

# 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 and 2005. For more information, please visit [www.landfire.gov](http://www.landfire.gov). Please direct questions to [helpdesk@landfire.gov](mailto:helpdesk@landfire.gov).

## Potential Natural Vegetation Group (PNVG)

**R2SBDWwt Black and Low Sagebrushes with Trees**

### 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

Paul Tueller ptt@intercomm.com

#### Vegetation Type

Shrubland

#### General Model Sources

- Literature  
 Local Data  
 Expert Estimate

#### Rapid Assessment Model Zones

- |                                                 |                                            |
|-------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> California             | <input type="checkbox"/> Pacific Northwest |
| <input checked="" type="checkbox"/> Great Basin | <input type="checkbox"/> South Central     |
| <input type="checkbox"/> Great Lakes            | <input type="checkbox"/> Southeast         |
| <input type="checkbox"/> Northeast              | <input type="checkbox"/> S. Appalachians   |
| <input type="checkbox"/> Northern Plains        | <input type="checkbox"/> Southwest         |
| <input type="checkbox"/> N-Cent. Rockies        |                                            |

#### Dominant Species\*

ARNO  
ARAR  
PSSP6  
ACTH

#### LANDFIRE Mapping Zones

12	17
13	18
16	

#### Geographic Range

Great Basin Basins and Mountain Ranges

#### Biophysical Site Description

This type describes low and black sagebrush that grow on shallow soils where a root limiting layer exists and where pinyon or juniper trees can establish. Low 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 5,500 ft to 9,000 ft, the elevational zone where pinyon or juniper can establish.

#### Vegetation Description

This type includes communities dominated by black sagebrush (*Artemisia nova*) and low sagebrush (*Artemisia arbuscula*). Pinyon or juniper encroachment is possible, however this PNVG is not a woodland (see R2PIJU). 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.). Conifer species could include one or more of the following: pinyon pine (*Pinus monophylla*), western juniper (*Juniperus occidentalis*), utah juniper (*Juniperus osteosperma*), or Rocky Mountain juniper (*Juniperus scopulorum*).

#### Disturbance Description

This type generally burns with mixed severity (average FRI of 100-140 yrs) in the early and middle successional stages due to relatively low fuel loads and herbaceous cover. Bare ground acts as a micro-barrier to fire between low statured shrubs. Oils and resins present in the foliage and stems of sagebrush

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

allow fire to spread. Stand-replacing fires (average FRI of 150-250 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 (average FRI of 150-200 yrs). Fires may or may not be wind driven. This type fits best into Fire Group IV.

Grazing by wild ungulates occurs in this type due to its high palatability compared to other browse. This native browsing tends to open up the canopy cover of shrubs but does not often change the successional stage. Because this disturbance has no effect on the model's dynamics, it was not included.

The invasion of conifer trees (Juniper species and Pinyon pine) does occur in this PNVG. A similar PNVG (R2SBDW) has been developed for the dwarf sagebrush type where the invasion of conifer trees does not occur. The closure of the sagebrush canopy and the early phase of invasion by young trees are initiated after the site has not burned for at least 120 yrs. After another 75 yrs following initial tree invasion, trees will close the canopy, greatly suppress sagebrush canopy, and replacement fire will occur every 150 yrs on average.

Drought is a stress factor that does not change the canopy cover of shrubs however the herbaceous layer will decrease and lower the probability of fire.

Ips beetle outbreaks occur after multiple years of drought in the pinyon and juniper classes C and D. When this occurs the successional stage does not change but the pinyon component is variably reduced depending on the severity of outbreak. A return interval of 60 yrs for prolonged and severe drought causes beetle attacks.

#### Adjacency or Identification Concerns

The dwarf sagebrush type tends to occur adjacent to either Wyoming big sagebrush, mountain big sagebrush, mountain shrublands, or juniper/pinyon types.

#### 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 and low sagebrush have been lumped into one PNVG. Black and low sagebrush may have similar fire regimes in the early to middle successional classes but have different potentials for invasion of conifer leading to a closed tree canopy, therefore a different fire regime in the late successional stages.

The stand replacement FRI of sagebrush types encroached by trees is not well known (shorter or longer) because the duration of the current human-caused encroachment in the Great Basin is approximately 120 yrs old. Therefore, we have not yet observed repeat fire intervals, especially without cheatgrass. If the FRI for dwarf sagebrush types fully encroached by trees is shorter (e.g., to 100 years from 150 yrs), then the percentage of class D decreases by 5% and that of class B (mid-open) increases by 5%. This is one of the more sensitive parameters.

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

Due to the problem/issue described above it may wise to build separate models for low sagebrush and black sagebrush.

This PNVG describes dwarf sagebrush communities that occur adjacent to woodlands.

## Succession Classes\*\*

*Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook ([www.frcc.gov](http://www.frcc.gov)).*

### **Class A 10 %**

Early1 Open

**Description**

Early seral community dominated by herbaceous vegetation; less than 5% sagebrush canopy cover; up to 24 years post-disturbance.

Replacement fire (FRI of 200 yrs) maintains vegetation in state A.

Drought every 3.5 yrs on average reduces the herbaceous cover but does not change the dynamics.

Succession to B after 25 years.

**Dominant Species\* and Canopy Position**

PSSP6  
ACTH7  
ACHY  
POSE

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** no data

**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	0 %	4 %
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 65 %**

Mid1 Open

**Description**

Mid-seral community with a mixture of herbaceous and shrub vegetation; 5 to 10% sagebrush canopy cover present; between 20 to 59 years post-disturbance.

Drought every 3.5 yrs on average reduces the herbaceous cover but does not change the dynamics.

Replacement fire (FRI of 200 yrs) returns vegetation to state A, whereas mixed severity fire (FRI of 100 yrs) maintains vegetation in state B. In the absence of any fire for 120 yrs, the vegetation will transition to C with young trees invading and sagebrush canopy closing. Otherwise, normal succession keeps the dynamics keeps vegetation in B.

**Dominant Species\* and Canopy Position**

ARNO4  
ARAR8  
ACHY  
PSSP6

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** no data

**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	5 %	9 %
Height	no data	no data
Tree Size Class	no data	

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

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**Class C 10%**

Late1 Open  
**Description**

Late seral community with a mixture of herbaceous and shrub vegetation; >10% sagebrush canopy cover present; dispersed conifer seedlings and saplings established; 60 or more years post-disturbance. Insect attack the vegetation in this state every 60 yrs on average. Less severe droughts (return interval of 3.5 yrs) reduce herbaceous cover but does not change succession. Replacement is every 200 years on average, whereas mixed severity fire is less frequent than in B (FRI of 130 yrs). Succession is to D after 75 yrs.

**Dominant Species\* and Canopy Position**

ARNO4  
ARAR8  
PSSP6  
ACHY

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** no data

**Structure Data (for upper layer lifeform)**

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	10 %	20 %
<i>Height</i>	no data	no data
<i>Tree Size Class</i>	no data	

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

**Class D 15%**

Late2 Closed  
**Description**

Late seral community with a closed canopy of conifer trees. The degree of tree canopy closure differs depending on whether it is a low sagebrush (max 15%) or black sagebrush (max 40%) community. In low sagebrush communities a mixture of herbaceous and shrub vegetation with >10% sagebrush canopy cover would still be present. In black sagebrush communities the herbaceous and shrub component would be greatly reduced (<1%). 75 years (black sage) to 100 years (low sage) post-disturbance. When Ips beetle outbreaks occur the pinyon component is reduced (return interval of 60 yrs). The only fire is replacement (FRI of 150 yrs) and driven by a greater amount of woody fuel than in previous states. Minor droughts have the same effect as before on herbaceous cover. Succession from class D to

**Dominant Species\* and Canopy Position**

JUOC  
PIMO  
ARNO4  
PSSP6

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** no data

**Structure Data (for upper layer lifeform)**

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	6 %	40 %
<i>Height</i>	no data	no data
<i>Tree Size Class</i>	no data	

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

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D without fire.

**Class E** 0 %

Late I Closed

**Description**

**Dominant Species\* and Canopy Position**

**Structure Data (for upper layer lifeform)**

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

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

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

**Fuel Model** no data

**Disturbances**

**Disturbances Modeled**

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

**Fire Regime Group: 3**

- 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

**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. All values are estimates and not precise.

**Historical Fire Size (acres)**

Avg: no data  
Min: no data  
Max: no data

**Sources of Fire Regime Data**

- Literature
- Local Data
- Expert Estimate

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	227	150	290	0.00441	37
Mixed	136	50	190	0.00735	62
Surface					
All Fires	85			0.01177	

**References**

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