USDA Natural Resources
Conservation Service

Ecological site F116CY011MO
Dry Igneous Exposed Backslope Woodland

Last updated: 9/24/2020
Accessed: 05/13/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 116C–St. Francois Knobs and Basins

The St Francois Knobs and Basins is the structural center of the Ozark Dome. Elevation ranges from about 450 feet along the rivers in the southern part of the area, to 1,772 feet on the summit of Taum Sauk Mountain, the highest point in Missouri. Prominent features of this MLRA are the Precambrian igneous knobs and hills that rise conspicuously to various elevations, interspersed with smooth-floored basins and valleys overlying dolomite and sandstone. Ecological Sites defined for this MLRA are associated with the igneous parent materials, either in knob or basin positions. Areas influenced primarily by dolomite and/or sandstone are included in ecological sites within MLRA 116A (Ozark Highlands).

Classification relationships

Terrestrial Natural Community Type (Nelson, 2010):
The reference state for this ecological site is most similar to a Dry Igneous Woodland.

Missouri Department of Conservation Forest and Woodland Communities (Missouri Department of Conservation, 2006):
The reference state for this ecological site is most similar to a Post Oak Woodland.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to a Quercus stellata - Quercus marilandica - Quercus velutina - Carya texana / Schizachyrium scoparium Woodland (CEGL002149).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs primarily within the St. Francois Igneous Glade/Oak Forest Knobs Land Type Association.

Ecological site concept

NOTE: This is a “provisional” Ecological Site Description (ESD) that is under development. It contains basic ecological information that can be used for conservation planning, application and land management. As additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

Dry Igneous Exposed Backslope Woodlands occupy the southerly and westerly aspects of steep, dissected slopes, and are mapped in complex with the Dry Igneous Protected Backslope Woodland ecological site. These sites occur throughout the area, and on outlying igneous knobs in adjacent counties. Soils are moderately deep, with abundant volcanic rock fragments, and are low in bases. These sites are often downslope from both Igneous Upland Woodland and Shallow Igneous Knob Glade ecological sites. Igneous Upland Woodland sites do not have root-restricting bedrock in the upper part of the soil profile, whereas Shallow Igneous Knob Glade sites are shallow to bedrock and are interspersed with rock outcrop. Vegetation of the reference state is woodland dominated by post oak and black oak, with scattered blackjack oak, northern red oak and shortleaf pine and a ground flora of native grasses and forbs.

Associated sites

F116CY003MO	**Dry Igneous Upland Woodland** Dry Igneous Upland Woodlands are typically upslope from Dry Igneous Exposed Backslope Woodlands, and are less sloping.
F116CY005MO	**Dry Igneous Protected Backslope Woodland** Igneous Protected Backslope Woodlands are on north and east facing slopes, and are mapped in a complex with this ecological site.
F116CY010MO	**Igneous Exposed Backslope Woodland** Igneous Exposed Backslope Woodlands are typically downslope from Dry Igneous Exposed Backslope Woodlands, and do not have bedrock within the soil profile.

Similar sites

F116CY003MO	**Dry Igneous Upland Woodland** Dry Igneous Upland Woodlands are typically upslope from Dry Igneous Exposed Backslope Woodlands, and are less sloping and slightly more productive.

Table 1. Dominant plant species

Tree	(1) *Quercus stellata* (2) *Quercus velutina*
Shrub	(1) *Rhus aromatica*
Herbaceous	(1) *Schizachyrium scoparium*

Physiographic features

This site is on upland backslopes with slopes of 15 to 50 percent. It is on exposed aspects (south, southwest, and west), which receive significantly more solar radiation than the protected aspects. The site receives runoff from upslope summit and shoulder sites, and generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Simmons et al., 2006) shows the typical landscape position of this ecological

site, and landscape relationships among the major ecological sites in the igneous uplands. The site is within the area labeled “3”, on the lower, steeper backslope positions.

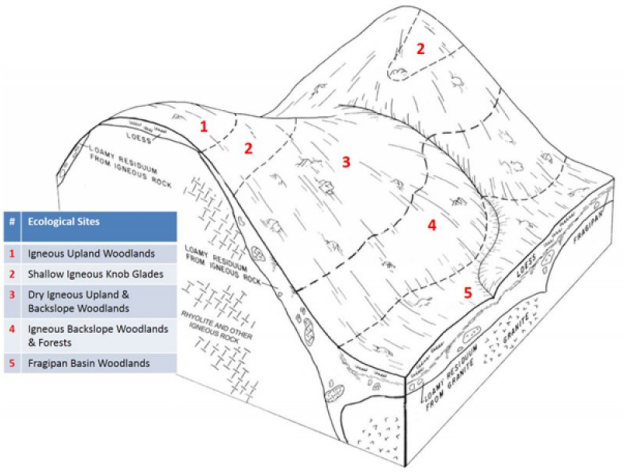


Figure 2. Major ecological sites of the igneous uplands.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Hillslope (3) Knob
Flooding frequency	None
Ponding frequency	None
Elevation	183–488 m
Slope	15–50%
Water table depth	76–152 cm
Aspect	W, SE, S, SW

Climatic features

The St. Francois Knobs and Basins have a continental type of climate marked by strong seasonality. In winter, dry-cold air masses, unchallenged by any topographic barriers, periodically swing south from the northern plains and Canada. If they invade reasonably humid air, snowfall and rainfall result. In summer, moist, warm air masses, equally unchallenged by topographic barriers, swing north from the Gulf of Mexico and can produce abundant amounts of rain, either by fronts or by convectional processes. In some summers, high pressure stagnates over the region, creating extended droughty periods. Spring and fall are transitional seasons when abrupt changes in temperature and precipitation may occur due to successive, fast-moving fronts separating contrasting air masses.

The St. Francois Knobs and Basins experience few regional differences in climates. The average annual precipitation in this area is 42 to 46 inches. The average annual temperature is about 54 to 56 degrees F. The lower temperatures occur at the higher elevations. Mean July maximum temperatures have a range of only one or two degrees across the area.

Mean annual precipitation varies somewhat along a west to east gradient. The rainfall is fairly evenly distributed throughout the year. Snow falls nearly every winter, but the snow cover lasts for only a few days.

During years when precipitation is normal, moisture is stored in the soil profile during the winter and early spring, when evaporation and transpiration are low. During the summer months the loss of water by evaporation and transpiration is high, and if rainfall fails to occur at frequent intervals, drought will result. Drought directly affects plant and animal life by limiting water supplies, especially at times of high temperatures and high evaporation rates.

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or

microclimatic variations. For example, air drainage at night may produce temperatures several degrees lower in the basin and floodplain ecological sites downslope from this ecological site. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in basins and valleys. Nearby Glade ecological sites may have higher daytime temperatures due to bare rock and higher reflectivity of these un-vegetated surfaces. Slope orientation is an important topographic influence on climate. The exposed (south- and west-facing) slopes that characterize this ecological site are regularly warmer and dryer than nearby ecological sites on protected slopes. Finally, the climate within closed-canopy woodland communities is measurably different from the climate of open-canopy woodlands within this ecological site.

References:
University of Missouri Climate Center - http://climate.missouri.edu/climate.php;

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Table 3. Representative climatic features

Frost-free period (characteristic range)	137-145 days
Freeze-free period (characteristic range)	164-169 days
Precipitation total (characteristic range)	1,143-1,194 mm
Frost-free period (actual range)	136-148 days
Freeze-free period (actual range)	163-170 days
Precipitation total (actual range)	1,143-1,194 mm
Frost-free period (average)	141 days
Freeze-free period (average)	166 days
Precipitation total (average)	1,168 mm

Climate stations used

- (1) FREDERICKTOWN [USC00233038], Fredericktown, MO
- (2) FARMINGTON [USC00232809], Farmington, MO
- (3) ARCADIA [USC00230224], Arcadia, MO

Influencing water features

This ecological site is not influenced by wetland or riparian water features. The site generates runoff to adjacent, downslope ecological sites. The water features of this upland ecological site include evapotranspiration, surface runoff, and drainage. Each water balance component fluctuates to varying extents from year-to-year. Evapotranspiration remains the most constant. Precipitation and drainage are highly variable between years. Seasonal variability differs for each water component. Precipitation generally occurs as single day events. Evapotranspiration is lowest in the winter and peaks in the summer. Water stored as ice and snow decreases drainage and surface runoff rates throughout the winter and increases these fluxes in the spring. The surface runoff pulse is greatly influenced by extreme events. Conversion to cropland or other high intensities land uses tends to increase runoff, but also decreases evapotranspiration. Depending on the situation, this might increase groundwater discharge, and decrease baseflow in receiving streams.

Soil features

These soils have granitic or rhyolitic volcanic bedrock at 20 to 40 inches, and acidic subsoils that are low in bases. The soils were formed under woodland vegetation, and have thin, light-colored surface horizons. Parent material is slope alluvium and residuum weathered from granite and rhyolite. They have gravelly and cobbly silt loam surface horizons, and subsoils with moderate to high amounts of volcanic gravel and cobbles. They are not affected by seasonal wetness. Soil series associated with this site include Irondale and Syenite.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–granite (2) Residuum–granite (3) Residuum–rhyolite
Surface texture	(1) Gravelly silt loam (2) Cobbly silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	51–102 cm
Surface fragment cover <=3"	5–34%
Surface fragment cover >3"	3–14%
Available water capacity (0-101.6cm)	5.08–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	3.5–6
Subsurface fragment volume <=3" (Depth not specified)	10–36%
Subsurface fragment volume >3" (Depth not specified)	7–25%

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.

Dry Igneous Exposed Backslope Woodlands are dominated by short (30 to 50 feet) open grown post oak and black oak, with scattered hickory, blackjack oak and shortleaf pine. Canopy is rather open 30 to 50 percent on the exposed positions. The understory canopy is also open with a dense ground flora of native grasses and forbs.

The somewhat shallow soils and exposed landscape position of Dry Igneous Exposed Backslope Woodlands limits the growth of trees and supports an abundance of native grasses and forbs in the understory. Fire played an important role in the maintenance of these systems as well. It is likely that these ecological sites, along with adjacent knobs and woodlands burned at least once every 5 years. These periodic fires would have kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs.

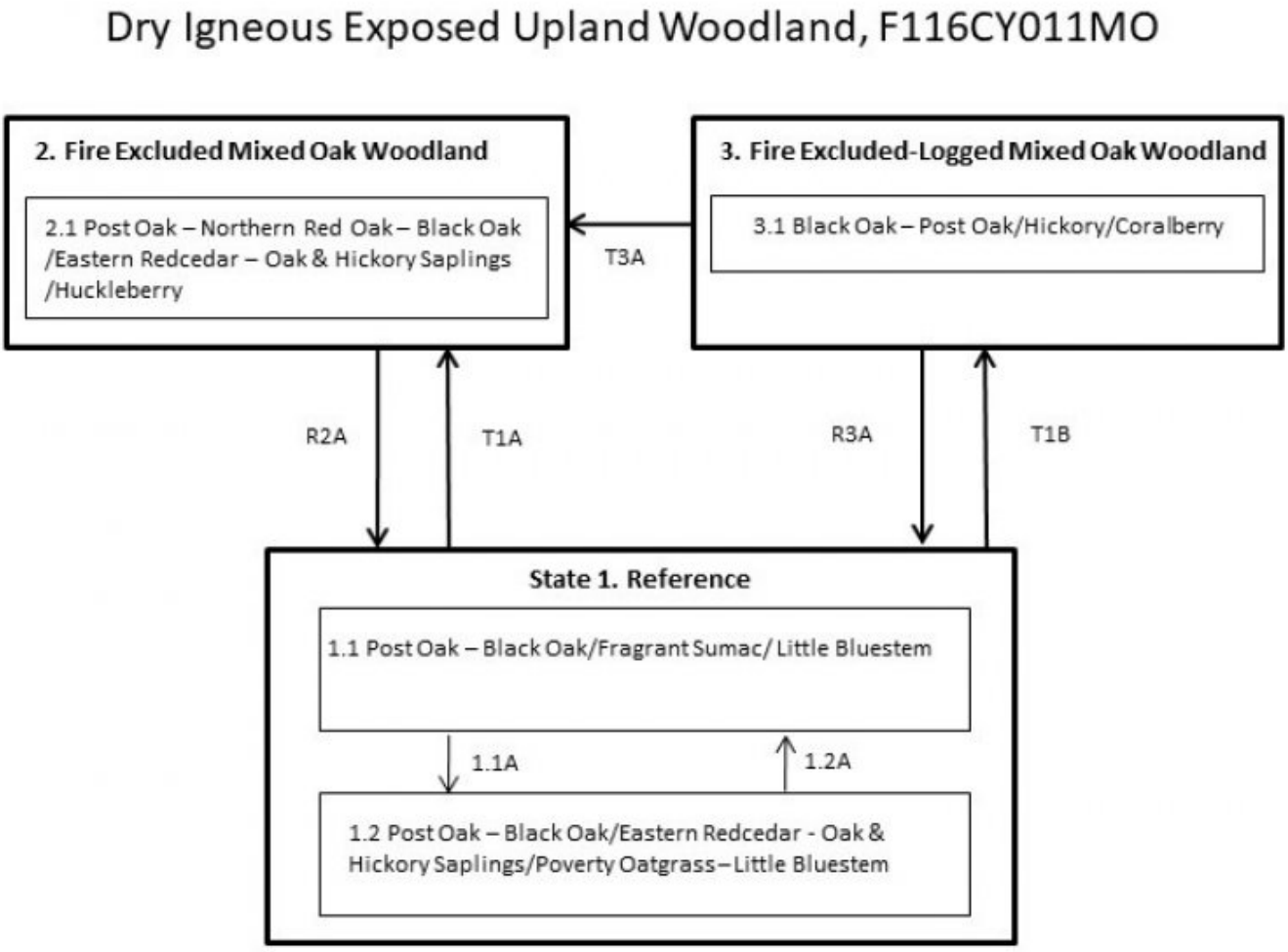
These sites were also subjected to occasional disturbances from wind and ice, as well as grazing by native large herbivores. Wind and ice would have periodically opened the canopy up by knocking over trees or breaking substantial branches off canopy trees. Grazing by large native herbivores, such as bison, elk and white-tailed deer, would have effectively kept understory conditions more open, creating conditions more favorable to oak reproduction and sun-loving ground flora species.

In the long term absence of fire, woody species have encroached into these woodlands. Once established, these woodies can quickly fill the woodland system. Most occurrences today are dense, and shady with a greatly diminished ground flora. Removal of the younger understory and the application of prescribed fire have proven to be effective management tools. Domestic grazing has also impacted these communities, further diminishing the diversity of native plants and introducing species that are tolerant of grazing, such as coralberry, gooseberry, and Virginia creeper. It also promotes the invasion of eastern redcedar. These grazed sites have a more open understory in addition to soil compaction, soil erosion and lower productivity problems. Timber harvesting is limited on these sites because of the poor quality and tree size but are excellent wildlife sites.

Timber harvesting is very limited on these sites because of the poor quality and tree size. They are excellent wildlife sites.

A State and Transition Diagram follows. 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.

State and transition model



Code	Event/Process
T1A, T3A	Fire suppression > 20 years
T1B	Fire suppression ; logging
R2A	Thinning ; prescribed fire
R3A	Prescribed fire
1.1A	Fire-free interval 10-15 years
1.2A	Fire interval 3-5 years

Figure 9. State and transition diagram for this ecological site

State 1

Reference

The reference state was old growth woodland dominated by short (30 to 50 feet) open grown post oak, with scattered blackjack oak, northern red oak and black oak and an occasional shortleaf pine. Canopy closure varies from open 30 to 50 percent canopy on most exposed positions to more closed 50 to 80 percent canopy on more protected positions. The understory is open with a dense ground flora of native grasses and forbs. Fire played an important role in the maintenance of these state as well. It is likely that these ecological sites, along with adjacent knobs burned at least once every 5 years. These periodic fires would have kept woodlands open, removed the litter, and stimulated the growth and flowering of the grasses and forbs. Soil fertility and site productivity is low. Two community phases are recognized in the reference state, with shifts between phases based on disturbance frequency. Reference states are rare today.

Community 1.1
Post Oak – Black Oak/Fragrant Sumac/ Little Bluestem

Forest overstory. Post oak and black oak are typical overstory species. Other oak species and hickories are also usually present. Canopy cover can range from 40 percent to nearly 70 percent. The Overstory Species list is based on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

Forest understory. Little bluestem dominates the dense ground layer. Numerous forbs are also present and locally abundant. The Understory Species list is based on field reconnaissance as well as commonly occurring species listed in Nelson 2010; names and symbols are from USDA PLANTS database.

Community 1.2
Post Oak – Black Oak/Eastern Redcedar - Oak & Hickory Saplings/Poverty Oat Grass – Little Bluestem

State 2
Fire Excluded Mixed Oak Woodland

This state is dominated by post oak, northern red oak and black oak. They can form relatively even-age stands, dating to when fire suppression became the dominant management characteristic on the site. This stage can occur relatively quickly (10 to 20 years). Canopy closures can approach 50 to 70 percent with little or no ground flora. Without active management or long term presence of fire, woody species such as eastern redcedar and hickory will encroach into these woodlands. Once established, these woody species can quickly fill the woodland system. Most occurrences of this state today are dense, and shady with a greatly diminished ground flora. Removal of the younger understory, opening the upper canopy, and the application of prescribed fire has proven to be effective management tools. Timber harvesting is very limited on these sites because of the poor quality and tree size.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates

Community 2.1
Post Oak - Northern Red Oak - Black Oak /Eastern Redcedar - Oak & Hickory Saplings /Huckleberry

State 3
Fire Excluded - Logged Mixed Oak Woodland

In the long term absence of fire, woody species have encroached into this woodland state. Once established, these woody species will quickly fill the woodland system. Removal of the younger understory and the application of prescribed fire have proven to be effective management tools. Timber harvesting is very limited on these sites because of the poor quality and tree size. This state, while of limited timber value, experienced occasional harvesting (high grading) of northern red oak, scarlet oak, shortleaf pine and white oak that has reduced the

densities of these species causing an increase in black oak and blackjack oak.

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates

Community 3.1
Black Oak-Post Oak/Hickory/Buckbrush

Transition T1A
State 1 to 2

Fire suppression > 20 years

Transition T1B
State 1 to 3

Fire suppression ; logging

Restoration pathway R2A
State 2 to 1

Thinning ; prescribed fire every 5-10 years

Restoration pathway R3A
State 3 to 1

Prescribed fire every 5-10 years

Transition T3A
State 3 to 2

Fire suppression > 20 years; logging cessation

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
post oak	QUST	*Quercus stellata*	Native	–	10–30	–	–
black oak	QUVE	*Quercus velutina*	Native	–	10–30	–	–
shagbark hickory	CAOV2	*Carya ovata*	Native	–	5–20	–	–
shortleaf pine	PIEC2	*Pinus echinata*	Native	–	5–20	–	–
blackjack oak	QUMA3	*Quercus marilandica*	Native	–	5–20	–	–
northern red oak	QURU	*Quercus rubra*	Native	–	5–20	–	–
black hickory	CATE9	*Carya texana*	Native	–	5–20	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
little bluestem	SCSC	*Schizachyrium scoparium*	Native	–	5–10
whitetinge sedge	CAAL25	*Carex albicans*	Native	–	5–10
cypress panicgrass	DIDID	*Dichanthelium dichotomum var. dichotomum*	Native	–	5–10
rock muhly	MUSO	*Muhlenbergia sobolifera*	Native	–	5–10
poverty oatgrass	DASP2	*Danthonia spicata*	Native	–	5–10
poverty oatgrass	DASP2	*Danthonia spicata*	Native	–	5–10
Bosc's panicgrass	DIBO2	*Dichanthelium boscii*	Native	–	5–10
slimleaf panicgrass	DILI2	*Dichanthelium linearifolium*	Native	–	5–10
Forb/Herb					
violet lespedeza	LEVI6	*Lespedeza violacea*	Native	–	5–10
Virginia tephrosia	TEVI	*Tephrosia virginiana*	Native	–	5–10
eastern beebalm	MOBR2	*Monarda bradburiana*	Native	–	5–10
deerberry	VAST	*Vaccinium stamineum*	Native	–	5–10
longleaf summer bluet	HOLO	*Houstonia longifolia*	Native	–	5–10
prostrate ticktrefoil	DERO3	*Desmodium rotundifolium*	Native	–	5–10
bluejacket	TROH	*Tradescantia ohiensis*	Native	–	5–10
narrowleaf mountainmint	PYTE	*Pycnanthemum tenuifolium*	Native	–	5–10
smooth yellow false foxglove	AUFL	*Aureolaria flava*	Native	–	5–10
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	5–10
smooth violet prairie aster	SYTU2	*Symphyotrichum turbinellum*	Native	–	5–10
nakedflower ticktrefoil	DENU4	*Desmodium nudiflorum*	Native	–	5–10
violet lespedeza	LEVI6	*Lespedeza violacea*	Native	–	5–10
elmleaf goldenrod	SOUL2	*Solidago ulmifolia*	Native	–	5–10
hairy sunflower	HEHI2	*Helianthus hirsutus*	Native	–	5–10
skyblue aster	SYOO	*Symphyotrichum oolentangiense*	Native	–	5–10
licorice bedstraw	GACI2	*Galium circaezans*	Native	–	5–10
downy ragged goldenrod	SOPE	*Solidago petiolaris*	Native	–	5–10
perplexed ticktrefoil	DEPE80	*Desmodium perplexum*	Native	–	5–10
manyray aster	SYAN2	*Symphyotrichum anomalum*	Native	–	5–10
trailing lespedeza	LEPR	*Lespedeza procumbens*	Native	–	5–10
woman's tobacco	ANPL	*Antennaria plantaginifolia*	Native	–	5–10
birdfoot violet	VIPE	*Viola pedata*	Native	–	5–10
Shrub/Subshrub					
fragrant sumac	RHAR4	*Rhus aromatica*	Native	–	10
St. Andrew's cross	HYHY	*Hypericum hypericoides*	Native	–	5–10
Blue Ridge blueberry	VAPA4	*Vaccinium pallidum*	Native	–	5–10
farkleberry	VAAR	*Vaccinium arboreum*	Native	–	5–10

Animal community

Wildlife (MDC, 2006):

Oaks on this site provide abundant hard mast; scattered shrubs provide soft mast; native legumes provide high-quality wildlife food.

Sedges and native cool-season grasses provide green browse; 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 and herbaceous cover habitat is important for turkey poults and quail chicks.

Birds species associated with this site are Indigo Bunting, Red-headed Woodpecker, Eastern Bluebird, Northern Bobwhite, Summer Tanager, Eastern Wood-Pewee, Whip-poor-will, Chuck-will's widow, and Red-eyed Vireo.

Reptiles and amphibians associated with this ecological site include ornate box turtle, northern fence lizard, five-lined skink, coal skink, broad-headed skink, six-lined racerunner, western slender glass lizard, prairie ring-necked snake, flat-headed snake, rough earth snake, red milk snake, western pygmy rattlesnake, and timber rattlesnake.

Other information

Forestry (NRCS 2002; 2014)
Management: Estimated site index values range from 40 to 50 for oak and 50 to 55 for shortleaf pine. Timber management opportunities are poor. These sites respond well to prescribed fire as a management tool.

Limitations: Large amounts of coarse fragments throughout profile; bedrock may be within 60 inches. 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.

Inventory data references

Potential Reference Sites: Dry Igneous Exposed Backslope Woodland

Plot PRHOGO02 – Irondale soil
Located in Prairie Hollow Gorge NA, Shannon County, MO
Latitude: 37.18112
Longitude: -91.262491

Plot KLMINP01 – Irondale soil
Located in Klepzig Mill NPS, Shannon County, MO
Latitude: 37.127286
Longitude: -91.198886

Plot BISMACA01 – Irondale soil
Located in Bismarck CA, St. Francois County, MO
Latitude: 37.732234
Longitude: -90.632577

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Contributors

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Approval

Nels Barrett, 9/24/2020

Acknowledgments

Missouri Department of Conservation and Missouri Department of Natural Resources personnel provided significant and helpful field and technical support in the development of this ecological site.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	09/14/2020
Approved by	Nels Barrett
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
