

# HURRICANE MATTHEW

2

Category  
(extremely dangerous)

11.4

Inches of Rain

41

Miles per hour  
of Max Wind Gusts

3-5

Feet of Inundation  
(max)\*



## Monitoring the Impact of Hurricane Matthew at "Ace Basin NERR"



+



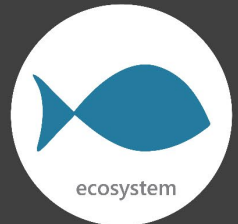
+



+



+



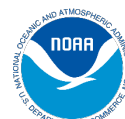
On October 8th, Matthew traveled northward about 50 n mi offshore of the Georgia coast as a category 2 hurricane. Matthew's track was headed directly towards the islands near Beaufort, South Carolina, but prior to reaching land made a sharp turn toward the northeast and weakened in intensity. Matthew moved parallel to the South Carolina coast as a category 1 hurricane bringing hurricane-force wind gusts and heavy rains to coastal regions of the Carolinas.

The effects of Matthew were observed at the ACE Basin 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 Beaufort, South Carolina.

STORM  
STORIES



NATIONAL  
ESTUARINE  
RESEARCH  
RESERVE  
SYSTEM



National Estuarine  
Research Reserve System  
Science Collaborative

Data shown are based on the ACE weather monitoring site

\*NHC Report AL142016

Created on May 27, 2022

# ACE

ACE Basin (Ashepoo-Combahee-Edisto) is one of 30 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

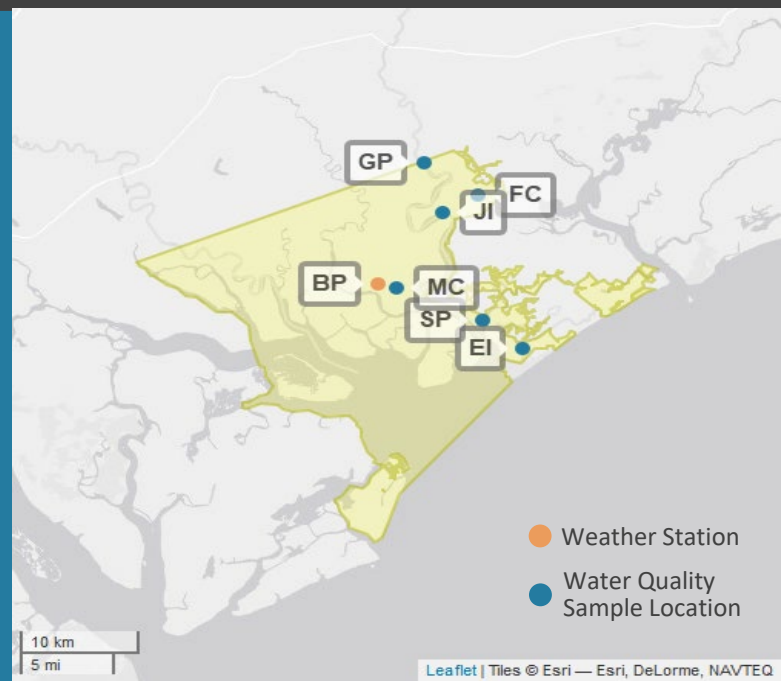
The **System Wide Monitoring Program (SWMP)** tracks weather and water quality as a storm happens and the impacts that follow. Scientific instruments (i.e., data sondes and sensors) are deployed at Reserves along the Atlantic and Gulf of Mexico coastal areas collecting data on the condition of our estuaries 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](http://www.nerrsdata.org/mobile)

## ACE Basin Storm Monitoring

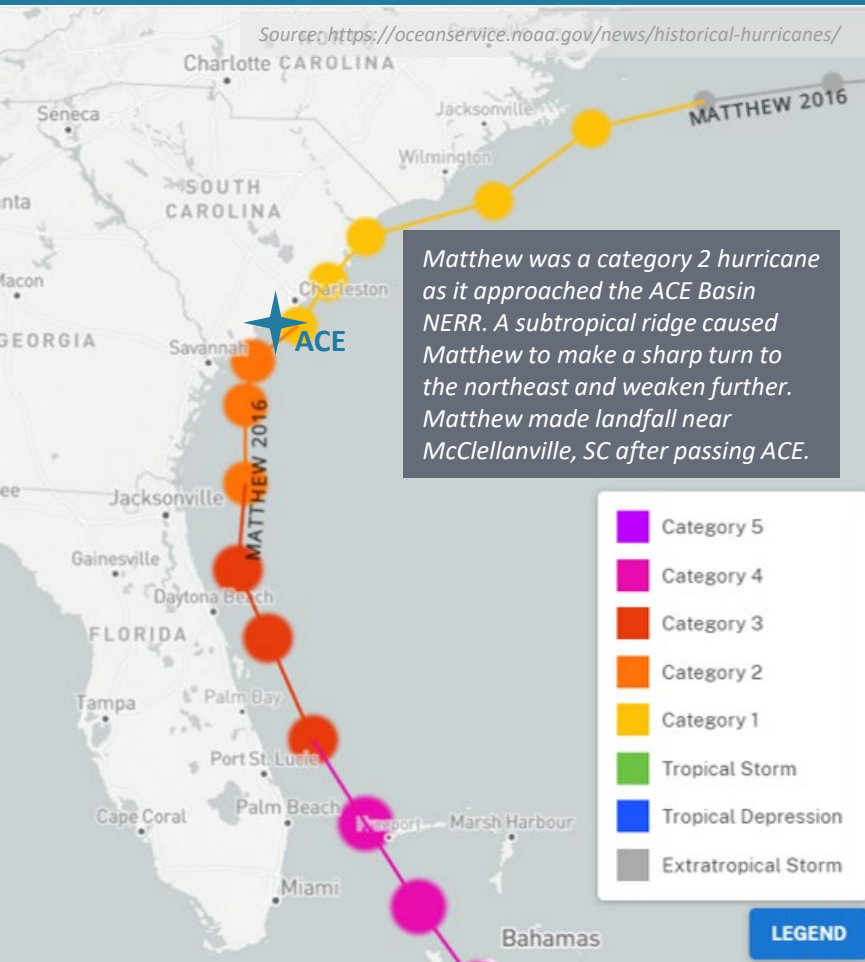
ACE Basin operates a weather station located at Bennett's Point (BP) and maintains six continuous, long-term water quality stations at Fishing Creek (FC), Mosquito Creek (MC), St. Pierre (SP), Grove Plantation (GP), Jehossee Island (JI), and Edisto Island (EI) locations.

ACE Basin is part of the SWMP. As Hurricane Matthew approached South Carolina, ACE Basin 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.
- In Beaufort County, trees were knocked down and fell into several homes.
- The northbound lane of the Harbor Island Bridge was washed out. Many boats, marinas, and roofs of homes were damaged.



## 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 notable changes to the regular diurnal cycle of dissolved oxygen, potentially stressing organisms.



## Weather Data

Station	Date	Rainfall Total (in)	Rainfall Average Intensity (in/hr)	Wind Speed Max (mph)	Wind Speed Average (mph)
Bennett's Point	10/7/2016	2.44	0.102	30.0	14.0
Bennett's Point	10/8/2016	8.95	0.373	41.2	27.7
Bennett's Point	10/9/2016	0.00	0.000	19.0	10.8
Bennett's Point	10/10/2016	0.00	0.000	18.3	8.0
Bennett's Point	10/11/2016	0.00	0.000	2.2	0.9

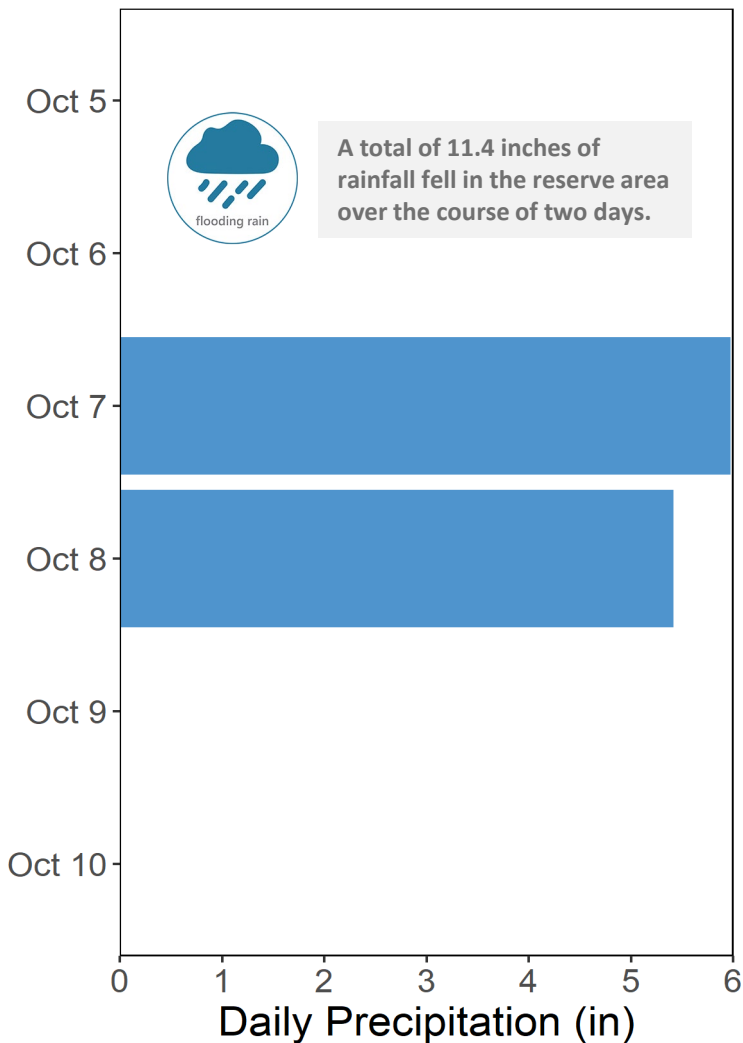
Peak wind measurements were recorded when Matthew traveled along the South Carolina coast on Oct. 8. Heavy rainfall occurred on both Oct. 7 and Oct. 8.

Data reporting time periods for Hurricane Matthew: 10/7/2016 - 10/11/2016



# RAINFALL

## Bennett's Point (BP)



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



Torrential rains fell over the South Carolina coast with 11.4 total inches of rainfall recorded at the Bennett's Point weather station. The effects of storm surge produced maximum inundation levels of 3-5 ft above ground level in South Carolina. In Beaufort County, inundation occurred at several locations along highway US21 as a result of storm surge.

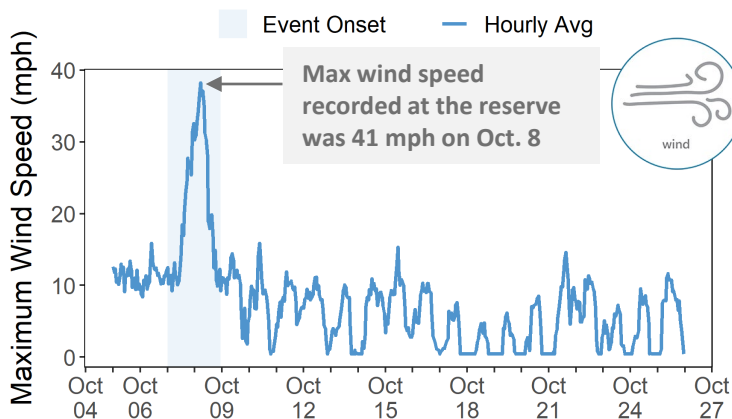
The combination of storm surge and inland freshwater flooding caused by excessive rainfall resulted in damage to more than one million structures, forcing businesses from Florida to North Carolina to temporarily close.

The max wind speed recorded at Bennett's Point was 41 mph. Matthew's wind field caused structural damage to homes and businesses. Downed trees and utility lines caused massive power outages.

Across South Carolina, Matthew caused over a billion dollars in damage, left 800,000 people without electrical power, and caused environmental problems.

# WIND SPEED

## Bennett's Point (BP)



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



# Water Quality Data

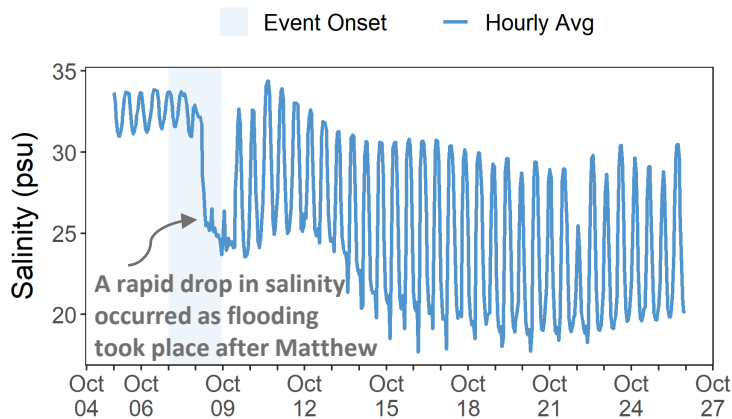
As Matthew approached the area surrounding ACE on Oct. 8, salinity levels dropped and the range in dissolved oxygen compressed.

Station	Date	Depth Maximum (ft)	Salinity Minimum (psu)	Salinity Maximum (psu)	Dissolved Oxygen Minimum (mg/L)	Dissolved Oxygen Maximum (mg/L)
Edisto Island	10/7/2016	11.84	30.9	33.8	4.8	6.3
Edisto Island	10/8/2016	13.06	24.7	32.9	5.5	6.5
Edisto Island	10/9/2016	10.83	23.6	32.9	5.4	6.5
Edisto Island	10/10/2016	11.78	23.4	34.4	4.8	6.6
Edisto Island	10/11/2016	8.83	24.9	29.6	5.2	6.0

Data reporting time periods for Hurricane Matthew: 10/7/2016 - 10/11/2016

## SALINITY

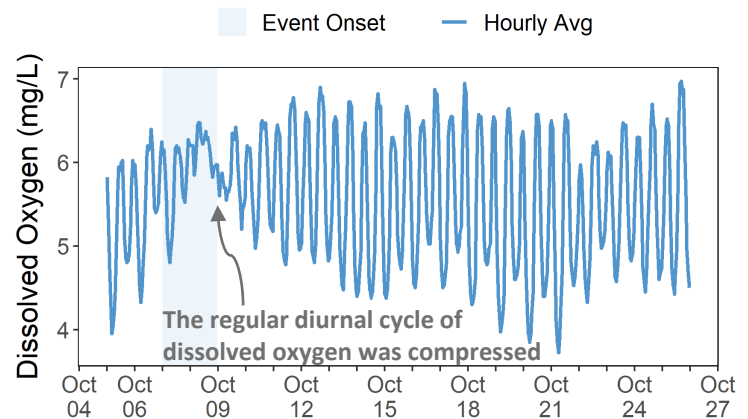
### Edisto Island (EI)



Salinity levels from Oct. 5 through Oct. 26.

## DISSOLVED OXYGEN

### Edisto Island (EI)



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

Salinity and dissolved oxygen levels recorded at Edisto Island (EI) show initial and post-storm impacts on water quality. Dissolved oxygen levels were impacted at the onset of Matthew. The regular diurnal variation was compressed, and levels stayed in the higher range during the flooding. Similarly, salinity levels experienced compression in its regular diurnal variation cycle but at low levels after a rapid drop in salinity.

Dramatic changes in salinity 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/>



## CONTACT

Sandra Upchurch, Research Biologist  
e: [UpchurchS@dnr.sc.gov](mailto:UpchurchS@dnr.sc.gov)  
p: 843-953-9223



## DATA

Visit [www.nerrsdata.org](http://www.nerrsdata.org) to view and download weather and water quality data from Ace Basin NERR.



## EXPLORE

Interested in learning more? Visit  
[www.dnr.sc.gov/marine/NERR/index.html](http://www.dnr.sc.gov/marine/NERR/index.html).

For video, news updates, and online storm data and prediction visualization tools, check out our Storm Story Map at  
[www.stormstorymap.url](http://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!

@estuaries

