



Storm Stories:

Natural changes to the barrier island landscape



On October 29, 2012, Hurricane Sandy struck Fire Island National Seashore and changed the lay of the land. Fire Island is shaped by natural processes and, while this storm was record-breaking, it was simply another chapter in natural change on the barrier island.

Hurricane Sandy

Hurricane Sandy was the largest hurricane ever recorded in the Atlantic but made landfall as a post-tropical cyclone with hurricane force winds in Atlantic City, New Jersey on October 29, 2012.

More than one hundred miles from the storm's center wind gusts of up to 80 miles per hour and a storm surge of more than ten feet drastically changed the landscape of Fire Island.

Landscape Change

Coastlines are constantly changing, with wind and waves pushing sand to and from the shoreline and causing formations like beaches, dunes, and spits to shift over time. Storms can cause striking differences in the barrier island landscape virtually overnight.

During Hurricane Sandy, high water and large waves scoured sand from the beach and dunes, moving sand over the top of the dunes and, in some places, through the dunes and across the width of the island. The elevation of the beach and location of the dunes were changed, creating a beach that is lower and wider.

But sand was not lost. Much of the sand moved offshore gradually returns and builds up the beach. Beachgrass helps stabilize sand and

naturally rebuilds dunes in a more northerly position. Sand moved across the island during the storm helps make the island more resilient to future storms by increasing the elevation of the island interior and bayside. Sandflats created during the storm can develop into new marshland.

In two locations on Fire Island, storm flow carved out a channel and "breached" the island, allowing a free exchange of water between ocean and bay. One breach, located in Smith Point County Park, silted up naturally and was reinforced by the Army Corps of Engineers. The National Park Service is evaluating the other breach, in the Otis Pike Fire Island High Dune Wilderness, to determine if there is a need to intervene.



An aerial view of an overwash in the Otis Pike Fire Island High Dune Wilderness. Sand moved from the beach and dunes during the storm provides sediment to the salt marsh and bay.

Evaluating Change

Measuring changes, like the amount of sand washed from the beach to the bayside of the island, helps the National Park Service (NPS) understand barrier island transformation.

Light Detection and Ranging (LIDAR) is a tool that uses lasers to map beach and dune elevation change. This allows scientists to evaluate the amount of sand lost or gained in a particular location. High Precision Global Positioning System (GPS) is also used to monitor changes. GPS is used to evaluate the position of the island's shoreline and the breach in the wilderness area.

All of the scientific data collected is helping the NPS understand and communicate changes that resulted from Hurricane Sandy, and manage the island in sustainable ways.



National Park Service staff measure an overwash fan.

A History of Change

Hurricane Sandy not only introduced a lower, wider beach, it also uncovered a bit of history. Filled with coal and headed to Newfoundland, the Bessie White ran aground close to Smith Point County Park in the 1922.

Waves carried the remains of the ship west, to its present-day location near Skunk Hollow in the Otis Pike Fire Island High Dune Wilderness. Winter storms occasionally reveal the wreck but for most of the year, the beach keeps this ship a buried treasure.



Look Closer! Storms periodically uncover large artifacts, like the wreck of the Bessie White, that help us judge the scale of landscape change. Compare the position of the dune in the above photo (after a 2006 Nor'easter) to that in the photo below (after Sandy in 2012).

