

10240

Madrean Lower Montane Pine-Oak Forest and Woodland

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zone

26

Geographic Range

Sierra Madre Occidentale and Sierra Madre Oriental in Mexico, Trans-Pecos Texas, New Mexico, and Arizona, generally south of the Mogollon Rim. In map zone 26, this Biophysical Setting (BpS) is limited to the Sky Islands of the Davis, Guadalupe, Eagle, Quitman, Sierra Diablo, Glass, Chisos and Chinati mountains.

Biophysical Site Description

The Madrean pine-oak forest and woodland of the interior North American Southwest is characterized by scrub oaks, alligator junipers, and Mexican pines that range in height from 15-50ft (6-15m); the understory is dominated by graminoids (Brown 1994). Elevation ranges from 5,500-7,000ft. With increasing elevation, alligator juniper give way to a mixture of relatively mesic scrub oak species and pines. This area is a transition zone with Rocky Mountain influence from the north, Appacherian influence from the west, and Madrean from the south. These influences determine the dominant species' compositions and structure. However, the model for these areas remains the same. Kuchler (1964) includes this type within type number 31, the oak-juniper woodland.

Vegetation Description

These forests and woodlands are composed of Madrean pines and evergreen oaks intermingled with patchy shrublands on most mid-elevation slopes (1,500-2,300m elevation). Throughout the BpS, the vegetation varies due to the surrounding mountain ranges and dominance changes throughout. Tree species include Emory oak (*Q. emoryi*), gray oak (*Q. grisea*), Gambel oak (*Q. gambelii*), Arizona cypress (*Cupressus arizonica*), alligator juniper (*Juniperus deppeana*), drooping juniper (*Juniperus flaccida*), Douglas-fir (*Pseudotsuga menziesii*), Arizona pine (*Pinus arizonica*), southwestern white pine (*P. strobiformis*), and ponderosa pine (*P. ponderosa*). Subcanopy and shrub layers may include typical encinal and chaparral species such as agave (*Agave* spp.), Texas madrone (*Arbutus xalapensis*), mountain mahogany (*Cercocarpus montanus*), Wright silktassel (*Garrya wrightii*), nolina (*Nolina* spp.), and silverleaf oak (*Q. hypoleuroides*). Some stands have moderate cover of perennial warm-season grasses such as sideoats grama (*Bouteloua curtipendula*), blue grama (*B. gracilis*), bull grass (*Muhlenbergia*

emersleyi), and Texas bluestem (*Schizachyrium cirratum*) (Powell 1994; Powell 1998). Graminoids decrease in cover and biomass with increasing cover of woody plants.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
QUERC	<i>Quercus</i>	Oak
JUDE	<i>Juncus debilis</i>	Weak rush
CEMO2	<i>Cercocarpus montanus</i>	Alderleaf mountain mahogany
MUHLE	<i>Muhlenbergia</i>	Muhly
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine

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

Disturbance Description

In this BpS, most fires likely occurred during early summer as a result of lightning associated with early summer thunderstorms. Surface fires were frequent with an interval of approximately 9yrs (Helen Mills Poulos fire history research 2005-2006 in Davis, Chisos, and Maderas del Carmen [MX] Mountains), and mixed-severity fires likely occurred less frequently, perhaps on the magnitude of every 13yrs (Mills Poulos, with 10% filter applied and same area as above). This system likely is predisposed to stand-replacement fires during any stage of stand development; however, replacement fires are assumed to have occurred every century or so coincident with hot, dry, windy conditions during early summer. Multi-decadal drought probably thinned stands but did not cause or contribute to stand replacement.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	16	30	10	200
Moderate (Mixed)	23	20	50	300
Low (Surface)	9	50	15	100
All Fires	5	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

This type usually was distributed across the landscape in patches of 100s-1000s of acres. In particularly dissected topography, this type may have occurred in smaller patches.

Adjacency or Identification Concerns

This system generally is bordered by pinyon-juniper woodland in lower elevations and ponderosa pine woodland at higher elevations (e.g., Madrean or Southern Rocky pinyon-juniper woodland). Indicator species of this type include alligator juniper, scrub oaks, Mexican pines, mountain muhly (*M. montana*), blue grama, and sideoats grama.

Issues or Problems

Lehmann lovegrass (*Eragrostis lehmanniana*) was purposely introduced into North America in the 1930s and has spread to the lower and drier edge of Madrean encinal and pine-oak woodland. By continuing to spread and therefore add fine fuel, it may contribute to significantly increased fire frequency in this system. Lehmann lovegrass may have an advantage over native grasses

following fire. Fire frequency greatly decreased after the introduction of livestock. Currently, livestock grazing may still preclude wildfire by reducing fine fuel loads.

Native Uncharacteristic Conditions

Tree cover >70% is uncharacteristic.

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	A	A	A	A	A	A	A	A	A	A
Shrub	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Shrub	1.0-3.0	A	A	A	A	A	A	A	A	A	A
Shrub	>3.0	A	A	A	A	A	A	A	A	A	A
Tree	0-5	B	B	B	B	B	B	B	UN	UN	UN
Tree	5-10	C	C	C	C	C	C	C	UN	UN	UN
Tree	10-25	C	C	C	C	C	C	C	UN	UN	UN
Tree	25-50	C	C	C	C	C	C	C	UN	UN	UN
Tree	>50	C	C	C	C	C	C	C	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 **29** **Early Development 1 - All Structures**

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
MUHLE	Muhlenbergia	Muhly	Upper
BOUTE	Bouteloua	Gramma	Upper
QUERC	Quercus	Oak	Upper
JUDE2	Juniperus deppeana	Alligator juniper	Upper

Description

Post-fire graminoids and herbaceous dicots with 10-30% cover dominated by grama and muhly grasses, asters, penstemons, and mid-height shrubs such as silktassel along with seedlings of overstory pine and oak.

Herbs dominant are the dominant lifeform (grasses and dicots); however, seedlings may overtake the grasses in later stages of the class.

Maximum Tree Size Class

Seedling <4.5ft

Class B	6	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
JUDE2	Juniperus deppeana	Alligator juniper	Upper
QUERC	Quercus	Oak	Upper
PICE	Pinus cembroides	Mexican pinyon	Lower
PIPO	Pinus ponderosa	Ponderosa pine	Upper

Description

Sapling size trees of overstory species and a reduced herbaceous understory depending on the density of the canopy. Actual height of tree species is 3-5m.

Maximum Tree Size Class

Pole 5-9" DBH

Class C	65	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUERC	Quercus	Oak	Middle
JUDE2	Juniperus deppeana	Alligator juniper	Upper
PIPO	Pinus ponderosa	Ponderosa pine	Upper
BOCU	Bouteloua curtipendula	Sideoats grama	Lower

Description

Open woodland with 20-70% dominated by alligator juniper, ponderosa pine, oaks, mountain mully, blue grama, and sideoats grama.

Herbs are the dominant lifeform (especially warm-season perennial grasses) with 25-70% cover.

Maximum Tree Size Class
Very Large >33" DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	12
Mid1:OPN	13	Late1:OPN	35
Late1:OPN	36	Late1: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:ALL	Early1:ALL	0.2	5	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.05	20	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.16	6	No	0
Replacement Fire	Late1:OPN	Early1:ALL	0.002	500	Yes	0
Mixed Fire	Late1:OPN	Late1:OPN	0.05	20	No	0
Surface Fire	Late1:OPN	Late1:OPN	0.16	6	No	0

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