

HURRICANE MATTHEW

1

Category
(very dangerous)

5.7

Inches of Rain

71

Miles per hour
of Max Wind Gusts

5.5

Feet of Storm Surge*



200 km

Monitoring the Impact of Hurricane Matthew at "North Inlet – Winyah Bay"



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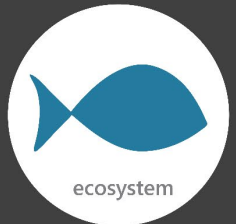
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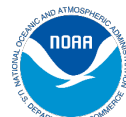
On October 8th, Hurricane Matthew moved parallel to the South Carolina coast as a category 1 hurricane until it made landfall about 25 miles south of Georgetown, South Carolina near McClellanville. Within a few hours, the center of the hurricane moved back offshore, but the large eyewall extended well inland and brought hurricane-force wind gusts and heavy rains to coastal regions of the Carolinas.

The effects of Matthew were observed at the North Inlet –Winyah Bay (NIWB) Research Reserve through the System-Wide Monitoring Program (SWMP), which tracks short-term variability and long-term change in weather and water quality in the areas surrounding Georgetown, South Carolina.

STORM
STORIES



NATIONAL
ESTUARINE
RESEARCH
RESERVE
SYSTEM



National Estuarine
Research Reserve System
Science Collaborative

Data shown are based on the NIWB weather monitoring site

*Oyster Landing NOS site

Created on May 27, 2022

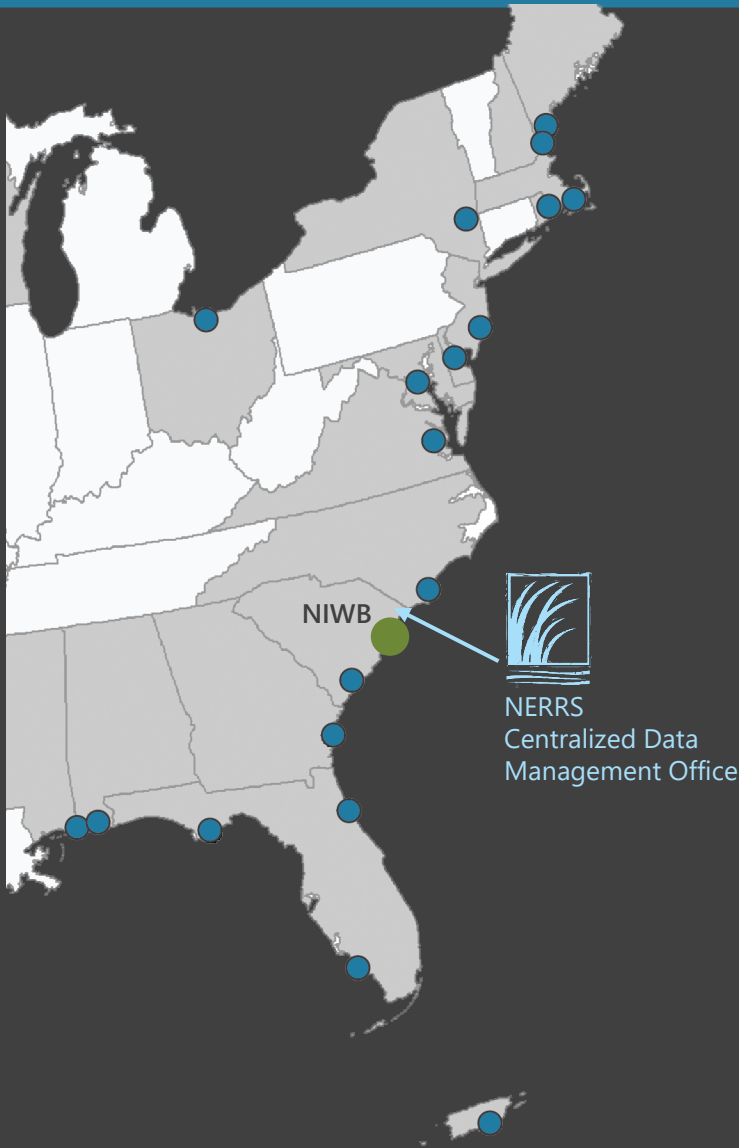
NIWB

North Inlet –Winyah Bay (NIWB) is one of 29 sites in the **National Estuarine Research Reserve Systems (NERRS)**. Each site is a state-federal partnership that combines research, monitoring, and education to advance the understanding and management of estuarine environments.

Locally Relevant, Nationally Significant

The **System Wide Monitoring Program (SWMP)** tracks weather and water quality as a storm happens and the impacts that follow. Scientific instruments (i.e., data sondes and sensors) are deployed at Reserves along the Atlantic and Gulf of Mexico coastal areas collecting data on the condition of our estuaries 24/7 to help protect people and places.

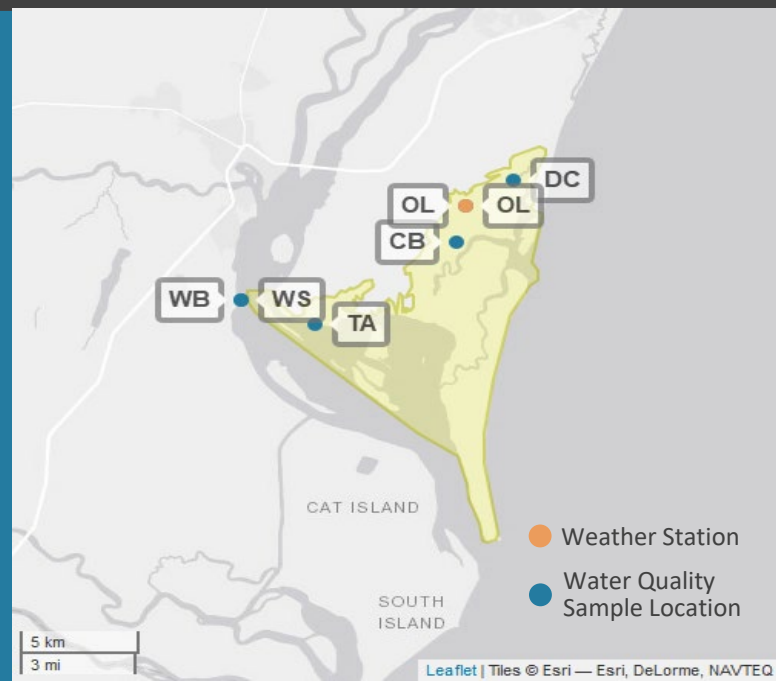
Data from the extensive monitoring network are delivered to the **Centralized Data Management Office (CDMO)**. Near real-time SWMP data are now available to via smartphone or tablet at: www.nerrsdata.org/mobile



NIWB Storm Monitoring

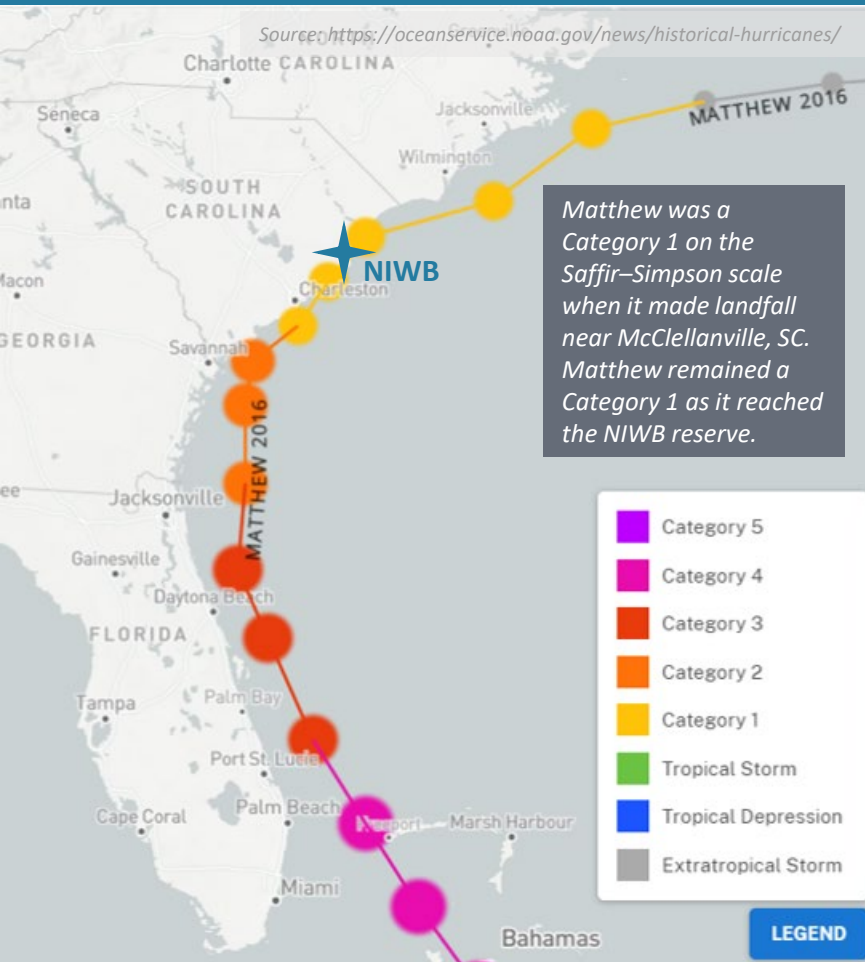
NIWB operates a weather station located in Oyster Landing (OL) and maintains six continuous, long-term water quality stations at Oyster Creek (OC), Debidue Creek (DC), Clambank (CB), Thousand Acre (TA), Winyah Bay Bottom (WB), and Winyah Bay Surface (WS) locations.

NIWB is part of the SWMP. As Hurricane Matthew approached South Carolina, NIWB monitored the weather and water quality, collecting data every 15 minutes for the following parameters: air temperature, relative humidity, atmospheric pressure, rainfall, wind speed and direction, water temperature, depth, salinity, dissolved oxygen, turbidity, and pH.



Storm Track

Matthew traveled along the Florida coast as a category 3 hurricane. Matthew weakened to a category 2 near the Georgia coast before transitioning to a category 1 near South Carolina. Matthew made landfall just south of McClellanville, South Carolina on October 8th.



Event Impacts



Human Health & Safety

- More than 800,000 homes and businesses lost power across South Carolina.
- Moderate flooding in the Black River and Pee Dee River spread into parts of the city of Georgetown and resulted in numerous evacuations throughout the county.



Economic Losses

- NOAA NCEI estimates that wind and water damage totaled approximately \$10 billion, making Matthew the 10th most destructive hurricane to affect the United States.



Ecosystem Impacts

- Aquatic life, like oysters, crabs, shrimp, fish, phytoplankton, etc. rely on specific levels of salinity and dissolved oxygen to thrive and survive. The weather impacts from Matthew caused significant drops in the levels of salinity and dissolved oxygen for varying periods of time, potentially stressing organisms.



Weather Data

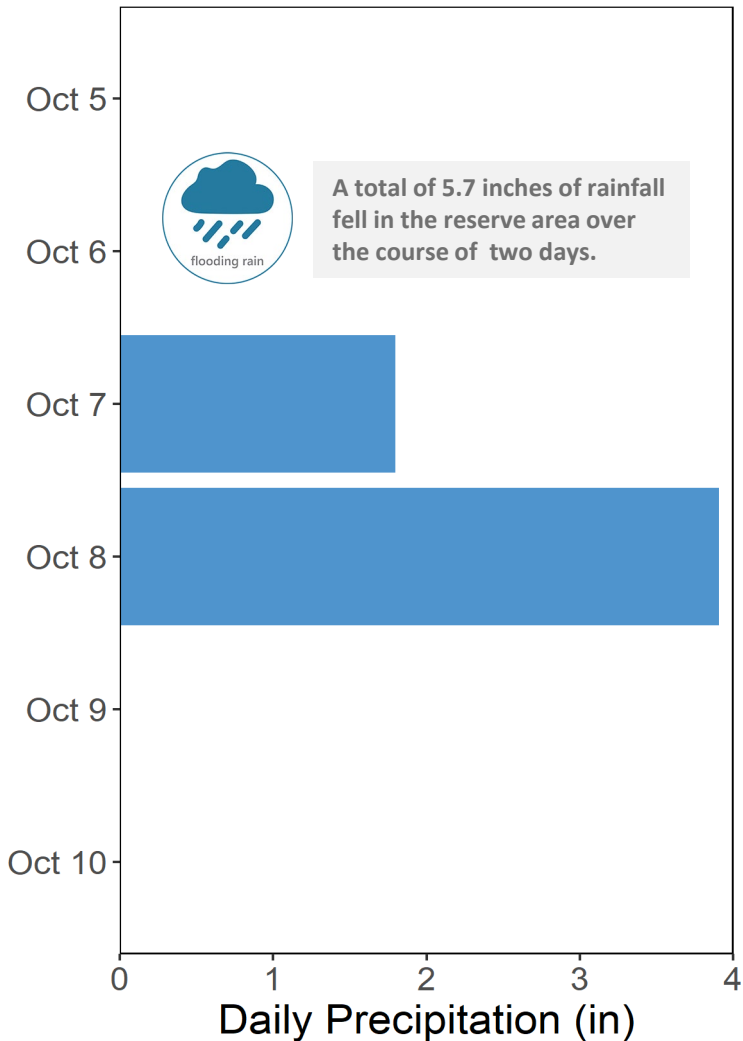
Station	Date	Rainfall Total (in)	Rainfall Average Intensity (in/hr)	Wind Speed Max (mph)	Wind Speed Average (mph)
Oyster Landing	10/6/2016	0.00	0.000	21.9	15.6
Oyster Landing	10/7/2016	0.63	0.026	36.5	18.3
Oyster Landing	10/8/2016	5.07	0.211	70.5	47.2
Oyster Landing	10/9/2016	0.00	0.000	30.6	21.2
Oyster Landing	10/10/2016	0.00	0.000	23.7	12.2

The highest local rainfall and wind measurements were recorded when Matthew approached NIWB on Oct. 8.

Data reporting time periods for Hurricane Matthew: 10/6/2016 - 10/10/2016

RAINFALL

Oyster Landing (OL)



Daily Rainfall measurements at the weather station from Oct. 5 through Oct. 10.

Matthew brought heavy rains, high winds, storm surge, and freshwater flooding to South Carolina.



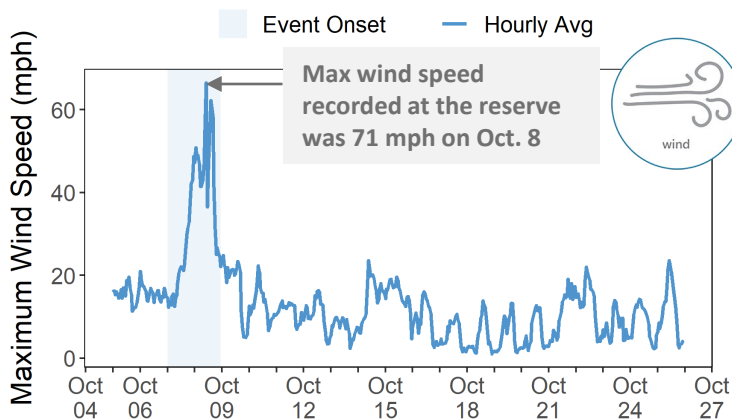
Torrential rains fell over South Carolina with 5.7 total inches of rainfall recorded at Oyster Landing over the course of two days. Hurricane-force wind gusts were felt in coastal areas. Massive wind speeds of up to 71 mph were measured at the reserve.

Maximum inundation levels across the state were 3-5 ft above ground level. At the NOS station at Oyster Landing, the peak water level was recorded at 4.7 ft above MHHW. In Georgetown County, moderate flooding occurred on the Black River and Pee Dee River and spread to parts of the city of Georgetown. Floodwaters caused numerous road closures plus downed trees and powerlines.

In addition to Georgetown County, Beaufort, Berkely, Charleston, Dorchester, and Horry counties were also heavily damaged by Matthew. Across South Carolina, Matthew caused over a billion dollars in damage, left 800,000 people without electrical power, and caused significant environmental problems.

WIND SPEED

Oyster Landing (OL)



Maximum Wind Speed readings at the weather station from Oct. 5 through Oct. 26.



Water Quality Data

As Matthew traveled along the South Carolina coast on Oct. 8, salinity levels dropped and the diurnal cycle range narrowed for dissolved oxygen.

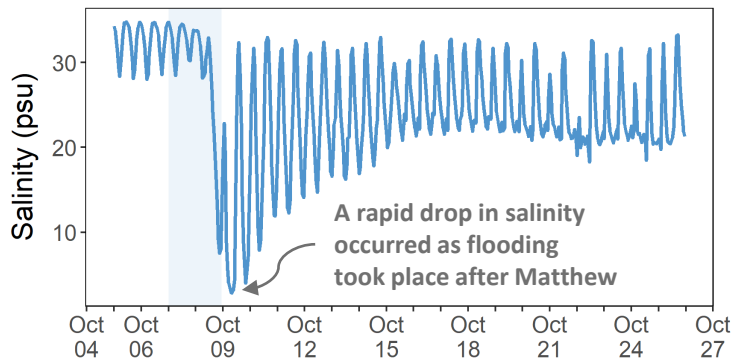
Station	Date	Depth Maximum (ft)	Salinity Minimum (psu)	Salinity Maximum (psu)	Dissolved Oxygen Minimum (mg/L)	Dissolved Oxygen Maximum (mg/L)
Debidue Creek	10/6/2016	11.71	27.6	34.8	4.2	6.7
Debidue Creek	10/7/2016	11.81	28.2	34.8	4.2	6.7
Debidue Creek	10/8/2016	13.78	14.7	33.9	5.2	6.6
Debidue Creek	10/9/2016	10.79	2.3	32.5	4.5	6.8
Debidue Creek	10/10/2016	12.24	3.7	33.0	4.4	7.3

Data reporting time periods for Hurricane Matthew: 10/6/2016 - 10/10/2016

SALINITY

Debidue Creek (DC)

Event Onset Hourly Avg

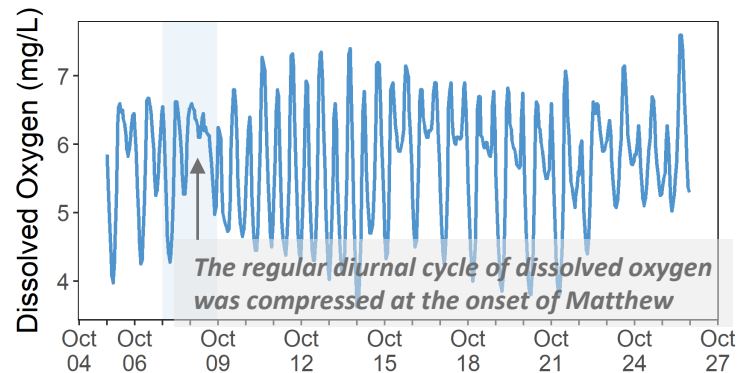


Salinity levels from Oct. 5 through Oct. 26.

DISSOLVED OXYGEN

Debidue Creek (DC)

Event Onset Hourly Avg



Dissolved Oxygen levels from Oct. 5 through Oct. 26.

Salinity and dissolved oxygen levels recorded at Debidue Creek show initial and post-storm impacts on water quality. For both parameters, the typical diurnal cycles were disturbed. For dissolved oxygen, the range in concentration was significantly smaller as Matthew traveled along the South Carolina coast on Oct. 8. For salinity, the daily minimum dropped dramatically as Matthew passed. Even after the storm, the salinity diurnal cycle recovered slowly.

Major changes in salinity and dissolved oxygen can cause stress to some aquatic organisms depending on the species and how long the levels deviate from what is normal. Water quality stresses can impact survival and future populations.



Every plant and animal species have habitat preferences and requirements. Understanding these habitats is critical to understanding populations.

About NERRS

Established in 1972, the NERRS is a network of 29 ecologically significant, locally treasured estuarine places in 23 states and Puerto Rico. Each Reserve is a partnership between NOAA and a state agency or university. Most of the 1.3+ million acres of estuary lands and waters that Reserves help to protect and steward are open to the public. Reserves work with local decision makers, states, universities, nonprofits, and others to set natural resource management priorities and address them through research, environmental monitoring, education, training, and stewardship.

The health of every reserve is continuously monitored by the System Wide Monitoring Program (SWMP). SWMP is a robust, long-term, and versatile monitoring program that uses the NERRS network to intensively study estuarine reference sites for evaluating ecosystem function and change. Reserve-generated data and information are available to local citizens and decision makers. For more information, go to: <https://coast.noaa.gov/nerrs/>



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DATA

Visit www.nerrsdata.org to view and download weather and water quality data from North Inlet - Winyah Bay NERR.



EXPLORE

Interested in learning more? Visit <http://northinlet.sc.edu/>. For video, news updates, online storm data and prediction visualization tools, check out our Storm Story Map at www.stormstorymap.url.



National Estuarine Research Reserves Protect People & Places

This work is/was sponsored by the National Estuarine Research Reserve System Science Collaborative, which supports collaborative research that addresses coastal management problems important to the reserves. The Science Collaborative is funded by the National Oceanic and Atmospheric Administration and managed by the University of Michigan Water Center (NA19NOS4190058).

Connect with us!

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