LANDFIRE Biophysical Setting Model

Biophysical Setting 2010800 Inter-Mountain Basins Big Sagebrush Shrubland

☑ *This BPS is lumped with: 11250*
☐ *This BPS is split into multiple models:*

General Information

Contributors (also see the Comments field) **Date** 6/5/2006

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Vegetation Type
Upland Shrubland

General Model Sources
☑ Literature
☑ Local Data
☑ Expert Estimate

Dominant Species
ARTRW8
PASM
ARCA13
BOGR2
HECO26
KOMA
PSSP6
ERNA10

Map Zone
20

Model Zone
☐ Alaska
☐ California
☐ Great Basin
☐ Great Lakes
☐ Hawaii
☐ Northeast
☐ Northern Plains
☑ N-Cent.Rockies
☐ Pacific Northwest
☐ South Central
☐ Southeast
☐ S. Appalachians
☐ Southwest

Geographic Range

Sagebrush occurs throughout much of the west. For MZ19, WY and Basin big sagebrush are found in southwest MT and east-central ID. For MZ20, this BpS is found in most subsections, except in westernmost 331D (most all of the shrubland however should be mapped as 1125 Steppe); however it is a very minor type, especially presettlement. In MZ20, mostly only ARTTSW except in extreme tip of mapzone, where ARTTSV is found at higher elevations.

Occurs where WY Basins ecoregion goes into MT between Beartooth and Pryor Mountains. Also occurs as very small patches particularly where might have pan spots developing.

Biophysical Site Description

This type is found between 3000-7000ft elevation on deep, well drained, alluvial soils in MZs 10 and 19. Artemisia tridentata ssp. tridentata occurs in swales with deeper soils at lower elevations. Artemisia tridentata ssp. wyomingensis is the more common subspecies in MZ19 and occurs on toeslopes and alluvial fans at mid-elevations.

In MZ20, this BpS occurs on fine-textured soils. ARTTSW is found primarily on soils derived from shale and mudstone, ie, on fine-textured substrates; since the landscape is largely plains, landscape features are not particularly good predictors, but geological substrates are. Upper limits more like 5000ft in MZ20. At extreme tip of mapzone, ARTTSV is found at higher elevations.

Vegetation Description

Wyoming and big basin sagebrush subspecies form a mosaic of patches throughout much of this BpS in MZs 10 and 19. Wyoming sagebrush (Atremisia tridentata ssp.wyomingensis) is the dominant species in

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valley bottoms, alluvial fans.

In deep soils in MZs 10 and 19, Basin big sagebrush (Artemisia tridentata spp. tridentata) is the dominant subspecies, except on alkaline soils, where greasewood (Sarcobatus vermiculatus) and rabbitbrush (Chrysothamnus spp) may also be present. However, ARTTST (ssp. tridentata) does not occur in MZ20. In MZ19 in SW MT, ARTTSW (ssp. wyomingensis) is a very minor component of the landscape; it is only found in the very lowest elevations squeezed between ARTTSV (ssp. vaseyana) above and ARTTST (ssp. tridentata) below or along drainages. ARTTSW prevails at relatively low cover values (10-30%) with its extent depending on that of the associated geological substrate; the niche filled by ARTTST in other zones is filled by ARTCAN in MZ20.

In MZs 10 and 19, some of the understory grasses include bluebunch wheatgrass (Pseudoroegneria spicata), needle and thread (Hesperostipa comata), squirreltail (Elymus elymoides) and western wheatgrass (Pascopyrum smithii).

In MZ20, as this BpS occurs on fine-textured soils, PASSMI does especially well here. The dominant wheatgrass in MZ20 is PASSMI and it is accompanied by BOUGRA, HESCOM and KOEMAC; the latter two increasing where grazing has been intensive and protracted.

Forbs most important for MZ20 include SPHCOC, DALPUR, PHLHOO, RATCOL and OPUPOL. Other forbs in MZs 10 and 19 include hawksbeard (Crepis acuminata), bird's beak (Cordylanthus spp), blue bell (Mertensia spp), Rocky mountain aster (Aster scopulorum), Phlox species, lupine (Lupinus spp) and buckwheat (Eriogonum spp).

Disturbance Description

Fire regime group IV, but may also encompass III and IV. Fire return intervals are estimated to average approximately 60yrs, and range from 10-150yrs. Although questions have recently been raised about the frequency of fire in this BpS and some adjacent types (Baker 2004 in press), most experts believe that presettlement fire frequency typically was less than 100yrs. Fires were mostly stand replacing (Tirmenstein 1999).

Recovery of ARTTSW sites to preburn ARTTSW density probably takes in excess of 60yrs to possibly 100yrs; thus, if fires were too frequent, hardly any of this BpS would exist, at least in the full sage development stage (Cooper, personal correspondence). For MZ20, there are almost no references for time it takes for sagebrush to return. One study shows no establishment 14yrs post-fire on CMR Refuge. There is also data from SW MT, MZ19 (Lesica and Cooper 2005) to support the notion that full recovery (to that of current control plots) of ARTTSW cover to take approximately 75-100yrs.

It has been hypothesized that prolonged drought has resulted in significant die off in this type.

Insects and disease may have resulted in replacement and mixed-severity disturbances in this type, but little information exists on the frequency of these disturbances under reference conditions. They are not modeled here.

Antelope, mule deer and pygmy rabbits are native herbivores that browse sagebrush. These were also not included in the model.

Adjacency or Identification Concerns

Please note that the only difference between this BpS 1080 and BpS 1125 is in the amount of herbaceous

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cover. In MZ20, 1080 is by far the more prevalent type, when considering pre-Euro reference conditions. BpS 1125 might be more prevalent today in MZ20 due to overgrazing.

It is difficult to distinguish some of these shrubland communities from each other - 1080, 1085 and 1125

Basin big sagebrush grows in association with Wyoming big sagebrush, mountain big sagebrush and desert shrub communities. Distribution is a result of local soil characteristics on a fine scale (1-500ac). Much of this type has been lost due to land clearing for agriculture or converted to a cheatgrass or greasewood type.

In MZ19, ARTTST has been largely lost in MT, but this was more the result of highly productive stream terraces becoming hayfields, not this less productive BpS 1080 (Cooper, personal correspondence).

This BpS will grow in association with Midgrass Prairie and BpS 1125.

Overgrazing has also been an issue. HESCOM and KOEMAC increase where grazing is intense and protracted.

Native Uncharacteristic Conditions

Over 45% shrub cover would be uncharacteristic for MZ20. The only reason it would be this high is in cases of extreme overgrazing.

Scale Description

Disturbance size probably resembles the patch size of the vegetation. With comparatively little fine fuel contributed by herbaceous litter, disturbance (fire) should be discontinuous.

Disturbance patch sizes range from 10s-100s of hectares.

Issues/Problems

It is difficult to map and identify the subspecies of big sagebrushes (Artemesia tridentata) without the aid of field assessments.

Fire size, frequency and severity are variable.

Comments

This model for MZ20 was adapted from the same BpS in MZ19, which was created by Dana Perkins (dana_perkins@blm.gov), Carly Gibson (cgibson@fs.fed.us) and John DiBari (jdibari@email.wcu.edu) and reviewed by Susan Miller, Lois Olsen and Robert Wooley. Descriptive and quantitative changes and adjustments were made to better represent the ecological differences present in MZ20.

The model for MZ19 is based on the Rapid Assessment model R0SBBB by Diane Abendroth (diane_abendroth@nps.gov) and reviewed by Bill Baker (bakerwl@uwyo.edu), Don Bedunah (bedunah@forestry.umt.edu), Shannon Downey (shannon_downey@blm.gov), Karen Clause (karen.clause@wy.usda.gov), Dennis Knight (dhknight@uwyo.edu), Thor Stephenson (thor_stephenson@blm.gov), Curt Yanish (curt_yanish@blm.gov), Gavin Lovell (gavin_lovell@blm.gov) and Eve Warren (eve_warren@blm.gov). Only descriptive changes were made to the model.

Peer review for the Rapid Assessment was incorporated 4/26/2005. There was considerable disagreement

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among reviewers about how to model this type. All comments were incorporated into the description.

This model was lumped with (subsumed by) the 2011250 model on 11/8/2006 by Brendan Ward at the direction of Elena Contreras.

Vegetation Classes

Class A 45 %

Early Development 1 All Structure

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Fuel Model

Indicator Species and Canopy Position

PASM Upper
BOGR2 Upper
HECO26 Upper
KOMA Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	50 %
Height	Herb 0m	Herb 1.0m
Tree Size Class	None	

- [x] Upper layer lifeform differs from dominant lifeform.

Shrub cover may be 5-10%.

Description

Grass-dominated community following replacement disturbance. Sagebrush might begin to return within ~ five years, but will remain relatively low canopy cover (<10%). However, it is questionable as to whether it might take more than 14yrs post-fire to have any establishment.

This class lasts up to 40yrs post disturbance and succeeds to mid-development open (class B) unless drought or replacement fire cause stand-replacing disturbance.

Replacement fire occurs every 80yrs, and drought occurs every 100yrs.

Class B 20 %

Mid Development 1 Open

Upper Layer Lifeform

- [ ] Herbaceous
- [x] Shrub
- [ ] Tree

Fuel Model

Indicator Species and Canopy Position

ARCA13 Upper
ARTRW8 Upper
PASM Lower
BOGR Lower

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	20 %
Height	Shrub 0m	Shrub 3.0m
Tree Size Class	None	

- [ ] Upper layer lifeform differs from dominant lifeform.

Description

It probably takes about 40-50yrs to reach this stage, which probably lasts 30yrs or more. The class in this model succeeds to the late development stage after 30yrs.

Sagebrush dominated (up to 15% canopy cover), open shrub community with abundant grasses.

Replacement fire (every 80yrs) or drought (every 100yrs); drought does not cause a transition.

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Class C 35 %

Late Development 1 Open

Upper Layer Lifeform

- ☐ Herbaceous
- ☑ Shrub
- ☐ Tree

Fuel Model

Indicator Species and Canopy Position

ARCA13
Upper
ARTRW8
Upper
PASM
Upper
BOGR
Lower

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	21 %	30 %
Height	Shrub 0m	Shrub 3.0m
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Mature and overmature sagebrush with suppressed understory. Cover minimum would be about 15% and the maximum about 25% for MZ20. In SW MT, there has never been more than 45% sage cover even in ARTTSV vegetation types, unless there were extreme cases of overgrazing.

This condition begins at age 70 and can perpetuate until disturbance causes a transition to another class.

Replacement fire (every 80yrs) and drought (every 100yrs); drought does not cause a transition.

Class D 0 %

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class E 0 %

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

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Fire Regime Group:** IV

Historical Fire Size (acres)

Avg 0
Min 0
Max 0

Sources of Fire Regime Data

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

Fire Intervals	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	80	10	150	0.0125	100
Mixed					
Surface					
All Fires	80			0.01252	

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class.

Additional Disturbances Modeled

- [ ] Insects/Disease
- [x] Wind/Weather/Stress
- [ ] Native Grazing
- [ ] Competition
- [ ] Other (optional 1)
- [ ] Other (optional 2)

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