USDA Natural Resources
Conservation Service

Ecological site F116CY005MO
Dry Igneous Protected Backslope Woodland

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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): 116C–St. Francois Knobs and Basins

The St Francois Knobs and Basins is the structural center of the Ozark Dome. Elevation ranges from about 450 feet along the rivers in the southern part of the area, to 1,772 feet on the summit of Taum Sauk Mountain, the highest point in Missouri. Prominent features of this MLRA are the Precambrian igneous knobs and hills that rise conspicuously to various elevations, interspersed with smooth-floored basins and valleys overlying dolomite and sandstone. Ecological Sites defined for this MLRA are associated with the igneous parent materials, either in knob or basin positions. Areas influenced primarily by dolomite and/or sandstone are included in ecological sites within MLRA 116A (Ozark Highlands).

Classification relationships

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

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 Woodland.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to a Quercus stellata - Quercus marilandica - Quercus velutina - Carya texana / Schizachyrium scoparium Woodland (CEGL002149).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs primarily within the St. Francois Igneous Glade/Oak Forest Knobs Land Type Association.

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. As additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Dry Igneous Protected Backslope Woodlands occupy the northerly and easterly aspects of steep, dissected slopes, and are mapped in complex with the Dry Igneous Exposed Backslope Woodland ecological site. These sites occur throughout the area, and on outlying igneous knobs in adjacent counties. Soils are moderately deep, with abundant volcanic rock fragments, and are low in bases. These sites are often downslope from both Igneous Upland Woodland and Shallow Igneous Knob Glade ecological sites. Igneous Upland Woodland sites do not have root-restricting bedrock in the upper part of the soil profile, whereas Shallow Igneous Knob Glade sites are shallow to bedrock and are interspersed with rock outcrop. Vegetation of the reference state is woodland dominated by white oak, black oak, and scarlet oak, and a ground flora of native grasses and forbs.

Associated sites

F116CY003MO	**Dry Igneous Upland Woodland** Dry Igneous Upland Woodlands are typically upslope from Igneous Protected Backslope Woodlands, and are less sloping.
F116CY004MO	**Igneous Protected Backslope Forest** Igneous Protected Backslope Forests are typically downslope from Igneous Protected Backslope Woodlands, and do not have bedrock within the soil profile.
F116CY011MO	**Dry Igneous Exposed Backslope Woodland** Dry Igneous Exposed Backslope Woodlands are on south and west facing slopes, and are mapped in a complex with this ecological site.

Similar sites

F116CY003MO	**Dry Igneous Upland Woodland** Dry Igneous Upland Woodlands are typically upslope from Dry Igneous Protected Backslope Woodlands, and are less sloping and somewhat more productive due to the deeper soil depths.

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus velutina*
Shrub	(1) *Sassafras albidum* (2) *Rhus aromatica*
Herbaceous	(1) *Carex*

Physiographic features

This site is on upland backslopes with slopes of 15 to 50 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 following figure (adapted from Simmons et al., 2006) shows the typical landscape position of this ecological

site, and landscape relationships among the major ecological sites in the igneous uplands. The site is within the area labeled “3”, on the lower, steeper backslope positions.

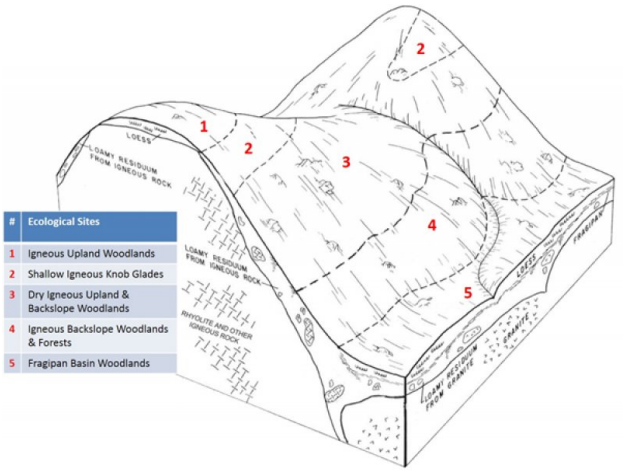


Figure 2. Major ecological sites of the igneous uplands.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Knob (3) Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	183–488 m
Slope	15–50%
Water table depth	76–152 cm
Aspect	NW, N, NE, E

Climatic features

The St. Francois Knobs and Basins have 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 St. Francois Knobs and Basins experience few regional differences in climates. The average annual precipitation in this area is 42 to 46 inches. The average annual temperature is about 54 to 56 degrees F. The lower temperatures occur at the higher elevations. Mean July maximum temperatures have a range of only one or two degrees across the area.

Mean annual precipitation varies somewhat along a west to east gradient. The rainfall is fairly evenly distributed throughout the year. Snow falls nearly every winter, but the snow cover lasts for only a few days.

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. For example, air drainage at night may produce temperatures several degrees lower in the basin and floodplain ecological sites downslope from this ecological site. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in basins and valleys. Nearby Glade ecological sites may have higher daytime temperatures due to bare rock and higher reflectivity of these un-vegetated surfaces. Slope orientation is an important topographic influence on climate. The protected (north- and east-facing) slopes that characterize this ecological site are regularly cooler and moister than nearby ecological sites on summits and on exposed slopes. Finally, the climate within closed-canopy woodland communities is measurably different from the climate of open-canopy woodlands within this ecological site.

References:
University of Missouri Climate Center - http://climate.missouri.edu/climate.php;

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Table 3. Representative climatic features

Frost-free period (characteristic range)	137-145 days
Freeze-free period (characteristic range)	164-169 days
Precipitation total (characteristic range)	1,143-1,194 mm
Frost-free period (actual range)	136-148 days
Freeze-free period (actual range)	163-170 days
Precipitation total (actual range)	1,143-1,194 mm
Frost-free period (average)	141 days
Freeze-free period (average)	166 days
Precipitation total (average)	1,168 mm

Climate stations used

- (1) ARCADIA [USC00230224], Arcadia, MO
- (2) FARMINGTON [USC00232809], Farmington, MO
- (3) FREDERICKTOWN [USC00233038], Fredericktown, MO

Influencing water features

This ecological site is not influenced by wetland or riparian water features. The site generates runoff to adjacent, downslope ecological sites. 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.

Soil features

These soils have granitic or rhyolitic volcanic bedrock at 20 to 40 inches, and acidic subsoils that are low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium and residuum weathered from granite and rhyolite. They have gravelly and cobbly silt loam surface horizons, and subsoils with moderate to high amounts of volcanic gravel and cobbles. They are not affected by seasonal wetness. Soil series associated with this site include Hassler, Irondale, and Syenite.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–rhyolite (2) Residuum–rhyolite
Surface texture	(1) Gravelly silt loam (2) Cobbly silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	51–102 cm
Surface fragment cover <=3"	5–34%
Surface fragment cover >3"	3–14%
Available water capacity (0-101.6cm)	5.08–10.16 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)	3.5–6
Subsurface fragment volume <=3" (Depth not specified)	10–36%
Subsurface fragment volume >3" (Depth not specified)	7–25%

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.

Dry Igneous Protected Backslope Woodlands have a moderately well-developed canopy (50 to 70 feet tall and 60 to 80 percent closure) dominated by white oak, black oak, and scarlet oak. Compared to exposed backslope forests, their overstory and understory is less open with a decrease in sun loving woodland ground flora. In addition, the protected landscape position of Dry Igneous Protected Backslope Woodlands helps to improve the growth of trees.

It is likely that this ecological site, along with adjacent glades and dry woodlands burned at least once every 5 years. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. During fire free intervals, woody species, especially black hickory, winged elm and eastern red cedar would have increased and the herbaceous understory diminished. The return of fire would have opened the woodlands up again and stimulated the abundant ground flora.

Dry Igneous Protected Backslope Woodlands were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores, such as bison, elk, and white-tailed deer. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by the large native herbivores would have effectively kept understory conditions more open, creating

conditions more favorable to oak reproduction and sun-loving ground flora species.

In the long term absence of fire, woody species will encroach into these woodlands. This is especially true after grazing has reduced grass cover and exposed more surface to the dispersal of seeds by birds. Once established, these woodies can quickly fill the woodland system. Most of these ecological sites today are more dense and shady with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective management tools.

Today, uncontrolled domestic grazing is also impacting some of these sites, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as coralberry, gooseberry, and Virginia creeper along with eastern redcedar. These grazed sites also have a more open understory in addition to soil compaction, soil erosion and lower site productivity problems.

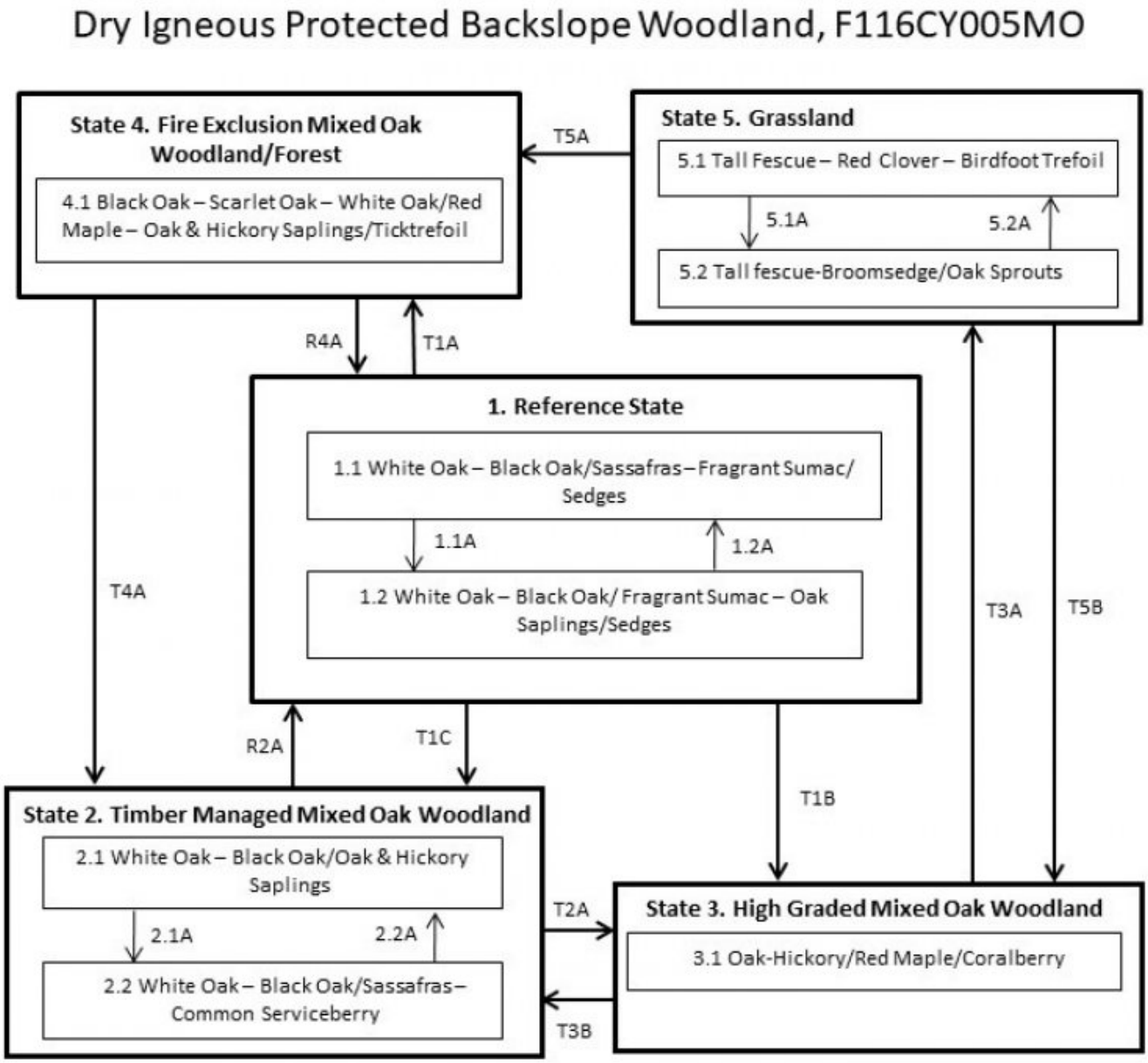
Dry Igneous Protected Backslope Woodlands are somewhat moderately productive timber sites. Poorly managed timber harvests in this region typically results in removal of the most productive trees, or high-grading of the stand. This can result in poorer quality residual timber and a shift in species composition away from more valuable oak species. 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 also occurs 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 and the introduction of prescribed burning, the ground flora diversity can be shaded out and productivity of the stand may suffer.

Prescribed fire can play a beneficial role in the management of this ecological site. The inclusion of protected backslope sites in larger burn units can add to the habitat diversity of the landscape.

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	Fire suppression; some logging
T1B, T2A, T5B	Logging – high grading; periodic grazing
T3A	Clearing; grassland seeding; grassland management
T1C, T4A, 2.2A	Managed forest harvesting; fire suppression
1.1A	Fire-free interval 10+ years
1.2A	Fire interval 5-7 years
2.1A	20-30 years of limited logging disturbance
5.1A	Over grazing; no fertilization
5.2A	Brush management; grassland seeding; grassland management
R2A, R4A	Selective thinning and prescribed fire interval 5-7 years
T3B	Logging cessation; selective thinning
T5A	Cessation of grazing & haying; long term succession

Figure 9. State and transition diagram for this ecological site

State 1

Reference

The historical reference state for this ecological site was old growth oak woodland. This state was dominated by white oak and black oak with occasional scarlet oak, and shortleaf pine. Periodic disturbances from fire, wind and ice maintained the reference structure and diverse ground flora species. Long disturbance-free periods allowed an increase in both the density of trees and the abundance of shade tolerant species. Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Reference sites are rare today. Most of these sites have been subject to repeated, high-graded timber harvest (State 3). Fire suppression has resulted in increased canopy density, which has affected the abundance and diversity of ground flora (State 4). Relatively few igneous woodlands have been managed effectively for timber harvest (State 2), resulting in either even-age or uneven-age woodlands.

Community 1.1
White Oak - Black Oak/Sassafras - Fragrant Sumac/ Sedge

Forest overstory. Canopy cover ranges from 60 to 80 percent. White oak and black oak dominate with scattered northern red oak and black gum. Shortleaf pine occurs on some sites. The Overstory Species list is based commonly occurring species listed in Nelson (2010).

Forest understory. Two understory layers are present - 20 to 40 foot tall small tree layer and a dense native forb and grass ground layer with scattered shrubs. The Understory Species list is based commonly occurring species listed in Nelson (2010).

Dominant plant species

- white oak (*Quercus alba*), tree
- black oak (*Quercus velutina*), tree
- scarlet oak (*Quercus coccinea*), tree
- blackgum (*Nyssa sylvatica*), tree
- pignut hickory (*Carya glabra*), tree
- shortleaf pine (*Pinus echinata*), tree
- northern red oak (*Quercus rubra*), tree
- sassafras (*Sassafras albidum*), tree
- red maple (*Acer rubrum*), tree
- slippery elm (*Ulmus rubra*), tree
- fragrant sumac (*Rhus aromatica*), shrub
- Carolina rose (*Rosa carolina*), shrub
- deerberry (*Vaccinium stamineum*), shrub
- Blue Ridge blueberry (*Vaccinium pallidum*), shrub
- ribbed sedge (*Carex virescens*), grass
- rosy sedge (*Carex rosea*), grass
- whitetinge sedge (*Carex albicans*), grass
- little bluestem (*Schizachyrium scoparium*), grass
- hairy woodland brome (*Bromus pubescens*), grass
- Virginia wildrye (*Elymus virginicus*), grass
- fuzzy wuzzy sedge (*Carex hirsutella*), grass
- parasol sedge (*Carex umbellata*), grass
- poverty oatgrass (*Danthonia spicata*), grass
- cypress panicgrass (*Dichanthelium dichotomum*), grass
- nakedflower ticktrefoil (*Desmodium nudiflorum*), other herbaceous
- fourleaf milkweed (*Asclepias quadrifolia*), other herbaceous
- elmleaf goldenrod (*Solidago ulmifolia*), other herbaceous
- downy ragged goldenrod (*Solidago petiolaris*), other herbaceous
- pointedleaf ticktrefoil (*Desmodium glutinosum*), other herbaceous
- hairy sunflower (*Helianthus hirsutus*), other herbaceous
- eastern beebalm (*Monarda bradburiana*), other herbaceous
- violet lespedeza (*Lespedeza violacea*), other herbaceous
- fourleaf yam (*Dioscorea quaternata*), other herbaceous
- spotted geranium (*Geranium maculatum*), other herbaceous

Community 1.2
White Oak - Black Oak/ Fragrant Sumac - Oak Saplings /Virginia Wildrye

Pathway P1.1A
Community 1.1 to 1.2

Fire-free interval 10+ years

Pathway P1.2A
Community 1.2 to 1.1

Fire interval 5-7 years

State 2
Timber Managed Mixed Oak Woodland

Periodic timber management, along with the absence of fire, will maintain this state. Continued exclusion of prescribed fire without a regular 15 to 20 year harvest re-entry into these stands, will slowly create an increase in more shade tolerant species. White oak will become less dominant and mid-story species such as sassafras, serviceberry and hickory will become more dominate and cause a transition to community phase 2.2.

Dominant resource concerns

- Plant structure and composition

Community 2.1
White Oak-Black Oak/Oak & HickorySaplings

Community 2.2
White Oak-Black Oak/Sassafras-DownyServiceberry

Pathway P2.1A
Community 2.1 to 2.2

20-30 years of limited logging disturbance

Pathway P2.2A
Community 2.2 to 2.1

Managed forest harvesting; fire suppression

State 3
High Graded Mixed Oak Woodland

This state is subjected to repeated, high-graded timber harvests resulting in a significant reduction in white oak densities. Fire cessation has also occurred. This state exhibits an over-abundance of black oak and hickory and other less desirable tree species, and weedy understory species such as coralberry, gooseberry, poison ivy and Virginia creeper. The canopy is somewhat open. Some intermittent uncontrolled domestic livestock grazing may also occur further degrading the site. Proper forest management techniques and cessation of grazing can cause a transition to State 2.

Dominant resource concerns

- Ephemeral gully erosion
- Organic matter depletion
- Plant productivity and health
- Plant structure and composition

- Plant pest pressure
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates

Community 3.1
Oak-Hickory/Red Maple/Buckbrush

State 4
Fire Exclusion Mixed Oak Woodland/Forest

This state is dominated by black oak, scarlet oak and to a lesser extent white oak. They can form relatively even-age stands, dating to when fire suppression became the dominant management characteristic on the site. This stage can occur relatively quickly (20 to 25 years). Canopy closures can approach 80 to 90 percent with decreasing ground flora. Without active management or long term presence of fire, woody species will continue to encroach into these woodlands. Once established, these woody species can quickly fill the forest system. Most occurrences of this state today are dense and shady with a greatly diminished ground flora. Some logging typically occurs. They are good wildlife sites. Removal of the younger understory, opening the upper canopy, and the application of periodic prescribed fire (5-7 years) has proven to be effective management tools in restoring the stage back to the reference state.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Wildfire hazard from biomass accumulation

Community 4.1
Black Oak-Scarlet Oak-White Oak/Red Maple-Oak & Hickory Saplings/Ticktrefoil

State 5
Grassland

Conversion of forested sites to planted, non-native grassland species such as tall fescue is a stage that is primarily associated with upper slope positions of this ecological site. If active grassland management is discontinued, the site will eventually transition to Phase 5.2 with an increase in broomsedge and oak sprouts and a loss of clover species. Return to the reference state from this state may be impossible requiring a very long term series of management options and stages. Many species may need to be eventually planted or reseeded to restore the system. Studies on Ozark woodlands indicate that conversion to grassland may result in soil loss from the clearing process and from erosion before the grassland is well established. Long-term grassland management results in higher soil pH levels and higher levels of calcium and magnesium from pasture liming. These effects may extend a foot or more into the soil profile. The effects of liming are more evident in phase 5.1 (Tall fescue – red clover – birdsfoot trefoil).

Community 5.1
Tall Fescue - Red Clover - Bird'sfoot Trefoil

Community 5.2
Tall fescue - Broomsedge Bluestem/Oak Sprouts

Dominant resource concerns

- Sheet and rill erosion
- Ephemeral gully erosion
- Nutrients transported to surface water
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure

- Terrestrial habitat for wildlife and invertebrates
- Feed and forage imbalance

Pathway P5.1A
Community 5.1 to 5.2

Over grazing; no fertilization

Pathway P5.2A
Community 5.2 to 5.1

Brush management; grassland seeding; grassland management

Transition T1C
State 1 to 2

Managed forest harvesting; fire suppression

Transition T1B
State 1 to 3

Logging – high grading; periodic grazing

Transition T1A
State 1 to 4

Fire suppression; some logging

Restoration pathway R2A
State 2 to 1

Selective thinning and prescribed fire interval 5-7 years

Transition T2A
State 2 to 3

Logging – high grading; periodic grazing

Transition T3B
State 3 to 2

Logging cessation; selective thinning

Transition T3A
State 3 to 5

Clearing; grassland seeding; grassland management

Restoration pathway R4A
State 4 to 1

Selective thinning and prescribed fire interval 5-7 years

Transition T4A
State 4 to 2

Selective thinning and prescribed fire interval 5-7 years

Transition T5B
State 5 to 3

Logging – high grading; periodic grazing

Restoration pathway T5A
State 5 to 4

Cessation of grazing and haying; long term succession

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	–	10–30	–	–
black oak	QUVE	*Quercus velutina*	Native	–	10–30	–	–
blackgum	NYSY	*Nyssa sylvatica*	Native	–	10–20	–	–
scarlet oak	QUCO2	*Quercus coccinea*	Native	–	10–20	–	–
pignut hickory	CAGL8	*Carya glabra*	Native	–	5–20	–	–
shortleaf pine	PIEC2	*Pinus echinata*	Native	–	0–10	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
rosy sedge	CARO22	*Carex rosea*	Native	–	5–20
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	5–20
hairy woodland brome	BRPU6	*Bromus pubescens*	Native	–	5–20
whitetinge sedge	CAAL25	*Carex albicans*	Native	–	5–20
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	5–20
ribbed sedge	CAVI4	*Carex virescens*	Native	–	5–20
Forb/Herb					
bristly buttercup	RAHI	*Ranunculus hispidus*	Native	–	5–10
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	5–10
fire pink	SIVI4	*Silene virginica*	Native	–	5–10
downy ragged goldenrod	SOPE	*Solidago petiolaris*	Native	–	5–10
pointedleaf ticktrefoil	DEGL5	*Desmodium glutinosum*	Native	–	5–10
manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	–	5–10
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	5–10
rue anemone	THTH2	*Thalictrum thalictroides*	Native	–	5–10
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	5–10
spotted geranium	GEMA	*Geranium maculatum*	Native	–	5–10
American ipecac	GIST5	*Gillenia stipulata*	Native	–	5–10
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	5–10
fourleaf milkweed	ASQU	*Asclepias quadrifolia*	Native	–	5–10
Shrub/Subshrub					
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	10–20
lowbush blueberry	VAAN	*Vaccinium angustifolium*	Native	–	5–20
Tree					
sassafras	SAAL5	*Sassafras albidum*	Native	–	5–20
red maple	ACRU	*Acer rubrum*	Native	–	5–10

Animal community

Wildlife (MDC 2006)
Oaks on this site provide abundant hard mast; scattered shrubs provide soft mast; native legumes provide high-quality wildlife food.

Sedges and native cool-season grasses provide green browse; native warm-season grasses provide cover and nesting habitat; and a diversity of forbs provides a diversity and abundance of insects.

Post-burn areas can provide temporary bare-ground and herbaceous cover habitat is important for turkey poults and quail chicks.

Birds species associated with this site are Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Summer Tanager, Eastern Wood-Pewee, Whip-poor-will, Chuck-will's widow, Red-eyed Vireo, Rose-breasted Grosbeak, Yellow-billed Cuckoo, and Broad-winged Hawk.

Reptile and amphibian species include ornate box turtle, northern fence lizard, five-lined skink, broad-headed skink, six-lined racerunner, flat-headed snake, rough earth snake, and timber rattlesnake.

Other information

Forestry (NRCS 2002; 20014)
Management: Field measured site index values average 62 for white oak and 51 for northern red oak. Timber management opportunities are fair. 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 small 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 site if timber management is the primary objective.

Limitations: Large amounts of coarse fragments throughout profile; bedrock may be within 60 inches. 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

Potential Reference Sites: Dry Igneous Protected Backslope Woodland

Plot HUMOCA02 – Irondale soil
Located in Hughes Mountain CA, Washington County, MO
Latitude: 37.809088
Longitude: -90.71103

Plot PERACA07 – Irondale soil
Located in Peck Ranch CA, Carter County, MO
Latitude: 37.077728
Longitude: -91.20008

Plot PRHOGO03 – Irondale soil
Located in Prairie Hollow Gorge NA, Shannon County, MO
Latitude: 37.181058
Longitude: -91.260433

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Approval

Nels Barrett, 9/24/2020

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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	09/10/2020
Approved by	Nels Barrett
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:**