

## *Ecological Site Description*

### **Loamy Floodplain Step Forest**

**F116AY039MO**

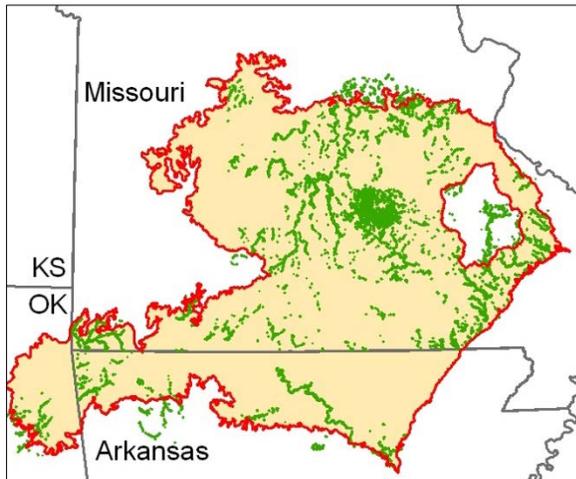
- (*Quercus rubra* - *Acer saccharum*/*Asimina triloba*/*Asarum canadense* - *Carex*)
- (northern red oak – sugar maple/pawpaw/wild ginger – sedge)

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



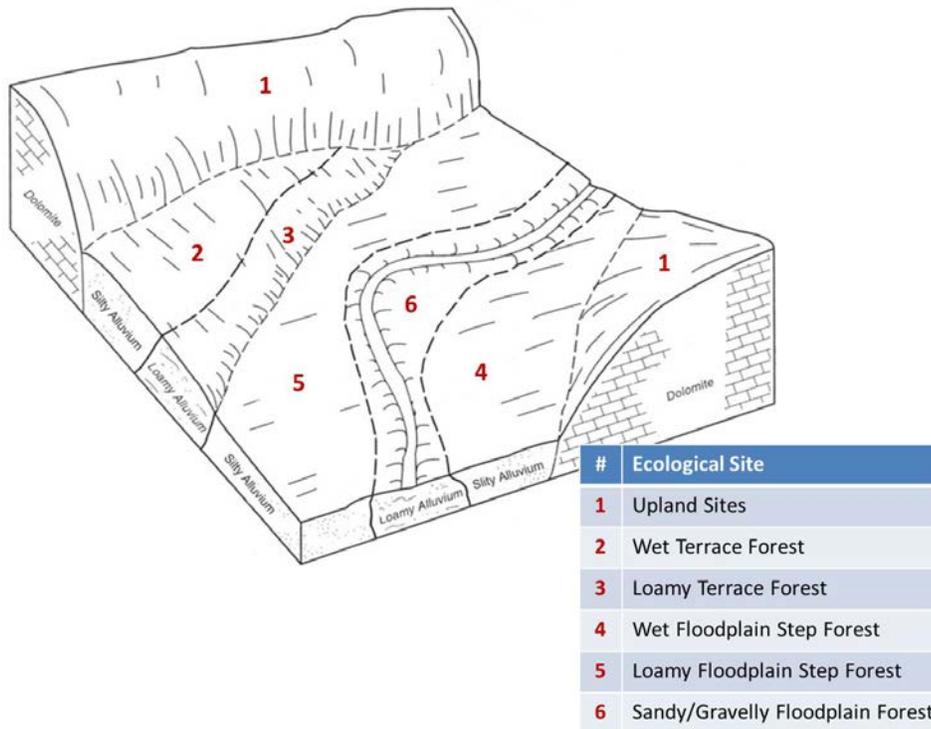
about 1,600 feet in the west, adjacent to the Burlington Escarpment of the Springfield Plateau. The underlying bedrock is mainly horizontally bedded Ordovician-aged dolomites and sandstones that dip gently away from the uplift apex in southeast Missouri. Cambrian dolomites are exposed on deeply dissected 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.

Loamy Floodplain Step Forests (green areas on map) occur along most major streams throughout the Ozark Highland MLRA. They are associated with occasionally flooded high floodplains on well drained, loamy soils. They are normally flanked by Sandy/Gravelly and Loamy Floodplain Forest ecological sites toward the stream, and a variety of terrace ecological sites above them in the landscape.

#### **Physiographic Features**

This site is on high floodplains (floodplain steps), with slopes of 0 to 8 percent. The site generates some runoff to adjacent lower floodplain sites, and receives some runoff from higher stream terraces and uplands. This site is subject to occasional flooding.

The following figure (adapted from Holbrook & Childress, 2006) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “5” on the figure. Loamy Floodplain Step Forest sites are typically below Terrace Forest sites, labeled “2” and “3”. The Floodplain Step Forest sites are slightly above the Floodplain Forest sites, which are adjacent to the active stream channel.



**Soil Features**

These soils have no rooting restriction. They were formed under forest vegetation, with periodic depositional flood events. Organic matter content is variable. Parent material is alluvium. They have silt loam, sandy loam or loam surface horizons, and loamy subsoils lacking argillic horizons that may be skeletal with depth. They are not affected by seasonal wetness. Soil series associated with this site include Gladden,

Haymond, Hontas, Huzzah, Jamesfin, Kaintuck, Possumtrot, Racket, Sturkie, and Woolly.

**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, Loamy Floodplain Step Forests in the Ozarks were on relatively stable floodplain positions that flooded approximately once every 3 to 5 years. It is likely that the hydrology of these streams has altered since pre-settlement because of changes in land use. Current flooding is likely more frequent. Historically these forests were structurally and compositionally diverse, with occasional tree fall gaps caused by flooding and natural mortality providing opportunities for regeneration of overstory species. The understory was also complex, with multiple layers of shade-tolerant species such as pawpaw, spicebush, Ohio buckeye and leatherwood. Grape vines,

greenbriar, and trumpet creeper climb into canopy gaps, and a diverse array of ground flora species carpet the forest floor.

Today, existing forests are dominated by a wide variety of deciduous hardwood tree species including sugar maple, northern red oak, bitternut hickory, bur oak, American elm, black walnut and Kentucky coffee tree. However, mortality and gaps formed from flood damaged trees are likely more abundant than historically, and the presence of more flood-tolerant trees such as sycamore, cottonwood, green ash and hackberry may be elevated.

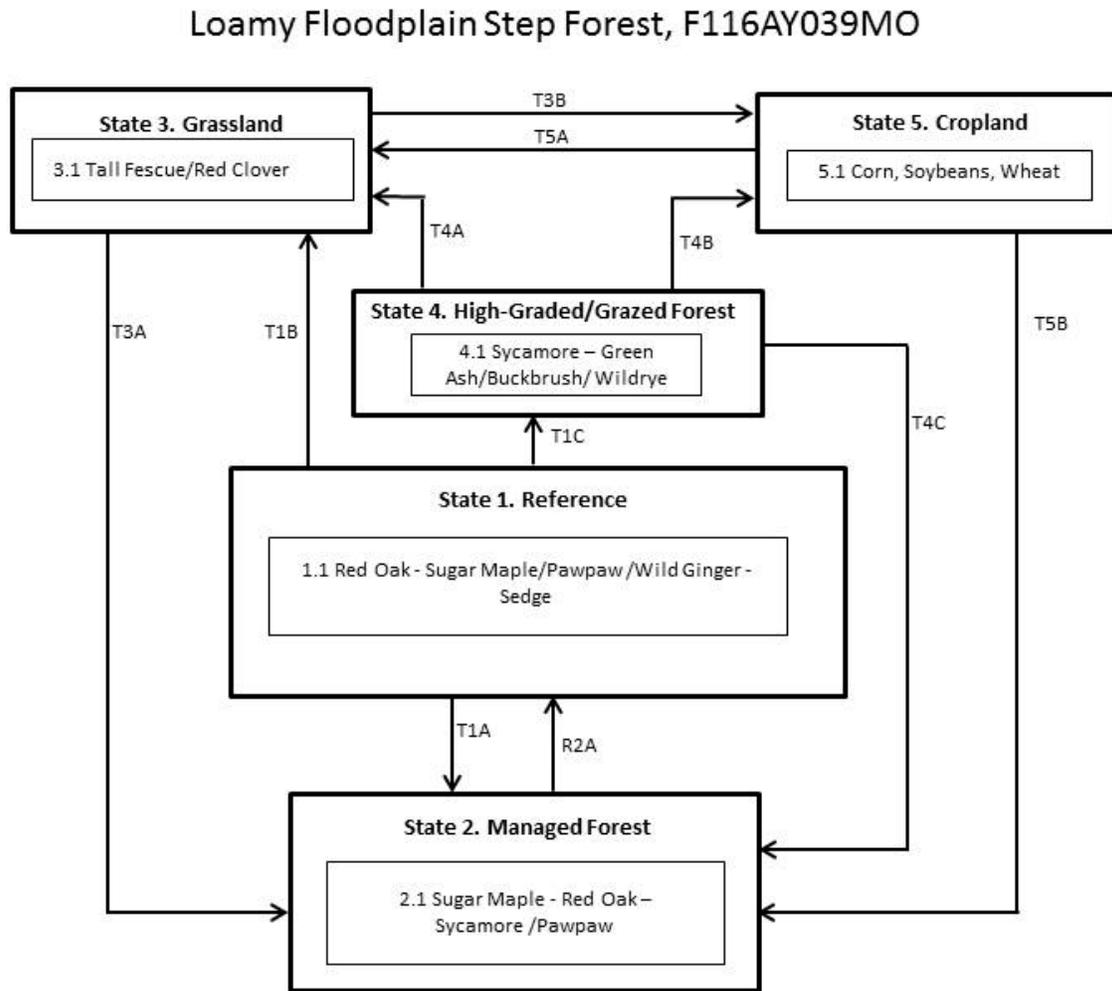
The productive Loamy Floodplain Step Forest sites have regularly been converted to pasture and occasionally, cropland. The remaining forests often occur as a narrow band traversing the riverfront forest or stream edge. These bands of forest play an important role as a source of food and shelter for migrating birds. In addition, they are very important for streambank stabilization, capturing sediment and mitigating scour during flood events.

Uncontrolled grazing by domestic livestock in the remaining strips of forest can kill trees and remove the ground cover, resulting in de-stabilization and degradation of this ecological site. Carefully planned timber harvest can be tolerated by this system, but high-grading of the timber will also degrade the system.

Re-establishment of these forests is important for stream quality and health, as well as for migratory birds. Planting of late-successional species on the appropriate landscape position and soils has proven to be quite successful.

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**



Code	Event/Activity
T1A	Uneven-age timber management
T1B, T4A	Clearing; pasture planting; prescribed grazing
T5A	Pasture planting; prescribed grazing
T1C	Poorly planned harvest (high-grading); uncontrolled grazing
T3B	Tillage; conservation cropping system
T4B	Clearing; tillage; conservation cropping system
T3A, T5B	Tree planting; long-term succession (+30-50 years); forest stand improvement; access control
T4C	Forest stand improvement; access control
R2A	Forest stand improvement; long term succession (+10-20 years)

## Ecological States

### State 1: Reference State

The historical reference state for this ecological site was old growth bottomland forest. Historically, Loamy Floodplain Step Forests in the Ozarks were on relatively stable floodplain positions that flooded approximately once every 3 to 5 years. This state was dominated by a variety of mesic species such as sugar maple, northern red oak, and bitternut hickory. Maximum tree age was likely 150 to 200 years. The understory was complex, with multiple layers of shade-tolerant species. A highly diverse ground flora was also present.

### State 2: Managed Forest

Where this state remains, it has often been subjected to selective timber harvest; rarely are they managed with an even-aged timber management system. While these patches may closely resemble the reference state, the diversity of tree species has been selectively (removal of oak and walnut) altered. In addition, a change to more frequent, higher-intensity floods on the modern landscape likely creates more frequent canopy gaps, and introduces more flood-tolerant species such as sycamore, eastern cottonwood, green ash or hackberry. Limiting timber harvest may allow a return to the reference state where hydrologic regimes are least altered.

### State 3: Grassland

This ecological site has been converted to non-native grasslands of tall fescue and red clover. This state frequently transitions to a cropland state especially when commodity prices are high. A return to a near-reference state from this state is not recommended. Transitioning to a Managed Forest state is possible through long-term commitments of time and money.

### State 4: High Graded/Grazed Forest

This state is subjected to uncontrolled grazing and high-graded timber harvests. The grazing will open up the understory and remove much of the diverse ground flora. This can lead to erosion of the topsoil during floods. Grazed units also often undergo timber harvest removing a wide variety of outstanding hardwood trees, further diminishing the structural and compositional diversity. A return to the near-reference state will require a long-term commitment including the elimination of grazing, planting of trees and perhaps shrub and herbaceous species, and very limited targeted timber harvests and thinning.

### State 5: Cropland

Some areas of this ecological site have been converted to row crop agriculture. They often transition to a Grassland state. A return to the near-reference state is not practical from this state. Transitioning to a Managed Forest state is possible through long-term commitments of time and money.

**Reference State Plant Community****Canopy Trees**

<b>Common Name</b>	<b>Botanical Name</b>	<b>Cover % (low-high)</b>	<b>Canopy Height (ft)</b>
BITTERNUT HICKORY	<i>Carya cordiformis</i>	10-30	80
SUGAR MAPLE	<i>Acer saccharum</i>	20-40	70
NORTHERN RED OAK	<i>Quercus rubra</i>	30-50	90
SYCAMORE	<i>Platanus occidentalis</i>	10-20	90
AMERICAN ELM	<i>Ulmus americana</i>	10-20	80
BLACK WALNUT	<i>Juglans nigra</i>	5-10	80
WHITE ASH	<i>Fraxinus americana</i>	5-10	70
BUR OAK	<i>Quercus macrocarpa</i>	5-10	90
KENTUCKY COFFEE TREE	<i>Gymnocladus dioicus</i>	5-10	80

**Understory Trees**

<b>Common Name</b>	<b>Botanical Name</b>	<b>Cover % (low-high)</b>	<b>Canopy Height (ft)</b>
OHIO BUCKEYE	<i>Aesculus glabra</i>	10-20	40
PERSIMMON	<i>Diospyros virginiana</i>	5-10	40
FLOWERING DOGWOOD	<i>Cornus florida</i>	5-10	30
BLUE BEECH	<i>Carpinus caroliniana</i>	20-30	20

**Shrubs**

<b>Common Name</b>	<b>Botanical Name</b>	<b>Cover % (low-high)</b>	<b>Canopy Height (ft)</b>
PAWPAW	<i>Asimina triloba</i>	10-20	10
CAROLINA BUCKTHORN	<i>Rhamnus caroliniana</i>	5-10	6
SPICE BUSH	<i>Lindera benzoin</i>	5-10	6
LEATHERWOOD	<i>Dirca palustris</i>	5-10	8
GIANT CANE	<i>Arundinaria gigantea</i>	0-20	15

**Vines**

<b>Common Name</b>	<b>Botanical Name</b>	<b>Cover % (low-high)</b>
SUMMER GRAPE	<i>Vitis aestivalis</i>	5-10
CAT GREENBRIER	<i>Smilax glauca</i>	5-10
VIRGINIA CREEPER	<i>Parthenocissus quinquefolia</i>	5-10

**Forbs**

<b>Common Name</b>	<b>Botanical Name</b>	<b>Cover % (low-high)</b>
CANADIAN WOODNETTLE	<i>Laportea canadensis</i>	5-10
SHINNING BEDSTRAW	<i>Galium concinnum</i>	5-10
BEAKED AGROMONY	<i>Agrimonia rostulata</i>	5-10
CANADIAN BLACK SNAKEROOT	<i>Sanicula canadensis</i>	5-10
POINTED LEAF TICKTREFOL	<i>Desmodium glutinosum</i>	5-10
WHITE AVENS	<i>Geum canadense</i>	5-10
EASTERN WATERLEAF	<i>Hydrophyllum virginianum</i>	5-10
LATE FLOWERING THROUGHWORT	<i>Eupatorium serotinum</i>	5-10
YELLOW WOOD SORREL	<i>Oxalis stricta</i>	5-10
TOOTHWORT	<i>Cardamine concatenata</i>	5-10
YELLOW PASSIONFLOWER	<i>Passiflora lutea</i>	5-10
BIANNUAL LETTUCE	<i>Lactuca ludoviciana</i>	5-10
MOODSEED	<i>Minispermum canadensis</i>	5-10
WILD GINGER	<i>Asarum canadense</i>	5-10
EARLY MEADOW RUE	<i>Thalictrum dioicum</i>	5-10

Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
RIVER OATS	<i>Chasmantheum latifolium</i>	5-10
BOSC'S PANIC GRASS	<i>Panicum boscii</i>	5-10
RICHWOODS SEDGE	<i>Carex oligocarpa.</i>	5-10
NODDING FESCUE	<i>Festuca obtusa</i>	5-10
EASTERN WOODLAND SEDGE	<i>Carex blanda</i>	5-10
VIRGINIA WILDRYE	<i>Elymus virginicus</i>	5-10
PARASOL SEDGE	<i>Carex umbellata</i>	5-10

**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.
- Birds associated with mid-successional stages include Whip-poor-will and Wood Thrush 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: Site index values range from 70 for oak to 105 for sycamore. Timber management opportunities are good to excellent. 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 group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Harvest methods that leave some mature trees to provide shade and soil protection may be desirable. Where possible, favor swamp white oak, northern red oak, black walnut, pecan, sycamore, and cottonwood. Maintain adequate riparian buffer areas.
- Limitations: Wetness from flooding – short duration and/or high water table; Use of equipment may be restricted in spring and other excessively wet periods. Equipment use when wet may compact soil and damage tree roots. Tree planting is difficult during spring flooding periods. Seedling mortality may be high due to excess wetness. Ridging the soil and planting on the ridges may increase survival.

## Supporting Information

*Relationship to Ecological Classification System:*

Terrestrial Natural Community Type (Nelson, 2010):

The Reference State for this Ecological Site is most similar to a Mesic Bottomland Forest.

Missouri Department of Conservation Forest and Woodland Communities (MDC, 2006):

The Reference State for this Ecological Site is most similar to Mixed Hardwood (Mesic Bottomland) Forest.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):

The Reference State for this Ecological Site is most similar to *Acer saccharum* - *Quercus rubra* - *Carya cordiformis* / *Asimina triloba* Forest.

## 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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