SAVING TEXAS’ LARGEST FRESHWATER MARSHES
Stephanie L. Gonzales, PE

Abstract

The Salt Bayou Watershed comprises over 100,000 acres of fresh and brackish marshes on the upper Texas Coast, in Jefferson County. Over half this area lies within the boundaries of the McFaddin National Wildlife Refuge (Refuge). In recent history, the beach ridge separating the Gulf from interior marshes was sufficiently high to prevent sea water inundation, with the exception of storm surge episodes associated with significant tropical storms or hurricanes.

The dune system has been decimated over the years by ongoing annual erosion, seasonal storm events, and hurricanes. Shoreline retreat has accelerated from historic rates around -20 feet per year, to as much as -40 feet per year in places. Hurricane Ike flattened much of the remaining beach ridge, moving a significant amount of sand outside the active profile either seaward onto the continental shelf or landward into the marsh. The loss of sand from the active beach system has eroded the dune crest, reducing elevations to the extent that sea water now routinely inundates the formerly fresh and brackish marsh in the Refuge interior. Taking no action would result in marsh loss on a massive scale and Gulf shoreline retreat measured in miles, rather than in feet, until it reaches one of the busiest segments of the Gulf Intracoastal Waterway (GIWW).

Presented herein is an overview of a multi-phase, interagency project designed to reduce seawater inundation into the sensitive interior wetlands of the Refuge during high tide events and low to mid energy storm events.

The initial part of the solution (Phase I and II) involves the construction of a clay core berm 600-ft landward of the current high water line to reduce the occurrences of seawater inundation within the interior marshes. Design criteria for berm crest elevation, cross-sectional dimensions, and materials are presented. In addition, “weak links” designed in the berm for the purpose of draining seawater back toward the Gulf is discussed. Construction is near completion, and the berm has already “proved its worth” preventing seawater inundation into the marshes during extreme high tide events and Tropical Storm Bill.

Phase III of the project includes the restoration of the beach and dune ridge along the Refuge shoreline. The historic wide sandy beaches and dunes along the shoreline have been decimated to
the extent the Pleistocene clay underpinning is exposed along much of the shoreline. Potential borrow sources, construction alternatives, sediment delivery and configuration are discussed.

**Key Words:** dune restoration, beach nourishment, seawater inundation

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**Bio**

Stephanie Gonzales studied Coastal Engineering at Texas A&M University. In her 4 years of working with a dredging contractor, she completed various beach nourishment and channel deepening projects along the East Coast. She currently works as an engineering consultant in Houston completing coastal work consisting of the design, evaluation and permitting of various shore protection projects including bulkheads, docks, and beach nourishment.

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