Ecological Site Description

Deep Loess Exposed Backslope Savanna R107BY003MO

- *(Quercus macrocarpa/Amorpha canescens/Schizachyrium scoparium - Bouteloua curtipendula)*
- (bur oak/lead plant/little bluestem – sideoats grama)

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

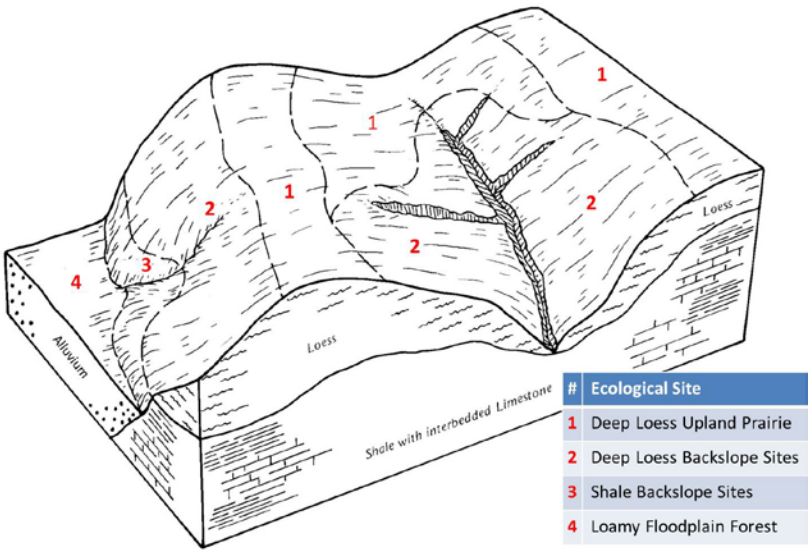
The Iowa and Missouri Deep Loess Hills (area outlined in red on the map) encompass the Missouri River floodplain and associated loess-covered uplands, from about Sioux City Iowa in the north to central Missouri. Elevation is about 1,565 feet on the highest ridges, to about 600 feet along the Missouri 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.

Deep Loess Exposed Backslope Savannas are within the green areas on the map (Missouri portion only; Iowa distributions are currently under review). They occupy the southerly and westerly aspects of steep, dissected slopes, and are mapped in complex with the Deep Loess Protected Backslope Woodland ecological site. These sites are adjacent to the Missouri River floodplain in the southern portion of the MLRA. Soils are very deep, with no rooting restrictions.

Physiographic Features

This site is on upland backslopes with slopes of 14 to 35 percent. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected 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 following figure (adapted from Cook, 1994) 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 southerly and westerly 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.



#	Ecological Site
1	Deep Loess Upland Prairie
2	Deep Loess Backslope Sites
3	Shale Backslope Sites
4	Loamy Floodplain Forest

Soil Features

These soils have no major rooting restriction. The soils were formed under a mixture of prairie and woodland vegetation, and have dark-colored surface horizons. Parent material is loess. The soils have silt loam surface horizons. Subsoils are silt loam to silty clay loam. Soil series associated with this site include Knox.

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 as a savanna with scattered shrubs and large post and bur oaks, and dominated by warm-season grasses such as little bluestem and sideoats grama. Tall grass species such as Indiangrass and big bluestem are also present. Other mid-grasses include prairie dropseed and broomsedge.

These sites were maintained by a combination of droughty soils, wind exposure, periodic fire and grazing. While protected by the Missouri River, these sites likely burned every 1 to 3 years. Fire removed dead plant litter and provided room for a lush growth of prairie vegetation. Fire also kept woody species at bay. Grazing by native large herbivores, such as bison, elk, and deer, also impacted these sites. Their activities would have altered composition and structure of the vegetation. Fuel loads would have been altered by heavy grazing and fire behavior affected, providing for a diversity of structure and composition. The partially wooded draws would have burned less intensely and less frequently. During fire free intervals woody species would have increased in abundance and spread up onto the prairie.

These sites are well drained and also supported a wide variety of native forbs interspersed throughout the grass stand. Some of the forbs were prairie clovers, various coneflowers, goldenrod species, and sunflowers. Lesser amounts of hoary puccoon, wild bergamot, blazing star, Indian paintbrush were also present. Leadplant, wild plum and prairie willow were low growing shrubs that occurred on the site. Occasional, scattered, large bur oaks and post oaks were also present.

Today, Deep Loess Exposed Backslope Savannas are still present in the region, although most are severely degraded. In the absence of fire many of the sites have been encroached by woody species. The remaining Deep Loess Exposed Backslope Savanna sites can be a stable plant community when controlled grazing and prescribed fire are used as management activities.

A prescribed grazing program that incorporates periods of deferment during the growing season benefits the warm season grasses and even the more palatable forb species. Exclusion of fire can lead to woody encroachment. Excessive grazing and livestock trailing can quickly impact soil stability and lead to sheet and gully erosion. Conversion back to a reference community from a non-native grass state can be expensive and may take many years before fully converted.

Reference State Plant Community

Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
BUR OAK	*Quercus macrocarpa*	5-20	50
POST OAK	*Quercus stellata*	5-20	40
DWARF CHINKAPIN	*Quercus prinoides*	5-20	15

Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
PASTURE ROSE	*Rosa carolina*	5-10	2
LEAD PLANT	*Amorpha canescens*	5-20	3
PRAIRIE WILLOW	*Salix humilis*	5-10	3
WILD PLUM	*Prunus americana*	5-10	6

Forbs

Common Name	Botanical Name	Cover % (low-high)
WILD QUININE	*Parthenium integrifolium*	5-20
BUTTERFLY WEED	*Asclepias tuberosa*	5-20
BLAZING STAR	*Liatris pycnostachya*	5-20
ASHY SUNFLOWER	*Helianthus mollis*	5-20
RATTLESNAKE MASTER	*Eryngium yuccifolium*	5-20
SHOWY GOLDENROD	*Solidago speciosa*	5-20
PRAIRIE MILKWEED	*Asclepias sullivantii*	5-20
FIELD MILKWORT	*Polygala sanguinea*	5-10
ROSINWEED	*Silphium integrefolium*	5-20
PURPLE PRAIRIE CLOVER	*Dalea purpurea*	5-20
PURPLE CONEFLOWER	*Echinacea purpurea*	5-20
PALE INDIAN PAINTBRUSH	*Castilleja septentrionalis*	5-20
HOARY PUCCOON	*Lithospermum canescens*	5-20
WILD BERGAMOT	*Monarda fistulosa*	5-20
RIGID GOLDENROD	*Solidago rigida*	5-20

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
LITTLE BLUESTEM	*Schizachyrium scoparium*	20-40
PORCUPINE GRASS	*Stipa spartea*	5-10
BIG BLUESTEM	*Andropogon gerardii*	5-10
INDIAN GRASS	*Sorghastrum nutans*	10-20
SWITCHGRASS	*Panicum virgatum*	5-10
BROOMSEDGE	*Andropogon virginicus*	5-10
SIDEOATS GRAMA	*Bouteloua curtipendula*	20-30

Site Interpretations

*Wildlife**

Prairie Phase:

- Game species that utilize this ecological site include:
  Northern Bobwhite will utilize this ecological site for food (seeds, insects) and cover needs (escape, nesting and roosting cover).

  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, insects) and nesting and brood-rearing cover. Turkey poults feed heavily on insects provided by this site type.

- Bird species associated with this ecological site's reference state condition:
  Breeding birds as related to vegetation structure (related to time since fire, grazing, haying, and mowing):

  Vegetation Height Short (< 0.5 meter, low litter levels, bare ground visible):
  Grasshopper Sparrow, Horned Lark, Northern Bobwhite

  Medium Vegetation Height (0.5 – 1 meter, moderate litter levels, some bare ground visible):
  Eastern Meadowlark, Dickcissel, Field Sparrow, Northern Bobwhite, Bobolink, Eastern Kingbird

  Brushy – Mix of grasses, forbs, native shrubs (e.g., *Rhus copallina*, *Prunus americana*, *Rubus* spp., *Rosa carolina*) and small trees (e.g., *Cornus drummondii*):
  Bell's Vireo, Yellow-Breasted Chat, Loggerhead Shrike, Brown Thrasher, Common Yellowthroat

- Amphibian and reptile species associated with this ecological site's reference state condition: Ornate Box Turtle (*Terrapene ornata ornata*), Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*), Great Plains Skink (*Eumeces obsoletus*), Northern Prairie Skink (*E. septentrionalis septentrionalis*), Prairie Kingsnake (*Lampropeltis calligaster calligaster*), and Bullsnake (*Pituophis catenifer sayi*).

- Small mammals associated with this ecological site's reference state condition:

Prairie Vole (*Microtus ochrogaster*), Meadow Jumping Mouse (*Zapus hudsonius*), Plains Pocket Gopher (*Geomys bursarius*), Franklin's Ground Squirrel (*Spermophilus franklinii*), and Thirteen-lined Ground Squirrel (*Spermophilus tridecemlineatus*).

- Invertebrates:
  Many native insect species are likely associated with this ecological site, especially native bees, ants, beetles, butterflies and moths, and crickets, grasshoppers and katydids. However information on these groups is often lacking enough resolution to assign them to individual ecological sites.

  Insect species known to be associated with this ecological site's reference state condition include: Prairie Meadow Katydid (*Conocephalus saltans*), Packard's Grasshopper (*Melanoplus packardii*), Mermiria Grasshopper (*Mermiria picta*), Black-margined Shield-back Katydid (*Pediodectes nigromarginata*), Ottoe Skipper butterfly (*Hesperia ottoe*) and two native bees (*Tetraloniella albata, Diadasia enavata).*

Savanna Phase:

- Oaks and hickories provide an important food source for many animals including White-tailed Deer, Wild Turkey, and Fox Squirrel.

- Both snags and live cavity or den trees provide important food and cover for vertebrate wildlife. Snags are also very important to invertebrate species. Fox Squirrel, Red-headed Woodpecker and Eastern Bluebird utilize snags and den trees for foraging, nesting or shelter. "Wolf" trees are a particularly valuable type of live cavity tree. These large diameter, often open-grown, old-ages, hollow trees provide both cavities for wildlife and usually hard or soft mast food sources. Large diameter snags and den trees are particularly important wildlife habitat features to retain.

- Game species that utilize this ecological site include:
  Northern Bobwhite will utilize this ecological site for food (seeds, insects) and cover needs (escape, nesting and roosting cover).

  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, insects) and nesting and brood-rearing cover. Turkey poults 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: Northern Bobwhite, Eastern Kingbird, Eastern Bluebird, Brown Thrasher, White-eyed Vireo, Prairie Warbler, Field Sparrow, Eastern Towhee, Red-headed Woodpecker, Great Crested Flycatcher, Loggerhead Shrike

  Winter resident: American Tree Sparrow, Harris' Sparrow

- Amphibian and reptile species associated with this ecological site's reference state condition: Ornate Box Turtle (*Terrapene ornata ornata*), Northern Fence Lizard (*Sceloporus undulates hyacinthinus*), Five-lined Skink (*Eumeces fasciatus*), Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*), Eastern Yellow-bellied Racer (*Coluber constrictor flaviventris*), Prairie Ring-necked Snake (*Diadophis punctatus arnyi*), and Rough Green Snake (*Opheodrys aestivus aestivus*). Sites containing or nearby to fishless or ephemeral ponds/pools can support the Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*).

- Small mammals associated with this ecological site's reference state condition: Fox Squirrel (*Sciurus niger*), Woodland Vole (*Microtus pinetorum*), Least Shrew (*Cryptotis parva*), and Indiana Bat (*Myotis sodalis*). Indiana bats utilize suitable live, dying or dead roost trees for summer habitat and raising young. Suitable roost trees typically have exfoliating or flaking bark and are larger in diameter.

- 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. However we don't have enough information on these groups to assign them to this phase of this ecological site's reference state condition at this time.

*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**. Historically this site was dominated by a ground cover of native prairie grasses and forbs. Some scattered open grown trees may have also been present. May be suitable for non-traditional forestry uses such as windbreaks, environmental plantings, alley cropping (a method of planting, in which rows of trees or shrubs are interspersed with rows of crops) or woody bio-fuels.

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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