

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):

R2SBDW

Black and Low Sagebrushes

General Information

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

Modelers

Sarah C. Heide Sarah_Heide@blm.gov

Gary Medlyn gmedlyn@nv.blm.gov

Reviewers

Michael Zielinski mike_zielinski@nv.blm.gov

Gary Back gback@srk.com
Paul Tueller ptt@intercomm.com

Vegetation Type

Shrubland

Dominant Species*

ARAR8

ARNO4

ACTH7

PSSP6

General Model Sources

- Literature
 Local Data
 Expert Estimate

LANDFIRE Mapping Zones

12 17
13 18
16

Rapid Assessment Model Zones

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

Geographic Range

Great Basin Basins and Mountain Ranges

Biophysical Site Description

This type describes low, low gray, Lahontan, black, and early sagebrushes that grow on shallow soils where a root-limiting layer exists. Low and early sagebrush tends to grow where claypan layers exist in the soil profile and soils are often saturated during a portion of the year. Black sagebrush tends to grow where either a calcareous or volcanic cement layer exists in the soil profile. Elevations range from 4,000 ft (Lahontan sagebrush) to 11,000 ft (low and black sagebrush).

Vegetation Description

This type includes communities dominated by black sagebrush (*Artemisia nova*), low sagebrush (*Artemisia arbuscula*), Lahontan sagebrush (*Artemisia arbuscula* ssp. *Longicaulis*), low gray sagebrush (*Artemisia arbuscula* ssp. *arbuscula*) and early sagebrush (*Artemisia arbuscula* subsp. *longiloba*). Although these types do not usually grow in combination, they do share similar fire regimes. 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*) and Indian ricegrass (*Oryopsis hymenoides*). Forbs often include buckwheats (*Eriogonum* spp.), fleabanes (*Erigeron* spp.), phloxes (*Phlox* spp.), paintbrushes (*Castilleja* spp.), globemallows (*Sphaeralcea* spp.), and lupines (*Lupinus* spp.).

Disturbance Description

Black sagebrush generally supports more fire than other dwarf sagebrushes, however this model applies to the more xeric type of black sagebrush that is not invaded by pinyon or juniper. This type generally burns with mixed severity (average FRI of 100-140 yrs) due to relatively low fuel loads and herbaceous cover.

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

Bare ground acts as a micro-barrier to fire between low stature shrubs. Oils and resins present in the foliage and stems of sagebrush allow fire to spread. Stand-replacing fires (average FRI of 200-240 yrs) can occur in this type when successive years of above average precipitation are followed by an average or dry year. Stand replacement fires dominate in the late successional class where the herbaceous component has diminished. Fires may or may not be wind driven and only cover small areas. This type fits best into Fire Group IV.

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.

Drought is a stress factor (average return interval of 3.5 yrs) that does not change the canopy cover of shrubs however the herbaceous (foliar) layer will decrease and lower the probability of fire.

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

Adjacency or Identification Concerns

The dwarf sagebrush type tends to occur adjacent to either Wyoming big sagebrush or mountain big sagebrush types. The dwarf sagebrush types create a mosaic within the Wyoming big sagebrush and mountain big sagebrush types, acting as a fire break that burns only under severe conditions.

Scale Description

Sources of Scale Data Literature Local Data Expert Estimate

Disturbance patch size for this type is not well known but is estimated to be 10s to 100s of acres due to the relatively small proportion of the sagebrush matrix it occupies and the limited potential for fire spread.

Issues/Problems

Black, low, low gray, Lahontan, and early sagebrush have been lumped into one PNVG. Reviewers and modelers recognized that the current PNVG may apply best to black sagebrush from eastern Nevada and to Lahontan and low sagebrush from north-central Nevada, but not from central Nevada (Zamora and Tueller 1973). Also, the current model may not apply well to low sagebrush from higher elevations (>8,000 ft) where a greater percentage of closed late-development class would be expected (as on many mountain ranges of Nevada).

The dominant species in each vegetation class reflect a compilation of species found in the PNVG but do not usually occur in the same communities.

Model Evolution and Comments

A dwarf sagebrush model with trees (R2SBDWwt) was developed in conjunction with this model.

Succession Classes

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

Class A 10%

Early1 PostRep

Description

Early seral community dominated by herbaceous vegetation; less than 6% sagebrush canopy cover; up to 24 years post-disturbance.

Replacement fire occurs every 240 yrs on average. Drought every 3-4 yrs reduces the herbaceous cover, but does not change successional dynamics. Succession to B after 24 years.

Indicator Species* and Canopy Position

PSSP6

POSE

ACHY

ACTH7

Upper Layer Lifeform Herbaceous Shrub Tree**Fuel Model** no data**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	0 %	6 %
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 70%

Mid1 Open

Description

Mid-seral community with a mixture of herbaceous and shrub vegetation; 6 to 10% sagebrush canopy cover present; between 20 to 59 years post-disturbance. Drought every 3-4 yrs reduces the herbaceous cover. Replacement fire (FRI of 240 yrs) causes a transition to A, whereas mixed severity fire (FRI of 100 yrs) maintains the site in its present condition. In the absence of fire for 120 yrs, the site will follow an alternative successional path to C. Otherwise, succession and mixed severity fire keeps site in class B.

Indicator Species* and Canopy Position

ARAR8

ARNO4

ACHY

ARARL

Upper Layer Lifeform Herbaceous Shrub Tree**Fuel Model** no data**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	6 %	10 %
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 C 20%

Late1 Closed

Description

Late seral community with a mixture of herbaceous and shrub vegetation; >10% sagebrush canopy cover present; 75 or more years post-disturbance. In class C, replacement fire is every 200 yrs on average (transition to A), whereas mixed severity fire

Indicator Species* and Canopy Position

ARNO4

ARAR8

ARARL

ACHY

Upper Layer Lifeform Herbaceous Shrub Tree**Fuel Model** no data**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	11 %	20 %
Height	no data	no data
Tree Size Class	no data	

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

happens on average every 140 yrs due to a diminished herbaceous component compared to class B. Mixed severity fire causes a transition to B. As before, drought affects the herbaceous component of the system. Succession will keep the site in class C without fire.

Class D 0%	<u>Indicator Species* and Canopy Position</u>	<u>Structure Data (for upper layer lifeform)</u>												
Late1 Open <u>Description</u>		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><i>Min</i></th> <th style="text-align: center;"><i>Max</i></th> </tr> </thead> <tbody> <tr> <td><i>Cover</i></td> <td style="text-align: center;">%</td> <td style="text-align: center;">%</td> </tr> <tr> <td><i>Height</i></td> <td style="text-align: center;">no data</td> <td style="text-align: center;">no data</td> </tr> <tr> <td><i>Tree Size Class</i></td> <td colspan="2" style="text-align: center;">no data</td> </tr> </tbody> </table>		<i>Min</i>	<i>Max</i>	<i>Cover</i>	%	%	<i>Height</i>	no data	no data	<i>Tree Size Class</i>	no data	
	<i>Min</i>	<i>Max</i>												
<i>Cover</i>	%	%												
<i>Height</i>	no data	no data												
<i>Tree Size Class</i>	no data													
	<u>Upper Layer Lifeform</u> <input type="checkbox"/> Herbaceous <input type="checkbox"/> Shrub <input type="checkbox"/> Tree <u>Fuel Model</u> no data	<input type="checkbox"/> Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:												

Class E 0%	<u>Indicator Species* and Canopy Position</u>	<u>Structure Data (for upper layer lifeform)</u>												
Late1 Open <u>Description</u>		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><i>Min</i></th> <th style="text-align: center;"><i>Max</i></th> </tr> </thead> <tbody> <tr> <td><i>Cover</i></td> <td style="text-align: center;">%</td> <td style="text-align: center;">%</td> </tr> <tr> <td><i>Height</i></td> <td style="text-align: center;">no data</td> <td style="text-align: center;">no data</td> </tr> <tr> <td><i>Tree Size Class</i></td> <td colspan="2" style="text-align: center;">no data</td> </tr> </tbody> </table>		<i>Min</i>	<i>Max</i>	<i>Cover</i>	%	%	<i>Height</i>	no data	no data	<i>Tree Size Class</i>	no data	
	<i>Min</i>	<i>Max</i>												
<i>Cover</i>	%	%												
<i>Height</i>	no data	no data												
<i>Tree Size Class</i>	no data													
	<u>Upper Layer Lifeform</u> <input type="checkbox"/> Herbaceous <input type="checkbox"/> Shrub <input type="checkbox"/> Tree <u>Fuel Model</u> no data	<input type="checkbox"/> Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:												

Disturbances

<u>Non-Fire Disturbances Modeled</u>	<u>Fire Regime Group:</u> 3
<input type="checkbox"/> Insects/Disease <input checked="" type="checkbox"/> Wind/Weather/Stress <input type="checkbox"/> Native Grazing <input type="checkbox"/> Competition <input type="checkbox"/> Other: <input type="checkbox"/> Other:	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

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

- Literature
- Local Data
- Expert Estimate

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
<i>Replacement</i>	243			0.00412	33
<i>Mixed</i>	119	75	140	0.00840	67
<i>Surface</i>					
<i>All Fires</i>	80			0.01253	

References

Blackburn, W.H. and P.T. Tueller. 1970. Pinyon and juniper invasion in black sagebrush communities in east-central Nevada. *Ecology* 51(5):841-848.

Chambers, J.C. and Miller J. editors. 2004. Great Basin riparian areas: ecology, management, and restoration. Society for Ecological Restoration International, Island Press. Pp 24-48.

Ratzlaff, T.D. and J.E. Anderson. 1995. Vegetal recovery following wildfire in seeded and unseeded sagebrush steppe. *Journal of Range Management* 48:386-391.

USDA-NRCS 2003. Ecological site descriptions for Nevada. Technical Guide Section IIE. MLRAs 28B, 28A, 29, 25, 24, 23.

Young, J.A. and D.E. Palmquist. 1992. Plant age/size distributions in black sagebrush (*Artemisa nova*): effects on community structure. *Great Basin Naturalist* 52(4):313-320.

Zamora, B. and P. T. Tueller. 1973. *Artemisia arbuscula*, *A. longiloba*, and *A. nova* habitat types in northern Nevada. *Great Basin Naturalist* 33: 225-242 .