LANDFIRE Biophysical Setting Model

Biophysical Setting 3211320 Central Mixedgrass Prairie

☐ *This BPS is lumped with:*
☐ *This BPS is split into multiple models:*

General Information

Contributors (also see the Comments field) **Date** 1/10/2007

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Modeler 2	Lee Elliott	lelliott@tnc.org	**Reviewer**		
Modeler 3			**Reviewer**		

Vegetation Type
Upland Grassland/Herbaceous

Dominant Species
BOBA3
SCSC
NALE3
ERIN
BOGR2
BOCU
SONU2
PRGL2

Map Zone
32

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

General Model Sources
☑ Literature
☑ Local Data
☑ Expert Estimate

Geographic Range

This type historically occurs in western KS, western NE, eastern CO, northeastern NM, the eastern Texas panhandle into central TX, and along the western portion of OK proper. This BpS comprises the eastern half of MZ34 in ECOMAP sections 332F and 315C. This type occurs in the western half of MZ32 and in the northern half of MZ35 (west of Interstate-35).

Biophysical Site Description

This type occurs on sandy loam, loamey, or clayey upland sites of the southern Great Plains. In TX and OK, elevations range from 915-275m (Wright and Bailey 1982). Precipitation ranges from 20 to 28 inches (Wright and Bailey 1982), although mixedgrass can occur on sites with up to 32in, and occurs mostly from May through September.

Vegetation Description

Historically, vegetation was generally dominated by midgrass, with some areas occupied by tallgrasses or short grasses, as an effect of grazing, edaphic and topographic conditions. (Species in order of dominance in boxes.) Dominant species include mostly midgrasses with some mix of tall and short grass - side oats grama (Bouteloua curtipendula), needlegrasses, little bluestem (Schizachyrium scoparium), Bothriochloa barbinodis, Nassella leucotricha and Eragrostis intermedia. Tallgrasses such as yellow indiangrass (Sorghastrum nutans), big bluestem (Andropogon gerardii) and switchgrass (Panicum virgatum) also occur. Blue grama (B. gracilis) can be prevalent, especially following significant grazing and on poor sites. Forbs present can include purple prairie clover (Dalea purpurea), vervain (Verbena bipinnatifida), dotted gayfeather (Liatris punctata). Mesquite (Prosopis glandulosa), Lotebush (Ziziphus obtusifolia), Soapweed yucca (Yucca glauca), Juniper species and prickly pear (Opuntia spp.) are present and may

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dominate large portions of the landscape under current conditions.

Shrubs included four-wing saltbush (Atriplex canescens), winterfat (Krascheninnikovia lanata), with lesser amounts of rabbitbrush (Chrysothamnus nauseosus), broom snakeweed (Gutierrezia sarothrae), fringed sage (Artemisia frigida) and sunsedge (Carex inops ssp. heliophila) are present mostly in MZ34. In MZs 32 and 35 dominant shrub species include broom snakeweed (Gutierrezia sarothrae), shinnery oak (quercus havardii), sand sage brush, sumac (reus glabra) and chickasaw plum (Prunus angustifolia).

Disturbance Description

Historically, fire return intervals were probably approximately 4-7yrs - slightly shorter return interval (more frequent fire) than shortgrass prairie due to higher fuel loads.

Episodic disturbance caused by insect infestation (grasshoppers, range caterpillars, Mormon crickets). Large herds of bison went through this system - as well as deer and pronghorn. Grazing impact would be greatest in recently burned areas because grasses are more palatable and nutritious.

This is a drought tolerant system. However, extended drought (over 3-4yrs) will reduce cover.

Drought, grazing and fire were probably the most important disturbances historically.

Adjacency or Identification Concerns

This system could be confused with shortgrass prairie to the west and tallgrass prairie to the east. Production is less in shortgrass versus mixedgrass prairie. Grasses are taller in mixedgrass than shortgrass prairie. These systems are intermixed, with the shorter grasses further west with less precipitation (other than the foothills areas).

Naturally occuring shrub dominated areas on sandy soils, on deposits associated with riparian areas can be found throughout the mixedgrass prarie type. It is hard to distinguish wether these shrub areas should be considered as part of the mixedgrass or if they should be considered sand sagebrush or sand shinnery oak. At finer scales, these types are easily distinguished and likely can be mapped at 30m resolution as a shrub community rather than grass.

What adds to the confusion is that current overgrazing has transitioned large portions of the region from mixed grass to short grass. In addition, the areas that have transitioned to a short grass prairie have also been invaded by woody shrubs, mainly honey mesquite (Prosopis glandulosa) and eastern redcedar (Juniperus virginiana).

What has historically been a mixedgrass prairie has been converted to row crops/ag. The mixedgrass prairie is primarily in rural areas so there is not as much residential development; however, urbanization is coming at an alarming rate. Mixedgrass prarie is now extremely rare as a result of land conversion to agriculture and woody species invasion.

Current condition is a mesquite or mixed shrub dominated landscape, resulting from spread of mesquite and loss of fire in the system.

Native Uncharacteristic Conditions

Mesquite (P. glandulosa) and eastern redcedar (Juniperus virginiana), have expanded well beyond their expected historical range and/or density. The introduction of cattle and their eating of the mesquite bean has promoted the expansion of the woody shrub. Also, overgrazing of the grasses has also allowed the

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mesquite to expand. Fire suppression has allowed easter redcedar to encroach into grasslands.

Scale Description

This is a matrix community - small to large patches. Disturbances can also occur within a matrix - small to large, huge patches. Driving variable is climate (drought, low rainfall, etc), grazing, and to a lesser extent fire.

Issues/Problems

A reviewer for MZs 32 and 35 indicated that both class A and B could start immediately after a fire (i.e. age zero) and that grazing could be removed as a disturbance from the model because it is the grazing/fire interaction, which could be represented by the fire alone, that causes the transition between states in the model. The regional lead could not change the start age of class A and B to 0 because LANDFIRE rules only allow one class to start at age 0. However, the regional lead did run the model without grazing, as suggested by the reviewer, and found that it did not change the class percents or the fire return interval. The regional lead chose to leave grazing in the model to maintain consistency with MZ34 but it should be recognized that the same results can be achieved if grazing is removed from the model. Furthermore, it should be recognized that there is an interaction between fire and grazing in this BpS even though the two disturbances are represented independently in the VDDT model.

Comments

Suggested reviewers for MZ34 include Dr. Fred Smeins (TAMU, RLEM), Dr. Mark Simmons (Wildflower Center, Austin, TX) and Dr. Steve Windhager (Wildflower Center, Austin, TX).

For MZs 35 and 32 this model was adopted from the same BpS in MZ34 modeled by Delber Bassett. Lee Elliott reveiwed the model for MZ34 and altered it for MZs 35, 34 and 32. The same description and VDDT model now represent this BpS in MZs 35, 34 and 32. Sam Fulendorf reviewed this system for MZs 32 and 35.

For MZ34 this model was developed from the MZs 27 and 33 model, developed by Dan Nosal (dan.nosal@co.usda.gov), Rich Sterry (richard_sterry@fws.gov), and Terri Schulz (tschulz@tnc.org), as a starting point. Both the description and the model were significantly altered resulting in a change in modelership.

Vegetation Classes

Class A **50 %**

Early Development 1 Open

Upper Layer Lifeform

☑ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

1

Indicator Species and Canopy Position

BOGR2
Upper
BUDA
Upper
AMPS
Upper
AMDR
Upper

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	30 %
Height	Herb 0m	Herb 0.5m
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class A is early succession stage. Grasses that exert more dominance in the early stages include western wheatgrass (Pascopyrum smithii) and tumble windmill grass (Chloris verticillata). Indicator grasses, such as

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blue grama (Bouteloua gracilis) and buffalograss (Buchloe dactyloides) will still be present, but in lesser amounts than the climax community. Annual forbs such as broomweed (Amphiachyris dracunculoides), ragweed (Ambrosia psilostachya) and false mesquite (Calliandra eriophylla) will typically be present early.

In this early stage, grasses will be more nutritious and palatable, grazing by bison, antelope, deer, rodents and lagomorphs would be common and maintain this class (modeled as native grazing with a probability of 0.1) Replacement fire might occur every 15yrs.

Class B **40 %**

Late Development 1 Closed

Upper Layer Lifeform

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

Fuel Model

3

Indicator Species and Canopy Position

BOBA3
Upper
SCSC
Upper
BOCU
Lower
ZIOB
Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	31 %	80 %
Height	Herb 0.6m	Herb >1.1m
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Scattered shrubs may be present (up to 10%, maybe up to one meter) - honey mesquite, Ashe juniper (Juniperus ashei), lotebush (Ziziphus obtusifolia), yucca (sandy sites) and elbowbush (Forestiera pubescens).

Description

This is the historic climax plant community with big bluestem (Andropogon gerardii), little bluestem (Schizachyrium scoparium), switchgrass (Panicum virgatum), yellow indiangrass (Sorghastrum nutans), blue grama (Bouteloua gracilis), buffalograss (Buchloe dactyloides), sideoats grama (Bouteloua curtipendula) and hairy grama (Bouteloua hirsuta).

There would also be scatterings of black grama (B. eriopoda) and vine mesquite (P. obtusum) on heavier soils.

Replacement fires occur more often in this class, every 10yrs. Native grazing maintains this class (modeled as native grazing with a probability of 0.1). Replacement drought also could occur every 40yrs. Without disturbance for 12yrs, this class will succeed to class C.

Class C **10 %**

Late Development 2 Closed

Upper Layer Lifeform

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

Fuel Model

3

Indicator Species and Canopy Position

ZIOB
Upper
JUAS
Upper
ZIOB
Upper
PRGL2
Lower

Structure Data (for upper layer lifeform)

	Min	Max
Cover	21 %	70 %
Height	Shrub 0m	Shrub 1.0m
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Shrubs - honey mesquite, Ashe juniper (Juniperus ashei), and lotebush (Ziziphus obtusifolia), yucca (sandy sites) and elbowbush (Forestiera pubescens). Replacement fires occur in this class every 10yrs; mixed fire maintains this class every 15yrs. Native grazing maintains this class (modeled as native grazing with a probability of 0.1). Drought occuring at approximately every 30yrs could drive this class to B.

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Class D **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class E **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

Fire Regime Group:** **II**

Historical Fire Size (acres)

Avg 0
Min 0
Max 0

Sources of Fire Regime Data

☑ Literature
☑ Local Data
☑ Expert Estimate

Fire Intervals

	Avg FI	*Min FI*	*Max FI*	*Probability*	*Percent of All Fires*
Replacement	6			0.16667	95
Mixed	125			0.008	5
Surface					
All Fires	6			0.17468	

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.

Additional Disturbances Modeled

☐ Insects/Disease
☑ Wind/Weather/Stress
☑ Native Grazing
☐ Competition
☐ Other (optional 1)
☐ Other (optional 2)

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