

LANDFIRE Biophysical Setting Model

Biophysical Setting 3411320

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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<u>Vegetation Type</u>	<u>Dominant Species</u>	<u>Map Zone</u>	<u>Model Zone</u>	
Upland	ANGE	34	☐ Alaska	☐ Northern Plains
Grassland/Herbaceous	SCSC		☐ California	☐ N-Cent. Rockies
General Model Sources			☐	☐
☒ Literature	HECO26		☐ Great Basin	☐ Pacific Northwest
☒ Local Data	PAVI2		☐ Great Lakes	☒ South Central
☒ Expert Estimate	BOGR2		☐ Hawaii	☐ Southeast
	BOCU		☐ Northeast	☐ S. Appalachians
	SONU2			☐ Southwest
	PRGL2			

Geographic Range

This type historically occurs in western KS, western NE, eastern CO, northeastern NM, eastern TX 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.

Biophysical Site Description

This type occurs on sandy loam, loamy 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 20-28in (Wright and Bailey 1982), and occurs mostly May through September.

Vegetation Description

Historically, vegetation was co-dominated with tallgrass, midgrass, short grass, and shrubs. (Species in order of dominance in boxes.) Dominant species include mix of tall and short grass - side oats grama (*Bouteloua curtipendula*), needlegrasses, little bluestem (*Schizachyrium scoparium*), yellow indiagrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*) and blue grama (*B. gracilis*), with intermingled forbs - purple prairie clover (*Dalea purpurea*) and vervain (*Verbena bipinnatifida*). On ridgelines and canyons honey mesquite (*Prosopis glandulosa*) would be found. Soapweed yucca (*Yucca glauca*) and prickly pear (*Opuntia* spp) are also present.

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*).

**Fire Regime Groups are: I: 0-35 year frequency, surface severity; II: 0-35 year frequency, replacement severity; III: 35-100+ year frequency, mixed severity; IV: 35-100+ year frequency, replacement severity; V: 200+ year frequency, replacement severity.

Disturbance Description

Historically, fire return intervals were probably approximately 10-15yrs - 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 occurred throughout the growing season, for relatively short periods. Grazing impact would be greatest in recently burned areas because grasses are more palatable and nutritious.

However, currently, there is overgrazing and continuous grazing, creating more shortgrass and increasing fire intervals (less fire).

This is a drought tolerant system. However, extended drought (over 3-4yrs) will reduce cover. Drought, grazing and fire were probably most important disturbances historically.

Adjacency or Identification Concerns

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

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.

What has historically been a mixedgrass prairie has been converted to row crops/agriculture. The mixedgrass prairie is primarily in rural areas so there is not as much residential development; however, urbanization is coming at an alarming rate.

Saltcedar (*Tamarix* spp) poses the largest invasive threat to the system but is confined to riparian corridors.

Currently, regardless of whether loamy, clayey or sandy loam soil, long-term continuous grazing changes plant composition to primarily sod-bound blue grama site. Also, the over-grazing has reduced the vegetative cover resulting in the loss of top soil due to wind erosion.

Native Uncharacteristic Conditions

Mesquite (*P. glandulosa*), has expanded well beyond its 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 mesquite to expand.

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

Comments

For MZ34 this model was developed from the MZs 27 and 33 draft model, developed by Dan Nosal (dan.nosal@co.usda.gov), Rich Sterry (richard_sterry@fws.gov) and Terri Schulz (tschulz@tnc.org), as a

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starting point. Both the description and the model were significantly altered resulting in a change in modelership.

Vegetation Classes

Class A 30 %

Early Development 1 Open

Upper Layer Lifeform

☒ Herbaceous

☐ Shrub

☐ Tree

Fuel Model

1

Indicator Species and Canopy Position

CHCU2

Upper

BOGR2

Upper

BOSA

Upper

BUCHL

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

(Early post-replacement 0-3yrs) This class represents an array of early species including annuals and resprouting perennials. Class A represents a mix of bare sand, including blowouts and sand draws, and extensive areas of sparse vegetative cover up to 20%. The persistence of this class depends on continual disturbance that inhibits the establishment of vegetation such as wind erosion drought and grazing. This class lasts for three years. Buckwheat (*Eriogonum annuum*) and horsetweed (*Conyza canadensis*) may dominate after disturbance.

Frequent wind/weather stress (every three years) in this class is referring to high wind events which occur normally. But the fire and drought are what create the conditions to have the wind affect the class and reset it. Native grazers (probability = 0.5) maintain this stage.

A year-end of 15yrs was chosen as a median. So this year-end covers part of the wind disturbance and environmental factors. Major droughts occur every 20-30yrs.

Wind/weather stress in this class is referring to high wind events which occur normally. We're describing it in terms of area - i.e.: 10% of area affected. But the fire and drought is what creates the conditions to have the wind affect the class and reset it.

Native grazers can accelerate or maintain this stage or slow this process, depending on when the grazing occurs and intensity. Because all of these effects occur naturally and frequently, it was not modeled.

If there are good climatic conditions, this stage can cycle more quickly, so this was modeled as alternate succession, with a probability of 0.01.

Currently, there would be less than 20% in class A. There would probably only be about five percent in this class.

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Class B 70 %

Late Development 1 Closed

Upper Layer Lifeform☒ Herbaceous☐ Shrub☐ Tree**Fuel Model**

1

Description**Indicator Species and Canopy Position**

ANGE

Upper

SONU2

Upper

BOGR2

Lower

PAVI2

Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	31 %	80 %
Height	Herb 0m	Herb >1.1m
Tree Size Class	None	

☒ Upper layer lifeform differs from dominant lifeform.

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

Four years plus. This is the historic climax plant community with big bluestem, little bluestem, switchgrass, yellow indiagrass, blue grama, buffalograss, sideoats grama and hairy grama.

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, and causes a transition to class A. Insects would also occur but are not modeled, no widespread effect - just localized. Native grazing maintains this class (modeled as native grazing with a probability of 0.1). Prairie dogs could be present but impact would be negligible. Replacement drought also could occur every 40yrs.

Class C 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 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**

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Class E 0 %

[Not Used] [Not Used]

**Indicator Species and
Canopy Position**

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
Height		
Tree Size Class		

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

☐ 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

Additional Disturbances Modeled

- ☐ Insects/Disease ☒ Native Grazing ☒ Other (optional 1) buffalo wallows
☒ Wind/Weather/Stress ☐ Competition ☐ Other (optional 2)

Fire Intervals

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	11			0.09091	100
Mixed					
Surface					
All Fires	11			0.09093	

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.

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