USDA Natural Resources Conservation Service

Ecological site R150BY716TX
Wind Tidal Flat

Last updated: 9/22/2023
Accessed: 05/13/2025

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

Wind Tidal Flats are generally dry, but during times when conditions are right, they are inundated by water from wind action and vegetated with an algal crust.

Associated sites

R150BY651TX	**Salt Flat** This site is slightly higher, vegetated, and is further inland.
R150BY728TX	**Subaqueous Grassflat** This site is permanently submersed.
R150BY652TX	**Southern Salt Marsh** This site is located in adjacent positions and is vegetated.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Salicornia bigelovii* (2) *Bare Ground*

Physiographic features

These nearly level soils are on wind-tidal flats on the bay or lagoon side of barrier islands. These soils are subject to frequent or very frequent flooding by wind tides and tropical storms. Slope ranges from 0 to 1 percent.

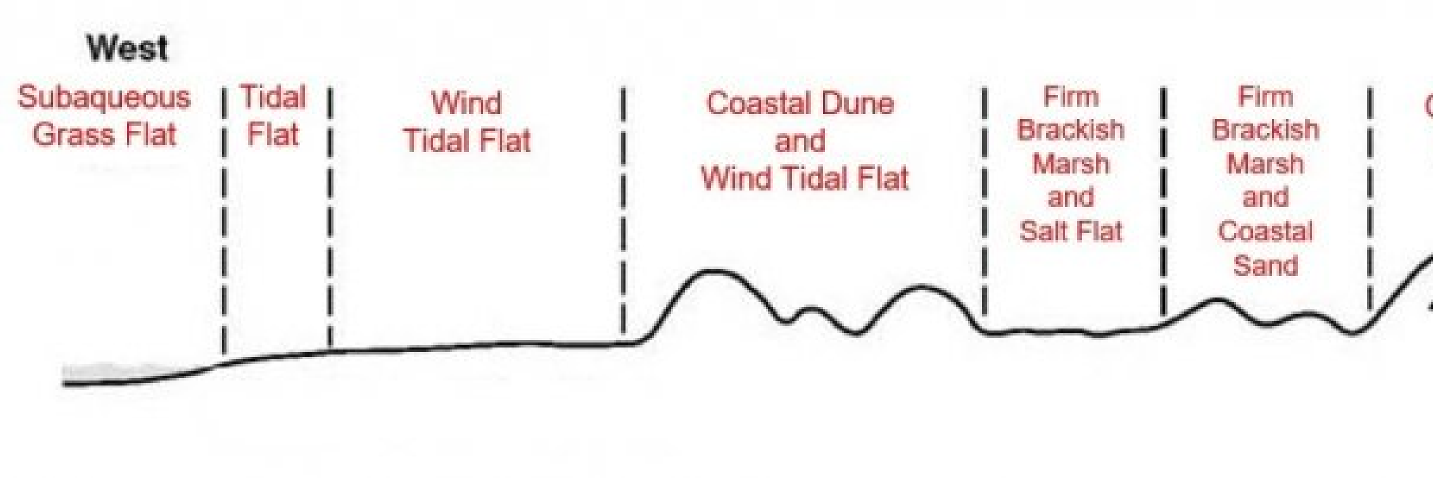

Figure 2.

Table 2. Representative physiographic features

Landforms	(1) Barrier island > Wind-tidal flat (2) Barrier island > Deflation basin
Runoff class	Negligible to high
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	Frequent to very frequent
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	0–1 m
Slope	0–1%

Ponding depth	0–30 cm
Water table depth	0–46 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)	263-365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	813-1,143 mm
Frost-free period (actual range)	251-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	711-1,270 mm
Frost-free period (average)	326 days
Freeze-free period (average)	365 days
Precipitation total (average)	991 mm

Climate stations used

- (1) GALVESTON [USW00012944], Galveston, TX
- (2) GALVESTON SCHOLES FLD [USW00012923], Galveston, TX
- (3) FREEPORT 2 NW [USC00413340], Freeport, TX
- (4) MATAGORDA NO 2 [USC00415659], Matagorda, TX
- (5) PALACIOS MUNI AP [USW00012935], Palacios, TX
- (6) PORT O'CONNOR [USC00417186], Port O Connor, TX
- (7) ARANSAS WR [USC00410305], Tivoli, TX
- (8) ROCKPORT [USC00417704], Rockport, TX
- (9) CORPUS CHRISTI NAS [USW00012926], Corpus Christi, TX
- (10) PADRE IS NS [USC00416739], Padre Island Ntl Seashor, TX
- (11) PORT MANSFIELD [USC00417184], Port Mansfield, TX
- (12) PORT ISABEL [USC00417179], Port Isabel, TX

Influencing water features

This is a wet site receiving water from runoff and flooding from wind-generated tides. It has a permanent water table at a depth of 0 to 18 inches throughout most years. Areas are flooded for brief to long periods of time.

Wetland description

These areas have hydric soils. Onsite investigation needed to determine local conditions.

Soil features

Soils are poorly or very poorly drained and runoff is negligible or low. Permeability is moderately slow to very slow. A permanent water table fluctuates between the surface to about 18 inches. These soils formed in sandy eolian and storm washover sediments of Holocene age. These soils are frequently flooded for brief periods with salt water, which occur during times of high wind that pushes water onto the wind-tidal flats, storm surge, and heavy rains associated with tropical storms. Soils correlated to this site include: Arrada, Barrada, Satatton and Tatton.

Table 4. Representative soil features

Parent material	(1) Eolian deposits–igneous, metamorphic and sedimentary rock (2) Alluvium–igneous, metamorphic and sedimentary rock
Surface texture	(1) Fine sand (2) Loamy fine sand (3) Sandy clay loam
Family particle size	(1) Sandy (2) Fine (3) Fine-loamy
Drainage class	Poorly drained
Permeability class	Moderately slow to very slow
Soil depth	0–46 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-152.4cm)	5.08–12.7 cm
Calcium carbonate equivalent (0-152.4cm)	3–10%
Electrical conductivity (0-152.4cm)	30–175 mmhos/cm
Sodium adsorption ratio (0-152.4cm)	30–125
Soil reaction (1:1 water) (0-152.4cm)	6.6–9
Subsurface fragment volume <=3" (101.6-152.4cm)	0–6%
Subsurface fragment volume >3" (101.6-152.4cm)	0–3%

Ecological dynamics

The Texas coastline is composed of barrier islands, peninsulas, bays, estuaries, and natural or man-made passes. The process of erosion and accretion constantly reshapes these mobile environments. Hurricane activity can significantly change the environment. Wind Tidal Flats lie on the bayward side of the back-island dune field. This land form is the lowest in the landscape leading into the bay or lagoon. This site is subject to frequent or very frequent flooding by wind tides and tropical storms.

Reference conditions consist of an Algal crust community. The Wind Tidal Flat is essentially barren of vegetation but has a thin benthic, blue-green algal mat consisting of cyanobacteria under the genus Lyngbea. Following short periods of inundation, halophytic vegetation consisting of glasswort (Salicornia spp.), dwarf saltwort (Salacornia virginica), sea lavender (Limonium spp.), and sea purselane (Sesuvium spp.). The presence of this community is short-lived however, due to the surface salinity rising as the surface dries eventually becoming toxic to the plants. The algal crust will also dry up and curl at the edges causing the site to look like a large mud flat area.

State and transition model

Ecosystem states

1. Algal Crust

State 1 submodel, plant communities

1.1. Algal Crust

State 1
Algal Crust

Dominant plant species

- dwarf saltwort (*Salicornia bigelovii*), other herbaceous

Community 1.1
Algal Crust

Figure 9. 1.1 Algal Crust Community

Figure 10. Close-up view of an algal mat

The reference community is dominated by an algal crust on the surface of the soil. Following inundation by climatic events, this area will populate with halophytic vegetation such as glasswort, dwarf saltwort, sea lavender, and sea purslane. The surface salinity rises as the surface dries, and eventually becomes toxic to the plants. The algal crust will also dry up curling at the edges resulting in this site looking like a large mud flat.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Forb	–	6	17
Grass/Grasslike	–	–	–
Shrub/Vine	–	–	–
Total	**–**	**6**	**17**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	5%
Non-vascular plants	95%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Forb					
1	**Forbs**			6–17	
	lavender thrift	LICA17	*Limonium carolinianum*	6–17	–
	Virginia glasswort	SADE10	*Salicornia depressa*	6–17	–
	pickleweed	SALIC	*Salicornia*	6–17	–
	slender seapurslane	SEMA3	*Sesuvium maritimum*	6–17	–

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 soils of this site is slow due to the high water table. However, because of the level terrain and proximity to the Gulf of Mexico, this site may be inundated periodically.

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 is popular. However, the algal crust is extremely sensitive to damage. Any physical impact to this algal crust will take many years to recover.

Other information

None.

Inventory data references

A team of range specialists and soil scientists, with years of coastal field experience, made onsite field visits to evaluate the vegetation present to provide this technical ecological site description.

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Approval

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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	05/13/2025
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:

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

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

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

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:**

17. **Perennial plant reproductive capability:**