[OCT 5 – OCT 10, 2016]

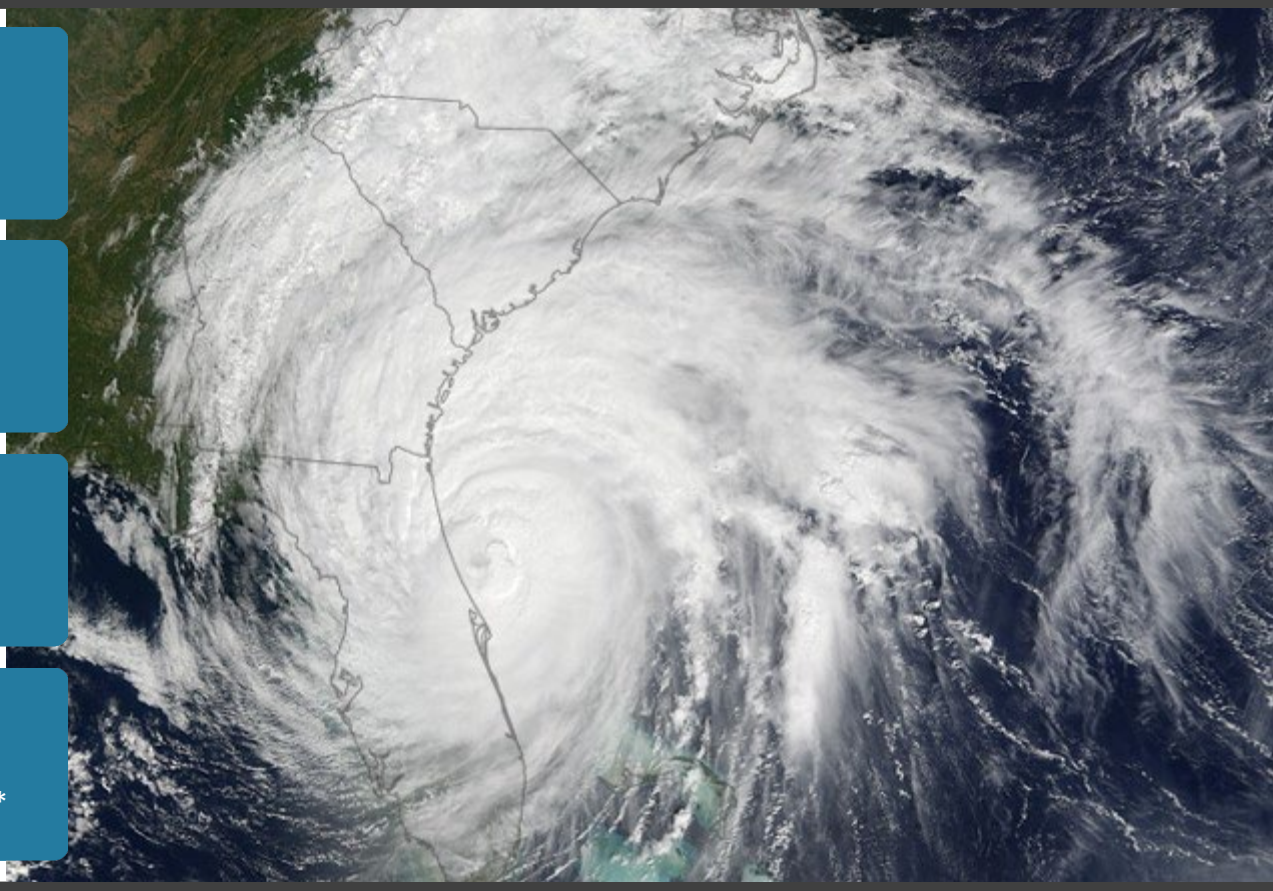
HURRICANE MATTHEW

1
Category
(very dangerous)

6.6
Inches of Rain*

47
Miles per hour
of Max Wind Gusts

4
Feet of Storm Surge**



Monitoring the Impact of Hurricane Matthew at "**North Carolina NERR**"

On Oct. 8th, Matthew moved parallel to the South Carolina coast as a category 1 hurricane until it made landfall near McClellanville, South Carolina. Matthew soon moved offshore, but the large eyewall extended well inland and brought hurricane-force wind gusts and heavy rains to coastal regions of the Carolinas. On Oct. 9th, Matthew traveled along the southeastern coast of North Carolina before continuing its path east-northeastward away from the state.

The effects of Matthew were observed at the North Carolina (NOC) 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 of Wilmington, South Port, and surrounding areas in New Hanover County in North Carolina.

STORM STORIES

NC COASTAL RESERVE & NATIONAL ESTUARINE RESEARCH RESERVE

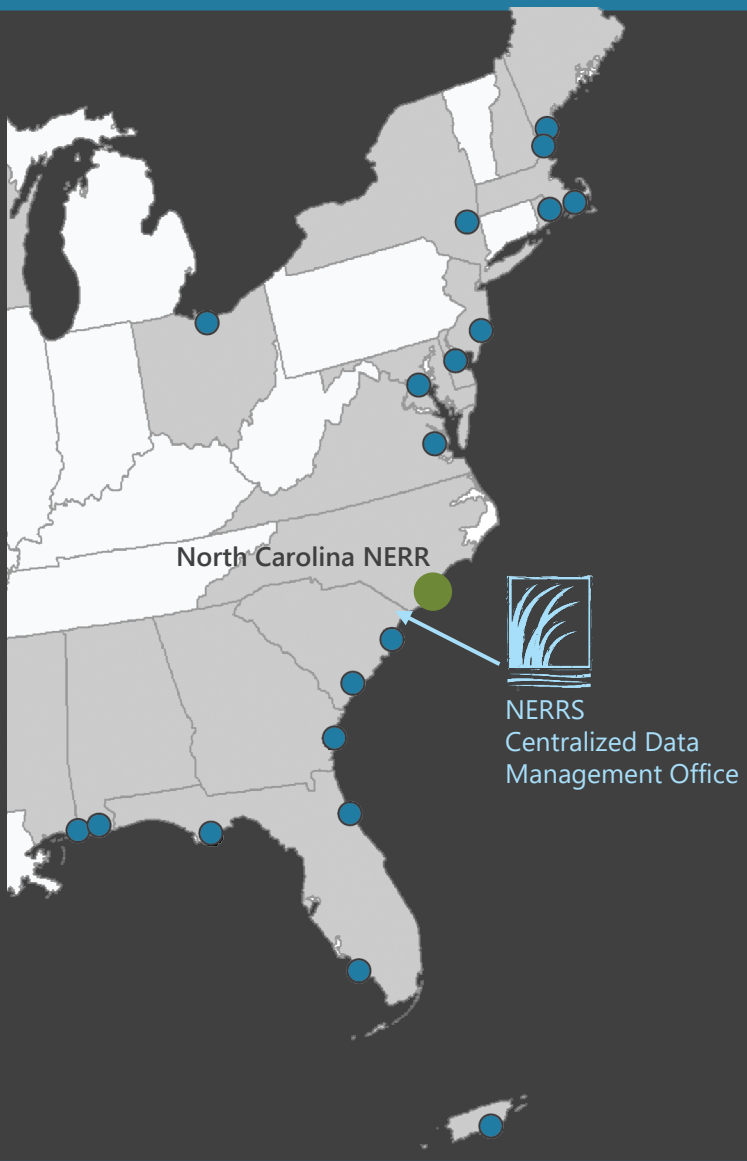
NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

National Estuarine Research Reserve System Science Collaborative

Data shown are based on the NOC weather monitoring site
*Wilmington IAP (KILM) site
**NHC Report AL142016
Created on May 27, 2022

NOC

The North Carolina NERR (NOC) 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

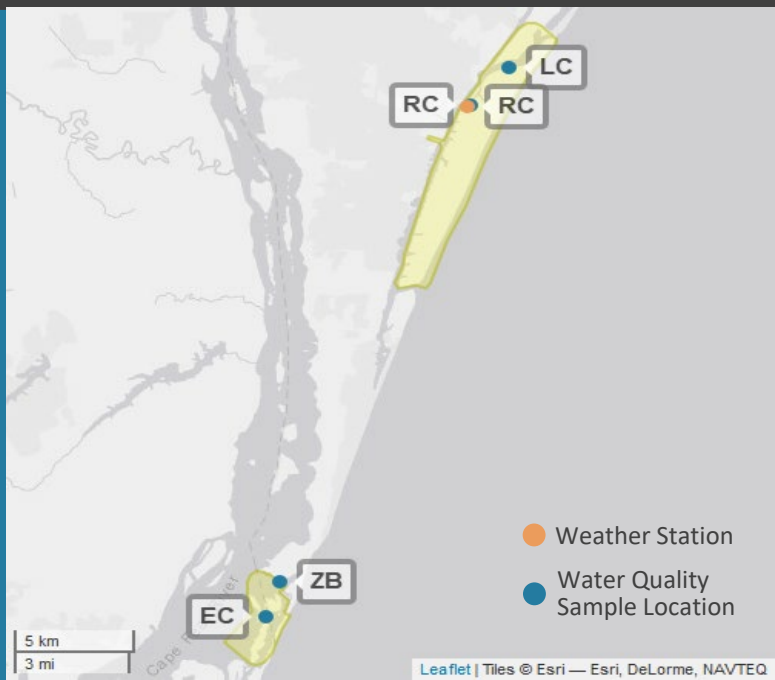
The **System Wide Monitoring Program (SWMP)** tracks weather and water quality as a storm happens and the impacts that follow. Scientific instruments (i.e., data sondes and sensors) are deployed at Reserves along the Atlantic and Gulf of Mexico coastal areas collecting data on the condition of our estuaries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

North Carolina Storm Monitoring

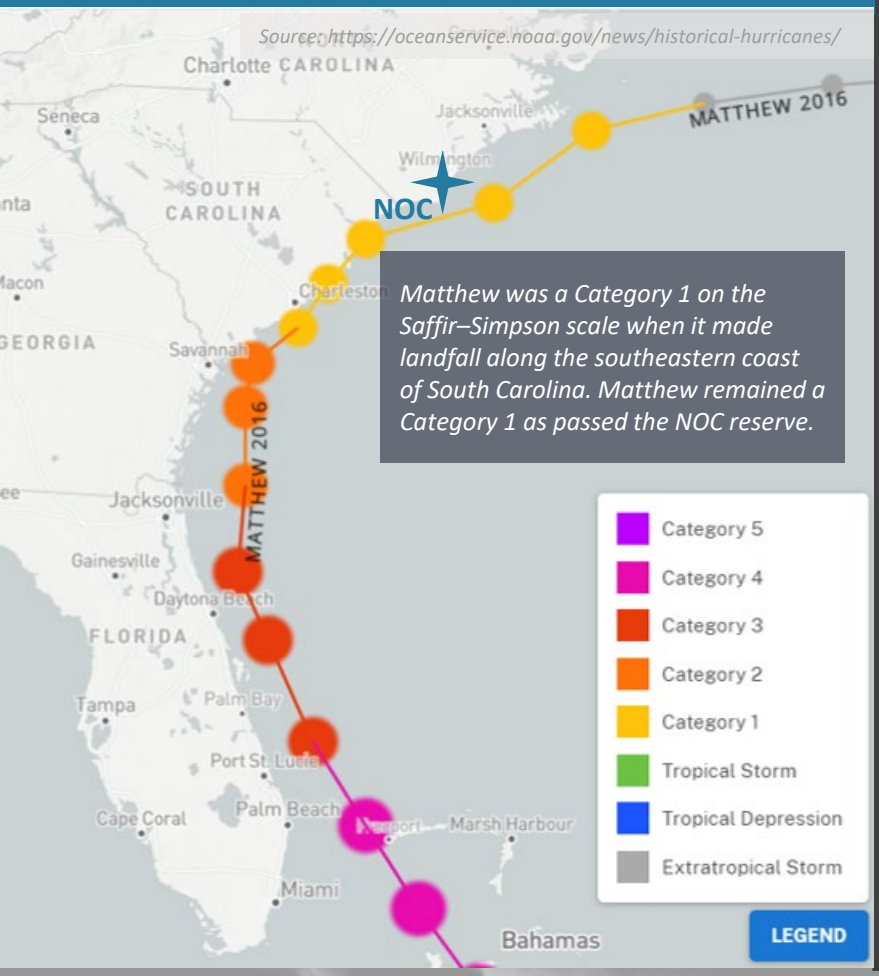
North Carolina NERR operates a weather station located at Research Creek (RC) and maintains four continuous, long-term water quality stations at Research Creek (RC), Loosin Creek (LC), Zeke's Basin (ZB), and East Cribbing (EC).

North Carolina NERR is part of the SWMP. As Hurricane Matthew approached the state, North Carolina NERR 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 and then transitioned to a category 1 near South Carolina. On Oct. 9th, Matthew traveled along the southeastern coast of North Carolina before becoming an extratropical storm.



Event Impacts

Human Health & Safety

- Freshwater flooding was widespread with low-lying areas impacted across several municipalities.
- Flooding caused closures of roads and sections of interstates.
- In New Hanover County, storm surge resulted in record flooding in downtown Wilmington.

Economic Losses

- Matthew's most costly impacts occurred in North Carolina where over $5 billion worth of damage was estimated. This was largely due to historic levels of river flooding in eastern North Carolina where 100,000 homes, businesses and other structures were damaged.

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 turbidity for varying periods of time, potentially stressing organisms.

Weather Data

Station	Date	Air Temperature *Average (°F)*	Barometric Pressure *Average (atm)*	Wind Speed *Max (mph)*	Wind Speed *Average (mph)*
Research Creek	10/6/2016	70.93	30.038	19.5	12.0
Research Creek	10/7/2016	76.28	29.945	26.4	13.9
Research Creek	**10/8/2016**	**77.31**	**29.526**	**47.4**	**24.5**
Research Creek	**10/9/2016**	**68.53**	**29.738**	**40.0**	**15.1**
Research Creek	10/10/2016	61.52	30.174	25.5	11.1

The highest local wind measurements were recorded when Matthew approached North Carolina on Oct. 8. Wind speeds remained high early on Oct. 9.

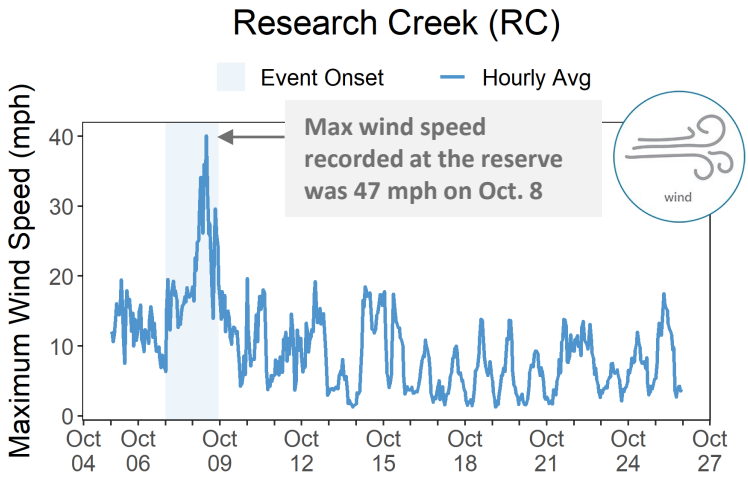
Data reporting time periods for Hurricane Matthew: 10/6/2016 - 10/10/2016

RAINFALL

Matthew caused heavy rainfall at reserves along the Atlantic coast with 6.6 inches total recorded at Wilmington, a gage near the North Carolina reserve.

Daily Rainfall measurements* at multiple reserves from Oct. 6 through Oct. 11.

WIND SPEED



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

In North Carolina, wind damage was primarily constrained to the immediate coastal areas. However, flood-producing rainfall was much more widespread. Torrential rains fell over eastern North Carolina with rainfall exceeding 10 inches in many places both along the coast and well inland.

In the southeastern portion of the state, maximum inundation levels were 2-4 ft above ground level. This resulted in record flood levels in downtown Wilmington. The highest coastal water levels were found farther up the coast on the sound side of the Outer Banks. Here maximum inundation levels were 4-6 ft above ground level.

NOAA NCEI estimates that wind and water damage across the southeast totaled approximately $10 billion, making Matthew the 10th most destructive hurricane to affect the United States. The most costly impacts occurred in North Carolina. River flooding was the main cause of damage throughout the state, where historic flood levels damaged 100,000 homes, business, and structures.

*No precipitation data were recorded at the NOC NERR rain gauge. Local rain data reported are based on the Wilmington IAP (KILM) site.

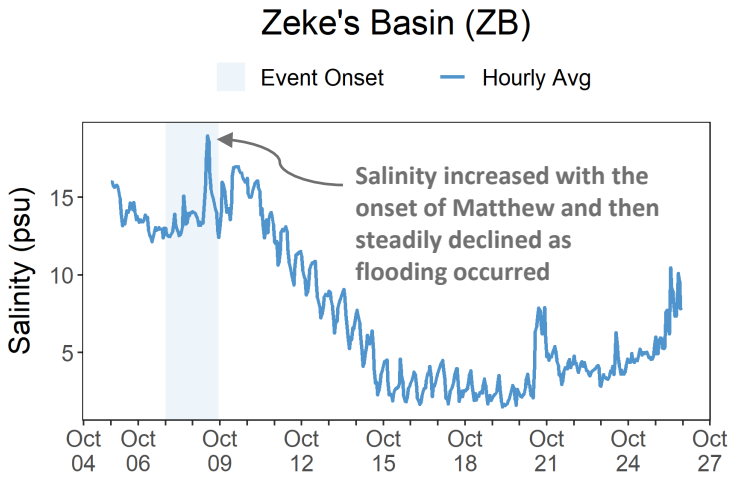
Water Quality Data

As Matthew approached North Carolina on Oct. 8, salinity levels peaked. Turbidity did not peak until the next day on Oct. 9.

Station	Date	Depth *Maximum (ft)*	Salinity *Minimum (psu)*	Salinity *Maximum (psu)*	Turbidity *Minimum (NTU)*	Turbidity *Maximum (NTU)*
Zeke's Basin	10/6/2016	4.53	12.1	15.2	11.0	32.0
Zeke's Basin	10/7/2016	4.56	12.3	16.2	7.0	133.0
Zeke's Basin	**10/8/2016**	**5.94**	**12.9**	**19.7**	**8.0**	**844.0**
Zeke's Basin	**10/9/2016**	**4.40**	**12.3**	**17.2**	**-1.0**	**947.0**
Zeke's Basin	10/10/2016	5.28	11.4	16.7	10.0	38.0

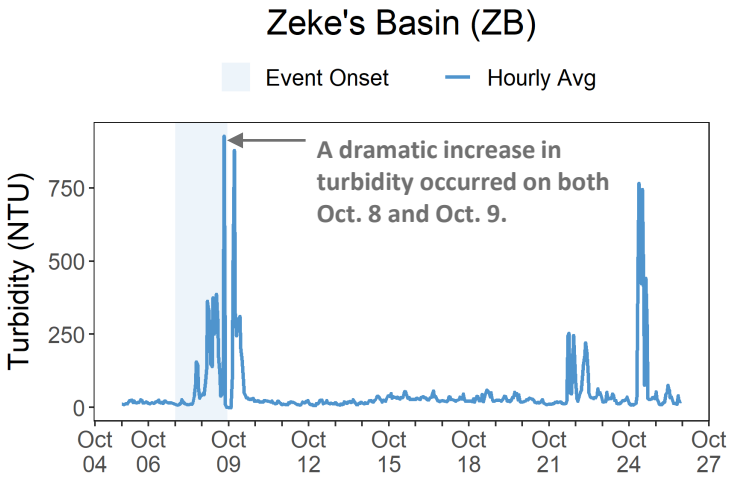
Data reporting time periods for Hurricane Matthew: 10/6/2016 - 10/10/2016

SALINITY



Salinity levels from Oct. 5 through Oct. 26.

TURBIDITY



Turbidity levels from Oct. 5 through Oct. 26.

Salinity and turbidity levels recorded at Zeke's Basin show initial and post-storm impacts on water quality. Salinity levels increased as Matthew approached North Carolina. After the hurricane had passed salinity levels steadily dropped over the next week. Dramatic spikes in turbidity occurred during the onset of the storm and immediately after. On October 10, the turbidity measurements began to level off to pre-storm conditions.

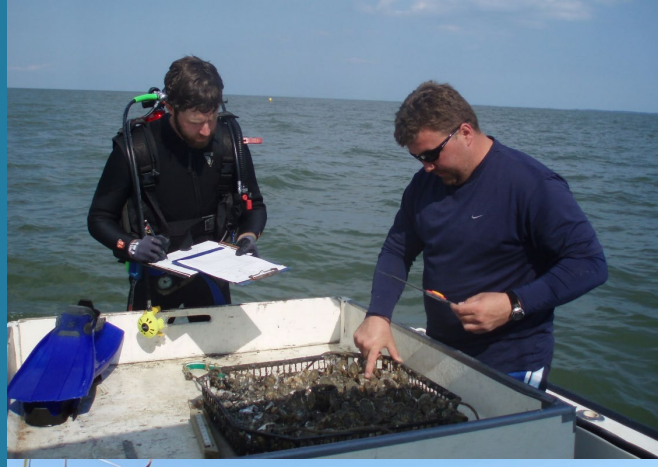
Dramatic increases in turbidity and shifts in salinity can cause stress to some aquatic organisms depending on the species and how long the levels deviate from what is normal. Water quality stresses can impact survival and future populations.

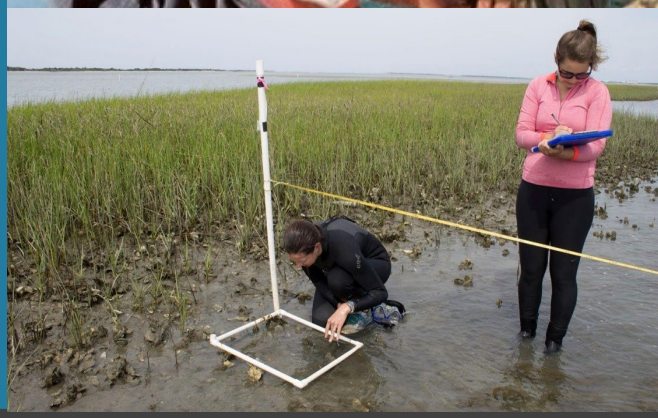
Every plant and animal species have habitat preferences and requirements. Understanding these habitats is critical to understanding populations.

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 Carolina NERR.

EXPLORE

Interested in learning more? Visit **deq.nc.gov/coastalreserve**
For video, news updates, online storm data and prediction visualization tools, check out our Storm Story Map at **www.storm storymap.url**.

National Estuarine Research Reserves Protect People & Places

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