11190

Southern Rocky Mountain Juniper Woodland and Savanna

BpS Model/Description Version: Aug. 20201/09/07

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Lee Elliott | lelliott@tnc.org | Guy McPherson | grm@ag.arizona.edu |

**Reviewed by:** Tim Christiansen and Derrick Holdstock

Vegetation Type

Steppe/Savanna

Map Zone

34

Geographic Range

This system may be limited to this map zone (MZ) or this and adjacent MZs in Texas and Oklahoma. It occurs in ECOMAP (Cleland et al. 2007) subsections 315Ba, 315Cc, 315Fb, 315Fc, and 332Fb.

Biophysical Site Description

Historically this type was likely restricted to steep slopes, buttes and escarpments, but appears to have expanded into adjacent grasslands since the 1860s (Ellis and Schuster 1968). This BpS occurs within Rough Breaks Ecological Sites (USDA NRCS Ecological Site Description).  The Caprock escarpment where this BpS occurs is dominated by caliche, a layer of calcium carbonate that resists erosion.

Vegetation Description

This system varies from relatively open savannas to closed-canopy woodlands. Some occurrences might be interpreted as shrublands. Pinchot’s juniper (*Juniperus pinchotii*) and oneseed juniper (*J. monosperma*) often dominate the system, along with fragrant sumac (*Rhus aromatica*), featherplume (*Dalea formosa*), Mohr oak (*Quercus mohriana*), and honey mesquite (*Prosopis glandulosa*) at some sites. Other shrub components may include lotebush (*Ziziphus obtusifolia*), algerita (*Berberis trifoliolata*), soapweed yucca (*Yucca angustifolia*), tulip prickly pear (*Opuntia phaeacantha*), and netleaf hackberry (*Celtis reticulata*). Grass species present include middle and short grasses such as sideoats grama (*Bouteloua curtipendula*), blue grama (*B. gracilis*), little bluestem (*Schizachyrium scoparium*), purple threeawn (*Aristida purpurea*), slim tridens (*Tridens muticus*), and plains lovegrass (*Eragrostis intermedia*). Forbs are also present and may be diverse.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| JUPI | *Juniperus pinchotii* | Pinchot's juniper |
| JUMO | *Juniperus monosperma* | Oneseed juniper |
| PRGL2 | *Prosopis glandulosa* | Honey mesquite |
| RHAR4 | *Rhus aromatica* | Fragrant sumac |
| BOCU | *Bouteloua curtipendula* | Sideoats grama |
| BOGR2 | *Bouteloua gracilis* | Blue grama |
| SCSC | *Schizachyrium scoparium* | Little bluestem |

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

Disturbance Description

Extreme regional droughts would tend to open the canopy.

Fire return interval is somewhat longer for this Biophysical Setting (BpS) than it is in adjacent BpSs because of the differences in fine fuel availability due to edaphic differences between the surrounding landscape and the effect of the juniper canopy on fine fuel development. In addition, FRI is affected by topographic sheltering, which causes most fires to burn in a very interrupted pattern as opposed to a wide flaming front as they do in adjacent BpSs. Also, there is considerable variation around the mean fire return interval, which has profound consequences for ecosystem response.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 88 | 45 |  |  |
| Moderate (Mixed) | 346 | 11 |  |  |
| Low (Surface) | 89 | 44 |  |  |
| All Fires | 39 | 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

Historically, this system probably occurred as a relatively continuous ribbon along escarpments and breaks, up to about 2km in width.

Adjacency or Identification Concerns

Currently, junipers, along with mesquite, have invaded adjacent grasslands. Mapping will be difficult because of the increase in woody vegetation in the absence of a natural fire cycle and in the presence of modified grazing regime, making this type an uncharacteristic representation of adjacent shortgrass and mixedgrass prairie.

Issues or Problems

Native Uncharacteristic Conditions

Comments

Moving forward, junipers may increase for a while, which will decrease available water for other plant species. This change will decrease fine fuels as well as soil-holding capacity for the adjacent lands. Increased drought will cause increased juniper mortality after the increase of juniper density. The results may be a fairly barren and wind erosion habitat.

Drought cycle rate will decrease with climate change. Fine fuels will become less dense due to more prolonged and frequent drought. Overstory will be decreased due to mortality rates increasing due to drought.

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 | B | B | B | C | C | C | C | C | UN | UN |
| Tree | 5-10 | B | B | B | C | C | C | C | C | UN | UN |
| Tree | 10-25 | B | B | B | C | C | C | C | C | UN | UN |
| Tree | 25-50 | B | B | B | C | C | C | C | C | UN | UN |
| Tree | >50 | B | B | B | C | C | C | C | C | 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 14 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BOCU | Bouteloua curtipendula | Sideoats grama | Upper |
| CHER2 | Chaetopappa ericoides | Rose heath | Upper |
| GUSA2 | Gutierrezia sarothrae | Broom snakeweed | Upper |

Description

Early open following catastrophic fire taking out canopy. Cover of graminoids and forbs with standing dead woody stems.

*Maximum Tree Size Class*  
None

Class B 23 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUPI | Juniperus pinchotii | Pinchot's juniper | Upper |
| JUMO | Juniperus monosperma | Oneseed juniper | Upper |
| RHAR4 | Rhus aromatica | Fragrant sumac | Middle |
| BOCU | Bouteloua curtipendula | Sideoats grama | Lower |

Description

Canopy is developing but remains open. Overstory species reaching the canopy include *J. pinchotii*, *J. monosperma*, and *Prosopis glandulosa*. Shrub layer developing with species including *Rhus aromatica* and *Opuntia phaeacantha*.

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

Class C 63 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUPI | Juniperus pinchotii | Pinchot's juniper | Upper |
| JUMO | Juniperus monosperma | Oneseed juniper | Upper |
| RHAR4 | Rhus aromatic | Fragrant sumac | Middle |
| BOCU | Bouteloua curtipendula | Sideoats grama | Lower |

Description

Canopy becoming closed. Similar species composition to Class B. Closed canopy reduces the development of fine fuels, thus reducing the return interval of replacement fires. Extreme drought at a severity adequate to cause significant canopy mortality would move the BpS to the open condition.

*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:CLS | 50 |
| Late1:CLS | 51 | 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 | 0.05 | 20 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.007 | 143 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.013 | 77 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.05 | 20 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Mid1:OPN | 0.007 | 143 | Yes | 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

Ellis, D. and J.L Schuster. 1968. Juniper age and distribution on an isolated butte in Garza County, Texas. Southwestern Naturalist 13: 343-348.

Hall, M.T. and C.J. Carr. 1968. Variability in Juniperus in the Palo Curo Canyon of western Texas. Southwestern Naturalist 13(1): 75-98.

McPherson, G.R., H.A. Wright and D.A. Wester. 1988. Patterns of shrub invasion in semiarid Texas grasslands. American Midland Naturalist 120(2): 391-397.

Steuter, A.A. and C.M. Britton. 1983. Fire-induced mortality of redberry juniper [Juniperus pinchotii Sudw.]. Journal of Range Management 36(3): 343-345.

USDA-NRCS Ecosite/Range Site Descriptions, Section II, Field Office Technical Guides.

http://www.nrcs.usda.gov/Technical/efotg/.