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)

R5PRTG **Southern Tallgrass Prairie**

General Information

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

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Vegetation Type

Grassland

Dominant Species*

ANDG OLIGO
SCHS
SORN
PANVI

General Model Sources

- ☐ Literature
- ☐ Local Data
- ☑ Expert Estimate

LANDFIRE Mapping Zones

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Rapid AssessmentModel Zones

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

Geographic Range

Central US from southeastern Nebraska through Kansas Flint Hills into Oklahoma, east into northwestern Arkansas, western Missouri, and southwest Iowa bordering and mingling with oak-hickory vegetation types.

Biophysical Site Description

Soils are generally fine-textured Mollisols occurring in thin layers over shale with some areas of deeper soils, especially on lower slopes and lowlands. In Arkansas, small area of this community occur along the Arkansas River Valley, a topoedaphic region characterized by broad, level to gently rolling uplands derived from shales. The combined effect of droughty soils, reduced precipitation, and prevailing level topography create conditions highly conducive to the ignition of spread of fires. This region includes large prairie areas in eastern Oklahoma and western Missouri south of the glacial line. Soil and precipitation encourage tree and shrub invasion in the absence of fire although woody communities occur in fire-protected microsites. Precipitation gradient decreases from east to west with precipitation adequate to allow tree and shrub establishment in the absence of fire. Hardwoods restricted to fire-protected ravines and along stream corridors forming gallery forests.

Vegetation Description

Tallgrass prairie is dominated by big bluestem (Andropogon gerardii), little bluestem (Schizachyrium scoparium), Indiangrass (Sorghastrum nutans) and switchgrass (Panicum virgatum). Secondary species vary in importance regionally depending on topography and soil moisture relations and include sideoats grama (Bouteloua curtipendula), needlegrass (Achnatherum spartea), Junegrass (Koeleria macrantha), buffalo grass (Buchloe dactyloides), and blue grama (Bouteloua gracilis). At the southwestern extent of this type sideoats grama (Bouteloua curtipendula), buffalo grass (Buchloe dactyloides), and blue grama (Bouteloua gracilis) increase in percent cover. Western wheatgrass (Pascopyrum smithii), porcupine grass (Hesperostipa spartea) and various Nassella and Hesperostipa become more important in the northern half of this type. Several short stature grasses such as Dicanthelium spp. and Carex spp. are also important throughout the type, particularly following heavy grazing. Conspicuous perennial forbs include the genera

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Helianthus, Soladago, Liatris, Dalea, Viola, and Antennaria. Shrubs that are important include Rosa spp., Salix, Symphoricarpos, Rhus and in the southern part of the region Juniperus virginiana is rapidly increasing in the absence of fire. Bison disturbance was historically an important disturbance that increased heterogeneity of patches on the landscape. A problem with much of the literature on fire in prairies, and therefore a caution, is that it does not include interaction with herbivory (Engle and Bidwell 2001).

Disturbance Description

The region is characterized by frequent surface fires, both lightning and anthropogenic in origin (Higgins 1986). Due to the abundance of fine fuels surface fires were usually replacement fires. Mixed fires occurred infrequently in heavily grazed or wet areas. Natural fires were possible during the dormant season through spring and during the late-growing season (Bragg 1982, Higgins 1986, Engle and Bidwell 2001), dependant on the availability of dry fine fuels sufficient to carry a fire. Prior to extirpation of bison, the fire return interval was estimated to have been from 1-3 years based on observation of travelers through the region (Gregg 1844, Olmstead, 1855). Historic accounts from later in the 1800's often depict very large landscape scale burns where an entire landscape was described as burning (Irving 1935, Jackson 1965). The accounts of fire size, however, followed the loss of bison as a major disturbance factor in the Great Plains and, thus, may not reflect historic reference fire conditions which may have been more patchy. For example, Risser (1990) suggests that bison grazing affected fire patterns and thus the landscape patterns in tallgrass prairie. Recent studies suggest that bison - and other grazing/browsing wildlife species - preferentially seek out the new growth of recently burned areas affecting patch composition (e.g. Jackson 1965, Risser 1990, Steuter 1986, Coppedge and Shaw 1998, Fuhlendorf and Engle 2004).

Adjacency or Identification Concerns

Scale Description

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

The large burn accounts of the late 1800's are in contrast to these patch burn model where small burns are preferentially grazed by bison. Using the fire/bison interaction model first proposed by Steuter (1986), recent modifications propose that anywhere from 1/6 to 1/3 of the landscape likely burned (Fuhlendorf and Engle 2004). Typically, following fire-induced green-up, intensive bison grazing alters community structure such that burned and grazed areas differ significantly from unburned areas (Steuter 1986; Fuhlendorf and Engle 2001, 2004). Heavily grazed and trampled burned areas, which, due to differential grazing, are dominated by forbs and thus would not burn in the next 1-3 years creating. Bison grazing, thus, drove or at the least strongly influenced fire and fire return intervals which, in turn, influenced bison grazing distribution. This patch-burn model, which depicts a landscape composed of a continuously shifting mosaic of patches with a short time period of duration, is believed to best represent the historic fire regime. It is also consistent with the scenario essential to perpetuate habitat for certain native prairie species. For example, the patch-burn model provides conditions to maintain suitable lek sites and brood rearing habitat for prairie chickens (Tympanicus cupido) which occurred in large numbers prior to European settlement (Sparks and Masters 1996).

Issues/Problems

Model Evolution and Comments

This model replaces R4PRTGsw from the Northern Plains model zone.

Changes were made to site description and class description as a result of peer review. Also, grazing was removed from class D.

Succession Classes**

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

Class A 20 %

Early1 Open

Description

Immediate, post-fire community that is short in duration (weeks to months-depending on time of burning). Transitions into B or C during the next growing season. Plant composition includes some annuals (e.g. Rudbeckia hirta or Linum)

Dominant Species* and Canopy Position

ANDG Upper
SCHSC Mid-Upper
RUDHI Mid-Upper
VIOLA Lower

Upper Layer Lifeform

☑ Herbaceous
☐ Shrub
☐ Tree

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	90 %
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 55 %

Mid1 Open

Description

Mixed forb and grass community either continuing post-burn development without grazing (e.g. from A) or recovering from native grazing (e.g. from C or D). Replacement fire returns the pixel back to A (immediate post-burn condition). Mixed fire occurs in a small proportion of the area resulting from incomplete summer burns in areas where fuel has been reduced by grazing. Native grazers on previously burned but ungrazed areas returns the pixel to C (post-burn grazed).

Dominant Species* and Canopy Position

ANDG Upper
SCHSC Mid-Upper
DALEA Mid-Upper
VIOLA Lower

Upper Layer Lifeform

☑ Herbaceous
☐ Shrub
☐ Tree

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	Max
Cover	1 %	90 %
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 %

Mid2 Open

Description

Mixed forb and grass community with forbs dominating the canopy; Rhizamotous species, especially grasses, kept low in stature due to grazing. Short-statured grasses increase in cover with longer grazing periods. Mixed fire occurs in a small proportion of the area resulting from incomplete summer burns in area where fuel has been reduced by grazing. Alternate

Dominant Species* and Canopy Position

SCHSC Upper
BOUC Upper
DALEA Upper
OLIGO Upper

Upper Layer Lifeform

☑ Herbaceous
☐ Shrub
☐ Tree

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	Max
Cover	1 %	90 %
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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succession reflects small areas within the larger grazed area that are not actually grazed and that succeed directly to D (areas neither burned nor grazed for at least 3-years). Class C will succeed to class B following cessation of grazing.

Class D 15 %

Late1 Closed

Description

Tallgrasses dominate; tillering and overall plant vigor reduced by mulch accumulation due to lack of grazing or burning; extended fire- or grazing-free periods allow for native woody plant encroachment. If fire is suppressed and this state continues, a new box should be added (Late Closed). Replacement fire returns pixel back to A (immediate post-burn). Since native grazers prefer classes A and B, grazing is not listed as a disturbance in this class.

Dominant Species* and Canopy Position

ANDG Upper
PANVI Upper
SORNU Upper
OLIGO Upper

Upper Layer Lifeform

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

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	Max
Cover	90 %	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 E 0 %

Late1 All Structu

Description

Dominant Species* and Canopy Position

Upper Layer Lifeform

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

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
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

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Disturbances Modeled

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

Historical Fire Size (acres)

Avg: 5000
Min: 1
Max: 10000

Sources of Fire Regime Data

- [x] Literature
- [ ] Local Data
- [x] 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	5			0.2	91
Mixed	50			0.02	9
Surface					
All Fires	5			0.22001	

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