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# SEVERE EROSION OF TEXAS BEACHES CAUSED BY ENGINEERING MODIFICATIONS TO THE COAST AND RIVERS

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Nearly all of the Gulf beaches of Texas are undergoing rapid erosion. The only beaches that are not eroding are located adjacent to jettied inlets, at river deltas where the river flows directly into the Gulf and in the longshore sediment convergence zone of Central Padre Island. Extremely severe beach erosion has been occurring on Bolivar Peninsula in the vicinity of Rollover Pass, West Galveston Island, Surfside on Follets Island, Quintana Beach, Sargent Beach, and South Padre Island.

Prior to the 20th century, most, if not all, of these beaches were either stable or accreting. Construction of major shoreline engineering structures commenced in 1876 with the construction of the Bolivar Roads jetties at Galveston. This was followed by major jetties at other inlets in order to protect the channels at shipping ports. Some manmade inlets have also caused massive beach erosion by trapping sand at their jetties, allowing large amounts of beach sand to flow through them into the bay, and allowing strong ebb tides to jet sand offshore beyond the reach of the longshore sediment transport system. In addition, the few rivers flowing to the coast were dammed for flood control and to build water supply reservoirs. River mouths were diverted from their original Gulf shoreline locations to new positions, in effect moving their deltas. Finally, extraction of groundwater for industrial use has caused compactional subsidence and relative rise in sea level.

The jetties have compartmentalized the coast and prevent the longshore sediment transport system in the surf from carrying sand past the jetties to the down-drift beaches on the other side of the inlets. For instance the East Galveston jetty at Bolivar Roads has captured over 28 million cubic yards of sand since construction of the jetty in 1876. Rollover Pass on Bolivar Peninsula has caused the annual loss of over 250,000 cubic yards of beach sand through the pass into Rollover Bay and the Gulf Intracoastal Waterway, causing massive erosion of the beaches west of Rollover Pass. Rapid development of the low, narrow and fragile barrier island at South Padre Island is occurring at the same time that sand is no longer brought to the coast by the Rio Grande River because nearly all of its water is used upstream. At times, the river mouth is completely closed by a bar.

The net result of these manmade changes in the Gulf Coast and rivers of Texas has resulted in severe and accelerating beach erosion along much of the Gulf shoreline, at the same time that development is exploding as more Texans want to vacation or live on the Gulf beaches. The manmade changes that have caused this massive erosion cannot be undone, if we are to have water supplies and ports for Texas. It will be necessary to use beach nourishment and/or more engineering structures to protect valuable Gulf-front property and to provide recreational beaches for present and future Texans.

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