11150

Inter-Mountain Basins Juniper Savanna

BpS Model/Description Version: Aug. 2020

Vegetation Type

Steppe/Savanna

Map Zones

21, 22

Geographic Range

This system is thought not to occur in map zone (MZ) 21. This widespread ecological system occupies dry foothills and sandsheets of western Colorado, northwestern New Mexico, northern Arizona and Utah, and west into the Great Basin of Nevada and southern Idaho.

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, often where juniper is expanding into semi-desert grasslands and steppe.

12-14in precipitation zone and above.

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 high cover of perennial bunch grasses and forbs (*Koeleria macrantha*, *Heterostipa comata*, *Pseudoroegneria spicata*, *Poa secunda*, and *Elymus elemoides* that make a bunchgrass understory.) These may vary in abundance in different classes but remain present. Sagebrush comes in, and grass cover is reduced. *Festuca idahoensis* may be present on more mesic sites.

BpS Dominant and Indicator Species

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, though it is predominantly Fire Regime Group III. Fire regime was primarily determined by fire occurrence in the surrounding matrix vegetation. Fire regime primarily determined by adjacent vegetation and spread from the adjacent types into this community. Lightning-ignited fires were common but typically did not affect more than a few individual trees. Replacement fires were uncommon to rare (average fire return interval [FRI] of 100-500yrs) and occurred primarily during extreme fire behavior conditions. Mixed-severity fire (average FRI of 100-500yrs) was characterized as a mosaic of replacement and surface fires distributed through the patch at a fine scale (<0.1ac). Surface fires could occur in stands where understory grass (FEID) cover is high and provides adequate fuel. Surface fires were primarily responsible for producing fire scars on juniper trees (average FRI of 100yrs).

FRIs vary between this 1115 system and BpS 1049 Limber Pine-Juniper Woodland. The Inter-Mountain Basins Juniper Savanna has a different moisture regime than the Foothill Limber Pine-Juniper Woodland -- the moisture tends to come at a different time of year. In the Foothill Limber Pine-Juniper Woodland that occurs on the Medicine Bow-Routt National Forests, we can get extensive fog at any time of the year, which leads to extensive white pine blister rust in the limber pine but also would influence the moisture content of fine fuel and subsequently the fire regime. There also tend to be more shrubs in the Limber Pine-Juniper Woodland than the Inter-Mountain Basins Juniper Savanna.

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.

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 (1019) or Colorado Plateau Pinyon-Juniper Woodland (1016). It is also ecologically similar to (and the model is similar to) Colorado Plateau Pinyon-Juniper Shrubland (1102).

In modern days, surrounding matrix vegetation has changed to young to mid-aged woodlands that burn more intensely than the former sagebrush matrix. Many lay people confuse these younger pinyon and juniper woodlands with true woodlands dependent on naturally fire-protected features.

Presence of cheatgrass can increase the fire frequency.

It was discussed among MZ22 reviewers as to whether or not this BpS truly occurs historically or if it is a seral component of BpS 1049. It is thought that this system, 1115, in late-seral condition, would develop toward a denser stand. Original models feel that Juniper Savanna is indeed a system within this MZ and that it should not be combined with the Limber Pine-Juniper Woodland. More juniper savanna would occur in the southwestern portion of this MZ and more limber pine juniper type in the eastern and northern portions of this MZ.

Issues or Problems

We have low degree of certainty on the percentages of canopy closure for the classes. Cheatgrass invasion may result in high cover measurements.

Native Uncharacteristic Conditions

Comments

MZs 21 and 22 were combined during 2015 BpS Review.

This model for MZ21 was adopted as is from the same BpS from MZ22. Since this type is thought not to occur in MZ21, it received no review for MZ 21.

Succession Classes

**Mapping Rules**

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

Description

Dominated by perennial forbs and grasses. Total cover remains low due to shallow, unproductive soil. Mixed-severity fire thins the tree seedlings. Juniperus osteosperma may have 0-10% cover and be up to 2m tall.

*Maximum Tree Size Class*  
None

Class B 13 Mid Development 1 - Open

Indicator Species

Description

Shrub-dominated community with young juniper seedlings becoming established. Mixed-severity fire.

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

Class C 36 Mid Development 2 - Open

Indicator Species

Description

Community dominated by young juniper and pine of mixed age structure. Juniper and pinyon becoming competitive on site and beginning to affect understory composition. Mixed-severity fire is less frequent than in previous states, whereas surface fire becomes more important at this age in succession.

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

Class D 45 Late Development 1 - Open

Indicator Species

Description

Site dominated by widely spaced old juniper. Grasses (e.g., *Hesperostipa comata*) present on microsites sites with deeper soils (>20in) with restricting clay subsurface horizon. Potential maximum overstory coverage is greater in those stands with pinyon as compared to those with only juniper. Replacement fire and mixed-severity fires are rare. Surface fire will scar ancient trees.

*Maximum Tree Size Class*  
Medium 9-21" DBH

Model Parameters

Deterministic Transitions

Probabilistic Transitions

References

Alexander, R.R. and F. Ronco, Jr. 1987. Classification of the forest vegetation on the National Forests of Arizona and New Mexico. Res. Note RM-469. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 10p.

Anderson, H.E. 1982. Aids to Determining Fuel Models For Estimating Fire Behavior. Gen. Tech. Rep. INT-122. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station. 22 p.

Arno, S.F. 2000. Fire in western forest ecosystems. Pages 97-120 in: J.K. Brown and J. Kapler-Smith, eds. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 257 pp.

Baker, W.L. and D.J. Shinneman. 2004. Fire and restoration of pińon-juniper woodlands in the western United States. A review. Forest Ecology and Management 189: 1-21.

Bradley, A.F., N.V. Noste and W.C. Fischer. 1992. Fire Ecology of Forests and Woodlands in Utah. Gen. Tech. Rep. GTR- INT-287. Ogden, UT: USDA Forest Service, Intermountain Research Station. 127 pp.

Brown, J.K. and J. Kapler-Smith, eds.2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42. vol 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 257 pp.

Erdman, J.A. 1970. Pinyon-juniper succession after natural fires on residual soils of Mesa Verde, Colorado. Science Bulletin, Biological Series - -Volume XI, No. 2. Brigham Young University, Provo, UT. 26 pp.

Everett, R.L. and K. Ward. 1984. Early Plant Succession on Pinyon-Juniper Controlled Burns. Northwest Science 58: 57-68.

Eyre, F.H., ed. 1980. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters. 148 pp.

Goodrich, S. and B. Barber. 1999. Return Interval for Pinyon-Juniper Following Fire in the Green River Corridor, Near Dutch John, Utah. In: S.B. Monsen, R. Stevens, R.J. Tausch, R. Miller and S. Goodrich, compilers. Proceedings: ecology and management of pinyon-juniper communities within the Interior West. 15-18 Sept 1997, Provo, UT. Proceedings RMRS-P-9. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station.

Gruell, G.E. 1999. Historical and modern roles of fire in pinyon-juniper. Pages 24-28 in: S.B. Monsen, R. Stevens, R.J. Tausch, R. Miller and S. Goodrich, compilers. Proceedings: ecology and management of pinyon-juniper communities within the Interior West. 15-18 Sept 1997, Provo, UT. Proceedings RMRS-P-9. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station.

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.

Hardy, C.C., K.M. Schmidt, J.P. Menakis and R.N. Samson. 2001. Spatial data for national fire planning and fuel management. Int. J. Wildland Fire. 10(3&4): 353-372.

Hessburg, P.F., B.G. Smith, R.B. Salter, R.D. Ottmar and E. Alvarado. 2000. Recent changes (1930s-1990s) in spatial patterns of interior northwest forests, USA. Forest Ecology and Management 136: 53-83.

Kilgore, B.M. 1981. Fire in ecosystem distribution and structure: western forests and scrublands. Pages 58-89 in: H.A. Mooney et al. (Technical Coordinators). Proceedings: Conference on Fire Regimes and Ecosystem Properties, Honolulu, 1978. Gen. Tech. Rep. WO-GTR-26.

Kuchler, A.W. 1964. Potential Natural Vegetation of the Conterminous United States. American Geographic Society Special Publication No. 36. 116 pp.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

NatureServe. 2004. International Ecological Classification Standard: Terrestrial Ecological Classifications. Terrestrial ecological systems of the Great Basin US: DRAFT legend for LANDFIRE project. NatureServe Central Databases. Arlington, VA. Data current as of 4 November 2004.

Ogle, K. and V. DuMond. 1997. Historical Vegetation on National Forest Lands in the Intermountain Region. USDA Forest Service, Intermountain Region, Ogden, UT. 129 pp.

Ott, J.E., E.D. McArthur and S.C. Sanderson. 2001. Plant community dynamics of burned and unburned sagebrush and pinyon-juniper vegetation in west-central Utah. Pages 177-190 in: S.B. Monsen, R. Stevens, R.J. Tausch, R. Miller and S. Goodrich, compilers. Proceedings: ecology and management of pinyon-juniper communities within the Interior West. 15-18 Sept 1997, Provo, UT. Proceedings RMRS-P-9. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station.

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.

Schmidt, K.M., J.P. Menakis, C.C. Hardy, W.J. Hann and D.L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 41 pp. + CD.

Soule’, P.T. and P.A. Knapp. 1999. Western juniper expansion on adjacent disturbed and near-relict sites. Journal of Range Management 52: 525-533.

Soule’, P.T. and P.A. Knapp. 2000. Juniperus occidentalis (western juniper) establishment history on two minimally disturbed research natural areas in central Oregon. Western North American Naturalist (60)1: 26-33.

Stein, S.J. 1988. Fire History of the Paunsaugunt Plateau in Southern Utah. Great Basin Naturalist. 48:58-63.

Tausch, R.J. and N.E. West. 1987. Differential Establishment of Pinyon and Juniper Following Fire. The American Midland Naturalist 119(1): 174-184.

USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, December). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/ [Accessed: 11/15/04].

Ward, K.V. 1977. Two-Year Vegetation Response and Succession Trends for Spring Burns in the Pinyon-Juniper Woodland. M.S. Thesis, University of Nevada, Reno. 54 pp.

Wright, H.A., L.F. Neuenschwander and C.M. Britton. 1979. The role and use of fire in Sagebrush-Grass and Pinyon-Juniper Plant Communities. Gen. Tech. Rep. INT-GTR-58. Ogden, UT: USDA Forest Service, Intermountain Research Station. 48 pp.

Young, J.A. and R A. Evans. 1978. Population Dynamics after Wildfires in Sagebrush Grasslands. Journal of Range Management 31: 283-289.

Young, J.A. and R.A. Evans. 1981. Demography and Fire History of a Western Juniper Stand. Journal of Range Management 34: 501-505.