

Barrier Island Recovery After an Outwash Event

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Outwash

North Core Banks, a long (36-km), low (2.6-m mean elevation), narrow (~1200-m wide) barrier island, was inundated from the sound side during Hurricane Dorian (September 2019). A ~2.5-m surge onto the back side of the island forced floodwaters to the ocean through gaps in the dune line. The outwash cut deep drainage channels into the island, removing ~16% of the island volume.



Initial Recovery Created Scores of Ponds Days after the storm, spits and swash bars started closing the channels. Months later, a continuous berm was restored, and nearly all the channels were partially filled. After three years, the frequency of overwash has decreased



Will the island recover? How? When?

Ponds Are Filling Slowly

A fit (after the initial rapid decrease) suggests 95% of the pond area will disappear in 16 years.

Ways to Fill the Ponds

- Washover Aeolian transport
- Pluvial runoff
- Sound-side flooding
- Eutrophication

Half-life = 3.63 v Half-life = 1.31 2022 Decimal Year

Acknowledgements

This work was supported by the USGS Coastal and Marine Hazards/Resources Program, Remote Sensing Coastal Change project, led by Jon Warrick, Jenna Brown, and Chris Sherwood. This work was also supported by the National Park Service, Cape Lookout National Seashore and by the Additional Supplemental Appropriations for Disaster Relief Act of 2019 (P.L. 116-20). Hindcast time series of water levels and waves were provided by the Renaissance Computing Center. Thanks to Jen Cramer, Xandra Evans, and Sara Zeigler for help in the field. Data are provisional and subject to revision until they have been thoroughly reviewed and received final approval.

Effectiveness of Overwash Will Diminish as the Berm Rebuilds

High-Water Events Must Be Big Enough to Overtop the Berm Crest Here is a hindcast of total water level .. uncertainties are associated with varying slopes



Berm elevation is slowly growing in the channel gaps. Poor linear fit suggests pre-Dorian elevations will be reached in ~2028



Right: Pluvial runoff forms little deltas in the ponds on the back berm (elevation from SfM photogrammetry) Bottom: Pond depth is less than 2 meters based on echo-sounder measurements from a remote-controlled catamaran



The return interval for berm overtopping (>2.7 m) is 5 years



Fraction of crests in channel gaps that meet pre-Dorian elevations is growing. Fit suggests recovery in 2036





(or removed by outwash 3 Vegetation growth is inhibited in former washout channels no seeds, rhizomes, or organic

matter

Lack of Revegetation in Sterile Soil - Conceptual Model

1 Vegetation growth depends

2 Vegetation cover is

modified by overwash

4 Overwash and Outwash

time series of overwash events

on vegetation cover



- Linear

Will this vegetation trap sand? Will it change the ecosystem?

Early Evidence of Vegetation at **Edges of Ponds**





The time scale for recovery is decades. Vegetation and said accumulation will be slow in the former outwash channels. Repeated overwash will further delay recovery. These ponds will be a part of the landscape for a generation.

Read and see more about North Core Banks, its history with hurricanes, and the USGS field efforts online in the "Dynamic Sands" geonarrative



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