

Ecological Site Description

Calcareous Loess Protected Backslope Forest

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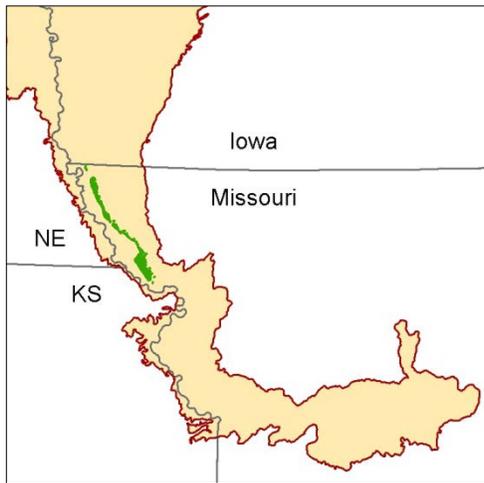
- (*Quercus rubra* - *Quercus alba*/*Asimina triloba* - *Ulmus rubra*/*Laportea canadensis* - *Erigenia bulbosa*)
- (northern red oak – white oak/pawpaw – red elm/Canadian woodnettle – harbinger of spring)

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: 107B – Iowa and Missouri Deep Loess Hills

Introduction

The Iowa and Missouri Deep Loess Hills (area outlined in red on the map) encompass the Missouri River floodplain and associated loess-covered uplands, from about Sioux City Iowa in the north to central Missouri. Elevation is about 1,565 feet on the highest ridges, to about 600 feet along the Missouri River near Glasgow in central Missouri. Local relief varies from 10 to 20 feet in the major river floodplains, to 50 to 100 feet in the dissected uplands, with loess bluffs of 200 to 300 feet along the Missouri River. The loess thins with distance from the Missouri river, and local relief decreases. The loess caps pre-Illinoian till, which crops out on lower hillslopes near the edges of the MLRA. The underlying bedrock is mainly Pennsylvanian and Cretaceous-aged shale, mudstone and sandstone.

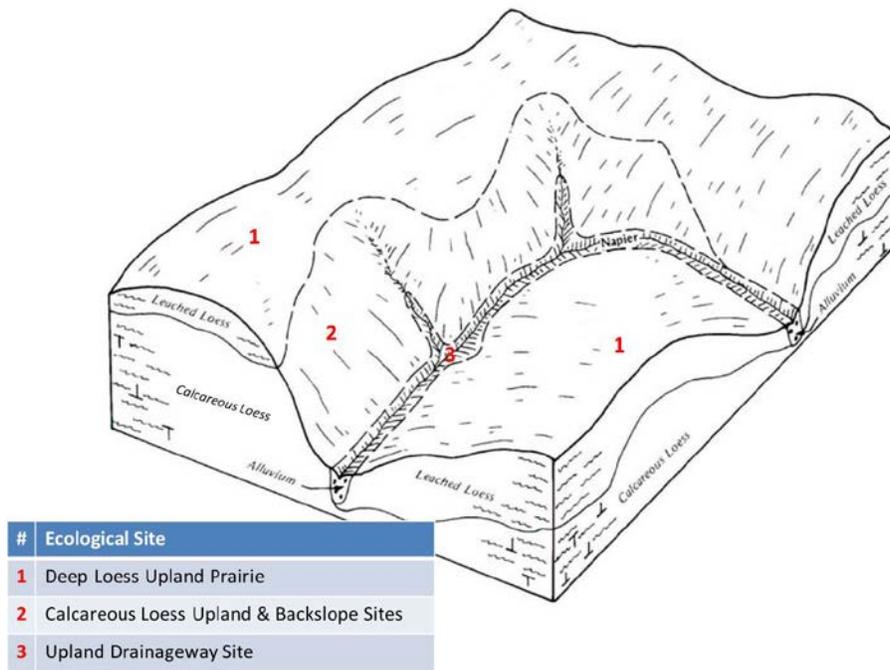


Calcareous Loess Protected Backslope Forests are within the green areas on the map (Missouri portion only; Iowa distributions are currently under review). They occupy the northerly and easterly aspects of steep, dissected slopes, and usually occupying the entire hillslope. They are mapped in complex with the Calcareous Dry Loess Exposed Backslope Woodland ecological site. These sites are adjacent to the Missouri River floodplain in the central portion of the MLRA, in Holt and Atchison counties, Missouri. Soils are very deep, with no rooting restrictions.

Physiographic Features

This site is on upland backslopes, with slopes of 14 to 90 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 adjacent figure (adapted from Holbrook, 1997) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. The site is within the area labeled “2”, on steep backslopes with northerly and easterly aspects. Deep Loess Upland Prairie sites are directly upslope, and are included within the area labeled “1”. Dashed lines within the Deep Loess Upland Prairie indicate different soils within this site.

Soil Features

These soils have no rooting restriction. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is loess. The soils are silt loam throughout, with calcium carbonate below about 2 feet. They are not affected by seasonal wetness. Soil series associated with this site include Timula.

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 a forest dominated by an overstory of red oak, white oak, white ash and occasional sugar maple. The canopy is rather tall (70 to 90 feet) and well developed (80 to 100 percent cover) and the understory well developed and with great structural diversity.

While fire-prone prairies, savannas and open woodlands surround this region, Calcareous Loess Protected Backslope Forests historically occurred in the most protected landscape positions. While the upland prairies and savannas may have had a fire frequency of 1 to 3 years, Calcareous Loess Protected Backslope Forests would have burned less frequently (estimated 10 to 25 years) and with

lower intensity. Periodic fires would have removed some of the shade tolerant understory, but it would have quickly recovered.

Today, these communities have been cleared, converted to pasture or have undergone repeated timber harvest and domestic grazing. Most existing sites have a younger (50 to 80 years) canopy layer whose composition may have been altered by timber harvesting practices. An increase in hickories over historic conditions is common. The absence of periodic fire allowed more shade-tolerant tree species, such as sugar maple, white ash, or hickories to increase in abundance.

Uncontrolled domestic grazing has also diminished the diversity and cover of woodland ground flora species, and has often introduced weedy species such as gooseberry, buckbrush, poison ivy and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion related to grazing can lower site productivity.

Calcareous Loess Protected Backslope Forests are one of the richest and most productive forest sites in the region. Oak regeneration is typically problematic. Sugar maple, red elm, ironwood, hickories, grapes, pawpaw and spicebush are often dominant competitors in the understory. Maintenance of the oak component will require disturbances that will impair the cool, moist, shaded conditions, so trade-offs will have to be made carefully.

Timber harvest in this region typically is done using single-tree selection, and often results in removal of the most productive trees, or high-grading of the stand. This can result in poorer quality 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 does occur 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.

Prescribed fire can play a beneficial but very limited role in the management of this ecological site. The higher productivity of these sites makes it more challenging than on woodland sites in the region. Control of woody species will be more difficult. Protected aspect forests did evolve with some fire, but their composition often reflects more closed, forested conditions, with fewer woodland ground flora species that can respond to fire. Consequently, while having protected aspects in a burn unit is acceptable, targeting them solely for woodland restoration is not advisable.

Reference State Plant Community

Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WHITE OAK	<i>Quercus alba</i>	30-50	70
RED OAK	<i>Quercus rubra</i>	30-50	90
WHITE ASH	<i>Fraxinus americana</i>	10-20	80
SHAGBARK HICKORY	<i>Carya ovata</i>	10-20	70
CHINKAPIN OAK	<i>Quercus muehlenbergii</i>	5-10	70
BLACK WALNUT	<i>Juglans nigra</i>	5-10	80
SUGAR MAPLE	<i>Acer saccharum</i>	5-10	70
BITTERNUT HICKORY	<i>Carya cordiformis</i>	5-10	80

Understory Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
HORNBEAM	<i>Ostrya virginiana</i>	10-20	40
RED BUD	<i>Cercis canadensis</i>	10-20	20
AMERICAN BLADDERNUT	<i>Staphylea trifolia</i>	10-20	30
RED ELM	<i>Ulmus rubra</i>	10-20	40

Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
SPICEBUSH	<i>Lindera benzoin</i>	10-20	6
PAWPAW	<i>Asimina triloba</i>	10-30	12

Forbs

Common Name	Botanical Name	Cover % (low-high)
BLACK SNAKEROOT	<i>Sanguinaria canadensis</i>	10-20
TOOTHWORT	<i>Cardamine concatenata</i>	10-20
ROUND LOBED HEPATICA	<i>Hepatica nobilis</i>	10-20
DUTCHMAN'S BREECHES	<i>Dicentra cucullaria</i>	10-20
EARLY MEADOW RUE	<i>Thalictrum dioicum</i>	10-20
GOLDEN ALEXANDER	<i>Zizia aptera</i>	10-20
FALSE SOLOMON'S SEAL	<i>Smilacina racemosa</i>	10-20
BLOODROOT	<i>Sanguinaria cana</i>	10-20
CANADIAN WOODNETTLE	<i>Laportea canadensis</i>	10-30
HARBINGER OF SPRING	<i>Erigenia bulbosa</i>	10-30

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
SILKY WILD RYE	<i>Elymus villosus</i>	5-10
BOTTLEBRUSH GRASS	<i>Elymus hystrix</i>	5-10
WOODLAND BROME	<i>Bromus pubescens</i>	5-10

Site Interpretations

Wildlife

- This forest type contains high structural and compositional diversity important for a number of songbirds and amphibians.
- Wild turkey, white-tailed deer, and eastern gray squirrel depend on hard and soft mast food sources and are typical upland game species of this type.
- Birds associated with this ecological site include Worm-eating warbler, Whip-poor-will, Great Crested Flycatcher, Ovenbird, Pileated Woodpecker, Wood Thrush, Red-eyed Vireo, Northern Parula, Louisiana Waterthrush (near streams), and Broad-winged Hawk.
- Reptile and amphibian species associated with mature forests include: ringed salamander, spotted salamander, marbled salamander, central newt, long-tailed salamander, dark-sided salamander, southern red-backed salamander, three-toed box turtle, western worm snake, western earth snake, and American toad.

Forestry

- **Management:** Site index values range from 60 to 80 for oak. Timber management opportunities are excellent. These groups respond well to even-aged management. 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. Uneven-aged management will slowly cause an increase in more shade tolerant species such as sugar maple. Using prescribed fire as a management tool could have a negative impact on timber quality, may not be fitting, or should be used with caution on a particular site if timber management is the primary objective. Where possible, favor white oak, black walnut, black cherry, and northern red oak.
- **Limitations:** No major equipment restrictions or limitations exist. 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

References

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