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Mermaids return to Coney Island

After Hurricane Sandy's 2012 visit, the mermaids, mermen – and US Army Corps of Engineers – are back at New York's Coney Island, reports **Dr JoAnne Castagna**

Waves of colourful sea creatures and mermaids flooded the Coney Island Boardwalk in Brooklyn, New York, this summer for the annual Mermaid Parade. Almost a year earlier, in the very same spot, the massive waves driven by Hurricane Sandy stormed ashore in not such a festive mood.

In late October of 2012, Sandy's 80 mph winds and 9.1m-high waves pounded the eastern coast of the United States, with New York and New Jersey hit especially hard.

After the superstorm retreated, leaving the beach in a mess, it seemed the parade – which draws thousands of costumed participants each year – would not return. But it, and the mermaids, did so and showed tremendous community support for an event that, somewhat ironically, is a celebration of the sea.

Also returning to Coney Island Beach is

the US Army Corps of Engineers (USACE), New York district. The beach is one of its many coastal projects and one of the first beaches where it is replenishing sand that was lost to Sandy. This work's part of a multi-phase programme the district is performing for coastal communities to help reduce risks from future storms.

Post-Sandy

Immediately after the storm, USACE was on the ground responding, through its own teams as well as providing disaster response assistance for the Federal Emergency Management Agency. Sandy was responsible for 60 deaths and also caused \$19Bn in damages and removed millions of cubic metres of sand from miles of coast. This sand loss makes coastal communities extremely vulnerable to future storms. In January 2013, Congress signed the

Hurricane Sandy Disaster Relief Appropriations Act of 2013, or the 'Sandy Bill', giving the Army Corps funding and the authority to take steps to restore coastal projects and navigation channels impacted by Sandy and reduce risk from storms to coastal communities in the northeast of the country.

The Corps is carrying out this mission in several simultaneous steps. Right now, districts in the northeast are repairing and restoring previously constructed coastal projects impacted by Sandy, which includes replacing lost sand on beaches. They are also progressing on projects and studies that were under way before Sandy.

In addition, the Corps' North Atlantic Division (NAD), of which the New York district is a part, is working on the North Atlantic Coast Comprehensive Study that will provide strategies to help reduce risk from storms to coastal communities.

Bringing back the sand

Hurricane Sandy removed roughly 7M m³ of sand from New York district's coastal projects in New York and northern New Jersey. USACE is replacing this sand and restoring previously built dunes and beach berms (see IHS DPCs passim), as well as repairing other risk reduction features such as levees and tide gates.

Restoring coastal projects, including replacing lost sand, is important to reducing coastal storm risks in the future. A beach's size, shape and sand volume help determine



Post-replenishment Coney Island Beach

Greg Kohl, AC Photos

how well the beach can reduce risk to a developed community during a storm or hurricane. These elements offer a level of natural protection by absorbing and dissipating the energy of breaking waves and storm surge, an offshore rise of water.

The Corps is not only replacing the sand that was lost to Sandy, it's also adding more to restore beach projects back to their originally constructed designs.

The district is dredging 13M m³ of sand from navigation inlets and offshore borrow areas, and placing it on five coastal projects in New York and two in New Jersey:

- In New York this includes Coney Island, Rockaway Beach, Gilgo Beach, West of Shinnecock Inlet and Westhampton, plus a risk reduction project in Oakwood Beach, Staten Island, that involves repairing a damaged levee and tide gate
- In New Jersey it includes the Sea Bright to Manasquan Project (see IHS DPC Nov 2013) and the Keansburg Project – Keansburg, East Keansburg and Laurence Harbor – which involves sand replenishment and repairs to levees damaged by Sandy.

All of this work is expected to be completed by 3Q/2014.

Offshore too

While Sandy's onshore results are highly visible, many people aren't aware of the offshore impact, especially on the region's navigation channels. As part of post-Sandy recovery efforts, the Corps is also restoring dozens of navigation channels and structures throughout the northeast that were impacted. This includes repairing breakwaters, jetties, bulkheads and revetments, as well as dredging federal navigation channels that were altered as a result of Sandy. New York district has already begun this work and expects to complete it all by 2Q/2015.

In order to reduce costs and increase efficiency, the district is combining missions by using sand dredged from navigation channels to restore beach projects where feasible. "By using the sand that we're removing from the navigation channels and inlets to restore the beaches, we're not only getting navigational benefits, but also beach benefits," said John Tavoraro, USACE-NY's operations division deputy chief. "Since we don't have to send out a dredge specifically to gather sand to restore a beach, we are saving money that can be



used for other Sandy-affected projects."

For years the district's maintained coastal projects in New York and New Jersey and, while the massive storm overwhelmed most coastal risk-reduction projects, they still helped mitigate damage during the storm.

"Our projects are designed to reduce the level of damage from more frequent lower intensity storms, but I do believe our coastal projects did minimise Sandy's impact," said Anthony Ciorra, USACE-NY's coastal restoration and special projects branch chief. "Areas that had our projects fared better than areas that didn't. These projects didn't

be finalised by the time you read this.

Westhampton, along the south shore of Long Island, New York, was another area that performed well during Sandy, Ciorra noted. "In Westhampton, where we'd constructed a dune and berm, there was less damage to that community than in nearby areas that didn't have any projects," he said.

Even projects not necessarily designed to reduce risk, such as the Jamaica Bay marsh islands restoration, may provide a blueprint for future approaches to coastal storm damage risk reduction. "Marsh islands can act as a natural protective buffer to the mainland behind them by dispersing wave energy during storms," said Lisa Baron, USACE-NY's district project manager. "These wetlands and other ecological habitats, such as dunes and reefs, are examples of nature-based infrastructure that contribute to coastal resiliency and ecosystem sustainability within the region and will aid in our defense against more frequent and lower level storms."



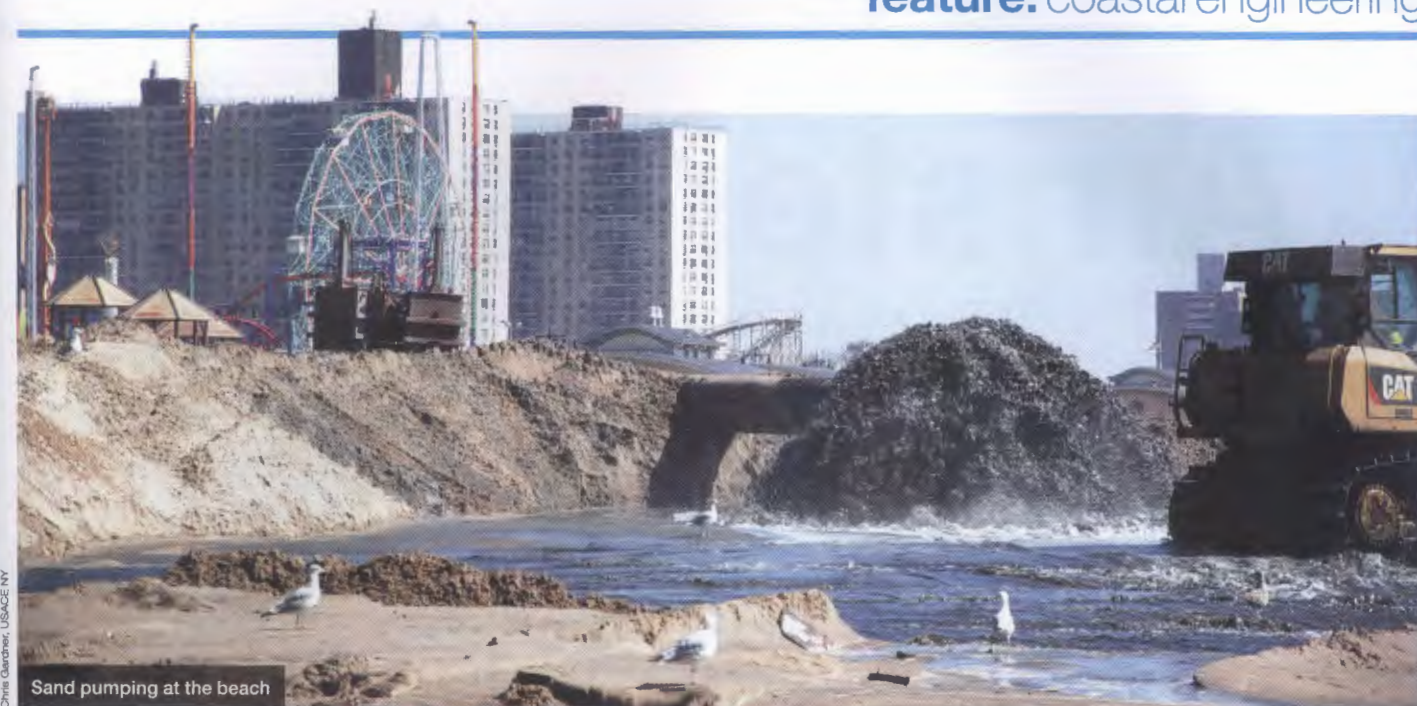
totally eliminate damages, but definitely minimised them."

The New York City Mayor's office agreed, stating that the first phase of the risk reduction project at Plumb Beach probably prevented a breach of the adjacent highway, protecting a vital transportation link.

Work on the second phase – including construction of groins and a breakwater to ensure the longer-term resiliency of the dune and beach berm – is ongoing and should

The next Sandy?

Before Sandy, New York district had several Congress-authorized projects that had not yet been built due to factors ranging from lack of federal/non-federal funds to local opposition/lack of support. The district also had several studies under way looking at coastal risk reduction for communities in New York and northern New Jersey. After Sandy, and with funding from the Sandy Bill, USACE-NY is co-ordinating with local partners to move these projects toward



Sand pumping at the beach

construction, advance the ongoing studies, and incorporate lessons learned from Sandy.

The Sandy Bill called on NAD to study ways to help reduce storm risks to coastal communities throughout the northeastern United States, so NAD assembled a team of professionals from its own district offices, plus federal, state and local agencies and academia, to collaborate on the North Atlantic Coast Comprehensive Study, which looked at nearly 50,000km of coast from Northern Virginia to Maine.

The goal is to come up with a framework of strategies that can be used by agencies to protect coastal communities. They are studying 38 coastal areas to see how they can be better protected by using various measures, such as dunes, flood walls, and bulkheads, to name just a few. Presently, the team is considering almost 30 different risk

management measures, including some from the City of New York's recently published Special Initiative for Rebuilding and Resiliency report.

"We're trying to place the right combination of measures in the right coastal locations based on the area's infrastructure, population, social and environmental vulnerabilities," said team member Lynn Bocamazo of USACE-NY's engineering division.

Fellow team member Donald Cresitello of the district's planning division said: "There's a lot of interest in this study, especially from communities that were severely impacted by Sandy and have no federal projects or studies in their area. They want to be assured they're going to be included in the study and have some risk reduction from future storms."

Ciorra added: "Most of our projects are designed to reduce the damage level of more frequent lower intensity storms. The team has to develop a more robust plan because storms like Sandy could become more frequent in the future – from once in 500 years to once in 100 years."

The strategies under development are geared towards reducing the risk from a 100-year storm event, and the team is also adding 91cm of storm water to its calculations to account for a potential century of rising sea level.

"What's going to be beneficial from this study is that it will provide agencies with valuable information they can use to save time and resources on future studies. The environmental and economic analysis and models that will come from this study will already be prepared for others to benefit from," Bocamazo concluded.

Finally...

The study will be completed in January 2015 and a draft will be available to the public for review and comment this winter (www.nad.usace.army.mil/CompStudy). Ultimately, the public will benefit from it, Ciorra noted.

"Next summer people are going to be very surprised at how significantly their beaches are going to change – they're going to be much bigger and wider. This work is going to be challenging and exciting. The Corps has been give a unique opportunity – and we're expected to deliver." DPC

>> www.nad.usace.army.mil/Sandy



Sea Bright NJ's beach replenished with sand