USDA Natural Resources Conservation Service

Ecological site R151XY673TX
INTERMEDIATE Firm MARSH

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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): 151X–Gulf Coast Marsh

Major land resource area (MLRA)151, Gulf Coast Marsh, is in Louisiana (95 percent), Texas (4 percent), and Mississippi (1 percent). It makes up about 8,495 square miles (22,015 square kilometers). The towns of Gretna, Chalmette, and Marrero, Louisiana, and the city of New Orleans, Louisiana, are in the eastern part of this MLRA. The town of Port Arthur, Texas, is in the western part. Interstate 10 and U.S. Highway 90 cross the area. The New Orleans Naval Air Station is in this MLRA. Fort Jackson, overlooking the mouth of the Mississippi River, and the Jean Lafitte National Historic Park and Preserve are in the MLRA. A number of national wildlife refuges and State parks occur throughout this area. MLRA 151 is a very complex ecosystem with active deltaic development and subsidence with extreme anthropogenic impact by man with construction of flood protection levees and channelization occurring on the eastern portion of the MLRA. The Western portion of the MLRA is more stable in that portions of the landscape is protected naturally by the Chenier's, although there is Anthropogenic affects of the interior due to channelization for navigation.

Classification relationships

Major Land Resource Area (MLRA) and Land Resource Unit (LRU) (USDA-Natural Resources Conservation Service, 2006)
The Natural Communities of Louisiana - (Louisiana Natural Heritage Program - Louisiana Department of Wildlife and Fisheries)

Ecological site concept

The central concept of this site is somewhat isolated from salt water intrusion. The salinity ranges are never high but there is some salinity in the soil that will manifest itself during periods of dry weather. The best indicator plant on this site is seashore Paspalum. Lesser amounts of California bulrush, Olney bulrush, softstem bulrush, marshhay cordgrass, spikesedges, seedbox, Colorado River hemp, and cattails are also found. Elevation, drainage, salinity, water depth, and duration play a major role in the vegetation. Small areas of open water are also included. These areas are important to waterfowl and other wildlife because habitat diversity. Water salinity level varies throughout the year. Fresher water is indicated by the presence of narrowleaf cattail, seedbox, whorled pennywort, and softstem bulrush.

Associated sites

R151XY676TX	**INTERMEDIATE Fluid MARSH** Intermediate Fluid Marsh is more Fluid than the intermediate Firm Marsh Site, similar plant communities.

Similar sites

R151XY009LA	**Fresh Firm Mineral Marsh 60-64 PZ** The Fresh Firm Marsh Site is similar in landscape position but the salinity range of the Intermediate Firm Site is higher, therefore the species composition and production will be less.
R151XY005LA	**Brackish Firm Mineral Marsh 55-64 PZ** The Brackish Firm Marsh Site is similar in landscape position but the salinity range of the Intermediate Firm Site is lower, therefore the species composition and production will be more.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

These areas are on low gulf coastal intermediate marshes at elevations of 1 foot or less. Slopes range from 0 to 0.1 percent. The soils formed in moderately thick herbaceous organic materials overlying fluid clayey or silty sediments. The unconsolidated mineral and organic sediments are too soft for cattle to graze. These areas flood very frequently and frequently with salt water during high tides and remain ponded for very long duration, and have influences of Fresh water which mitigates this affect.

Table 2. Representative physiographic features

Landforms	(1) Marsh (2) Delta plain
Flooding duration	Very long (more than 30 days)
Flooding frequency	Frequent to very frequent
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	0 m
Slope	0%
Ponding depth	0–30 cm
Water table depth	0–15 cm
Aspect	Aspect is not a significant factor

Climatic features

The following climatic data is from the weather station listed below. Site specific weather data should be used for land management decision making. For site specific weather conditions, obtain data from a weather station close to the site.

Winds effect surface water levels on this site. Southerly winds tend to elevate tides and prevent fresh water run off. Northerly winds lower tides in the Gulf and allow water to escape from shallow marshes and bays. Strong cold fronts periodically deplete all surface water until the winds subside and incoming tides return.

Severe tropical storms occur about once every 10 years and lesser strength storms once every five years. The main tropical storm months are August and September but a storm may occur as late as October.

Table 3. Representative climatic features

Frost-free period (average)	253 days
Freeze-free period (average)	290 days
Precipitation total (average)	1,600 mm

Climate stations used

- (1) PORT ARTHUR SE TX AP [USW00012917], Port Arthur, TX

Influencing water features

Marsh ecosystems are characterized by unique vegetative and hydrologic factors. Salinity, depth of water, duration of inundation, and slight differences in elevation determine the kinds of plants that can persist in marsh ecosystems. Frequent to very frequent flooding occurs as the result of high water from up-stream and from occasional tidal surge. Because of the flat slopes and concave surface of these areas, these floodwaters become trapped, resulting in surface ponding of long duration. Several factors may affect salinity and/or water depth as well as duration of inundation:

Natural Factors:
•Upstream Hydrology – the duration of flooding is influenced by the volume of water discharged upstream (runoff) in the hydrologic unit. This may be a permanent or transient feature of the water regime.

•Tidal Exchange – all marsh ecosystems are affected to some degree by tidal exchange.
•Salinity – the amount of salt per unit volume of water is a limiting factor in determining which plants can persist in a marsh ecosystem. Measured in parts per thousand (ppt). Relatively few plants can tolerate prolonged exposure or inundation to waters with high salt concentrations. Salinity level in the Intermediate Marsh is range from 0 to less than 8 ppt.

Human Induced Factors
•Navigation Enhancement – canals and realignment of natural water courses may have catastrophic effects on marsh ecosystems. These features can inject salt water into areas that previously had lower levels of salinity, and/or they may prolong salt water inundation. Navigation features are frequently deeper than previous natural hydrologic conduits. Salt water is heavier than fresh water and creates a salt water wedge below the fresher surface water in a canal or other navigation feature. In marshes near the Gulf of Mexico or adjacent natural water bodies, navigation features can alter the duration and salinity of tidal flux.

•Salt Water Sills or Barriers – these structural measures limit tidal flow. They are usually in a navigable stream or canal and are designed to limit the amount and/or duration of saline inundation.

•Water Control Structures – these structures are designed to maintain optimum water depth in a hydrologic or management unit. They may be used to manipulate water depth for wildlife, moderate salinity levels, and enhance vegetation management.

Soil features

The soil series in this site concept are Barnett, Harris, Ijam & Leerco. They are very deep, very poorly drained, very slowly permeable firm mineral soils that formed in mineral sediments of Coastal Marshes. Surface runoff and internal drainage are lacking. The soil is permanently saturated to the surface. The soils can support the weight of livestock.

Table 4. Representative soil features

Family particle size	(1) Clayey
Drainage class	Very poorly drained
Permeability class	Slow
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm

Ecological dynamics

This is a permanently saturated or flooded wetland site that occurs along the immediate upper Texas coastline as a broad, nearly level, coastal flat. The vegetation of the site is entirely influenced by elevation, daily tidal inundation, and salinity levels. Natural shallow drains and ponds are interspersed throughout the site.

Subsidence, a drop in land elevation, may cause a transitional shift from a marsh plant community to a deep open water state. Subsidence may occur naturally or be influenced by human activities such as pumping from wells or the creation of navigation channels. As subsidence progresses, vegetation is submerged and may weaken and die. Loss of anchoring vegetation and subsequent subaqueous erosion of surface sediment and organic detritus through current or wave action moves the site to a deep open water state. Transition back to the marsh state will only occur when water depths are reduced and the vegetative community has been re-established by planting or natural regeneration.

Prescribed fire is a tool that can be used to maintain this site. Fires occuring when the marsh is dry may remove the organic matter that anchors the herbaceous plant community and allow currents, tides, or wave action to sweep surface sediments and plants away resulting in a deep open water state.

State and transition model

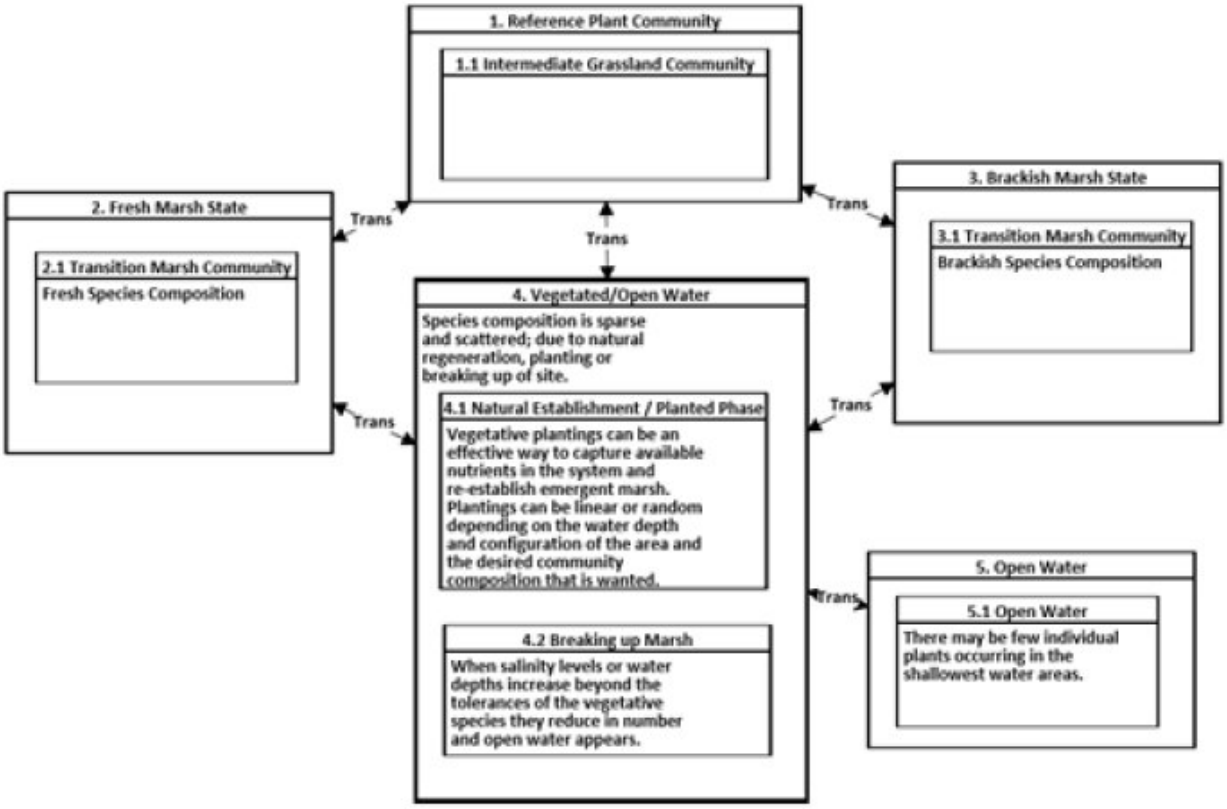

Figure 6. DRAFT STM

T 1-2	Salinity levels decrease, species numbers increase (more diversity), Fresh Species increase.
R 2-1	Salinity Levels Increase, More Intermediate species.
T 1-3	Salinity levels increase, Brackish Species increase.
R 3-1	Salinity Levels Decrease, More Intermediate species.
T 1-4	Increased water Depth or Salinity, reduces number of plants in an area. Open water area increases.
R 4-1	Reduced water Depth, plants increase or planted and colonizing site. Open water area decrease.
T 2-4	Increased water Depth or Salinity, reduces number of plants in an area. Open water area increases.
R 4-2	Reduced water Depth or Salinity, plants increase or planted and colonizing site. Open water area decrease.
T 3-4	Increased water Depth or Salinity, reduces number of plants in an area. Open water area increases.
R 4-3	Reduced water Depth, plants increase or planted and colonizing site. Open water area decrease.
T 4-5	Increased water Depth or Salinity, reduces number of plants in an area. Open water area increases.
R 5-4	Reduced water Depth or Salinity, plants increase or planted and colonizing site. Open water area decrease.

Figure 7. DRAFT LEGEND

State 1
Reference Plant Community

Intermediate marsh—Typical vegetation is frequently dominated by: *Leptochloa fusca*, *Panicum virgatum*, *Paspalum vaginatum*, *Phragmites australis*, or *Schoenoplectus americanus*. Both intermediate and brackish marshes can be dominated by *Spartina patens*, but intermediate marshes dominated by *Spartina patens* have a higher species richness often including *Sagittaria lancifolia*, *Schoenoplectus americanus*, Eleocharis spp., and (or) Cyperus spp.

Community 1.1
Intermediate Grassland Community

State 2
Fresh Marsh State

Fresh marsh—Typical vegetation is frequently dominated by *Panicum hemitomon*, *Sagittaria lancifolia*, *Eleocharis*

baldwinii, or Cladium jamaicense. Other than these dominant plants, the following species primarily occur in fresh marsh: *Boehmeria cylindrica*, *Cephalanthus occidentalis*, *Colocasia esculenta*, *Decodon verticillatus*, *Nymphaea odorata*, *Sagittaria latifolia*, *Sagittaria platyphylla*, *Schoenoplectus deltarum*, and *Triadenum virginicum*.

Community 2.1
Transition Marsh Community

Fresh Species Composition

State 3
Brackish Marsh State

Brackish marsh—Typical vegetation is often dominated by *Spartina patens* but is occasionally dominated by *Spartina cynosuroides*, *Spartina spartinae*, or Bolboschoenus robustus. Both intermediate and brackish marshes can be dominated by *Spartina patens*, but brackish marshes dominated by *Spartina patens* typically have a small number of other species such as *Spartina alterniflora*, *Distichlis spicata*, *Juncus roemerianus*, or Bolboschoenus robustus.

Community 3.1
Transition Marsh Community

Brackish Species Composition

State 4
Vegetated/Open Water

Marsh plants exist in a delicate balance with water depth and salinity levels. When this balance is altered, the plant community adapts to the new regime. The Vegetated/Open Water community is dominated by Species best suited to conditions where the system is breaking up or where open areas have been planted as part of a restoration effort. This phase requires knowledge of the landscape to determine whether it has been planted or is breaking up.

Community 4.1
Natural Establishment / Planted Phase

Vegetative plantings can be an effective way to capture available nutrients in the system and re-establish emergent marsh. Plantings can be linear or random depending on the water depth and configuration of the area and the desired community composition that is wanted.

Community 4.2
Breaking up Marsh

When salinity levels or water depths increase beyond the tolerances of the vegetative species they reduce in number and open water appears.

State 5
Open Water

Marsh plants exist in a delicate balance with water depth and salinity levels. When this balance is altered, the plant community adapts to the new regime. The Open Water community is where the system is breaking up or where open water ponds exist within the landscape. This phase requires knowledge of the landscape to determine whether it is breaking up. The open water areas within a planning unit are beneficial for wildlife, but require monitoring to insure that they are not enlarging due to erosion of the shorelines which can be a symptom of a marsh unit that it deteriorating.

Community 5.1
Open Water

There may be few individual plants occurring in the shallowest water areas.

Transition 1
State 1 to 2

Salinity levels decrease, species numbers increase (more diversity), Fresh Species increase.

Transition 2
State 1 to 3

Salinity levels increase, Brackish Species increase.

Transition 4
State 1 to 4

Increased water Depth or Salinity, reduces number of plants in an area. Open water area increases.

Restoration pathway 1
State 2 to 1

Salinity Levels Increase, More Intermediate species.

Transition 1
State 2 to 3

Salinity levels increase, Brackish Species increase.

Transition 2
State 2 to 4

Increased water Depth or Salinity, reduces number of plants in an area. Open water area increases.

Restoration pathway 1
State 3 to 1

Salinity Levels Decrease, More Intermediate species.

Transition 1
State 3 to 4

Increased water Depth or Salinity, reduces number of plants in an area. Open water area increases.

Transition 1
State 4 to 1

Reduced water Depth, plants increase or planted and colonizing site. Open water area decrease.

Restoration pathway 1
State 4 to 1

Reduced water Depth, plants increase or planted and colonizing site. Open water area decrease.

Restoration pathway 2
State 4 to 2

Reduced water Depth or Salinity, plants increase or planted and colonizing site. Open water area decrease.

Transition 2
State 4 to 2

Reduced water Depth or Salinity, plants increase or planted and colonizing site. Open water area decrease.

Restoration pathway 3
State 4 to 3

Reduced water Depth, plants increase or planted and colonizing site. Open water area decrease.

Transition 3
State 4 to 3

Reduced water Depth, plants increase or planted and colonizing site. Open water area decrease.

Restoration pathway 1
State 5 to 4

Reduced water Depth or Salinity, plants increase or planted and colonizing site. Open water area decrease.

Additional community tables

Type locality

Location 1: Jefferson County, TX

Other references

NRCS Soil Surveys for Coastal Parish & Counties in LA & TX.
NRCS NASIS soils database.
Marsh Ecological Site Descriptions (LA & TX).
Sasser, C.E., Visser, J.M., Mouton, Edmond, Linscombe, Jeb, and Hartley, S.B., 2014, Vegetation types in coastal Louisiana in 2013: U.S. Geological Survey

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
Contact for lead author	Mike Stellbauer, Zone RMS, NRCS, Bryan, Texas
Date	09/22/2005
Approved by	
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:** None

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):** Little to no bare ground.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter movement is uncommon for HCPC under normal conditions.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is resistant to erosion. Soil stability class range is expected to be 5-6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The soil surface structure is about 12 inches thick very dark gray mucky peat. SOM is 20-60%.

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

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

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/grass-likes >>

    Sub-dominant: Cool-season tallgrasses >

    Other: Warm-season forbs

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Decadence of warm-season perennial tallgrasses/grass-likes is normal and contributes to the high percentage of organic matter that characterizes the site.

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):** 6000# for below average moisture years to 10000# for above average moisture years.

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:** No common invaders occur on site.

17. **Perennial plant reproductive capability:** All perennial plants should be capable of reproducing.