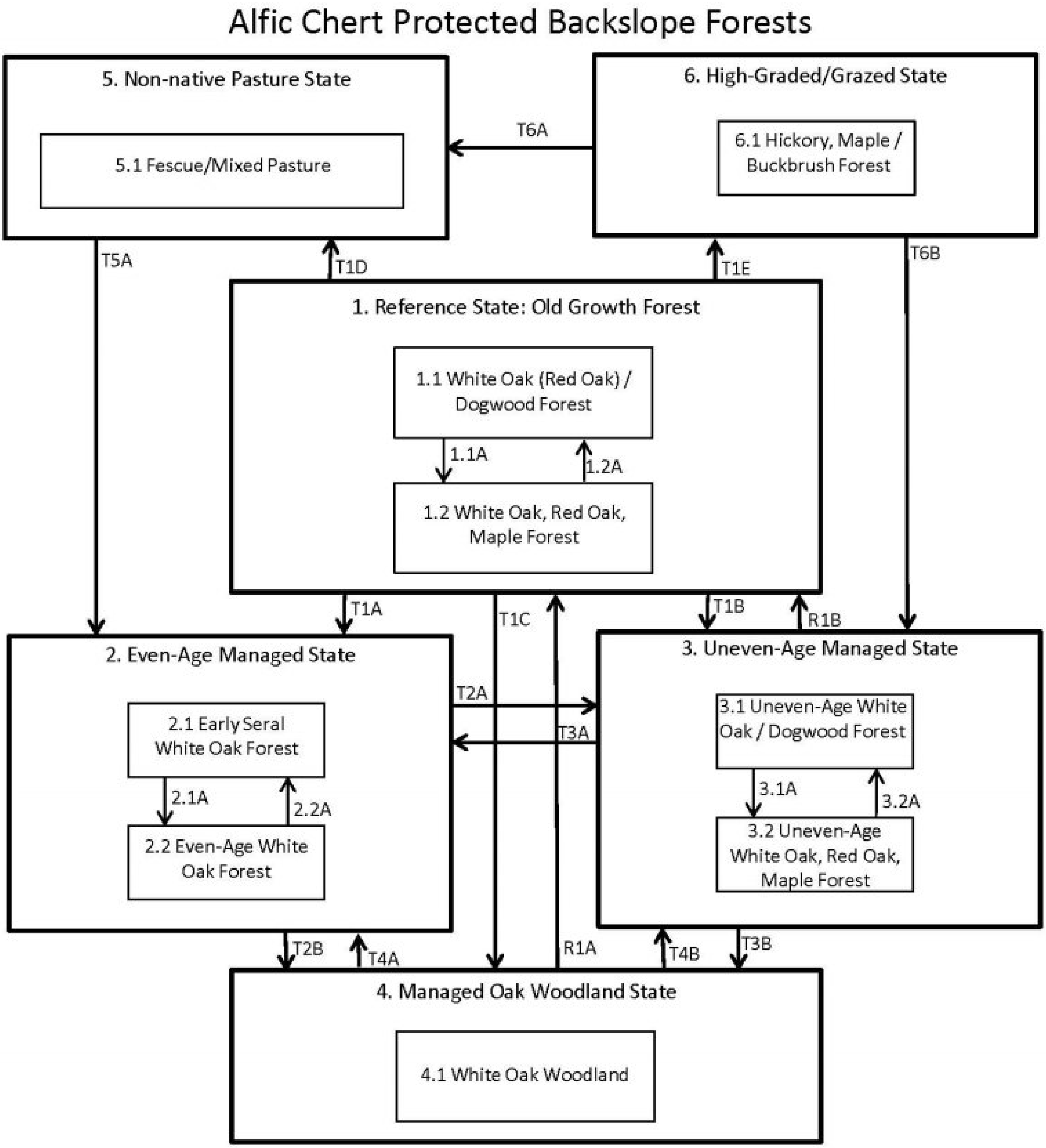
Today, these communities have either been cleared and converted to pasture, or have undergone repeated timber harvest and domestic grazing. Most existing occurrences have a younger (50-80 years) canopy layer whose composition may have been altered by timber harvesting practices. An increase in hickories over historic conditions is common. In addition, in the absence of fire, the canopy, sub-canopy and woody understory layers are better developed. The absence of periodic fire may have allowed more shade-tolerant tree species, such as sugar maple, white ash, or hickories to increase in abundance.

Domestic grazing has also diminished the diversity and cover of woodland ground flora species, and has often introduced weedy species such as gooseberry, buckbrush, poison ivy and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and erosion related to grazing can lower productivity.

Alfic Chert Protective Backslope Forests are productive timber sites in. Timber harvest in this region typically is done using single-tree selection, and often results in removal of the most productive trees, or high-grading of the stand. This can result in poorer quality timber and a shift in species composition away from more valuable oak species. Carefully planned single tree selection or the creation of group openings can help regenerate more desirable oak species and increase vigor on the residual trees. Clear-cutting does occur and results in dense, even-aged stands of primarily oak. This may be most beneficial for existing stands whose composition has been highly altered by past management practices. However, without some thinning of the dense stands, the ground flora diversity can be shaded out and productivity of the stand may suffer.

Prescribed fire can play a beneficial but limited role in the management of this ecological site. The higher productivity of these sites makes it more challenging than on other forest sites in the region. Control of woody species will be more difficult. Protected aspect forests did evolve with some fire, but their composition often reflects more closed, forested conditions, with fewer woodland ground flora species that can respond to fire. Consequently, while having protected aspects in a burn unit is acceptable, targeting them solely for woodland restoration is not advisable.

State and transition model



Code	Practice
T1A	Fire suppression; clearcut; even-age mgt
T1B	Fire suppression; single tree selection; uneven-age mgt
T1C, T2B, T3B	Prescribed fire
T1D, T6A	Clearing & pasture planting
T1E	Poorly planned harvest & grazing
T2A, T4B	Uneven-age mgt
T3A, T4A	Even-age mgt
T5A	Tree planting; long-term succession
T6B	Uneven-age mgt; tree planting
R1A	Extended rotations
R1B	Uneven-age mgt, extended rotations

Code	Practice
1.1A, 2.1A, 3.1A	No disturbance
1.2A	Disturbance
2.2A	Even-age mgt.
3.2A	Uneven-age mgt.

State 1
Reference State: Old Growth Forest

The historical reference state for this Ecological Site was old growth oak forest. The Old Growth Forest was dominated by white oak. Maximum tree age was likely 150-300 years. Periodic disturbances from fire, wind or ice maintained the dominance of white oak by opening up the canopy and allowing more light for white oak reproduction. Long disturbance-free periods allowed an increase in more shade tolerant species. Two community phases are recognized in the Old Growth Forest state, with shifts between phases based on disturbance frequency. Old Growth Forests are very rare today. Many sites have been converted to non-native pasture (State #5). Others have been subject to repeated, high-graded timber harvest coupled with domestic livestock grazing (State #6). Fire suppression has resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Many Old Growth Forests have been managed effectively for timber harvest, resulting in either even-age (State 2) or uneven-age (State 3) forests.

Community 1.1
White Oak (Red Oak) / Dogwood Forest

This community is one of the more productive upland forests in the MLRA. While the overstory is dominated by white oak, red oak and black gum can also be common. This forest community has a multi-tiered structure, and a canopy that is 75-100 feet tall with 80-100 % closure. The sub-canopy and understory are well developed, with flowering dogwood as a dominant understory tree and sapling. A moderate abundance of shade tolerant forest generalists, such as may apple, Christmas fern, tick trefoil and white snakeroot, cover the ground. Periodic disturbances, including fire, ice and wind create canopy gaps, allowing white oak to successfully reproduce and enter the canopy. In the absence of disturbance, more shade tolerant species such as red oak, sugar maple, hickory, white ash and others increase in importance and add structural diversity to the system. In addition, more shade-loving forest shrub (e.g., spicebush) and herbaceous (e.g., bloodroot) species also increase. Over time, these gradual species changes result in a community phase transition to the White Oak, Red Oak, Maple Forest (Community Pathway 1.1A to Community Phase 1.2 on the State & Transition Diagram). Long-term catastrophic disturbances may have replaced the entire canopy every 300 or more years, allowing the oaks to once again regain prominence.

Community 1.2
White Oak, Red Oak, Maple Forest

This community is one of the more productive upland forests in the MLRA. The overstory is a mixture of white oak and more shade tolerant species such as red oak, sugar maple, hickory, white ash and others. This forest community has a multi-tiered structure, and a canopy that is 75-100 feet tall with 90-100 % closure. An abundance of shade tolerant forest generalists, such as may apple, Christmas fern, tick trefoil and white snakeroot, cover the ground. In addition, more shade-loving forest shrub (e.g., spicebush) and herbaceous (e.g., bloodroot) species are common. Periodic disturbances, including fire, ice and wind create canopy gaps, allowing white oak to successfully reproduce and enter the canopy. Over time, these disturbance events result in a community phase transition to the White Oak (Red Oak / Dogwood Forest (Community Pathway 1.2A to Community Phase 1.1 on the State & Transition Diagram).

Pathway 1.1A
Community 1.1 to 1.2

This forest community is on protected, north and east facing slopes. It has a multi-tiered structure, with irregular, variable canopy closure.

Pathway 1.2A
Community 1.2 to 1.1

This pathway results from ecological disturbances such as fire, ice storms, or violent wind storms. Historically, native grazers such as bison provided disturbance events as well.

State 2
Even-Aged Managed State

This state starts with a sequence of early seral white oak forests, which mature over time. These forests tend to be rather dense, with a depauperate understory and ground flora. Thinning can increase overall tree vigor and improve understory diversity. Continual timber management, depending on the practices used, will either maintain this state, or convert the site to uneven-age (State 3) woodlands. Prescribed fire without extensive timber harvest will, over time, cause a transition to Managed Oak Woodlands (state 4).

Community 2.1
Early Seral White Oak Forest

This forest community has a simple, dense, single-tiered structure, with canopy height that varies with age, and 100% canopy closure. The understory and ground flora is depauperate. Thinning can increase overall tree vigor and improve understory diversity. However, in the absence of fire, the diversity and cover of the ground flora is still diminished. If the community is not subject to disturbance, it will mature over time and transition into a Even-Age White Oak Forest community (Community Pathway 2.1A to Community Phase 2.2 on the State & Transition Diagram).

Community 2.2
Even-Age White Oak Forest

This forest community has a single-tiered structure, with canopy height that varies with age, and 80-100% canopy closure. The understory and ground flora is depauperate. Thinning can increase overall tree vigor and improve understory diversity. However, in the absence of fire, the diversity and cover of the ground flora is still diminished. Clearcutting or catastrophic disturbance will cause a transition to the Early Seral White Oak Forest community (Community Pathway 2.2A to Community Phase 2.1 on the State & Transition Diagram).

Pathway 2.1A
Community 2.1 to 2.2

This pathway is a gradual transition that results from limited disturbance for 60-90 years.

Pathway 2.2A
Community 2.2 to 2.1

This pathway typically results from even-age forestry management techniques such as clear-cutting. It can also result from catastrophic events such as severe ice or wind storms.

State 3
Uneven-Age Managed State

Uneven-Age Managed forests resemble their Reference State (Old Growth Forests). The biggest difference is tree age, most being only 50-90 years old. Composition is also likely altered from the reference state depending on tree selection during harvest. In addition, without a regular 15-20 year harvest re-entry into these stands, they will slowly increase in more shade tolerant species and white oak will become less dominant.

Community 3.1
Uneven-Age White Oak / Dogwood Forest

This forest community has a multi-tiered structure, and 80-100% canopy closure. If the community is not subject to disturbance, it will mature over time and transition into an Uneven-Age White Oak, Red Oak, Maple Forest community (Community Pathway 3.1A to Community Phase 3.2 on the State & Transition Diagram).

Community 3.2
Uneven-Age White Oak, Red Oak, Maple Forest

This forest community has a multi-tiered structure, and 90-100% canopy closure. If the community is subject to periodic selective timber harvest or other patchy disturbance events, it will transition into an Uneven-Age White Oak / Dogwood Forest community (Community Pathway 3.2A to Community Phase 3.1 on the State & Transition Diagram).

Pathway 3.1A
Community 3.1 to 3.2

This pathway is a gradual transition that results from extended, disturbance-free periods of roughly 50 years or longer.

Pathway 3.2A
Community 3.2 to 3.1

This pathway typically results from uneven-age forestry management techniques such as selective cutting, with a 15 year rotation and a maximum timber tree age of 120 years.

State 4
Managed Oak Woodland State

The Managed Oak Woodland State results from managing forest communities on protected aspects in States 1, 2 or 3 with prescribed fire, over time. This condition likely existed historically during extremely droughty times. However, woodland management on protected slopes will be challenging because of the productivity of the tree species on these sites. While inclusion of protected aspects in a woodland management unit is acceptable, singling out these historically forested sites for woodland management is undesirable.

Community 4.1
White Oak Woodland

: This woodland community has a single to two-tiered structure, and 70-90% canopy closure.

State 5
Non-native Pasture State

Type conversion of forests to planted, non-native pasture species such as tall fescue has been common in this area. Steep slopes, abundant surface fragments, low organic matter contents and soil acidity make non-native pastures difficult to maintain in a healthy, productive state on this ecological site. If grazing and active pasture management are discontinued, the site will eventually transition to State 2 (Even-Age). Timber Stand Improvement practices can hasten this process.

Community 5.1
Fescue / Mixed Pasture

This is an herbaceous community that is typically dominated by tall fescue. Various other grass and forb species are typically present, in various amounts. Shrub and pioneer tree species such as eastern redcedar and black locust typically invade sites that are not regularly managed.

State 6
High-Graded / Grazed State

Timbered sites subjected to repeated, high-graded timber harvests and domestic grazing transition to this State. This state exhibits an over-abundance of hickory and other less desirable tree species, and weedy understory species such as buckbrush, gooseberry, poison ivy and Virginia creeper. The vegetation offers little nutritional value for cattle, and excessive stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff. Exclusion of cattle from sites in this state coupled with uneven-age management techniques will cause a transition to State 3 (Uneven-Age).

Community 6.1
Hickory, Maple / Buckbrush Forest

This forest community has a multi-tiered structure, with irregular, variable canopy closure.

Transition T1A
State 1 to 2

This transition typically results from even-age timber management practices, such as clear-cut, seed tree or shelterwood harvest.

Transition T1B
State 1 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest

Restoration pathway R1B
State 1 to 3

This restoration pathway generally requires uneven-age timber management practices, such as single tree or group selection harvest, with extended rotations that allow mature trees to exceed ages of about 120 years.

Restoration pathway R1A
State 1 to 4

This restoration pathway generally requires uneven-age timber management practices, such as single tree or group selection harvest, with extended rotations that allow mature trees to exceed ages of about 120 years.

Transition T1C
State 1 to 4

This transition is the gradual conversion of forest communities to woodland communities on protected aspects, and is the result of the systematic application of prescribed fire.

Transition T1D
State 1 to 5

This transition is the result of clearing the forest community and planting pasture species. Soil erosion can be extensive in this process, along with loss of organic matter. Liming and fertilizing associated with pasture management typically raises the soil pH and increases the cation concentration (such as calcium and magnesium) of the upper soil horizons.

Transition T1E
State 1 to 6

This transition is the result of poorly planned timber harvest techniques such as high-grading, accompanied by unmanaged cattle grazing. Soil erosion and compaction often result from cattle grazing after the understory has been damaged.

Transition T2A
State 2 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest.

Transition T2B
State 2 to 4

This transition is the result of the systematic application of prescribed fire. Mechanical thinning may also be used.

Transition T3A
State 3 to 2

This transition typically results from even-age timber management practices, such as clear-cut, seed tree or shelterwood harvest.

Transition T3B
State 3 to 4

This transition is the result of the systematic application of prescribed fire. Mechanical thinning may also be used.

Transition T4A
State 4 to 2

This transition typically results from even-age timber management practices, such as clear-cut, seed tree or shelterwood harvest.

Transition T4B
State 4 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest.

Transition T5A
State 5 to 2

This transition results from the cessation of cattle grazing and associated pasture management such as mowing and brush-hogging. Herbicide application, tree planting and timber stand improvement techniques can speed up this otherwise very lengthy transition.

Transition T6B
State 6 to 3

This transition typically results from uneven-age timber management practices, such as single tree or group selection harvest. Tree planting, mechanical thinning and other timber stand improvement techniques may be helpful to decrease the transition time.

Transition T6A
State 6 to 5

This transition is the result of clearing the forest communities and planting pasture species. Soil erosion can be extensive in this process, along with loss of organic matter. Liming and fertilizing associated with pasture management typically raises the soil pH and increases the cation concentration (such as calcium and magnesium) of the upper soil horizons.

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
white oak	QUAL	*Quercus alba*	Native	–	–	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	–	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	–	–	–
shortleaf pine	PIEC2	*Pinus echinata*	–	–	–	–	–
red maple	ACRU	*Acer rubrum*	–	–	–	–	–
sugar maple	ACSA3	*Acer saccharum*	–	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Forb/Herb					
toadshade	TRSE2	*Trillium sessile*	–	–	–
white fawnlily	ERAL9	*Erythronium albidum*	–	–	–
hepatica	HENO2	*Hepatica nobilis*	–	–	–
goldenseal	HYCA	*Hydrastis canadensis*	–	–	–
Christmas fern	POAC4	*Polystichum acrostichoides*	–	–	–
mayapple	POPE	*Podophyllum peltatum*	–	–	–
largeflower bellwort	UVGR	*Uvularia grandiflora*	–	–	–
lesser yellow lady's slipper	CYPAP4	*Cypripedium parviflorum var. parviflorum*	–	–	–
feathery false lily of the valley	MARA7	*Maianthemum racemosum*	–	–	–
Virginia springbeauty	CLVI3	*Claytonia virginica*	–	–	–
Virginia snakeroot	ARSE3	*Aristolochia serpentaria*	–	–	–
rattlesnake fern	BOVI	*Botrychium virginianum*	–	–	–
Shrub/Subshrub					
cat greenbrier	SMGL	*Smilax glauca*	–	–	–
wild blue phlox	PHDI5	*Phlox divaricata*	–	–	–
flowering dogwood	COFL2	*Cornus florida*	Native	–	–
common serviceberry	AMAR3	*Amelanchier arborea*	–	–	–
fragrant sumac	RHAR4	*Rhus aromatica*	–	–	–
Tree					
hophornbeam	OSVI	*Ostrya virginiana*	–	–	–
blackgum	NYSY	*Nyssa sylvatica*	–	–	–
Vine/Liana					
summer grape	VIAE	*Vitis aestivalis*	–	–	–
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	–	–	–

Table 7. Community 2.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
white oak	QUAL	*Quercus alba*	Native	–	–	–	–
post oak	QUST	*Quercus stellata*	Native	–	–	–	–
black oak	QUVE	*Quercus velutina*	Native	–	–	–	–

Table 8. Community 2.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	–

Contributors

Fred Young

Approval

Matthew Duvall, 3/20/2025

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	05/10/2025
Approved by	Matthew Duvall
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:**