15230

Edwards Plateau Dry-Mesic Slope Forest and Woodland

BpS Model/Description Version: Aug. 2020

Update 3/18

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

Forest and Woodland

Map Zones

32, 35

Geographic Range

This system is expected to occur on slopes in the Edwards Plateau and Lampasas Cutplain.

Biophysical Site Description

This system occurs on limestone slopes in the Edwards Plateau of Texas.

Vegetation Description

The canopy is typically dominated by trees, including Ashe juniper (*Juniperus ashei),* Buckley oak (*Quercus buckleyi*, more common in the eastern part of the range), Lacey oak (*Q. laceyi,* more common in the western part of the range), or cedar elm (*Ulmus crassifolia*). Plateau oak (*Q. fusiformis*) is often present but not dominant in this system; Texas ash (*Fraxinus texensis*) can be a canopy co-dominant in the eastern part of the range. Canopy closure is variable, and this system can be expressed as forests and woodlands. This system may include small patch inclusions of more riparian related vegetation that usually occurs at a scale that will be difficult to distinguish using remote sensing (may be referred to as wooded draws).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SCSC | *Schizachyrium scoparium* | Little bluestem |
| QUBU2 | *Quercus buckleyi* | Buckley oak |
| QULA | *Quercus laceyi* | Lacey oak |
| ULCR | *Ulmus crassifolia* | Cedar elm |
| Unknown | *Juniperus ashei* | Ashe juniper |

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

Disturbance Description

Stand replacement fires are infrequent (50-100yrs). Surface non-replacement fires occur at ̴ 30-40yr intervals. Disease present (e.g. oak-wilt) though uncertain as to the prevalence historically. Fires ignited in adjacent grasslands and move into forests through ladder fuels. Extreme droughts (e.g., 2011) may cause mortality of large numbers of trees.

Fire Frequency Results

|  |  |  |
| --- | --- | --- |
| **Severity** | **Min FI** | **Max FI** |
| Replacement |  |  |
| Moderate (Mixed) |  |  |
| Low (Surface) |  |  |
| **All Fires** |  |  |

Scale Description

Size limited by slope width often in bands of 50-400m in breadth. Where diverse terrain exists, community is widespread but isolated on slopes.

Adjacency or Identification Concerns

Edwards Plateau Mesic Canyon is limited to steep, narrow canyons that support more mesic species. On plateau tops, shinnery communities (e.g. Edwards Plateau Limestone Shrubland) become dominant. On toe slopes, the forest gives way to Edwards Plateau Limestone Savanna and Woodland. Also, Central Mixed Grass and Western Great Plains Shortgrass Prairies occur on lower slopes and plateau tops. This Biophysical Setting (BpS) may transition to riparian or floodplain systems in some situations.

**Issues or Problems**

Shifts in dominance of juniper and deciduous species through time is questionable. One assumption is the deciduous dominance has declined in favor of juniper with fire suppression over the last century, but many early accounts mention “cedar” as a major component of the vegetation. Droughts may cause shifts, since Ashe juniper appears to be more susceptible to drought than some of the hardwood species: after the 2011 drought, large numbers of Ashe junipers died.

**Native Uncharacteristic Conditions**

Juniper increase suspected with decreased fire on the landscape. However, many early accounts of the vegetation in this area mention dense, extensive stands of “cedar” (Lisa O’Donnell with the City of Austin has compiled a large database of such accounts).

Comments

This model was developed for map zone (MZ)35 by Charlotte Reemts and Joseph White. Suggested reviewers for MZ35 include: Chuck Sexton (USFWS, Balcones Canyonlands National Wildlife Refuge) and David Diamond (MO).

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

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 2 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Upper |
| MULI | Muhlenbergia lindheimeri | Lindheimer's muhly | Upper |
| BOCU | Bouteloua curtipendula | Sideoats grama | Upper |

Description

Open grassland/savanna which initiates either through very frequent fires or through landslide (small). This class succeeds to Class B.

*Maximum Tree Size Class*  
None

Class B 6 Early Development 2 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSC | Schizachyrium scoparium | Little bluestem | Mid-Upper |
| BOCU | Bouteloua curtipendula | Sideoats grama | Mid-Upper |
| RHLA3 | Rhus lanceolata | Prairie sumac | Upper |
| BANE2 | Baccharis neglecta | Rooseveltweed | Upper |

Description

In the absence of major surface fire, initiation of woody species occurs, predominantly Ashe juniper re-sprouting hardwood species. Flame leaf sumac (*Rhus spp*.) and baccharis (*Baccharis spp*.) occur often as associates during this phase and provide moderate aerial fuels.

Surface fires expected to maintain stage. Multiple replacement fires (included in the probability estimation) returns to Class A. On mesic sites, stand turns into dense, stem exclusion forest (Class D; modeled as alternate succession); otherwise (especially on drier sites) this class will succeed to open woodland (Class C).

*Maximum Tree Size Class*  
None

Class C 10 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUAS | Juniperus ashei | Ashe's juniper | Upper |
| ULCR | Ulmus crassifolia | Cedar elm | Upper |
| QUBU2 | Quercus buckleyi | Quercus buckleyi | Upper |
| CAPL3 | Carex planostachys | Cedar sedge | Lower |

Description

This community emerges on drier sites and/or sites experiencing multiple fires in mature stands. The maximum size (21-33in) is indicative of remnant large trees following a burn. On sites recovering from a canopy fire, juniper may be absent. Lacey oak is more common in the western part of this vegetation type; Buckley oak is more common in the east

Surface fires are expected to maintain this stage. Multiple replacement fires (included in the probability estimation) returns to Class B. In the absence of replacement fire, this class succeeds to Class D.

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

Class D 13 Mid Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUAS | Juniperus ashei | Ashe's juniper | Upper |
| QUBU | Quercus buckleyi | Quercus buckleyi | Upper |
| ULCR | Ulmus crassifolia | Cedar elm | Upper |

Description

Without major surface fires, dense stand of trees emerges with increased competition and autogenic mortality. Surface fuels become limited with elimination of herbaceous growth.

Surface fires are expected to maintain this stage. Mixed fires can open the canopy and return this stage to Class C. In the absence of mixed fire, this class succeeds to Class E.

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

Class E 69 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUAS | Juniperus ashei | Ashe's juniper | Upper |
| QUBU2 | Quercus bucklei | Quercus buckleyi | Upper |
| FRTE | Fraxinus texensis | Texas ash | Upper |

Description

Late development, mature slope forest dominated by junipers and oaks. Typical oak belt forms where geologic formations increase soil moisture. Some gaps may be present where trees fall due to disease or ice damage inducing regeneration. Downed woody material present and provides significant surface fuels. Duff loading is still low.

Surface fires are expected to maintain this stage. Mixed fire sends to Class C assuming that the smaller trees are consumed leaving the larger trees. Mixed fire return interval was estimated on the basis the time required for *J. ashei* to reach the canopy, based on Fort Hood crown fire data.

Note that cover in this class may be higher than indicated but was retained to ensure lack of overlap with Class D.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Early2:OPN | 3 |
| Early2:OPN | 4 | Mid1:OPN | 30 |
| Mid1:OPN | 31 | Mid2:CLS | 50 |
| Mid2:CLS | 51 | Late1:CLS | 70 |
| 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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.2 | 5 | Yes | 0 |
| Replacement Fire | Early2:OPN | Early1:ALL | 0.05 | 20 | Yes | 0 |
| Alternative Succession | Early2:OPN | Mid2:CLS | 0.07 | 14 | Yes | 0 |
| Surface Fire | Early2:OPN | Early2:OPN | 0.2 | 5 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.033 | 30 | No | 0 |
| Replacement Fire | Mid1:OPN | Early2:OPN | 0.04 | 25 | Yes | 0 |
| Mixed Fire | Mid2:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Surface Fire | Mid2:CLS | Mid2:CLS | 0.013 | 77 | No | 0 |
| Mixed Fire | Late1:CLS | Mid1:OPN | 0.009 | 111 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.025 | 40 | No | 0 |

References

Amos, Bonnie B. and Frederick R. Gehlbach. 1988. Edwards Plateau Vegetation - Plant Ecological Studies in Central Texas. Baylor University Press. Waco, TX. 144 pp.

Diamond, D.D. 1997. An old-growth definition for western juniper woodlands: Texas Ashe juniper dominated or codominated communities. USDA Forest Service, General Technical Report SRS-15.

Diamond, D.D., G.A. Rowell and D.P. Keddy-Hector. 1995. Conservation of Ashe juniper (Juniperus ashei Buchholz) woodlands of the central Texas Hill Country. Natural Areas Journal 15:189–197.

Huss, D.L. 1954. Factors influencing plant succession following fire in Ashe juniper woodland types in Real County, Texas. Dissertation, Texas A&M University, College Station, TX.

Murray, D. B., J. D. White, et al. (2012). "Woody vegetation persistence and disturbance in central Texas grasslands inferred from multidecadal historical aerial photographs." Rangeland Ecology & Management 66(3):297-304.

Murray, D. B., J. D. White, et al. (2013). "Loss of Neighbors, Fire, and Climate Effects on Texas Red Oak Growth in a Juniper-dominated Woodland Ecosystem." The American Midland Naturalist 170(2): 348-369.

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

Reemts, C. M. and L. L. Hansen (2008). "Slow recolonization of burned oak-juniper woodlands by Ashe juniper (*Juniperus ashei*): ten years of succession after crown fire." Forest Ecology and Management 255: 1057-1066.

Reemts, C. M. and L. L. Hansen (2013). "Short-Term Effects of Repeated Wildfires in Oak-Juniper Woodlands." The Journal of the Association for Fire Ecology 9(3): 64-79.

Stambaugh, M. C., J. C. Sparks, et al. (2014). "Historical pyrogeography of Texas, USA." Fire Ecology 10(3): 72-89.

Smeins, F.E. 1980. Natural role of fire on the Edwards Plateau. In: L.D. White (ed.). Prescribed range burning in the Edwards Plateau of Texas. Texas Agricultural Extension Service, College Station, TX, USA. Pages 4–16.

Van Auken, O.W., A.L. Ford and J.L. Allen. 1981. An ecological comparison of upland deciduous and evergreen forests of Central Texas. American Journal of Botany 68:1249–1256.

Van Auken, O.W., A.L. Ford and A. Stein. 1979. A comparison of some woody upland and riparian plant communities of the southern Edwards Plateau. Southwestern Naturalist 24:165–180.

Yao, J., D. B. Murray, et al. (2012). "Fire in a sub-humid woodland: The balance of carbon sequestration and habitat conservation." Forest Ecology and Management 280:40-51.