

## *Ecological Site Description*

### **Interbedded Sedimentary Upland Woodland**

**F116BY008MO**

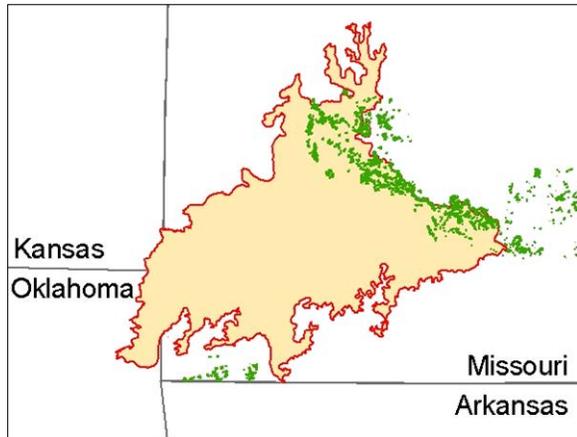
- (*Quercus alba* - *Quercus velutina*/*Rhus aromatica*/*Schizachyrium scoparium* - *Carex pensylvanica*)
- (white oak – black oak/aromatic sumac/ little bluestem – Pennsylvania sedge)

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:** 116B – Springfield Plain

#### **Introduction**

The Springfield Plain (area outlined in red on the map) is in the western part of the Ozark Uplift. It is primarily a smooth plateau with some dissection along streams. Elevation is about 1,000 feet in



the north to over 1,700 feet in the east along the Burlington Escarpment adjacent to the Ozark Highlands. The underlying bedrock is mainly Mississippian-aged limestone, with areas of shale on lower slopes and structural benches, and intermittent Pennsylvanian-aged sandstone deposits on the plateau surface.

Interbedded Sedimentary Upland Woodlands (green areas on the map) occur primarily along the northeast edge of the Springfield Plain, typically on lower hillslopes where shale is near the surface. A few isolated areas to the southwest are in the Elk

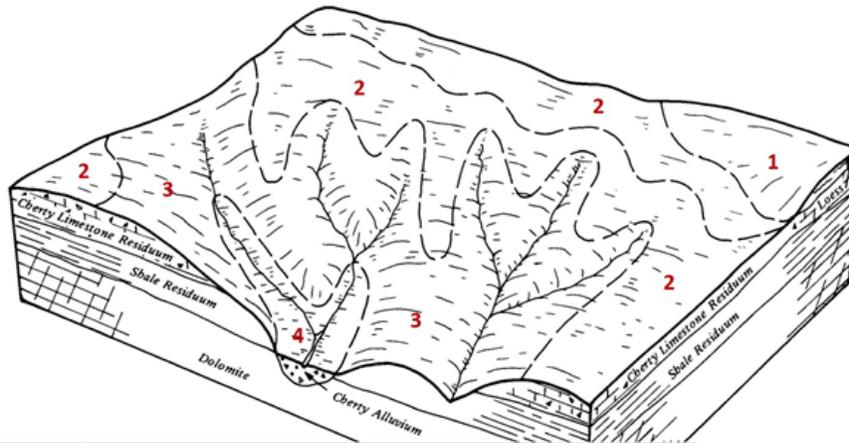
River watershed in McDonald County. Soils are moderately deep and deep over shale bedrock, and typically have shale fragments in clayey subsoils.

#### **Physiographic Features**

This site is on upland summits, shoulders and backslopes with slopes of 3 to 20 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Dodd, 1990) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. Shale Upland Woodland sites are within the area labeled as “3”, and are typically on lower slopes and structural benches where the shale crops out downslope from the overlying limestone. Steeper, lower backslopes within this area are in the Shale Backslope ecological sites. Low-base Chert Upland Woodland sites

are typically upslope, and areas of Low-base Chert Upland sites are shown on upper slopes within the area labeled as “3”. Several soils are included within the Low-base Chert Upland Woodland area labeled as “2”, as indicated by the dashed line within the delineation.



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

**Soil Features**

These soils are underlain by interbedded shale, mudstone and limestone bedrock between 40 and 70 inches, although the site definition allows for soils as shallow as 20 inches. The subsoils are not low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium over residuum derived from siltstone and shale. They have silt loam surface

horizons that are often gravelly, and clayey subsoils with varying amounts of shale fragments. These soils are not affected by seasonal wetness. Soil series associated with this site include Alsop and Boskydell.

**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 woodland dominated by an overstory of white oak and black oak. This woodland type is moderate in canopy closure (50 to 80 percent), with an open understory and a dense, diverse herbaceous ground flora. Historically, white oak dominated the canopy, along with black oak and occasional hickories, bur oak and post oak. Woodlands are distinguished from forest, by their relatively open understory, and the presence of sun-loving ground flora species including the dominant prairie grasses. Characteristic plants in the ground flora can be used to gauge the restoration potential along with remnant open-grown old-age trees, and tree height growth.

Fire played an important role in the maintenance of these systems. Because Interbedded Sedimentary Upland Woodlands normally occur next to the prairie edge, it is likely that these ecological sites burned at least once every 3 to 5 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.

Today, this community has either been cleared and converted to pasture or cropland, or has grown dense in the absence of fire. Most occurrences today exhibit canopy closure of 80 to 100 percent. In addition, the sub-canopy and understory layers are better developed. Black oak and hickory now share dominance with white oak and there are considerable more saplings in the understory. 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.

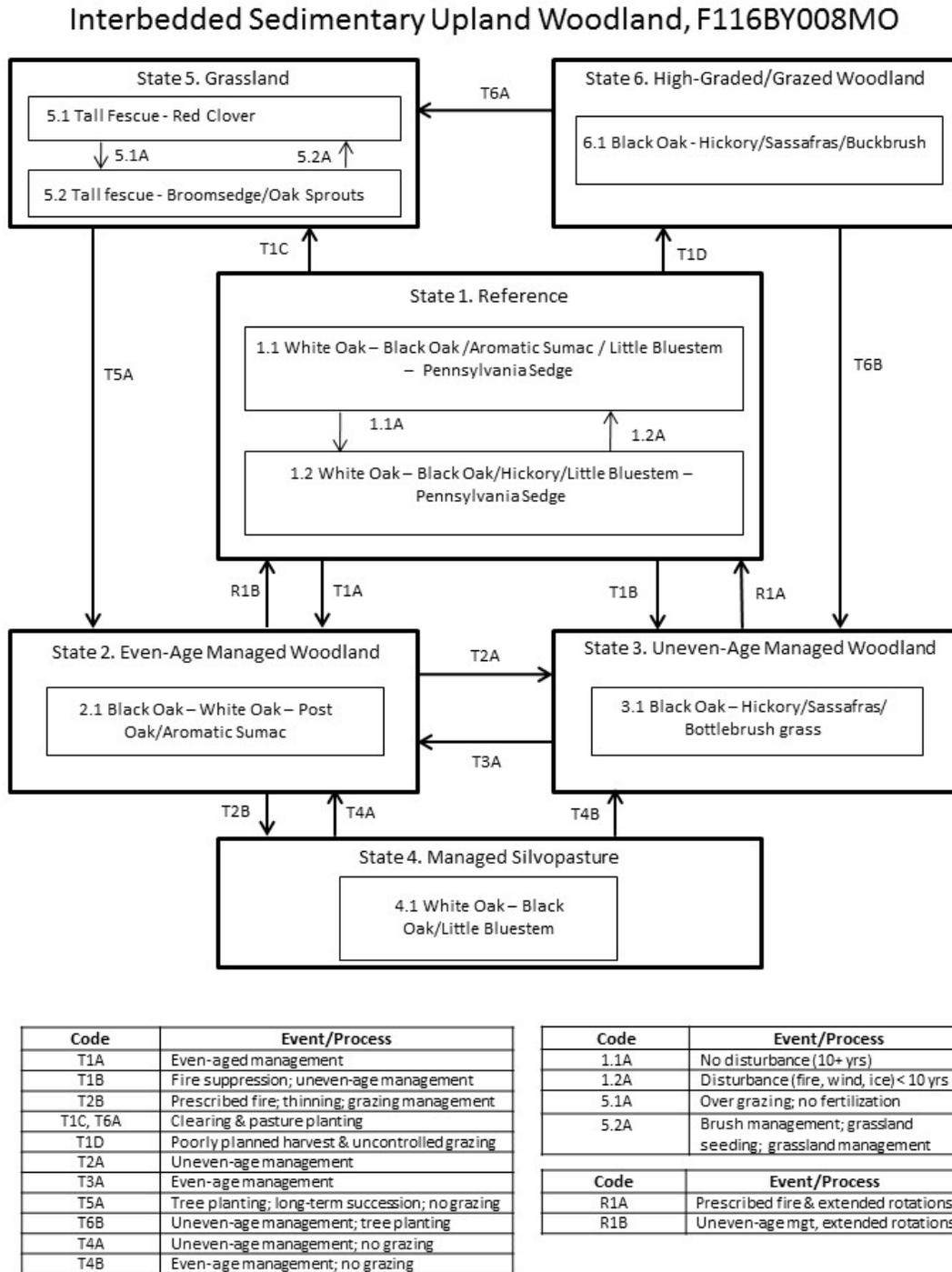
In the long term absence of fire, woody species, especially hickory, hornbeam and gooseberry encroach into these woodlands. Once established, these woody plants can quickly fill the existing understory increasing shade levels greatly diminishing the ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective management tools.

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.

Interbedded Sedimentary Upland Woodlands, if managed properly, can be a source for timber products especially white oak. Most areas on this ecological site have been repeatedly logged and high graded. Even-age management, using clearcut, or shelterwood and seed-tree harvest systems without fire will perpetuate the overly dense, shaded conditions. Thinning and/or occasional partial cuts, using an uneven-age management system can provide sunlight to the woodland floor, stimulating native woodland ground flora. However, in the absence of fire and continual cultural treatments, oak sprouting creates a dense stand, again shading out the sun-loving ground flora. Partial cutting and prescribed fire can restore the more open structure and diversity of ground flora species. This type of site with proper management can provide timber products, wildlife habitat, and potential native forage.

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**



## Ecological States

### State 1: Reference

The historical reference state for this ecological site was old growth oak woodland. The woodland was dominated by white oak and black oak. Maximum tree age was likely 150 to 300 years. Periodic disturbances from fire, wind or ice maintained the woodland 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. Many sites have been converted to grassland (State 5). Others have been subject to repeated, high-graded timber harvest coupled with uncontrolled domestic livestock grazing (State 6). Fire suppression has 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, resulting in either even-age (State 2) or uneven-age woodlands (State 3).

### State 2: Even-Age Managed Woodland

These woodlands tend to be rather dense, with a sparse understory and ground flora. Thinning can increase overall tree vigor and improve understory diversity. However, in the absence of fire, the diversity and cover of the ground flora is diminished. Continual timber management, depending on the practices used, will either maintain this state, or convert the site to uneven-age woodlands.

### State 3: Uneven-Age Managed Woodland

Uneven-Age Managed Woodlands resemble their reference state. The biggest difference is tree age, most being only 60 to 90 years old. Composition is also likely altered from the reference state depending on tree selection during harvest. In addition, without a regular 15 to 20 year harvest re-entry into these stands, they will slowly increase in more shade tolerant species and white oak will become less dominant. Uneven Age Managed Woodland is also dense because of fire suppression. Without periodic canopy disturbance, stem density and fire intolerant species, like hickory, will increase in abundance.

### State 4: Managed Silvopasture

The Managed Silvopasture state results from managing woodland communities (States 2 or 3) with prescribed fire, canopy thinning, and controlled grazing. This state can resemble the reference state, but with younger maximum tree ages, more open canopies and lower ground flora diversity. Sensation of grazing and controlled harvesting will allow transition to various managed woodland states.

### State 5: Grassland

Conversion of woodlands to planted, non-native grassland species such as tall fescue has been common for this region. Steep slopes, surface fragments, low organic matter contents and soil acidity make grasslands harder to maintain in a healthy, productive state on this ecological site. Two community phases are recognized in the Grassland state, with shifts between phases based on types of management. Poor management will result in a shift to community 5.1A that shows an increase in oak sprouting and increases in broomsedge densities. If grazing and active pasture management is discontinued, the site will eventually transition to State 2 from this phase.

### State 6: High-Graded Grazed Woodland

States that were subjected to repeated, high-grading timber harvests and uncontrolled domestic grazing transitioned to a High-Graded, Grazed Woodland state. This state exhibits an over-abundance of hickory and other less desirable tree species, and weedy understory species such as buckbrush, gooseberry, poison ivy and Virginia creeper. The existing vegetation offers little nutritional value for cattle, and excessive cattle stocking damages tree boles, degrades understory species composition and results in soil compaction and accelerated erosion and runoff. Two common transitions from this state are woody clearing and conversion to State 5, Grassland or removing livestock, limited harvesting, and allowing long term succession to occur to some other woodland state.

### Reference State Plant Community

#### Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
WHITE OAK	<i>Quercus alba</i>	30-50	70
BLACK OAK	<i>Quercus velutina</i>	20-40	80
MOCKERNUT HICKORY	<i>Carya alba</i>	5-10	60
POST OAK	<i>Quercus stellata</i>	5-10	60
SHAGBARK HICKORY	<i>Carya ovata</i>	5-10	60

#### Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
HAZELNUT	<i>Corylus americana</i>	10-20	4
FRAGRANT SUMAC	<i>Rhus aromatica</i>	10-30	3
NEW JERSEY TEA	<i>Ceanothus americanus</i>	5-20	3

#### Forbs

Common Name	Botanical Name	Cover % (low-high)
ELM-LEAFED GOLDENROD	<i>Solidago ulmifolia</i>	5-30
HAIRY SUNFLOWER	<i>Helianthus hirsutus</i>	10-30
BABY WHITE ASTER	<i>Symphotrichum anomalum</i>	10-30
PURPLE CONEFLOWER	<i>Echinacea purpurea</i>	5-20
NAKED FLOWER TICK TREFOIL	<i>Desmodium nudiflorum</i>	10-20
SLENDER LESPEDEZA	<i>Lespedeza virginica</i>	10-20
SMALL-LEAF TICK-TREFOIL	<i>Desmodium marilandicum</i>	10-20
EASTERN BEEBALM	<i>Monarda bradburiana</i>	10-20
FOUR-LEAF MILKWEED	<i>Asclepias quadrifolia</i>	10-20
SMOOTH SPIDERWORT	<i>Tradescantia ohiensis</i>	5-10

#### Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
WOODLAND BROME	<i>Bromus pubescens</i>	5-20
LITTLE BLUESTEM	<i>Schizachyrium scoparium</i>	10-30
PENNSYLVANIA SEDGE	<i>Carex pensylvanica</i>	5-20
WOODBANK SEDGE	<i>Carex cephalophora</i>	10-20
VIRGINIA WILDRYE	<i>Elymus virginicus</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 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: Field measured site index values for oak range from 51 for post oak, 62 for red oak and 54 for white oak. Timber management opportunities are fair 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 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.
- Limitations: Clay in lower portion of soil profile; Exposed clayey soils have reduced traction and compact easily when wet. Unsurfaced roads and skid trails may be impassable during rainy periods. Restrict activities to dry periods or surfaced areas. Seedling mortality may be high during the summer because of lack of adequate soil moisture, especially on south facing slopes. 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

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