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. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG)

R0PGRn   **Northern Prairie Grassland**

General Information

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

Modelers		**Reviewers**
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Vegetation Type

Grassland

Dominant Species*

AGRO
STIPA
BOUT
ANDR

General Model Sources

☐ Literature
☐ Local Data
☐ Expert Estimate

LANDFIRE Mapping Zones

10	21
19	22
20	29

Rapid AssessmentModel Zones

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

Geographic Range

This vegetation group covers the northern prairies east of the Rocky Mountains from north central Montana to southeastern Montana and eastern Wyoming.

Biophysical Site Description

Elevations range from 1900 to 3500 feet. The continental climate entails long cold winters, hot summers with low humidity and strong winds year round. Mean annual precipitation is generally 10 to 15 inches with most falling as rain or snow from April through June. The major ecological sites that characterize this area include Clayey, Silty and Sandy (also known as Sands). Topography is level to sloping (0-15%).

Vegetation Description

The vegetation is dominated by cool and warm season perennial grasses (50-85% canopy cover). Rhizomatous grasses (western and thickspike wheatgrass, gramma grasses, bluestems, etc.) dominate the visual aspect of the community, though bunch grasses (bluebunch wheatgrass, needle grasses, etc.) often comprised more than 50% of the community composition. A diverse array of perennial summer forbs (black samson, scurfpea, prairieclovers, flax, dotted gayfeather, etc.) occupies 10% of the community. Shrubs and halfshrubs (Wyoming sagebrush, silver sage, rabbit brush, fringed sagewort, etc.) obtain less than 5% cover. Most of the ground surface is covered and bare ground is less than 20%.

Disturbance Description

Grazing by large, concentrated herds of ungulates (bison, elk, pronghorn and deer) along with aboriginal and natural fire maintained healthy, productive and diverse grasslands. (This grazing regime is referred to as "Native Grazing" in the VDDT model.) Such grazing may have resulted in heavy defoliation and/or some soil churning, but was temporally transitory. Temporary impact followed by rest-recovery time is characteristic.

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

A small portion of the landscape was subjected to repeated or prolonged heavy animal impact, including heavy defoliation and repeated soil churning and/or compaction. Such areas included watering points for herds, bison or elk wallows, and prairie dog towns. (This heavy animal impact disturbance is referred to as "Optional1" in the VDDT model.) Repetitive heavy animal impact sends the community to an alternative open successional pathway.

Replacement Fire, when it occurred in an intact community, resulted in removal of most of the above-ground biomass, but resulted in little mortality and relatively rapid recovery times. Mixed Fire also occurred in this type and opened up the community to some varied degree. In late-development closed conditions (class E), the absence of replacement or mixed fire for many years (e.g., 50 years) would lead to a buildup of dead grass, and productivity is decreased, resulting in greater mortality from smoldering fire. Thus, there is the potential for a mixed severity fire to cause a transition from class E (late-development closed) to C (mid1-open).

Adjacency or Identification Concerns

Areas with similar soils but steeper topography (>15%) are less productive and have a higher dominance of shrubs. The natural grazing regime has been ubiquitously replaced with continuous, low density grazing. Under this grazing regime, taller, palatable grasses (needle grasses, bluebunch wheatgrass, bluestems) decrease and short grasses (western wheatgrass, blue gramma, sandberg bluegrass) increase. Shrubs (Wyoming sagebrush, rabbitbrush, fringed sagewort) increase greatly over the historic plant community. Compare the ecological site description to avoid using a shrub model for historic plant community when considering a grass site that has changed as a result of uncharacteristic grazing.

This PNVG may be similar to the PNVG R4PRMGn from the Northern Plains model zone.

Scale Description

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

Historically, natural grazing and fire generally encompassed hundreds to thousands of acres. Repeated heavy animal impact occurred at the scale of 10's to 100's of acres for ungulate impacts and 100's to 1000's of acres for prairie dog towns.

Issues/Problems

This PNVG covers a large diverse area with relatively little extensive data or published studies for vegetation classification. Fire frequency is based primarily on inference based on understanding of the plant community dynamics and anecdotes or historical research (mostly oral histories) regarding Indian burning.

Model Evolution and Comments

Workshop code was MGRA1.

This model received no formal peer review, though suggested reviewers included: Jeff Dibenedetto (Custer NF); Steve Cooper (MT Natural Heritage Program); Larry Rau (BLM Miles City FO); Mitch Forsyth (BLM Havre FS); Steve Klessens (BLM Glasgow FS).

The largest extensive dataset for this area resides in the soil survey studies done by NRCS. Modeling for this effort relied heavily on the Ecological Site Descriptions for MLRA 58 and 60 (NRCS 2003).

Succession Classes**

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

Class A 15 %

Early1 PostRep
Description

Class A comprises the intact historic plant community after Replacement Fire (>75% consumption of above-ground biomass). Little below-ground mortality occurs, and resprouting of perennial grasses and forbs often occurs within days or weeks, depending on season. Grasses show greater vigor; some forb establishment may occur as a result of exposure of mineral soil. Canopy cover recovers quickly after resprouting. The community transitions back to late-development closed (class E) within 3 years.

Dominant Species* and Canopy Position

AGROP
STIPA
BOUTE
ANDR

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	80 %	100 %
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 1 %

Early2 Open
Description

Class B results from repetitive and/or prolonged animal impact including excessive defoliation and soil disturbance, often occurring over several years. Soils are compacted or churned or both; rootmass is greatly reduced; bare ground exceeds 50%. Early successional perennial or annual grasses dominate and forbs, especially tap-rooted increasers, comprise a significant percentage of the community. Weedy halfshrubs and prickly pear are common. In the absence of replacement fire or heavy animal impact, this class will succeed to a mid-development open condition (class C) after approximately 10 years.

Dominant Species* and Canopy Position

GUSA2
ARIST
FEOC3
OPPO

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	40 %
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   4 %

Mid1 Open
Description

Later successional perennial grasses are establishing, though bare ground is still prevalent. Fibrous rooted increaser forbs (blue flax, hood's phlox) enter the community.   In the absence of replacement fire or heavy animal impact, this class will succeed to a later mid-development open condition (class D) after approximately 25 years.

Dominant Species* and Canopy Position

AGSM
BOGR2
KOMA
POSE

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model   no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	40 %	60 %
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   15 %

Late1 Open
Description

The full complement of late successional species is present. The grass layer includes the taller decreasers and a diversity of forbs is present. However, overall canopy cover is lower than in Class E. Mixed or mosaic fire in E will sometimes move and area into this class. This class includes both late recovery from heavy animal impact and an opening of the stand from mosaic fire.   In the absence of replacement fire or heavy animal impact, this class will succeed to a late-development closed condition (class E) after approximately 20 years.

Dominant Species* and Canopy Position

AGROP
STIPA
BOUTE
ANDR

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model   no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	60 %	80 %
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   65 %

Late1 Closed
Description

Class E represents the intact historic plant community functioning under natural grazing, highly productive, diverse, dominated by taller cool and warm season rhizomatous and perennial grasses. Mixed fire may either maintain Class E or send the

Dominant Species* and Canopy Position

AGROP
STIPA
BOUTE
ANDR

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model   no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	80 %	100 %
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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community back to Class D.

Disturbances

Disturbances Modeled

☑ Fire
☐ Insects/Disease
☐ Wind/Weather/Stress
☑ Native Grazing
☐ Competition
☑ Other: Repeated Heavy
        Animal Impact (Opt2)
☐ Other

Historical Fire Size (acres)

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

Sources of Fire Regime Data

☐ Literature
☐ Local Data
☑ Expert Estimate

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.

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	22	2	40	0.04545	55
Mixed	27	10	50	0.03704	45
Surface					
All Fires	12			0.08250	

References

NRCS. 2003. eFOTG: Electronic Field Office Technical Guide. Available at: http://www.nrcs.usda.gov/technical/efotg/.