

DELAWARE BAY MISPILLION INLET ENVIRONMENTAL RESTORATION PROJECT

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The Delaware Department of Natural Resources and Environmental Control (DNREC) has received grants from Hurricane Sandy funding to rehabilitate and improve environmental functionality and sustainability for areas along the Delaware Bay shoreline. The Mispillion Inlet Complex near Milford, Delaware was one of the projects selected due to its importance as habitat for both American Horseshoe Crabs (*Limulus polyphemus*) and shorebirds, specifically the threatened species Rufa Red Knot (*Calidris canutus rufa*). The complex includes the Mispillion River and Cedar Creek that connect at Mispillion Inlet and provide access for tidal flow and navigation into the Delaware Bay via federally-authorized and maintained channels. Efforts to stabilize Mispillion Inlet first occurred in 1859 when a 560-foot long timber pile jetty was constructed along the north side of the inlet. In 1908 a south jetty was constructed, and in subsequent years, several additional jetty extensions were made to a total length of about 5,800 feet. In 1985, the barrier spit separating Mispillion River and the Delaware Bay north of the inlet breached and was subsequently closed with a stone dike and sand fill. Two years later, the repaired area was breached again, followed by placement of more rock and sand.

At Mispillion Inlet, migratory shorebirds and horseshoe crabs have an important connection. In late spring, red knots, ruddy turnstones, sanderlings, short- and long-billed dowagers, black bellied plovers, and semi-plated and least sandpipers stop at the Inlet to feast on the freshly laid horseshoe crab eggs. The Delaware Bay supports a large aggregation of these birds (>500,000 individuals) and is numerically one of the most important migratory stopover points in North America. As the sandy habitat in Mispillion River and Cedar Creek erodes, the amount of suitable habitat for horseshoe crab spawning and shorebird feasting decreases, threatening both populations.

Beginning in 2011, erosion has occurred behind the stone dike at the north end, and tidal flow has created a channel between the stone dike and the beach. This eroded area has increased the potential for a new breach which could cause undesirable changes to the hydrodynamics of the system, as well as possibly completely eroding the sand beach used by the shorebirds and crabs. The primary goal of this project was to design structural and non-structural options for restoring habitat and stabilizing the eroding shorelines in this area. The work consisted of an assessment of existing conditions at Mispillion Inlet, and the development of wave, hydrodynamic and sediment transport models to assist with the design.

The design analysis consisted of evaluating topography and bathymetry, water levels including sea level rise, river discharge and tidal currents, wind conditions and wave conditions. The wave studies were used to develop armor stone sizes, crest elevations and side slopes of the coastal rock structures. Beach sand samples were collected to assist with specifying grain size distribution of

the fill material. The hydrodynamic model was used to evaluate potential erosion of the fill and provide information for design of the beachfill platform.

The design included rehabilitation of the existing stone dike, construction of new rock groins and placement of sand for beach nourishment adjacent to the stone dike and along the Mispillion River. This paper will provide details of the plans for the project, as well as showing results of the completed project.

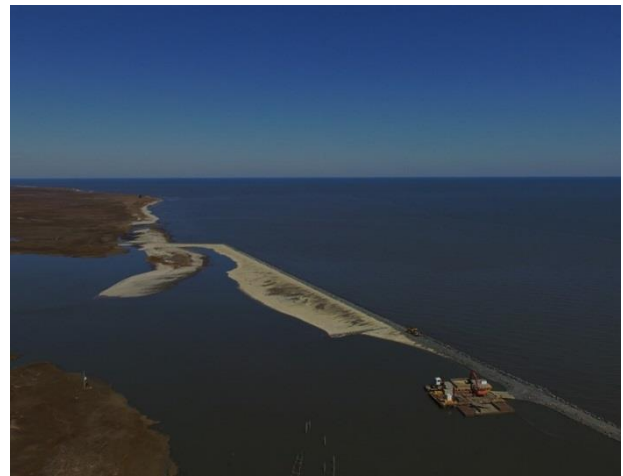


Figure 1 - Stone Dike and Sand Fill Construction at Mispillion Inlet, Looking North

The majority of the project was completed in time for the migration of the horseshoe crabs and Rufa Red Knot. The new beach area was extensively utilized by the birds and the project was a success in achieving the desired goals.



Figure 1 - Horseshoe Crabs and Red Knots at Mispillion