

10620

Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zones

22, 28

Geographic Range

In MZ22, this BpS is a very minor component, primarily in the northeastern corner of the zone in subsections (Cleland et al. 2007) M331Ba, 342A, 342Ac, 342Ad, M331Ad, M331Aj and 342Fa.

The curlleaf mountain mahogany *Cercocarpus ledifolius* community type occurs in the Sierra Nevada and Cascade Range to Rocky Mountains from MT and WY in the Bighorn Basin to northern AZ, and in Baja California, and Mexico (Marshall 1995).

Biophysical Site Description

Curlleaf mountain mahogany (*Cercocarpus ledifolius*) communities are usually found on upper slopes and ridges between 5,000-10,500ft. elevations (USDA-NRCS 2003), although northern stands may occur as low as 2,000ft (Marshall 1995). In western NV and southern ID, curlleaf mountain mahogany may occur down to 5000ft or lower. Most stands occur on rocky shallow soils and outcrops, with mature stand cover between 10-55%. In the absence of fire, old stands may occur with > 55% cover on somewhat productive sites with moderately deep soils or, at least, fractured below ground bedrock. In southern ID and in the Bighorn Basin, WY, curlleaf mountain mahogany is most often associated with a limestone bedrock.

Vegetation Description

Mountain big sagebrush is the most common codominant with curlleaf mountain mahogany. Curlleaf mountain mahogany is both a primary early successional colonizer rapidly invading bare mineral soils after disturbance and the dominant long-lived species. Where curlleaf mountain mahogany has reestablished quickly after fire, snowberry, blue bunch wheatgrass, green needlegrass, Oregon grape, Ribes, phlox and prairie sandwort, may co-dominate. Litter and shading by woody plants inhibits establishment of curlleaf mountain mahogany. Invasion of Utah and Rocky Mountain juniper, limber pine or Douglas-fir can occur and will eventually shade-out the curlleaf mountain mahogany.

Reproduction often appears dependent upon geographic variables (slope, aspect and elevation) more than biotic factors. Mountain big sagebrush and black sagebrush are often associated.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
CELE3	<i>Cercocarpus ledifolius</i>	Curl-leaf mountain mahogany
ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain big sagebrush
PUTR2	<i>Purshia tridentata</i>	Antelope bitterbrush
SYMPH	<i>Symphoricarpos</i>	Snowberry

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

Disturbance Description

Curlleaf mountain mahogany usually does not resprout, and is easily killed by fire (Marshall 1995). Curlleaf mountain mahogany is a primary early successional colonizer rapidly invading bare mineral soils after disturbance. Fires are not common in early seral stages, when there is little fuel, except in chaparral. Replacement fires (mean FRI of 150-500yrs) become more common in mid-seral stands, where herbs and smaller shrubs provide ladder fuel. By late succession, two classes and fire regimes are possible depending on the history of mixed severity and surface fires.

FRI for MZ22 somewhat longer than in other mapzones. However, that could be presumably due to the sole inclusion of curlleaf mountain mahogany and not other types as are included in other mapzones for this BpS.

Several fire regimes affect this community type. It is clear that being very sensitive to fire and very long-lived would suggest FRG V and development in fire-safe sites (Gruell et al. 1985). This is true of late development classes, but younger classes can resemble more the surrounding juniper, limber and sagebrush communities in their fire behavior and exhibit a FRG IV.

From MZ16 and early models for this BpS: Data from a thesis in NV and expert observations suggests some large mountain mahogany may survive less intense fires. Therefore, surface fires were added as a disturbance to late seral stages, but this is a more recent concept in curlleaf mountain mahogany ecology. Surface fires were assumed to occur on a very small scale, perhaps caused by lightning strikes.

Ungulate herbivory: Heavy browsing by native medium-sized and large mammals reduces mountain mahogany productivity and reproduction (USDA-NRCS 2003). This is an important disturbance in early, especially, and mid-seral stages, when mountain mahogany seedlings are becoming established. Browsing by small mammals has been documented (Marshall 1995), but is relatively unimportant and was incorporated as a minor component of native herbivory mortality.

Windthrow and snow creep on steep slopes are also sources of mortality.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	228	25	100	500
Moderate (Mixed)	78	75		
Low (Surface)				
All Fires	58	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

Because these communities are restricted to rock outcrops and thin soils, stands usually occur on a small scale, and are spatially separated from each other by other communities that occur on different aspects or soil types. A few curlleaf mountain mahogany stands may be much larger than 100ac. These stands occur predominately on the west slope of the Bighorn Mountains.

Adjacency or Identification Concerns

Some existing curlleaf mountain mahogany stands may be in the big sagebrush, Douglas-fir, Rocky Mountain and Utah juniper stands resulting from encroachment on deeper soils.

Note that this description is only considering curlleaf mountain mahogany and not true mountain mahogany. True mountain mahogany is covered in BpS 2210862 Rocky Mountain Lower Montane-Foothill Shrubland-True Mountain Mahogany and BpS 2810620.

Native grazing was primarily by ungulates, and over browsing can stress decadent stands. Early successional stands are currently infrequent and late open and closed stands are the norm.

Issues or Problems

This model is intended to capture only the Curlleaf Mountain Mahogany which is only a portion of BpS 1062.

Native Uncharacteristic Conditions

Encroachment of conifer species. Greater than 70% canopy closure in class D would be uncharacteristic in this BpS.

The distribution of classes should be applied to rocky and shallow soils, not to its current distribution resulting from mahogany encroachment into deeper soils.

Comments

MZs 22 and 28 were combined during 2015 BpS Review.

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	B	B	C	D	D	UN	UN	UN
Shrub	0.5-1.0	B	B	B	B	C	D	D	UN	UN	UN
Shrub	1.0-3.0	B	B	B	B	C	D	D	UN	UN	UN
Shrub	>3.0	B	B	B	B	C	D	D	UN	UN	UN
Tree	0-5	D	D	D	D	D	UN	UN	UN	UN	UN

Tree	5-10	D	D	D	D	D	UN	UN	UN	UN	UN
Tree	10-25	D	D	D	D	D	UN	UN	UN	UN	UN
Tree	25-50	D	D	D	D	D	UN	UN	UN	UN	UN
Tree	>50	D	D	D	D	D	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 4 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CELE3	Cercocarpus ledifolius	Curl-leaf mountain mahogany	Upper
ARTRV	Artemisia tridentata ssp. vaseyana	Mountain big sagebrush	Upper
FEID	Festuca idahoensis	Idaho fescue	Upper
SYMPH	Symphoricarpos	Snowberry	Upper

Description

Curlleaf mountain mahogany rapidly invades bare mineral soils after fire. Litter and shading by woody plants inhibits establishment. Bunch grasses and disturbance-tolerant forbs and resprouting shrubs, such as snowberry, may be present. Skunkbush sumac and sagebrush seedlings are present.

Maximum Tree Size Class

None

Class B 19 Mid Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CELE3	Cercocarpus ledifolius	Curl-leaf mountain mahogany	Upper
ARTR2	Artemisia tridentata	Big sagebrush	Mid-Upper
FEID	Festuca idahoensis	Idaho fescue	Mid-Upper
SYMPH	Symphoricarpos	Snowberry	Mid-Upper

Description

Curlleaf mountain mahogany is dominant with mature sagebrush, bitterbrush, snowberry and rabbitbrush co-dominant. Mountain mahogany seedlings are common. Various shrub species typically dominate. However, under mixed severity fire disturbance various grass species may dominate.

Maximum Tree Size Class

None

Class C 13 Mid Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CELE3	Cercocarpus ledifolius	Curl-leaf mountain mahogany	Upper
ARTR2	Artemisia tridentata	Big sagebrush	Low-Mid
JUOS	Juniperus osteosperma	Utah juniper	Upper
SYMPH	Symphoricarpos	Snowberry	Low-Mid

Description

Young curlleaf mountain mahogany are common, and shrub diversity is high. This class can persist; it is thus a mid or late closed stage and combines aspects of both.

Maximum Tree Size Class

None

Class D 64 Late Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CELE3	Cercocarpus ledifolius	Curl-leaf mountain mahogany	Mid-Upper
PSME	Pseudotsuga menziesii	Douglas-fir	Upper
JUOS	Juniperus osteosperma	Utah juniper	Upper
JUSC2	Juniperus scopulorum	Rocky mountain juniper	Upper

Description

There is a wide range of cover for mountain mahogany. Various shrub species typically dominate. However, under mixed severity fire disturbance various grass species may dominate. This class represents the late-successional endpoint for curlleaf mountain mahogany that is maintained by infrequent scattered canopy fire and drought mortality (modeled as wind and weather stress), which thins the stand.

Fire scars with dead and decadent branches on older shrubs, with herbaceous-dominated understory are evidence for this condition. Other shrub species may be abundant, but decadent. These stands are in areas poorly suited for experiencing fire. In the absence of fire (2-3 FRIs for mixed severity and surface fires), these stands will persist with shrubs reaching very old age.

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:OPN	9
Mid1:OPN	10	Mid1:CLS	49
Mid1:CLS	50	Mid1:CLS	999
Late1:ALL	50	Late1:ALL	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	0.004	250	Yes	0
Native Grazing	Early1:ALL	Early1:ALL	0.005	200	No	0
Native Grazing	Mid1:OPN	Mid1:OPN	0.005	200	No	0
Alternative Succession	Mid1:OPN	Late1:ALL	0.005	200	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.0067	149	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.014	71	No	0
Native Grazing	Mid1:CLS	Mid1:CLS	0.005	200	No	0
Alternative Succession	Mid1:CLS	Late1:ALL	0.005	200	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.01	100	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.013	77	Yes	0
Replacement Fire	Late1:ALL	Early1:ALL	0.0025	400	Yes	0
Wind or Weather or Stress	Late1:ALL	Late1:ALL	0.01	100	No	0
Mixed Fire	Late1:ALL	Late1:ALL	0.013	77	No	0

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