

11190

## Southern Rocky Mountain Juniper Woodland and Savanna

BpS Model/Description Version: Aug. 2020

| Modelers       |                      | Reviewers      |                        |
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### Vegetation Type

Steppe/Savanna

### Map Zone

28

### Geographic Range

Found throughout the region. This type is usually the lowest-elevation tree-dominated type in the area and is found on lower mountain slopes, mesas, and adjacent plains. Primarily along the eastern and southern slopes of the southern Rockies and mountains in Arizona and New Mexico.

### Biophysical Site Description

This ecological system occupies the lower and warmest elevations. It is best represented just below the lower elevational range of ponderosa pine and often intermingles with grasslands and shrublands. This system is best described as a savanna that has widely spaced, mature (>150yrs old) juniper trees and occasionally *Pinus edulis*.

### Vegetation Description

*Juniperus monosperma* and *Juniperus scopulorum* (at higher elevations) are the dominant tall shrubs or short trees. *Pinus edulis* may be present. Graminoid species are similar to those found in Western Great Plains Shortgrass Prairie (CES303.672), with *Bouteloua gracilis* and *Pleuraphis jamesii* being most common. In addition, succulents such as species of *Yucca* and *Opuntia* are typically present.

### BpS Dominant and Indicator Species

| Symbol | Scientific Name             | Common Name            |
|--------|-----------------------------|------------------------|
| PIED   | <i>Pinus edulis</i>         | Twoneedle pinyon       |
| JUMO   | <i>Juniperus monosperma</i> | Oneseed juniper        |
| JUSC2  | <i>Juniperus scopulorum</i> | Rocky mountain juniper |
| BOGR2  | <i>Bouteloua gracilis</i>   | Blue grama             |
| PLJA   | <i>Pleuraphis jamesii</i>   | James' galleta         |
| YUCCA  | <i>Yucca</i>                | Yucca                  |

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

### Disturbance Description

Disturbance by fire in this type is primarily either stand-replacement or single-tree. There is little fire importation from adjacent types. Some areas have extensive mortality since 2002 due to the drought-induced Ips beetle outbreak. Return interval for fire could be extended by ungulate grazing. Concentrations of ungulates could increase the percent of the landscape dominated by

## Fire Frequency

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.

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 burn whole stands up to 1,000s of acres.

Higher-elevation sites of this type border the juniper steppe type. It is replaced upward by PIPO and/or Gambel oak/*Cercocarpus* shrubland and desert scrub on the lower end.

Note that open and closed classes are reversed from the standard in this model (i.e., B/E are open and C/D are closed canopy).

## Comments

## Mapping Rules

[illegible]

|       |       |   |   |   |   |   |   |   |   |   |   |
|-------|-------|---|---|---|---|---|---|---|---|---|---|
| Shrub | >3.0  | A | A | A | A | A | A | A | A | A | A |
| Tree  | 0-5   | A | A | A | A | A | A | A | A | A | A |
| Tree  | 5-10  | B | B | B | B | C | C | C | C | C | C |
| 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 leaf form 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

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### Class A      8      Early Development 1 - All Structures

#### Indicator Species

| Symbol | Scientific Name             | Common Name            | Canopy Position |
|--------|-----------------------------|------------------------|-----------------|
| PIED   | <i>Pinus edulis</i>         | Twoneedle pinyon       | All             |
| JUMO   | <i>Juniperus monosperma</i> | Oneseed juniper        | All             |
| JUSC2  | <i>Juniperus scopulorum</i> | Rocky mountain juniper | All             |
| BOGR2  | <i>Bouteloua gracilis</i>   | Blue grama             | Lower           |

#### Description

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

#### Maximum Tree Size Class

Sapling >4.5ft; <5" DBH

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### Class B      2      Mid Development 1 - Open

#### Indicator Species

| Symbol | Scientific Name             | Common Name            | Canopy Position |
|--------|-----------------------------|------------------------|-----------------|
| PIED   | <i>Pinus edulis</i>         | Twoneedle pinyon       | Upper           |
| JUMO   | <i>Juniperus monosperma</i> | Oneseed juniper        | Upper           |
| JUSC2  | <i>Juniperus scopulorum</i> | Rocky mountain juniper | Upper           |
| BOGR2  | <i>Bouteloua gracilis</i>   | Blue grama             | Lower           |

#### Description

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

#### Maximum Tree Size Class

Medium 9-21" DBH

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### Class C      9      Mid Development 1 - Closed

| Symbol | Scientific Name             | Common Name            | Canopy Position |
|--------|-----------------------------|------------------------|-----------------|
| PIED   | <i>Pinus edulis</i>         | Twoneedle pinyon       | Upper           |
| JUMO   | <i>Juniperus monosperma</i> | Oneseed juniper        | Upper           |
| JUSC2  | <i>Juniperus scopulorum</i> | Rocky mountain juniper | Upper           |
| BOGR2  | <i>Bouteloua gracilis</i>   | Blue grama             | Lower           |

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

Medium 9-21" DBH

|                |          |                                    |
|----------------|----------|------------------------------------|
| <b>Class D</b> | <b>6</b> | <b>Late Development 1 - Closed</b> |
|----------------|----------|------------------------------------|

| Symbol | Scientific Name             | Common Name            | Canopy Position |
|--------|-----------------------------|------------------------|-----------------|
| PIED   | <i>Pinus edulis</i>         | Twoneedle pinyon       | Upper           |
| JUMO   | <i>Juniperus monosperma</i> | Oneseed juniper        | Upper           |
| JUSC2  | <i>Juniperus scopulorum</i> | Rocky mountain juniper | Upper           |
| BOGR2  | <i>Bouteloua gracilis</i>   | Blue grama             | Lower           |

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.

Large 21-33" DBH

|                |           |                                  |
|----------------|-----------|----------------------------------|
| <b>Class E</b> | <b>75</b> | <b>Late Development 1 - Open</b> |
|----------------|-----------|----------------------------------|

| Symbol | Scientific Name             | Common Name            | Canopy Position |
|--------|-----------------------------|------------------------|-----------------|
| PIED   | <i>Pinus edulis</i>         | Twoneedle pinyon       | Upper           |
| JUMO   | <i>Juniperus monosperma</i> | Oneseed juniper        | Upper           |
| JUSC2  | <i>Juniperus scopulorum</i> | Rocky mountain juniper | Upper           |
| BOGR2  | <i>Bouteloua gracilis</i>   | Blue grama             | Lower           |

Late-development, open juniper-pinyon stand with “savanna-like” appearance; mixed grass/shrub/herbaceous community.

### Maximum Tree Size Class

None

## **Model Parameters**

### **Deterministic Transitions**

| <b>From Class</b> | <b>Begins at (yr)</b> | <b>Succeeds to</b> | <b>After (years)</b> |
|-------------------|-----------------------|--------------------|----------------------|
| Early1:ALL        | 0                     | Mid1:OPN           | 69                   |
| Mid1:CLS          | 50                    | Late1:CLS          | 149                  |
| Mid1:OPN          | 70                    | Late1:OPN          | 239                  |
| Late1:CLS         | 195                   | Late1:CLS          | 259                  |
| Late1:OPN         | 240                   | Late1:OPN          | 999                  |

### **Probabilistic Transitions**

| <b>Disturbance Type</b>    | <b>Disturbance occurs In</b> | <b>Moves vegetation to</b> | <b>Disturbance Probability</b> | <b>Return Interval (yrs)</b> | <b>Reset Age to New Class Start Age After Disturbance?</b> | <b>Years Since Last Disturbance</b> |
|----------------------------|------------------------------|----------------------------|--------------------------------|------------------------------|------------------------------------------------------------|-------------------------------------|
| Replacement Fire           | Early1:ALL                   | Early1:ALL                 | 0.0025                         | 400                          | Yes                                                        | 0                                   |
| Competition or Maintenance | Early1:ALL                   | Early1:ALL                 | 0.01                           | 100                          | No                                                         | 0                                   |
| Alternative Succession     | Early1:ALL                   | Mid1:CLS                   | 0.015                          | 67                           | Yes                                                        | 0                                   |
| Alternative Succession     | Mid1:OPN                     | Late1:CLS                  | 0.002                          | 500                          | Yes                                                        | 0                                   |
| Replacement Fire           | Mid1:OPN                     | Early1:ALL                 | 0.002                          | 500                          | Yes                                                        | 0                                   |
| Mixed Fire                 | Mid1:OPN                     | Mid1:OPN                   | 0.003                          | 333                          | No                                                         | 0                                   |
| Competition or Maintenance | Mid1:OPN                     | Mid1:OPN                   | 0.007                          | 143                          | No                                                         | 0                                   |
| Surface Fire               | Mid1:OPN                     | Late1:OPN                  | 0.04                           | 25                           | Yes                                                        | 0                                   |
| Surface Fire               | Mid1:CLS                     | Mid1:CLS                   | 0.001                          | 1000                         | No                                                         | 0                                   |
| Mixed Fire                 | Mid1:CLS                     | Mid1:CLS                   | 0.001                          | 1000                         | No                                                         | 0                                   |
| Replacement Fire           | Mid1:CLS                     | Early1:ALL                 | 0.002                          | 500                          | Yes                                                        | 0                                   |
| Mixed Fire                 | Mid1:CLS                     | Mid1:OPN                   | 0.005                          | 200                          | Yes                                                        | 0                                   |
| Replacement Fire           | Late1:OPN                    | Early1:ALL                 | 0.002                          | 500                          | Yes                                                        | 0                                   |
| Mixed Fire                 | Late1:OPN                    | Late1:OPN                  | 0.005                          | 200                          | No                                                         | 0                                   |
| Insects or Disease         | Late1:OPN                    | Late1:OPN                  | 0.005                          | 200                          | No                                                         | 0                                   |
| Surface Fire               | Late1:OPN                    | Late1:OPN                  | 0.04                           | 25                           | No                                                         | 0                                   |
| Surface Fire               | Late1:CLS                    | Late1:CLS                  | 0.0005                         | 2000                         | No                                                         | 0                                   |
| Replacement Fire           | Late1:CLS                    | Early1:ALL                 | 0.0015                         | 667                          | Yes                                                        | 0                                   |
| Mixed Fire                 | Late1:CLS                    | Late1:OPN                  | 0.005                          | 200                          | Yes                                                        | 0                                   |
| Insects or Disease         | Late1:CLS                    | Late1:OPN                  | 0.005                          | 200                          | Yes                                                        | 0                                   |

## References

- Baker, W.L. and D.J. Shinneman. 2004. Fire and restoration of piñon-juniper woodlands in the western United States: a review. *Forest Ecology and Management* 189: 1-21.
- Floyd, M.L., W.H. Romme and D.D. Hanna. 2000. Fire history and Vegetation Pattern in Mesa Verde National Park, Colorado, USA. *Ecological Applications* 10, 1666-1680.
- Gottfried, G.J.; Eskew, L.G.; Curtin, C.G.; Edminster and C.B. compilers. 1999. Toward integrated research, land management, and ecosystem protection in the Malpai Borderlands: conference summary; 1999 January 6-8; Douglas, AZ. *Proceedings RMRS-P-10*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station: 95-99.
- NatureServe. 2005. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.4. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: May 2, 2005).
- 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.
- Romme, W.H., L. Floyd-Hanna and D. Hanna. 2003. Ancient pinyon-juniper forests of Mesa Verde and the West: a cautionary note for forest restoration programs. Pages 335-350 in: P.N. Omi and L.A. Joyce. tech. eds. *Fire, fuel treatments, and ecological restoration: conference proceedings*. 16-18 April 2002. Fort Collins, CO. *Proceedings RMRS-P-29*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 475 pp.
- Stein, S.J. 1988. Fire History of the Paunsaugunt Plateau in Southern Utah. *Great Basin Naturalist*. Vol. 48, No. 1: 58-63.
- Sullivan, J. 1993. *Juniperus pinchotii*. In: *Fire Effects Information System*, [Online]. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2005, May 2].