10860
Rocky Mountain Lower Montane-Foothill Shrubland

BpS Model/Description Version: Aug. 2020

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Vegetation Type
Shrubland

Map Zones
27, 31, 33

Geographic Range
This system occurs in the foothills, canyon slopes, and lower mountains of the Rocky Mountains. It ranges from southern New Mexico extending north into Wyoming and west into the Intermountain region.

This system is mostly found on the eastern Front Range -- both sides of the southern Rockies; there are also large patches on western side. It's patchy in canyons and adjacent to shortgrass prairie. The description here focuses more on true mountain-mahogany community type. Information in the FEIS online database indicates that the central distribution of true mountain-mahogany is located on the west side of the Rocky Mountains in the foothills and mountains of Utah, Colorado, and Wyoming. The range of true mountain-mahogany also extends north into Montana, east into South Dakota, and Nebraska, south from Oklahoma into Mexico, and west into Arizona and Nevada. True mountain-mahogany occasionally occurs in Idaho and southwestern Oregon.

Some experts felt that this system did not occur in New Mexico in map zone (MZ) 27 and rather occurred west of the New Mexico portion of MZ27.

This might be just on the outskirts of MZs 31 and 39, in the westernmost area on the fringes. In general, there is no mountain-mahogany in the eastern or central portions of MZs 31 or 39.

Biophysical Site Description
This ecological system is found in the foothills, canyon slopes, and lower mountains of the Rocky Mountains and on outcrops and canyon slopes in the western Great Plains. These shrublands are usually associated with exposed sites, rocky substrates, and dry conditions, which limit tree growth.

This Biophysical Setting (BpS) occurs in the transition zone between the plains and montane life zones. It ranges from roughly 1,500-2,900m (4,950-9,570ft). This BpS occurs on relatively dry sites with thin, shallow soils on moderately steep aspects. This BpS is not intended to cover communities dominated by ocean-spray (HODU) on extremely rocky sites (where vegetation is clearly subordinate to rock).

This system could be common in the foothills where *Quercus gambelii* is absent such as the northern Colorado Front Range and in drier foothills and prairie canyonlands and outcrops.

In New Mexico, this system is often a successional stage within pinyon woodlands maintained in a landscape by fire but eventually progressing to pinyon-juniper or as persistent shrubland on rocky breaks and ridges.

Vegetation Description

Species dominance varies depending on site conditions and by geographic location. Scattered trees or inclusions of grassland patches or steppe may be present, but the vegetation is typically dominated by a variety of shrubs including *Andropogon gerardii*, *Amelanchier utahensis*, *Cercocarpus montanus*, *Purshia tridentata*, *Rhus trilobata*, *Prunus americana*, *Ribes cereum*, *Symphoricarpus oreophilus,* and *Yucca glauca*.

Grasses may include species of *Bouteloua* (*B. curtipendula*), *Muhlenbergia*, *Hesperostipa*, *Sorghastrum nutans*, and *Pseudoroegneria spicata* or Griffith wheatgrass.

Shrub species dominant are true mountain-mahogany, several species of rabbitbrush, snowberry, hackberry, and chokecherry. *Quercus gambelii* does not occur. However, *Quercus undulata* (wavyleaf oak) is an important component in New Mexico.

Ponderosa pine, pinyon pine, and junipers may also be associated with this system. There is some evidence of early removal of these trees -- needs research.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
CEMO2	*Cercocarpus montanus*	Alderleaf mountain mahogany
ANGE	*Andropogon gerardii*	Big bluestem
SCSC	*Schizachyrium scoparium*	Little bluestem
BOCU	*Bouteloua curtipendula*	Sideoats grama
RHTR	*Rhus trilobata*	Skunkbush sumac
HECOC8	*Hesperostipa comata ssp. Comata*	Needle and thread
PSEUD22	*Pseudoroegneria*	Wheatgrass
HENE5	*Hesperostipa neomexicana*	New mexico feathergrass

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

Disturbance Description

Historically, this type may have been in a Fire Regime Group IV or II -- primarily moderate-interval (e.g., 30-70yr) replacement fires in the shrub-dominated layer. Nearly all the dominant species in this BpS have the capability to resprout after disturbance.

For MZs 25 and previous, mixed-severity fire was modeled. However, due to a new understanding of fire severity definitions, only replacement fire was modeled for MZs 27 and 33. The mean fire return interval (MFRI) was originally 80yrs replacement and 50yrs mixed. Some feel that the overall MFRI might be ~80yrs; however, there is very little direct evidence of either 50 or 80yrs to ascertain.

Fires play an important role in this system as the dominant shrubs usually have a severe die-back following fire, although some plants will stump sprout.

In New Mexico, this type is maintained within the pinyon-juniper matrix by repeated stand-replacement fires.

Grazing or browsing primarily by deer, elk, and some pronghorn occurred, as well as bison.

Browsing/barking by rabbits occurs during heavy snowfall. Voles may also impact during heavy snow years.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	46	100		
Moderate (Mixed)				
Low (Surface)				
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

Erhard's observations suggest that the scale of the most common disturbance extent is relatively small. The disturbance regime is expected to be relatively frequent under historic conditions. Scale estimate is in the 100s of acres realm -- not 1,000s of acres. However, in the last several years, there have been fires in the 1,000s of acres. Native grazing and browsing affect areas on a scale of probably 100s of acres. In New Mexico, there can be large brush fields of this type inside the pinyon-juniper matrix that are maintained by repeated stand-replacing fires.

The system occurs in large patches -- and can occur from 100-50,000ac. But more commonly, it would occur in the 1,000s of acres.

Adjacency or Identification Concerns

Shrub species vary by geographic location in this region. Shrub species dominance is tied to a variety of environmental conditions including geology, soils, topographic position, etc., making a description of this generalized type problematic.

This system is generally drier than Rocky Mountain Gambel Oak-Mixed Montane Shrubland (CES306.818) but may include mesic montane shrublands where *Quercus gambelii* does not occur. (However, *Q. undulata* does occur in New Mexico.)

Fire suppression may have allowed an invasion of trees into some of these shrublands, but in many cases west-facing slope and drier sites are too dry for tree growth. This can occur in some sites. (Some feel that fire suppression has allowed ponderosa pine to return more quickly and that they are native to these soils and sites -- Harvey Sprock, NRCS, personal communication.) Most of the steep west-facing hogbacks consist of deeper developed soils that do not have trees or many shrubs. On north-facing or east-facing slopes, ponderosa pine, pinyon pine, and junipers may also be associated with this system in more mesic patches -- scattered patches. There is some evidence of removal of these trees in the 1800s to early 1900s -- needs research. It is also thought that sometimes this is not invasion but rather succession to woodlands.

Today, in portions, the understory is dominated by exotics -- toadflax, knapweeds, cheatgrass, musk thistle, Kentucky bluegrass, Canada bluegrass, and mullein. These exotics may have a very different fire regime than the historic condition. Overstory is probably okay.

Recreation today such as foot, bike, and horse traffic is disturbing this system. Roads and housing are causing fragmentation.

Past, continuous (livestock) grazing has also altered the understory especially.

There are still some large fully functioning patches. But when near urban areas, much is degraded.

In New Mexico, this system is often a successional stage within pinyon woodlands maintained in a landscape by fire but eventually progressing to pinyon-juniper. Therefore, this type might also be considered a state in the pinyon-juniper models.

Without fire, the shrubs will grow taller and bigger and, from a wildlife forage point of view, less palatable. Hence, there is a management inclination to burn these shrublands at a higher-than-normal MFRI today (Este Muldavin, personal communication).

Issues or Problems

This is a poorly understood system and needs better monitoring data.

This is a model of succession from shrubland to grassland. It is uncertain if that works for New Mexico -- either this stuff is persistent shrublands or it moves to woodlands rather than grasslands. Reviewers cannot think of a place where there has been such a grassland dynamic. This type can be much more prevalent adjacent to grasslands going north into Colorado and Wyoming -- hence the model transition to grassland. But in New Mexico, that might be relatively rare.

Native Uncharacteristic Conditions

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	UN	UN	UN
Herb	0.5-1.0	A	A	A	A	A	A	A	UN	UN	UN
Herb	>1.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	0-0.5	B	B	B	UN	UN	UN	UN	UN	UN	UN
Shrub	0.5-1.0	B	B	B	C	C	C	C	C	C	C
Shrub	1.0-3.0	B	B	B	C	C	C	C	C	C	C
Shrub	>3.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	0-5	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	5-10	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	10-25	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	25-50	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	>50	UN	UN	UN	UN	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 17 Early Development 1 - All Structures

Upper-layer lifeform is not the dominant lifeform. Herbaceous cover may dominate: BOGR2, up to 0.09m in height, canopy cover 20-60%. Shrub cover less than 10% 0-1m.

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
BOGR2	Bouteloua gracilis	Blue grama	Middle
MUMO	Muhlenbergia montana	Mountain muhly	Middle
CEMO2	Cercocarpus montanus	Alderleaf mountain mahogany	Upper
BOCU	Bouteloua curtipendula	Sideoats grama	Low-Mid

Description

Early succession, usually after moderately frequent stand-replacement fires; grasses and forbs dominant. <10% shrub cover, with grasses/forbs dominant in extensive openings. (Some question whether or not mountain muhly was abundant.)

Climate -- drought, above-average precipitation, late-spring frosts, etc., are major factors in the time it takes for this class to succeed.

This is a model of succession from shrubland to grassland. It is uncertain if that works for New Mexico -- either this system remains as persistent shrublands or it moves to woodlands rather

than grasslands. Reviewers cannot think of a place where there has been such a grassland dynamic. This type can be much more prevalent adjacent to grasslands going north into Colorado and Wyoming, but in New Mexico, that might be relatively rare.

Maximum Tree Size Class
None

Class B 21 Mid Development 1 - Closed

Upper-layer lifeform is not the dominant lifeform. Herbaceous cover may dominate at times/ locations: BOGR2, up to 0.09m in height, canopy cover 0-20%.

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CEMO2	Cercocarpus montanus	Alderleaf mountain mahogany	Upper
BOGR2	Bouteloua gracilis	Blue grama	Upper
MUMO	Muhlenbergia montana	Mountain muhly	Lower

Description
This class contains >10% shrub cover (i.e., line intercept method) by weakly sprouting and seed-producing shrubs; grasses/forbs dominant in scattered openings.

Maximum Tree Size Class
None

Class C 62 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
BOGR2	Bouteloua gracilis	Blue grama	Lower
MUMO	Muhlenbergia montana	Mountain muhly	Lower
CEMO2	Cercocarpus montanus	Alderleaf mountain mahogany	Upper
ANGE	Andropogon gerardii	Big bluestem	Upper

Description
There is >30% shrub cover depending on location/timing, with over-mature shrubs as patchy dominant overstory (e.g., in rock outcrops); grasses/forbs dominant in extensive openings. All age classes are present but dominated by over-mature shrubs (e.g., in rocky draws).

Other indicator species might include *Shizachyrium scoparium*, *Bouteloua curtipendula*, and *Pseudoroegeneria spicata*. Some feel that some of the tree species might occur in this class historically -- such as *Pinus ponderosa*, *Juniperus scopulorum*, and *Pinus edulis* -- and that they might indicate succession instead of encroachment (Sprock, personal communication).

There might be very scattered trees in this class.

Maximum Tree Size Class
None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:CLS	10
Mid1:CLS	11	Late1:CLS	25
Late1:CLS	26	Late1:CLS	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
Wind or Weather or Stress	Early1:ALL	Early1:ALL	0.005	200	No	0
Native Grazing	Early1:ALL	Early1:ALL	0.005	200	No	0
Competition or Maintenance	Early1:ALL	Early1:ALL	0.005	200	No	0
Replacement Fire	Early1:ALL	Early1:ALL	0.025	40	Yes	0
Wind or Weather or Stress	Mid1:CLS	Mid1:CLS	0.005	200	No	0
Replacement Fire	Mid1:CLS	Mid1:CLS	0.0125	80	No	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.0125	80	Yes	0
Wind or Weather or Stress	Late1:CLS	Late1:CLS	0.005	200	No	0
Replacement Fire	Late1:CLS	Early1:ALL	0.02	50	Yes	0

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