USDA Natural Resources
Conservation Service

# Ecological site F115XB011MO
# Chert Protected Backslope Forest

Accessed: 05/06/2024

## General information

**Provisional**. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

**Figure 1. Mapped extent**

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

## MLRA notes

Major Land Resource Area (MLRA): 115X–Central Mississippi Valley Wooded Slopes

The Central Mississippi Valley Wooded Slopes, Western Part (area outlined in red on the map) consists mainly of the deeply dissected, loess-covered hills bordering the Missouri and Mississippi Rivers as well as the floodplains and terraces of these rivers. It wraps around the northeast corner of the Ozark Uplift, and constitutes the southern border of the Pre-Illinoisan-aged till plain. Elevation ranges from about 320 feet along the Mississippi River near Cape Girardeau in the south to about 1,020 feet on the highest ridges near Hillsboro, MO in the east. Local relief varies from 10 to 20 feet in the major river floodplains, to 50 to 100 feet in the dissected uplands, with bluffs of 200 to 350 feet along the Mississippi and Missouri Rivers. Underlying bedrock is mainly Ordovician-aged dolomite and sandstone, with Mississippian-aged limestone north of the Missouri River.

## Classification relationships

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

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

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to a Quercus alba / Cornus florida Unglaciated Forest (CEGL002066).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs primarily in Land Type Associations of the following Subsections:
Outer Ozark Border
Mississippi River Hills

## Ecological site concept

NOTE: This is a “provisional” Ecological Site Description (ESD) that is under development. It contains basic ecological information that can be used for conservation planning, application and land management. After additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Chert Protected Backslope Forests are within the green areas on the map. They occupy the northerly and easterly aspects of steep, dissected slopes, and are mapped in complex with the Chert Exposed Backslope Woodland

ecological site. The Chert Backslope ecological sites are typically associated with Mississippian-aged limestone, but also occur in Ordovician-aged dolomite. Loess ecological sites are typically upslope. Areas of Limestone/Dolomite Woodland/Glades are commonly associated with these sites. Soils are typically very deep, with an abundance of chert fragments. The reference plant community is forest with an overstory dominated by northern red oak and white oak, an understory dominated by flowering dogwood and blackgum, and a rich herbaceous ground flora.

## Associated sites

| | |
|---|---|
| F115XB005MO | **Loamy Upland Woodland**<br>Loamy Upland Woodlands are upslope on summits and gentle backslopes slopes. |
| F115XB014MO | **Chert Limestone/Dolomite Protected Backslope Forest**<br>Chert Limestone/Dolomite Protected Backslope Forests are downslope on north and east aspects. |
| F115XB046MO | **Chert Limestone/Dolomite Exposed Backslope Woodland**<br>Chert Limestone/Dolomite Exposed Backslope Woodlands are downslope on south and west aspects. |
| F115XB048MO | **Chert Exposed Backslope Woodland**<br>Chert Exposed Backslope Woodlands are found on similar landscapes but on southerly and westerly aspects. |

## Similar sites

| | |
|---|---|
| F115XB048MO | **Chert Exposed Backslope Woodland**<br>Chert Exposed Backslope Woodlands are found on similar landscapes but on southerly and westerly aspects. |
| F115XB014MO | **Chert Limestone/Dolomite Protected Backslope Forest**<br>Chert Limestone/Dolomite Protected Backslope Forests are generally downslope, have shallower soil profiles and are less productive. |

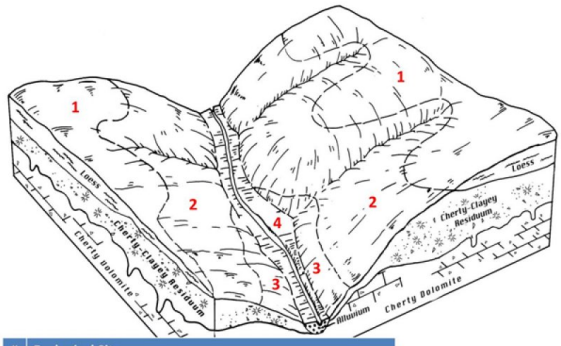
**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Quercus alba*<br>(2) *Quercus rubra* |
| Shrub | (1) *Cornus florida* |
| Herbaceous | (1) *Polystichum acrostichoides*<br>(2) *Podophyllum peltatum* |

## Physiographic features

This site is on upland backslopes with slopes of 15 to 70 percent. 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.

The accompanying figure (adapted from Skaer, 2004) shows the typical landscape position of this ecological site, and landscape relationships among the major ecological sites in the uplands. The site is within the area labeled “2”, on steep backslopes with northerly and easterly aspects. Chert Upland Woodland sites, on hillslope shoulders and upper backslopes, and included in the area. Sites that are shallower to limestone or dolomite bedrock are typically downslope, such as the Chert Limestone/Dolomite Backslope sites shown in the figure. Shallow Limestone/Dolomite glade sites are also common downslope.




| # | Ecological Site |
|---|---|
| 1 | Loamy Upland Woodland |
| 2 | Chert Upland & Backslope Woodland & Forest |
| 3 | Chert Limestone/Dolomite Backslope Woodland & Forest |
| 4 | Loamy/Gravelly Upland Drainageway Forest |

**Figure 2. Landscape relationships for this ecological site.**

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Hill |
| Flooding frequency | None |
| Ponding frequency | None |
| Slope | 15–70% |
| Water table depth | 69–152 cm |
| Aspect | N, NE, E |

## Climatic features

The Central Mississippi Valley Wooded Slopes, Western Part 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 Mexico 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 Central Mississippi Valley Wooded Slopes, Western Part experiences regional differences in climates, but these differences do not have obvious geographic boundaries. Regional climates grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line diagonally crossing the MLRA from northwest to southeast. Both mean annual temperature and precipitation exhibit gradients along this line.

The average annual precipitation in most of this area is 38 to 48 inches. The average annual temperature is 53 to 57 degrees F. Mean January minimum temperature follows the northwest-to-southeast gradient. However, mean July maximum temperature shows hardly any geographic variation in the MLRA. Mean July maximum temperatures have a range of only two or three degrees across the area.

Mean annual precipitation varies along the same gradient as temperature. Seasonal climatic variations are more complex. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation. Most of the rainfall occurs as high-intensity, convective thunderstorms in summer. Snowfall is common in winter.

During years when precipitation is normal, moisture is stored in the soil profile 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 MLRA 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. Higher daytime temperatures of bare rock surfaces and higher reflectivity of these unvegetated surfaces create characteristic glade and cliff ecological sites. Slope orientation is an important topographic influence on climate. 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 ecological site is measurably different from the climate of the more open grassland or savanna ecological sites.

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 (average) | 172 days |
| Freeze-free period (average) | 199 days |
| Precipitation total (average) | 1,143 mm |

## Climate stations used

- (1) BOWLING GREEN 1 E [USC00230856], Bowling Green, MO
- (2) FULTON [USC00233079], Fulton, MO
- (3) UNION [USC00238515], Union, MO

## Influencing water features

The water features of this upland ecological site include evapotranspiration, surface runoff, and drainage. Each water balance component fluctuates to varying extents from year-to-year. Evapotranspiration remains the most constant. Precipitation and drainage are highly variable between years. Seasonal variability differs for each water component. Precipitation generally occurs as single day events. Evapotranspiration is lowest in the winter and peaks in the summer. Water stored as ice and snow decreases drainage and surface runoff rates throughout the winter and increases these fluxes in the spring. The surface runoff pulse is greatly influenced by extreme events. Conversion to cropland or other high intensities land uses tends to increase runoff, but also decreases evapotranspiration. Depending on the situation, this might increase groundwater discharge, and decrease baseflow in receiving streams (Vano 2005).

## Soil features

These soils have no rooting restriction, and subsoils are not low in bases. A few areas have dolomite or limestone bedrock below 40 inches. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium over residuum weathered from limestone and dolomite. They have gravelly or very gravelly silt loam surface horizons, and skeletal subsoils with high amounts of chert gravel and cobbles. They are not affected by seasonal wetness. Soil series associated with this site include Beemont, Goss, Rueter, and Swiss.
The accompanying picture of the Goss series shows a thin, light-colored surface horizon underlain by very cobbly reddish clay. Scale is in inches. Picture from Henderson (2004).

**Figure 7. Goss series**

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Slope alluvium–dolomite<br>(2) Residuum–dolomite |
| Surface texture | (1) Gravelly silt loam<br>(2) Very gravelly loam |
| Family particle size | (1) Clayey |
| Drainage class | Moderately well drained to somewhat excessively drained |
| Permeability class | Very slow to moderately slow |
| Soil depth | 102–183 cm |
| Surface fragment cover <=3" | 15–50% |
| Surface fragment cover >3" | 0–39% |
| Available water capacity (0-101.6cm) | 5.08–15.24 cm |
| Calcium carbonate equivalent (0-101.6cm) | 0% |
| Electrical conductivity (0-101.6cm) | 0–2 mmhos/cm |
| Sodium adsorption ratio (0-101.6cm) | 0 |
| Soil reaction (1:1 water) (0-101.6cm) | 4.5–7.3 |
| Subsurface fragment volume <=3" (Depth not specified) | 35–60% |
| Subsurface fragment volume >3" (Depth not specified) | 2–30% |

## Ecological dynamics

Information contained in this section was developed using historical data, professional experience, field reviews, and scientific studies. 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.

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 overstory is dominated by white oak, northern red oak and sugar maple are also present. This forest community has a multi-tiered structure, and a canopy that is 70 to 90 feet tall with 80 to 100 percent closure. The sub-canopy and understory are well developed, with flowering dogwood as a dominant understory tree and saplings.

While the upland prairies and savannas had an estimated fire frequency of 1 to 3 years, Chert Protected Backslope Forests burned less frequently (estimated 10 to 20 years) and with lower intensity. The composition and structure of the Chert Backslopes varies in relation to slope aspect. Exposed, south and west facing slopes are doughtier and more fire-prone than are the protected north and east facing slopes, which are relatively cool and moist. These two ecological sites intergrade on neutral, northwest and southeast exposures. The north and west facing slopes of the 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 large herbivores, such as elk, and deer, and periodic fires kept understory conditions more open. In addition, these ecological types were subject to occasional disturbances from wind and ice, which opened the canopy up by knocking over trees or breaking substantial branches of canopy trees.

Today, these communities have been cleared and converted to pasture, or have undergone repeated timber harvest and domestic grazing. Most existing occurrences have a younger (50 to 80 years) canopy layer whose composition has 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 has allowed more shade-tolerant tree species, such as sugar maple, white ash, or hickories to increase in abundance.

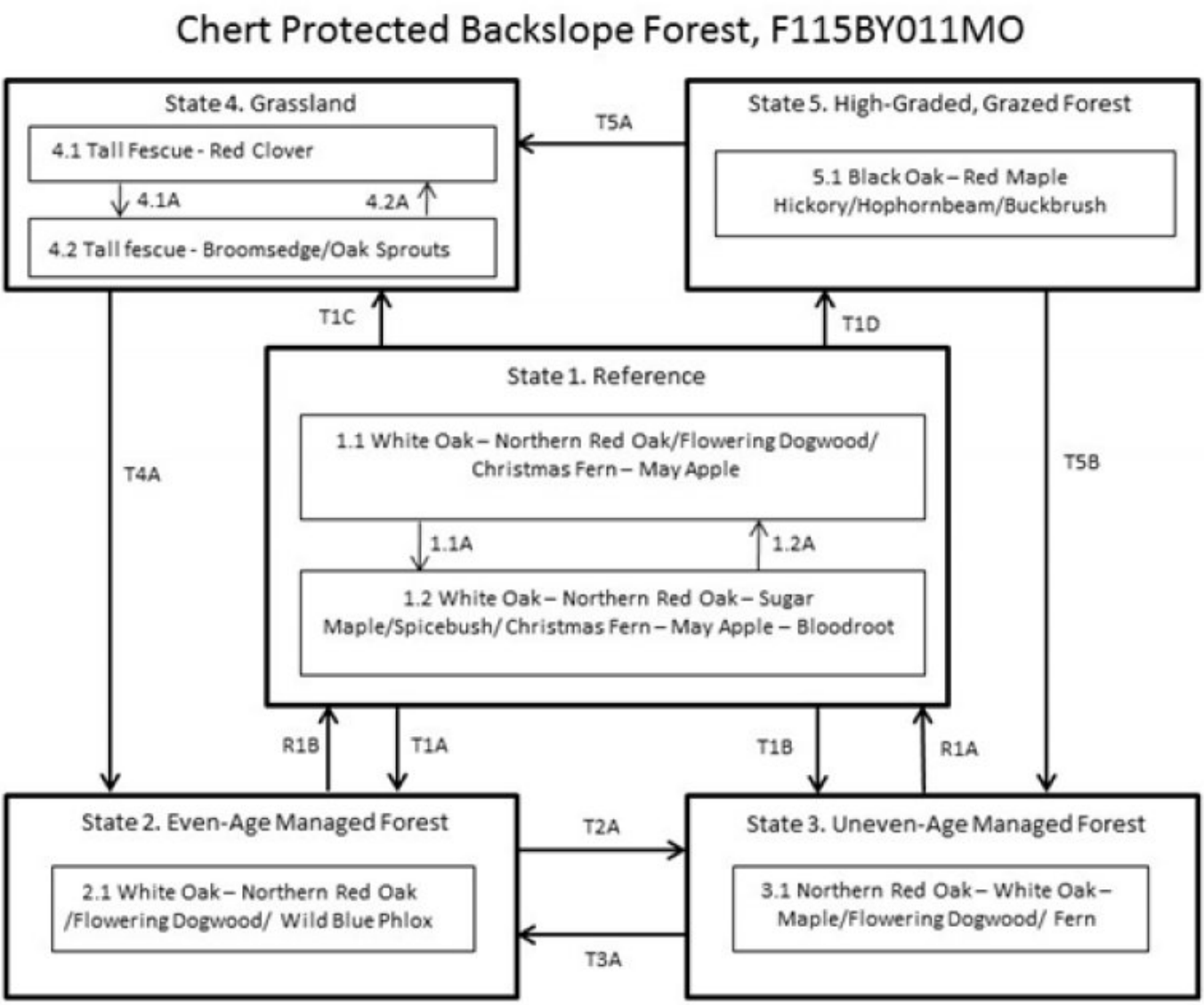
Uncontrolled domestic grazing has diminished the diversity and cover of woodland ground flora species, and has introduced weedy species such as gooseberry, buckbrush, poison ivy and Virginia creeper created a more open understory and increased soil compaction.

Chert Protective Backslope Forests are moderately productive sites. Carefully planned single tree selection or the creation of small 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. 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.

A State and Transition Diagram follows. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

## State and transition model




| Code | Event/Process |
|---|---|
| T1A | Harvesting; even-aged management |
| T1B | Harvesting; uneven-age management |
| T1C, T5A | Clearing; pasture planting |
| T1D | High-grade harvesting; uncontrolled grazing |
| T2A | Uneven-age management |
| T3A | Even-age management |
| T4A, T5A | Tree planting; long-term succession; no grazing |
| T5B | Uneven-age management; tree planting; no grazing |

| Code | Event/Process |
|---|---|
| 1.1A | No disturbance (10+ yrs) |
| 1.2A | Disturbance (fire, wind, ice) < 10 yrs |
| 4.1A | Over grazing; no fertilization |
| 4.2A | Brush management; grassland seeding; grassland management |

| Code | Event/Process |
|---|---|
| R1A | Extended rotations |
| R1B | Uneven-age mgt, extended rotations |

**Figure 8. State and transition diagram for this ecological s**

## State 1

## Reference

The Reference State was dominated by white oak. Maximum tree age was likely 150 to 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 such as red oak and sugar maple. Two community phases are recognized in this state, with shifts between phases based on disturbance frequency. High quality reference states are rare today. Some sites have been converted to grassland (State 4). Others have been subject to repeated, high-graded timber harvest coupled with domestic livestock grazing (State 5). Fire suppression has resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Many Reference sites have been managed for timber harvest, resulting in either even-age (State 2) or uneven-age (State 3) forests.

### Community 1.1
### White Oak – Northern Red Oak/Flowering Dogwood/ Christmas Fern – May Apple

**Figure 9. Reference site at Reifsnider State Forest, near Warrenton, Missouri**

This forest community has a multi-tiered structure, and a canopy that is 70 to 90 feet tall with 80 to 100 percent 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 northern 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.

**Forest overstory.** The Overstory Species list is based on field surveys and commonly occurring species listed in Nelson (2010).

**Forest understory.** The Understory Species list is based on field surveys and commonly occurring species listed in Nelson (2010).

### Community 1.2
### White Oak – Northern Red Oak – Sugar Maple/Spicebush/ Christmas Fern – May Apple – Bloodroot

The overstory is a mixture of white oak and more shade tolerant species such as northern red oak, sugar maple, hickory, white ash and others. This forest community has a multi-tiered structure, and a canopy that is 70 to 90 feet tall with 90 to 100 percent closure. An abundance of shade tolerant forest generalists, such as May apple, Christmas fern, and white snakeroot, cover the ground. In addition, more shade-loving forest shrub (e.g., spicebush) and herbaceous (e.g., bloodroot) species are common.

## State 2
## Even-Aged Managed Forest

This state starts with a sequence of early seral white oak forests, which mature over time. These forests tend to be rather dense, with an under developed 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) forests.

### Community 2.1
### White Oak – Northern Red Oak /Flowering Dogwood/ Wild Blue Phlox

This is an even-aged forest management phase. Logging activities are removing higher volumes of white oak causing a decrease in white oak in the canopy and an increase in northern red oak. Large group, shelterwood or clearcut harvests create a more uniform age class structure throughout the canopy layer while also opening up the understory and allowing more sunlight to reach the forest floor.

## State 3
## Uneven-Age Managed Forest

Uneven-Age Managed forests resemble the Reference State. The biggest difference is tree age, most being only 60 to 90 years old. Composition is also likely altered from the reference state depending on tree selection during harvest. In addition, without a regular 15 to 20 year harvest re-entry into these stands, they will slowly increase in more shade tolerant species such as sugar maple and white oak will become less dominant.

### Community 3.1
### Northern Red Oak – White Oak – Maple/Flowering Dogwood/ Fern

This is an uneven-aged forest management phase. Selective logging activities are removing higher volumes of white oak causing a decrease in white oak in the canopy and an increase in northern red oak and sugar maple. Densities numbers, especially more shade tolerant species, are increasing at the lower size-class levels.

## State 4
## Grassland

Conversion of forests to planted, non-native pasture species such as tall fescue has been common in this MLRA. Steep slopes, abundant surface fragments, low organic matter contents and soil acidity make non-native pastures challenging to maintain in a healthy, productive state on this ecological site. If grazing and active pasture management is discontinued, the site will eventually transition to State 2 (Even-Age).

### Community 4.1
### Tall Fescue - Red Clover

This phase is well-managed grassland, composed of non-native cool season grasses and legumes. Grazing and haying is occurring. The effects of long-term liming on soil pH, and calcium and magnesium content, is most evident in this phase. Studies show that these soils have higher pH and higher base status in soil horizons as much as two feet below the surface, relative to poorly managed grassland and to woodland communities (where liming is not practiced).

### Community 4.2
### Tall fescue - Broomsedge/Oak Sprouts

This phase is the result of over use, poor grassland and grazing management and lack of adequate nutrient application. Oak sprouts, oak saplings, and invasive species are increasing as a result of poor management.

## State 5
## High-Graded / Grazed Forest

Forested sites subjected to repeated, high-graded timber harvests and uncontrolled 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 livestock from sites in this state coupled with uneven-age management techniques will cause a transition to State 3 (Uneven-Age).

### Community 5.1
### Black Oak - Red Maple - Hickory/Buckbrush

Due to high-grade logging and uncontrolled grazing, this community phase exhibits an over-abundance of hickory and other less economically desirable tree species and weedy understory species such as buckbrush, gooseberry, poison ivy and multi-flora rose. The understory vegetation offers little nutritional value for cattle, and excessive livestock stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff.

### 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 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 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.

## Additional community tables

**Table 5. Community 1.1 forest overstory composition**

| Common Name | Symbol | Scientific Name | Nativity | Height (M) | Canopy Cover (%) | Diameter (Cm) | Basal Area (Square M/Hectare) |
|---|---|---|---|---|---|---|---|
| **Tree** | | | | | | | |
| white oak | QUAL | *Quercus alba* | Native | – | 2–75 | – | – |
| northern red oak | QURU | *Quercus rubra* | Native | – | 2–50 | – | – |
| sugar maple | ACSA3 | *Acer saccharum* | Native | – | 2–50 | – | – |
| black oak | QUVE | *Quercus velutina* | Native | – | 2–10 | – | – |
| white ash | FRAM2 | *Fraxinus americana* | Native | – | 2–5 | – | – |
| red maple | ACRU | *Acer rubrum* | Native | – | – | – | – |
| shagbark hickory | CAOV2 | *Carya ovata* | Native | – | – | – | – |
| mockernut hickory | CATO6 | *Carya tomentosa* | Native | – | – | – | – |

**Table 6. Community 1.1 forest understory composition**

| Common Name | Symbol | Scientific Name | Nativity | Height (M) | Canopy Cover (%) |
|---|---|---|---|---|---|
| **Grass/grass-like (Graminoids)** | | | | | |
| eastern woodland sedge | CABL | *Carex blanda* | Native | – | 2–5 |
| rock muhly | MUSO | *Muhlenbergia sobolifera* | Native | – | 1–2 |
| **Forb/Herb** | | | | | |
| American hogpeanut | AMBR2 | *Amphicarpaea bracteata* | Native | – | 5–10 |
| nakedflower ticktrefoil | DENU4 | *Desmodium nudiflorum* | Native | – | 0.1–10 |
| lady's slipper | CYPRI | *Cypripedium* | Native | – | 2–5 |
| feathery false lily of the valley | MARA7 | *Maianthemum racemosum* | Native | – | 0.1–5 |
| largeflower bellwort | UVGR | *Uvularia grandiflora* | Native | – | 2–5 |
| mayapple | POPE | *Podophyllum peltatum* | Native | – | 1–2 |
| wild blue phlox | PHDI5 | *Phlox divaricata* | Native | – | 0.1–1 |
| fourleaf milkweed | ASQU | *Asclepias quadrifolia* | Native | – | 0.1–1 |
| tall tickseed | COTR4 | *Coreopsis tripteris* | Native | – | 0.1–1 |
| great waterleaf | HYAP | *Hydrophyllum appendiculatum* | Native | – | 0.1–1 |
| Virginia snakeroot | ARSE3 | *Aristolochia serpentaria* | Native | – | – |
| Virginia springbeauty | CLVI3 | *Claytonia virginica* | Native | – | – |
| white fawnlily | ERAL9 | *Erythronium albidum* | Native | – | – |
| hepatica | HENO2 | *Hepatica nobilis* | Native | – | – |
| goldenseal | HYCA | *Hydrastis canadensis* | Native | – | – |
| feathery false lily of the valley | MARA7 | *Maianthemum racemosum* | Native | – | – |
| toadshade | TRSE2 | *Trillium sessile* | Native | – | – |
| **Fern/fern ally** | | | | | |
| northern maidenhair | ADPE | *Adiantum pedatum* | Native | – | 2–5 |
| Christmas fern | POAC4 | *Polystichum acrostichoides* | Native | – | 2–5 |
| rattlesnake fern | BOVI | *Botrychium virginianum* | Native | – | 1–2 |
| **Shrub/Subshrub** | | | | | |
| blackhaw | VIPR | *Viburnum prunifolium* | Native | – | 2–5 |
| fragrant sumac | RHAR4 | *Rhus aromatica* | Native | – | – |
| Blue Ridge blueberry | VAPA4 | *Vaccinium pallidum* | Native | – | – |
| **Tree** | | | | | |
| flowering dogwood | COFL2 | *Cornus florida* | Native | – | 2–25 |
| hophornbeam | OSVI | *Ostrya virginiana* | Native | – | 2–5 |
| common serviceberry | AMAR3 | *Amelanchier arborea* | Native | – | 0.1–1 |
| **Vine/Liana** | | | | | |
| Virginia creeper | PAQU2 | *Parthenocissus quinquefolia* | Native | – | – |
| cat greenbrier | SMGL | *Smilax glauca* | Native | – | – |
| summer grape | VIAE | *Vitis aestivalis* | Native | – | – |

**Table 7. Community 2.1 forest overstory composition**

| Common Name | Symbol | Scientific Name | Nativity | Height (M) | Canopy Cover (%) | Diameter (Cm) | Basal Area (Square M/Hectare) |
|---|---|---|---|---|---|---|---|
| **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 (M) | Canopy Cover (%) |
|---|---|---|---|---|---|
| **Grass/grass-like (Graminoids)** | | | | | |
| little bluestem | SCSC | *Schizachyrium scoparium* | Native | – | – |

## Animal community

Wildlife (MDC 2002):

Wild turkey, white-tailed deer, and eastern gray squirrel depend on hard and soft mast food sources and are typical upland game species of this type.

Bird species associated with early-successional community stages are Prairie Warbler, Field Sparrow, Brown Thrasher, Blue-winged Warbler, White-eyed Vireo, Blue-gray Gnatcatcher, Yellow-breasted Chat, Indigo Bunting, and Eastern Towhee. Birds associated with mid-successional stages include Whip-poor-will and Wood Thrus while birds associated with late-successional stages include Worm-eating warbler, Whip-poor-will, Great Crested Flycatcher, Ovenbird, Pileated Woodpecker, Wood Thrush, Red-eyed Vireo, Northern Parula, Louisiana Waterthrush (near streams), and Broad-winged Hawk.

Reptile and amphibian species associated with mature forests include: ringed salamander, spotted salamander, marbled salamander, central newt, long-tailed salamander, dark-sided salamander, southern red-backed salamander, three-toed box turtle, western worm snake, western earth snake, and American toad.

## Other information

Forestry (NRCS 2002, 2014):

Management: Field collected site index values average 59 for white oak and 64 for black oak. Timber management opportunities are generally good. Create group openings of at least 2 acres. Large clearcuts should be minimized if possible to reduce impacts on wildlife and aesthetics. Uneven-aged management using single tree selection or group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Using prescribed fire as a management tool could have a negative impact on timber quality and should be used with caution on a particular site if timber management is the primary objective.

Limitations: Coarse fragments throughout the profile; Surface stones and rocks are problems for efficient and safe equipment operation and will make equipment use somewhat difficult. Disturbing the surface excessively in harvesting operations and building roads increases soil losses, which leaves a greater amount of coarse fragments on the surface. Hand planting or direct seeding may be necessary. Seedling mortality due to low available water capacity may be high. Mulching or providing shade can improve seedling survival. Mechanical tree planting will be limited. Erosion is a hazard when slopes exceed 15 percent. On steep slopes greater than 35 percent, traction problems increase and equipment use is not recommended.

## Inventory data references

Chert Protected Backslope Forest – Potential Reference – F115BY011MO

Plot DABOCA_JK14 – Rueter soil

Located in Daniel Boone CA, Warren County, MO
Latitude: 38.783323
Longitude: -91.375746

Plot WESPCA_JK04 – Rueter soil
Located in Weldon Springs CA, St. Charles County, MO
Latitude: 38.683577
Longitude: -90.70516

Plot REIFCA_JK08 – Rueter soil
Located in Reifsnider CA, Warren County, MO
Latitude: 38.77238
Longitude: -91.09613671

## Other references

Henderson, Richard L. 2004. Soil Survey of Cedar County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.

MDC, 2006. Missouri Forest and Woodland Community Profiles. Missouri Department of Conservation, Jefferson City, Missouri.

Natural Resources Conservation Service. 2002. Woodland Suitability Groups. Missouri FOTG, Section II, Soil Interpretations and Reports. 30 pgs.

Natural Resources Conservation Service. Site Index Reports. Accessed May 2014. https://esi.sc.egov.usda.gov/ESI_Forestland/pgFSWelcome.aspx

NatureServe, 2010. Vegetation Associations of Missouri (revised). NatureServe, St. Paul, Minnesota.

Nelson, Paul W. 2010. The Terrestrial Natural Communities of Missouri. Missouri Department of Conservation, Jefferson City, Missouri.

Nigh, Timothy A., & Walter A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City, Missouri.

Skaer, David M. 2004. Soil Survey of Jefferson County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.

Vano, Julie A. 2005. Land Surface Hydrology in Northern Wisconsin: Influences of climatic variability and land cover. University of Wisconsin-Madison.

University of Missouri Climate Center - http://climate.missouri.edu/climate.php; accessed June 2012

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/

## Contributors

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## Acknowledgments

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## 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:**

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:**

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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:**

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17. **Perennial plant reproductive capability:**

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