

LANDFIRE Biophysical Setting Model

Biophysical Setting: 9814340

Texas-Louisiana Coastal Prairie

☒ This BPS is lumped with: 1487

☐ This BPS is split into multiple models: BpS 1434 is systematically lumped with 1487. BpS 1487 is too fine for mapping and modeling.

General Information

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<u>Vegetation Type</u>	<u>Dominant Species</u>	<u>Map Zone</u>	<u>Model Zone</u>	
Upland	ANGE	98	☐ Alaska	☐ Northern Plains
Grassland/Herbaceous	SCSC		California	N-Cent.Rockies
<u>General Model Sources</u>	PAVIS		☐	☐
☐ Literature	SPSP		☐ Great Basin	☐ Pacific Northwest
☒ Local Data	TRDA3		☐ Great Lakes	☒ South Central
☒ Expert Estimate	PAHE2		☐ Hawaii	☐ Southeast
	SONU2		☐ Northeast	☐ S. Appalachians
	MOCE2			☐ Southwest

Geographic Range

This BpS encompasses non-saline tallgrass prairie vegetation ranging along the coast of LA and TX. This coastal prairie region once covered as much as nine million acres (Grace 2000). The prairie region of southwestern LA was once extensive (~ 2.5 million acres) but today is limited to small, remnant parcels (100-1000ac). Gulf Coast and inland varying distances from 50-150 miles (80-240 km) from south TX to LA and the mouth of the Mississippi River. In LA, it is bordered to the north and east by Southern Floodplain Forest (Kuchler 1964). To the south and west it also joins with the desert grasslands.

This BpS is found in MZ37 in ECOMAP subsections 232Ea and 232Eb.

Biophysical Site Description

This BpS is found on Vertisols and Alfisols which developed over Pleistocene terraces flanking the Gulf Coast. It is often characterized by a ridge-and-swale or mound-and-intermound microtopography and encompasses both upland and wetland plant communities. The bluestem-sacahuista is relatively flat, but is characterized by ridge-swale or mound-intermound microtopography. This type is dissected by numerous rivers and streams which result in highly variable species composition (Johnston 1963, Diamond and Smeins 1985, Drawe 1994).

A topographic and moisture gradient exists as one progresses inland and out of floodplains. The diversity of embedded edaphic conditions and wetlands within the general type is important and interacted with fire to determine wildlife species distributions. Extended inundation in areas referred to as lagunas adds a disturbance element within 25km of the coast. These areas are subject to a different successional pattern than that following other types of disturbance (Scifres and Mutz 1978).

**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.

Vegetation Description

Upland dominants include little bluestem (*Schizachyrium scoparium*), brownseed paspalum (*Paspalum plicatulum*), Indiangrass (*Sorghastrum nutans*) and big bluestem (*Andropogon gerardii*). Wetland dominants in undisturbed occurrences include switchgrass (*Panicum virgatum*) and eastern gamagrass (*Tripsacum dactyloides*); disturbed occurrences may be dominated by bushy bluestem (*A. glomeratus*). This type has many of the same vegetation elements of tallgrass prairie but also has a number of additional species, including some tropical grasses. Nearly 1000 plant species have been identified in this type. The forb community tends to be richer in the coastal prairie than in true tallgrass prairie. This type is considered a shrub-grassland complex rather than a prairie (Johnston 1963, Scifres and Mutz 1975, Drawe 1994). This type is highly variable in species composition because of the dissected nature of the terrain and topography caused by numerous rivers and creeks (Johnston 1963, Diamond and Smeins 1985, Drawe 1994). The species composition is dominated by little bluestem, sea coast bluestem (*S. c. var. littoralis*), several *Panicums* and sacahuista, also known as Gulf cordgrass (*Spartina spartinae*). Sacahuista (*Nolina* spp) primarily dominates along floodplains of the numerous rivers and near the coast. Other important species include bushy bluestem, other bluestems such as split-beard (*A. ternarius*), broomsedge bluestem (*A. virginicus*), silver bluestem (*Bothriochloa saccharoides*), various *Sporobolus* spp and several tropical grasses of the genera *Heteropogon*, *Paspalum*, *Trachypogon* and the previously mentioned *Panicum*. Secondary species vary in importance regionally depending on topography and soil moisture relations and include sideoats grama (*Bouteloua curtipendula*), buffalo grass (*Buchloe dactyloides*) and threeawns (*Aristida* spp). Several grass-like species that are important include sedges (*Carex* spp), spikerush (*Eleocharis* spp) and *Scirpus* spp. Conspicuous forbs include the genera *Ratibida* (prairie coneflower), *Rudbeckia* (coneflower), *Liatris* (blazing-stars) and *Sagittaria* (arrowhead). Shrubs that are important include honey mesquite (*Prosopis glandulosa*) and various acacias most notably huicache (*Acacia farnesiana*) in Texas, also Macartney rose (*Rosa bracteata*) and various oaks (*Quercus* spp). Eastern baccharis (*Baccharis halimifolia*) and wax myrtle (*Morella cerifera*) are more important to the east. All of these woody plants and others increase in the absence of fire.

Disturbance Description

Fire (lightning and anthropogenic) occurs about 2-5 times every 10yrs. In the absence of regular fire, this system will be invaded by woody shrubs and trees. Disturbance sizes were estimates based on landscape size and should be reviewed. This type is fire regime group II, with frequent replacement fires, both lightning and anthropogenic in origin (Stewart 1951, Lehmann 1965, Drawe 1980, Stewart 2002; Jurney et al. 2004). Likely, this type has one of the most frequent fire regimes in North America. Annual burning was described in references to historic accounts (Stewart 1951, Chamrad and Dodd 1973, Stewart 2002:141-144) and in one instance reference was made to burning twice (summer and winter) in the same year (Lehmann 1965:133). These references do not indicate every acre was burned every year but likely some considerable area was burned every year with most of the type being burned at least biannually and some areas burned twice in a given year. Lehmann (1965) also notes accounts about the patches of unburned vegetation and relative green-up compared to burned areas. Fire was likely possible during most seasons and dependent on the availability of dry fine fuels sufficient to carry a fire. Historic accounts from the 1800s depict large burns, but the terrain is dissected by numerous rivers and creeks bordered by trees (Lehmann 1965, Drawe 1994). Therefore this landscape matrix strongly influenced the probable size of burn.

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). Bison (*Bison bison*) were historically an important source of disturbance that increased heterogeneity of patches on the landscape. Wild horses were established early on and large herds were noted by early explorers in the southwestern part of this type (Stewart 2002). Pronghorn (*Antilocapra americana*) historically occurred in the southwestern most part of this type (Nelson 1925) where rainfall amounts dropped considerably. Although historical accounts of large groups (1,000's)

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of bison do occur, bison herds were of smaller size and more dispersed in this system than herds of the central Great Plains. Bison grazing affects fire patterns and thus the landscape patterns in tallgrass prairie (Risser 1990) and assuredly this system as well. Bison and other grazing/browsing wildlife species preferentially seek out the new growth of recently burned areas affecting patch composition (e.g., Coppedge and Shaw 1998, Jackson 1965, Risser 1990, Steuter 1986, Fuhlendorf and Engle 2004). Burn accounts are in agreement with the 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 a 20,000ac (8094ha) tallgrass landscape likely burned (Fuhlendorf and Engle 2004). Likely this figure is less for coastal prairie because of the dissected terrain. Burning causes earlier green-up and increased nutrient content of native grasses and is preferentially selected by grazing animals (Lehmann 1965, Oefinger and Scifres 1977). Typically following green-up, fire is followed by intensive bison grazing pressure to the point that structural classes shifted over the landscape in response to an interaction between bison grazing pressure and fire (Steuter 1986; Fuhlendorf and Engle 2001, 2004). Heavily grazed and trampled areas would not burn in the next year to three years creating a one-way closed path. Following this type disturbance the patches are dominated with forbs and will not burn in the succeeding dormant and growing season because of lack of fuel. Whereas previous years unburned post-grazing re-growth would be the next patch to burn. Bison grazing influenced fire return intervals. Fire occurrence in turn influenced bison grazing distribution. This model depicts a landscape composed of a continuously shifting mosaic of patches with a short time period of duration. The small patch burn and very frequent fire scenario is essential to perpetuate suitable lek sites and brood rearing habitat for Attwater's prairie chicken (*Tympanicus cupido attwateri*) in this system with long growing seasons, fertile soil and quick recovery time and with habitat requirements (Kessler 1978) similar to other prairie chicken species noted by Sparks and Masters (1996). This species historically occurred as somewhat discrete populations in parts of the blackland prairie and coastal prairie (Lehmann 1965, Chamrad and Dodd 1973, Silvy and Hagen 2004, Silvy et al. 2004). Frequent fire is essential to control woody dynamics in this dissected landscape mosaic of rivers and creeks with stringers of bottomland and some upland forests (Denevan 1992; Lehmann 1965, Stewart 1951, 2002) and varying edaphic and moisture conditions (Scifres and Mutz 1975).

Adjacency or Identification Concerns

In LA this system grades coastward into marshes of the chenier plain and inland into West Gulf Coastal Plain Wetland Longleaf Savanna and Flatwoods (CES203.191). In TX this system generally grades coastward into a saline prairie or salt marsh system and inland into West Gulf Coastal Plain Wetland Longleaf Savanna and Flatwoods (CES203.191), or oak woodland vegetation. Relatively undisturbed natural depressions (potholes) occurring within the upland matrix units of this system are included in West Gulf Coastal Plain Texas-Louisiana Coastal Prairie Pondshore (CES203.541; BpS 1487). Current conditions of the coastal prairie are changed by the lack of fire use, which in turn allows invasive woody species (Chinese tallow, wax myrtle, swamp privet and eastern baccharis).

Native Uncharacteristic Conditions

Overgrazing, fire-exclusion and associated woody encroachment; conversion to agriculture.

Scale Description

Burned and unburned patches mainly 100-1000ac in size. Grazing patches follow burned patches on the landscape. Burned patches may remain open for 0-1yrs; grazing will prolong this open state.

Issues/Problems

Some estimates state that 99% of coastal prairie has been lost through conversion to other uses and environmental degradation due to the interruption of important ecological processes, such as fire / grazing, needed to maintain this system.

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Comments

Vegetation Classes

Class A	25 %	<u>Indicator Species and Canopy Position</u>	<u>Structure Data (for upper layer lifeform)</u>												
Early Development 1 All Structures		ANGE	<table border="1"> <thead> <tr> <th></th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Cover</td> <td>0 %</td> <td>70 %</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> </tbody> </table>		Min	Max	Cover	0 %	70 %	Height	Herb 0m	Herb 0.5m	Tree Size Class	None	
	Min	Max													
Cover	0 %	70 %													
Height	Herb 0m	Herb 0.5m													
Tree Size Class	None														
<u>Upper Layer Lifeform</u>		Upper													
☒ Herbaceous		FORBS													
☐ Shrub		Mid-Upper													
☐ Tree		SCSC	☐ Upper layer lifeform differs from dominant lifeform.												
<u>Fuel Model</u>		Upper													
1		SPSP													
		Upper													

Description

0- 1yrs. Open. Burned in last year. 'Sweet' regrowth that may occasionally be grazed (local intensive grazing). Cover of bare ground, forbs and annuals will be higher in this open box. Post fire community that is short duration (often weeks-depending on time of burning) before transitioning into one of the other community stages. Succession post inundation with water proceeds in a different manner through a sedge then bunchgrass stage. Transition to class B the following year. Grazing by bison and also herbivory by geese will occur frequently in this class (every three years in the model) since the regrowth is the ideal food source for nutrition. Flooding (every 10yrs) will maintain this class.

NOTE -- most of the grazing will occur in this box. Native ungulates will concentrate on recently burned patches. Although ecologically very important grazing not included in this model because it would be closely associated (spatially and temporally) with burned patches.

Class B	60 %	<u>Indicator Species and Canopy Position</u>	<u>Structure Data (for upper layer lifeform)</u>												
Mid Development 1 Closed		SCSC	<table border="1"> <thead> <tr> <th></th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Cover</td> <td>71 %</td> <td>100 %</td> </tr> <tr> <td>Height</td> <td>Herb 0.6m</td> <td>Herb >1.1m</td> </tr> <tr> <td>Tree Size Class</td> <td colspan="2">None</td> </tr> </tbody> </table>		Min	Max	Cover	71 %	100 %	Height	Herb 0.6m	Herb >1.1m	Tree Size Class	None	
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Height	Herb 0.6m	Herb >1.1m													
Tree Size Class	None														
<u>Upper Layer Lifeform</u>		Upper													
☒ Herbaceous		PAVI2													
☐ Shrub		Upper													
☐ Tree		ANGE	☐ Upper layer lifeform differs from dominant lifeform.												
<u>Fuel Model</u>		Upper													
3		SONU2													
		Upper													

Description

Closed. Two years plus old with disturbance. Mix of live and standing dead herbaceous biomass. Cover dominated by grasses. This class remains in class B until replacement fire takes it to class A (every four years). Grazing by bison and also herbivory by geese will occur frequently in this class (every three years in the model) since the regrowth is the ideal food source for nutrition. Flooding will maintain this class (10yr interval). This class moves class to C without fire.

NOTE -- grazing is not explicitly included in this model. Local grazing would lengthen the fire return interval. This model assumes an intact grassland landscape with episodic (not chronic) grazing pressure.

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Class C 5 %

Mid Development 1 Open

Upper Layer Lifeform

- ☐ Herbaceous
☒ Shrub
☐ Tree

Fuel Model

3

Indicator Species and Canopy Position

ANGE
 Mid-Upper
 SPSP
 Mid-Upper
 MOCE2
 Upper
 BAHA
 Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	31 %	60 %
Height	Shrub 0m	Shrub 3.0m
Tree Size Class	None	

- ☒ Upper layer lifeform differs from dominant lifeform.

Grass will still be the dominant type however shrubs will be increasing without disturbance.

Description

3-6yrs old without disturbance (fire after eight years). Replacement fire every five years moves to class A. Flooding events every 10yrs moves the class to B. Tallgrass dominated but with a persistent woody component, tillering and overall plant vigor reduced by mulching effect from accumulation of ungrazed, unburned plant litter. Over short periods of fire exclusion woody encroachment will rapidly occur. The woody element will also increase following drought and over-utilization of herbaceous plants. Can go from tree seedling/sapling to large trees (D class). Three meters is taller than the species actually get in this class - maximum height is probably closer to two meters.

Class D 10 %

Late Development 1 Closed

Upper Layer Lifeform

- ☐ Herbaceous
☒ Shrub
☐ Tree

Fuel Model

4

Indicator Species and Canopy Position

MOCE2
 Upper
 BAHA
 Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	61 %	100 %
Height	Shrub 1.1m	Shrub 3.0m
Tree Size Class	None	

- ☐ Upper layer lifeform differs from dominant lifeform.

Description

Eight years plus. Closed. 'Un-burned' greater than six years old. The grass component is reduced or eliminated by the shrub canopy closure. Moderate intensity mixed fire will move this class to C (10yr interval).

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**

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Fire Regime Group:** II

Historical Fire Size (acres)

Avg 500

Min 10

Max 10000

Sources of Fire Regime Data

- ☐ Literature
☐ Local Data
☒ Expert Estimate

Additional Disturbances Modeled

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

Fire Intervals

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	5	1	6	0.2	95
Mixed	100			0.01	5
Surface					
All Fires	5			0.21001	

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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