10590

Southern Rocky Mountain Pinyon-Juniper Woodland

BpS Model/Description Version: Aug. 2020 ,

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Vegetation Type

Forest and Woodland

Map Zone

26

Geographic Range

The southern Rocky Mountain ecological system occurs on semiarid mountains and foothills in southern Colorado east of the Continental Divide and in foothills, mountains, and plateaus of New Mexico. It extends out to limestone breaks in the southeastern Great Plains, on the steep slopes of the Chupadera Mesa, in the foothills of Sacramento, and within several mountain ranges including the Organ, Franklin, Sierra Ladrone, Manzano, Sandia, and Guadalupe Mountains.

Biophysical Site Description

This Biophysical Setting (BpS) typically is found at elevations between 5,000-7,000ft. Severe climatic events such as frost and drought as well as aspect are thought to determine the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture from stony, cobbly, gravelly sandy loams to clay loam or clay. Limestone substrate increases as you move south and is important in the Sacramento, Guadalupe, and Franklin Mountains.

Vegetation Description

Two-needle pinyon (*Pinus edulis*) and/or oneseed juniper (*Juniperus monosperma*) dominate the tree canopy. Mexican pinyon (*Pinus cembroides*) begins to dominate as you move further south. Rocky Mountain juniper (*J. scopulorum*) may codominate or replace *J. monosperma* at higher elevations. In southern transitional areas between Madrean Pinyon-juniper woodland (CES305.797) and southern Rocky Mountain Pinyon-Juniper Woodland (CES306.835) in southern New Mexico, alligator juniper (*J. deppeana*) becomes common. Understory layers are variable and may be dominated by shrubs or graminoids or be absent. Associated species are more typical of southern Rocky Mountains than the Colorado Plateau and include mountain mahogany (*Cercocarpus montanus*), hairy mountain mahogany (*C. breviflorus*), red barberry (*Mahonia haematocarpa*), Gambel oak (*Quercus gambelii*), gray oak (*Q. grisea*), pungent oak (*Q. pungens*), shrub live oak (*Q. turbinella*), blue grama (*Bouteloua gracilis*), James’ galleta (*Pleuraphis jamesii*), and pinyon ricegrass (*Piptochaetium fimbriatum*).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| JUDE | *Juncus debilis* | Weak rush |
| JUMO | *Juniperus monosperma* | Oneseed juniper |
| JUSC | *Juncus scirpoides* | Needlepod rush |
| PIED | *Pinus edulis* | Twoneedle pinyon |
| PICE | *Pinus cembroides* | Mexican pinyon |
| QUGA | *Quercus gambelii* | Gambel oak |
| PIFI | *Piptochaetium fimbriatum* | Pinyon ricegrass |
| BOGR2 | *Bouteloua gracilis* | Blue grama |

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

Disturbance Description

Fires were ignited by lightning during summer monsoon season. Fire regime as described here is based on expert estimate of historical range of variation (Schussman and Smith 2006). Fire is fairly frequent in May and June, mostly mixed-severity. Significant drought occurs about every 60yrs and, in combination with the resultant herbivory impacts from pine beetle infestations, causes disproportional mortality of large, old trees.

The drought cycle that usually kills large trees has been severe enough to stress and kill many medium to small trees. The trees that are drought-stressed are also affected by beetle infestations, which further the number of dead trees in all class sizes. Fire pathways and frequencies may be changed due to the increased fuel loading and the increase of shrub density.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 29 | 36 | 20 | 1000 |
| Moderate (Mixed) | 32 | 33 | 20 | 1000 |
| Low (Surface) | 34 | 31 | 10 | 100 |
| 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

In the Franklin Mountains, patch size is smaller due to drier site conditions. In the Organ Mountains, patch size can be large. Pinyon-juniper woodland usually was distributed across the landscape in large patches between 100s-1,000s of acres in size. Matrix formations occur at higher elevations. In particularly dissected topography, this type may have occurred in smaller patches.

Adjacency or Identification Concerns

This system is generally found at higher elevations and more mesic sites than semi-desert grassland and desert scrub. Typically, it is bordered at higher elevations by Madrean encinal or ponderosa pine-gamble oak woodland. The primary difference between this type and the Madrean pinyon-juniper is that in this type *J. deppeana* and *P. edulis* are more dominant. The fire return interval is also slightly longer for the southern Rocky Mountain type. Cover and density of juniper and pinyon trees at lower elevations in this type doubtless have increased as a result of fire suppression (possibly as mitigated by livestock grazing).

Issues or Problems

Virtually no components of the fire regimes are known with any certainty. Fire scars are rare, and trees in this system cannot be aged with conventional dendrochronological techniques. Information about fire regimes is extrapolated from adjacent systems, and extreme caution is warranted when interpreting these models. Fire season can be inferred more reliably than fire frequency; the former likely is equally or more important than the latter. This system also includes pinyon-juniper woodlands and savannas with understories dominated by other shrubs or a grass layer and lack of evergreen oaks, which may have a different fire behavior.

Native Uncharacteristic Conditions

Comments

One factor that has been seen due to fire in junipers is that streams have more running water due to the decrease in junipers. The increase of available water to other tree/shrub/herbaceous species could increase the non-tree habitat structure, which would lead to other changes in a habitat such as erosion potential, which in turn could increase due to fewer deeper roots holding water and soil.

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 | B | B | B | B | B | B | B |
| Tree | 5-10 | D | D | D | D | D | C | C | C | C | C |
| Tree | 10-25 | D | D | D | D | D | C | C | C | C | C |
| Tree | 25-50 | D | D | D | D | D | C | C | C | C | C |
| Tree | >50 | D | D | D | D | D | C | C | C | C | C |

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 22 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIFI | Piptochaetium fimbriatum | Pinyon ricegrass | Upper |
| BOGR2 | Bouteloua gracilis | Blue grama | Upper |
| QUGA | Quercus gambelii | Gambel oak | Upper |
| QUTU2 | Quercus turbinella | Sonoran scrub oak | Upper |

Description

Initial post-fire community dominated by perennial caespitose grasses. Blue grama (*Bouteloua gracilis*) dominates among other grama grasses. Evidence of past fires may be observed, including charcoal and resprouting woody plants.

*Maximum Tree Size Class*  
None

Class B 34 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUDE | Juncus debilis | Weak rush | Upper |
| PIED | Pinus edulis | Twoneedle pinyon | Upper |
| QUGA | Quercus gambelii | Gambel oak | Upper |
| QUTU2 | Quercus turbinella | Sonoran scrub oak | Upper |

Description

Community dominated by young to mature alligator juniper (*J. deppeana*) and evergreen oak trees of various ages.

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

Class C 1 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUDE | Juncus debilis | Weak rush | Upper |
| PIED | Pinus edulis | Twoneedle pinyon | Upper |
| QUGA | Quercus gambelii | Gambel oak | Middle |
| QUTU2 | Quercus turbinella | Sonoran scrub oak | Middle |

Description

Woodland phase: site dominated by relatively dense old alligator juniper (*J. deppeana*), redberry juniper (*J. coahuilensis*), and evergreen oak trees.

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

Class D 43 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUDE | Juncus debilis | Weak rush | Upper |
| PIED | Pinus edulis | Twoneedle pinyon | Upper |
| PIFI | Piptochaetium fimbriatum | Pinyon ricegrass | Lower |
| BOGR2 | Bouteloua gracilis | Blue grama | Lower |

Description

Savanna phase with more frequent fire. *J. coahuilensis* is dominant, and Pinchot’s juniper (*J. pinchotii*) is present. The tallest trees would be about 35-40ft tall.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 9 |
| Mid1:CLS | 10 | Late1:CLS | 84 |
| Late1:CLS | 85 | Late1:CLS | 999 |
| Late1:OPN | 85 | Late1:OPN | 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 | 0.0833 | 12 | Yes | 0 |
| Alternative Succession | Mid1:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.025 | 40 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.04 | 25 | No | 0 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.015 | 67 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0167 | 60 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.04 | 25 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.0667 | 15 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.015 | 67 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0167 | 60 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.04 | 25 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.0667 | 15 | No | 0 |

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