11150
Inter-Mountain Basins Juniper Savanna

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Vegetation Type
Steppe/Savanna

Map Zones
17

Geographic Range
In Nevada and western 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 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 comate,* 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 fire return interval [FRI] of greater than 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	810	23	100	1000
Moderate (Mixed)	426	43	100	1000
Low (Surface)	551	34		
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 steppe was usually distributed across the landscape in patches that range from 10s-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 (biophysical setting [BpS] 1019) or Colorado Plateau Pinyon-Juniper Woodland (BpS 1016).

In modern days, surrounding matrix vegetation has changed to young-mid aged woodlands that encroached the former sagebrush matrix during the last century of fire exclusion or livestock grazing. 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 most fire study for pinyon and/or juniper are from other regions with fire scars recorded on conifers that experience more frequent fire.

Native Uncharacteristic Conditions

Comments

This is essentially the same model as the Rapid Assessment model 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	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
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. Infrequent mixed severity fire thins vegetation.

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 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 from the shrubs. Juniper cover may be 5-20%; less than 5m tall. 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

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. Duration 300yrs with succession to E unless replacement fire (average FRI of 1000yrs) causes a transition to A. Mixed severity and surface fire are less frequent than in previous states (500yrs).

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. Rare mixed and surface fires, every 1000yrs on average, 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	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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