Ecological Site Description

Dry Igneous Exposed Backslope Woodland F116CY011MO

- *(Quercus stellata - Quercus velutina/Rhus aromatic/Schizachyrium scoparium)*
- (post oak – black oak/aromatic sumac/little bluestem)

An Ecological Site Description (ESD) is a reference document of ecological knowledge regarding a particular land area (ecological site). An ESD describes ecological potential and ecosystem dynamics of land areas and their potential management. Ecological sites are linked to soil survey map unit components, which allows for mapping of ecological sites. (***NOTE:*** *This is a "provisional" ESD, and is subject to change. It contains basic ecological information sufficient for conservation planning and land management in Missouri. After additional information is developed and reviewed, a "Correlated" ESD will be published and will be available via the Web Soil Survey* http://websoilsurvey.nrcs.usda.gov .)

Major Land Resource Area: 116C – St. Francois Knobs and Basins

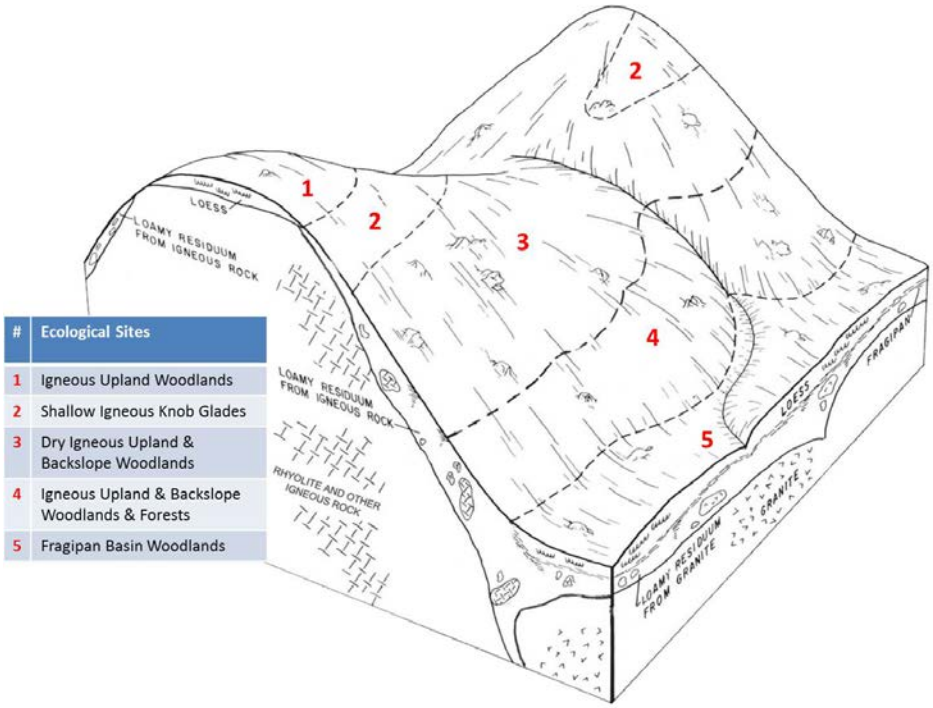
Introduction

The St Francois Knobs and Basins (area outlined in red on the map) 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).

Dry Igneous Exposed Backslope Woodlands are within the green areas on the map. They occupy the southerly and westerly aspects of steep, dissected slopes, and are mapped in complex with the Dry Igneous Protected 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.

Physiographic Features

This site is on upland backslopes with slopes of 15 to 50 percent. It is on exposed aspects (south, southwest, and west), which receive significantly more 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.



#	Ecological Sites
1	Igneous Upland Woodlands
2	Shallow Igneous Knob Glades
3	Dry Igneous Upland & Backslope Woodlands
4	Igneous Upland & Backslope Woodlands & Forests
5	Fragipan Basin Woodlands

The adjacent 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.

Soil Features

These soils have granitic or rhyolitic volcanic bedrock at 20 to 60 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.

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 Exposed Backslope Woodlands are dominated by short (30 to 50 feet) open grown post oak, with scattered blackjack, northern red and black oaks and shortleaf pine. Canopy is rather open 30 to 50 percent on the exposed positions. The understory canopy is also open with a dense ground flora of native grasses and forbs.

The somewhat shallow soils and exposed landscape position of Dry Igneous Exposed Backslope Woodlands limits the growth of trees and supports an abundance of native grasses and forbs in the understory. Fire played an important role in the maintenance of these systems as well. It is likely that these ecological sites, along with adjacent knobs and woodlands burned at least once every 5 years. These periodic fires would have kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs.

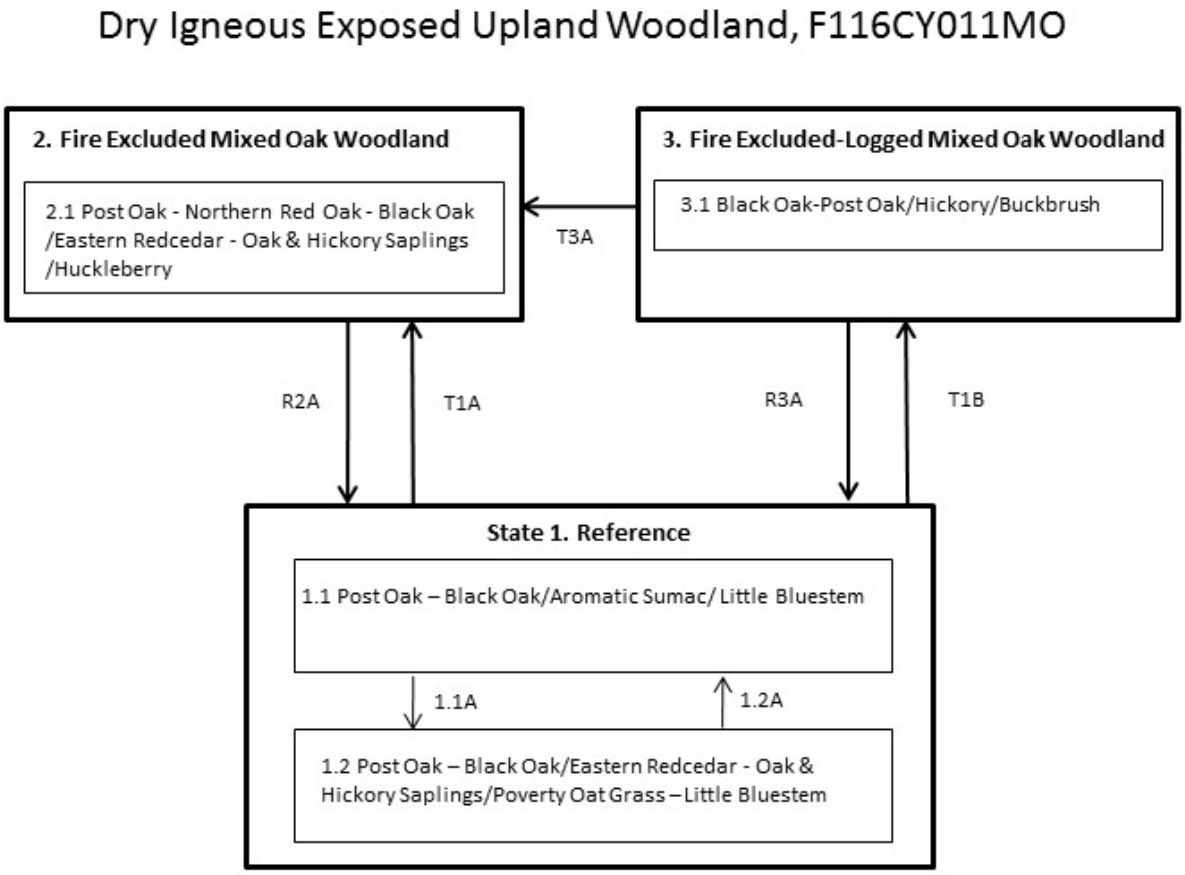
These sites were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by large native herbivores, such as bison, elk and deer, 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 have encroached into these woodlands. Once established, these woodies can quickly fill the woodland system. Most occurrences today are 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. Domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, gooseberry, and Virginia creeper. It also promotes the invasion of eastern red cedar.

Today, uncontrolled domestic grazing is also impacting these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, 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 productivity problems.

Timber harvesting is very limited on these sites because of the poor quality and tree size. They are excellent wildlife sites.

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.



Code	Event/Process
T1A, T3A	Fire suppression > 20 years
T1B	Fire suppression ; logging
R2A	Thinning ; prescribed fire
R3A	Prescribed fire
1.1A	Fire-free interval 10-15 years
1.2A	Fire interval 3-5 years

Ecological States

State 1 - Reference

The reference state was old growth woodland dominated by short (30 to 50 feet) open grown post oak, with scattered blackjack, northern red and black oaks and an occasional shortleaf pine. Canopy closure varies with aspect and soil depth from open 30 to 50 percent canopy on most exposed positions, shallower soils, to more closed 50 to 80 percent canopy on more protected positions with deeper soil profiles. The understory is open with a dense ground flora of native grasses and forbs.

Fire played an important role in the maintenance of these state as well. It is likely that these ecological sites, along with adjacent knobs burned at least once every 5 years. These periodic fires would have kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. Soil fertility and site productivity is low. Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Reference states are very rare today.

State 2 - Fire Excluded Mixed Oak Woodland
This state is dominated by post oak, northern red oak and black 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 (10 to 20 years). Canopy closures can approach 50 to 70 percent with little or no ground flora. Without active management or long term presence of fire, woody species such as redcedar will encroach into these woodlands. Once established, these woodies can quickly fill the woodland system.

Most occurrences of this state today are dense, and shady with a greatly diminished ground flora. Removal of the younger understory, opening the upper canopy, and the application of prescribed fire has proven to be effective management tools. Timber harvesting is very limited on these sites because of the poor quality and tree size. They are excellent wildlife sites.

State 3 - Fire Excluded-Logged Mixed Oak Woodland
In the long term absence of fire, woody species have encroached into this woodland state. Once established, these woody species will quickly fill the woodland system. Removal of the younger understory and the application of prescribed fire have proven to be effective management tools.

Timber harvesting is very limited on these sites because of the poor quality and tree size. This state, while of limited timber value, experienced occasional harvesting (high grading) of northern red oak, scarlet oak, shortleaf pine and white oak that has reduced the densities of these species causing an increase in black oak and blackjack oak.

Reference State Plant Community
Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
POST OAK	*Quercus stellata*	20-40	40
BLACK OAK	*Quercus velutina*	10-30	50
NORTHERN RED OAK	*Quercus rubra*	5-20	50
BLACK HICKORY	*Carya texana*	10-20	40
BLACKJACK OAK	*Quercus marilandica*	10-20	30
SHORTLEAF PINE	*Pinus echinata*	10-20	50
SHAGBARK HICKORY	*Carya ovata*	5-20	40

Understory Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
SASSAFRAS	*Sassafras albidum*	5-10	30
DOWNY SERVICEBERRY	*Amelanchier arborea*	5-10	20

Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WINGED ELM	*Ulmus elata*	5-20	6
AROMATIC SUMAC	*Rhus aromatica*	10-30	5
LOW BUSH BLUEBERRY	*Vaccinium vacillans*	5-20	3

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
CYPRESS PANIC GRASS	*Panicum dichotomum*	5-10
LITTLE BLUESTEM	*Schizachyrium scoparium*	10-30
ROCK MULY	*Muhlenbergii sobolifera*	5-10
WHITETINGE SEDGE	*Carex albicans*	5-10
POVERTY OAT GRASS	*Danthonia spicata*	10-20

Forbs

Common Name	Botanical Name	Cover % (low-high)
NAKED FLOWER TICKTREFOIL	*Desmodium nudiflorum*	5-10
SLENDER BUSH CLOVER	*Lespedeza virginica*	5-10
BIRD'S FOOT VIOLET	*Viola pedata*	5-10
ELM-LEAF SOLIDAGO	*Solidago ulmifolia*	5-10
LICORICE BEDSTRAW	*Galium circaezans*	5-10
DOWNY RAGGED GOLDENROD	*Solidago petiolares*	5-10
PERPLEXED TICKTREFOIL	*Desmodium perplexum*	5-10
MANYRAY ASTER	*Symphiotrichum anomalum*	5-10
TRAILING BUSH CLOVER	*Lespedeza procumbens*	5-10
ST. ANDREW'S CROSS	*Hypericum hypericoides*	5-10
WOMEN'S TOBACCO	*Antennaria plantaginifolia*	5-10
HAIRY SUNFLOWER	*Helianthus hirsutus*	5-10
SKY BLUE ASTER	*Symphyotrichum oolentangiense*	5-10

Site Interpretations

Wildlife

- 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, and Red-eyed Vireo.
- Reptiles and amphibians associated with this ecological site include ornate box turtle, northern fence lizard, five-lined skink, coal skink, broad-headed skink, six-lined racerunner, western slender glass lizard, prairie ring-necked snake, flat-headed snake, rough earth snake, red milk snake, western pygmy rattlesnake, and timber rattlesnake.

Forestry

- Management: Site index values range from 40 to 50 for oak and 50 to 55 for shortleaf pine. Timber management opportunities are poor.

- 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.

Glossary

Backslope – a hillslope profile position that forms the steepest and generally linear, middle portion of the slope.

Backswamp – marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces

Calcareous – the presence of calcium carbonate in the soil parent material within the rooting zone; relatively alkaline

Claypan – a dense, compact, slowly permeable layer in the subsoil having much higher clay content than the overlying material

Chert – hard, extremely dense or compact crystalline sedimentary rock, consisting dominantly of interlocking crystals of quartz

Cliff – a significant vertical, or near vertical, rock exposure

Dolomite – a type of sedimentary rock that is a carbonate mineral composed of calcium magnesium carbonate

Drainageway – the upper most reach of a stream channel system characterized by little meandering

Dry – a site where soil moisture is limiting during the growing season; low available water capacity

Dune – a low mound, ridge, bank or hill of loose, wind-blown sand

Exposed – steep, south and west-facing slopes, which are warmer and drier than other slope aspects

Flatwoods – a type of woodland that occurs on soils with a root restricting subsoil layer within 20 to 30 inches, resulting in very slow runoff and ponding that remains saturated for most of the winter and early spring months but dries out and becomes very dry in the summer months; plants that grow there must be adapted to both conditions

Floodplain – the nearly level plain that borders a stream and is subject to inundation under flood-stage conditions

Footslope – a hillslope position at the base of a slope where hillslope sediment (colluvium) accumulates

Forest – a vegetative community dominated by trees forming a closed canopy and interspersed with shade-tolerant understory species

Fragipan – a dense, brittle subsoil horizon that is extremely hard and compact when dry

Glade – open, rocky, barren vegetative community dominated by drought-adapted forbs and grasses, typically with scattered, stunted woody plants

Igneous – bedrock created by cooling and crystallization of magma forming igneous rock. Granite and rhyolite are typical igneous bedrocks in Missouri

Limestone – a type of sedimentary rock composed largely of calcium carbonate

Loess – material transported and deposited by wind and consisting predominantly of silt-size particles

Loamy – soil material containing a relatively equal mixture of sand and silt and a somewhat smaller proportion of clay

Marsh – a type of wetland that is dominated by herbaceous rather than woody plant species

Moist – a site that is moderately well to well drained and has high available water capacity, resulting in a well-balanced supply of moisture (neither too dry nor too wet).

Mudstone – blocky or massive, fine-grained sedimentary rock in which the proportions of clay and silt are approximately equal

Natric – a soil horizon that displays a blocky, columnar, or prismatic structure and has a subhorizon with an exchangeable-sodium saturation of over 15%

Outwash – stratified sediments of sand and gravel removed or “washed out” from a glacier by melt-water streams

Prairie – a vegetative community dominated by perennial grasses and forbs with scattered shrubs and very few trees

Protected – steep, north- and east-facing slopes, which are cooler and moister than other slope aspects

Residuum - unconsolidated, weathered, or partly weathered mineral material that accumulates by disintegration of bedrock in place

Riser – a component of terraces and flood-plain steps consisting of the steep side slope; the escarpment

Riverfront – a vegetative community in the floodplain immediately adjacent and generally parallel to a river or stream channel

River hills – a geographic area characterized by thick, dissected loess deposits, formed immediately adjacent to the edges of the Missouri and Mississippi River floodplains

Sandy – a coarse-sized soil containing a large mixture of sand and gravels and a somewhat smaller proportion of silts and clays with excessive drainage

Sandstone – a sedimentary rock containing dominantly sand-size particles

Savanna – grasslands interspersed with open-grown scattered trees, groupings of trees, and shrubs

Shale – a sedimentary rock formed from clay, silty clay, or silty clay loam deposits and having the tendency to split into thin layers

Shallow – a site with bedrock within 20 inches of the surface

Shoulder – the slope profile position that forms the convex surface near the top of a hill slope; it comprises the transition zone from summit to backslope

Sinkhole – a closed, circular or elliptical depression, commonly funnel-shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock or by collapse of underlying caves within bedrock

Summit – the top or highest area of a hillslope

Swale –shallow, closed depressions irregularly spaced across a floodplain or terrace with an irregularly undulating surface.

Swamp – an area of low, saturated ground, intermittently or permanently covered with water, and predominantly vegetated by shrubs and trees.

Talus – rock fragments of any size or shape (usually coarse and angular) derived from and lying at the base of a cliff or very steep rock slope.

Terrace – a step-like surface, bordering a valley floor that represents the former position of a flood plain

Till – dominantly unsorted and unstratified soil material deposited directly by a glacier

Upland – a general term for the higher ground of a region, in contrast with a low-lying, adjacent land such as a valley or floodplain

Wet – a somewhat poorly, poorly or very poorly drained site that has an oversupply of moisture during the growing season

Woodland – a highly variable vegetative community with a canopy of trees ranging from 30 to 100 percent closure with a sparse midstory and a dense ground flora of grasses, sedges and forbs

References

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

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.

Simmons, M., J. D. Childress, K. Godsey, & R. Taylor. 2006. Soil Survey of Reynolds County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.