

Ecological Site Description

Fragipan Upland Woodland

F134XY004MO

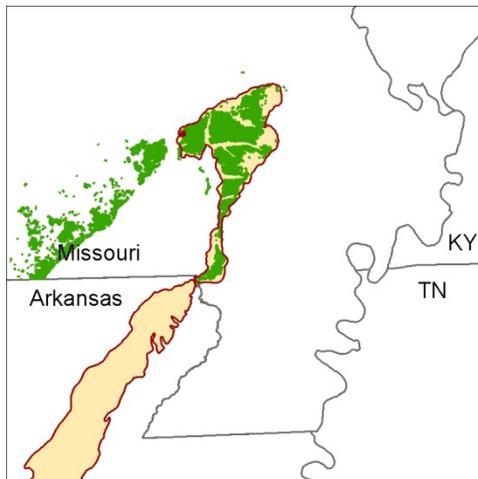
- (*Quercus stellata* - *Quercus velutina*/*Rhus aromatica*/*Elymus virginicus* - *Desmodium*)
- (post oak – black oak/aromatic sumac /Virginia wild rye – tick trefoil)

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: 134 – Southern Mississippi Valley Loess

Introduction

The Southern Mississippi Valley Loess (area outlined in red on the map; northern portion only) is a relatively narrow strip of the coastal plain bordering the Mississippi River valley that is blanketed with loess. The northern part of this MLRA, discussed here, is locally referred to as Crowley’s Ridge. Elevation ranges from about 300 feet on the footslopes to nearly 600 feet on the highest ridges. Loess caps the summits and upper slopes, and Pliocene-aged sand and gravel deposits of the coastal plain influence soils on lower, steeper slopes.



Fragipan Upland Woodlands are within the green areas on the map (Missouri portion only; distributions farther south are currently under review). These sites are widespread in the uplands of Crowley’s Ridge in Stoddard and Dunklin counties, Missouri, and in the southeastern edge of the Ozark Highlands in Butler and Ripley counties, Missouri. Soils have root-restricting fragipans.

Physiographic Features

This site is on convex upland summit crests and shoulders with slopes of 1 to 15 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

Soil Features

These soils have a root-restricting fragipan at about 24 inches. They were formed under woodland vegetation, and have thin, light-colored surface horizons. They have silt loam surface horizons, and loamy subsoils. Parent material is loess. A seasonal high water table is perched above the fragipan during the spring months, but has little effect on native vegetation. Soil series associated with this site include Loring.

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.

Historically, Fragipan Upland Woodlands were dominated by doughty and fire-tolerant post and black oak. Canopy closure varied from 50 to 70 percent and tree height from 50 to 65 feet. Native prairie grasses dominated the open understory, along with a diverse mix of native legumes, asters, sunflowers and other forbs.

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.

In this region of wet lowland forests, it is unlikely that fire played a major role in the ecological dynamics of the forests and woodlands. Most upland woodlands had an estimated fire frequency of 5 to 15 years. These periodic fires kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. During 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.

Fragipan Upland Woodlands were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores, such as bison, elk, and deer. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by native herbivores would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and woodland ground flora species.

Today, this community has been cleared and converted to pasture, or logged and has increased stand density in the absence of fire. Most occurrences exhibit canopy closure of 80 to 100 percent. In addition, the sub-canopy and understory layers are more developed. Post and blackjack oak share dominance with black oak, black hickory and an occasional white oak. Under these denser, more shaded conditions, the original sun-loving ground flora has diminished in diversity and cover. While some woodland species persist in the ground flora, many have been replaced by more shade-tolerant species.

Although timber products from Fragipan Upland Woodlands are of limited value, logging does occur, and influences the community. Occasional partial cuts provide sunlight to the woodland floor, stimulating native woodland ground flora. However, in the absence of fire and continual cultural treatments, oaks sprout and grow into a dense stand, again shading out the sun-loving ground flora. Partial cutting and prescribed fire can, however, restore the more open structure and diversity of ground flora species.

Managed areas show an exceptional resiliency. This type of management may provide timber products, wildlife habitat, and potential native forage. 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.

Reference State Plant Community

Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
POST OAK	<i>Quercus stellata</i>	30-60	50
BLACK HICKORY	<i>Carya texana</i>	10-30	40
BLACKJACK OAK	<i>Quercus marilandica</i>	10-30	30
BLACK OAK	<i>Quercus velutina</i>	10-30	50
SASSAFRAS	<i>Sassafras albidum</i>	0-20	20
WHITE OAK	<i>Quercus alba</i>	0-10	50

Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
FRAGRANT SUMAC	<i>Rhus aromatica</i>	10-20	3
HAZELNUT	<i>Corylus americana</i>	0-20	3
NEW JERSEY TEA	<i>Ceanothus americanus</i>	0-20	3
BLACK HUCKLEBERRY	<i>Gaylussacia baccata</i>	0-20	2

Forbs

Common Name	Botanical Name	Cover % (low-high)
BRISTLY SUNFLOWER	<i>Helianthus hirsutus</i>	5-20
WHITE WILD INDIGO	<i>Baptisia alba</i>	5-20
SPREADING ASTER	<i>Aster patens</i>	5-20
ELM-LEAVED GOLDENROD	<i>Solidago ulmifolia</i>	5-20
COMMON CINQUEFOIL	<i>Potentilla simplex</i>	5-20
SMALL-LEAF TICK TREFOIL	<i>Desmodium marilandicum</i>	5-20
PANICLED TICK TREFOIL	<i>Desmodium paniculatum</i>	5-20
PENCIL FLOWER	<i>Stylosanthes biflora</i>	5-20
GOAT'S RUE	<i>Tephrosia virginiana</i>	5-20
HAIRY HAWKWEED	<i>Hieracium gronovii</i>	5-20
HAND COREOPSIS	<i>Coreopsis palmata</i>	5-20
YELLOW FALSE FOXGLOVE	<i>Aureolaria grandiflora</i>	5-20
HOG PEANUT	<i>Amphicarpeaea bracteata</i>	5-10
SLENDER LESPEDEZA	<i>Lespedeza virginica</i>	5-20

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
LITTLE BLUESTEM	<i>Schizachyrium scoparium</i>	10-20
BIG BLUESTEM	<i>Andropogon gerardii</i>	10-20
INDIANGRASS	<i>Sorghastrum nutans</i>	10-20
POVERTY OAT GRASS	<i>Danthonia spicata</i>	10-20
VIRGINIA WILDRYE	<i>Elymus virginicus</i>	10-20
HIRSUTE SEDGE	<i>Carex complanata</i>	10-20
BLUE SEDGE	<i>Carex glaucoidea</i>	10-20
BROOMSEDEGE	<i>Andropogon virginicus</i>	10-20

Site Interpretations

Wildlife

- Oaks provide hard mast; numerous native legumes provide high-quality wildlife food; native warm-season grasses provide extensive cover and nesting habitat; and forbs provide a diversity and abundance of insects.
- Bird species associated with early-successional communities are Northern Bobwhite, Painted Bunting, Prairie Warbler, Field Sparrow, Blue-winged Warbler, Yellow-breasted Chat, Brown Thrasher, and Bachman's Sparrow.
- Birds associated with mid- to late successional sites are Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Summer Tanager, Eastern Wood-Pewee, Whip-poor-will, Chuck-will's widow, and Red-eyed Vireo.
- Reptiles and amphibians associated with Post Oak Woodlands include ornate box turtle, northern fence lizard, five-lined skink, coal skink, broad-headed skink, six-lined racerunner, western slender glass lizard, prairie ring-necked snake, flat-headed snake, rough earth snake, red milk snake, western pygmy rattlesnake, and timber rattlesnake.

Forestry

- **Management:** Estimated site index values for oaks range from 45 to 50. Timber management opportunities are poor to fair. These sites have a root-restricting fragipan which impedes rooting. Reduced rooting depth restricts tree growth and increases windthrow hazards. 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. These sites respond well to prescribed fire as a management tool. Favor black oak and post oak,
- **Limitations:** Restricted rooting depth; seasonal wetness. Equipment use when wet may compact soil and damage tree roots. Planting is difficult during wet spring periods. Seedling mortality may be high due to excess seasonal wetness, shallow effective rooting depths or sodium. Ridging the soil and planting on the ridges may increase survival. The use of equipment can become restricted in spring and other excessively wet periods.

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

Missouri Department of Conservation. 2006. Missouri Forest and Woodland Community Profiles. Missouri Department of Conservation, Jefferson City, Missouri.

Natural Resources Conservation Service. 2002. Woodland Suitability Groups. Missouri FOTG, Section II, Soil Interpretations and Reports. 30 pgs.

Natural Resources Conservation Service. Site Index Reports. Accessed May 2014.
https://esi.sc.egov.usda.gov/ESI_Forestland/pgFSWelcome.aspx

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.