11150

Inter-Mountain Basins Juniper Savanna

BpS Model/Description Version: Aug. 2020

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

Vegetation Type

Steppe/Savanna

Map Zone

13

Geographic Range

In California, Nevada, and western Arizona and Utah.

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 with little soil development 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 bunchgrasses and forbs, with *Elymus elymoides*, *Achnatherum hymenoides* (= *Oryzopsis hymenoides*), *Hesperostipa comata*, and *Pleuraphis jamesii* 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 fire return interval [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 | 800 | 23 | 100 | 1000 |
| Moderate (Mixed) | 423 | 44 | 100 | 1000 |
| Low (Surface) | 562 | 33 |  |  |
| All Fires | 185 | 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 savanna 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. Patches are often linear and follow the edge of drainages.

Adjacency or Identification Concerns

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

In modern days, surrounding matrix vegetation has changed to young to mid-aged woodlands that encroached the former sagebrush matrix during the last century of fire exclusion or livestock grazing. True woodlands sites have experienced densification as historic grazing reduced the competition grasses imposed on tree and shrub seedlings. The woodlands burn more intensely than the former sagebrush matrix. Many lay people confuse these younger pinyon and juniper woodlands with true woodland sites dependent on naturally fire-protected features.

Issues or Problems

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

Native Uncharacteristic Conditions

Tree and shrub cover >40% is uncharacteristic with tree cover >30% being rare.

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 | B | B | B | B | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | C | C | C | C | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | C | C | C | C | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | C | C | C | C | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | D | D | E | E | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | D | D | E | E | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | D | D | E | E | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | D | D | E | E | UN | UN | UN | UN | UN | UN |
| Tree | >50 | D | D | 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 2 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 |

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.

*Maximum Tree Size Class*  
None

Class C 7 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) with young juniper seedlings emerging and becoming established. Juniper cover may be 5-20%; <5m tall.

*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.

Shrubs can be present up to 20% cover.

*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 (e.g., *Hesperostipa comata*) present on microsites with deeper soils (>20in) with restricting clay subsurface horizon. Shrubs are present.

Shrubs can be present from 10-15% cover.

*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 | 30 | 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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