13040

Ozark-Ouachita Dry-Mesic Oak Forest

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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Vegetation Type

Forest and Woodland

Map Zones

32, 43, 44, 49

Geographic Range

This biophysical setting (BpS) primarily occurs in the Interior Low Plateau, southern Central Lowland, Ozark Plateaus, and Ouachita physiographic provinces. It includes parts of Missouri, Arkansas, and Oklahoma.

Biophysical Site Description

This type is found on a wide range of topographic positions. Distribution is nonetheless influenced by local conditions affecting moisture and fertility. Generally, from east to west, that distribution becomes more and more limited in extent and more dependent on very favorable habitat conditions. Drier sites (often oak dominated) represent approximately 75% of the total type whereas <25% of the type is represented as the most mesic sites in the upland landscape. In Missouri, this type is typically on protected slopes and benches overlaying the Gasconade formation or Eminence-Poosi dolomite, though it may be found on exposed lower slopes. In Arkansas, this type is on lower slopes, benches, upper north slopes, and well-drained flats. Soils are well drained, with gravel and boulders of chert, dolomite, or sandstone at or near the soil surface.

Vegetation Description

The vegetation is variable along moisture gradients, but includes (on more mesic sites) generally more fire-intolerant species such as red maple (*Acer rubrum*), sugar maple (*Acer sacchrarum*), and other hardwood components. More commonly the vegetation is dominated by white oak (*Quercus alba*), red oak (*Quercus rubra*), *Carya tomentosa*, *Nyssa sylvatica*, *Pinus echinata*, *Quercus coccinea*,and *Fraxinus americana*, and other fire-tolerant hardwood species are dominant. Drier sites are generally more open than mesic sites and may have up to 15% pine canopy cover. At these sites, the canopy is open enough to support mixed grasses, sedges, and forbs, but not warm-season grasses (one reviewer questioned this statement). Herbaceous cover is moderate to abundant (20-80% cover) and is often dominated by *Desmodium nudiflorum*, *Amphicarpaea bracteata*, *Cimicifuga racemosa*, *Desmodium glutinosum*, and *Polystichum acrostichoides*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| QUAL | *Quercus alba* | White oak |
| QURU | *Quercus rubra* | Northern red oak |
| CATO | *Carya tomentosa* | Mokernut hickory |
| ACRU | *Acer rubrum* | Red maple |
| NYSY | *Nyssa sylvatica* | Blackgum |
| PIEC2 | *Pinus echinata* | Shortleaf pine |

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

Disturbance Description

This BpS is fire regime group I primarily, but with lower frequency than drier types and primarily low-intensity surface fire with occasional mosaic (mixed-severity) or replacement fire. Mean fire return interval (MFRI) is about 10-20yrs, with wide year-to-year and within-type variation related to moisture cycles, degree of sheltering, and proximity to more fire-prone types. Anthropogenic fire is considered and contributes to within-type MFRI variation. 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. Other natural disturbances may include wind, ice, and mortality from insect and disease.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 186 | 6 | 50 | 300 |
| Moderate (Mixed) | 66 | 17 | 20 | 150 |
| Low (Surface) | 15 | 77 | 5 | 35 |
| All Fires | 11 | 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 occur up to several thousand acres in size.

Adjacency or Identification Concerns

This BpS is topographically adjacent to the wetter type (BpS 1334) downslope and the drier type (BpS 1364) on ridgetops depending on local conditions affecting moisture, aspect, elevation, and soil productivity.

Issues or Problems

Native Uncharacteristic Conditions

Densification due to fire suppression and timber harvesting. Shift in species composition due to the selection of oak for cutting.

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 7 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACRU | Acer rubrum | Red maple | Upper |
| QUAL | Quercus alba | White oak | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| PRSE2 | Prunus serotina | Black cherry | Upper |
| SAAL5 | Sassafras albidum | Sassafras | Mid |

Description

Sprouts, seedlings, saplings of major overstory species in gaps and openings created or maintained by wind/weather/stress, aboriginal or lightning-caused stand replacement fire, and insect/disease.

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

Class B 21 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACRU | Acer rubrum | Red maple | lower |
| ACSA3 | Acer saccharum | Sugar maple | Upper |
| QUAL | Quercus alba | White oak | Upper |
| QURU | Quecus rubra | Northern red oak | Upper |

Description

Dominated by young to mid-seral species with some development of mid- and understory species. Closed-canopy conditions are a function of mesic (or topographically protected) conditions. Understory/mid-story development with at least two layers present (dependent on age) on these more mesic sites. On drier sites, forested-to-woodland conditions are interspersed, but with a relatively open understory.

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

Class C 22 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| ACRU | Acer rubrum | Red maple | Upper |

Description

Similar overstory species as Class B but in a single-canopy structure without well-developed mid story. On drier sites, generally more oak dominated. Variable herbaceous understory ranging from grass to rich herbaceous layers. The understory is a function of moisture gradients, and fire frequency and intensity.

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

Class D 33 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| OSVI | Ostrya virginiana | Hophornbeam | Mid |
| CACA18 | Carpinus caroliniana | American hornbeam | Mid |

Description

Mature canopy sometimes reaching 100ft in height. Dominant overstory species variable by location and stand history. Open (woodland) conditions dependent on fire frequency and intensity. Generally more oak dominated, with white oak a common dominant.

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

Class E 17 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| ACSA3 | Acer saccharum | Sugar maple | Middle |
| FAGR | Fagus grandifolia | American beech | Low-Mid |
| COFL2 | Cornus florida | Flowering dogwood | Low-Mid |

Description

Canopy may have more non-oak hardwoods such as blackgum, red maple, American beech, and dogwood with well-developed lower layers containing many of the canopy species.

*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 | 14 |
| Mid1:OPN | 15 | Late1:OPN | 64 |
| Mid1:CLS | 15 | Late1:CLS | 64 |
| Late1:OPN | 65 | Late1:OPN | 999 |
| Late1:CLS | 65 | 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 | 10 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.025 | 40 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.04 | 25 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 20 |
| Wind or Weather or Stress | Mid1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.01 | 100 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.1 | 10 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.025 | 40 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.025 | 40 | No | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 20 |
| Wind or Weather or Stress | Late1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.1 | 10 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.025 | 40 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.025 | 40 | No | 0 |

References

Brown, James K. and Jane Kapler Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 257 pp.

Frost, C. 1996 Presettlement Fire Frequency Regimes of the United States: A First Approximation. Pages 70-81 in: Proceedings of the 20nd Tall Timbers Fire Ecology Conference: Fire in Ecosystem Management: Shifting the Paradigm from Suppression to Prescritpion. Tall Timbers Research Station, Tallahassee, FL.

Foti, T. and S. Glenn. 1991. The Ouachita Mountains Landscape at the Time of Settlement. In D. Henderson and L. D. Hedrick, editors. Proc.: Conference on Restoring Old Growth Forest in the Interior Highlands of Arkansas and Oklahoma. Winrock International, Morrilton, AR.

Fryar, R.D. 1991. Old Growth Stands of the Ouachita National Forest. In D. Henderson and L.D. Hedrick, editors. Proc: Restoration of Old Growth Forest in the Interior Highlands of Arkansas and Oklahoma. Winrock International. Morrilton, AR.

Glitzenstein, J.S., P.A. Harcomb and D.R. Streng. 1986. Disturbances, succession, and

maintenance of species diversity in an east Texas forest. Ecological Monographs. 56: 243-258.

Guyette, R.P. and B.E. Cutter. 1997. Fire history, population, and calcium cycling in the Current River Watershed. In: Pallardy et al. eds. Proceedings 11th Central Hardwood Forest Conference. USDA Forest Service GTR NC-188. 401 pp.

Guyette, R.P and B.E. Cutter. 1991. Tree-ring analysis of fire history of a post-oak savanna in the Missouri Ozarks. Natural Areas Journal. 11(2): 93-99.

Guyette, R.P. and D.C. Dey. 1997. Historic shortleaf pine (Pinus echinata) abundance and fire frequency in a mixed oak - pine forest (MOFEP site 8). In: B. Brookshire and S. Shifley,eds. The Proceeding of the Missouri Ozark Forest Ecosystem Project Symposium: An experimental approach to landscape research. USDA Forest Service GTR NC-193. 378 pp.

Guyette, R.P., Dey D.C and M.C. Stambaugh. 2003. Fire history of an Indiana oak barren. American Midlands Naturalist. 149: 21-34.

Guyette, R.P. and J. Kabrick. 2003. The legacy of forest disturbance, succession, and species at the MOFEP sites. In: (S. Shifley, eds.) The Proceeding of the Second Missouri Ozark Forest Ecosystem Project Symposium. USDA Forest Service GTR NC-227.

Guyette, R.P. and E.A. McGinnes, Jr. 1982. Fire History of an Ozark Glade in Missouri.

Trans. Mo. Acad. Sci.16: 85-93.

Guyette, R.P., R.M. Muzika and C.D. Dey. 2002. Dynamics of an anthropogenic fire regime. Ecosystems. 5(5): 472-486.

Guyette, R.P. and M.A. Spetich 2003. Fire history in oak-pine forests in the Lower Boston Mountains, Arkansas, USA. Forest and Ecology Management. 180: 463-474.

Jurney, D., R. Evans, J. Ippolito and J.V. Bergstrom. 2004. The role of wildland fire in portions of southeastern Mareica. Pages 95-116 in: R.T. Engstrom, K.E.M. Galley and W.J. de Groot (eds.). Proceedings of the 22nd Tall Timbers Fire Ecology Conference: Fire in Montane, Boreal, and Temperate Ecosystems, Tall Timbers Research Station, Tallahassee, FL.

Masters, R.E. 1991. Effects of fire and timber harvest on vegetation and cervid use on oak -pine sites in Oklahoma Ouachita Mountains. Pages 168-176 in: S.C. Nodvin and T.A. Waldrop, (eds.). Fire and the environment: ecological and cultural perspectives. Proc. of an international symposium. USDA Forest Service Gen. Tech. Rep. SE-69. Southeast For. Exp. Sta., Asheville, NC.

Masters, R.E. 1991. Effects of timber harvest and prescribed fire on wildlife habitat and use in the Ouachita Mountains of eastern Oklahoma. Ph.D. Thesis, Oklahoma State Univ. Stillwater. 351 pp.

Masters, R.E. and D. M. Engle. 1994. BEHAVE-evaluated for prescribed fire planning in mountainous oak-shortleaf pine habitats. Wildlife Society Bulletin. 22: 184-191.

Masters, R.E., D. M. Engle and R. Robinson. 1993. Effects of timber harvest and periodic fire on soil chemical properties in the Ouachita Mountains. Southern Journal of Applied Forestry. 17: 139-145.

Masters, R.E., R.L. Lochmiller and D.M. Engle. 1993. Effects of timber harvest and periodic fire on white-tailed deer forage production. Wildlife Society Bulletin. 21: 401-411.

Masters, R.E., R.L. Lochmiller, S.T. McMurry and G.A. Bukenhofer. 1998. Small mammal response to pine-grassland restoration for red-cockaded woodpeckers. Wildlife Society Bulletin. 28: 148-158.

Masters, R.E., J.E. Skeen and J.A. Garner. 1989. Red-cockaded woodpecker in Oklahoma; an update of Wood's 1974-77 Study. Proc. Okla. Acad. Sci. 69: 27-31.

Masters, R.E., J.E. Skeen and J. Whitehead. 1995. Preliminary fire history of McCurtain County Wilderness Area and implications for red-cockaded woodpecker management. Pages 290-302 in D.L. Kulhavy, R.G. Hooper and R. Costa. (eds.). Red-cockaded woodpecker: Species recovery, ecology and management. Center for Applied Studies, Stephen F. Austin University, Nacogdoches, TX.

Masters, R.E., C.W. Wilson, D.S. Cram, G.A. Bukenhofer and R.L. Lochmiller. 2002. Influence of ecosystem restoration for red-cockaded woodpeckers on breeding bird and small mammal communities. Pages 73-90 in W.M. Ford, K.R. Russell and C.E. Moorman, editors. In The role of fire in non-game wildlife management and community restoration: traditional uses and new directions: proceedings of a special workshop. Annual Meeting of The Wildlife Society, Nashville, TN. USDA Forest Service Northeast Research Station. General Technical Report NE- 288.

Masters, R.E., C.W. Wilson, G.A. Bukenhofer and M.E. Payton. 1996. Effects of pinegrassland restoration for red-cockaded woodpeckers on white-tailed deer forage production. Wildlife Society Bulletin 24: 77-84.

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

NatureServe. 2005. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatrueServe Central Databases. Arlinton, VA U.S. A. Data current as of January 13, 2005.

Schmidt, K.M., J.P. Menakis, C.C. Hardy, W.J. Hann and D.L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 41 pp. + CD.

Spetich, Martin A., ed. 2004. Upland oak ecology symposium: history, current conditions, and sustainability. Gen. Tech. Rep. SRS–73. Asheville, NC: USDA Forest Service, Southern Research Station. 311 pp.

USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, December). Fire Effects Information System, [Online]. Available:http://www.fs.fed.us/database/feis/.

USDA Forest Service, Southern Forest Research Station, Southern Forest Resource Assessment, [Online]. Available: http://www.srs.fs.fed.us/sustain.

USDA Forest Service, Southern Region, June 1997, Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region – Report of the Region 8 Old-Growth Team, Forestry Report R8-FR 62.