

## 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)

**R3MSHB Mountain Mahogany Shrubland**

#### General Information

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

##### Modelers

Dean Erhard      [derhard@fs.fed.us](mailto:derhard@fs.fed.us)

##### Reviewers

William L. Baker      [bakerwl@uwyo.edu](mailto:bakerwl@uwyo.edu)  
Tim Christiansen      [christta@wsmr.army.mil](mailto:christta@wsmr.army.mil)  
Barry Johnston      [bcjohnston@fs.fed.us](mailto:bcjohnston@fs.fed.us)

##### 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 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 checked="" type="checkbox"/> Southwest |
| <input type="checkbox"/> N-Cent. Rockies |   |

##### Dominant Species\*

CEMO  
CHRY  
SYMP  
PRVI

##### LANDFIRE Mapping Zones

14	24	28
15	25	
23	27	

#### Geographic Range

This is a minor but relatively widespread PNVG that occurs throughout the northern portion of the Southwest region (i.e., Colorado). The description here focuses more on true mountain-mahogany, which is generally distributed on the west side of the Rocky Mountains in the foothills and mountains of Utah, Colorado, and Wyoming. The range of true mountain-mahogany also extends north into Montana, east into South Dakota and Nebraska, south from Oklahoma into Mexico, and west into Arizona and Nevada. True mountain-mahogany occasionally occurs in Idaho and southwestern Oregon (Marshall 1995).

#### Biophysical Site Description

This PNVG occurs in the transition zone between the foothill and montane life zones. It is generally a relatively minor inclusion in woodlands and open forestlands. It ranges from roughly 7,000 ft. to 9,500 feet in the upper Rio Grande drainage. This PNVG occurs on relatively xeric sites with thinly- to moderately well developed soils on moderately steep to steep southerly aspects. This PNVG is not intended to cover ocean-spray (HODU) dominated communities on extremely rocky sites (where vegetation is clearly subordinate to rock).

#### Vegetation Description

The mountain shrubland PNVG is an aggregation of numerous shrubland-dominated ecosystems. Species dominance varies depending on site conditions and by geographic location. Species dominant include true mountain mahogany (*Cercocarpus montanus*) and sumac (*Rhus trilobata*) at lower elevations, with several species of rabbitbrush (*Chrysothamnus* spp.), snowberry (*Symphoricarpos* spp.), chokecherry (*Prunus virginiana*), serviceberry (*Amelanchier* spp.) at higher elevations. Antelope bitterbrush (*Purshia tridentata*) and big sagebrush (*Artemisia tridentata*) may also be present. Gambel's oak is not included here.

#### Disturbance Description

Historically, this type may have been in a Fire Regime II -- primarily short-interval (e.g., 20-50 yr) stand replacement fires in the shrub-dominated layer. Nearly all the dominant species in this PNVG have the

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

capability to resprout after disturbance.

Mixed severity fires were modeled here to capture moderate top-kill (25-75%) fire effects.

**Adjacency or Identification Concerns**

If Gambel oak is present, please consult one of the PNVGs that includes Gambel oak (R3QUGA, R3PPGO).

This PNVG may be similar to the PNVG R0MTSB for the Northern and Central Rockies model zone, but the fire frequency is longer in the Northern and Central Rockies PNVG, probably due to geographic and climatic changes. This PNVG may also be similar to the PNVG R2MSHBwt for the Great Basin model zone, but the proportions of mixed versus replacement fire are opposite in the two regions, probably due to differences in weather and lightning patterns.

**Scale Description**

**Sources of Scale Data**  Literature  Local Data  Expert Estimate

Local observations (Erhard 2004) suggest that the scale of the most common disturbance extent is relatively small. This PNVG is generally small and the disturbance regime is expected to be relatively frequent under historic conditions.

**Issues/Problems**

Original model information (pre-peer review) was based on experience in the upper Rio Grande drainage (specifically the Rio Grande NF). Peer reviewers added to the geographic distribution and species lists for this PNVG to broaden its geographic inclusion.

**Model Evolution and Comments**

Additional reviewer included: Brenda Wilmore (bwilmore@fs.fed.us).

Peer review for this type was mixed. Two reviewers agreed with the model parameters. One reviewer felt the fire return interval should be a little longer, putting it into Fire Regime Group III or IV. Another reviewer suggested that R3MSHB and R3QUGA be combined and have a total MFI of 100 years with no mixed or surface fires. As a compromise, the amount of replacement fire in the model was cut in half equally in all classes. As a result, the amount of mixed fire was also reduced. The total MFI changed from 28 years to 55 years. The resulting changes in each class were minimal (<5%), and the proportional distribution remained the same (i.e., dominated by class E). Peer reviewers also added to the geographic distribution and species lists for this PNVG to broaden its geographic inclusion.

Quality control resulted in elimination of rule violations (use of relative age) in all classes except A.

A similar type, Mountain Shrubland with trees (R3MSHBwt) was dropped from the Rapid Assessment based on peer review and quality control. Its mapping rules were combined with this PNVG.

<b>Succession Classes**</b>														
<i>Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).</i>														
<b>Class A 15%</b>	<b>Dominant Species* and Canopy Position</b>	<b>Structure Data (for upper layer lifeform)</b>												
<b>Description</b>	BOGR2 MUMO	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Cover</td> <td>0 %</td> <td>10 %</td> </tr> <tr> <td>Height</td> <td>no data</td> <td>no data</td> </tr> <tr> <td>Tree Size Class</td> <td colspan="2">no data</td> </tr> </tbody> </table>		Min	Max	Cover	0 %	10 %	Height	no data	no data	Tree Size Class	no data	
	Min	Max												
Cover	0 %	10 %												
Height	no data	no data												
Tree Size Class	no data													
Early1 PostRep Early succession, usually after moderately frequent stand replacement fires; grasses and forbs dominant.	<b>Upper Layer Lifeform</b> <input type="checkbox"/> Herbaceous <input type="checkbox"/> Shrub <input type="checkbox"/> Tree	<input type="checkbox"/> Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:												

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

**Fuel Model** no data

**Class B 15 %**

Mid1 Closed

**Description**

>10% shrub cover (i.e., line intercept method) by weakly sprouting and seed producing shrubs; grasses/forbs dominant in scattered openings.

**Dominant Species\* and Canopy Position**

CEMO2

CHRY5

BOGR2

**Upper Layer Lifeform**

Herbaceous

Shrub

Tree

**Fuel Model** no data

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

	Min	Max
Cover	11 %	75 %
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 10 %**

Mid1 Open

**Description**

<10% shrub cover, with grasses/forbs dominant in extensive openings.

**Dominant Species\* and Canopy Position**

BOGR2

MUMO

**Upper Layer Lifeform**

Herbaceous

Shrub

Tree

**Fuel Model** no data

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

	Min	Max
Cover	1 %	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 D 10 %**

Late1 Open

**Description**

<10% shrub cover, with overmature shrubs as patchy dominant overstory (e.g., in rock outcrops); grasses/forbs dominant in extensive openings.

**Dominant Species\* and Canopy Position**

CEMO2

BOGR2

MUMO

**Upper Layer Lifeform**

Herbaceous

Shrub

Tree

**Fuel Model** no data

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

	Min	Max
Cover	1 %	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:

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

**Class E 50 %**

Late I Closed

**Description**

>10% shrub cover; all age classes present but dominated by overmature shrubs (e.g., in rocky draws).

**Dominant Species\* and Canopy Position**

CEMO2  
CHRY5  
SYMPH  
MUMO

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** no data

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

	Min	Max
Cover	11 %	75 %
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**

**Disturbances Modeled**

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

**Historical Fire Size (acres)**

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

**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

**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.

**Sources of Fire Regime Data**

- Literature
- Local Data
- Expert Estimate

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	75			0.01333	73
Mixed	200			0.005	27
Surface					
All Fires	55			0.01834	

**References**

Arno, Stephen F.; Gruell, George E. 1983. Fire history at the forest-grassland ecotone in southwestern Montana. *Journal of Range Management* 36: 332-336.

Arno, Stephen F.; Gruell, George E. 1986. Douglas-fir encroachment into mountain grasslands in southwestern Montana. *Journal of Range Management* 39: 272-275.

Arno, Stephen F.; Wilson, Andrew E. 1986. Dating past fires in curleaf mountain-mahogany communities. *Journal of Range Management* 39(3): 241-243.

Bunting, Stephen C.; Neuenschwander, Leon F.; Gruell, George E. 1985. Fire ecology of antelope bitterbrush in the Northern Rocky Mountains. In: Lotan, James E.; Brown, James K., compilers. *Fire's Effects on Wildlife Habitat—Symposium Proceedings*. March 21, 1984, Missoula, Montana. Gen. Tech. Rep. INT-186. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station:48-57.

Erdman, J.A. 1970. Pinon-juniper succession after natural fires on residual soils of Mesa Verde, Colorado. *Brigham Young University Biological Series* Vol. XI (2). 58pp.

Floyd, M.L., W.H. Romme, and D.D. Hanna. 2000. *Fire History and vegetation pattern in Mesa Verde*

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

National Park, Colorado, USA. *Ecological Applications* 10:1666-1680.

Gruell, George E.; Bunting, Stephen C.; Neuenschwander, Leon F. 1985. Influence of fire on curlleaf mountain-mahogany in the Intermountain West. In: Lotan, James E.; Brown, James K., compilers. *Fire's Effects on Wildlife Habitat— Symposium Proceedings*. March 21, 1984, Missoula, Montana. Gen. Tech. Rep. INT-186. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 58-71.

Johnston, Barry C., Laurie Huckaby, Terry J. Hughes, and Joseph Pecor. 2001. Ecological types of the Upper Gunnison Basin: Vegetation-soil-landform-geology-climate-water land classes for natural resource management. Technical Report R2-RR-2001-01, 858 pp. Lakewood, CO: USDA Forest Service, Rocky Mountain Region. May, 2001. Keeley, J.E. and S.C. Keely. 1988. Chaparral. Chapter 6 (pages 165-207) in: Barbour, M.G. and W.D. Billings (editors). *North American terrestrial vegetation*. Cambridge Univ. Press, Cambridge, England.

Marshall, K. Anna. 1995. *Cercocarpus montanus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2004, October 29].

Martin, Robert E.; Driver, Charles H. 1983. Factors affecting antelope bitterbrush reestablishment following fire. In: Tiedemann, Arthur R.; Johnson, Kendall L., compilers. *Research and management of bitterbrush and cliffrose in western North America*. Gen. Tech. Rep. INT-152. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station: 266-279.

Mueggler, Walter F.; Stewart, William L. 1980. Grassland and shrubland habitat types of western Montana. Gen. Tech. Rep. INT-66. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, 154p.

Omi, P. and L. Emrisk. 1980. Fire and resource management in Mesa Verde National Park. Contract CS-1200-9-B015. Unfinished report, on file at Mesa Verde National Park.

Payson, Timothy E.; Ansley, James R.; Brown, James K.; Gottfried, Gerald J.; Haase, Sally M.; Harrington, Michael G.; Narog, Marcia G.; Sackett, Stephen S.; Wilson, Ruth C. Chapter 6: Fire in Western Shrubland, Woodland, and Grassland Ecosystems. In: Brown, James K.; Smith, Jane Kapler, eds. *Wildland fire in ecosystems: Effects of fire on flora*. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 121-160.

Rice, C. L. 1983. A literature review of the fire relationships of antelope bitterbrush. In: Tiedemann, Arthur R.; Johnson, Kendall L., compilers. *Research and management of bitterbrush and cliffrose in western North America*. Gen. Tech. Rep. INT-152. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station: 256-265.

Romme, W.H., P. Barry, D. Hanna, and S. White. A wildlife hazard map for La Plata County, Colorado. Final report to the San Juan National Forest, Durango, CO.

Schmidt, Kirsten M, Menakis, James P., Hardy, Colin C., Hann, Wendel J., Bunnell, David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41 p. + CD.

Shiflet, Thomas N., ed. 1994. Rangeland cover types of the United States. Denver, CO: Society for Range Management. 152 p.

Spencer, J.R., W.H. Romme, L. Floyd-Hanna, and P.G. Rowlands. 1995. A preliminary vegetation classification for the Colorado Plateau. Pages 193-213 in: C. van Riper III (editor), Proceedings for the second biennial conference on research in Colorado Plateau national parks. National Park Service Transactions and Proceedings Series NPS/NRNAU/NRTP-95/11.

Spencer, A.W. and W.H. Romme. 1996. Ecological patterns, Pages 129-142 in: Blair, R. (managing editor), The western San Juan Mountains: their geology, ecology, and human history. University Press of Colorado, Niwot, CO.

Wright, Henry A. 1971. Shrub response to fire. In: Wildland shrubs—their biology and utilization. Gen. Tech. Rep. INT-1. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station: 204-217.