14010

Central Interior Highlands Calcareous Glade and Barrens

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Vegetation Type

Steppe/Savanna

Map Zones

49

Geographic Range

Central Interior Highlands Calcareous Glade and Barrens is found in the Interior Highlands of the Ozark, Ouachita and Interior Low Plateau regions. In MZ49, this BpS occurs in the Southern Shawnee Hills Level IV Ecoregion (71n) and on the Mississippi River and Illinois River bluffs (72d, 72g) in IL (White and Madany 1978, Woods et al. 2006).

Biophysical Site Description

Occurs along moderate to steep slopes and steep valleys on primarily southerly to westerly facing slopes. Limestone and/or dolomite bedrock typify this system with shallow, moderately to well-drained soils interspersed with rocks. These soils often dry out during the summer and autumn, and then become saturated during the winter and spring.

Vegetation Description

In MZ49, BpS 1401 is typically dominated by little bluestem (Schizachyrium scoparium), often associated with side-oats grama (Bouteloua curtipendula) and Indian grass (Sorghastrum nutans). Other characteristic ground layer species include shale barren aster (Aster oblongifolius), late purple aster (A. patens), pale purple coneflower (Echinacea pallida), prairie tea (Croton monanthogynus), diamondflowers (Hedyotis nigricans), false aloe (Manfreda virginica), flowering spurge (Euphorbia corollata), obedient plant (Physostegia virginiana), false boneset (Kuhnia eupatorioides), rattlesnake-master (Eryngium yuccifolium), prairie Indian plantain (Cacalia plantaginea), hoary puccoon (Lithospermum canescens), prairie dock (Silphium terebinthinaceum) and saw greenbriar (Smilax bona-nox) (White and Madany 1978, Heikens and Robertson 1995, Lawless et al. 2006).

Stunted woodlands primarily dominated by chinkapin oak (Quercus muehlenbergii) interspersed with Eastern red cedar (Juniperus virginiana) occur on variable-depth-to-bedrock soils. The trees typically occur as islands in a wider herbaceous or rocky area. The islands are found in microenvironments where the soil depth and available water are sufficient to support trees (e.g., depressions in the bedrock). Other woody plants associated with this system (within their ranges) include Shumard’s oak (Q. shumardii), post oak (Quercus stellata), eastern redbud (Cercis canadensis), winged elm (Ulmus alata), blue ash (Fraxinus quadrangulata) and Carolina buckthorn (Frangula caroliniana).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SCSC | *Schizachyrium scoparium* | Little bluestem |
| SONU2 | *Sorghastrum nutans* | Indiangrass |
| QUMU | *Quercus muehlenbergii* | Chinkapin oak |
| SITE | *Silphium terebinthinaceum* | Silphium terebinthinaceum |
| BOCU | *Bouteloua curtipendula* | Sideoats grama |
| JUVI | *Juniperus virginiana* | Eastern redcedar |
| SYOB | *Symphyotrichum oblongifolium* | Aromatic aster |
| PHVI8 | *Physostegia virginiana* | Obedient plant |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Fire is the primary natural dynamic, fires help manage this system by restricting woody growth and maintaining the more open glade structure. Historically grazing by wild and domestic ungulate species represented a significant disturbance regime. Regionally significant drought cycles affect severity of other disturbance regimes.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 19 | 18 |  |  |
| Moderate (Mixed) | 15 | 21 |  |  |
| Low (Surface) | 5 | 61 |  |  |
| All Fires | 3 | 100 |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Within geographic range, collective acreage in the tens of thousands of acres, however glade complexes occur in patches throughout the range in areas of two to more than one thousand acres in size.

Adjacency or Identification Concerns

Typically adjacent to dry oak woodlands and/or prairie associations on calcareous soils. Identification concerns include over-encroachment of glades by eastern red cedar on non-dolomite/limestone substrates especially those of old fields in late, primary succession.

Issues or Problems

Native Uncharacteristic Conditions

Encroachment of native redcedar is locally severe at the present due to fire suppression.

Comments

Model for MZ44 by Collins and Milks modified for MZ49 by B. Slaughter. Text adapted for Illinois. Suggested reviewers: Blane Heumann, Paul Nelson, Doug Ladd and Ray Wiggs.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Herb | >1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0-0.5 | UN | UN | UN | B | B | B | B | B | B | B |
| Shrub | 0.5-1.0 | UN | UN | UN | B | B | B | B | B | B | B |
| Shrub | 1.0-3.0 | UN | UN | UN | B | B | B | B | B | B | B |
| Shrub | >3.0 | UN | UN | UN | B | B | B | B | B | B | B |
| Tree | 0-5 | A | A | A | E | E | E | E | E | E | E |
| Tree | 5-10 | C | C | C | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | D | D | D | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 58 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Lower |
| SONU2 | Sorghastrum nutans | Indiangrass | Lower |
| SITE | Silphium terebinthinaceum | Silphium terebinthinaceum | Lower |
| QUMU | Quercus muehlenbergii | Chinkapin oak | All |

Description

Perennial and annual forbs, grasses, and sedges dominate. The ground vegetation ranges to four feet high by midsummer. Scattered stunted trees persist in fissures in the soil. Tree species include oak and cedar seedlings.

Upper Layer Lifeform is not the dominant lifeform. Class A is dominated by grasses, forbs, and sedges. Minimum cover would be zero on outcroppings of bedrock, and maximum canopy would be 100%. Height of dominant layer may be up to 4 ft. Tree seedlings would be scattered throughout the herbaceous layer.

*Maximum Tree Size Class*  
Seedling <4.5ft

Class B 7 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUVI | Juniperus virginiana | Eastern redcedar | Middle |
| QUMU | Quercus muehlenbergii | Chinkapin oak | None |

Description

Mid-seral closed canopy dominated by eastern red cedar shrubs. Isolated areas rarely affected by fire. Herbaceous layer persists but is overtopped by shrubs. Scattered hardwood saplings occur within shrub layer, and scattered stunted trees occur in the upper canopy.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class C 24 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Lower |
| SONU2 | Sorghastrum nutans | Indiangrass | Lower |
| SITE | Silphium terebinthinaceum | Silphium terebinthinaceum | Lower |
| QUMU | Quercus muehlenbergii | Chinkapin oak | All |

Description

Mid-seral open canopy dominated by herbaceous layer of perennial grasses, forbs, and sedges. Shrub component occurs as cedar species and oak sprouts. Low-intensity, frequent fires maintain open structure (surface fire every five years and mixed fire every 10yrs). Tree species are scattered, but have developed some crown structure. Bedrock outcroppings remain open. Edaphic conditions determine species composition and arrangement. Likely represents greatest diversity among classes.

Upper Layer Lifeform is not the dominant lifeform. Class C is dominated by a diverse herbaceous layer of grasses, sedges and forbs. Minimum canopy closure would be zero in bedrock outcroppings, and 100% in areas with deeper soil.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Class D 10 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Lower |
| SONU2 | Sorghastrum nutans | Indiangrass | Lower |
| SITE | Silphium terebinthinaceum | Silphium terebinthinaceum | Lower |
| QUMU | Quercus muehlenbergii | Chinkapin oak | All |

Description

Late-seral open canopy dominated herbaceous layer of perennial grasses, forbs, and sedges. Scattered shrub component occurs as cedar and oak saplings and resprouts. Tree species occur as widely-scattered oaks with well-developed crowns.

Upper Layer Lifeform is not the dominant lifeform. Class D is dominated by a diverse herbaceous layer of grasses, sedges, and forbs. Minimum canopy closure would be zero in bedrock outcroppings, and 100% in areas with deeper soil. Height of dominant layer 0-15 m.

*Maximum Tree Size Class*  
Large 21-33"DBH

Class E 1 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUVI | Juniperus virginiana | Eastern redcedar | All |
| QUMU | Quercus muehlenbergii | Chinkapin oak | None |

Description

Late-seral closed canopy dominated by shrub and tree layer of eastern red and Ashe's juniper. Widely scattered trees occur with stunted canopy growth due to competition of resources. Herbaceous layer largely reduced and extremely scattered. Bedrock layers are heavily encroached and may be completely covered in some areas.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 20 |
| Mid1:OPN | 21 | Late1:OPN | 70 |
| Mid1:CLS | 21 | Late1:CLS | 70 |
| Late1:OPN | 71 | Late1:OPN | 999 |
| Late1:CLS | 71 | Late1:CLS | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Alternative Succession | Early1:ALL | Mid1:CLS | 1 | 1 | Yes | 19 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.05 | 20 | No | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.07 | 14 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.2 | 5 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 10 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.04 | 25 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.1 | 10 | No | 0 |
| Native Grazing | Mid1:OPN | Mid1:OPN | 0.15 | 7 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.2 | 5 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:CLS | 0.005 | 200 | No | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 30 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.015 | 67 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.1 | 10 | No | 0 |
| Native Grazing | Late1:OPN | Late1:OPN | 0.15 | 7 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.2 | 5 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.005 | 200 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0083 | 120 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.05 | 20 | Yes | 0 |

References

Heikens, A.L. and P.A. Robertson. 1995. Classification of barrens and other natural xeric forest openings in southern Illinois. Bulletin of the Torrey Botanical Club 122: 203-214.

Lawless, P.J., J.M. Baskin, and C.C. Baskin. 2006. Xeric limestone prairies of eastern United States: Review and synthesis. The Botanical Review 72: 235-272.

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