Ecological site R150BY530TX
Northern Coastal Sand

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

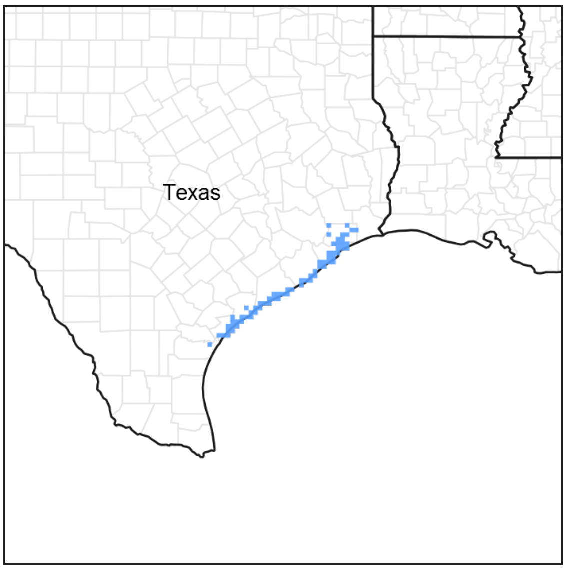


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 150B–Gulf Coast Saline Prairies

MLRA 150B is in the West Gulf Coastal Plain Section of the Coastal Plain Province of the Atlantic Plain and entirely in Texas. It makes up about 3,420 square miles. It is characterized by nearly level to gently sloping coastal lowland plains dissected by rivers and streams that flow toward the Gulf of Mexico. Barrier islands and coastal beaches are included. The lowest parts of the area are covered by high tides, and the rest are periodically covered by storm tides. Parts of the area have been worked by wind, and the sandy areas have gently undulating to irregular topography because of low mounds or dunes. Broad, shallow flood plains are along streams flowing into the bays. Elevation generally ranges from sea level to about 10 feet, but it is as much as 25 feet on some of the dunes. Local relief is mainly less than 3 feet. The towns of Groves, Texas City, Galveston, Lake Jackson, and Freeport are in the northern half of this area. The towns of South Padre Island, Loyola Beach, Corpus Christi, and Port Lavaca are in the southern half. Interstate 37 terminates in Corpus Christi, and Interstate 45 terminates in Galveston.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 150B

Ecological site concept

Northern Coastal Sands are sandy-textured ecological sites positioned in front and behind Coastal Dunes in areas of mean annual precipitation greater than 41inches. Northern Coastal Sands do not pond and have a water table below 40 inches.

Associated sites

R150BY713TX	**Coastal Swale** Also found on barrier flat but much lower with ponding water. Found below Low Coastal Sand.
R150BY552TX	**Tidal Flat** Located on a lower landform closer to the bay. Areas are subject to tidal flooding.
R150BY714TX	**Coastal Dune** Coastal Dunes are sandy-textured formations adjacent to the ocean or bay. The dunes are dynamic and actively move across the landscape, especially when they are devoid of vegetation.
R150BY550TX	**Northern Salt Marsh** This site is lower in the landscape and is wetter.

Similar sites

R150BY648TX	**Southern Coastal Sand** Similar landscape but different precipitation regime.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Baccharis*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Uniola paniculata*

Physiographic features

The sites are found on beach ridges and strand plains of the Coastal Plain and in the foredunes and dune fields of the Barrier Islands. This nearly level to gently sloping site formed in sandy sediments that have been reworked by wind and wave action. A water table is present approximately 30 to 60 inches below the surface during normal years. Elevation ranges from 2 to 30 feet.

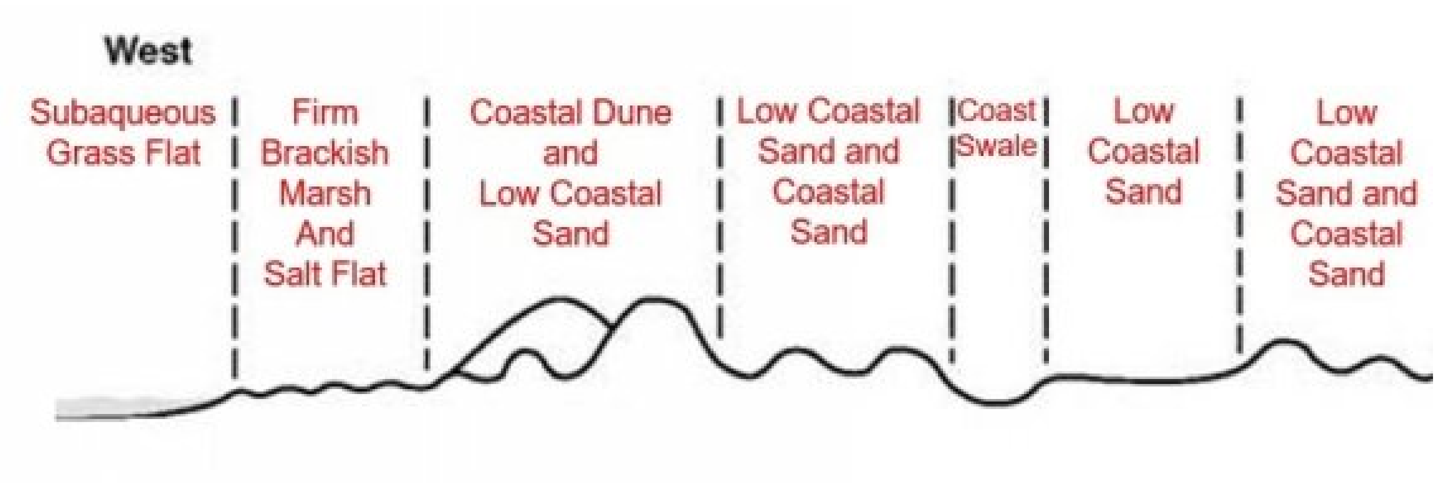


Figure 2.

Table 2. Representative physiographic features

Landforms	(1) Barrier island > Foredune (2) Barrier island > Beach ridge (3) Coastal plain > Strand plain
Runoff class	Negligible to very low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	1–9 m
Slope	0–5%
Water table depth	91–152 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is predominately maritime, controlled by the warm and very moist air masses from the Gulf of Mexico. The climate along the upper coast of the barrier islands is subtropical subhumid and the climate on the lower coast of Padre Island is subtropical semiarid (due to high evaporation rates that exceed precipitation). Almost constant sea breezes moderate the summer heat along the coast. Winters are generally warm and are occasionally interrupted by incursions of cool air from the north. Spring is mild and damaging wind and rain may occur during spring and summer months. Tropical cyclones or hurricanes can occur with wind speeds of greater than 74 mph and have the potential to cause flooding from torrential rainstorms. Despite the threat of tropical storms, the storms are rare. Throughout the year, the prevailing winds are from the southeast to south-southeast.

The average annual precipitation is 45 to 57 inches in the northeastern half of this area, 26 inches at the extreme southern tip of the area, and 30 to 45 inches in the rest of the area. Precipitation is abundant in spring and fall in the southwestern part of the area and is evenly distributed throughout the year in the northeastern part. Rainfall typically occurs as moderate-intensity, tropical storms that produce large amounts of rain during the winter. The average annual temperature is 68 to 74 degrees F. The freeze-free period averages 340 days and ranges from 315 to 365 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	246-365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	1,092-1,295 mm
Frost-free period (actual range)	236-365 days
Freeze-free period (actual range)	244-365 days
Precipitation total (actual range)	965-1,295 mm
Frost-free period (average)	314 days
Freeze-free period (average)	340 days
Precipitation total (average)	1,168 mm

Climate stations used

- (1) PORT O'CONNOR [USC00417186], Port O Connor, TX
- (2) PALACIOS MUNI AP [USW00012935], Palacios, TX
- (3) FREEPORT 2 NW [USC00413340], Freeport, TX
- (4) GALVESTON SCHOLES FLD [USW00012923], Galveston, TX
- (5) GALVESTON [USW00012944], Galveston, TX
- (6) MATAGORDA NO 2 [USC00415659], Matagorda, TX

- (7) ANGLETON BRAZORIA AP [USW00012976], Angleton, TX

Influencing water features

In some areas, the water table will be near the surface for a very brief or brief period following storms or abnormally high tides. This site normally does not flood during daily tidal events but is rarely to occasionally inundated with salt water during cyclonic storms for very brief or brief durations. Permeability is very rapid above the water table.

Wetland description

Poorly drained sites have hydric soils. Better drained sites are non-hydric but may have small areas of hydric soils Onsite investigation needed to determine local conditions.

Soil features

The soils are of very deep, moderately well to somewhat excessively drained, with very rapid permeability. Surface textures include fine sand, loamy fine sand, and sand. Soils are commonly non-saline and non-sodic. Other soil features include no to little calcium carbonate percentage and moderately acid to moderately alkaline soil reactions. Soil correlated to this site include: Galveston.

Table 4. Representative soil features

Parent material	(1) Eolian sands–igneous, metamorphic and sedimentary rock (2) Fluviomarine deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Fine sand (2) Loamy fine sand (3) Sand
Family particle size	(1) Sandy (2) Loamy
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Rapid to very rapid
Soil depth	203 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–1%
Available water capacity (0-152.4cm)	10.16–15.24 cm
Calcium carbonate equivalent (0-152.4cm)	0–2%
Electrical conductivity (0-152.4cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-152.4cm)	0–10
Soil reaction (1:1 water) (0-152.4cm)	5.6–8.4
Subsurface fragment volume <=3" (0-152.4cm)	0–1%
Subsurface fragment volume >3" (0-152.4cm)	0%

Ecological dynamics

The Texas coastline is composed of barrier islands, peninsulas, bays, estuaries, and natural or man-made passes. These mobile environments are constantly reshaped by the process of erosion and accretion. Hurricane activity can significantly change the island's environment. The Padre Island region is subdivided into habitats based on landform and vegetation. The Coastal Sand ecological lies on the bay side of the foredunes. The landforms vary from almost level to a series of low ridges and hummocky surfaces. The variety of vegetation is greater than other inland sites. The overall aspect is a grassland plain.

The plant communities are dynamic, and composition may vary dramatically with variations in annual rainfall, grazing, and fire. This landscape is typically a vegetated barrier flat unless impacted by recent hurricane activity. Because of southern proximity and nearness to the Gulf of Mexico, extreme climatic variations ranging from extended drought to hurricanes are possible. Bare ground may predominate during droughts or following hurricanes while a midgrass prairie may predominate under proper management and non-droughty periods.

This site has historically been an open prairie comprised of tall/midgrass plant community. The dominant grasses are seacoast bluestem (*Schizachyrium littorale*) and other important associated grasses include gulfdune paspalum (*Paspalum monostachyum*), and brownseed paspalum (*Paspalum plicatulum*), and seacoast dropseed (*Sporobolus virginicus*). Bare ground may dominate during droughts, following hurricanes, or other severe soil disturbance events.

Continued overuse by livestock results in a midgrass community. This community is the result from the decline of seacoast bluestem, seacoast dropseed, and other perennial grasses with an increase in brownseed paspalum, and hairawn muhly (*Muhlenbergia capillaris*). Lack of brush control and improper grazing management may result in a transition to the Shrubland State. Common shrub species include baccharis (Baccharis spp.), wax myrtle (*Morella cerifera*), greenbrier (Smilax spp.), dewberry (Rubus spp.), and prickly pear (Opuntia spp.). Nonnative invaders include Chinese tallow (*Triadica sebifera*) and saltcedar (Tamarix spp.).

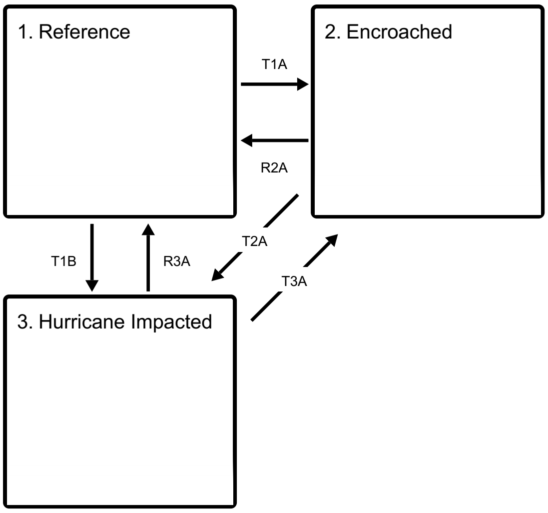
Further overgrazing will cause seacoast bluestem to be virtually absent. Threeawns (Aristida spp.), broomsedge bluestem (*Andropogon virginicus*), yankeeweed (*Eupatorium compositifolium*), ragweed (Ambrosia spp.), croton (Croton spp.), wax myrtle, wild indigo (Baptisia spp.), and sesbania (Sesbania spp.). Nonnative invaders include Smutgrass (*Sporobolus indicus*), carpetgrass (Axonopus spp.). Severe overuse results in a large amount of bare ground and blowing sand. Blowing sand further accelerates community degradation.

The intensity of a hurricane plays a large role in the plant community. Due to the extensive creeping rhizomes and ability to tolerate high salinity levels, gulfdune paspalum can survive a moderately-intensive hurricane while other species cannot. Following a hurricane, the plant community will consist of gulfdune paspalum and various annual pioneer plants. Following a severe hurricane, vegetation will be virtually devoid. Length of recovery to reference conditions will depend on the severity and the ability to defer from grazing or other major natural disturbance.

Active sand dunes occur on this site. Overuse by livestock exacerbates dune formation. Continuous dunes sometimes cover several square miles. The dunes add to landscape diversity but can pose management problems because they migrate across the landscape and may cover fences, roads, equipment, and buildings. Cutting native hay near a sand dune and mulching the dune with the hay while lightly incorporating the hay into the soil is an effective method of stabilizing dunes.

State and transition model

Ecosystem states



T1A - Absence of disturbance and natural regeneration overtime, this may be coupled with excessive grazing pressure and the introduction of non-native species

T1B - Extreme weather events coupled with soil erosion

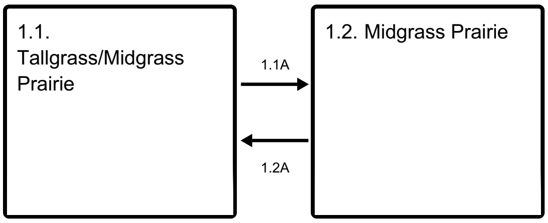
R2A - Establishment of regular disturbance return intervals and chemical/mechanic control of non-native species

T2A - Extreme weather events coupled with soil erosion

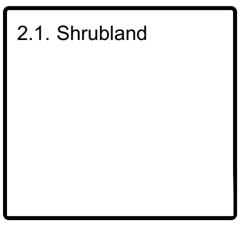
R3A - Absence of disturbance, natural regeneration overtime, and chemical/mechanical treatment of non-native species

T3A - Absence of disturbance and natural regeneration overtime

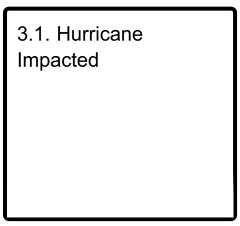
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Reference

The Reference state is considered to representative of pre-Euro settlement conditions. Historically this site was an open prairie comprised of warm-season tall/midgrasses. Community phase changes are primarily driven by severe weather events (hurricanes, drought, etc.), fire, and grazing.

Dominant plant species

- shore little bluestem (*Schizachyrium littorale*), grass
- gulfdune paspalum (*Paspalum monostachyum*), grass
- brownseed paspalum (*Paspalum plicatulum*), grass

Community 1.1
Tallgrass/Midgrass Prairie

Figure 9. 1.1 Tallgrass/Midgrass Prairie

The Tall/Midgrass Prairie Community (1.1) is the reference community. Seacoast bluestem (also known as shore little bluestem) dominates this site. Other important associated grasses include gulfdune paspalum and brownseed paspalum. It also supports a diverse understory community of perennial legumes and other forbs. Under heavy grazing and elimination of fire, the community will shift from an open tallgrass/midgrass prairie to a Midgrass Community (1.2). Like other prairie ecological sites, woody species are present, but only in sparse amounts. Occasional fires or hurricanes help manage the density of woody vegetation. Woody canopy cover exceeding 15 percent indicates a transition to the Shrubland State (2). The driving factor is the size of woody plants, which relates to reproductive capability. Because the woody species that dominate in the Shrubland State (2) are resprouting species, the transition starts to increase soon after fire or brush control ceases. Unless some form of brush control takes place, woody species will increase to the 15 percent canopy cover level that indicates a state change. This is a continual process. Managers need to monitor the increase in woody species and realize that when canopy approaches 15 percent a threshold is about to be crossed. There is a 3 to 5-year window of action before the rapid transition to the Shrubland State occurs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3026	5044	6725
Shrub/Vine	168	280	448
Forb	168	280	448
Tree	–	–	–
Total	**3362**	**5604**	**7621**

Figure 11. Plant community growth curve (percent production by month). TX7765, Tallgrass Dominant with Midgrasses Community. Tallgrass prairie dominant with midgrasses and forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	20	15	10	10	15	6	4	0

Community 1.2
Midgrass Prairie

The Midgrass Prairie Community (1.2) is the result of heavy livestock grazing over a long period of time. Seacoast bluestem decreases in vigor and production compared to the reference community (1.1). Gulfdune paspalum, brownseed paspalum, and hairawn muhly increase. Gulf cordgrass may occur in small patches within this community. It may dominate the patches, but it will not dominate the entirety. Heavy abusive grazing will reduce plant cover, litter, and mulch. Bare ground will increase and expose the soil to erosion. Litter and mulch will move off-site as plant cover declines. Water flow patterns will increase in length, and resilience to degradation will decline. Without some form of brush control, scattered woody plants (native and non-native) may invade or increase on the site. Woody species in excess of 15 percent canopy cover indicate a transition to the Shrubland State (2). Also, there is a growing concern by coastal scientists that woodrush flatsedge (*Cyperus entrerianus*) will become the next invasive plant in this area. Care should be taken to prevent establishment. If woodrush flatsedge is found, eradication should be conducted. Herbicide is an option for removal. Until the Midgrass Community (1.2) crosses the threshold into the Shrubland State (2), this community can be managed back toward the reference community (1.1) using practices including prescribed grazing, prescribed burning, and strategic brush control. It may take several years to achieve this transition depending upon climate and the aggressiveness of the treatment. Once woody species (native and non-native) begin to establish, returning fully to the reference community is difficult, but it is possible to return to a similar plant community.

Pathway 1.1A
Community 1.1 to 1.2

The Tall/Midgrass Community (1.1) will shift to a Midgrass Community (1.2) when there is continued growing-season stress on warm-season perennial tallgrass species. These stresses include extended drought periods as well as improper grazing management resulting from excessive stocking rate, insufficient critical growing season deferment, excess intensity of defoliation, repeated, long-term growing-season defoliation, long-term drought, and/or other repeated critical growing-season stress. Increaser species (lower successional midgrasses and unpalatable forbs) are generally endemic species released by disturbance. The reference plant community can be maintained through properly managed grazing that provides adequate growing season deferment to allow establishment of grass seedlings and/or the recovery of vigor of stressed plants. The driver for community shift 1.1A is improper grazing management.

Pathway 1.2A
Community 1.2 to 1.1

The Midgrass Community (1.2) will return to a Tall/Midgrass Community (1.1) with proper grazing management with proper stocking rates, sufficient critical growing season deferment, and proper grazing intensity. Favorable moisture conditions and burning prior to initiation of spring growth will accelerate this transition. The driver for community shift 1.2A is proper grazing management.

State 2
Encroached

The Encroached State is characterized by an increase of long-lived wood species, including non-native species. Woody vegetation has increased to the point where it is controlling site processes including energy transfer, nutrient cycling, and hydrologic cycling. Non-natives species may be present and are stable to increasing.

Dominant plant species

- baccharis (*Baccharis*), tree
- wax myrtle (*Morella cerifera*), tree
- greenbrier (*Smilax*), tree

Community 2.1
Shrubland

The Shrubland Community (2.1) has over 15 percent woody plant canopy, including baccharis, wax myrtle, greenbrier, dewberry, and prickly pear. The nonnative canopy can include saltcedar and Chinese tallow. This community results from the lack of effective brush control. Improper grazing management can accelerate the transition to the Shrubland Community (2.1). Dominant understory species generally include Midgrass Community (1.2) grasses and forbs. Forbs may increase along with shrub species. Unpalatable invaders may occupy the interspaces between trees and shrubs. Without brush control, tree canopy will continue to increase until canopy cover approaches 40 percent. Once Chinese tallow and/or saltcedar are established on a site, they can easily dominate. The site can become a near monospecific stand of tallow trees or a stand of saltcedar along with some native species. Large parts of Texas' upper coastal prairie originally dominated by little bluestem have been invaded by Chinese tallow. These Chinese tallow woodlands have altered ecosystem processes with higher primary production and changed ion concentrations in the soil. Annually, a mature tree produces an average of 100,000 seeds that are spread mainly by birds and water. In addition, stumps have the ability to resprout and roots readily develop shoots. Saltcedar is an introduced plant from Eurasia that was brought to the United States for landscape purposes. There are several species of saltcedar, some more aggressive than others. *Tamarix ramosissima* is especially invasive. Since introduction, they have naturalized all across the United States in numerous floodplains, river bottoms, marshes, and drainages. They prefer to grow in moist environments but can tolerate a wide range of growing conditions. Saltcedar is a rapid growing plant and capable of reproducing vegetatively and by seed. Like Chinese tallow, a saltcedar produces large amounts of seeds, up to 500,000 per year and germinates within 24 hours following dispersal. Controlling saltcedar is an ongoing process. Some methods of control include burning, chopping, herbicide treatment. However, treatments are short-lived because saltcedar has the ability to resprout from the roots and vegetatively. Several treatments should be combined to help manage saltcedar. Mechanical and/or chemical treatments followed with a regular prescribed burn schedule are a viable treatment option for restoration of this site back to the Prairie State (1). Before woody plant density becomes excessive, individual plant treatment may be a viable option. If density of desirable herbaceous understory has decreased substantially, reseeding may be needed along with brush control. Another form of natural shrub control for this community is a hurricane or a storm surge. Most shrubs found in this community are intolerant of salinity thus decrease in numbers.

State 3
Hurricane Impacted

This state is the result of a severe weather event. High winds have resulting in scoured areas and buried vegetation. Severity of impacts is related to hurricane intensity.

Dominant plant species

- gulfdune paspalum (*Paspalum monostachyum*), grass

Community 3.1
Hurricane Impacted

This plant community is a hurricane-induced state. The vegetation has been "burned" due to high salinity content carried by high winds laden with coastal water. Vegetation has also been buried under thick sediment deposits of sand. Some areas are scoured and devoid of vegetation and may temporarily suffer complete vegetative loss. This community can return to the Tallgrass Prairie State (1) given enough time for the vegetation to recover. Inappropriate management practices (improper grazing management) can slow the speed of recovery and is dependent on the severity of hurricane disturbance and pre-disturbance conditions. The intensity of a hurricane plays a large role on the overall impact. Gulfdune paspalum can survive a moderately intensive hurricane while other plant species cannot. This is due to the extensive creeping rhizomes as well as the plant's ability to tolerate higher salinity levels. Following a hurricane, the plant community will consist of gulfdune paspalum and annual pioneer plant species. Following a severely intensive hurricane, the site will be virtually devoid of vegetation.

Transition T1A
State 1 to 2

Lack of fire or effective brush control will lead to an increase in woody species. When the woody canopy cover exceeds 15 percent, the site transitions to the Shrubland State (2). Improper grazing management can accelerate this transition. The driver for the Transition T1A is lack of effective brush management, lack of fire, and improper grazing management. Any of the plant communities in the Prairie State can transition to the Shrubland State (2).

Transition T1B
State 1 to 3

The driver is a strong hurricane which floods the site and causes severe soil erosion and/or deposition. Vegetation typically dies from exposure to high salinity from the sea water driven over the site by high winds, from soil erosion that exposes roots, or from being buried under thick sediment or debris deposits. Vegetation loss on these sites varies depending on hurricane severity and can be driven by high winds or high water.

Restoration pathway R2A
State 2 to 1

If sufficient native species remain, brush management combined with proper grazing management may be sufficient to drive the community through this restoration pathway. If not, reseeding may be necessary. The driver of this restoration pathway is proper grazing management combined with brush control and/or fire.

Transition T2A
State 2 to 3

The driver is a strong hurricane which floods the site and causes severe soil erosion and/or deposition. Vegetation typically dies from exposure to high salinity from the sea water driven over the site by high winds, from soil erosion that exposes roots, or from being buried under thick sediment or debris deposits. Vegetation loss on these sites varies depending on hurricane severity and can be driven by high winds or high water.

Restoration pathway R3A
State 3 to 1

With time, the Hurricane Impacted State (3) can recover and return to the Prairie State (1) under appropriate management practices. Remnant desirable species and adequate seed bank of desirable species facilitate this restoration pathway. The driver for this restoration pathway is time, activities that promote desirable species establishment, and the absence of invasive species establishment. If unwanted shrubs establish, quick intervention with brush management will also be needed for restoration.

Transition T3A
State 3 to 2

The Hurricane Impacted State (3) can transition to the Shrubland State (2). The driver for this restoration pathway is time. The presence of woody propagules and lack of quick intervention of brush management can and the absence of invasive species establishment.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm-season tallgrasses**			1121–4573	
	shore little bluestem	SCLI11	*Schizachyrium littorale*	1121–4573	–
2	**Warm-season midgrasses**			673–1524	
	gulfdune paspalum	PAMO4	*Paspalum monostachyum*	560–1121	–
	saltmeadow cordgrass	SPPA	*Spartina patens*	448–897	–
	broomsedge bluestem	ANVI2	*Andropogon virginicus*	673–897	–
	bushy bluestem	ANGL2	*Andropogon glomeratus*	448–673	–
3	**Other grasses**			168–381	
	seaoats	UNPA	*Uniola paniculata*	0–224	–
	hairawn muhly	MUCA2	*Muhlenbergia capillaris*	84–112	–
	bitter panicgrass	PAAM2	*Panicum amarum*	84–112	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	56–84	–
4	**Grasslikes**			168–381	
	sedge	CAREX	*Carex*	112–224	–
	rush	JUNCU	*Juncus*	112–224	–
Forb					
5	**Forbs**			168–448	
	bundleflower	DESMA	*Desmanthus*	84–140	–
	snoutbean	RHYNC2	*Rhynchosia*	84–140	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	84–140	–
	sensitive plant	MIMOS	*Mimosa*	84–140	–
	phlox	PHLOX	*Phlox*	56–112	–
	groundcherry	PHYSA	*Physalis*	56–112	–
	camphor daisy	RAPH2	*Rayjacksonia phyllocephala*	56–112	–
	croton	CROTO	*Croton*	56–112	–
	hydrocotyle	HYDRO2	*Hydrocotyle*	56–112	–
	ragweed	AMBRO	*Ambrosia*	56–112	–
	false indigo	AMORP	*Amorpha*	56–112	–
	wild indigo	BAPTI	*Baptisia*	56–112	–
	bushy seaside tansy	BOFR	*Borrichia frutescens*	28–84	–
	Forb, annual	2FA	*Forb, annual*	28–84	–
Shrub/Vine					
6	**Shrubs**			168–448	
	baccharis	BACCH	*Baccharis*	112–336	–
	wax myrtle	MOCE2	*Morella cerifera*	112–336	–
	pricklypear	OPUNT	*Opuntia*	112–336	–
	blackberry	RUBUS	*Rubus*	112–336	–
	greenbrier	SMILA2	*Smilax*	112–336	–

Animal community

The animal communities of the Coastal Prairie communities are influenced by fresh and salt water inundations.

Cattle and many species of wildlife make extensive use of the site. White-tailed deer may be found scattered across the prairie and are found in heavier concentrations where woody cover exists. Feral hogs are present and at times become abundant. Coyotes are abundant and fill the mammalian predator niche. Rodent populations rise during drier periods and fall during periods of inundation. Alligators are locally abundant and make frequent use of the marshes depending on salt concentrations in the marshes.

The region is a major flyway for waterfowl and migrating birds. Hundreds of thousands of ducks, geese, and sandhill cranes abound during winter. Whooping cranes are an important endangered species that occur in the area, especially near Aransas National Wildlife Refuge. Northern harriers are common predatory birds seen patrolling marshes. Curlews, plovers, sandpipers, and willets are shorebirds that make use of the tidal areas. Seagulls and terns are plentiful throughout the year trolling the shores as well. Further inland, rails, gallinules, and moorhens make use of the brackish marshes.

Hydrological functions

In the Prairie State, infiltration into the sandy soils of this site in the Prairie State (1) is rapid. However, because of landscape position, this site receives seepage water from adjacent sites and may be inundated following extensive rains from both rainfall and seepage. Runoff and erosion from rainwater are seldom a problem. Occasional high tides can lead to either erosion on the site or bury the site with sand and mud, under extreme hurricane conditions; this can lead to the Hurricane Impacted State (3).

Improper grazing management reduces the composition of bunchgrasses and reduces ground cover (resulting in a transition to the Midgrass Community (1.2). This decreases the function of the water cycle; infiltration declines and runoff increases due to poor ground cover, rainfall splash, low organic matter, and poor structure. Combining sparse ground cover with intensive rainfall creates conditions that increase the frequency and severity of flooding. The decline in the quality of the understory component and the increase in shrub canopy cover cause soil erosion to accelerate, surface runoff quality to decline, and sedimentation to increase.

In the Shrubland State hydrology Functions in the Shrubland State (2) are similar to those in the Prairie State (1), as canopy cover is high and infiltration rapid. Under domination by woody species, especially mesquite, interception of rainfall by tree canopies increases. This reduces the amount of rainfall reaching the soil surface. The funneling effect of the canopy increases stemflow and soil moisture at tree bases. Trees have increased transpiration compared to grasses. The increased transpiration reduces the amount of water available for other plants to use. An increase in woody canopy creates a decline in grass cover, which has similar impacts as those described for improper grazing above.

Recreational uses

The beach area is a popular tourist designation throughout the year. Bird watching and saltwater fishing are other recreational uses.

Inventory data references

Information presented was derived from the Coastal Sand Range Site Description, NRCS clipping data, literature, field observations, and personal contacts with range-trained personnel.

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Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high-intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Mike Stellbauer, Zone RMS, Bryan, TX
Contact for lead author	979-846-4814
Date	07/12/2009
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** Uncommon.

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than 20 percent bare ground randomly distributed throughout.

5. **Number of gullies and erosion associated with gullies:** None.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None, except for hurricane-induced scouring.

7. **Amount of litter movement (describe size and distance expected to travel):** Small to medium sized litter may move short distances during intense storms.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class ranges 4 to 6 at surface. Soil surface is resistant to erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 42 inches of very dark gray loamy fine sand. SOM is 1 to 2 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Under reference conditions, this tallgrass prairie, with adequate litter and little bare ground, provides for maximum infiltration and little runoff under normal rainfall events.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season tallgrasses

    Sub-dominant: Warm-season midgrasses Forbs

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses due to their growth habit will exhibit some mortality and decadence, though very slight.

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14. **Average percent litter cover (%) and depth (in):** Litter is primarily herbaceous.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 3,000 to 6,800 pounds per acre.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Chinese tallow, common bermudagrass, and bahiagrass are the primary invaders.

17. **Perennial plant reproductive capability:** All species should be capable of reproducing except for periods of prolonged drought conditions, heavy natural herbivory, and intense wild fires.