

## 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)

**R4PRMGn Northern Mixed Grass Prairie**

#### General Information

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

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#### Vegetation Type

Grassland

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

#### Dominant Species\*

AGSM      KOMA  
STIPA      BUDA  
BOUT  
CAFI

#### LANDFIRE Mapping Zones

30	39
31	40
33	

#### Geographic Range

Northeastern Montana, western North and South Dakota, northeastern Wyoming, western Nebraska.

#### Biophysical Site Description

Elevations range from 1,300 to 4,000 feet. Temperatures range between extremes of hot summers and cold winters that are typical of a continental climate. Precipitation increases from west (12 in.) to east (24 in.). Two-thirds of the precipitation occurs during the growing season. Soils vary, but are generally aridicols in the west and mollisols in the east. Soils in the northern Great Plains, west of the Missouri River in the Dakotas, northwestern Nebraska, northeastern Wyoming and Montana are formed from sandstone and shales. These soils range from clayey, fine-loamy, to fine silty soils of mixed origin in level and hilly-undulating lands with major contributions from loess, eolian sand, alluvium, and mountain outwash.

#### Vegetation Description

This vegetation type is characterized by the dominance of cool-season grasses such as western wheatgrass and needlegrasses. Warm-season grasses like grama grasses and buffalo grass are common and usually increase in dominance following heavy disturbance. Needleleaf sedge is very common throughout this vegetation type, especially in sandy soils. Needleleaf sedge tends to be very drought-resistant.

#### Disturbance Description

The northern mixed-grass prairie is strongly influenced by wet-dry cycles. Fire, grazing by large ungulates and small mammals such as prairie dogs and soil disturbances (i.e. buffalo wallows and prairie dog towns) are the major disturbances in this vegetation type. From instrumental weather records, droughts are likely to occur about 1 in every 10 years. Historically, there were likely close interactions between fire and grazing since large ungulates tend to be attracted to post-fire communities. Average fire intervals are estimated at 8-25 years, although in areas with very broken topography fire intervals may have been greater than 30 years. Fires were most common in July and August, but probably occurred from about April to September. Seasonality of fires influences vegetation composition. Early season fires (April - May) tend to favor warm-

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

season species, while late season fires (August - September) tend to favor cool-season species. Replacement fire in our model does remove 75% of the above ground cover as assumed in the literature. However, we don't think loss of the above ground cover by the replacement fire will necessarily induce a retrogression back to an earlier seral stage because the main component of dominant grasses remains unharmed to insure the continuity of the seral stage. We used 3 levels of native ungulate grazing intensities: heavy with at least 80% biomass removal, moderate with about 60% removal, and light with 40% or less removal. We assumed that light grazing would not alter the community enough to change classes, but increasing grazing intensity would move the community back to earlier stages.

**Adjacency or Identification Concerns**

This PNVG transitions to tallgrass prairie to the east, sagebrush steppe to the west, and sandhills prairie, shortgrass prairie and southern mixed-grass prairie to the south. In the western part of this PNVG, big sagebrush can invade with heavy grazing or absence of fire. Cheatgrass currently is increasing in portions of this PNVG.

This PNVG is similar to the PNVG R0PGRn from the Northern and Central Rockies model zone.

**Scale Description**

Sources of Scale Data  Literature  Local Data  Expert Estimate

Historically, fires probably ranged in size from 1000s to 10,000s of acres. The variation depends on build-up of fuels which were influenced by precipitation and grazing. Extent of weather influences (wet-dry cycles) would have been very widespread.

**Issues/Problems**

**Model Evolution and Comments**

Ortmann in his review, suggested that in addition to fire, drought and grazing, insect outbreaks (Rocky Mountain locust) would have impacted all classes.

<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>														
<p><b>Class A 29 %</b></p> <p><u>Description</u></p> <p>Very short-stature vegetation resulting from prairie dog disturbance. A variety of forb species such as fetid marigold, scarlet globemallow, and curlycup gumweed tend to dominate this class. Common grass species include purple three-awn, buffalo grass, and saltgrass. Greasewood may be present in lowland areas. Fringed sagebrush can also be a component of this class. The fuels in this class are generally too sparse to carry fire.</p>	<p><u>Dominant Species* and Canopy Position</u></p> <p>DYPA Upper GRSQ Upper SPCO Upper ARPU9 Upper</p> <p><u>Upper Layer Lifeform</u></p> <p><input checked="" type="checkbox"/> Herbaceous <input type="checkbox"/> Shrub <input type="checkbox"/> Tree</p> <p><u>Fuel Model</u> 1</p>	<p><u>Structure Data (for upper layer lifeform)</u></p> <table border="1" style="width: 100%;"> <thead> <tr> <th></th> <th style="text-align: center;">Min</th> <th style="text-align: center;">Max</th> </tr> </thead> <tbody> <tr> <td>Cover</td> <td style="text-align: center;">10 %</td> <td style="text-align: center;">30 %</td> </tr> <tr> <td>Height</td> <td style="text-align: center;">Herb Short &lt;0.5m</td> <td style="text-align: center;">Herb Short &lt;0.5m</td> </tr> <tr> <td>Tree Size Class</td> <td colspan="2" style="text-align: center;">no data</td> </tr> </tbody> </table> <p><input type="checkbox"/> Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:</p>		Min	Max	Cover	10 %	30 %	Height	Herb Short <0.5m	Herb Short <0.5m	Tree Size Class	no data	
	Min	Max												
Cover	10 %	30 %												
Height	Herb Short <0.5m	Herb Short <0.5m												
Tree Size Class	no data													

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**Class B 12%**

Early2 Open

**Description**

Grasses such as buffalo grass, blue grama, dropseeds, and upland sedges dominate this class. Forbs like scarlet globemallow, scarlet gaura, skeleton weed, and dotted gayfeather are common in this class. Prickly pear, man sage, fringed sage, and broom snakeweed occur in this class. Prickly pear tends to increase with heavy grazing.

**Dominant Species\* and Canopy Position**

BUDA Upper  
BOGR2 Upper  
CAFI Upper  
SPORO Upper

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** 1

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

	Min	Max
Cover	15 %	45 %
Height	Herb Short <0.5m	Herb Short <0.5m
Tree Size Class	no data	

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

**Class C 18%**

Mid1 Open

**Description**

Blue grama, western wheatgrass, needlegrasses, prairie junegrass, upland sedges, and little bluestem are common grasses. In some areas species such as big bluestem, sand bluestem, prairie sandreed and bluebunch wheatgrass are locally common. Common forbs include scurfpea, prairie coneflower, Rocky Mountain beeplant, scarlet globemallow, and dotted gayfeather. Prickly pear, man sage (*Artemisia ludoviciana*), fringed sage, snowberry and broom snakeweed occur in this class.

**Dominant Species\* and Canopy Position**

BOGR2 Mid-Upper  
AGSM Upper  
STIPA Upper  
CAFI Middle

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** 1

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

	Min	Max
Cover	30 %	60 %
Height	Herb Short <0.5m	Herb Medium 0.5-0.9m
Tree Size Class	no data	

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

**Class D 25%**

Late1 Open

**Description**

Vegetation community in this class is very similar to Class C, although western wheatgrass and needlegrasses are the most common species. In some areas western wheatgrass forms dense stands. Fewer forbs occur in this class than in Class C. Prairie junegrass is more common in this class than previous classes.

**Dominant Species\* and Canopy Position**

AGSM Upper  
STIPA Upper  
CAFI Middle  
BOGR2 Mid-Upper

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Fuel Model** 1

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

	Min	Max
Cover	50 %	80 %
Height	Herb Short <0.5m	Herb Tall > 1m
Tree Size Class	no data	

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

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**Class E 16%**

Late2 Closed

**Description**

Vegetation community is similar to Class D but needle grasses tend to be more prevalent, especially during years with wet springs. Forbs are sparse. Litter layer tends to be relatively thick and continuous.

**Dominant Species\* and Canopy Position**

STIPA Upper  
 AGSM Upper  
 BOGR Mid-Upper  
 CAFE

**Upper Layer Lifeform**

- Herbaceous  
 Shrub  
 Tree

**Fuel Model 1****Structure Data (for upper layer lifeform)**

	Min	Max
Cover	80 %	100 %
Height	Herb Short <0.5m	Herb Tall > 1m
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: prairie dog disturbance  
 Other drought + grazing

**Historical Fire Size (acres)**

Avg: 10000  
 Min: 1000  
 Max: 100000

**Fire Regime Group: 2**

- 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	15	8	25	0.06667	67
Mixed	30	15	35	0.03333	33
Surface					
All Fires	10			0.10001	

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