14000

Central Appalachian Alkaline Glade and Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |
| None | None | None | None |

Vegetation Type

Steppe/Savanna

Map Zone

63

Geographic Range

This Biophysical Setting (BpS) occurs on thin soil over calcareous bedrock (primarily limestone or dolostone) at low to moderate elevations from the central Appalachians south into the Ridge and Valley (NatureServe 2007). In map zone (MZ)62, this BpS occurs on the unglaciated Allegheny plateau in Subsections 221Ea and 221Ed (Cleland et al. 2007). This type is reported by Fike (1999) in the Pittsburgh Low Plateau ecological region of Pennsylvania, corresponding to Subsection 221Ea. The type is apparently restricted to one occurrence in Ohio (Lawless et al. 2006), where the majority of calcareous glades are represented by BpS 1401, which is concentrated on the Interior Low Plateau of MZ53. Local glade openings on circumneutral clay over shale or limestone in Athens and Lawrence Counties, Ohio, may also represent this type (Wistendahl 1975, Auffenorde and Wistendahl 1985).

Biophysical Site Description

This BpS occupies dry areas of calcareous parent material, typically limestone and dolostone, on mid-elevation rocky ridges, slopes, and outcrops (NatureServe 2007). Soils are high in calcium and magnesium. In Ohio, this type is restricted to limestone of the Pennsylvania Conemaugh Formation on the Marietta Plateau in Belmont County (Lawless et al. 2006).

Vegetation Description

The vegetation for MZ62 is based on Fike (1999). The apparent rarity of this BpS in MZ62 limits data availability. The small trees redcedar (*Juniperus virginianus*), chinquapin oak (*Quercus muhlenbergii)* and redbud (*Cercis canadensis*) characterize the overstory. Shrubs may include hop-hornbeam (*Ostrya virginiana*), and flowering dogwood (*Cornus florida).* [The ground layer is dominated by little bluestem & big bluestem). The ground layer is well-expressed due to the lack of forest development, and supports Indian grass (*Sorghastrum nutans*), aromatic aster (*Aster oblongifolius*), hoary puccoon (*Lithospermumcanescens*), tall larkspur (*Delphinium exaltatum*), green milkweed (*Asclepias viridiflora*), flowering spurge (*Euphorbia corollata*), and whorled rosinweed (*Silphium trifoliatum*). All occurrences cover a small area, 1-3ac and occur in the Captina Creek watershed. This type is referred to as "inred-cedar -- redbud shrubland" in Pennsylvania (Fike 1999). Elsewhere in Pennsylvania, but apparently outside MZ62, this type associates with "side-oats gramma calcareous grassland," prairie-like openings that support a diverse array of grasses and forbs, and scattered trees favoring an alkaline substrate. Remnant glades in southeastern Ohio that may represent this type are characterized by similar floristic composition to those sites found in Pennsylvania (see Wistendahl 1975, Auffenorde and Wistendahl 1985).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| JUVI | *Juniperus virginiana* | Eastern redcedar |
| CECA4 | *Cercis canadensis* | Eastern redbud |
| RHAR4 | *Rhus aromatica* | Fragrant sumac |
| AMELA | *Amelanchier* | Serviceberry |
| BOCU | *Bouteloua curtipendula* | Sideoats grama |
| SCSC | *Schizachyrium scoparium* | Little bluestem |
| ANGE | *Andropogon gerardii* | Big bluestem |
| PAVI2 | *Panicum virgatum* | Switchgrass |

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

Disturbance Description

The origin of glade openings has been related to several factors, including shallow soils, weather-resistant calcareous bedrock, moderate to steep slopes, aspect (generally south- to west-facing), fires (including anthropogenic fires), pasturing, land clearage for cultivation, and erosion (Lawless et al. 2006). Guyette et al. (2003) found fire return intervals of 1-40yrs in a southern Indiana site (outside this MZ), with higher fire frequency coinciding with the period of European colonization post-1820. Native American burning may account for some occurrences of this BpS, especially on xeric sites, and European agricultural practices may account for some of the occurrences on more mesic sites (Lawless et al. 2006). In the absence of fire, xeric sites may convert to redcedar dominance, whereas deeper soil sites may convert to hardwood dominance within 100yrs (Lawless et al. 2006).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 5 | 79 | 1 | 40 |
| Moderate (Mixed) | 19 | 21 |  |  |
| Low (Surface) | 1420 |  |  |  |
| All Fires | 4 | 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

This is a small patch system occurring over calcareous parent materials in a matrix of oak-dominated or mixed mesophytic forest types.

Adjacency or Identification Concerns

Mappability concern: due to its limited distribution in MZ62, it may be difficult to identify site supporting 1400 within the matrix forests (primarily 1317, 1303 (?), and 1321). In addition, the origin of these openings is apparently related, at least in part, to human land use activity.

Issues or Problems

Native Uncharacteristic Conditions

Comments

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 | A | A | A | A | A | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | A | A | A | A | A | UN | UN | UN | UN | UN |
| Herb | >1.0 | A | A | A | A | A | UN | UN | UN | UN | UN |
| Shrub | 0-0.5 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | B | B | B | B | B | B | UN | UN | UN | UN |
| Tree | 5-10 | UN | UN | UN | UN | UN | UN | C | C | C | C |
| Tree | 10-25 | UN | UN | UN | UN | UN | UN | D | D | D | D |
| 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 52 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Lower |
| ANGE | Andropogon gerardii | Big bluestem | Lower |
| PAVI2 | Panicum virgatum | Switchgrass | Lower |

Description

Early successional stage dominated by grasses and forbs following fire. This stage is maintained by frequent ground fire and/or grazing by native herbivores. Anthropogenic disturbances, including fire, may have maintained the community type in this stage.

*Maximum Tree Size Class*  
None

Class B 27 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Lower |
| ANGE | Andropogon gerardii | Big bluestem | Lower |
| JUVI | Juniperus virginiana | Eastern redcedar | Upper |
| CECA4 | Cercis canadensis | Eastern redbud | Mid-Upper |

Description

Mid-successional stage characterized by invasion of (primarily) xerophytic shrubs and small trees due to lack of fire or grazing. Woody species composition varies across substrate types, but redcedar is characteristic in most sites.

*Maximum Tree Size Class*  
Sapling >4.5ft; <5in DBH

Class C 7 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUVI | Juniperus virginiana | Eastern redcedar | Upper |
| CECA4 | Cercis canadensis | Eastern redbud | Mid-Upper |
| COFL2 | Cornus florida | Flowering dogwood | Middle |
| RHAR4 | Rhus aromatica | Fragrant sumac | Low-Mid |

Description

Late successional stage characterized by partially closed to closed canopy of redcedar, associated with redbud, flowering dogwood, and a variety of shrubs and herbs. Light-requiring ground layer species patchy or absent under dense canopy. Stage is a result of long-term fire suppression and/or lack of grazing herbivores.

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

Class D 14 Late Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUMU | Quercus muehlenbergii | Chinkapin oak | Upper |
| QUPR2 | Quercus prinus | Chestnut oak | Upper |
| JUVI | Juniperus virginiana | Eastern redcedar | Mid-Upper |
| ACSA3 | Acer saccharum | Sugar maple | Upper |

Description

Alternative late successional stage on more mesophytic substrates. Long-term fire suppression and/or lack of grazing herbivores promotes invasion of mesophytic woody forest species, eventually converting the system to mixed mesophytic forest, commonly including several oaks, sugar maple, and white ash. This climax may be associated with anthropogenic glade openings on substrates conducive to forest development in the absence of anthropogenic disturbance.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 5 |
| Mid1:OPN | 6 | Late1:CLS | 40 |
| Late1:CLS | 41 | Late1:CLS | 999 |
| Late2:CLS | 41 | Late2: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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.33 | 3 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Late2:CLS | 1 | 1 | Yes | 33 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.1 | 10 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.2 | 5 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Replacement Fire | Late2:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Surface Fire | Late2:CLS | Late2:CLS | 0.005 | 200 | No | 0 |

References

Cleland, D.T.; Freeouf, J.A.; Keys, J.E.; Nowacki, G.J.; Carpenter, C.A.; and McNab, W.H. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. Gen. Tech. Report WO-76D [Map on CD-ROM] (A.M. Sloan, cartographer). Washington, DC: U.S. Department of Agriculture, Forest Service, presentation scale 1:3,500,000; colored

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.