10160

Colorado Plateau Pinyon-Juniper Woodland

BpS Model/Description Version: Aug. 2020

Revised: 9/17

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |

**Reviewer:** Tim Christiansen

Vegetation Type

Forest and Woodland

Map Zones

16, 23, 24, 25

Geographic Range

This ecological system occurs in dry mountains and foothills of the Colorado Plateau region, including the western slope of the Colorado Rockies to the Wasatch Range, south to the Mogollon Rim and east into the northwestern corner of New Mexico.

Biophysical Site Description

These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. This system is typically found at lower elevations ranging from 1,500-2,440m. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture ranging from stony, cobbly, and gravelly sandy loams to clay loam or clay.

Vegetation Description

*Juniperus monosperma* and hybrids of *Juniperus spp.* may dominate or co-dominate the tree canopy. *Juniperus scopulorum*may co-dominate or replace *Juniperus osteosperma* at higher elevations. Understory layers are variable and may be dominated by shrubs or graminoids or be absent. Associated species include *Arctostaphylos patula*, *Artemisia tridentata, Cercocarpus intricatus, Cercocarpus montanus, Coleogyne ramosissima, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Bouteloua gracilis, Pleuraphis jamesii*, or *Poa fendleriana.*

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIED | *Pinus edulis* | Twoneedle pinyon |
| JUMO | *Juniperus monosperma* | Oneseed juniper |
| JUSC2 | *Juniperus scopulorum* | Rocky Mountain juniper |
| PIMO | *Pinus monophylla* | Singleleaf pinyon |
| JUOS | *Juniperus osteosperma* | Utah juniper |

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

Disturbance Description

The fire regime is characterized by somewhat frequent mixed-severity mosaic fires (Mean Fire Return Interval [MFRI] of 150-200yrs) with very infrequent replacement fires (MFRI of 200-500yrs) (Rondeau 2001). Surface fire occurs only in the earliest succession class. There is frequent fire importation from adjacent types. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Weather-related stress thins trees in more closed stands. Insects/diseases have a similar effect, but with a greater frequency, in closed stands than open ones. Competition from grasses and older trees in late-open stands maintains stand openness.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 431 | 29 | 1 | 1000 |
| Moderate (Mixed) | 193 | 65 |  |  |
| Low (Surface) | 2239 | 6 |  |  |
| All Fires | 126 | 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**

The most common disturbance in this type is very small-scale, either single-tree or small groups. If the conditions are just right, replacement fires can burn stands of 1,000s of acres. This type may also have mixed-severity fires of 10s-100s of acres.

Adjacency or Identification Concerns

This system occurs at higher elevations than Great Basin Pinyon-Juniper Woodland (1019) and Colorado Plateau Pinyon-Juniper Shrubland (1102) where sympatric.

Issues or Problems

Reviewer Tim Christiansen states there is difficulty separating the pinyon-juniper models except for understory species. Lumping should be considered.

Native Uncharacteristic Conditions

Comments

Climate change may lead to increases of insect damage and of dead standing trees.

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 | C | C | C | C | B | B | B | B | B | B |
| Tree | 5-10 | D | D | D | D | E | E | E | E | E | E |
| Tree | 10-25 | D | D | D | D | E | E | E | E | E | E |
| Tree | 25-50 | D | D | D | D | E | E | E | E | E | E |
| Tree | >50 | D | D | D | D | E | E | E | 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 9 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BOGR2 | Bouteloua gracilis | Blue grama | Upper |
| PLJA | Pleuraphis jamesii | James' galleta | Upper |
| POSE | Poa secunda | Sandberg bluegrass | Upper |
| ARPA6 | Arctostaphylos patula | Greenleaf manzanita | Upper |

Description

Grass/forb/shrub/seedling -- usually post-fire.

*Maximum Tree Size Class*  
None

Class B 21 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIED | Pinus edulis | Twoneedle pinyon | Upper |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| JUSC2 | Juniperus scopulorum | Rocky Mountain juniper | Upper |
| JUMO | Juniperus monosperma | Oneseed juniper | Upper |

Description

Mid-development, dense pinyon-juniper woodland; understory is sparse.

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

Class C 24 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIED | Pinus edulis | Twoneedle pinyon | Upper |
| JUMO | Juniperus monosperma | Oneseed juniper | Upper |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| JUSC2 | Juniperus scopulorum | Rocky Mountain juniper | Upper |

Description

Mid-development, open pinyon-juniper stand with mixed shrub/herbaceous community in understory. Mixed-severity fire and insects/disease maintain stand structure.

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

Class D 38 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIED | Pinus edulis | Twoneedle pinyon | Upper |
| JUMO | Juniperus monosperma | Oneseed juniper | Upper |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| JUSC2 | Juniperus scopulorum | Rocky mountain juniper | Upper |
| PIMO | Pinus monophylla | Singleleaf pinyon |  |

Description

Late-development, open juniper-pinyon stand with “savanna-like” appearance; mixed

grass/shrub/herbaceous community.

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

Class E 8 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIED | Pinus edulis | Twoneedle pinyon | Upper |
| JUMO | Juniperus monosperma | Oneseed juniper | Upper |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| JUSC2 | Juniperus scopulorum | Rocky Mountain juniper | Upper |
| PIMO | Pinus monophylla | Singleleaf pinyon |  |

Description

Dense, old-growth stands with multiple layers. Late-development, closed pinyon-juniper forest. May have all-aged, multi-storied structure. Moderate mortality within stand. Occasional shrubs with few grasses and forbs and often rock or bare soil.

*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 | 59 |
| Mid1:OPN | 60 | Late1:OPN | 159 |
| Mid1:CLS | 60 | Late1:CLS | 179 |
| Late1:OPN | 160 | Late1:OPN | 999 |
| Late1:CLS | 180 | 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** |
| Surface Fire | Early1:ALL | Early1:ALL | 0.005 | 200 | No | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Alternative Succession | Early1:ALL | Mid1:CLS | 0.01 | 100 | Yes | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.001 | 1000 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.005 | 200 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 0.02 | 50 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0023 | 435 | Yes | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:OPN | 0.007 | 143 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.007 | 143 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.001 | 1000 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.005 | 200 | No | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 0.005 | 200 | Yes | 0 |
| Competition or Maintenance | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.007 | 143 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.007 | 143 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |

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