

## *Ecological Site Description*

### **Dolomite Protected Cliff**

**R116AY014MO**

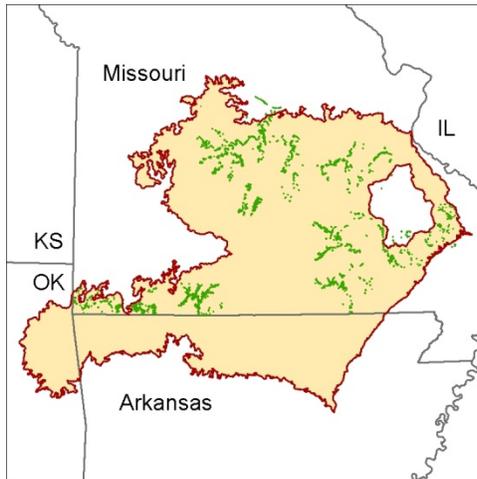
- (*Acer saccharum* - *Fraxinus quadrangulata*/*Hydrangea arborescens* - *Staphylea trifolia*/*Aquilegia canadensis* - *Solidago rugosa*)
- (sugar maple – blue ash/wild hydrangea – American bladdernut/columbine – cliff goldenrod)

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.

Dolomite Protected Cliffs 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 Dolomite Exposed Cliff ecological site. Soils are very shallow to limestone or dolomite.

### **Physiographic Features**

This site is on cliffs. It is on protected aspects (north, northeast, and east), which receive significantly less solar radiation than the exposed aspects. The site generates runoff to adjacent, downslope ecological sites, and in places receives runoff from upslope summit and shoulder sites. This site does not flood.

### **Soil Features**

These soils are underlain with dolomite bedrock at less than 20 inches. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is limestone and

dolomite residuum. These soils are loamy or clayey, and are skeletal, with high amounts of limestone/dolomite gravel, channers and flagstones. They are not affected by seasonal wetness. Soil series associated with this site include Gasconade, Knobby, and Moko.

### **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.*

The reference plant community is characterized by rock shelves, vertical rock cliffs and by stress tolerant trees, shrubs, ferns, lichens and mosses. These sites have large expanses of bare rock, with a variety of plants occupying cracks and minor ledges across the cliff face. Protected cliffs are normally more vegetated than exposed. Some harbor rare plants that are relicts of the colder climate of the Pleistocene.

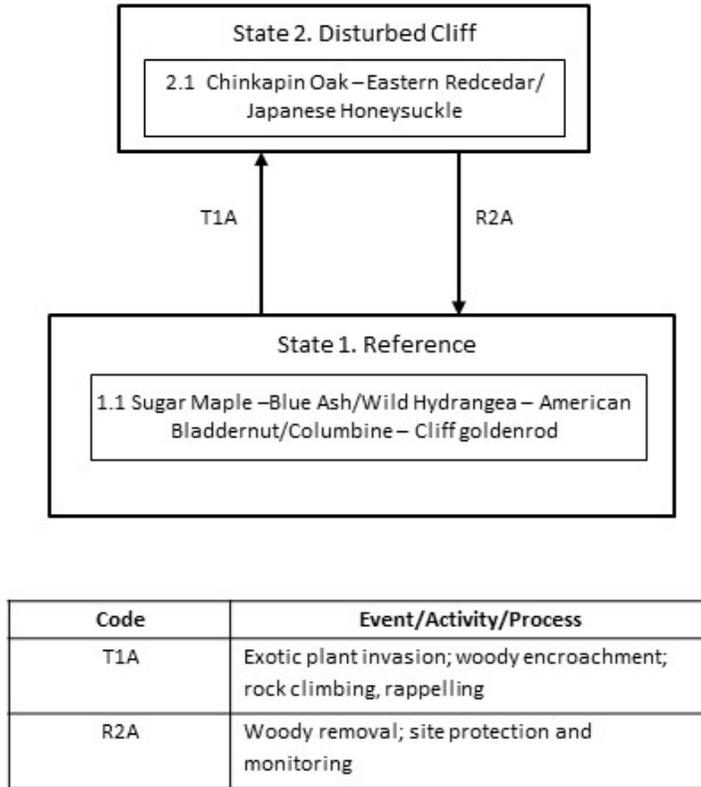
Dolomite Protected Cliffs can be above talus slopes or terraces, and are often below loess or chert forests and woodlands. Exposures of dolomite can be up to 100 feet in height, and often occur in a series of irregular rock ledges. When present, trees are stunted and the herbaceous vegetation is generally sparse. Cliff faces with visible seep zones and cool shaded habitats often support ferns, liverworts, mosses, algae, and fungi.

Soils are generally absent but do occur on cliff edges, ledges, and rock terraces and support higher densities of forbs and ferns. Microhabitats associated with cliffs are often ephemerally wet, becoming dry in summer. Shading on north and east facing aspects coupled with adjacent taller trees at the cliff bases keep the cliff face cooler. Protected cliffs are normally more vegetated than exposed cliffs. Vegetation structure is influenced by drought stress (cliff edge), wind, and storm damage and damage by falling rocks.

A state-and-transition model 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 may change as knowledge increases.

**Figure 1: State and transition diagram**

**Dolomite Protected Cliff, R116AY014MO**



**Ecological States**

**State 1: Reference**

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**State 2: Disturbed Cliff**

This state has experienced significant exotic plant invasion, such as Japanese honeysuckle. Repeated trampling by rock climbing and rappelling activities destroy the structure and composition of the reference plant communities. In addition, woody encroachment through these disturbances is also occurring.

**Reference State Plant Community**

## Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
SUGAR MAPLE	<i>Acer saccharum</i>	0-10	30
BLUE ASH	<i>Fraxinus quadrangulata</i>	0-10	30
CHINKAPIN OAK	<i>Quercus muehlenbergii</i>	0-10	30
EASTERN REDCEDAR	<i>Juniperus virginiana</i>	0-10	20

## Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WILD HYDRANGEA	<i>Hydrangea arborescens</i>	5-20	3
AMERICAN BLADDERNUT	<i>Staphylea trifolia</i>	5-20	10
FRAGRANT SUMAC	<i>Rhus aromatica</i>	5-20	4

## Ferns/Lichens

Common Name	Botanical Name	Cover % (low-high)
WALKING FERN	<i>Asplenium rhizophyllum</i>	5-10
BULBLET FERN	<i>Cystopteris bulbifera</i>	5-10
EBONY SPLEENWORT	<i>Asplenium platyneuron</i>	5-10
PURPLE CLIFFBRAKE	<i>Pellaea atropurpurea</i>	5-10
RIM LICHEN	<i>Lecanora muralis</i>	5-10
FISHSCALE LICHEN	<i>Psora pseudorussellii</i>	5-10

## Forbs

Common Name	Botanical Name	Cover % (low-high)
WAXYLEAF MEADOW RUE	<i>Thalictrum revolutum</i>	5-10
BROADLEAF GOLDENROD	<i>Solidago flexicaulis</i>	5-10
ORANGE CONEFLOWER	<i>Rudbeckia fulgida var. umbrosa</i>	5-10
COLUMBINE	<i>Aquilegia canadense</i>	5-10
CLIFF GOLDENROD	<i>Solidago rugosa</i>	5-10

## Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
LITTLE BLUESTEM	<i>Schizachyrium scoparium</i>	5-20
SIDEOATS GRAMA	<i>Bouteloua curtipendula</i>	5-20
BRISTLELEAF SEDGE	<i>Carex eburnea</i>	5-20

**Site Interpretations***Wildlife*

- Only a few animals are highly associated with cliff natural communities due to their unique structural conditions.
- Bird species associated with this ecological site's reference state condition: Turkey Vulture, Eastern Phoebe, American Kestrel, Northern Rough-winged Swallow, Cliff Swallow, and Barn Swallow.
- North-facing cliffs that are wet and moist may have numerous lungless salamander (Family Plethodontidae) species and pickerel frogs (*Rana palustris*).

- Small mammals likely associated with this ecological site's reference state condition: Eastern Woodrat (*Neotoma floridana*) and *Peromyscus* species.
- As with most natural communities, many invertebrate groups are represented on cliff natural communities including snails, spiders, insects, centipedes, millipedes and protistan microbe communities. Funnel-web and aerial web spiders are two groups well represented on cliff natural communities. Colonies of microcaddisflies and midgeflies are some of the invertebrate groups that occur on seep-type habitats created by the movement of thin sheets of water over the rock surface. Terrestrial snails are often abundant in the talus slopes that develop at the base of protected limestone/dolomite cliffs.

### Forestry

- **Management:** **This ecological site is not recommended for traditional timber production activity.**

### 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

## References

Baker, John L. 1998. Soil Survey of Cooper County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.

Fitzgerald, J.A. and D.N. Pashley. 2000a. Partners in Flight bird conservation plan for the Ozark/Ouachitas. American Bird Conservancy.

Fitzgerald, J.A. and D.N. Pashley. 2000b. Partners in Flight bird conservation plan for the Dissected Till Plains. American Bird Conservancy.

Heitzman, J.R. and J.E. Heitzman. 1996. Butterflies and moths of Missouri. 2<sup>nd</sup> ed. Missouri Department of Conservation, Jefferson City.

Jacobs, B. 2001. Birds in Missouri. Missouri Department of Conservation, Jefferson City.

Johnson, T.R. 2000. The amphibians and reptiles of Missouri. 2<sup>nd</sup> ed. Missouri Department of Conservation, Jefferson City.

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.

Pitts, D.E. and W.D. McGuire. 2000. Wildlife management for Missouri landowners. 3<sup>rd</sup> ed. Missouri Department of Conservation, Jefferson City.

Schoolcraft, H.R. 1821. Journal of a tour into the interior of Missouri and Arkansas from Potosi, or Mine a Burton, in Missouri territory, in a southwest direction, toward the Rocky Mountains: performed in the years 1818 and 1819. Richard Phillips and Company, London.

Schwartz, C.W., E.R. Schwartz and J.J. Conley. 2001. The wild mammals of Missouri. University of Missouri Press, Columbia and Missouri Department of Conservation, Jefferson City.