

11160

Madrean Juniper Savanna

BpS Model/Description Version: Aug. 2020

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Modelers		Reviewers	
Mike Babler	mbabler@tnc.org	Keith Schulz	Keith_Schulz@natureserve.org
None	None	None	None
None	None	None	None

Vegetation Type

Steppe/Savanna

Map Zones

24

Model Splits or Lumps

This Biophysical Setting (BpS) is lumped with: 241025

Geographic Range

Sierra Madre Occidentale and Sierra Madre Oriental in Mexico, Trans-Pecos Texas, southern New Mexico, southern Arizona (south of the Mogollan Rim) and southwestern New Mexico.

Biophysical Site Description

This ecological system typically is found at elevations between 1,400-2,200m. Savannas occur at the lower altitudinal limits for montane tree species, below the pinyon-juniper woodlands but at or above semi-desert grassland where soil moisture limits cover of montane woody plants. At higher and therefore moister elevations, woodlands grade into Madrean encinal or, less frequently, upper montane conifer-oak forest characterized by taller and denser vegetation than these woodlands. Savannas and woodlands are found on many and varied topographic positions, including low-to mid-elevation mountain slopes, hills, plateaus, basins and flats.

Vegetation Description

Madrean oaks such as *Quercus arizonica*, *Q. emoryi*, *Q. grisea*, *Q. oblongifolia* or *Q. mohriana* may be codominant with pinyon pines (*Pinus edulis* and *P. discolor*). *Pinus engelmannii* occurs infrequently, and *P. ponderosa* and *P. arizonica* are absent or sparse. *Juniperus monosperma* is often present to dominant on the Gila. Understory layers are variable and may be dominated by shrubs such as manzanita (*Arctostaphylos pungens* and *A. pringlei*), cliffrose (*Cowania mexicana*), Apache plume (*Fallugia paradoxa*) or barberry (*Berberis* spp.) or graminoids such as sideoats grama (*Bouteloua curtipendula*), cane bluestem (*Bothriochloa barbinodis*) and muhly grasses (*Muhlenbergia emersleyi*, *M. torreyi* and *M. porteri*). Graminoids decrease in cover and biomass with increasing cover of woody plants.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
JUDE	<i>Juncus debilis</i>	Weak rush
PIED	<i>Pinus edulis</i>	Twoneedle pinyon
PIDI3	<i>Pinus discolor</i>	Border pinyon

QUAR	<i>Quercus arizonica</i>	Arizona white oak
QUEM	<i>Quercus emoryi</i>	Emory oak
QUGR3	<i>Quercus grisea</i>	Gray oak
QUOB	<i>Quercus oblongifolia</i>	Mexican blue oak
QUMO	<i>Quercus mohriana</i>	Mohr oak

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

Disturbance Description

The fire regime of this ecological system is almost completely unknown. There are essentially no data about fire frequency, fire history or fire behavior. The occasional paper that addresses fire includes considerably more speculation than data. It would seem that fire occurrence was determined primarily by fire occurrence in the surrounding matrix vegetation, and was ignited by lightning during early summer. However, even this information is speculative and undocumented. Based on contemporary ecological knowledge, models that assume specific fire regimes are little more than wild guesses. These "wild guesses" follow; they may be ignored or improved upon. Preferably the latter.

This system likely is predisposed to stand-replacement fires during the earliest stage of stand development. Replacement fires are assumed to have occurred every century or so, and mixed severity fires slightly less frequently. Significant drought occurs about every 60yrs and, in combination with herbivory from invertebrates, causes disproportional mortality of large, old trees.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	138	33	20	1000
Moderate (Mixed)	212	21	20	1000
Low (Surface)	100	46		
All Fires	46	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

Pinyon-juniper woodland usually was distributed across the landscape in patches between 100s-1,000s of acres. In particularly dissected topography this type may have occurred in smaller patches.

Adjacency or Identification Concerns

This system is found generally at higher elevations and more mesic sites than semi-desert grassland. Typically, it is bordered at higher elevations by upper montane conifer-oak forest (BpS 1024) or ponderosa pine or madrean Pine-Oak.

Cover and density of juniper and pinyon trees at lower elevations in this type doubtless have increased as a result of fire suppression (possibly as mitigated by livestock grazing). This phenomenon is characteristic of BpS 141116 (juniper savanna), with which BpS 141025 has been lumped.

Issues or Problems

Information about fire regimes is extrapolated from adjacent systems, and extreme caution is warranted when interpreting these models. Fire season can be inferred more reliably than fire frequency; the former likely is equally or more important than the latter.

Description

Initial post-fire community dominated by perennial caespitose grasses. Evidence of past fires may be observed, including charcoal and resprouting woody plants.

Maximum Tree Size Class

None

Class B 44 Mid Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
JUDE	Juncus debilis	Weak rush	Upper
PIED	Pinus edulis	Twoneedle pinyon	Upper
QUAR	Quercus arizonica	Arizona white oak	Upper
QUEM	Quercus emoryi	Emory oak	Upper

Description

Community dominated by young to mature alligator juniper and evergreen oak trees of various ages.

Maximum Tree Size Class

Pole 5-9" DBH

Class C 50 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
JUDE	Juncus debilis	Weak rush	Upper
PIED	Pinus edulis	Twoneedle pinyon	Upper
QUAR	Quercus arizonica	Arizona white oak	Upper
QUEM	Quercus emoryi	Emory oak	Upper

Description

Site dominated by relatively dense old alligator juniper and evergreen oak trees. Because trees have grown and aged, consequent gaps in canopy facilitate mixed severity fire every couple of centuries.

Maximum Tree Size Class

Medium 9-21"DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:CLS	9
Mid1:CLS	10	Late1:CLS	99
Late1:CLS	85	Late1:CLS	984

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:ALL	Early1:ALL	0.01	100	Yes	0
Mixed Fire	Mid1:CLS	Mid1:CLS	0.005	200	No	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.007	143	Yes	0
Mixed Fire	Late1:CLS	Late1:CLS	0.005	200	No	0
Replacement Fire	Late1:CLS	Early1:ALL	0.007	143	Yes	0
Wind or Weather or Stress	Late1:CLS	Late1:CLS	0.01	100	No	0
Surface Fire	Late1:CLS	Late1:CLS	0.02	50	No	0

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