11150

Inter-Mountain Basins Juniper Savanna

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Peter Weisberg | pweisberg@cabnr.unr.edu | Jon Bates | jon.bates@oregonstate.edu |
| Crystal Kolden | ckolden@gmail.com | Don Major | dmajor@tnc.org |
| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zones

10, 19

Geographic Range

In NV, western UT and southern ID.

Biophysical Site Description

This ecological system is typically found at lower elevations ranging from 1,500-2,300m. Occurrences are found on lower mountain slopes, hills, plateaus, basins and flats. Juniper savanna ecotype generally occurs in local, geologically confined, badland environments and is limited in its distribution. Occurs at the lower altitudinal limits for tree species, below the pinyon-juniper woodland type but at or above sagebrush semi-desert and salt desert shrubland in locations where soil moisture is limiting.

Vegetation Description

The vegetation is typically open savanna, although there may be inclusions of more dense juniper woodlands. This savanna is typically dominated by *Juniperus osteosperma* trees with sparse cover of black sagebrush and perennial bunch grasses and forbs, with *Elymus elymoides*, *Achnatherum hymenoides* (=*Oryzopsis hymenoides*), *Hesperostipa comata*, and *Pleuraphis jamesii* (more southern locations) being most common. Pinyon trees are typically not present because sites are outside the ecological or geographic range of *Pinus edulis* and *Pinus monophylla*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| JUOS | *Juniperus osteosperma* | Utah juniper |
| ARNO4 | *Artemisia nova* | Black sagebrush |
| HECO26 | *Hesperostipa comata* | Needle and thread |
| ACHY | *Achnatherum hymenoides* | Indian ricegrass |
| ELEL5 | *Elymus elymoides* | Squirreltail |
| PLJA | *Pleuraphis jamesii* | James' galleta |

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

Disturbance Description

Uncertainty exists about the fire frequencies of this ecological system. It is likely that fires were very infrequent in this ecotype with inherently low productivity. Fire occurrence was primarily determined by fire occurrence in the surrounding matrix vegetation. Lightning-ignited fires typically did not affect more than a few individual trees. Replacement fires were rare (average FRI of >300-1,000yrs) and occurred primarily during extreme fire behavior conditions, particularly when preceded by wetter years associated with high herbaceous production. Fire regime primarily determined by adjacent communities, as fire rarely originated within the community. Mixed severity fire (average FRI of 200-500yrs) was characterized as a mosaic of replacement and surface fires distributed through the patch at a fine scale (<0.1ac). Surface fire could occur in stands where understory grass cover was high and provided adequate fuel. Surface fire was primarily responsible for producing fire scars on juniper trees in older stands (average FRI of 500yrs).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 835 | 23 | 100 | 1000 |
| Moderate (Mixed) | 445 | 43 | 100 | 1000 |
| Low (Surface) | 569 | 34 |  |  |
| All Fires | 192 | 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

Juniper steppe was usually distributed across the landscape in patches that range from 10s to 100s of acres in size. In areas with very broken topography and/or mesa landforms this type may have occurred in patches of several hundred acres.

Adjacency or Identification Concerns

This system is generally found at lower elevations and more xeric sites than Great Basin Pinyon-Juniper Woodland (BpS 1019) or Colorado Plateau Pinyon-Juniper Woodland (BpS 1016).

In modern days, surrounding matrix vegetation has changed to young-mid aged woodlands that burn more intensely than the former sagebrush matrix that they encroached during the last century of fire exclusion or livestock grazing. Many lay-people confuse these younger juniper woodlands with true woodland sites dependent on naturally fire-protected features.

Also occurring under post-settlement management of woodlands (both fire exclusion and the reduction of grasses that would prevent woody establishment) is the uncharacteristic growth of younger trees amongst older trees. These canopy closures allow fires to crown and kill older trees (>200yrs) that would normally not experience these fires in unproductive soils.

Issues or Problems

Uncertainty exists about the fire frequencies of this ecological system because juniper does not generally survive fire and most fire studies for pinyon and/or juniper are from other regions with fire scars recorded on conifers that experience more frequent fire.

Native Uncharacteristic Conditions

Comments

D Major made changes to vegetation class structural values in response to MTD v3.1 updates (K Pohl 7/18/05 request). These changes have not been reviewed and accepted by model developers as of 7/24/05.

Jon Bates reviewed BpS 1125 for MZ18 with no changes recommended. Reviewer does not consider himself an expert of this system, therefore he was not retained as a modeler. Louis Provencher (lprovencher@tnc.org) made editorial changes and adjusted to 15% cover the cutoff between mid-open and late-open to achieve mutually exclusive cover classes.

Note for MFSL by L. Provencher: classes D (100-400yrs) and E (400yrs+) cannot be distinguished by cover or height. The main difference between these classes is DBH and the shape of tree crowns: rounder crowns for older trees.

This is essentially the same model as R2PIJU developed by Steve Bunting (sbunting@uidaho.edu), Krista Waid-Gollnick (krista\_waid@blm.gov) and Henry Bastian (henry\_bastian@ios.doi.gov) for juniper and/or pinyon savanna. Mean FRIs are somewhat longer due to the more arid Great Basin context. Reviewers of R2PIJU were George Gruell (ggruell@charter.net), Jolie Pollet (jpollet@blm.gov) and Peter Weisberg (pweisberg@cabnr.unr.edu).

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 | B | B | C | C | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | B | B | C | C | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | B | B | C | C | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | B | B | C | C | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | C | C | D | D | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | D | D | D | D | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | E | E | E | E | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | E | E | E | E | UN | UN | UN | UN | UN | UN |
| Tree | >50 | E | E | E | E | UN | UN | UN | UN | UN | UN |

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 3 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| HECO26 | Hesperostipa comata | Needle and thread | Upper |
| ELEL5 | Elymus elymoides | Squirreltail | Upper |
| ACHY | Achnatherum hymenoides | Indian ricegrass | Upper |
| CRYPT | Cryptantha | Cryptantha | Lower |

Description

Initial post-fire community dominated by annual forbs. Later stages of this class contain greater amounts of perennial grasses and forbs. Evidence of past fires, charcoal and other evidence can be observed.

*Maximum Tree Size Class*  
None

Class B 2 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| HECO26 | Hesperostipa comata | Needle and thread | Mid-Upper |
| ARNO4 | Artemisia nova | Black sagebrush | Upper |
| ELEL5 | Elymus elymoides | Squirreltail | Mid-Upper |
| ACHY | Achnatherum hymenoides | Indian ricegrass | Mid-Upper |

Description

Dominated by perennial forbs and grasses, with early shrub establishment. Total cover remains low due to shallow unproductive soil. It is important to note that replacement fire at this stage does not eliminate perennial grasses. Mixed severity fire thins the woody vegetation.

*Maximum Tree Size Class*  
None

Class C 6 Mid Development 2 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ARNO4 | Artemisia nova | Black sagebrush | Middle |
| ELEL5 | Elymus elymoides | Squirreltail | Low-Mid |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| ACHY | Achnatherum hymenoides | Indian ricegrass | Low-Mid |

Description

Shrub dominated community (10-25% cover, 0.2-0.5m height) with young juniper seedlings becoming established. It is important to note that replacement fire at this stage does not eliminate perennial grasses.

*Maximum Tree Size Class*  
Seedling <4.5ft

Class D 23 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| ARNO4 | Artemisia nova | Black sagebrush | Middle |
| ELEL5 | Elymus elymoides | Squirreltail | Low-Mid |
| ACHY | Achnatherum hymenoides | Indian ricegrass | Low-Mid |

Description

Community dominated by young to mature juniper of mixed age structure. Juniper becoming competitive on site and beginning to affect understory composition.

*Maximum Tree Size Class*  
Large 21-33"DBH

Class E 66 Late Development 2 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUOS | Juniperus osteosperma | Utah juniper | Upper |
| ARNO4 | Artemisia nova | Black sagebrush | Middle |
| ELEL5 | Elymus elymoides | Squirreltail | Lower |
| ACHY | Achnatherum hymenoides | Indian ricegrass | Lower |

Description

Site dominated by widely spaced old juniper. Grasses (eg*, Hesperostipa comata*) present on microsites sites with deeper soils (>20in) with restricting clay subsurface horizon. Shrubs present. Mixed and surface fire will scar ancient trees.

*Maximum Tree Size Class*  
Very Large >33"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Mid1:OPN | 19 |
| Mid1:OPN | 20 | Mid2:OPN | 39 |
| Mid2:OPN | 40 | Late1:OPN | 99 |
| Late1:OPN | 100 | Late2:OPN | 399 |
| Late2:OPN | 400 | Late2: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:OPN | Early1:OPN | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Early1:OPN | Early1:OPN | 0.005 | 200 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:OPN | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.005 | 200 | No | 0 |
| Replacement Fire | Mid2:OPN | Early1:OPN | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Mid2:OPN | Mid2:OPN | 0.005 | 200 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:OPN | 0.001 | 1000 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.002 | 500 | No | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.002 | 500 | No | 0 |
| Replacement Fire | Late2:OPN | Early1:OPN | 0.001 | 1000 | Yes | 0 |
| Surface Fire | Late2:OPN | Late2:OPN | 0.002 | 500 | No | 0 |
| Mixed Fire | Late2:OPN | Late2:OPN | 0.002 | 500 | No | 0 |

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