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)

R4PRMGs Southern Mixed Grass Prairie

General Information

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

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Vegetation Type

Grassland

Dominant Species*

BOGR	BUDA
ANGE	STCO4
SCHIZ	PASM
BOCU	KOEL

General Model Sources

- [x] Literature
- [ ] Local Data
- [x] Expert Estimate

LANDFIRE Mapping Zones

38
31
33

Rapid AssessmentModel Zones

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

Geographic Range

The southern mixed grass prairie ranges from central Nebraska (south of the Nebraska Sandhills) south to northern Oklahoma. It is bordered on the east by tallgrass prairie. In Kansas it is bordered by short grass prairie in the west. In Nebraska it is bordered on the west by Sandhills, Sandsage, and western mixed grass prairie.

Biophysical Site Description

The loessal plains and hills regions of central Nebraska and Kansas are included in this region as well as the Red Hills region of south-central Kansas and northern Oklahoma. The semi-arid region is characterized by seasonal moisture and temperature extremes of a continental climate. Elevation ranges from 1300 - 4000 feet. Precipitation ranges from 12-32 inches with 2/3 occurring during the growing season. Regional droughts are common.

Vegetation Description

This community is dominated by a mixture of tall (1-2 m) and mid (0.5 - 1 m) grasses with an understory of shortgrasses (<0.5 m). Tallgrasses, primarily big bluestem and Indiangrass, are more abundant on lower slopes and bottoms, mid (primarily little bluestem, western wheatgrass, sideoats grama, and Junegrass) and short grasses (primarily blue grama and buffalograss) dominate on upper slopes and ridge tops. Shortgrasses dominate heavily grazed sites. In presettlement times the shortgrasses and mid grasses were likely in presettlement times due to heavy bison grazing. Species diversity was moderate to high in the mixed grass prairie (Steinauer and Rolfsmeier 2003). Common forb species in the mixed grass prairie include western ragweed, fringed sage, prairie coneflower, scarlet globe mallow, scarlet gaura, and others. Shrubs and trees were a small component of the southern mixed grass prairie in presettlement times. Today exotic plants, such as smooth brome, cheatgrass, and Kentucky bluegrass and eastern red cedars are abundant in this prairie type. The exotics were not present in presettlement times and cedars were limited to fire-protected sites.

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

Disturbance Description

There is no historical documentation on the actual extent or condition of native grasslands or the frequency of fire before 1850. A presumed fire return cycle of 5-10 years was estimated for the southern mixed grass prairie (Joern and Keeler 1995). Fires were set by both lightning and Native Americans (Bragg and Steuter 1995). Most of the dominant grass species were fire-tolerant, although they may require two to three years to recover (Launchbaugh 1973, Nagel 1983). Fires were most frequent where litter accumulation was the greatest. Most grasses tolerate fire during years of normal to above normal precipitation, but are adversely affected during dry years (Wright 1974). In the absence of burning and grazing and the concomitant increase in mulch, significant reductions in the dominant grasses (e.g. blue grama, buffalograss and sideoat grama occurs in Kansas and Oklahoma mixed grass prairie while other species (e.g. sedges and tall dropseed) increase (Nagel 1994). In most instances, mid- and tallgrasses decrease with grazing while shortgrasses, especially buffalograss, increase as much as 90% in the Kansas and Oklahoma mixed grass prairie (Bragg and Steuter 1995). While heavy grazing reduces standing crop, moderate grazing may only slightly reduce, or even increase production over ungrazed areas (Tomanek and Albertson 1957). Ungrazed areas accumulate litter and may eventually cause stand degeneration. Prairie dogs were a common disturbance in the mixed grass prairie, their total presettlement abundance is unknown. For this model it is estimated that prairie dogs occupied 30% of the heavily grazed landscape (Class B). The presence of prairie dogs created or maintained a short vegetation stature, often composed of more weedy species. Prairie dogs are represented by Option 1 in the model. Longer term drought is not uncommon in the region. Using NOWA precipitation data, it is estimated for this model that drought occurred every ten years within the region. In the model, drought maintains Class B communities in that state, while Class C and D communities drop to the lower class. Longer term drought shifted the vegetation to short stature species (Weaver and Albertson 1956). Exotic grass and eastern red cedar invasion is a common disturbance in southern mixed grass prairie today, however these invasive species did not impact the presettlement prairie and their impact was not included in the model. Light to moderate grazing in the model is represented by Option 2. Heavy grazing is represented by the native grazing option.

Adjacency or Identification Concerns

Ungrazed sites, particularly eastward, may be dominated by big bluestem to the extent they are difficult to distinguish from tallgrass prairie. Heavily grazed sites are dominated by shortgrasses and may be difficult to distinguish from shortgrass prairie.

This PNVG may be similar to the PNVGs R3PGRs from the Southwest model zone and R5PRSG from the South Central model zone.

Scale Description

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

Fires ranged in size from small 1 acre or less burns that might occur with lightning strikes during the growing season to large scale fire events that might reach 5 million acres in size. Average fire size was likely around 1000 acres in size.

Issues/Problems

Research and published literature on fire frequency is extremely limited for this PNV.

Model Evolution and Comments

Ortmann in his review suggested rocky mountain locust outbreaks are another disturbance factor, although return interval is unknown.

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 All Struct

Description

Class A represents a post fire, early development, open canopy community. Blackened soil with ash is present. Short, mid and even tallgrasses can be present but they are resprouting and of short stature. This community has a very low likelihood of burning, except possibly in the fall when vegetation has had some regrowth. These sites are very attractive to native grazers after some regrowth is present, and are subject to heavy grazing the year after a burn.

Dominant Species* and Canopy Position

BOGR2 Upper
ANGR Upper
BOCU Upper
SCHIZ4 Upper

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	0 %
Height	no data	Herb Short <0.5m
Tree Size Class	no data	

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

Class B 40 %

Mid1 Closed

Description

Class B represents a post-fire, heavily grazed community. Grazing has driven this community to a short-stature community dominated by blue grama and buffalograss. Mid- and tallgrasses may be present, but are not expressed due to there lower abundance and low stature induced by grazing. This community can develop the year after burning. Fuel build-up is low due to grazing and the probability of fire is moderately low. Grazing can continue on the site for several years. The short-stature vegetation and grazing may attract prairie dogs further perpetuating this community. It is estimated for the model that prairie dogs occupy 20% of this community. Over a few years grazing pressure is likely to decrease on the site and will after 3-4 years convert to a mixed grass (Class C) community.

Dominant Species* and Canopy Position

BOGR2 Lower
BUDA Lower

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	75 %	100 %
Height	Herb Short <0.5m	Herb Short <0.5m
Tree Size Class	no data	

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

Dominant life form is short and mid-grass species. The is the possibility in areas that tallgrasses are the dominant species.

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

Class C 45 %

Mid2 Closed

Description

Class C represents a mid-development, closed canopy community. A post-fire (Class A) community will go to this community without grazing. A Class B community will go to Class C in a few years without heavy disturbance. This is a classic mid grass community dominated by little bluestem, sideoats grama, western wheatgrass, needle-and-thread, but short grasses are well developed in the understory and tallgrasses may be scattered mostly on wetter sites. Light to moderate grazing will maintain this community over time. About three years without disturbance and this community will accumulate litter, tallgrasses may become somewhat more prominent and the class will go to Class D. Fuel is present in this community and it will burn more frequently than Class B, but not as frequently as Class D.

Dominant Species* and Canopy Position

BOGR2 Lower
BOCU Upper
SCHIZ4 Upper
PASM Upper

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	90 %	100 %
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 5 %

Late1 Closed

Description

Class D is a closed canopy community with somewhat taller vegetation stature and fairly dense litter accumulation. The species composition is similar to Class C though shortgrasses may be somewhat less common and tallgrasses somewhat more common. This community has developed from Class C when undisturbed for about 3 years or longer. Dense litter makes this community susceptible to fire and not attractive to large grazers or prairie dogs.

Dominant Species* and Canopy Position

PASM Lower
ANGE Upper
SCHIZ4 Middle
BOCU Middle

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	90 %	100 %
Height	Herb Medium 0.5-0.9m	Herb Tall > 1m
Tree Size Class	no data	

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

Mid grasses likely dominate, though tallgrasses may dominate in limited areas.

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Class E **0 %**

Late1 All Structu

Description

Dominant Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
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: Prairie dogs
- ☑ Other moderate grazing

Historical Fire Size (acres)

Avg: 1000
Min: 1
Max: 5000000

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	9	1	10	0.11111	100
Mixed					
Surface					
All Fires	9			0.11113	

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