10160

Colorado Plateau Pinyon-Juniper Woodland

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Mike Babler | mbabler@tnc.org | Paul Langowski | plangowski@fs.fed.us |
| None | None | Dick Edwards | rledwards@fs.fed.us |
| None | None | Vic Ecklund | vecklund@csu.org |

Vegetation Type

Forest and Woodland

Map Zones

15, 28

Model Splits or Lumps

This Biophysical Setting (BpS) is lumped with 1102.

Geographic Range

This BpS occurs on the Colorado Plateau from the western slope of Colorado to the Wasatch Range, south to the Mogollon Rim. This type is usually the lowest-elevation tree-dominated type in the area and is found on lower mountain slopes, mesas, and adjacent plains.

Biophysical Site Description

These woodlands occur on warm dry sites on mountain slopes, mesas, plateaus, and ridges. This type is found on many sites, ranging from deep, well-drained soils on nearly flat slopes to shallow, steep, and rocky sites. Typically, lower elevations: 1,500-2,400m (4,950-7,950ft).

Vegetation Description

This type is dominated by JUOS and JUMO with lesser amounts of PIED and JUSC2. Understory layers are variable. The most common shrub associates are ARTR2, QUGA, and CEMO2. It has a sparse to absent understory of grasses, shrubs, and forbs.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| JUOS | *Juniperus osteosperma* | Utah juniper |
| PIED | *Pinus edulis* | Twoneedle pinyon |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| JUSC2 | *Juniperus scopulorum* | Rocky mountain juniper |
| ARTR2 | *Artemisia tridentata* | Big sagebrush |
| JUMO | *Juniperus monosperma* | Oneseed 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 mosaic fire with very infrequent replacement fires (Rondeau 2001).There is frequent fire importation from adjacent types. Some areas have had extensive mortality since 2002 due to the drought-induced Ips beetle outbreak.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 425 | 29 |  |  |
| Moderate (Mixed) | 191 | 65 |  |  |
| Low (Surface) | 2209 | 6 |  |  |
| All Fires | 125 | 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, then it will have replacement fires that burn stands up to 1,000s of acres. This type may also have mixed-severity fires of 10-100s of acres.

Adjacency or Identification Concerns

At higher elevations, this type borders ponderosa pine and/or Gambel oak/*Cercocarpus* shrubland. At lower elevations, it abuts sagebrush and desert scrub.

Issues or Problems

Native Uncharacteristic Conditions

Comments

Peer review of original Rapid Assessment (RA) model was mixed. One reviewer strongly recommended dropping this type entirely and using only the pinyon-juniper rare fire model (R3PIJUrf), based on studies showing no evidence of mixed-severity fire in pinyon-juniper. Because of the time frame of the RA and the relative uncertainty surrounding pinyon-juniper fire history, the issue was unresolved, and both models were unchanged.

One reviewer had concerns with all pinyon-juniper models and wanted to be certain there was a system with a long fire return interval modeled.

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 | B | 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 10 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUOS | Juniperus osteosperma | Utah juniper | All |
| PIED | Pinus edulis | Twoneedle pinyon | All |
| JUSC2 | Juniperus scopulorum | Rocky mountain juniper | All |

Description

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

*Maximum Tree Size Class*  
Seedling <4.5ft

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 |

Description

Mid-development, dense pinyon-juniper woodland; understory being lost.

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

Class C 25 Mid Development 1 - Open

Indicator Species

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

Description

Mid-development, open pinyon-juniper stand with mixed shrub/herbaceous community in understory.

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

Class D 34 Late Development 1 - Open

Indicator Species

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

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 10 Late Development 1 - Closed

Indicator Species

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

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 much rock.

*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 |
| 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 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.007 | 143 | No | 0 |
| Competition or Maintenance | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.002 | 500 | 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 |

References

Despain, D.W. and J.C. Mosely. 1990. Fire history and stand structure of a pinyon-juniper woodland at Walnut Canyon National Monument, Arizona. USDI National Park Service Technical Report No. 34. Cooperative National Park Resources Studies Unit, University of Arizona, Tucson AZ. 27 pp.

Gruell, G.E., L.E. Eddleman and R. Jaindl. 1994. Fire History of the Pinyon-Juniper Woodlands of Great Basin National Park. Technical Report NPS/PNROSU/NRTR-94/01. U.S. Department of Interior, National Park Service, Pacific Northwest Region. 27 pp.

NatureServe. 2004. International Ecological Classification Standard: Terrestrial Ecological Classifications, NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of November 4, 2004.

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

Rondeau, R. 2001. Ecological System Viability Specifications for Southern Rocky Mountain Ecoregion. Colorado Natural Heritage Program. 181 pp.

Unpublished report for the Fire-Learning Network: Robbie and McCarthy on Jemez Mtns.