4 MINUTE READ

Swan Island

from **Engineering With Nature: An Atlas, Volume 2.**

by **US Army Engineer Research and Development Center**

Chesapeake Bay, Maryland, United States

Providing resilience for coastal communities. The coastal islands and marshes of the Chesapeake Bay are disappearing, along with their ecosystems and the shoreline protection they provide. Within the last half century, the cumulative effects of shoreline erosion, subsidence, inadequate sediment supply, and sea level rise have accelerated the rate of island submergence. For example, the Smith Island complex, of which Swan Island is a part, has eroded at rates of up to 2 meters per year over the past 75 years. To counter these losses, the U.S. Army Corps of Engineers (USACE)–Baltimore District is restoring historic island footprints using clean dredged sediments. This project to restore and monitor the 11-hectare Swan Island is in partnership with the U.S. Army Engineer Research and Development Center (ERDC), the National Oceanic and Atmospheric Administration, the Maryland Department of Natural Resources, and the U.S. Fish and Wildlife Service. The sediment placement resulted in elevation gains from 0.15 to 0.5 meters, which transformed Swan Island from a low-elevation fragmented and sinking marsh to a higher elevation gradient. The restoration will significantly benefit the larger ecosystem,

increasing resilience to future sea level rise, reducing erosion in the adjacent coastal community, and providing new habitat to local wildlife.

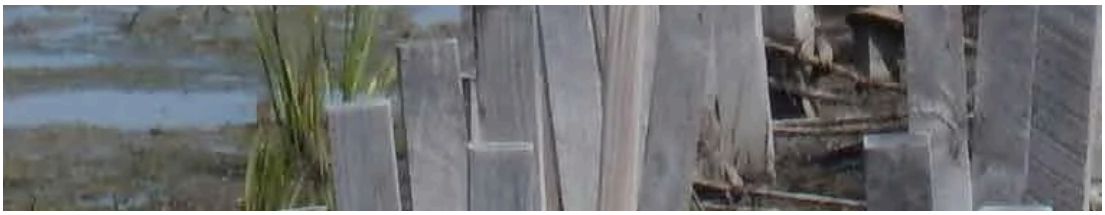
Article cover: Swan Island in 2019 after placement of dredged sediments. (Photo by NOAA)

Producing Efficiencies

To quantify and assess restoration outcomes for Swan Island, the project team is using data from pre- and postrestoration monitoring to develop an integrated hydrodynamic and ecological model. The simulation model will help to evaluate island performance under a range of future sea level rise scenarios and to plan future sediment additions. The general approach and results of model outcomes will be applied to other island systems and regions, facilitating island restoration approaches in the future.

Using Natural Processes

Swan Island functions as a natural wave break for the town of Ewell on nearby Smith Island. Restoring the elevation, combined with planting and rapid recolonization with native vegetation, helps to stabilize the placed sediments, minimize erosion, and facilitate the trapping of new sediments, thus rendering the island more resilient to storms and sea level rise. It also has ecological benefits for a multitude of species as this effort will recapture muchneeded migratory bird habitat previously lost in the Chesapeake Bay.



Real-time kinematic GPS determines locations and elevations of vegetation on the island. (Photo by NOAA)

Broadening Benefits

The restored island will support migratory birds, fish, and invertebrates. Only four months postplacement, fish were observed in the newly formed channels, and migratory birds were abundant. As the vegetative community matures, bird and aquatic life usage is expected to increase. Adjacent island communities also benefit economically through the routine maintenance of navigation channels, which support local tourism and provide access to fishing grounds, transportation, and commerce. Finally, keeping clean sediment within this sediment-starved ecosystem enhances the ability of marsh communities to trap those sediments, increasing island resilience.

Placing feldspar clay on sediment to determine the amount of sediment accretion. (Photo by NOAA)

Promoting Collaboration

The Swan Island restoration project is a collaborative partnership of five federal and state agencies and USACE's Engineering With Nature Initiative. It leverages the resources, expertise, and mandates of the agencies involved to meet project objectives, pooling their knowledge of hydrodynamics, sediment transport, subtidal and intertidal habitats, and the Martin National Wildlife Refuge itself. Also, ERDC scientists are training project partners in developing an integrated hydrodynamic and ecological model to better quantify the resilience and ecological benefits of the project. This collaborative partnership is filling critical knowledge gaps relative to the resilience and ecological benefits of island restoration projects.

An aerial view of Swan Island in 2017 showing the severe island submergence before restoration.

(Image from Google Earth)

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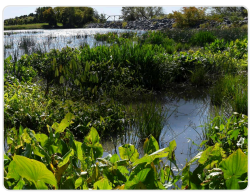
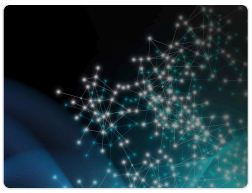


Introduction

13min pages 19-29

Conclusion

5min pages 320-325



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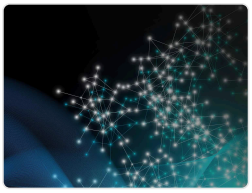
2min pages 310, 318-319



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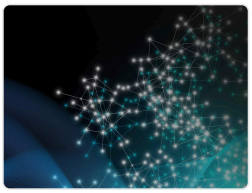
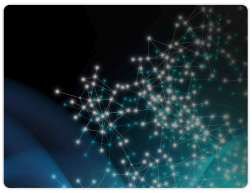
2min pages 310, 316-317



Natural Infrastructure Opportunities Tool

2min pages 310, 314-315



Ecosystem Services Identification and Inventory

2min pages 310, 312-313

Cypress Reforestation

4min pages 306-309

Matarandiba Island

3min pages 302-305

Lower Yellowstone River Fish Passage

4min pages 298-301

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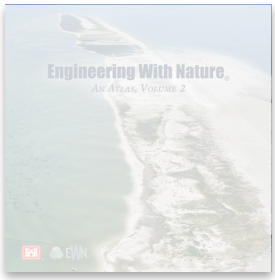

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