Ecological Site Description

Calcareous Loess Upland Woodland F107BY009MO

- *(Quercus muehlenbergii - Quercus macrocarpa/ /Schizachyrium scoparium - Solidago ulmifolia*)
- (chinkapin oak – bur oak/ /little bluestem – elm leaved 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 (MLRA): 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.

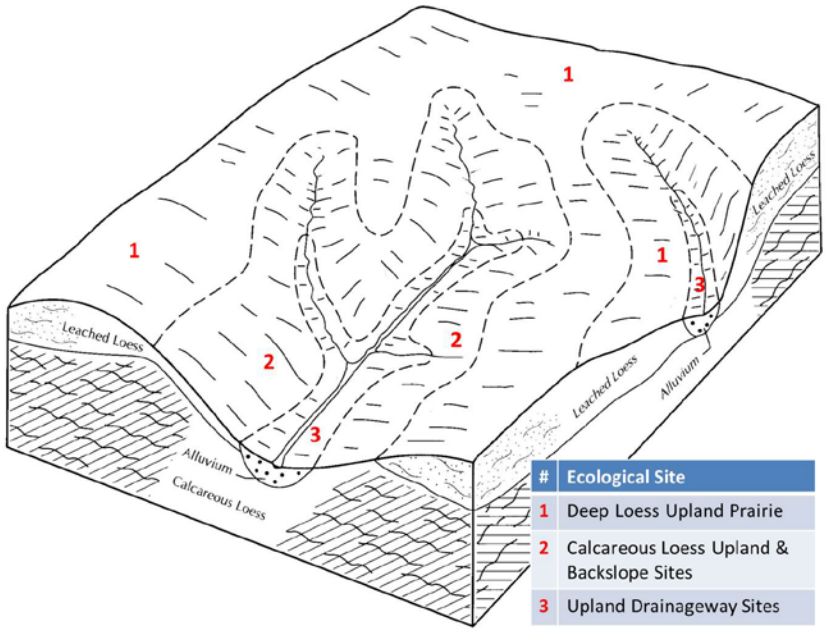
Calcareous Loess Upland Woodlands are within the green areas on the map (Missouri portion only; Iowa distributions are currently under review). These sites are adjacent to the Missouri River floodplain in the central portion of the MLRA, in Holt County, Missouri. Soils are very deep, with no rooting restrictions.

Physiographic Features

This site is on upland summit crests, shoulders and upper backslopes, with slopes of 2 to 14 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following 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 shoulders and upper slopes. Steeper areas lower on the slopes are in Calcareous Backslope ecological sites, and are included in the area labeled as "2". 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.

This woodland is the most open type in northern Missouri, with wide-spreading tree crowns, very open overstory and understory, and a dense and diverse grass, forb, and shrub coverage. The reference plant community is dominated by an overstory of chinquapin oak, along with scattered bur oak. The canopy is moderate in height (50 to 60 feet) and open (40 to 60 percent cover).

Woodlands are distinguished from forest, by their relatively open understory, and the presence of sun-loving ground flora species. Characteristic plants in the ground flora can be used to gauge the restoration potential of a stand along with remnant open-grown old-age trees, and tree height growth.

The juxtaposition of these sites to dry prairies, guarantees that fire was an important part of the system, likely occurring every 2 to 5 years. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. During longer fire free intervals, woody understory species increased and the herbaceous understory diminished. The return of fire would open the woodlands up again and stimulate the abundant ground flora.

Calcareous Loess Upland Woodlands were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores. Wind and ice would have periodically opened the

canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by native large herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction.

Today, most of these ecological sites have been cleared and converted to pasture or have undergone timber removal and domestic grazing. Most existing woodland ecological sites have a younger (50 to 80 years) canopy layer whose species composition and quality has been altered by timber harvesting and grazing practices.

In the long term absence of fire, woody species, especially hickory and sumac encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective restoration means.

Uncontrolled domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion related to grazing can be a problem and lower site productivity.

These ecological sites are not productive from a timber standpoint but are valuable wildlife sites.

Reference State Plant Community

Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
BUR OAK	*Quercus macrocarpa*	30-60	50
WHITE OAK	*Quercus alba*	10-20	50
BLACK OAK	*Quercus velutina*	30-60	60
MOCKERNUT HICKORY	*Carya alba*	10-20	60
CHINKAPIN OAK	*Quercus muehlenbergii*	10-20	50
SHAGBARK HICKORY	*Carya ovata*	10-20	50

Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
AROMATIC SUMAC	*Rhus aromatica*	10-30	5
AMERICAN HAZELNUT	*Corylus americana*	10-30	5
SMOOTH SUMAC	*Rhus glabra*	5-10	8

Forbs

Common Name	Botanical Name	Cover % (low-high)
VIRGINNIA SPIDERWORT	*Tradescantia virginiana*	5-20
WHORLED MILKWEED	*Asclepias quadrifolia*	5-20
DRUMMOND'S ASTER	*Symphyotrichum drummondii*	5-20
SMOOTH BLUE ASTER	*Symphyotrichum laeve*	5-20
POINTEDLEAF TICKTREFOIL	*Desmodium glutinosum*	5-20
NAKED FLOWER TICKTREFOIL	*Desmodium nudiflorum*	5-20
ELM-LEAVED GOLDENROD	*Solidago ulmifolia*	5-20
BEEBALM	*Monarda bradburiana.*	5-20
PURPLE CONEFLOWER	*Echinacea purpurea*	5-20
SMOOTH SPIDERWORT	*Tradescatia ohiensis*	5-20

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
BIG BLUESTEM	*Andropogon gerardii*	10-30
PENNSYLVANIA SEDGE	*Carex pensylvanica*	10-30
EASTERN STAR SEDGE	*Carex radiata*	10-20
WHITETINGE SEDGE	*Carex albicans*	10-20
LITTLE BLUESTEM	*Schizachyrium scoparium*	10-30
WOODLAND BROME	*Bromus pubescens*	10-20
BOTTLEBRUSH GRASS	*Elymus hystrix*	10-20
VIRGINIA WILDRYE	*Elymus virginicus*	10-20
SIDEOATS GRAMA	*Bouteloua curtipendula*	5-10

Site Interpretations

Wildlife

- Oak acorns are an excellent hard mast species, and along with the soft mast from shrubs, high energy legume seeds and abundant browse, the community provides excellent food and cover for wildlife.
- Large diameter trees of extended age provide substantial opportunity for significant tree cavities.
- Bird species associated with early-successional these Woodlands include Northern Bobwhite, Bell's Vireo, Prairie Warbler, Field Sparrow, and Brown Thrasher.
- Mid- to late successional birds include Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Eastern Wood-Pewee, and Red-tailed Hawk.
- Amphibian and reptile species associated with mature Woodlands include tiger salamander, small-mouthed salamander, ornate box turtle, northern fence lizard, five-lined skink, broad-headed skink, six-lined racerunner, western slender glass lizard, prairie ring-necked snake, flat-headed snake, and rough earth snake.

Forestry

- Management: Site index values range from 46 to 59 for oak. Timber management opportunities are good. 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. Using prescribed fire as a management tool should be used with caution on a particular site if timber management is the primary objective. Favor white oak, post oak, chinkapin oak and black 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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