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Columbia Plateau Low Sagebrush Steppe

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
Crystal Kolden	ckolden@gmail.com	Mike Zielinski	mike_zielinski@nv.blm.gov
Gary Medlyn	gmedlyn@nv.blm.gov	Terri Barton	terri_barton@nv.blm.gov
None	None	None	None

Reviewer: Kori Blankenship

Vegetation Type

Steppe/Savanna

Map Zones

10, 12, 17, 18, 19, 21

Geographic Range

This Biophysical Setting (BpS) is found in eastern Oregon, northern, central, and western Nevada (at higher elevations), southern Idaho, and western Wyoming around Jackson Hole. BpS will occur in large patches in eastern and central Nevada where similar substrates are found on higher-elevation mountain tops and mesas.

Biophysical Site Description

This type describes low sagebrush on shallow soils where claypan produces a seasonally perched water table. Occurs on lowlands, erosional fan remnants, pediments of volcanic, granitic, or quartzite base material, rock pediment remnants, side slopes and summits of mountains, and foothills. Subsoils swell on wetting and crack on drying, have depth to a fine-textured subsoil ranging from 5-10in, and tend to have a high percentage of coarse fragments (gravels, cobbles, rocks, or stones). Where soils are influenced by aeolian calcareous dust additions originating from local playas or another source, black sage can occur. Low sage tends to grow where claypan layers exist in the soil profile, and soils are often saturated during a portion of the year. Elevations range from 1,000m at higher latitudes to 3,000m in lower latitudes. Where concave areas or drainages occur, Wyoming or basin big sagebrush (at lower elevations) and mountain big sagebrush (at higher elevations) will dominate. Precipitation in these sites ranges from 10-16in/yr.

Vegetation Description

This type includes communities dominated by low sagebrush (*Artemisia arbuscula*), low gray sagebrush (*Artemisia arbuscula* ssp. *arbuscula*), and in some cases early sagebrush (*Artemisia arbuscula* ssp. *longiloba*), which replaces low sagebrush. Although these types do not usually grow in combination, they do share similar fire regimes. Other shrubs growing on site may include antelope bitterbrush (*Purshia tridentata*) and/or Douglas rabbitbrush (*Chrysothamnus viscidiflorus*). Dwarf sagebrushes generally have relatively low fuel loads with low-growing and cushion forbs and scattered bunch grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), needlegrasses (*Achnatherum* spp.), Sandberg's bluegrass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), Prairie junegrass (*Koeleria macrantha*), Thurber's needlegrass

(*Achnatherum thurberianum*), and Indian ricegrass (*Achnatherum hymenoides*). The presence of Idaho fescue does not occur in more southerly and easterly dwarf sage sites. Forbs often include buckwheats (*Eriogonum* spp.), fleabanes (*Erigeron* spp.), phloxes (*Phlox* spp.), paintbrushes (*Castilleja* spp.), goldenweeds (*Haplopappus* spp.), hawksbeard (*Crepis* spp.), and lupines (*Lupinus* spp.).

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
ARAR8	<i>Artemisia arbuscula</i>	Little sagebrush
ARARL	<i>Artemisia arbuscula</i> ssp. <i>longiloba</i>	Little sagebrush
ACTH7	<i>Achnatherum thurberianum</i>	Thurber's needlegrass
PSSP6	<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass
FEID	<i>Festuca idahoensis</i>	Idaho fescue
CHVI8	<i>Chrysothamnus viscidiflorus</i>	Yellow rabbitbrush

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

Disturbance Description

Low sagebrush generally supports less fire than black sagebrush. Stand-replacing fires can occur in this type when successive years of above-average precipitation are followed by a dry winter, a dry spring, and when high winds are present with dry lightning (Miller and Rose 1999). Stand-replacing fires are primarily wind-driven and only cover small areas.

Grazing by wild ungulates occurs in this type due to its high palatability (mostly for *A. nova* and *A. arbuscula*) compared to other browse. Native browsing tends to open up the canopy cover of shrubs but does not often change the successional stage.

Low and early sagebrush types can be pockmarked by burrowing animals, especially ants, breaking through the root restrictive zone and creating a seedbed that is readily colonized by sagebrush. Burrowing creates small patches (i.e., generally >200sq ft) of big sagebrush in the low sagebrush types, which could affect fuel loads. This was not considered in the model.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	201	100	100	450
Moderate (Mixed)				
Low (Surface)				
All Fires	201	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

Low sagebrush communities can occur in small to 10,000ac areas on mountain ranges. Disturbance patch size for this type is not well known but is estimated to be 10s-100s of acres due to the relatively small proportion of the sagebrush matrix it occupies and the limited potential for fire spread.

Adjacency or Identification Concerns

The low sagebrush type tends to occur over broad areas, with pockets of black sagebrush where there is a calcareous substrate and Wyoming or mountain big sagebrush (in northern latitudes) in

drainages or small concave pockets of deeper soils. In Nevada, where low sagebrush occurs at higher elevations, in rocky, open stands, pockets of curl-leaf mountain mahogany with an understory of mountain sagebrush occur along the drainages.

Cheatgrass (*Bromus tectorum*) is likely to invade this site after disturbance although not at higher elevations. There has been extensive replacement of low sagebrush by annual grass after fire in parts of eastern Oregon. Medusahead invasion into low sagebrush is cited as a potential problem (e.g., Jordan Valley in Oregon and Owyhee uplands) after fire. Current and future fire regimes will be very different because of weed introductions.

Issues or Problems

Past fire regimes in low sagebrush are not well quantified.

Native Uncharacteristic Conditions

If shrub cover is >30% or >0.5m, it is uncharacteristic.

Comments

During the 2016 Model Review, Kori Blankenship revised this model to remove mixed-severity fire. Louisa Evers suggested that a single model and description could adequately represent this BpS in map zones (MZ) 1, 7, 8, 9, 12, 17, and 18. LANDFIRE staff reviewed the models in question but found substantial differences in the descriptions, especially in the species, and determined that further expert review was needed to determine if lumping these zones would be appropriate.

During LANDFIRE National when this BpS was considered in map zone 21, there was considerable debate about the fire frequency. Expert estimates of the mean fire return interval ranged from 90-400yrs. After an extensive model review process, LANDFIRE leadership determined that the model developed for MZ 10, 12, 17, 18, and 19 adequately represented the opinion of many experts and the fire literature, and that model was adopted for MZ 21 with minor edits.

A LANDFIRE National reviewer suggested that "bare ground" be defined in the s-class descriptions.

This model was originally developed during LANDFIRE National for MZ 12 and 17 by Crystal Kolden and Gary Medlyn and reviewed by Mike Zielinski and Terri Barton. Jon Bates accepted it for MZ 10, 18, 19 with minor edits; no review was received. Don Major updated the s-class structure information for MZ 10. For MZ 21, comments were considered from many individuals including: Jon Bates, Klara Varga, Tristan Fluharty, Dave Tart, Reggie Clark (rmclark@fs.fed.us), John Simons (john_simons@blm.gov), Steve Kilpatrick, and an anonymous contributor.

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	UN	UN	UN	UN	UN	UN	UN
Herb	0.5-1.0	A	A	A	UN	UN	UN	UN	UN	UN	UN
Herb	>1.0	A	A	A	UN	UN	UN	UN	UN	UN	UN
Shrub	0-0.5	A	B	C	UN	UN	UN	UN	UN	UN	UN
Shrub	0.5-1.0	A	B	C	UN	UN	UN	UN	UN	UN	UN
Shrub	1.0-3.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	>3.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
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 leaf form 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 11 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PSSP6	Pseudoroegneria spicata	Bluebunch wheatgrass	Middle
CHVI8	Chrysothamnus viscidiflorus	Yellow rabbitbrush	Upper
FEID	Festuca idahoensis	Idaho fescue	Middle
ACTH7	Achnatherum thurberianum	Thurber's needlegrass	Middle

Description

Early seral community dominated by herbaceous vegetation. Low cover of sagebrush.

Maximum Tree Size Class

None

Class B 52 Late Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ARAR8	Artemisia arbuscular	Little sagebrush	Upper
CHVI8	Chrysothamnus viscidiflorus	Yellow rabbitbrush	Middle

PSSP6	Pseudoroegneria spicata	Bluebunch wheatgrass	Middle
ACTH7	Achnatherum thurberianum	Thurber's needlegrass	Middle

Description

Mid-seral community with a mixture of herbaceous and shrub vegetation. Dominant lifeform is herbaceous. Drought reduces the herbaceous cover.

Maximum Tree Size Class

None

Class C 37 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ARAR8	Artemisia arbuscular	Little sagebrush	Upper
FEID	Festuca idahoensis	Idaho fescue	Middle
ARARL	Artemisia arbuscula ssp. Longiloba	Little sagebrush	Upper
PSSP6	Pseudoroegneria spicata	Bluebunch wheatgrass	Middle

Description

Late seral community with a mixture of herbaceous and shrub vegetation; herbaceous component is co-subdominant.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Late1:OPN	24
Late1:OPN	25	Late1:OPN	999
Late1:CLS	120	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	0.005	200	Yes	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	200
Replacement Fire	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.005	200	Yes	0

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