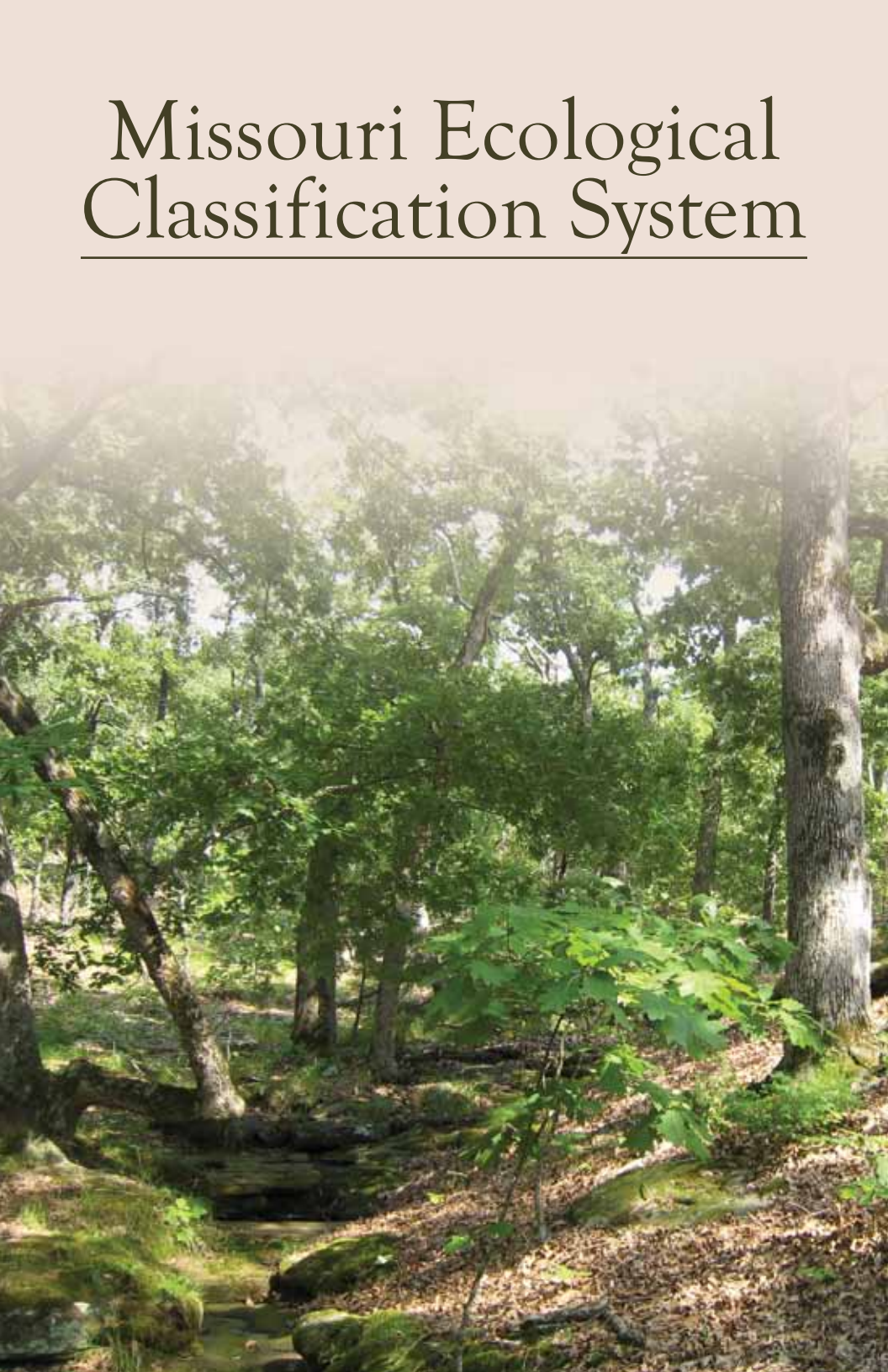
Missouri Ecological Classification System



Missouri State Conservationist

I am pleased to share with you an innovative product that will enhance conservation planning and land management in Missouri. The cooperative effort to develop the information in this document included input from a wide range of technical experts representing three federal agencies, three state agencies and a diverse group of individuals.

We present to you a new concept for advancing the science, practice, and management of ecological sites throughout Missouri. Proper management of Missouri's various ecosystems is critical to ensuring that we will have healthy soils and quality water for generations to come.

Information about specific ecological sites is available via the Web Soil Survey and NRCS' online Field Office Technical Guide (eFOTG). There are links to both on the Missouri NRCS website.

I hope that you find this publication informative and useful.

State Conservationist

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Missouri Ecological Classification System

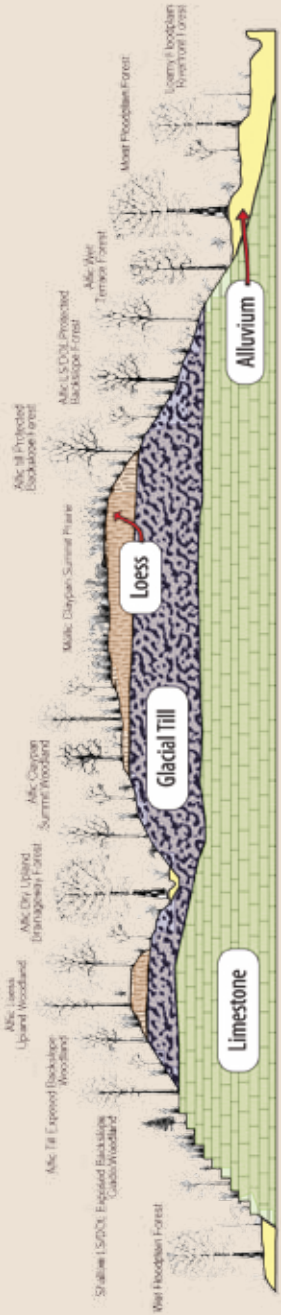
The conservation of Missouri's rich array of native plant and animal communities involves properly maintaining, enhancing and restoring these native ecosystems. In addition, land managers in Missouri are often charged with the difficult task of managing resources from a multiple-use perspective. An ecological classification system is a framework that allows landowners and natural resource managers to identify, map, and describe land with similar physical and biological characteristics (ecological sites) at scales suitable for use in natural resource planning and management.

What Are Ecological Sites?

Looking across a landscape it is not difficult to recognize that areas differ from others in kinds, size and amount of vegetation. These differences are used as the basic subdivision for inventory and analysis of landscapes. Ecological sites (ES) incorporate a land classification system that describes the ecological potential and ecosystem dynamics of land areas.

Ecological sites are tied to USDA Major Land Resource Areas (MLRA) both structurally and ecologically (see map on Page 16). Within this framework, lands are classified considering discrete physical and biotic factors. Physical factors include soils, climate, hydrology, geology, and physiographic features. Biotic factors include plant species occurrence, plant community compositions, annual biomass production, wildlife-vegetation interactions, and other factors. Ecological dynamics such as grazing, fire and various management actions are important factors with ecological sites. As a result, a particular ecological site may feature several plant communities that occur over time or in response to specific management actions. They can be used to map the landscape and organize ecological information for purposes of monitoring, assessment, restoration, and management.

Ecological Site Cross Section



How Are Ecological Sites Named?

Our Missouri naming procedure for ecological sites includes three basic criteria: soil/substrate, landform, and type of historic vegetational community. Examples of ecological sites in Missouri include: Loess Fragipan Upland Flatwoods; Alfic Chert Protected Backslope Forest; and Mollic Claypan Summit Prairie.

How Are Ecological Sites Mapped?

A fundamental concept of ecological sites is their direct linkage to soil types, specifically the soil map unit components of the National Cooperative Soil Survey. Classification of land areas to ecological sites can be easily visualized via Web Soil Survey of the USDA Natural Resources Conservation Service (NRCS) or within a personal GIS via Soil Survey Geographic (SSURGO) digital soil data. This allows for mapping of ecological sites, as detailed soil mapping is readily available for Missouri. Ecological sites are linked to map unit components of one or more soil map units. A soil map unit may have several map unit components that cannot be mapped separately (because they are closely intermingled, for example), so soil map units may not correspond in a one-to-one fashion with ecological sites.

Mapping Ecological Sites

Comparison between a soil map (left) and an ecological site map from an area in St. Joe State Park near Farmington, Mo.

Map Symbol	Soil map unit name	Ecological site name
66014	Haymond silt loam, 0 to 3 percent slopes, frequently flooded	Loamy Floodplain Riverfront Forest
66067	Elsah silt loam, 0 to 3 percent slopes, frequently flooded	Sandy/Gravelly Floodplain Riverfront Forest
67000	Elsah silt loam, 1 to 3 percent slopes, frequently flooded	Alfic Dry Upland Drainageway Forest
73155	Gasconade-Rock outcrop complex, 3 to 35 percent slopes	Shallow Limestone/Dolomite Backslope Woodland/Glade
73207	Caneyville silt loam, 3 to 8 percent slopes	Loamy Limestone/Dolomite Upland Woodland
73208	Caneyville silt loam, 8 to 15 percent slopes	Loamy Limestone/Dolomite Upland Woodland
73210	Goss very cobbly silt loam, 15 to 50 percent slopes, extremely stony	Alfic Chert Backslope Woodland/Forest
73272	Hildebrecht silt loam, 3 to 8 percent slopes	Loess Fragipan Upland Woodland
73380	Caneyville silt loam, 15 to 20 percent slopes, stony	Loamy Limestone/Dolomite Backslope Woodland/Forest
73530	Caneyville silt loam, 1 to 5 percent slopes	Loamy Limestone/Dolomite Upland Woodland
76032	Midco gravelly loam, 1 to 3 percent slopes, frequently flooded	Alfic Dry Upland Drainageway Forest

What Is An Ecological Site Description?

Information and data pertaining to a particular ecological site is organized into a reference document known as an Ecological Site Description (ESD). ESDs function as a repository of ecological knowledge regarding an ecological site. ESDs are maintained on the NRCS Ecological Site Information System (ESIS), which is the repository for information associated with ESDs and the collection of all site data. For Missouri, an additional initial location site for this information is the Missouri Field Office Technical Guide (FOTG). Regardless of location, these reports describe: the biophysical properties of ecological sites; vegetation and surface soil properties of reference conditions that represent pre-settlement vegetation, historical range of variation and proper functioning condition; state-and-transition model graphics and text; and a description of ecosystem services provided by the ecological site and other interpretations.

A basic or provisional ESD for all ecological sites identified in Missouri is available on the Missouri Field Office Technical Guide, Section II - Natural Resources Information. Topics include: a Site ID name and number, Introduction, Physiographic Features, Soil Features, Ecological Dynamics, Reference Plant List, Wildlife Interpretations and Glossary. Certified ESDs will be accessed through Ecological Site Information System (ESIS) or the Web Soil Survey.

Ecological Site Description

Ecological Site Description

Alfic Shale Protected Backslope Forest **F109XY013MO**

- *(Quercus alba-Quercus rubra/ Ostrya virginiana /Erigenia bulbosa-Cardamine concatenate)*
- (white oak - northern red oak/ eastern hop hornbeam /harbinger of spring - cutleaf toothwort)

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 "Certified" ESD will be published and will be available via the Web Soil Survey* http://websoilsurvey.nrcs.usda.gov .)

Major Land Resource Area: 109 – Iowa and Missouri Heavy Till Plain

Introduction

The Iowa and Missouri Heavy Till Plain (area outlined in red on the map) is an area of rolling hills interspersed with interfluve divides and alluvial valleys. Elevation ranges from about 660 feet along the lower reaches of rivers, to about 980 feet on stable interfluve summits in southern Iowa. Relief is about 80 to 160 feet between major streams and adjacent interfluve summits. Most of the till plain drains south to the Missouri River via the Grand and Chariton River systems, but the northeastern portion drains southeast to the Mississippi River. Loess caps the pre-Illinoisan aged till on interfluves, whereas the till is exposed on side slopes. Mississippian aged limestone and Pennsylvanian aged sandstone and shale crop out on lower slopes in some areas.

Alfic Shale Protected Backslope Forests are within the green areas on the map (Missouri portion only; Iowa distributions are currently under review). They occupy the northerly and easterly aspects of steep, dissected slopes, and are mapped in complex with the Alfic Shale Exposed Backslope Woodland ecological site. Sites are scattered throughout the MLRA, on Pennsylvanian aged shale. Soils are moderately deep to deep over shale bedrock, and typically have shale fragments in clayey subsoils.

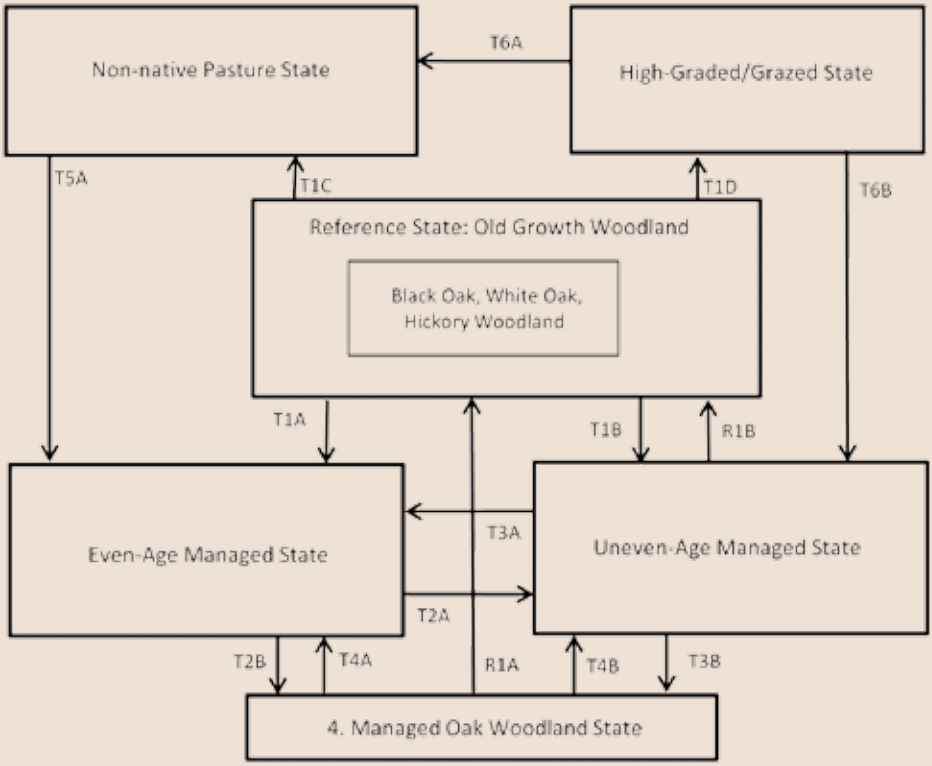
Physiographic Features

This site is on upland backslopes with slopes of 14 to 50%. The site receives runoff from upslope summit and shoulder sites, and generates runoff to adjacent, downslope ecological sites. This site does not flood.

What Is A State-And-Transition Model?

State-and-transition models (STM) are key components of ESDs. The patterns, causes, and indicators of transitions between different management states within an ecological site are described by state-and-transition models. State-and-transition models synthesize literature, field data, and informal knowledge tied to a particular ecological site to distinguish changes in vegetation and soils that are reversible versus changes that are not. The models describe the major states, community phases (i.e., easily-reversible variants of states), and transitions or pathways between communities and states. Transitions contain information about mechanisms, triggers, thresholds, and indicators of threshold development. A native woodland state being converted to non-native pasture grasses and then converted to cropland is an example of three distinct states associated with a particular ecological site. Management actions, such as conservation practice implementation, grazing management, and other land use decisions are a significant part of the described state-and-transition model.

State-And-Transition Model



Code	Practice
T1A	Even-aged mgt (clear cut, seed tree, shelterwood)
T1B	Fire suppression; uneven-age mgt (single tree or group selection)
T2B, T3B	Prescribed fire; thinning
T1C, T6A	Clearing & pasture planting
T1D	Poorly planned harvest & grazing
T2A, T4B	Uneven-age mgt
T3A, T4A	Even-age mgt
T5A	Tree planting; long-term succession
T6B	Uneven-age mgt; tree planting
R1A	Prescribed fire & extended rotations
R1B	Uneven-age mgt, extended rotations

Code	Practice
1.1A, 2.1A, 3.1A	No disturbance (10+ yrs)
1.2A	Disturbance (fire, wind, ice) < 10 yrs
2.2A	Even-age mgt.
3.2A	Uneven-age mgt.

How Is Missouri Developing Ecological Sites?

The Missouri ecological site description project is a team effort with a wide range of technical experts. NRCS and the Missouri Department of Conservation are leading this effort along with the University of Missouri, Missouri Department of Natural Resources, Forest Service, and U.S. Fish and Wildlife Service. Missouri is using a framework based on soil properties for identifying ecological sites.. Statewide, the project has identified eight essential soil properties that have significant influence on vegetation and site productivity: landform, parent material, root restriction, base saturation, drainage, texture, flooding, and ponding.

The development process in Missouri involves five steps: 1) group soils into potential ecological sites that have similar properties; 2) analyze the spatial distribution of potential ecological sites and individual map units and make adjustments where needed; 3) overlay potential ecological sites with the historic vegetation data to develop potential reference plant communities (PRPC); 4) sample current vegetation to validate PRPCs; and 5) identify, map, and describe ecological sites.

How Are Ecological Sites Used?

Ecological sites and associated information (ESDs) are used to stratify the landscape for monitoring and assessment, interpretation of resource hazards and opportunities, and to prioritize and guide management actions. ESDs are developed and maintained by NRCS and its partners, and used by the Missouri Department of Conservation, the Missouri Department of Natural Resources, the Nature Conservancy, and many other Missouri entities.

Ecological sites (ES) help us understand how ecosystem attributes vary within and among regions, and they can be a positive influence in helping to develop sound management goals and objectives. There are many ways in which this work can be used. Silviculture, wildlife management, resource planning, natural community management, ecosystem restoration, private lands conservation, and scientific research can all benefit when considering ecological sites. Specifically:

- ESs can be used to define forest stand mapping units, increase understanding of species site relationships, and help understand appropriate management strategies.
- ESs can help understand, manage, and restore native ecosystems. An understanding of the environmental factors associated with Missouri's native landscapes is imperative in order to manage our great diversity of natural communities in the state.
- ESs can be used to allocate appropriate conservation-related cost-share programs and practices, such as bottomland tree plantings, forest stand improvement, native grassland plantings, and wildlife restoration activities.

Meeting The Needs of Future Generations

Knowledge of ecological sites and their potential uses can assist landowners in wisely managing their land for current needs and also for future generations.

Summary

Missouri is part of a nationwide effort to describe and map management-scale ecological site conditions, to be used as a basis for guiding cost-share programs, land management and conservation planning. Missouri ecological sites are a multi-agency team effort with a framework that can help drive resource planning and management at a variety of scales, from eco-region, to landscape, and finally to the field and farm size. Ecological site information will be available via the NRCS Web Soil Survey, USDA Ecological Site Information System website, and the Missouri Field Office Technical Guide.

Additional Resources

Web Addresses

Missouri Field Office Technical Guide:

http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg

Ecological Site Information System:

http://esis.sc.egov.usda.gov/

Web Soil Survey:

http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Contact Information

For additional information on the Missouri Ecological Classification System, contact:

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Ecological Classification System Program Coordinator
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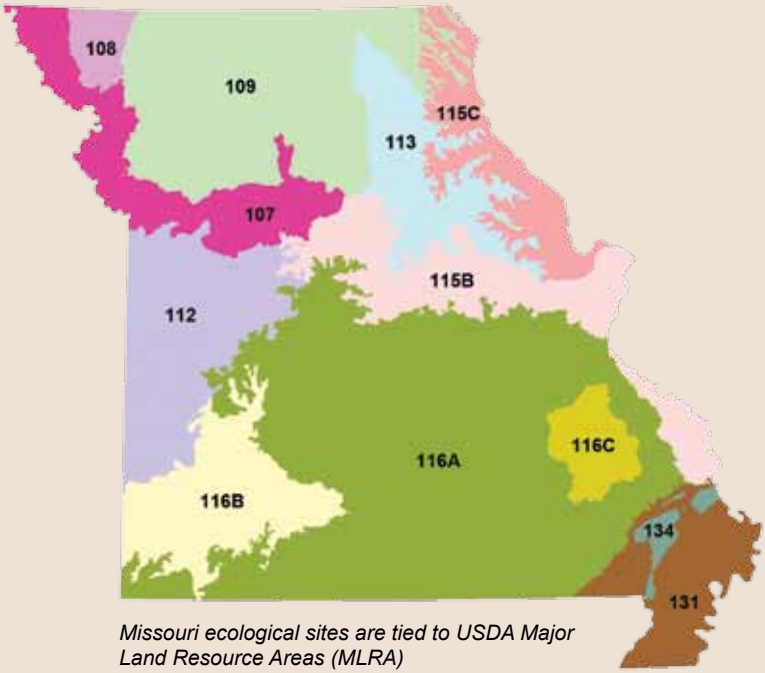
573-882-8388 Ext 3941

Natural Resources Conservation Service
State Soil Scientist
Parkade Center, Suite 250
601 Business Loop 70 West
Columbia, MO 65203
Phone: (573) 876-0900

Major Land Resource Areas in Missouri



Missouri ecological sites are tied to USDA Major Land Resource Areas (MLRA)

107B: Iowa and Missouri Deep Loess Hills

108D: Illinois and Iowa Deep Loess and Drift, Western Part

109: Iowa and Missouri Heavy Till Plain

112: Cherokee Prairies

113: Central Claypan, Western Part

115B: Central Mississippi Valley Wooded Slopes, Western Part

115C: Central Mississippi Valley Wooded Slopes, Northern Part

116A: Ozark Highland

116B: Springfield Plain

116C: St. Francois Knobs and Basins

131A: Southern Mississippi River Alluvium

134: Southern Mississippi Valley Loess

United States Department of Agriculture
Natural Resources Conservation Service

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