

Ecological Site Description

Gravelly/Loamy Upland Drainageway Forest

F116AY037MO

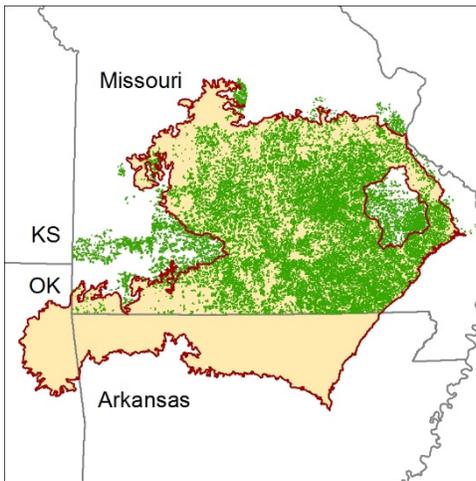
- (*Quercus alba* - *Quercus velutina*/*Cornus florida* - *Carpinus caroliniana*/*Elymus virginicus* - *Carex*)
- (white oak – black oak/flowering dogwood – blue beech/Virginia wild rye – sedge)

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: 116A - Ozark Highland

Introduction

The Ozark Highland (area outlined in red on the map) constitutes the Salem Plateau of the Ozark



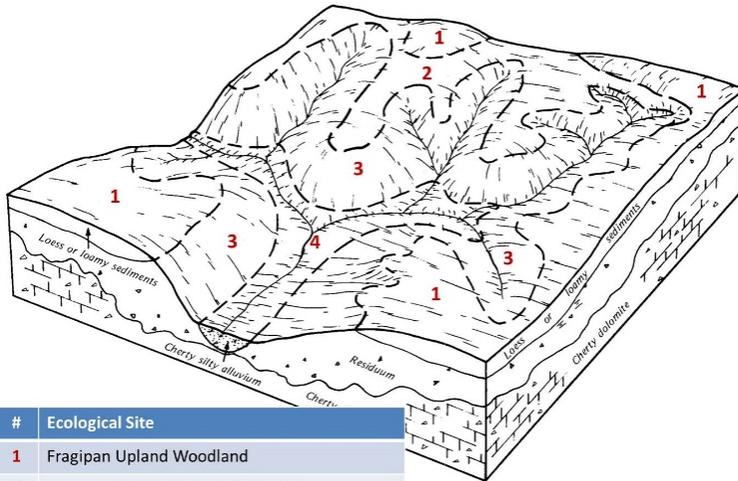
Uplift. Elevation ranges from about 300 feet on the southeast edge of the Ozark escarpment, to about 1,600 feet in the west, adjacent to the Burlington Escarpment of the Springfield Plateau. The underlying bedrock is mainly horizontally bedded Ordovician-aged dolomites and sandstones that dip gently away from the uplift apex in southeast Missouri. Cambrian dolomites are exposed on deeply dissected hillslopes. In some places, Pennsylvanian and Mississippian sediments overlie the plateau. Relief varies, from the gently rolling central plateau areas to deeply dissected hillslopes associated with drainageways such as the Current and Eleven Point Rivers.

Gravelly/Loamy Upland Drainageway Forests are widely distributed throughout the Ozark Highland, in narrow upland drainageways. Soils range from loamy to very gravelly and are subject to flooding.

Physiographic Features

This site is in narrow drainageways in the uplands, with slopes of 2 to 5 percent. The site receives runoff from adjacent upland sites. Most areas are subject to frequent, brief flooding.

The following figure (adapted from Wolf, 1989) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “4” on the figure. Gravelly Upland Drainageway sites are typically associated with uplands that have abundant chert fragments, such as the Low-base Chert sites shown here.



#	Ecological Site
1	Fragipan Upland Woodland
2	Low-base Chert Upland Woodland
3	Low-base Chert Backslope Woodland & Forest
4	Gravelly/Loamy Upland Drainageway Forest

Soil Features

These soils have no rooting restrictions, although many areas have low plant-available water capacity, due to an abundance of coarse fragments. They were formed under primarily woodland vegetation. Parent material is alluvium. They have loam or silt loam surface horizons that are often gravelly, and loamy subsoils with abundant gravel and cobbles in many places. These soils are not affected by seasonal wetness. Soil series associated with this site include Atkins, Bearthicket, Bloomsdale, Britwater, Cedargap, Dameron,

Dapue, Elsayh, Gladden, Haymond, Hontas, Horsecreek, Huzzah, Jamesfin, Kaintuck, Midco, Perche, Pinerun, Possumtrot, Racket, Raftville, Razort, Relfe, Sandbur, Secesh, Sharon, Stultz, Sturkie, Tilk, Wakefield, and Wideman..

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.

Gravelly/Loamy Upland Drainageway Forests occur throughout the Ozark Highland as a very common linear feature along many low order streams. Because many of the streams are relatively high gradient, they have a rather flashy flood regime, and movement and deposition of coarse alluvial materials is common. They are well drained and drier, thus supporting more drought resistant white and black oaks along with a variety of other hardwood trees.

The reference community is a well-developed forest with a rather tall, developed canopy (60 to 80 feet tall and 80 to 100 percent canopy closure), a complex understory and a dense herbaceous ground flora. Gaps in all three layers are common due to flash flooding. White oak and black oak dominate along with a variety of mixed hardwood tree species, including northern red oak, elm, shortleaf pine and hickory. Flowering dogwood and blue beech form a well-developed understory with a dense herbaceous layer dominated by wild ryes and sedges.

Because of the narrow floodplain setting, frequent flooding and rather droughty soils, many upland drainageway forests remain. They often occur as a rather narrow band of timber traversing the headwater streams, often in a matrix of upland forest.

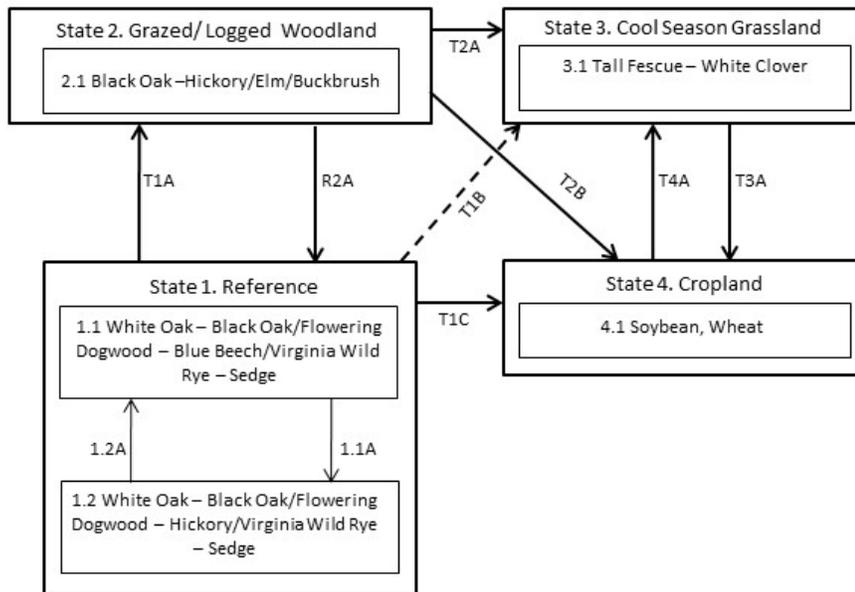
Domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as buckbrush, gooseberry, and Virginia creeper. Grazed sites also have a more open understory. In addition, soil compaction and soil erosion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

Some carefully planned timber harvest might be tolerated by this system, but high grading of the timber can also degrade the system. Re-establishment of these drainageway forests is important for stream quality and health, as well as for migratory birds. Replanting of these systems has proven to be quite successful, but species selection needs to pay attention to local soil and moisture conditions.

A State and Transition Diagram is depicted in Figure 1. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

Figure 1: State and transition diagram

Gravelly/Loamy Upland Drainageway Forest, F116AY036MO



Code	Event/Activity/Process
T1A	Grazing; repeated timber harvests
T3A	Tillage; conservation cropping system
T1B,T2A	Woody removal; tillage; vegetative seeding; grassland management
T1C, T2B	Woody removal; tillage; conservation cropping system
T4A	Vegetative seeding ; grassland management
1.1A	Lack of disturbance events 10+ years
1.2A	Disturbance events 2-5 years
R2A	Forest stand improvement

Ecological States

State 1: Reference

The historical reference state for this ecological site was old growth oak forest. The forest was dominated by a wide variety of deciduous hardwood tree species including white oak and black oak. Maximum tree age was likely 150 to 300 years. Periodic disturbances from flooding, fire, wind or ice as well as grazing by native large herbivores maintained the forest structure and diverse ground flora species. Long disturbance-free periods allowed an increase in both the density of trees and the abundance of shade tolerant species.

Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Reference states are very rare today. Fire suppression and altered drainage have resulted in increased canopy density, which has affected the abundance and diversity of ground flora. Most reference states are currently altered because of timber harvesting, clearing and conversion to grassland or cropland.

State 2: Grazed/ Logged Forest

Composition is altered from the reference state depending on tree selection during harvest. This state will slowly increase in more shade tolerant species and white oak will become less dominant. Without periodic canopy disturbance, stem density and fire intolerant species, like elm, will increase in abundance. Some periodic grazing may be occurring.

State 3: Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue, orchard grass, and red clover has been common. Occasionally, these pastures will have scattered oaks. Long term uncontrolled grazing can cause significant soil erosion and compaction. A return to the reference state may be impossible, requiring a very long term series of management options and transitions.

State 4: Cropland

This is a state that exists currently with intensive cropping of soybeans and wheat. Some conversion to cool season hay land occurs, but when commodity prices are high, these states transition back to cropland.

Reference State Plant Species

Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WHITE OAK	<i>Quercus alba</i>	40-70	70
BLACK OAK	<i>Quercus velutina</i>	20-40	80
MOCKERNUT HICKORY	<i>Carya tomentosa</i>	0-10	60
SHAGBARK HICKORY	<i>Carya ovata</i>	0-10	50
NORTHERN RED OAK	<i>Quercus rubra</i>	10-20	80
RED ELM	<i>Ulmus rubra</i>	10-20	60
EASTERN REDCEDAR	<i>Juniperus virginiana</i>	0-10	50
SHORTLEAF PINE	<i>Pinus echinacea</i>	0-10	70

Understory/Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
FLOWERING DOGWOOD	<i>Cornus florida</i>	10-20	30
BLUE BEECH	<i>Carpinus caroliniana</i>	10-20	20
AMERICAN HAZELNUT	<i>Corylus americana</i>	10-20	10
FRAGRANT SUMAC	<i>Rhus aromatica</i>	10-20	5

Forbs

Common Name	Botanical Name	Cover % (low-high)
WILD GINGER	<i>Asarum canadense</i>	10-30
TALL BELLFLOWER	<i>Campanula americana</i>	10-20
FIGWORT	<i>Scrophularia marilandica</i>	10-20
CAROLINA ELEPHANT'S FOOT	<i>Elephantopus carolinianus</i>	5-20

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
WOODLAND BROME	<i>Bromus pubescens</i>	5-20
PENNSYLVANIA SEDGE	<i>Carex pensylvanica</i>	10-20
PARASOL SEDGE	<i>Carex umbellata</i>	10-20
VIRGINIA WILD-RYE	<i>Elymus virginicus</i>	10-30
BOTTLEBRUSH GRASS	<i>Elymus hystrix</i>	10-20

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.
- Oaks provide hard mast; scattered shrubs provide soft mast; native legumes provide high-quality wildlife food;
- Sedges and native cool-season grasses provide green browse; patchy native warm-season grasses provide cover and nesting habitat; and a diversity of forbs provides a diversity and abundance of insects.
- Post-burn areas can provide temporary bare-ground – herbaceous cover habitat important for turkey poults and quail chicks.
- Bird species associated with mature communities include Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Eastern Wood-Pewee, Broad-winged Hawk, Great-Crested Flycatcher, Summer Tanager, and Red-eyed Vireo.
- Reptile and amphibian species associated with this ecological site include tiger salamander, small-mouthed salamander, ornate box turtle, northern fence lizard, five-lined skink, broad-headed skink, flat-headed snake, and rough earth snake.

Forestry

- Management: Site index values range from 50 to 70. 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. Maintain adequate riparian buffer

areas.

- **Limitations:** Wetness from flooding – short duration; coarse fragments in profile; excessive drainage. The use of equipment may be restricted in spring and other excessively wet periods. Disturbing the surface excessively in harvesting operations and building roads increases soil losses, which may leave a greater amount of coarse fragments on the surface. Tree planting is difficult during spring flooding periods. Mechanical tree planting may be limited due to coarse fragments on surface.

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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