

The Coastal Sand Plain of Southern Texas

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The Coastal Sand Plain consists of more than 2 million acres of rangeland in southern Texas characterized by unique history, geology, climate, and biotic communities. It borders the shallow waters of the Laguna Madre on the east and extends inland about 60 miles to meet the Brush Country of the Rio Grande Plain on the west and south-west. The region borders Baffin Bay and the Coastal Prairie on the north and the lower Rio Grande Valley on the south.

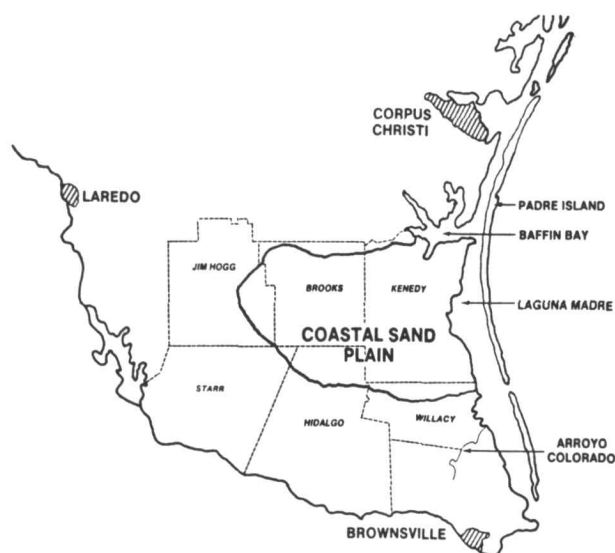


Fig. 1. Location of the Coastal Sand Plain in southern Texas.

Despite its size and unique biotic communities, many biogeographers do not classify the Sand Plain as a distinct vegetational region. It has been lumped into the "Texas Savanna" or considered part of the Coastal Prairie. Other unique areas of rangeland, such as the Nebraska Sandhills, are well-known to ecologists and laymen alike. The Sand Plain deserves recognition as a unique area of rangeland.

History of Settlement

Spanish explorers first visited south Texas in the 17th century. Major settlements were established in the 18th century to the north of the Sand Plain along the San Antonio River and south of the region along the lower Rio Grande River, but lack of permanent water supplies kept the Sand Plain sparsely populated.

The Sand Plain was divided into several Spanish and Mexican Land Grants in the late 1700s and early 1800s. These included the San Juan de Carricitos Grant, granted by Spain to Don Jose Narcisco Cabazos in 1792, which comprised 601,657 acres in present-day Hidalgo, Kenedy, and Willacy Counties (Texas General Land Office, 1988). It was the largest grant made in southern Texas. Cabazos went into possession of the grant with 900 head of livestock. His heirs remained in possession after his death until most of them were driven off by Indians in 1811.

Jean Louis Berlandier, a French botanist, traversed the Sand Plain while traveling from Matamoros to Goliad in 1834. The region was sparsely populated and he encountered no dwellings between the Rancho del Animas (about 39 miles north of the Arroyo Colorado in present-day Cameron County) and Santa Gertrudis (near present-day Kingsville). He described the region as a "wilderness of plains" that was "covered with small forests of oaks" and remarked that it was grazed by cattle and large herds of wild horses (Berlandier 1980).

Mexico ordered its citizens to move south of the Rio Grande after the battle of San Jacinto in 1836. Many of the descendants of the original land grantees obeyed, abandoning their land and livestock (Smith 1986). The region became the domain of outlaws, Indians, and stray Mexican livestock. Forays by Comanches, Lipan Apaches, and outlaws from south of the Rio Grande held ranching efforts to a minimum until after the Mexican War. Wild horses were so abundant in the region during the 1840's and 1850's that early travellers referred to it as the "Wild Horse Desert" (Inglis 1964).

Several soldiers crossed the Sand Plain during the Mexican War and commented on the vegetation. Kirby-Smith traveled across the area in 1846 and called it a sandy desert (Inglis 1964). General Philip Henry Sheridan was equally unimpressed with the countryside when he crossed it the same year and remarked, "If I possessed both Texas and hell, I'd rent out Texas and live in hell" (Coole 1952; in Lehmann 1984).

Although the land appeared desolate to many early travelers, the large herds of wild horses and cattle on the Sand Plain gave evidence to others that the land was conducive to large-scale ranching (Smith 1986). In the early 1850's, the potential of the region for ranching was recognized with the establishment of several large ranches that are still in operation. Major James Durst purchased 92,996 acres of the La Barreta grant from the Balli family in 1852 for 1,600 pesos (Smith 1986). This purchase marked the beginning of the present-day Armstrong Ranch. Captain Richard King established a cow camp near present-day Kingsville in 1853 and purchased lands

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that were to become the King Ranch. Two of the 4 divisions of this immense 800,000+-acre ranch are in the Sand Plain. During this same time period Captain Mifflin Kenedy began establishing the Kenedy Ranch, which sprawls over 500,000 acres.

Geology and Soils

The Coastal Sand Plain is precisely defined by the unique geologic substrate, which consists of wind-worked Quaternary sand that is 6 feet deep in places. The ultimate origin of the sands is from deposits by early Holocene and Pleistocene precursors of rivers to the north, such as the Guadalupe, Colorado, and Brazos, and the Rio Grande to the south. The underlying layers are marine sedimentary materials of Quarternary to Tertiary age, which are exposed where the sand sheet ends. However, the reason the sands were deposited in a thick sheet in their present location is unknown.



Fig. 2. Active sand dune.

The precise extent of active dunes on the Sand Plain is unknown. They make up as much as 5% of the entire region and are concentrated in the eastern third of the area. Individual active dunes often cover 250 acres, and continuous dunes sometimes cover as much as several square miles. The maximum relief in these areas is generally about 30 feet, and the unstable dunes often grade into vegetated dunes that form dune and swale or hummocky landscapes. Large areas of wind-worked sands are almost flat, and there are few well-defined drainage systems. Numerous internally drained, ephemeral ponds derived from blow-outs or subsidence of the underlying strata dot the landscape. The downwind sides of many of these depressions have wind-deposited clay loam or sandy loam low hills, called lomas, ranging from 3 to more than 30 feet high.

Climate

The Coastal Sand Plain is located along the eastern coast of the continent in a subtropical region. This com-

bination usually produces a humid subtropical climate with little variability in annual precipitation. In Southern Texas, the climate is much drier, characterized as a subhumid-to-semiarid east-coast subtropical climate, with extreme variability in precipitation.

The subtropical subhumid-to-semiarid regimes experience high temperatures along with deficiencies of moisture. It is also characterized by a combination of high humidity and infrequent but significant killing frosts.

The seasonal distribution of rainfall is uneven, with peaks occurring in May-June and September-October, a dramatic minimum in November-March and a modest trough in July-August. About 65% of the rains, and most of the ecologically useful rains, fall in the summer. In some years, tropical storms in June to November produce large amounts of rainfall. Annual rainfall has varied from 14 to 53 inches since 1950.

Vegetation

Plant Communities

The unique geology and climate of the Sand Plain have interacted to produce a mosaic of several different habitats. These include extensive uplands with a dune and swale topography that support open grasslands dotted with large live oak mottes (groves) and smaller honey



Fig. 3. Live oak mottle surrounded by seacoast bluestem-dominated prairie.

mesquite mottes, blowing dunes, and coastal wind tidal flats and saline habitats. Uplands generally support scattered mottes of live oak or mesquite interspersed in grassland. The oak mottes are not evenly distributed across the Sand Plain, but rather form discontinuous oak belts in which mottes are commonly connected with one another and form dense forests. Together, these discontinuous oak belts cover 1/4 to 1/3 of the sand sheet.

Mesquite mottes often contain large individual trees reaching more than 30 feet in height with an understory of small shrubs. Common understory shrubs include spiny hackberry, lime prickly-ash, and bluewood.



Fig. 4. Honey mesquite mottes.

Coastal habitats of the eastern edge of the Sand Plain include extensive forblands on wind tidal flats, a gradient of salt marsh to gulf cordgrass grasslands, and extensive blowing sand dunes. Species such as glasswort and sea ox-eye are found on wind tidal flats, while smooth cordgrass and saltgrass are found in limited salt marshes. Marshhay cordgrass is important in intermediate marsh.

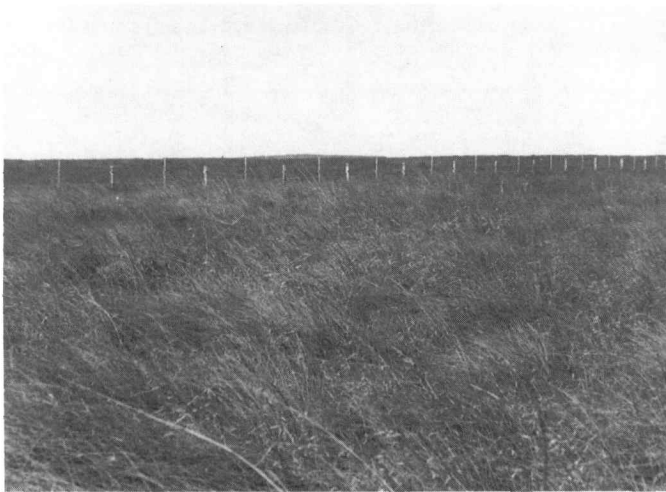


Fig. 5. Upland grassland supporting big bluestem, switchgrass, Indiangrass, and seacoast bluestem.

A grassy dune and swale landscape is characteristic of a majority of the Coastal Sand Plain. Seacoast bluestem is the prevailing dominant of all but the wettest grasslands that are not overgrazed. Camphor daisy dominates with seacoast bluestem on moderately disturbed dune ridges and well-drained flats. Grasses associated with seacoast bluestem in these habitats include crinkleawn, brown-seed paspalum, thin paspalum, Pan-American balsam-scale, and three-awns. Gulf dune paspalum dominates with seacoast bluestem in swales and moderately drained

flats. Important associates include big bluestem, gulf muhly, and Indiangrass.

Low, poorly drained grasslands where the permanent water table is seldom more than 1.5 feet below the surface are dominated by gulf cordgrass. Bushy bluestem and switchgrass may be important associates.

Ecological Affinities

The prairies to the northeast of the Sand Plain are dominated by a mixture of tall and mid grasses and thus are similar in structure to the Sand Plain. In turn, these grasslands are part of a grassland continuum that extends from Texas to Canada. Thus, the Sand Plain grasslands might be considered the southwestern-most extension of this prairie continuum if not for the unique flora and sandy substrate which make it distinctive. The prevailing dominant of the Sand Plain is seacoast bluestem, a variety of little bluestem, which in turn is the prevailing dominant of the Coastal and Blackland Prairies (Diamond and Smeins 1985; Diamond and Fulbright, in press).

Secondary grasses and forbs, however, differ greatly between the Sand Plain and grasslands to the north. For example, only 2 of 18 common forbs of upland grasslands of the Sand Plain are found among the common forbs of the Upper Coastal Prairie.

Wildlife

The dunes, mottes, and grasslands of the Sand Plain provide a distinctive mix of habitats for wildlife. White-tailed hawks, Harris hawks, crested caracaras, and black-shouldered kites are common avian predators. They and bobcats and coyotes hunt for such unique prey as northern pygmy mice, kangaroo rats, and Coue's rice rats.



Fig. 6. Keeled earless lizard.

Several of the most interesting predators of this region are now scarce or extirpated. There are still a few mountain lions and ocelots in dense mesquite thickets, and occasionally a lone black bear or gulf coast hog-nosed skunk is reported, but the jaguarundi, jaguar, and red wolf as well as the aplomado falcon are gone. Efforts are

underway to reintroduce the falcon into the subtropical savannahs of the region, which once provided the north-eastern most extent of suitable habitat for this bird.

Mottes of live oak, with their thick drapings of small bromeliads, are home to the northernmost populations for a number of other birds that can still be found on the sand sheet (Fall 1973). The tropical parula, a tiny tropical warbler that requires ball moss or a similar fiber for nest construction, lives in the oaks along with hooded orioles, ferruginous pygmy-owls, red-billed pigeons, northern beardless tyrannulets, and Couch's kingbirds.

The grasslands, dunes, and ephemeral, clay-bottomed ponds too have their own peculiar fauna. Botteri sparrows nest in the expanses of gulf cordgrass. Ord's kangaroo rat and Padre Island and keeled earless lizards blend perfectly into the dunes. Black-spotted newts, great plains narrow-mouthed toads, and lesser sirens alternate extended estivation with intensive breeding bouts in the shallow temporary ponds created by the brief and unpredictable showers characteristic of this region, which, despite annual precipitation exceeding 20 inches, has no natural permanent bodies of fresh water.

White-tailed deer, javelina, Rio Grande turkey, and northern bobwhites abound in the Sand Plain. Exotic species include feral pigs and nilgai. Nilgai are native to India and were introduced by the King Ranch in the 1930's (Sheffield 1983). The largest herd of these animals in North America is found in the eastern half of the Sand Plain.

Summary

Clearly, the geology and climate of the Sand Plain have produced an environment unlike any other, with a set of animal and plant species found nowhere else. The deep sands, unpredictable climate, and lack of permanent bodies of fresh water resulted in a history of large ownerships and sparse human population (Kenedy County, in the heart of the Sand Plain, has fewer than 1,000 residents). It is a unique and distinct region that exemplifies the essence of rangeland, land that is untamed by the plow because of factors beyond man's control.

Literature Cited

- Berlandier, J.L. 1980.** Journey to Mexico during the years 1826 to 1834. The Texas State Historical Association in cooperation with the Center for Studies in Texas History, University of Texas, Austin. (In 2 volumes).
- Diamond, D.D., and F.E. Smeins. 1985.** Composition, classification and species response patterns of remnant Tallgrass prairies in Texas. *Amer. Midl. Nat.* 113:294-308.
- Diamond, D.D., and T.E. Fulbright (In press).** Contemporary plant communities of upland grasslands of the Coastal Sand Plain, Texas. *Southwestern Nat.*
- Fall, B.A. 1973.** Noteworthy bird records from south Texas (Kenedy County). *Southwestern Nat.* 18:244-247.
- Inglis, J.M. 1964.** A history of vegetation on the Rio Grande Plain. Texas Parks and Wildlife Department Bulletin #45. Texas Parks and Wildlife Department, Austin. 122 p.
- Lehmann, V.W. 1984.** Bobwhites in the Rio Grande Plain of Texas. Texas A&M University Press, College Station.
- Sheffield, W.J. 1983.** Food habits of nilgai antelope in Texas. *J. Range Manage.* 36:316-322.
- Smith, D.S. 1986.** The Armstrong chronicle, a ranching history. Corona Publishing Co., San Antonio, Texas.
- Texas General Land Office. 1988.** Guide to Spanish and Mexican land grants in South Texas. Texas General Land Office, Austin.

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