10620

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

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Vegetation Type

Forest and Woodland

Map Zones

7, 9

Geographic Range

The curl-leaf mountain mahogany (*Cercocarpus ledifolius* var. *intermontanus*) type occurs in eastern Oregon, northern Nevada, southern Idaho, and northeastern California (possibly eastern Washington), and grades into similar systems in the central Rocky Mountains.

Biophysical Site Description

Curl-leaf mountain mahogany (*Cercocarpus ledifolius* var. *intermontanus*) is usually found on slopes, ridges, rimrock, and canyons between 2,000ft and 8,000ft elevation (Marshall 1995). Most stands are found on rocky shallow soils and outcrops, with mature stand cover between 10% and 55%. In absence of fire, stands may occur on somewhat deeper soils, with >55% cover.

Vegetation Description

Mountain big sagebrush is the most common co-dominant with curl-leaf mountain mahogany. Curl-leaf mountain mahogany is both a primary early successional colonizer rapidly invading bare mineral soils after disturbance and the dominant long-lived species. Where curl-leaf mountain mahogany has reestablished quickly after fire, rabbitbrush (*Chrysothamnus nauseosus*) may co-dominate. Litter and shading by woody plants inhibit establishment of curl-leaf mountain mahogany. Reproduction often appears dependent upon geographic variables (slope, aspect, and elevation) more than biotic factors. Snowberry, serviceberry, aspen, and currant are present on cooler sites with more moisture. Western juniper and ponderosa pine are often present, with <10% total cover in forested zones. In old, closed-canopy stands, understory may consist largely of prickly phlox (*Leptodactylon pungens*), pinegrass, Idaho fescue, or Sherman big bluegrass.

BpS Dominant and Indicator Species

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

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

Disturbance Description

There are three significant disturbances to this type of vegetation. Fire: Curl-leaf mountain mahogany does not resprout and is killed easily by fire (Marshall 1995). (However, reviewers offered that resprouts have been observed in south-central, and southeast Oregon.) Curl-leaf 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. Replacement fire (mean fire return interval [MFRI], 100-500yrs) becomes 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 rare surface fires. In the presence of surface fire and past mixed-severity fires in younger classes, the stand will adopt a savanna-like woodland structure with a grassy understory. Trees can become very old and will show fire scars. In late, closed stands, the absence of herbs and small forbs makes replacement fire uncommon, requiring extreme winds and drought. In such cases, thick duff provides fuel for more intense fires. Mixed fires are present in all classes, except the Late-Closed Class, and are more frequent in the Mid-Development classes. (Reviewers felt that the summed fire regime [MFRI, 76yrs] seemed too frequent [especially in the mountains in the south of map zone {MZ} 9], but they were unable to identify which of the sub-types was contributing too much.)

Ungulate herbivory: Heavy browsing by native medium-size 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-caused mortality.

Avian-caused mortality: In western Nevada for ranges in close proximity to the Sierra Nevada, sapsucker drilling of curl-leaf mountain mahogany has been observed to cause stand-replacement mortality (Christopher Ross, Nevada BLM, pers. comm.). Reviewers in Oregon commented that this disturbance is extremely rare, and even then would only be noticeable in small (1-5ac) patches, not larger patches.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 242 | 32 | 100 | 500 |
| Moderate (Mixed) | 212 | 36 |  |  |
| Low (Surface) | 243 | 32 |  |  |
| All Fires | 77 | 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 generally 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 curl-leaf mountain mahogany stands may be much larger than 100ac.

Adjacency or Identification Concerns

Birchleaf mountain mahogany (*Cercocarpus betuloides*) is found in Klamath County, Oregon, and adjacent California, but is easily distinguished by leaf shape. Some existing curl-leaf mountain mahogany stands may be in the big sagebrush biophysical setting (BpS), now uncharacteristic because of fire exclusion.

Issues or Problems

Data for the setback in succession caused by native grazing are lacking, but observed by experts. In the model, only Class A had a setback of -10, whereas no setback was specified for Classes B and C, which do not have many seedlings.

Several fire regimes affect this community type. It is clear that being very sensitive to fire and very long-lived would suggest fire regime group (FRG) V. This is true of Late-Development classes (and, says reviewers, where sagebrush is the adjacent type), but younger classes can resemble more the surrounding chaparral or sagebrush communities in their fire behavior and exhibit FRG IV. (Also, reviewers suggested that FRG IV applies where this type is adjacent to pine or fir.) Experts had divergent opinions on this issue; some emphasized infrequent and only stand-replacing fires whereas others suggested more frequent replacement fire, mixed-severity fires, and surface fires. The current model is a compromise reflecting more frequent fire in Early Development classes, surface fire in the Late Open Class, and infrequent fire in the Late Closed Class.

Native Uncharacteristic Conditions

Comments

MZs 7 and 9 were combined during 2015 BpS Review.

Data from a thesis in Nevada and expert observations suggest 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 curl-leaf mountain mahogany ecology. Surface fires were assumed to occur on a very small scale, perhaps caused by lightning strikes.

An extensive zone of mixed mountain mahogany and pinyon pine exists in western Nevada and eastern California, and perhaps elsewhere. This type was not incorporated in the model and is probably more appropriately included in the pinyon pine model.

Dealy (1978) described types from throughout eastern Oregon.

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 | B | B | B | B | B | B |
| Shrub | 0.5-1.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 1.0-3.0 | C | C | C | C | C | C | C | C | C | C |
| Shrub | >3.0 | C | C | C | C | C | C | C | C | C | C |
| Tree | 0-5 | D | D | D | D | D | D | D | D | D | D |
| Tree | 5-10 | E | E | E | E | E | E | E | E | E | E |
| Tree | 10-25 | E | E | E | E | E | E | E | E | E | E |
| Tree | 25-50 | E | E | E | E | E | E | E | E | E | E |
| Tree | >50 | E | E | E | E | E | E | E | E | E | E |

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 |
| ARTR2 | Artemisia tridentata | Big sagebrush | Upper |
| CHRYS | Chrysactinia | Chrysactinia | Upper |
| SYMPH | Symphoricarpos | Snowberry | Upper |

Description

Curl-leaf mountain mahogany rapidly invades bare mineral soils after fire. Litter and shading by woody plants inhibit establishment. Bunchgrasses and disturbance-tolerant forbs and resprouting shrubs, such as snowberry, may be present. Rabbitbrush and sagebrush seedlings are present. Graminoids and forbs are the dominant lifeform for the first 3yrs, but shrubs would dominate the next years.

*Maximum Tree Size Class*  
None

Class B 12 Mid Development 1 - Open

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 | Middle |
| PUTR2 | Purshia tridentata | Antelope bitterbrush | Middle |
| SYMPH | Symphoricarpos | Snowberry | Middle |

Description

Young curl-leaf mountain mahogany are common, although shrub diversity is very high. Herbivores clearly impact this type because it is very palatable.

*Maximum Tree Size Class*  
None

Class C 14 Mid Development 1 - Closed

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 | Middle |
| CHRYS | Chrysactinia | Chrysactinia | Middle |
| SYMPH | Symphoricarpos | Snowberry | Middle |

Description

Curl-leaf mountain mahogany is dominant, with mature sagebrush, bitterbrush, snowberry, and rabbitbrush co-dominant. Few mountain mahogany seedlings are present.

*Maximum Tree Size Class*  
None

Class D 41 Late Development 1 - Open

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 | Mid-Upper |
| PUTR2 | Purshia tridentata | Antelope bitterbrush | Mid-Upper |

Description

Moderate cover of mountain mahogany. This class represents one of two late-successional endpoints for curl-leaf mountain mahogany. Evidence of fire scars on older trees and presence of open savanna-like woodlands with herbaceous-dominated understory are evidence for this condition. Other shrub species may be abundant, but decadent. In the absence of fire, the stand will eventually become closed and not support a herbaceous understory.

*Maximum Tree Size Class*  
None

Class E 29 Late Development 2 - Closed

Indicator Species

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

Description

High cover of large shrub or tree-like mountain mahogany. Very few other shrubs are present and herb cover is low. Duff may be very deep. Scattered trees may occur in this class. Class will become old-growth.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 9 |
| Mid1:CLS | 10 | Mid1:OPN | 49 |
| Mid1:OPN | 50 | Late1:OPN | 99 |
| Late1:OPN | 100 | Late1:OPN | 999 |
| Late2:CLS | 150 | Late2: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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.01 | 100 | No | 0 |
| Native Grazing | Early1:ALL | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Native Grazing | Mid1:OPN | Mid1:OPN | 0.001 | 1000 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.013 | 77 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0067 | 149 | Yes | 0 |
| Native Grazing | Mid1:CLS | Mid1:CLS | 0.01 | 100 | No | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.02 | 50 | No | 0 |
| Alternative Succession | Late1:OPN | Late2:CLS | 1 | 1 | Yes | 200 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Replacement Fire | Late2:CLS | Early1:ALL | 0.002 | 500 | Yes | 0 |

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