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Northern Rocky Mountain Montane-Foothill Deciduous Shrubland

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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None	None	None	None
None	None	None	None

Reviewer: Louisa Evers

Vegetation Type

Shrubland

Map Zones

1, 8, 9

Geographic Range

This type is found in the northern Great Basin, the Columbia Basin, the Blue Mountains and Hells Canyon region of northeastern Oregon, and north and east into the northern Rockies. It occurs at the ecotone between steppe or shrub-steppe and forest, although the distribution is patchy.

Biophysical Site Description

These shrublands occur on steep slopes at elevations of 1,750-4,500 ft. They occur on all slope aspects but are usually on sites with concave microtopography such as dry drainageways. Soils are moderately deep to deep and loamy texture with a cryic soil temperature regime and xeric soil moisture regime. Adjacent vegetation is usually steppe, shrub-steppe, or forest.

Vegetation Description

The montane-foothill deciduous shrub community type includes a diversity of sprouting shrubs species, many of which are deciduous. Common shrub species that may be present include mountain snowberry (*Symphoricarpos oreophilus*), common snowberry (*Symphoricarpus albus*), Saskatoon serviceberry (*Amelanchier alnifolia*), bitter cherry (*Prunus emarginata*), choke cherry (*Prunus virginiana*), snowbrush ceanothus (*Ceanothus velutinus*), antelope bitterbrush (*Purshia tridentata*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), wax currant (*Ribes cereum*), roses (*Rosa* spp.), rabbitbrush, squaw apple, ocean spray (*Holodiscus discolor*), ninebark (*Physocarpous malvaceus*), birchleaf spiraea (*Spiraea betulifolia*), syringa (*Philadelphus lewisii*), antelope bitterbrush (*Purshia tridentata*), mountain mahogany (*Cercocarpus ledifolius*), and several other shrubs, many of which may be found in nearby forest Biophysical Settings (BpSs). Mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*) or subalpine big sagebrush (*A. tridentata* spp. *spiciformus*) may also be present. The most constant shrubs present include snowberry, Saskatoon serviceberry, cherry, and antelope bitterbrush. Antelope bitterbrush and curl-leaf mountain mahogany are weak sprouters, but all other species typical of this type are strong sprouters. Shrubs form a nearly continuous layer 1-1.5m high.

The herb layer is dominated by grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), pinegrass (*Calamagrostis rubescens*), and Idaho fescue (*Festuca idahoensis*) and forbs such as bedstraw (*Galium* spp). Other species can include Columbia needlegrass (*Achnatherum nelsonii*), *Poa nevadaensis*, and Sandberg bluegrass (*Poa secunda*). Herbaceous plants are temporarily more abundant after fires. These sites are able to support trees, but the combination of frequent fires, competition by shrubs, and distant seed sources keeps trees from dominating.

The most common tree is Douglas-fir (*Pseudotsuga menziesii*). Ponderosa pine (*Pinus ponderosa*) and western juniper (*Juniperus occidentalis*) may also present but less common, presumably because the more shade-tolerant firs are more adapted to grow through the dense shrub layer.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PHMA5	<i>Physocarpus malvaceus</i>	Mallow ninebark
SYAL	<i>Symphoricarpos albus</i>	Common snowberry
AMAL2	<i>Amelanchier alnifolia</i>	Saskatoon serviceberry
HODI	<i>Holodiscus discolor</i>	Oceanspray
ROSA5	<i>Rosa</i>	Rose
SPBE2	<i>Spiraea betulifolia</i>	White spirea
PUTR2	<i>Purshia tridentata</i>	Antelope bitterbrush
PRVI	<i>Prunus virginiana</i>	Chokecherry

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

Disturbance Description

Fire is an important disturbance agent. Communities are dominated by species that re-sprout quickly after fire. The precise fire frequency is not known. Fires were typically patchy instead of stand-replacing as many of the species included contribute relatively little to fire spread. Fire return intervals and the relative proportion of patchy verses stand-replacing fire likely depends on the proportions of species with deciduous leaves and those with evergreen leaves. The leaves of evergreen species tend to contain a high proportion of waxes, oils, and other volatile compounds that promote fire spread while the leaves of deciduous species typically do not. For example, ninebark senesces early (August) to avoid drought and is presumably more flammable at that time than green shrubs.

Fire frequency was likely influenced by surrounding communities including sagebrush and grassland. However, since sprouting shrubs dominate, recovery rates for this BpS would typically be much faster than for sagebrush. Historic fires on adjacent bunchgrass slopes were quite frequent (the return interval may have been as low as 5-10yrs) and often spread into shrub patches.

Other disturbance agents are insects that defoliate the shrubs, slope movement, and erosion. Soil creep is a constant on these steep slopes. Soil erosion or rapid slope movements are possible, especially after fire, but often prevented by dense and rapidly resprouting vegetation.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	41	100	3	50

Moderate (Mixed)				
Low (Surface)				
All Fires	41	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 BpS may occur as small patches, often very narrow, in drainageways or as larger patches ranging in size from 100s-1000s of acres. Disturbance patch size can range from 10s-1000s of acres.

Adjacency or Identification Concerns

This type can occur as rather small islands or stringers within a landscape dominated by steppe or shrub-steppe vegetation. These settings have high fire frequencies, and fires can easily eliminate tree seed sources.

This type often intermingles with sagebrush steppe, leading to some difficulty in distinguishing this BpS from the Inter-Mountain Basins Montane Sagebrush Steppe. Early successional stages may be confused with a grassland BpS, but sprouting shrubs should be evident within 2-5yrs of the disturbance. Seral shrub fields with similar species composition that typically will develop into a seral stage with trees (within 50yrs) are excluded from this shrub BpS and should be included in an appropriate forest BpS. Western juniper encroachment can occur in the montane shrub, potentially leading to misclassification as Columbia Plateau Western Juniper Woodland and Savanna.

Issues or Problems

There has been discussion of how to treat the ecotone between this BpS and adjacent BpSs since this type tends to blend into adjacent forest and steppe or sage-steppe BpSs. There is a need to clearly describe the dynamics of pine and Douglas-fir encroachment into montane-foothill deciduous shrub from locations where montane-foothill shrub is an understory component in conifer forest.

Native Uncharacteristic Conditions

Prolonged absence of fire can permit tree encroachment into the montane-foothill deciduous shrub BpS or increased shrub cover in combination with decreased herbaceous cover in all three community types. Scattered trees may be present, but tree cover >10% indicates an uncharacteristic type or a change to a different BpS.

Comments

In the state-and-transition model, the replacement fires that do not transition to the Early class represent patchy replacement fires.

This BpS was reviewed by Louisa Evers during the 2016 review period. Evers made descriptive changes and eliminated two s-classes dominated by trees. While scattered trees may be present in this BpS, separate tree s-classes do not fit within this BpS concept. According to the NatureServe Ecological System description, “seral shrub fields of comparable composition that typically will

develop into a seral stage with trees (within 50 years) are excluded from this shrub system and are included in their appropriate forest system.”

Evers suggested that this model and description could adequately represent the BpS not only in map zones (MZ) 1, 8, and 9 but also in MZ 10 and MZ 19. LANDFIRE staff reviewed the models in question but found substantial differences in the descriptions, disturbance regimes, and quantitative models and determined that further expert review was needed to determine if lumping these zones would be appropriate.

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	B	B	B	B	B	B	B	B
Shrub	0.5-1.0	C	C	C	C	C	C	C	C	C	C
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	C	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	5-10	C	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	10-25	C	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	25-50	C	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	>50	C	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 3 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PHMA5	Physocarpus malvaceus	Mallow ninebark	Middle
SYAL	Symphoricarpos albus	Common snowberry	Middle
CARU	Calamagrostis rubescens	Pinegrass	Middle
PSSPS	Pseudoroegneria spicata ssp. spicata	Bluebunch wheatgrass	Middle

Description

Post-fire mixture of resprouting shrubs, grasses and forbs, and annuals. Shrub sprouts may be obscured by the taller herbaceous plants.

None

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PHMA5	Physocarpus malvaceus	Mallow ninebark	Upper
SYAL	Symphoricarpos albus	Common snowberry	Upper
AMAL2	Amelanchier alnifolia	Saskatoon serviceberry	Upper
HODI	Holodiscus discolor	Oceanspray	Upper

Description

Shrubs form a closed canopy, with herbaceous plants in the understory and in small gaps. Mountain/subalpine big sagebrush may be co-dominant, or sprouting shrubs may be more dominant in the shrub layer. Tree seedlings are rare or absent.

Maximum Tree Size Class

None

Class C	69	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PHMA5	Physocarpus malvaceus	Mallow ninebark	Upper
SYAL	Symphoricarpos albus	Common snowberry	Upper
AMAL2	Amelanchier alnifolia	Saskatoon serviceberry	Upper
CERCO	Cercocarpus spp.	Mountain mahogany	Upper

Description

Sprouting shrubs dominate. Dead shrubs may be present, and crowns of living shrubs contain a significant proportion of dead material. Herbaceous cover is <30%. Scattered trees may have become established and managed to grow above the dense shrub layer.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:CLS	4
Mid1:CLS	5	Late1:CLS	20
Late1:CLS	21	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
Replacement Fire	Early1:ALL	Early1:ALL	0.008	125	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.008	125	Yes	0
Replacement Fire	Mid1:CLS	Mid1:CLS	0.0167	60	No	0
Replacement Fire	Late1:CLS	Early1:ALL	0.008	125	Yes	0
Replacement Fire	Late1:CLS	Mid1:CLS	0.0167	60	Yes	0

References

Johnson, C.G. and R.R. Clausnitzer. 1992 Plant associations of the Blue and Ochoco Mountains. USDA Forest Service R6-ERW-TP-036-92, 164 pp. plus appendices.

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NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

Swanson, D.K. 2005. Unpublished Data. USFS Ecologist, Wallowa-Whitman National Forest, Baker City, OR.