10160

Colorado Plateau Pinyon-Juniper Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Kathy Roche | kroche@fs.fed.us | Dan Binkley | Dan.Binkley@ColoState.edu |
| Carolyn Meyer | meyerc@uwyo.edu | Ken Stinston | ken\_stinson@blm.gov |
| None | None | Eve Warren | eve\_warren@blm.gov |

Vegetation Type

Forest and Woodland

Map Zone

22

Geographic Range

This system occurs in subsections 342Gj, 342Gc, and 342Gf of MZ22 in Wyoming and in the southern part of map zone (MZ) 22 in Colorado. Its occurrence is coincident with areas having 2,000-2,500 growing degree days.

Biophysical Site Description

These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. System typically found at lower elevations ranging from 1,500-2,800m. In Wyoming, these woodlands typically occur on escarpments and in foothills. 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, gravelly sandy loams to clay loam or clay. Commonly found on rocky soils, deep or shallow. Prior to European settlement, this community was limited to rocky ridges or surfaces where sparse vegetation limited fire. Today, it occupies more productive sites.

Vegetation Description

*Juniperus osteosperma* may dominate or co-dominate the tree canopy. *Juniperus scopulorum* may occur in wetter, deeper soils – i.e., in drainages, in Bighorn Basin in Wyoming. Understory layers are variable and may be dominated by shrubs or graminoids or be absent. Associated species include *Arctostaphylos patula*, *Artemisia tridentata*, *Artemisia nova*, *Cercocarpus intricatus*, *Cercocarpus montanus*, *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, *Rosa woodsii*, *Bouteloua gracilis*, *Pleuraphis jamesii*, *Poa fendleriana*, *Koeleria cristata*, *Pseudoroegneria spicate*, or *Leucopoa kingii*.

In MZ22, *Pinus edulis* occurs only in the southeast and southwest edges of the zone and is nearly absent in Wyoming except near Flaming Gorge Reservoir. In the classification of plots, *Ephedera viridis* separates Biophysical Setting (BpS) 1016 from BpS 1049. EPVI or PIED must be present to type to 1016.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| JUOS | *Juniperus osteosperma* | Utah juniper |
| JUSC2 | *Juniperus scopulorum* | Rocky mountain 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 mixed-severity mosaic fires (mean fire return interval [MFRI] of 150-200yrs) with very infrequent replacement fires (MFRI of 200-500yrs) (Rondeau 2001). Low-severity 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/disease 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. In Wyoming, some juniper reaches extreme ages (>700yrs.).

It is thought that when fire occurs at 30-60yr intervals, juniper disappears. However, one reviewer for MZ22 stated that that does not occur in the Bighorn Basin. Such fire return intervals do not result in a loss of *Juniperus osteosperma*.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 456 | 31 |  |  |
| Moderate (Mixed) | 214 | 65 |  |  |
| Low (Surface) | 3283 | 4 |  |  |
| All Fires | 139 | 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. This type may also have mixed-severity fires of 10-100s 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. In MZ22 on escarpments, this BpS occurs at the highest elevations. In other locations, it is lower than and adjacent to BpS 1049, 1051, and 1053 and above and adjacent to sagebrush. We think that this BpS occurs in the southern part of MZ22.

It is difficult to distinguish between BpS 1049 and BpS 1016 in Wyoming. PIED stops at the Colorado/Wyoming border. It seems that 1016 is probably a better match for sites to the south. In the classification of plots, *Ephedera viridis* separates BpS 1016 from BpS 1049. EPVI or PIED must be present to type to 1016.

Issues or Problems

Native Uncharacteristic Conditions

Comments

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 | C | C | C | C | C | C | C | C | C | C |
| Tree | 10-25 | C | C | C | C | C | C | C | C | C | C |
| Tree | 25-50 | C | C | C | C | C | C | C | C | C | C |
| Tree | >50 | C | C | C | C | C | 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 6 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| KOMA | Koeleria macrantha | Prairie junegrass | Upper |
| POSE | Poa secunda | Sandberg bluegrass | Upper |
| ANRO6 | Anomodon rostratus | Anomodon moss | Upper |

Description

Grass/forb/shrub/seedling -- usually post-fire. Juniper seedlings may have 10% cover and be up to 1m in height.

*Maximum Tree Size Class*  
None

Class B 27 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| KOMA | Koeleria macrantha | Prairie junegrass | Lower |
| JUSC2 | Juniperus scopulorum | Rocky mountain juniper | Upper |
| PIFL2 | Pinus flexilis | Limber pine | Upper |

Description

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

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

Class C 67 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| KOMA | Koeleria macrantha | Prairie junegrass | Lower |
| PIFL2 | Pinus flexilis | Limber pine | Upper |
| JUSC2 | Juniperus scopulorum | Rocky mountain 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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Mid1:OPN | 30 |
| Mid1:OPN | 31 | Late1:OPN | 200 |
| Late1:OPN | 201 | 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** |
| Surface Fire | Early1:OPN | Early1:OPN | 0.005 | 200 | No | 0 |
| Replacement Fire | Early1:OPN | Early1:OPN | 0.005 | 200 | Yes | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.001 | 1000 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:OPN | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.005 | 200 | No | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.001 | 1000 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:OPN | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.005 | 200 | No | 0 |
| Competition or Maintenance | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |

References

Chumley, T., R. Hartman and B.E. Nelson 1998. Atlas of Wyoming Flora. Www.sbs.utexas.edu/chumley/wyomap/atlas.htm

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.

Knight, D.H. 1994. Mountains and Plains, The Ecology of Wyoming Landscapes. Yale University Press. New Haven, CT.

Miller, R.F. and R.J. Tausch. 2001. The Role of Fire in Juniper and Pinyon Woodlands: a Descriptive Analysis. Pages 15-30 in K.E.M. Galley and T.P. Wilson (eds.). Proceedings of the Invasive Species Workshop: the role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on fire Ecology, Prevention and Management. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, FL.

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.

Spence, J.R., W.H. Romme. L.Floyd-Hanna and P.G. Rowland. 1995. A Preliminary Vegetation Classification for the Colorado Plateau. In: van Riper C. III, Proceedings of the Second Biennial Conference on Research in Colorado Plateau National Parks. October 25-28 1993, National Park Service Transactions and Proceedings. NPS/NRNAU/NRTP-95/11. NAU Press, Flagstaff, AZ.

Tausch, R. J., N.E. West and A.A. Nabi. 1981. Tree Age and Dominance Patterns in Great

Basin Pinyon-Juniper Woodlands. Jour. Range. Manage. 34: 259-264.

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

Wyoming Geographic information Science center, Land Cover Map for Wyoming. www.sdvc.uwyo.edu