Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R2SBMT **Mountain Big Sagebrush**

General Information

Contributors *(additional contributors may be listed under "Model Evolution and Comments")*

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Vegetation Type

Shrubland

Dominant Species*

ARTRP4
PUTR2
SYOR2

General Model Sources

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

LANDFIRE Mapping Zones

12 17
13 18
16

Rapid Assessment Model Zones

- [ ] California
- [x] Great Basin
- [ ] Great Lakes
- [ ] Northeast
- [ ] Northern Plains
- [ ] N-Cent.Rockies
- [ ] Pacific Northwest
- [ ] South Central
- [ ] Southeast
- [ ] S. Appalachians
- [ ] Southwest

Geographic Range

Within the Great Basin, this type occurs in mountain ranges in central and northern Nevada, southern Idaho, Utah, and eastern California. Similar vegetation occurs in Wyoming, Colorado, Oregon, and Washington.

Biophysical Site Description

Within the Great Basin modeling zone, elevation ranges from 4500 feet in Idaho to 10,500 feet in the White Mountains of California (Winward and Tisdale 1977, Blaisdell et al. 1982, Cronquist et al. 1994, Miller and Eddleman 2000). However, elevations are predominantly between 5000 and 9000 feet. Mean annual precipitation is typically between 14 and 22 inches, but ranges from 10 to 30 inches (Mueggler and Stewart 1980, Tart 1996).

This type mostly occupies moist, productive rolling upland sites. Soils are typically deep and have well developed dark organic surface horizons (Hironaka et al. 1983, Tart 1996). However, at the high ends of its precipitation and elevation ranges mountain big sagebrush occurs on shallow and/or rocky soils.

Vegetation Description

This vegetation type is a mosaic of mountain big sagebrush (Artemisia tridentata var. vaseyana and A. tridentata var. pauciflora depending on taxonomy used) and herbaceous communities where tree (conifers) encroachment is unlikely (due to high elevation or soils). Codominant shrubs can include antelope bitterbrush, mountain snowberry, and viscid rabbitbrush. Graminoids are very diverse. Dominant graminoids include Idaho fescue, bluebunch wheatgrass, mountain brome, needlegrasses, slender wheatgrass, bluegrasses, or rough fescue. Among the large number of possible forb species, common forbs may include sulphur buckwheat, pussytoes, lupine, phlox, arrowleaf balsamroot, prairie smoke, and sticky geranium. Mueggler and Stewart (1980), Hironaka et al. (1983), Jensen et al. (1988), and Tart (1996) described several mountain big sagebrush habitat types.

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Disturbance Description

Mean fire return intervals in and recovery times of mountain big sagebrush are subjects of lively debate in recent years (Welch and Criddle 2003). Mountain big sagebrush communities were historically subject to stand replacing fires with a mean return interval ranging from 10 years at the Ponderosa pine ecotone, 40+ years at the Wyoming big sagebrush ecotone, and up to 80 years in areas with a higher proportion of low sagebrush in the landscape (Crawford et al. 2004, Johnson 2000, Miller et al. 1994, Burkhardt and Tisdale 1969 and 1976, Houston 1973, Miller and Rose 1995, Miller et al. 2000). Under pre-settlement conditions mosaic burns generally exceeded 75% topkill due to the relatively continuous herbaceous layer. Brown (1982) reported that fire ignition and spread in big sagebrush is largely (90%) a function of herbaceous cover. Mountain big sagebrush communities are also subject to periodic mortality due to insects, diseases, winter kill, rodent outbreaks, and drought (Anderson and Inouye 2001). These disturbances in combination may have significantly reduced the cover of dense stands about every 50 to 100 years.

Recovery rates for shrub canopy cover vary widely in this type, depending post fire weather conditions, abundance of resprouting shrubs, and size and severity of the burn. Mountain big sagebrush typically reaches 5% canopy cover in 8 to 14 years (mean of 12 years). This may take as little as 4 years under favorable conditions and longer that 25 years in unfavorable situations (Pedersen et al. 2003, Miller unpublished data). Mountain big sagebrush typically reaches 25% canopy cover in about 25 years, but an average recovery time of 40 years was used because recovery may take as few as 9 years or as long as 70 years (Winward 1991, Pedersen et al. 2003, Miller unpublished data). Variation in recovery rates is dependent upon burn size and uniformity, survival of residual seed, and upon environmental factors (especially weather). Mountain snowberry and resprouting forms of bitterbrush may return to pre-burn cover values in a few years. Bitterbrush plants less than fifty years old are more likely to resprout than older plants (Simon 1990).

Adjacency or Identification Concerns

This type may be adjacent to forests dominated by aspen, Ponderosa pine, Douglas-fir or lodgepole pine. It also occurs adjacent to pinyon-juniper woodlands. This type probably served as an ignition source for adjacent aspen stands.

At the lower elevation, dry end of the type, mountain big sagebrush could be confused with Wyoming big sagebrush. At the higher elevation, moist end of the type, mountain big sagebrush, while generally recognized as A. tridentata var. vaseyana, could be confused with A. tridentata var. pauciflora and spiked big sagebrush (Artemisia tridentata ssp. Spiciformis) or mountain shrub communities characterized by Amelanchier, Prunus, and or Rosa.

Uncharacteristic conditions in this type include herbaceous canopy cover less than 40% and dominance of the herbaceous layer by mulesears (Wyethia amplexcaulis) on clayey soils.

This PNVG is similar to the PNVG R0SBMT for the Northern and Central Rockies model zone.

Scale Description

Sources of Scale Data ☑ Literature ☐ Local Data ☑ Expert Estimate

This type occupies areas ranging in size from 10's to 10,000's of acres. Disturbance patch size can also range from 10,s to 1,000's of acres. The distribution of past burns was assumed to consist of many small patches in the landscape.

Issues/Problems

Reviewers and modelers had very different opinions on the range of mean FRIs and mountain big sagebrush recovery times (see Welch and Criddle 2003). It is increasingly agreed upon that a MFI of 20 years, which

used to be the accepted norm, is simply too frequent to sustain populations of Greater Sage Grouse and mountain big sagebrush ecosystems whose recovery time varies from 10-70 years. Reviewers consistently suggested longer FRIs and recovery times. The revised model is a compromise with longer recovery times and FRIs. Modeler and reviewers also disagreed on the choice of FRG: II (modeler) vs. IV (reviewers). In future efforts, this PNVG should be restricted to high elevations where conifer encroachment is unlikely. The PNVG with conifer encroachment is R2SBMTwc.

Model Evolution and Comments

The three development classes chosen for this PNVG correspond to the early, mid-, and late seral stages familiar to range ecologists. The depleted or decadent sagebrush condition was considered uncharacteristic of the pre-settlement condition, thus not included.

Resprouting bitterbrush in mountain big sagebrush types is potentially important to wildlife in early stand development.

Succession Classes

Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 20 %

Early1 PostRep

Description

Herbaceous cover is variable but typically >50% (50-80%). Shrub cover is 0 to 5%. Replacement fire is uncommon during early recovery (average FRI of 80 yrs) and maintains vegetation in A by causing an ecological setback of 12 yrs. Succession to class B after 12 years.

Indicator Species* and Canopy Position

ARTRV
PUTR2
SYOR2

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	5 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class B 45 %

Mid1 Open

Description

Shrub cover 6-25%. Mountain big sagebrush cover up to 20%. Herbaceous cover is typically >50%. Replacement fire occurs with a mean FRI of 40 yrs. Succession to class C after 28 years.

Indicator Species* and Canopy Position

ARTRV
PUTR2

SYMPH

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	6 %	25 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Class C 35 %

Late1 Closed

Description

Shrubs are the dominant lifeform. Shrub cover 26-45+%. Herbaceous cover is typically <50%. Insects and disease every 75 yrs on average will thin the stand and cause a transition to class B. Replacement fire is every 50 yrs on average. Succession keeps vegetation in class C.

Indicator Species* and Canopy Position

ARTRV
PUTR2
SYMPH

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	26 %	45 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class D 0 %

Description

Indicator Species* and Canopy Position

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class E 0 %

Description

Indicator Species* and Canopy Position

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Disturbances

Non-Fire Disturbances Modeled

- ☑ Insects/Disease
- ☐ Wind/Weather/Stress
- ☐ Native Grazing
- ☐ Competition
- ☐ Other:
- ☐ Other:

Fire Regime Group: 4

I: 0-35 year frequency, low and mixed severity
II: 0-35 year frequency, replacement severity
III: 35-200 year frequency, low and mixed severity
IV: 35-200 year frequency, replacement severity
V: 200+ year frequency, replacement severity

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Historical Fire Size (acres)

Avg:

Min:

Max:

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 the 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. All values are estimates and not precise.

Sources of Fire Regime Data

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

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	48	15	100	0.02083	100
Mixed					
Surface					
All Fires	48			0.02085	

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