

## *Ecological Site Description*

### **Shallow Sandstone Upland Glade/Woodland**

**R116AY027MO**

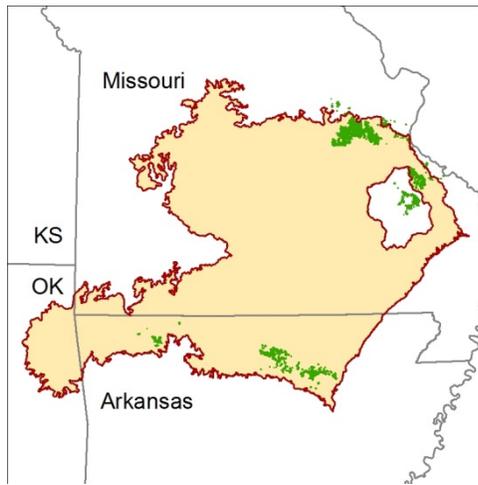
- (*Quercus marilandica*/*Rhus copallina*/*Schizachyrium scoparium* - *Crotonopsis elliptica*)
- (blackjack oak/winged sumac/little bluestem – Michaux’s croton)

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:** 116A – Ozark Highland

#### **Introduction**

The Ozark Highland (area outlined in red on the map) constitutes the Salem Plateau of the Ozark Uplift. Elevation ranges from about 300 feet on the southeast edge of the Ozark escarpment, to



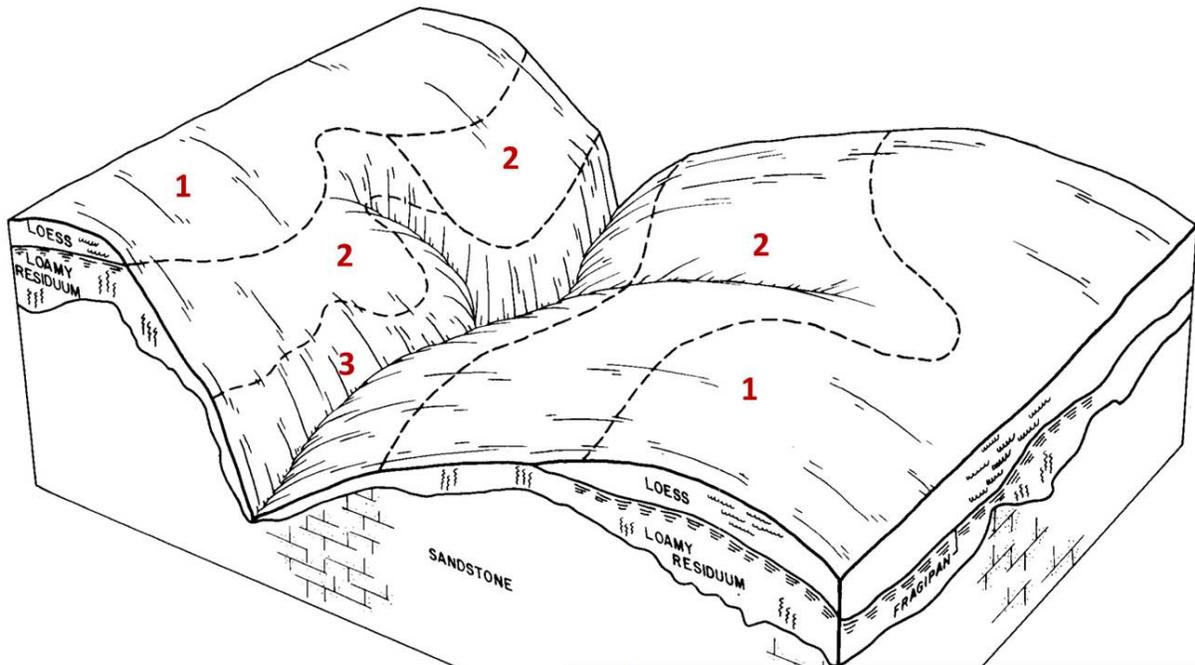
about 1,600 feet in the west, adjacent to the Burlington Escarpment of the Springfield Plateau. The underlying bedrock is mainly horizontally bedded Ordovician-aged dolomites and sandstones that dip gently away from the uplift apex in southeast Missouri. Cambrian dolomites are exposed on deeply dissected hillslopes. In some places, Pennsylvanian and Mississippian sediments overlie the plateau. Relief varies, from the gently rolling central plateau areas to deeply dissected hillslopes associated with drainageways such as the Current and Eleven Point Rivers.

Sandstone Upland Glade/Woodlands (green areas on the map) occur in the northeastern and southern portions of the Ozark Highland. They occur in valleys below loess and chert covered uplands and form a complex with sandstone woodlands and forests. Soils are very shallow to sandstone bedrock.

#### **Physiographic Features**

This site is on upland crests, shoulders and backslopes with slopes of 3 to 15 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Brown & Childress, 1985) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “3” on the figure. Shallow Sandstone Upland Glade/Woodland sites are typically associated with Low-base Sandstone Upland Woodland sites, labeled “2”.



#	Ecological Site
1	Fragipan Upland Flatwoods
2	Low-base Sandstone Upland Woodland
3	Shallow Sandstone Upland Glade/Woodland

**Soil Features**

These soils are underlain by sandstone bedrock at less than 20 inches. The soils were formed under a mixture of grasses, forbs, and woodlands. Organic matter content is variable, but is generally low. Parent material is sandstone residuum. They have fine sandy loam or loam surface layers, with loamy subsoils. Low to moderate amounts of sandstone fragments are in some soils. They are not affected by seasonal wetness. Soil series associated with this site include Ramsey.

**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.*

Shallow Sandstone Upland Glade/Woodlands harbor a wide diversity of lichens, plants and animals. The dominant grasses include little bluestem, broomsedge and Indian grass. The glade/woodland complexes range from wide open grassy areas with very shallow soils and bare bedrock, to areas with widely scattered blackjack oaks on slightly deeper soils and more protected slopes.

The shallow soils of the Shallow Sandstone Upland Glade/Woodlands limit the growth and abundance of trees and support the native grasses and forbs that dominate these systems. Trees found on and near glades are often stunted and express poor development because of shallow droughty soils and poor growing conditions. Like the adjacent prairies, fire also played an important role in the maintenance of these systems. These systems typically burned at least once every three years.

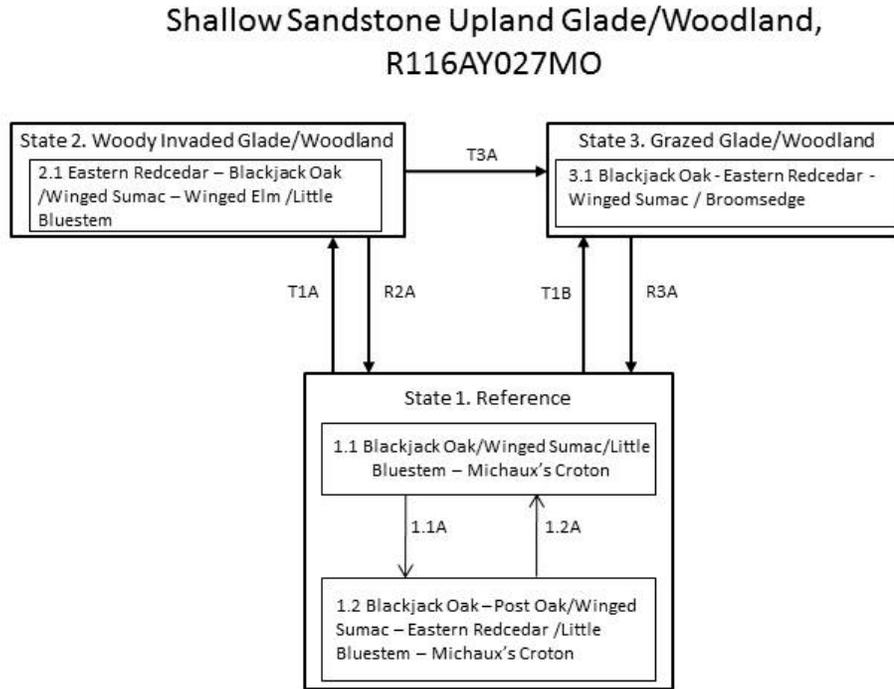
These periodic fires removed the litter and stimulated the growth and flowering of the grasses and forbs. They also further limited the growth and dominance of trees. Fire tolerant blackjack oak occupied islands and edges of deeper soils, creating a complex mosaic of open glade and low-density woodland.

During fire-free intervals, woody species increased, especially on protected slopes. Once established, blackjack oak, eastern redcedar and sumac can quickly fill in a glade/woodland system, especially if grazing has diminished the vigor of the diverse flora.

Many glades have been heavily grazed and suffer substantial woody invasion. Removal of the woodies and the application of prescribed fire have proven to be effective management tools.

A state-and-transition diagram is depicted in Figure 1. 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.

**Figure 1: State and transition diagram**



Code	Event/Activity
T1A	Fire suppression (>20 years)
T1B	Uncontrolled grazing; fire suppression
T3A	Uncontrolled grazing
R2A	Cedar removal; prescribed fire
R3A	Grazing exclusion; prescribed fire; woody removal
1.1A	Fire-free interval (5-10 years)
1.2A	Fire interval (3-5 years)

**Ecological States**

**State 1: Reference**

The historic Shallow Sandstone Upland Glade/Woodland reference site harbors a wide diversity of plants and animals. Many, like little bluestem, Indian grass, and sideoats grama, are also found on prairies. The glade/woodland complexes range from wide open grassy areas with shallower soil profiles and bare bedrock, to areas with widely scattered blackjack and post oaks on locations with soil depths at the deeper extreme of the range for this soil component. On protected slopes, open woodlands are more common. Here the deeper soil depth range for this soil component and protected aspects allow more woody components to dominate. While many have suffered from grazing and fire suppression, good examples can still be found.

**State 2: Woody Invaded Glade/Woodland**

This state is dominated by eastern redcedar with large increases of oak density due to extended periods of fire suppression. This state can form relatively even-age stands, dating to when fire suppression became the dominant management characteristic on the site. Canopy closures can

approach 100 percent with little or no ground flora. Transition back to the reference state may require a number of prescribed fire events and thinning out of excess woody species. This state also can transition to a grazed state (State 3) with the introduction of domestic livestock.

### State 3: Grazed Glade/Woodland

The Grazed Glade/Woodland State has reduced cover, diversity and vigor of native glade/woodland flora. Woody species encroachment, particularly by eastern redcedar, has also increased in this state. Potential physical site damage by uncontrolled livestock grazing may further degrade this state.

### Reference State Plant Community

#### Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
BLACKJACK OAK	<i>Quercus marilandica</i>	5-20	20
POST OAK	<i>Quercus stellata</i>	0-10	30
EASTERN REDCEDAR	<i>Juniperus virginiana</i>	0-10	10
SHORTLEAF PINE	<i>Pinus echinata</i>	0-10	40

#### Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WINGED ELM	<i>Ulmus alata</i>	0-10	5
WINGED SUMAC	<i>Rhus copallina</i>	0-10	5
FARCKLEBERRY	<i>Vaccinium arboreum</i>	0-10	3
AROMATIC SUMAC	<i>Rhus aromatica</i>	0-10	3

#### Lichens

Common Name	Botanical Name	Cover % (low-high)
REINDEER LICHEN	<i>Cladina rangiferina</i>	5-20
CUP LICHEN	<i>Cladonia mateocyatha</i>	5-20
COBBLESTONE LICHEN	<i>Acarospora contigua</i>	5-20

#### Forbs

Common Name	Botanical Name	Cover % (low-high)
MICHAUX'S CROTON	<i>Croton michauxii</i> var. <i>ellipticus</i>	0-10
GOAT'S RUE	<i>Tephrosia virginiana</i>	0-10
BLAZING STAR	<i>Liatris squarrosa</i>	0-10
ROUGH FALSE FOX GLOVE	<i>Agalinis gattingeri</i>	0-10
WILD PETUNIA	<i>Ruellia humilis</i>	0-10
SMALL PLANTAIN	<i>Plantago pusilla</i>	0-10
ROUGH BUTTONWEED	<i>Diodia teres</i>	0-10
DWARF DANDELION	<i>Krigia virginica</i>	0-10
SOUTHERN BLUETS	<i>Houstonia micrantha</i>	0-10
HAIRY LIP FERN	<i>Cheilanthes lanosa</i>	0-10
ROCK SPIKEMOSS	<i>Selaginella rupestris</i>	0-10
MEALY CORYDALIS	<i>Corydalis crystallina</i>	0-10
HAIRY PINWEED	<i>Lechea villosa</i>	0-10
PINWEED	<i>Hypericum gentianoides</i>	0-10

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
LOPSIDED RUSH	<i>Juncus secundus</i>	5-10
BROOMSEDGE	<i>Andropogon virginicus</i>	5-10
TAPERED ROSETTE GRASS	<i>Dichanthelium acuminatum</i>	5-10
POVERTY OAT GRASS	<i>Danthonia spicata</i>	5-10
LITTLE BLUESTEM	<i>Schizachyrium scoparium</i>	10-20
INDIAN GRASS	<i>Sorghastrum nutans</i>	5-10
UMBRELLA SEDGE	<i>Cyperus lupulinus</i>	5-10
PURPLE LOVEGRASS	<i>Eragrostis spectabilis</i>	5-10
SIXWEEKS FESCUE	<i>Vulpia octoflora</i>	5-10

**Site Interpretations**

*Wildlife*

- Wildlife habitat: oaks provide hard mast; numerous native legumes provide high-quality wildlife food; native warm-season grasses provide extensive cover and nesting habitat; and a diversity of forbs provides a diversity and abundance of insects. Post-burn areas can provide temporary bare-ground – herbaceous cover habitat important for turkey poult and quail chicks.
- Game species that utilize this ecological site include:  
Northern Bobwhite will utilize this ecological site for food (seeds, insects), cover needs (escape, nesting and roosting cover) and brood-rearing habitat.

Cottontail rabbits will utilize this ecological site for food (seeds, soft mast) and cover needs.

Turkey will utilize this ecological site for food (seeds, green browse, soft mast, and insects) and nesting and brood-rearing cover. Turkey poult feed heavily on insects provided by this site type.

White-tailed deer will utilize this ecological site for browse (plant leaves in the growing season, seeds and soft mast in the fall/winter). This site type also can provide escape cover.

- Bird species associated with this ecological site’s reference state condition:  
Breeding Birds: Field Sparrow, Yellow-breasted Chat, Blue-winged Warbler, Brown Thrasher, Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Summer Tanager and Eastern Wood-Pewee.
- Amphibian and reptile species that may be associated with this ecological site’s reference state: five-lined skink (*Eumeces fasciatus*), six-lined racerunner (*Cnemidophorus sexlineatus*), flat-headed snake (*Tantilla gracilis*), eastern coachwhip (*Masticophis flagellum flagellum*), red milk snake (*Lampropeltis triangulum sypila*), ground snake (*Snora semiannulata*) and prairie ring-necked snake (*Diadophis punctatus arnyi*).
- Small mammals likely associated with this ecological site’s reference state condition: eastern woodrat (*Neotoma floridana*) and peromyscus species.

- Invertebrates – Many native insect species are likely associated with this phase of this ecological site’s reference state condition, especially native bees, ants, beetles, butterflies and moths, and crickets, grasshoppers and katydids.

Insect species likely associated with this ecological site’s reference state condition: lichen grasshopper (*Trimerotropis saxatilis*), a prickly pear borer moth (*Melitara prodenialis*), native ants (*Pheidole tysoni*, *Formica schaufussi*), and native bees (*Colletes aestivalis*, *Andrena helianthiformis*, *Protandrena rudbeckiae*, *Lasioglossum coreopsis*, *Anthidium psoraleae* and *Dianthidium subrufulum*).

### Forestry

- Management: Site index values are less than 30 for eastern redcedar and generally less than 40 for oak. Productivity is very low. **Very limited to no timber management opportunities exist.** These sites are valuable for wildlife purposes and watershed protection. Severely reduced rooting depth restricts tree growth and increases windthrow hazards. These sites respond well to prescribed fire as a management tool.
- Limitations: Surface stones and surface rock; very shallow soil depth. Surface stones and rocks are problems for efficient and safe equipment operation. Severe seedling mortality due to high soil surface temperatures and low available water holding capacity is possible. Machine planting and mechanical site preparation is not recommended. Hard bedrock at shallow depths may interfere with equipment operation. Rock outcrops may cause breakage of timber when harvesting. Surface stones and rocks will make equipment use extremely difficult. 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 formed by cooling and solidification of magma. 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

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