

Ecological Site Description

Limestone/Dolomite Exposed Cliff

R115BY019MO

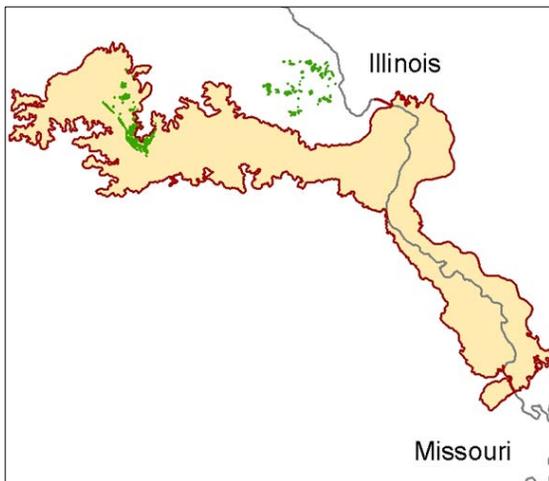
- (*Juniperus virginiana* - *Quercus muehlenbergii* /*Celastrus scandens*/*Bouteloua curtipendula* - *Pellaea atropurpurea*)
- (Eastern redcedar – chinkapin oak/American bittersweet /sideoats grama – purple cliffbrake)

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: 115B – Central Mississippi Valley Wooded Slopes, Western Part

Introduction

The Central Mississippi Valley Wooded Slopes, Western Part (area outlined in red on the map) consists mainly of the deeply dissected, loess-covered hills bordering the Missouri and Mississippi Rivers as well as the floodplains and terraces of these rivers. It wraps around the northeast corner of the Ozark Uplift, and constitutes the southern border of the Pre-Illinoian-aged till plain.



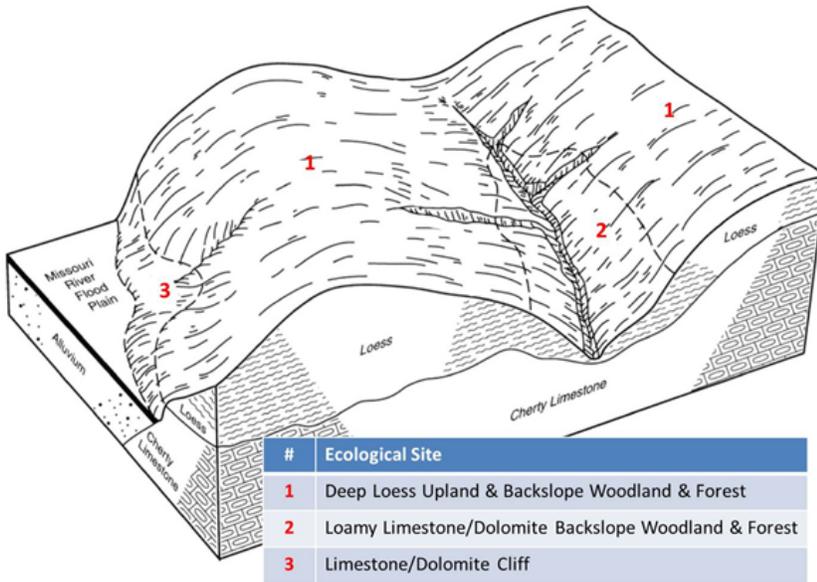
Elevation ranges from about 320 feet along the Mississippi River near Cape Girardeau in the south to about 1,020 feet on the highest ridges near Hillsboro, MO in the east. Local relief varies from 10 to 20 feet in the major river floodplains, to 50 to 100 feet in the dissected uplands, with bluffs of 200 to 350 feet along the Mississippi and Missouri Rivers. Underlying bedrock is mainly Ordovician-aged dolomite and sandstone, with Mississippian-aged limestone north of the Missouri River.

Limestone/Dolomite Exposed Cliffs are within the green areas on the map. They occupy southerly and westerly aspects, and are mapped in complex with the

Limestone/Dolomite Protected Cliff ecological site. These sites are north of the Missouri River, often on cliffs adjacent to floodplains. They are typically associated with Limestone/Dolomite Glade/Woodland ecological sites. Soils are very shallow to limestone or dolomite.

Physiographic Features

This site is on cliffs. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected 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.



The adjacent figure (adapted from Young et al., 2003) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites in the uplands adjacent to the Missouri River. The site is within the area labeled “3”, on cliffs with southerly and westerly aspects. They are typically associated with Shallow Limestone/Dolomite Glade/Woodland ecological sites, included within the area labeled “3”. Deep Loess sites often directly upslope, and are included within the area labeled “1”.

Soil Features

These soils are underlain with limestone and/or dolomite bedrock at less than 20 inches. The soils 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.

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 community is characterized by vertical rock cliffs and by stress tolerant trees and shrubs, ferns, lichens and mosses. The stunted trees and shrubs and prairie grasses, sedges, forbs, and lichens dominate a variety of microhabitats (e.g. vertical rock faces, crevices, ledges, and solution pockets) making up this diverse ecological site. Exposed cliffs are normally less vegetated than protected cliffs. Herbaceous vegetation ranges up to 35 percent cover, although lichen cover may be greater. Occasional woody species can be found on the site.

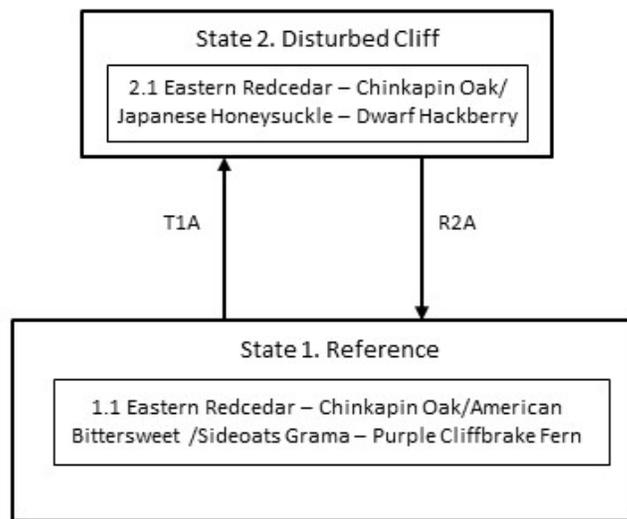
Soils are generally absent but do occur on cliff edges, ledges, and rock terraces and support higher densities of woody species, forbs and ferns. These sites have large expanses of bare rock, with a variety of plants occupying cracks and minor ledges across the cliff face. Solar radiation on south and west facing aspects coupled with strong air movements keep the cliff face hot and dry.

Vegetation structure is influenced by drought stress (cliff edge), wind, extreme heat, 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

Limestone/Dolomite Exposed Cliff, R115BY019MO



Code	Event/Activity/Process
T1A	Exotic plant invasion; woody encroachment; Human disturbances: rock climbing, rappelling
R2A	Woody removal; site protection and monitoring

Ecological States

State 1: Reference

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. When present, trees are stunted and the herbaceous vegetation is generally sparse.

State 2: Disturbed Cliff

This state has experienced significant exotic plant invasion, such as Japanese honeysuckle. Repeated trampling by human 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)
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/Vines

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WILD HYDRANGEA	<i>Hydrangea arborescens</i>	5-20	3
DWARF HACKBERRY	<i>Celtis tenuifolia</i>	5-20	10
FRAGRANT SUMAC	<i>Rhus aromatic</i>	5-20	4
AMERICAN BITTERSWEET	<i>Celastrus scandens</i>	5-20	1

Ferns/Lichens

Common Name	Botanical Name	Cover % (low-high)
TENNESSEE BLADDER FERN	<i>Cyopteris tennesseensis</i>	5-10
PURPLE CLIFFBRAKE	<i>Pellaea atropurpurea</i>	5-10
RIM LICHEN	<i>Lecanora valesiaca</i>	5-10
FISHSCALE LICHEN	<i>Psora pseudorussellii</i>	5-10

Forbs

Common Name	Botanical Name	Cover % (low-high)
COLUMBINE	<i>Aquilegia canadensis</i>	5-10
MISSOURI CONEFLOWER	<i>Rudbeckia missouriensis</i>	5-10
NARROW-LEAVED BLUETS	<i>Hedyotis nigricans</i>	5-10
BROADLEAF GOLDENROD	<i>Solidago flexicaulis</i>	5-10
ORANGE CONEFLOWER	<i>Rudbeckia fulgida var. umbrosa</i>	5-10
WRINKLELEAF GOLDENROD	<i>Solidago rugosa</i>	5-10
BROADLEAF GOLDENROD	<i>Solidago flexicaulis</i>	5-10
STICKLEAF MENTZELIA	<i>Mentzelia oligosperma</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.
- South-facing cliffs that are more xeric may have overwintering Northern Fence Lizards (*Sceloporus undulatus hyacinthinus*), Five-lined Skinks (*Eumeces fasciatus*), Rough Green snakes (*Opheodrys aestivus aestivus*) or Timber Rattlesnakes (*Crotalus horridus*).
- 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.

*This section prepared by Mike Leahy, Natural Areas Coordinator, Missouri Department of Conservation, 2013

Forestry

- **Management:** **This ecological site is not recommended for traditional timber management 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

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. 2nd 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. 2nd 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.

Nelson, Paul W and Douglas Ladd. 1980. “Preliminary report on the identification, distribution and classification of Missouri glades”.

Nigh, Timothy A., and 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. 3rd ed. Missouri Department of Conservation, Jefferson City.

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.

Young, Fred J., Caryl A. Radatz, & Curtis A. Marshall. 2003. Soil Survey of Boone County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.