

LANDFIRE Biophysical Setting Model

Biophysical Setting 3411490

Western Great Plains Shortgrass 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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Vegetation Type

Upland
Grassland/Herbaceous

Dominant Species

BOGR2
BUDA

Map Zone

34

Model Zone

☐ Alaska
☐ California

☐ Northern Plains
☐ N-Cent. Rockies

General Model Sources

- ☒ Literature
☒ Local Data
☒ Expert Estimate

BOCU
BOHI2
ARFI2
SPCR

☐
☐ Great Basin
☐ Great Lakes
☐ Hawaii
☐ Northeast

☐
☐ Pacific Northwest
☒ South Central
☐ Southeast
☐ S. Appalachians
☐ Southwest

Geographic Range

Shortgrass prairie is found primarily in the western half of the Western Great Plains Division in the rainshadow of the Rocky Mountains and ranges from the Nebraska Panhandle south into TX and NM (Laurenroth and Milchunas 1993).

In MZ34, shortgrass occurred historically in ECOMAP sections 315b (Texas High Plains), 331B (Southern High Plains), the western portion of 315f (Northern Texas High Plains) and transitioning into 315c (Mixed Grass Prairie) in the eastern section of MZ34. The eastern boundary of shortgrass is in MZ34.

Biophysical Site Description

In MZ34, (Texas panhandle) elevations are 1200-1830m (4000-6000ft) on the western edge and slopes to 915m (3000ft) on the edge of the caprock. Precipitation ranges from 38-51cm (15-20in) and occurs mainly May, June, August and September. Soils are primarily clay loams, silt loams and sandy loams, underlain with caliche (Wright and Bailey 1982).

Vegetation Description

Historically, vegetation was dominated by short grass, and the subdominants were midgrasses and a small amount of shrubs on the fringes. Grass cover may be as great as 80% in this mapzone, depending on precipitation and time since disturbance.

In the Texas panhandle, blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*) are co-dominants, with sideoats grama (*Bouteloua curtipendula*), sand dropseed (*Sporobolus cryptandrus*), hairy

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grama (*Bouteloua hirsuta*), three-awns (*Aristida* spp), lovegrass (*Eragrostis* spp) and tobosagrass (*Pleuraphis mutica*) present in varying amounts. Forbs will be more common during wet years and after disturbance but are seldom major components. They include annual broomweed (*Gutierrezia dracunculoides*), silverleaf nightshade (*Solanum elaeagnifolium*), western ragweed (*Ambrosia psilostachya*) and others. Woody plants include honey mesquite (*Prosopis glandulosa*), sand shinnery oak (*Quercus havardii*), four-wing saltbush (*Atriplex canescens*), broom snakeweed (*Gutierrezia sarothrae*), soaptree yucca (*Yucca elata*), prickly pear (*Opuntia* spp), cholla (*Opuntia* spp) and tasajillo (*Opuntia leptocaulis*) (Wright and Bailey 1982). Woody plants have increased their presence with overgrazing and fire suppression.

Blue grama is the major diagnostic for this system.

Disturbance Description

Return interval for fire could be extended (longer return interval) by ungulate grazing. Fire return intervals are now occurring more infrequently - approximately 40yrs. Probably burned more frequently with Native Americans at approximately 10-20 year intervals. Wright and Bailey (1982) indicate that historic MFRI in the Southern Great Plains was probably between 5-10yrs.

Prairie dogs would have occurred extensively. There were some very large towns, but there were also areas without any towns.

Episodic disturbance caused by insect infestation (grasshoppers, range caterpillars and Mormon crickets). The range caterpillar (*Hemileuca oliviae*) has approximately 50yr interval in some areas - i.e.: with a patchy distribution. Mormon crickets (*Anabrus simplex*) and grasshoppers are more evenly distributed. There were localized areas where grubs were an issue.

Large herds of bison went through this system - as well as elk, deer and pronghorn. Through growing season, were there for relatively short periods. Bison probably followed behind fire in the subsequent growing season causing periods of heavy disturbances (fire followed by bison) interrupting longer periods of little to no disturbance.

This is a drought tolerant system. It is the norm in this system. Annual herbaceous production is affected by timing and amount of rainfall. There are short and long term droughts, and the climate varies year to year... more dry years than moist years.

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

Adjacency or Identification Concerns

This system could be confused with mixedgrass prairie. Production is less in shortgrass versus mixedgrass prairie. A higher occurrence of blue grama would indicate shortgrass. If cover is 50% or more midgrasses, the system would probably be mixedgrass.

In MZ34, there is much less shortgrass prairie present now than historically, due to agricultural conversion. Much apparent grassland in MZ34 is actually Conservation Reserve Program (CRP) which may be very different in composition than native grassland.

In MZ34, this BpS is adjacent to mixed grass prairie.

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Even the shortgrass prairie today that would have existed historically is departed. There is much more blue grama currently. Even though blue grama is diagnostic for this type - historically and currently, it's still more prevalent today in higher cover. There's less overall species diversity. There are some current increasers such as several species of three-awn.

Currently, in MZ34 weeping lovegrass (*Eragrostis curvula*) is an introduced species but not a big invasives problem.

Some mesquite hummocks occur currently more than historically. Currently, there is mesquite widespread and low-statured, although historically it was present but not as prominent. If mesquite is over three feet high, it's a different BpS. More mesquite, cholla, prickly pear currently - uncharacteristic.

There is also some encroachment of juniper into these grasslands. If there is over 10% juniper canopy cover in the grasslands, this would be uncharacteristic.

Currently, there is grazing mismanagement increasing fire intervals (less fire) throughout. Grazing mismanagement currently fosters a grazing adaptive blue grama species of sod.

Native Uncharacteristic Conditions

If grass is over 0.5m, it would be uncharacteristic because it would be in a different BpS (Mixedgrass Prairie, BpS 1132). There is also more mesquite, juniper, cholla and prickly pear currently. If mesquite or juniper are over three feet high, different BpS.

If grass cover over 80%, uncharacteristic. (it's patchy in this system.)

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 fire.

Issues/Problems

Introduced exotic tamarisk (*Tamarix* spp) is present in small, mostly isolated, populations through most of MZ34 in wet (or formerly wet) areas only.

Comments

For MZ34 this model was adapted from MZ27 draft model by Rex Peiper, John Tunberg and Clarence Chavez. Due to significant changes in the description and model the authorship was changed.

Vegetation Classes

Class A 30 %

Early Development 1 Open

Upper Layer Lifeform

- ☒ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

1

Description

Indicator Species and Canopy Position

BOGR2
 Upper
 BUDA
 Upper
 PASM
 Upper
 CHVE2
 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.

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0-3yrs. 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 blue grama and buffalograss will still be present, but in lesser amounts than the climax community. Annual forbs such as broomweed, ragweed and false mesquite (*Calliandra eriophylla*) will typically be present early. Weeping lovegrass (an exotic) may be increased by fire. On sandy soils, sand bluestem (*Andropogon hallii*), little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*) and sand shinnery oak may increase after disturbance. There was also a lot of bare ground in this stage.

In this early stage, grasses will be more nutritious and palatable, grazing by bison, antelope, deer, rodents and lagomorphs would be high (probability = 0.5), but not cause a transition. This would also be a typical prairie dog town and with buffalo wallows. Prairie dog impact occurs on 10% of this class each year (modeled as option 1 with a probability of 0.1).

Surface soil horizon is heavily eroded by wind after disturbance, particularly in sandy soils.

Replacement fire (MFRI = 100yrs) might occur, but not often due to low fuel loads, and would reset age to zero.

Class B		70 %		<u>Indicator Species and Canopy Position</u>	<u>Structure Data (for upper layer lifeform)</u>												
Late Development 1 Closed				BOGR2	<table><tr><td></td><td>Min</td><td>Max</td></tr><tr><td>Cover</td><td>31 %</td><td>80 %</td></tr><tr><td>Height</td><td>Herb 0m</td><td>Herb 0.5m</td></tr><tr><td>Tree Size Class</td><td colspan="2">None</td></tr></table>		Min	Max	Cover	31 %	80 %	Height	Herb 0m	Herb 0.5m	Tree Size Class	None	
	Min	Max															
Cover	31 %	80 %															
Height	Herb 0m	Herb 0.5m															
Tree Size Class	None																
<u>Upper Layer Lifeform</u>				Upper	☒ Upper layer lifeform differs from dominant lifeform. Scattered woody plants may be present, particularly in ravines and other refugia from fire (up to 10% cover, maybe up to one meter tall) - four wing saltbush, mesquite, juniper, prickly pear and cholla.												
☒	Herbaceous			BUDA													
☐	Shrub			Upper													
☐	Tree			BOCU													
	<u>Fuel Model</u>			Upper													
	1			SPCR													
<u>Description</u>				Lower													

Four years plus. This is the historic climax plant community with blue grama, buffalograss, sideoats grama, sand dropseed, hairy grama and sand sage (*Artemisia filifolia*). Historically, would have more midgrasses.

There would also be scatterings of black grama (*B. eriopoda*) and vine mesquite (*Panicum obtusum*) on heavier soils. Replacement fires (MFRI = 10yrs) occur more often in this class and cause a transition to class A. Insects would also occur but not modeled, no widespread effect - just localized. Native grazing occurs every five years in this class and maintains this class. Prairie dog impact could occur in this class (0.01 probability), bringing this class back to A. Replacement drought also could occur every 40yrs causing a transition to A.

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Class C 0 %

[Not Used] [Not Used]

Indicator Species and
Canopy Position

Structure Data (for upper layer lifeform)

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	%	%
<i>Height</i>		
<i>Tree Size Class</i>		

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class D 0 %

[Not Used] [Not Used]

Indicator Species and
Canopy Position

Structure Data (for upper layer lifeform)

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	%	%
<i>Height</i>		
<i>Tree Size Class</i>		

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class E 0 %

[Not Used] [Not Used]

Indicator Species and
Canopy Position

Structure Data (for upper layer lifeform)

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	%	%
<i>Height</i>		
<i>Tree Size Class</i>		

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

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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) prairie dogs
☒ Wind/Weather/Stress ☐ Competition ☐ Other (optional 2)

Fire Intervals

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	14			0.07143	100
Mixed					
Surface					
All Fires	14			0.07145	

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.

References

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