



The Corps

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helps restore
Chesapeake Bay coastlines,
marshes

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Highlighting Environmental Operating Principle #1

Fostering sustainability as a way of life

Engineering with Nature

Baltimore District strives to restore Chesapeake Bay islands, marshes

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The coastal islands and marshes of Chesapeake Bay are disappearing. Within the last half century, cumulative effects of shoreline erosion, subsidence, inadequate sediment supply and sea level rise, have accelerated the rate of island submergence.

Danielle Szimanski, project manager, U.S. Army Corps of Engineers, Baltimore District, wants to help reverse this trend. One island at a time.

Since 2013, the Baltimore District has restored 34 acres of island habitat using 650,000 cubic yards of dredged, shallow water channel sediments.

"I am a biologist and ecologist, not an engineer, and if I can help the environment, while meeting our core mission goals then that is

what I am going to do," said Szimanski of her goal to restore islands in the Maryland waters of the Chesapeake Bay.

But, she doesn't want to stop there.

She plans to help Baltimore District become the next Engineering With Nature Proving Ground, joining Galveston, Buffalo and the Philadelphia districts. Engineering With Nature is a USACE initiative focused on the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits, known as a "triple-win" outcome, through collaboration. Districts designated as EWN Proving Grounds are committed to applying EWN practices and principles to achieve their mission goals.

Beneficial use of dredged sediment became the preferred placement option in the early 2000s after Maryland placed a prohibition on open water placement within the Chesapeake Bay.



"Upland placement of dredged material has always been a limitation because of the large amount of wetlands in the area,"

Szimanski said. "Then, the Maryland law required us to get creative and shift our approach to sediment placement."

Restoration of underwater grasses, wetlands, eroding shorelines, fish or shellfish habitats and islands are all considered beneficial use by the State of Maryland.

"EWN is about collaborating, working with natural processes, creating efficiencies, and increasing and diversifying project benefits," said Dr. Todd Bridges, senior research scientist at the U.S. Army Engineer Research and Development Center and national lead for the EWN initiative.

"There are great examples of this approach across the Corps," Bridges said. "What Baltimore District has accomplished through beneficial use of dredged sediment illustrates the point."

Island restoration is the most cost effective way for the Baltimore District navigation section, to maintain navigable channels, their primary mission goal. In doing so, local communities benefit economically through access to safe and efficient transportation for commerce and recreation, including their fishing grounds, which for some, is the mainstay of their livelihoods. Islands provide environmental benefits such as increased nesting habitat, free from predation, for Maryland's threatened and endangered and migratory birds, such as black ducks, royal and common terns, black skimmers, and federally listed species like piping plovers. Shallow water areas near the footprint of some of the restored islands function as fishery habitat for horseshoe crabs, and winter and summer flounder, including young of the year fish. Depending on their location, islands also function as a 'natural breakwater,' just as Swan Island, once completed, will protect the Town of Ewell.

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To find historic island footprints, that have since eroded, Szimanski has to be part historian and part explorer. She first uses a combination of historic nautical charts, archived USACE bathymetric and topographic surveys, aerial and satellite imagery.

“For the Sinepuxent Bay and Isle of Wight Federal Channel Dredging Project, we were able to identify four islands created from the original dredging of the channel in 1934,” said Szimanski. Following confirmation of historic island boundaries, her team goes out in the field to visually confirm the presence of the shallow water areas, mark with GPS coordinates, and collect sediment samples for grain size and priority pollutants analysis.

“The sediment composition should be 80-90 percent sand and also be pollutant-free, for the site to be considered for restoration,” Szimanski said.

Back in the office, she uses Google Earth and other software to develop site designs, specifications and stabilization strategies for each island, to present as options to the local sponsor and stakeholders during the decision making process.

“I like to create things,” the biologist added. “My favorite part is to design the site and then work with our stakeholders to tweak the final specifications based on their goals for the project.”

Often these goals include working with Maryland State bird biologists to optimize habitat diversity for state threatened, endangered and migratory birds.

Once Szimanski has stakeholder agreement, the next step is to develop the plans and specifications for the dredging contracts, incorporating the final design.

The construction of all associated natural features such as planting of high and low marsh, upland plant communities, beaches and dunes and the stabilization strategies, if any, are all included in the contract.

These natural features help diversify the environmental benefits while providing stabilization for the island. The stabilization strategies are all nature-based and depend on the sediment type and the physical energy at the site. Natural grading, silt containment with coir logs, hay bales, rock or capping with sand, can be combined with planting and strategic use of concrete armor units, such as in the restoration of Swan Island.

Operations and Maintenance funds cover the dredging and placement of the sediment, including the construction of the islands and natural features, but there is no money for monitoring or site maintenance built into the contracts.

After construction, the sites revert back to the original landowners and it’s up to them to decide to maintain or let nature take its course.

“I just want to rebuild everything and avoid upland placement altogether,” Szimanski added. “I want to create islands in the bay that have 100 percent natural and nature-based features, and there are plenty of remnant islands out there to be restored.”

Szimanski also wants to include monitoring and modeling efforts in combination with island restoration, through expanded partnerships with USACE, other agencies and universities.

Bob Blama retired project manager with the Baltimore District agrees.

“Monitoring should be part of every project, but there is usually no money for it,” Blama said.

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Bridges adds that monitoring is a key element for future success.

“As we pursue and implement Engineering With Nature across the Corps, we need to learn from these projects and their outcomes, how the teams achieved their results, what benefits were produced, and then share best practices across USACE,” Bridges said.

There are also advantages to expanding our understanding of the systems where these island projects occur.

The Chesapeake Bay is a dynamic and complex system of tides and currents, and the fate of sediments is not well known.

With a better understanding of the

hydrodynamics, the Baltimore District could develop more stable island designs and consider strategic sediment placement options to further reduce costs and naturally facilitate island maintenance.

“If you understood the system dynamics, you could place the sediment and let Mother Nature design it,” said Blama.

Strategic placement of dredged sediments has been used by the New Orleans District as a cost effective strategy to build and sustain Horseshoe Bend Island in the Atchafalaya River, using the river’s energy and processes.

“Horseshoe Bend Island is an exemplary EWN project that demonstrates how

natural and engineering processes can be combined to achieve economic, environmental and social benefits,” said Bridges, “Our goal with the EWN initiative is to make such exceptional projects a matter of common practice in the future.”

Szimanski encourages other USACE districts to consider island restoration for placement of dredged sediments.

“You gotta take that leap,” she said. “We had to do it out of necessity, so, we had to start from the ground up and figure it out. Even if you have to start with small amounts of sediment for pilot projects, this can get the stakeholders on board. That’s how we got started.”