13670

Ozark-Ouachita Shortleaf Pine-Oak Forest 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

Forest and Woodland

Map Zones

32, 44

Geographic Range

This Biophysical Setting (BpS) is common in the Interior Highlands. More specifically, it is located in Arkansas, Oklahoma, and southern Missouri, within the Ouachita and Boston Mountains, Arkansas River Valley, and the Salem and Springfield plateaus. It typically occupies dry to dry-mesic sites at elevations between 500-2,500ft. ECOMAP subsections where this BpS occurs include M231, 231G, M223A, and 223A.

Biophysical Site Description

This BpS is found on drier sites primarily on south and west aspects or ridgetops. It is dominated by shortleaf pine (*Pinus echinata*), oaks (*Quercus* spp.), and hickories (*Carya* spp.). Open conditions describe a single canopy structure with no developed midstory. Closed conditions are multiple-canopy species, usually late-seral forests. Substrate is variable and includes sandstone, chert, and shale.

Vegetation Description

Upland woodlands dominated by white oak (*Q. alba*), post oak (*Q. stellata*), red oaks (*Q. velutina* and *Q. rubra*), and shortleaf pine. Dogwood (*Cornus* spp.), small oaks, grasses, and blueberries (*Vaccinium* spp.) dominate the understory. Small stand-replacement fires, oak decline, and wind throw are the major, large-scale, stand-replacement agents. The exact composition of the hardwoods is much more closely related to aspect and topographic factors than is the pine component. Historically in the Missouri Ozarks, forest types with a shortleaf pine component within this region included more than ~50% of the landscape, ~20% scrub forests and 30% in open condition (Batek et al. 1999). On a pre-European landscape basis, shortleaf pine was positively associated with fire frequency (Batek et al. 1999) and negatively associated with topographic roughness (Guyette and Kabrick 2003; Guyette et al. 2006). Characteristic herbs include little bluestem (*Schizachyrium scoparium*), longleaf woodoats (*Chasmanthium sessiliflorum*), goldenrod (*Solidago* spp.), beebalm (*Monarda* spp.), and pale purple coneflower (*Echinacea pallida*).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIEC2 | *Pinus echinata* | Shortleaf pine |
| QUST | *Quercus stellata* | Post oak |
| QURU | *Quercus rubra* | Northern red oak |
| QUVE | *Quercus velutina* | Black oak |
| QUMA3 | *Quercus marilandica* | Blackjack oak |
| QUAL | *Quercus alba* | White oak |

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

Disturbance Description

Fire is the primary disturbance process in this type. The Fire Regime is Group 1, with high-frequency, low-intensity surface fires averaging every 5yrs. Replacement fires are infrequent. Mixed fire is very infrequent in open canopy conditions but occurs more frequently in closed canopy (every 80yrs in closed states). Seasonality helps define surface, mixed-fire, and stand-replacement fire types. Mixed fires are slightly more frequent in closed late-seral stages. Stand-replacement fires occurred mostly under drought conditions during the growing season. Late-growing-season fires under normal moisture conditions were for the most part surface fires. Historically, anthropogenic fire contributed significantly to all fire occurrences. Additional disturbance factors include wind/weather/stress, within-stand competition and maintenance, and insect/disease outbreaks.

The absence of disturbance is also significant in movement to classes with closed canopy conditions. Native ungulate grazing may have played a small role in replacement where buffalo and elk concentrated, but fire generally maintained systems. Drought and moist cycles play a strong role interacting with both fire and native grazing.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 352 | 1 |  |  |
| Moderate (Mixed) | 93 | 5 | 50 | 2000 |
| Low (Surface) | 5 | 94 | 2 | 10 |
| All Fires | 5 | 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

Topographically complex areas can be relatively small (<1,000ac). Larger landscapes can be up to 10s of 1,000s acres in size, such as south slopes of the Ozark and Ouachita mountains.

Adjacency or Identification Concerns

The BpS was defined using NatureServe -- Ozark-Ouachita Shortleaf Pine-Oak Forest and Woodland. This BpS is the more dissected central and southern Ouachitas, Middle and Upper Boston Mountains, and Current River Hills. In the Ouachitas, this BpS is adjacent to dry oak on the ridgetops and the mesic oak in the lower elevations.

Issues or Problems

Native Uncharacteristic Conditions

Currently more of this type is in Class E than historically.

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 | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 1.0-3.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | >3.0 | A | A | A | A | A | A | A | A | A | A |
| Tree | 0-5 | A | A | A | A | A | A | A | A | A | A |
| Tree | 5-10 | C | C | C | C | C | C | C | B | B | B |
| Tree | 10-25 | D | D | D | D | D | D | D | E | E | E |
| Tree | 25-50 | D | D | D | D | D | D | D | E | E | E |
| Tree | >50 | D | D | D | D | D | D | D | E | E | E |

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 6 Early Development 1 - All Structures

Upper Layer Lifeform: Tree

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUERC | Quercus | Oak | Upper |
| CARYA | Carya | Hickory | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | Upper |
| ANDRO2 | Andropogon | Bluestem | Lower |

Description

Pine and oak reproduction to 15ft tall. Community of forbs and perennial grasses. More persistent on dry sites. Openings tend to be small and have scattered live trees.

Class B 7 Mid Development 1 - Closed

Upper Layer Lifeform: Tree

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUERC | Quercus | Oak | Upper |
| CARYA | Carya | Hickory | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | Upper |

Description

Mid-seral with closed canopy shortleaf and oak pole-sized trees with little or no herbaceous understory. Some woody understory development.

Class C 23 Mid Development 1 - Open

Upper Layer Lifeform: Tree

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUERC | Quercus | Oak | Mid-Upper |
| CARYA | Carya | Hickory | Mid-Upper |
| PIEC2 | Pinus echinate | Shortleaf pine | Mid-Upper |
| ANDRO2 | Andropogon | Bluestem | Lower |

Description

Mid-development, open-canopy shortleaf and oak, mature-sized trees with a mix of shrub sprouts and herbaceous understory.

Class D 46 Late Development 1 - Open

Upper Layer Lifeform: Tree

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUERC | Quercus | Oak | Upper |
| CARYA | Carya | Hickory | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | Upper |
| ANDRO2 | Andropogon | Bluestem | Lower |

Description

Late-development, open-canopy primary pine-oak in composition. Late-seral forest and woodlands with pine and oak overstory and with shrub community and limited areas of perennial grasses.

Class E 18 Late Development 1 - Closed

Upper Layer Lifeform: Tree

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUERC | Quercus | Oak | Upper |
| CARYA | Carya | Hickory | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | Upper |
| ANDRO2 | Andropogon | Bluestem | None |

Description

Late-seral, closed-canopy, pine- and oak-dominated overstory community. Limited herbaceous cover and “rank” woody shrub understory layer. Canopy gaps with non-oak regeneration.

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 14 |
| Mid1:OPN | 15 | Late1:OPN | 59 |
| Mid1:CLS | 15 | Late1:CLS | 59 |
| Late1:OPN | 60 | Late1:OPN | 999 |
| Late1:CLS | 60 | 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 | 9 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.007 | 143 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.25 | 4 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 15 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.007 | 143 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.25 | 4 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Competition or Maintenance | Mid1:CLS | Mid1:CLS | 0.01 | 100 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.025 | 40 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.05 | 20 | No | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 10 |
| Wind or Weather or Stress | Late1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.007 | 143 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.25 | 4 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.005 | 200 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.005 | 200 | Yes | 0 |
| Insects or Disease | Late1:CLS | Early1:ALL | 0.007 | 143 | Yes | 0 |
| Competition or Maintenance | Late1:CLS | Late1:CLS | 0.01 | 100 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.025 | 40 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.07 | 14 | No | 0 |

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