Ecological Site Description

Gravelly Protected Backslope Forest F134XY009MO

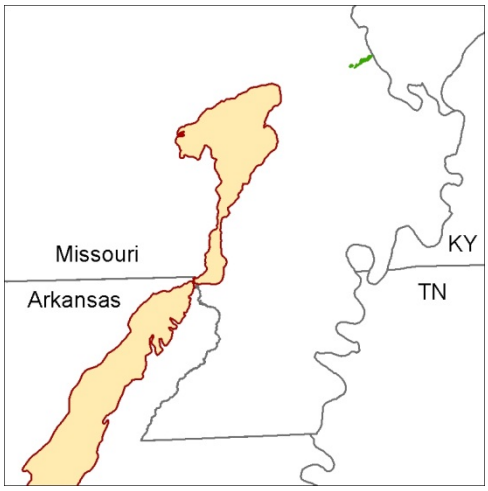
- *(Quercus alba - Fagus grandifolia/Cornus florida/ Polystichum acrostichoides - Podophyllum peltatum)*
- (white oak – beech/flowering dogwood/Christmas fern – May apple)

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 (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.



Gravelly Protected Backslope Forests are within the green area on the map (Missouri portion only; distributions farther south are currently under review). They occupy the northerly and easterly aspects of steep, dissected slopes, and are mapped in complex with the Gravelly Exposed Backslope Woodland ecological site. They typically occur below Loess Forests and Woodlands. These sites are not extensive, occurring in a few scattered upland locations in Scott County, Missouri. Soils are very deep, with an abundance of gravel.

Physiographic Features

This site is on upland backslopes, with slopes of 15 to 45 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.

Soil Features
These soils have acidic subsoils that are low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is coastal plain sediments. They have gravelly loam surface horizons, and skeletal subsoils with high amounts of gravel and cobbles. These soils are not affected by seasonal wetness. Soil series associated with this site include Saffell.

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 white oak, with occasional beech and bitternut hickory. The canopy is rather tall (80 to 100 feet) and well developed (80 to 100 percent closure) and the understory with great structural diversity. In the most mesic landscape positions, more shade tolerant and moisture loving species such as sugar maple, basswood, coffee tree, and walnut are in greater abundance.

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. In addition, Gravelly Protected Backslope Forests occur in the most cool, moist and protected landscape positions. While the upland woodlands had an estimated fire frequency of 5 to 15 years, Gravelly Protected Backslope Forests burned much less frequently (estimated 15 to 25 years) and with much lower intensity.

Gravelly Protected Backslope Forests would have also been subjected to occasional disturbances from wind and ice, as well as grazing by large native herbivores. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees.. Grazing by large native herbivores would have effectively kept understory conditions more open, also creating conditions more favorable to oak reproduction.

Today, these communities have either been cleared or converted to pasture, or have undergone repeated timber harvest and domestic grazing. Most existing occurrences have a younger (50 to 80 years) canopy layer whose composition has been altered by timber harvesting practices. An increase in hickories over historic conditions is not uncommon. In addition, in the absence of fire, the canopy, sub-canopy and woody understory layers are better developed. On protected slopes, 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, regardless of aspect, has also diminished the diversity and cover of both woodland and forest 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 erosion related to grazing can lower site productivity.

Gravelly Protected Backslope Forests are productive timber sites in the region. 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. However, without some thinning of the dense stands, the ground flora diversity can be shaded out and productivity of the stand may suffer.

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 such as well-planned timber harvests that will impair the cool, moist, shaded conditions.

Reference State Plant Community

Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WHITE OAK	*Quercus alba*	40-60	90
NORTHERN RED OAK	*Quercus rubra*	10-20	100
WALNUT	*Juglans nigra*	5-10	80
BITTERNUT HICKORY	*Carya cordiformis*	10-20	80
BEECH	*Fagus grandifolia*	10-20	80
RED MAPLE	*Acer rubrum*	5-20	70
SUGAR MAPLE	*Acer saccharum*	5-20	80
BASSWOOD	*Tilia americana*	5-10	100
KENTUCKY COFFEETREE	*Gymnocladus dioicus*	5-10	90

Understory Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
FLOWERING DOGWOOD	*Cornus florida*	20-30	30
BLACKGUM	*Nyssa sylvatica*	10-20	40
EASTERN HOPHORNBEAM	*Ostrya virginiana*	10-20	15

Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
JUNEBERRY	*Amelanchier arborea*	10-20	12
FRAGRANT SUMAC	*Rhus aromatica*	10-20	3
LOW BUSH BLUEBERRY	*Vaccinium pallidum*	20-30	2

Vines

Common Name	Botanical Name	Cover % (low-high)
VIRGINIA CREEPER	*Parthenocissus quinquefolia*	10-20
CAT GREENBRIER	*Smilax glauca*	10-20
SUMMER GRAPE	*Vitis aestivalis*	10-20

Ferns

Common Name	Botanical Name	Cover % (low-high)
RATTLESNAKE FERN	*Botrychium virginianum*	5-20
CHRISTMAS FERN	*Polystichum acrostichoides*	10-30

Forbs

Common Name	Botanical Name	Cover % (low-high)
VIRGINIA-SNAKEROOT	*Aristolochia serpentaria*	10-20
VIRGINIA SPRINGBEAUTY	*Claytonia virginica*	10-20
WHITE DOG'S TOOTH VIOLET	*Erythronium albidum*	10-20
HEPATICA	*Hepatica nobilis*	10-20
GOLDEN SEAL	*Hydrastis canadensis*	10-20
FEATHERY FALSE SOLOMON'S-SEAL	*Maianthemum racemosum*	10-20
WILD BLUE PHLOX	*Phlox divaricata*	10-20
MAYAPPLE	*Podophyllum peltatum*	20-30
TOAD SHADE	*Trillium sessile*	10-20
BELLWORT	*Uvularia grandiflora*	10-20
LESSER YELLOW LADY'S SLIPPER	*Cypripedium parviflorum var. parviflorum*	0-5

Grasses and sedges

Common Name	Botanical Name
Typically <5% cover	n/a

Site Interpretations

Wildlife

- 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.
- Bird species associated with early-successional community stages are Prairie Warbler, Field Sparrow, Brown Thrasher, Blue-winged Warbler, White-eyed Vireo, Blue-gray Gnatcatcher, Yellow-breasted Chat, Indigo Bunting, and Eastern Towhee. Birds associated with mid-successional stages include Whip-poor-will and Wood Thrus while birds associated with late-successional stages 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: Estimated site index values range from 60 to 65 for oak. Timber management opportunities are moderate to 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 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. Favor black walnut, white oak and northern red oak.

- Limitations: Large amounts of coarse fragments throughout profile; Surface stones and rocks are problems for efficient and safe equipment operation and will make equipment use

somewhat difficult. Disturbing the surface excessively in harvesting operations and building roads increases soil losses, which leaves a greater amount of coarse fragments on the surface. Hand planting or direct seeding may be necessary. Seedling mortality due to low available water capacity may be high. Mulching or providing shade can improve seedling survival. Mechanical tree planting will be limited. 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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