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Tigertail Lagoon / Sand Dollar Island



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by US Army Engineer Research and Development Center



Marco Island, Florida, United States

Increasing coastal resiliency through a multitiered coastal barrier

system. Shaped by the natural sand bypassing processes at the Big Marco River, landward migration of emergent shoals since the 1990s has formed a lagoon sheltered by an attached sand spit known as Sand Dollar Island. Natural processes led to continued landward migration of the spit, pinching the tidal channel and reducing coastal protection. The mangrove-lined back bay was next to be eroded. The Tigertail Lagoon and Sand Dollar Island Ecosystem Restoration project area lies on the northwest part of Marco Island in a state-administered Critical Wildlife Area adjacent to the City of Marco Island, Florida, a barrier island community with over 16,000 full-time residents that rises to over 40,000 during winter months. The project restored the three-kilometer-long sand spit, a coastal lagoon, and mangrove shorelines by reestablishing an adequate flow channel. Restoration of the sand spit and lagoon provides continued and enhanced coastal protection to over a quarter of the Gulf-facing shoreline while maintaining a large and productive natural coastal ecosystem that is accessible to the public. Adaptive management of this area will ensure that

the natural environmental functions of this dynamic coastal system will remain in place, providing habitat and coastal protection into the future.

Article Cover: Aerial view of the flow channel and restored wetland.

Restoration of over eight hectares of lost tidal wetlands occurred since 2017. A tidal flow channel was established, reconnecting the lagoon south end at Tigertail Beach Park with gulf tidal flow. (Photo by Humiston & Moore Engineers)

Producing Efficiencies

The highly productive lagoon habitat, consisting of hectares of mangroves, seagrass beds, and shallow foraging areas, was in decline as the Sand Dollar Island spit migrated landward, covering seagrasses and eventually reaching the mangroves. Restoration of this ecological system included relocating the existing spit seaward to where it was approximately five years ago. This enlarged the existing waterway to prior conditions and provided enhanced sediment management at the Big Marco River, where excess shoaling required frequent maintenance dredging. The project established a sand trap where nuisance sediment is accumulating, using that to reconstruct the thinning and retreating Sand Dollar Island spit.

Using Natural Processes

The project relocated nuisance sediment shoaling to areas where it provides enhanced protection from wave and coastal storm impacts. Sand from Sand Dollar Island erodes either toward the sand trap or adjacent Marco Island Beaches, providing supply to that area, creating a natural cycle and beneficial downdrift effects. This beneficial use of dredged materials will ensure continued supply to downdrift beaches and provide natural recirculation to the sand trap. Periodic maintenance of this sand spit will provide coastal protection that is adaptive to sea level rise.





Aerial view of flow channel preconstruction. Restoration of the gulf shoreline improved tidal flushing, water quality, and recreational park attractions.

(Photo by Humiston & Moore Engineers)

Broadening Benefits

The Tigertail Lagoon and Sand Dollar Island ecosystem is a protected natural preserve and a critical wildlife area that provides valuable habitat for a variety of birds, sea turtles, manatees, and seagrasses and valuable Marco Island recreational resources for residents and tourists for birding, fishing, kayaking, paddle boarding, kitesurfing, and, on the northern half, boating. The project design included enhanced terrestrial habitat for shorebirds and nesting sea turtles. Beneficial use of sediment was applied by taking sediment from the areas of shoaling to be applied to areas of erosion and retreat, providing economic and sustainable adaptability for future management.



Aerial view of the lagoon entrance postconstruction.

(Photo by Humiston & Moore Engineers)

Promoting Collaboration

Project design elements included integrated efforts with the upland community, the City of Marco Island, state and federal agencies, Rookery

Bay National Estuarine Research Reserve, and Critical Wildlife Area administration to maintain the integrity of the natural barriers system for protection and management of coastal flooding vulnerability and wildlife habitat. Community outreach included engagement and feedback from local groups, such as Friends of Tigertail Beach and the upland property owners. Designs were provided and input solicited from each stakeholder throughout the design and permitting stages. This led to several design modifications to incorporate additional beneficial features.



American flamingo (*Phoenicopterus ruber*) present in Tigertail Beach Park. The beach is one of 510 points on the Great Florida Birding and Wildlife Trail and is considered one of the best all-around birding spots in southwest Florida.

(Photo by Jack Hartfelder, Turrell Hall & Associates)



Beachgoers enjoying postrestoration conditions along Tigertail Beach Park.

(Photo by Mohamed Dabees, Humiston & Moore Engineers, and Jack Hartfelder, Turrell Hall & Associates)



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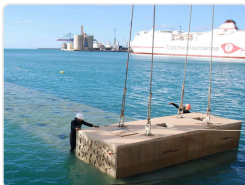
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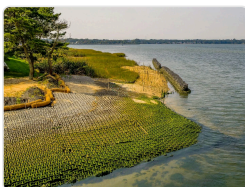
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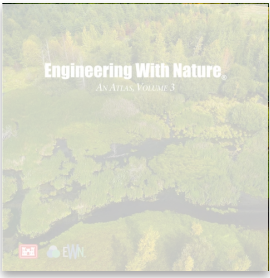
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