USDA Natural Resources Conservation Service

Ecological site R150BY715TX
Firm Brackish Marsh

Last updated: 9/22/2023
Accessed: 04/23/2025

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

Firm Brackish Marshes consists of very deep, poorly drained, very slowly permeable soils on planar to concave barrier flats.

Associated sites

R150BY648TX	**Southern Coastal Sand** This site is found on the barrier flat and higher in the landscape.
R150BY650TX	**Low Coastal Sand** This site is found on the barrier flat but is slightly lower on the landscape.

Similar sites

R150BY652TX	**Southern Salt Marsh** These areas are on similar landforms but on the mainland coastal plains. More salt tolerant vegetation is located on these areas.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Spartina patens* (2) *Paspalum monostachyum*

Physiographic features

These nearly level soils are on planar to concave barrier flats. These soils are subject to occasional flooding by high storm surge from strong tropical storms and are ponded after periods of heavy rainfall. Slope ranges from 0 to 1 percent.

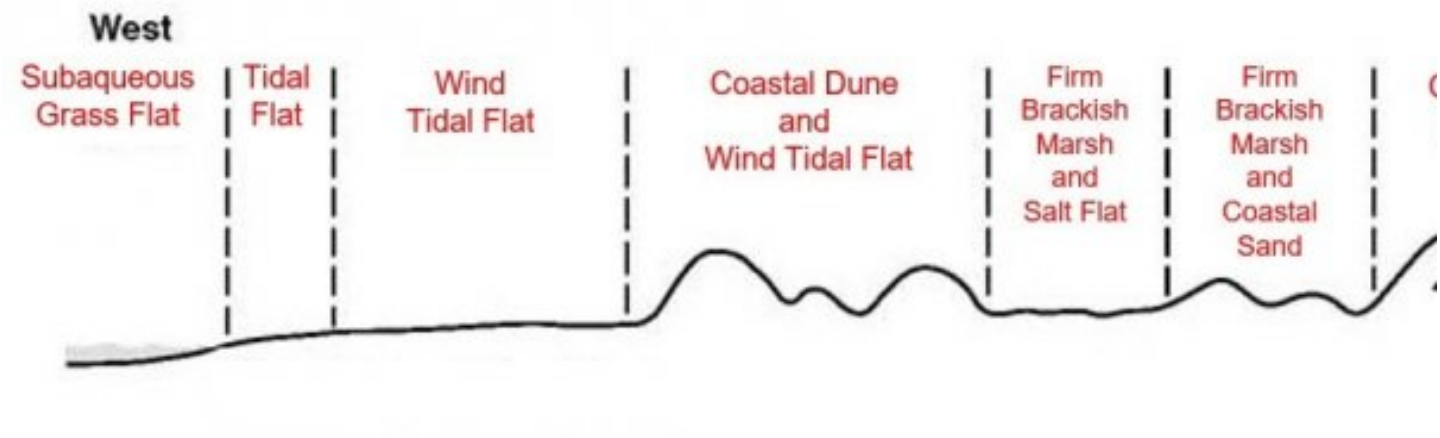


Figure 2.

Table 2. Representative physiographic features

Landforms	(1) Barrier island > Barrier flat
Runoff class	Negligible
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Frequent

Elevation	0–5 ft
Slope	0–1%
Ponding depth	0–6 in
Water table depth	0–30 in
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)	271-365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	33-44 in
Frost-free period (actual range)	249-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	28-48 in
Frost-free period (average)	329 days
Freeze-free period (average)	365 days
Precipitation total (average)	38 in

Climate stations used

- (1) PORT MANSFIELD [USC00417184], Port Mansfield, TX
- (2) PADRE IS NS [USC00416739], Padre Island Ntl Seashor, TX
- (3) ROCKPORT [USC00417704], Rockport, TX
- (4) PORT O'CONNOR [USC00417186], Port O Connor, TX
- (5) MATAGORDA NO 2 [USC00415659], Matagorda, TX
- (6) FREEPORT 2 NW [USC00413340], Freeport, TX
- (7) GALVESTON [USW00012944], Galveston, TX

Influencing water features

This is a moist to wet sandy sodic site that receives water from runoff and seepage from adjacent sites. It has a permanent water table from 10 to 30 inches throughout the year in most years and rarely if ever at the wilting point below 10 inches. Some areas are ponded or saturated for periods of time following heavy rains.

Wetland description

This site has hydric soils. Onsite investigation needed to determine local conditions.

Soil features

The site consists of very deep, poorly drained, very slowly permeable soils that formed in sandy eolian and storm washover sediments on barrier islands. The soils are light-colored, neutral to strongly alkaline and comprised of fine sands. The depth of the surface horizon is 0 to 11 inches. Surface runoff is negligible. Because of seepage from adjacent sites and the relative landscape position, a water table is present in this soil at a depth of 10 to 30 inches. Permeability is rapid above the high water table, but the overall permeability class is very slow. Soils correlated to this site include: Karankawa and Madre.

Table 4. Representative soil features

Parent material	(1) Estuarine deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Fine sand
Family particle size	(1) Sandy
Drainage class	Poorly drained
Permeability class	Very slow
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-60in)	2 in
Calcium carbonate equivalent (0-60in)	1–15%
Electrical conductivity (0-20in)	0–4 mmhos/cm
Sodium adsorption ratio (0-20in)	5–20
Soil reaction (1:1 water) (0-60in)	6.6–9
Subsurface fragment volume <=3" (20-60in)	0–8%
Subsurface fragment volume >3" (20-60in)	0–3%

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.

The site has historically been a midgrass prairie. Common abundant species include saltmarsh bulrush (Schoenoplectus robustus), gulfdune paspalum (*Paspalum monostachyum*), marshhay cordgrass (*Spartina patens*), seashore saltgrass (*Distichlis spicata*), and bushy bluestem (*Andropogon glomeratus*) with an understory of round pennywort (Hydrocotle umbellata), white-topped sedge (Rhynchosporia colorata), sea lavender (*Limonium carolinianum*), frogfruit (*Phyla lanceolata*), and other perennial grasses and forbs.

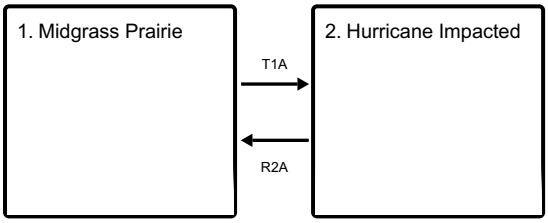
Heavy grazing by domestic livestock results in removal of the more palatable species. This community will have significantly less bulrush, gulfdune paspalum, and marshhay cordgrass, with increasing amounts of seashore saltgrass, seashore dropseed (*Sporobolus virginicus*), slimleaf rosette grass (*Dichanthelium linearifolium*), spikerush (Eleocharis spp.), shoregrass (*Monanthochloe littoralis*), frogfruit, sea purslane (Sesusvium maritimum), sea lavender, narrow-leaf sumpweed (*Iva angustifolia*), and bushy sea-oxeye (*Borrichia frutescens*). Further heavy grazing results in further the plant community being comprised of only shortgrasses and forbs.

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.

Ecological sites along the barrier islands have the capability of producing and accumulating large volumes of herbaceous biomass when ungrazed for several years. When intense spring and summer wildfires burn these areas when soil moisture is limited, the plant community will be altered somewhat. Loss of biomass opens the plant community up to sunlight and intensified soil surface temperatures; this will result in a change of the dominance of midgrasses and may result in a plant community that has significantly more forbs than reference conditions would indicate.

State and transition model

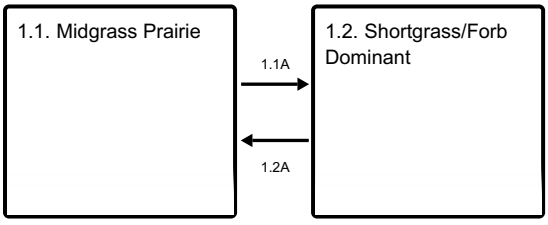
Ecosystem states



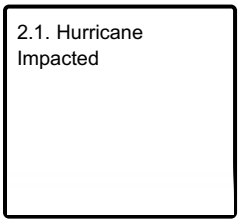
T1A - Loss of vegetative cover

R2A - Natural regeneration over time

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Midgrass Prairie

Dominant plant species

- saltmeadow cordgrass (*Spartina patens*), grass
- gulfdune paspalum (*Paspalum monostachyum*), grass

Community 1.1
Midgrass Prairie

The reference plant community an open, midgrass prairie community dominated by bulrush, gulfdune paspalum, and/or marshhay cordgrass. Other important associated grasses include bushy bluestem, seashore saltgrass, seashore dropseed, and others. This community also supports a diverse understory community of perennial forbs such as round pennnywort, frogfruit, sea lavender, and others. In the absence of fire and/or grazing, with heavy biomass accumulation, the forb community may be severely depressed due to lack of sunlight. The plant communities are dynamic and composition varies dramatically with variations in seasonal rainfall, grazing, and fire. Extreme climatic variations are possible ranging from extended drought to gulf storm surges to intense summer fires. Bare ground may exist during these episodic events while a midgrass prairie may predominate under proper management and normal rainfall.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1800	2670	3250
Forb	200	330	480
Total	**2000**	**3000**	**3730**

Figure 10. Plant community growth curve (percent production by month). TX7755, Open Warm-Season Grassland. Shortgrass community with forbs.

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

Community 1.2
Shortgrass/Forb Dominant

This community results from heavy abusive grazing with or without the presence of fire. Gulfdune paspalum, bulrush, and marshhay cordgrass are greatly reduced in this community while seashore dropseed, seashore saltgrass, spikerush, fogfruit, round pennywort, and bushy sea-oxeye increase and may dominate. Eventually, a complete loss of midgrasses will occur, and only shortgrasses and forbs will be present if continued heavy grazing continues. Overgrazing will result in plant composition of some of the prementioned species with sea lavender, sea purslane, narrow-leaf sumpweed, and in some instances shoregrass. There may also be increased amounts of bare ground.

Pathway 1.1A
Community 1.1 to 1.2

The transition to Community 1.2 occurs because of overgrazing, lack of fire, or naturally occurring drought conditions.

Pathway 1.2A
Community 1.2 to 1.1

The restoration back to Community 1.1 requires prescribed grazing, the return of prescribed fire, and/or more average rainfall conditions returning.

State 2
Hurricane Impacted

Vegetation severely reduced or absent.

Community 2.1
Hurricane Impacted

This plant community is caused by the destructive forces of hurricanes. The vegetation has been burned due to high winds laden with coastal water. Vegetation has also been buried under thick sediment deposits. Some areas are scoured and devoid of vegetation and may temporarily suffer complete vegetative loss. This community can be restored back to the Midgrass Prairie State (1) given enough time for the vegetation to recover. Usually, deferment and time are the best options for recovery.

Transition T1A
State 1 to 2

Transition to State 2 is caused by the associated effects of Hurricanes. This includes storm surges, wind scouring of plants, and burial of vegetation by sediment deposition.

Restoration pathway R2A
State 2 to 1

Restoration back to the Midgrass Prairie State (1) typically requires time and deferment of grazing. Time for recovery depends on the severity of the hurricane.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			1400–2800	
	gulfdune paspalum	PAMO4	*Paspalum monostachyum*	1400–2800	–
	saltmeadow cordgrass	SPPA	*Spartina patens*	1400–2800	–
2	**Midgrasses**			100–200	
	bushy bluestem	ANGL2	*Andropogon glomeratus*	100–200	–
3	**Shortgrasses**			100–200	
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	100–200	–
	saltgrass	DISP	*Distichlis spicata*	100–200	–
	seashore dropseed	SPVI3	*Sporobolus virginicus*	100–200	–
4	**Sedges**			160–320	
	sedge	CAREX	*Carex*	160–320	–
	spikerush	ELEOC	*Eleocharis*	160–320	–
	starrush whitetop	RHCO7	*Rhynchospora colorata*	160–320	–
5	**Shortgrass**			40–80	
	shoregrass	MOLI	*Monanthochloe littoralis*	40–80	–
Forb					
6	**Forbs**			100–200	
	manyflower marshpennywort	HYUM	*Hydrocotyle umbellata*	100–200	–
	lanceleaf fogfruit	PHLA3	*Phyla lanceolata*	100–200	–
7	**Forb**			100–200	
	blue mistflower	COCO13	*Conoclinium coelestinum*	100–200	–
	lavender thrift	LICA17	*Limonium carolinianum*	100–200	–
	slender seapurslane	SEMA3	*Sesuvium maritimum*	100–200	–
8	**Forbs**			20–40	
	camphorweed	HESU3	*Heterotheca subaxillaris*	20–40	–
	perennial saltmarsh aster	SYTE6	*Symphyotrichum tenuifolium*	20–40	–
9	**Forbs**			20–40	
	Forb, perennial	2FP	*Forb, perennial*	20–40	–

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

Infiltration into the sandy soil is slow due to a high water table. This site is a wetland and as such serves as a part of the wetland filtering system that is essential to the gulf coast. Because of landscape position, this site receives seepage water from adjacent sites and may be inundated following extensive rains from rainfall and seepage. Runoff and erosion from water are seldom a problem.

Recreational uses

The Padre Island National Seashore is a popular tourist designation throughout the year. Because the National Seashore endeavors to preserve Padre Island in its natural state, visiting the island is very much like stepping back into the past. Bird watching and saltwater fishing are other recreational uses.

Inventory data references

A team of Rangeland Management Specialists and Soil Scientists, with years of coastal field experience, made on-site field visits to evaluate the vegetation present on this site in its' various states to provide this technical Ecological Site description.

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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)	
Contact for lead author	
Date	04/23/2025
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

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:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
