

SC HURRICANES COMPREHENSIVE SUMMARY

LAST UPDATED: MAY 30, 2024



Visible Satellite Image of Hurricane Ian Landfall Near Georgetown, 2:05 p.m. EDT, September 30, 2022

SOUTH CAROLINA STATE CLIMATOLOGY OFFICE

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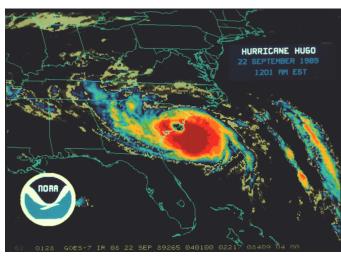
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SOUTH CAROLINA TROPICAL CYCLONE CLIMATOLOGY

An understanding of tropical cyclones is essential to understand South Carolina's climatology, especially when considering the growth of coastal communities. However, impacts from these systems are not limited to the coast. Inland areas have been affected by flooding rain, high winds, and tornadoes.

From 1851 to 2023, 44 tropical cyclones have made landfall on the South Carolina coast. Of these that have hit the state's coast, only four made landfall as major (Category 3+) hurricanes. They are the 1893 Great Charleston Hurricane, Hurricane Hazel of 1954, Hurricane Gracie of 1959, and Hurricane Hugo of 1989. There are no Category 5 hurricane landfalls on record in South Carolina. One other



hurricane, the 1893 Sea Islands hurricane, had the impact of a major hurricane in South Carolina after making landfall in Georgia.

While the official Atlantic Hurricane Season begins each year on June 1 and ends on November 30, tropical cyclones sometimes form outside of these dates, mainly in May and December. South Carolina has been affected by 13 tropical cyclones during May, with seven of those impacts occurring since 2007.



This summary includes a statistical analysis of the historical tropical cyclones that have affected the Palmetto State. It also contains an overview of tropical cyclone hazards, brief narratives of notable hurricanes that have impacted South Carolina, and a timeline of tropical cyclones that have hit the state since 1851.

SOUTH CAROLINA BY THE NUMBERS

86%

ANNUAL CHANCE
OF BEING
IMPACTED BY A
TROPICAL
SYSTEM BASED
ON THE LAST 50
YEARS

(AT LEAST ONE IMPACT IN 43 OF THE LAST 50 YEARS)

THE BREAKDOWN:

(based on the 1851-2023 period of record)

286 TROPICAL OR FORMERLY TROPICAL CYCLONES HAVE IMPACTED SC

133 STORM CENTERS HAVE TRACKED THROUGH SC

TROPICAL CYCLONES HAVE MADE LANDFALL ALONG THE SC COAST

3 1 WERE CATEGORY 1 OR HIGHER WHILE IN SC

25 HURRICANES MADE LANDFALL ON THE SC COAST

MAJOR (CAT. 3+) HURRICANE IMPACTS

MAJOR (CAT. 3+) HURRICANE LANDFALLS

This table outlines the earliest and latest tropical storms or hurricanes that have impacted South Carolina since 1851.

South Carolina has never been <u>impacted</u> by a tropical cyclone earlier than February 3rd or later in the year than December 2nd.

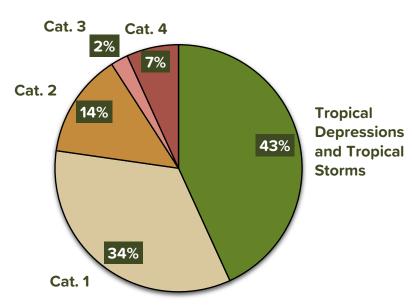
A tropical storm or hurricane has never made <u>landfall</u> in South Carolina later than October 31st. No major hurricane (Category 3 or higher) on record has made landfall before mid-August or after mid-October.



LANDFALLS IN SOUTH CAROLINA

A tropical cyclone makes landfall when its center crosses a coastline. Because the strongest winds in a tropical cyclone are not located precisely at the center, a tropical cyclone's strongest winds can be over land even if landfall does not occur.





Landfalling Tropical Storms and Hurricanes in South Carolina, 1851-2023:

19 Tropical Depressions and Tropical Storms

15 Category 1

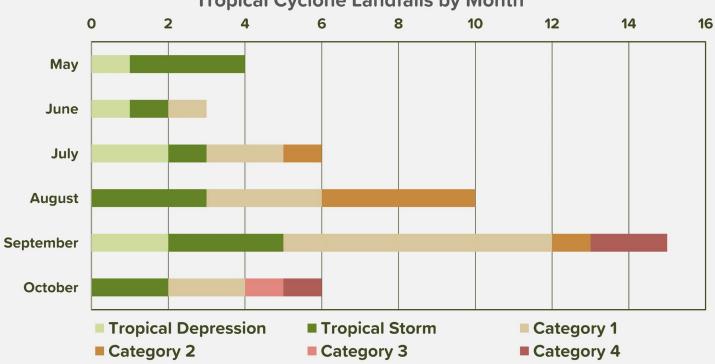
6 Category 2

Category 3

3 Category 4

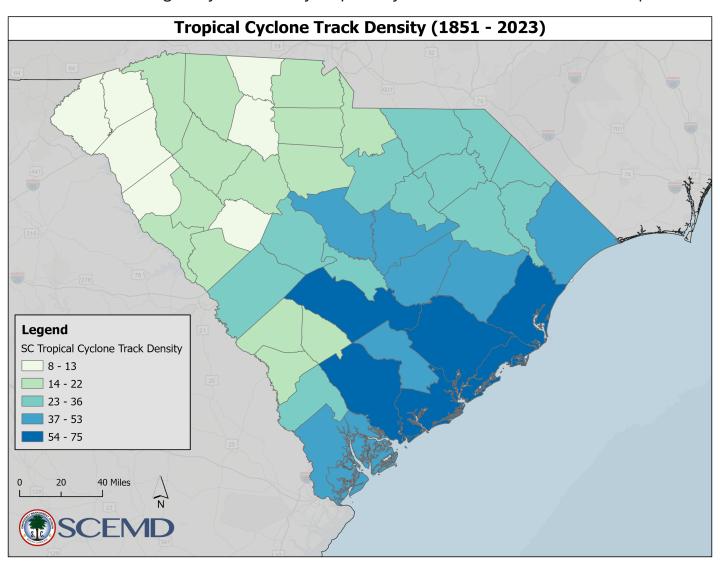
Category 5





SOUTH CAROLINA TROPICAL CYCLONE TRACK DENSITY

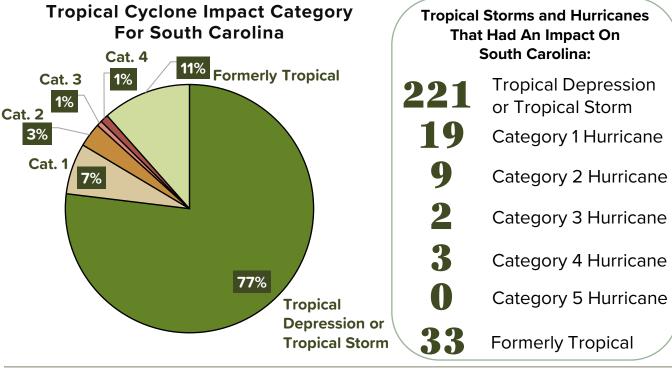
This map includes the counts of the storms categorized by the National Hurricane Center as either formerly tropical extratropical storms, tropical depressions, tropical storms, or hurricanes that have passed into or through the state from any direction, not just those making landfall on the coastline. This map does not include the tracks of remnants from tropical cyclones or far-reaching impacts of tropical cyclones that tracked outside the state. The map clearly shows that the counties close to the coast are more regularly affected by tropical cyclones than counties in the Upstate.

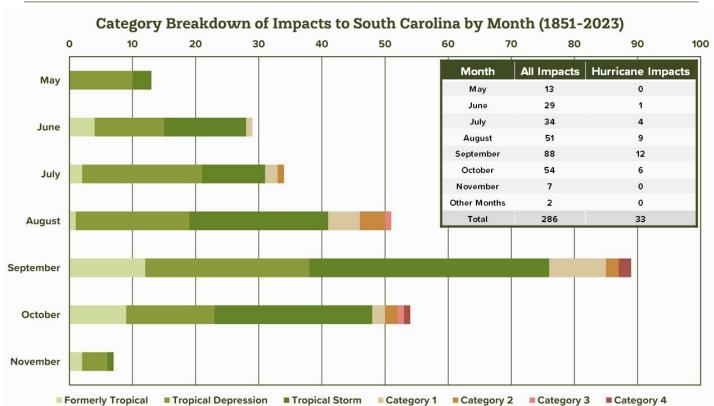


Tropical cyclones can be hazardous for residents all over the state, even if they do not make landfall along the South Carolina coast. As a tropical cyclone moves inland, it loses its strength since it is no longer over its fuel source, the warm ocean water. Even in a weakened state, the remnants of these storms can produce heavy rain, tornadoes, and strong winds in interior portions of the state.

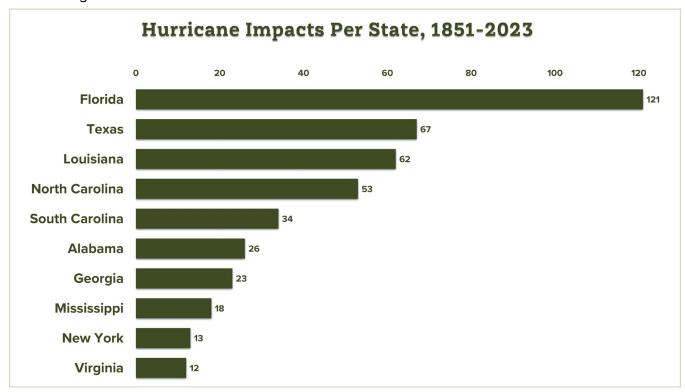
STORM IMPACTS ON SOUTH CAROLINA

The typical size of a tropical cyclone is approximately 300 miles in diameter. While a storm might not make landfall in South Carolina, the state can still feel far-reaching impacts of high winds, heavy rain, tornadoes, and coastal surge from a distant storm. The impact category is intended to describe the storm's effect on South Carolina. For near-miss storms, this can be different than a storm's intensity at the time as rated by the National Hurricane Center.





Over the last 50 years, at least one tropical cyclone has impacted South Carolina about seven years out of every eight on average. South Carolina ranks fifth among the states for having the most hurricane impacts over the entire historical record for Atlantic hurricanes stretching back to 1851.

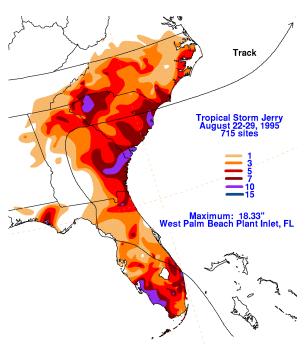




HAZARDS

INLAND FLOODING

Flooding from heavy rain has been the leading cause of hurricane-related deaths since 2013. Flooding rain from tropical cyclones does not correlate with the intensity of the tropical storm or hurricane but rather the storm's forward speed: slower-moving tropical cyclones cause heavier rainfall. Heavy torrential rains can occur hundreds of miles away from the center of the storm. Slowmoving Tropical Storm Florence (2018) dropped more than 30 inches of rain across portions of eastern North Carolina and over 20 inches in Horry County, the most on record for a tropical cyclone in South Carolina. The rain caused extensive flooding within the Pee Dee watershed that lasted weeks. Tropical Storm Jerry of 1995 made landfall on the Florida coast before slowly moving into the Upstate. Downpours dumped up to 15 inches of rain, leading to dam breaks and extensive flooding along the Saluda, Broad, Congaree, and Edisto rivers.



Highest Rainfall Totals Per Tropical Cyclones And Their Remnants (1956-2023) In South Carolina

Rainfall Total	Tropical Cyclone	Dates	Location
23.68"	Florence	Sep 15-18, 2018	Loris 2.9 WSW
17.45"	Beryl	Aug 13-18, 1994	Jocassee 8 NW
16.92"	Matthew	Oct 7-8, 2016	Edisto Island Middleton
16.80"	Floyd	Sep 15-16, 1999	Myrtle Beach
15.21"	Dorian	Sep 5-6, 2019	Pawleys Island 5.6 NNE
15.13"	Jerry	Aug 23-28, 1995	Hilton Head
14.17"	Hermine	Sep 1-3, 2016	Georgetown 6.0 S
14.11"	T. D. Eight	Aug 15-18, 1971	Sullivans Island
13.96"	Marco/Klaus	Oct 10-13, 1990	Pageland
13.80"	Gladys	Oct 17-20, 1968	Marion

Stations operated by the National Weather Service or CoCoRaHS

HAZARDS

STORM SURGE



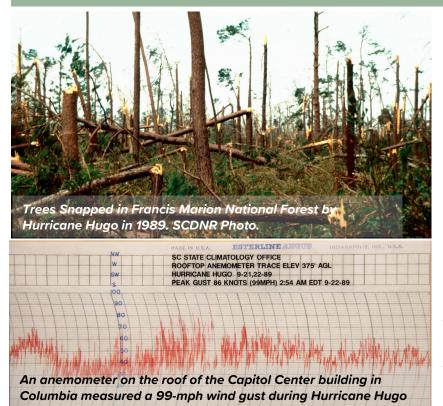
Residents of coastal communities must understand the impacts of a tropical cyclone's storm surge. The highest recorded storm tide on record along the South Carolina coast occurred during Hurricane Hugo (1989). From Sewee Bay to McClellanville, the storm surge was about 20 feet, sweeping away anything in its push inland.

The storm surge went 10 miles inland up the Cooper, Ashley, and Santee Rivers, destroyed piers and oceanfront property, and caused significant beach erosion in Georgetown and Horry counties. Although Hurricane Irma (2017) made landfall in southwest Florida, it produced maximum inundation levels of 3 to 5 feet above ground level along the Georgia and South Carolina coast. More recently, Hurricane Ian (2022) made landfall near Pawleys Island with a peak storm surge of about seven feet. Historically, storm surge is the leading cause of death in landfalling tropical cyclones.



HAZARDS

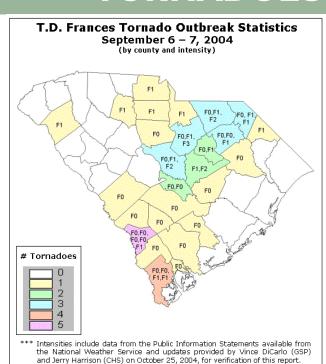
WIND



Tropical cyclones are known for damaging wind and are categorized on the Saffir-Simpson scale based on the maximum sustained winds, not the maximum wind gusts. Tropicalstorm-force wind (38-73 mph) can reach hundreds of miles from the storm's center, though the strongest winds usually occur near the center. Winds can stay at hurricane strength (74 mph or higher) well after landfall. As Hurricane Hugo moved through South Carolina in 1989, hurricaneforce winds occurred over much of the state. For example, Shaw Air Force Base recorded a wind gust of 109 mph

TORNADOES

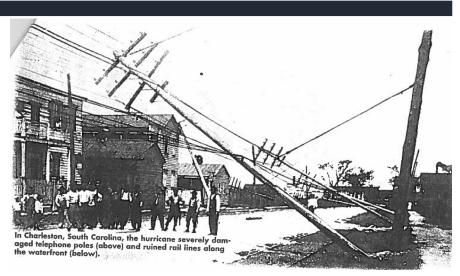
Tornadoes produced by tropical cyclones form in the outer rainbands, which can be hundreds of miles away from the storm's center and are most likely to occur in the northeastern quadrant of the storm. More than half of landfalling hurricanes produce at least one tornado. One of the most significant tornado outbreaks recorded in South Carolina was Hurricane Frances (2004), which made landfall along the east coast of Florida. Thunderstorms in the far-reaching outer rainbands spawned over 100 tornadoes across the Southeast, including 46 in South Carolina. Most of the tornadoes were relatively weak, rated F-0 or F-1 on the Fujita Scale in use at the time, but one in Kershaw County was an F-3 that destroyed buildings and mobile homes near Camden.



NOTABLE HURRICANES

August 28, 1893: The Sea Islands Hurricane

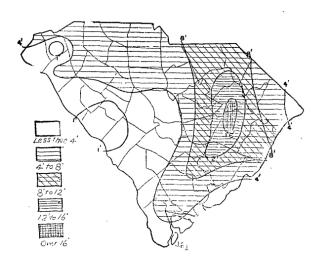
Telegraph and telephone communication capabilities rapidly grew during the late 19th Century, which meant warnings of incoming harsh weather conditions could reach areas with large populations. However, warnings could not reach more isolated populations, such as those residing on the Sea Islands of Georgia and South Carolina.



On August 28, 1893, a Category 3 hurricane made landfall at Ossabaw Island, Georgia at high tide before moving into South Carolina. It created an enormous storm surge that submerged many of the Sea Islands. Winds estimated at 125 mph hit the Beaufort area, while winds were estimated to be near 120 mph in Charleston. At least 2,000 South Carolinians died, and the hurricane caused \$334.1 million (inflation-adjusted to 2023) of damage. It was the first of two major hurricanes to affect South Carolina in 1893. The 1893 Charleston Hurricane made landfall as a Category 3 storm near McClellanville on October 18, causing more extensive damage in the Palmetto State.

July 14, 1916: The 1916 Charleston Hurricane

Chart Showing Total Precipitation During Period, July 14 to 18, 1916.

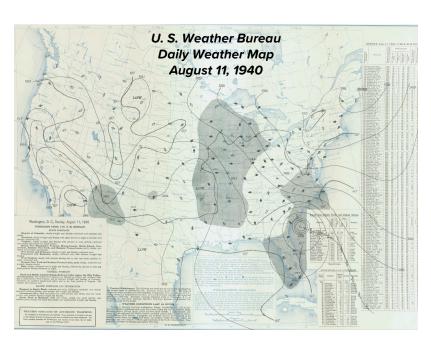


When this hurricane made landfall at Awendaw, it was a Category 2, with winds estimated at 105 mph. It crawled to the northwest over eastern South Carolina, which resulted in record rainfall for the time and widespread flooding. A weather station in Effingham (Florence County) recorded 13.25 inches of rain in only 24 hours. This hurricane caused about \$282 million (inflationadjusted to 2023) in damages, destroying over 700,000 acres of crops and causing the most extensive flooding of the Santee River System since records began in 1840. A tropical cyclone that had affected the state a few days prior was partly responsible for historic flooding in the Upstate. Rainfall and flooding were also historic in western North Carolina. The flood damaged the original Catawba Dam in York County. It was rebuilt as the Lake Wylie Dam in 1925.

NOTABLE HURRICANES

August 11, 1940: The 1940 S. C. Hurricane

This Category 2 hurricane made landfall near Hilton Head with winds of 105 mph, then tracked into central Georgia before curving to the north and heading into East Tennessee. Parts of the Lowcountry recorded more than ten inches of rain. The storm surge caused damage along the coast from Folly Beach to Beaufort, including the U.S. Marine Corps base on Parris Island and Port Royal. The storm tide at Charleston was 10.71 feet above mean low water. Crop losses, including corn, hay, cotton, and truck crops, were severe in the coastal sections, and trees and roofs were damaged 50 miles inland.



October 15, 1954: Hurricane Hazel



Hurricane Hazel's landfall as a Category 4 storm occurred near Little River, SC, near the South Carolina - North Carolina state line. Myrtle Beach, SC, reported a peak wind gust of 106 mph at landfall. Hazel made landfall during the highest lunar tide of the year, with a storm surge of at least 10 feet in SC with an 18-foot surge just across the state line in Calabash. Damage reports from across the Grand Strand state that 80% of the oceanfront buildings in Pawley's Island were destroyed, and only 2 of 275 buildings were left standing in Garden City.

Significant wind and storm surge damage occurred in Georgetown and Horry counties. Rainfall totals ranged from under an inch on the western half of the state to over eight inches along the Grand Strand. One person was killed, and the total damage costs in South Carolina were estimated at \$308.2 million (inflation-adjusted to 2023). Hazel moved fast, tracking north at almost 50 mph. After hitting the Carolinas, it marched north with damaging wind reported as far north as Toronto, Canada. While many hurricanes have hit farther north along the East Coast, Hazel remains the strongest, farthest north hurricane landfall on record.

NOTABLE HURRICANES

September 29, 1959: Hurricane Gracie

Hurricane Gracie made landfall on St. Helena Island near Beaufort as a Category 4 hurricane with winds of 130 mph. It tracked to the north-northwest through the Midlands, maintaining hurricane strength before weakening to a tropical storm over Chester County. Substantial wind damage occurred along the South Carolina coast from Beaufort to Charleston. Gracie destroyed crops in the Lowcountry and Midlands, including a significant loss of the unpicked cotton crop. While the storm made landfall at low tide, a storm tide of up to 10 feet occurred along the coast. The low tide landfall helped mitigate disastrous flooding from the surge. Rainfall totals were over six inches along the path of the storm. Gracie caused ten deaths in SC. Gracie was South Carolina's second landfalling hurricane of 1954; Category 1 Hurricane Cindy hit near Awendaw on July 9.



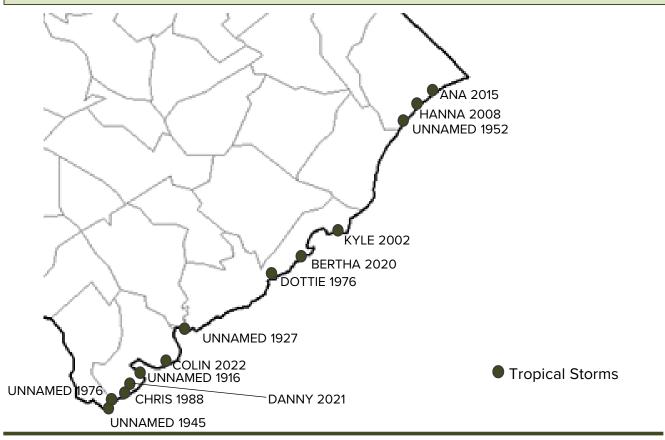
NOAA's Hurricane Re-analysis Project upgraded Gracie from a Category 3 to a Category 4 hurricane in June 2016.

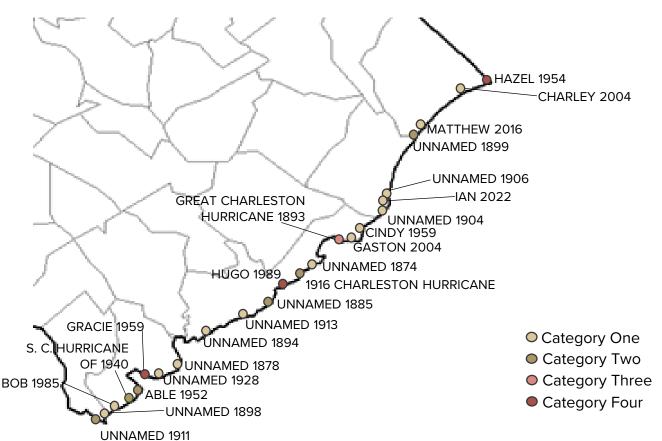
September 21-22, 1989: Hurricane Hugo



Hurricane Hugo was one of the worst natural disasters in South Carolina's history. It made landfall near Sullivan's Island as a Category 4 hurricane with estimated maximum sustained winds of 140 mph around midnight on September 22, 1989. Hugo was moving northwest at 25 mph when it made landfall. Due to this accelerated speed, Hugo maintained hurricane-force winds (74 mph or higher) as far inland as Sumter, where gusts reached 109 mph. Gusts reached 87 mph in Charlotte, NC. Forested areas in 36 counties along the storm's path sustained significant damage. Hugo produced the highest storm tide height in history along the US East Coast, around 20 feet in Bulls Bay, SC, near Cape Romain. Hugo is still the costliest storm in South Carolina history. At the time, it was the nation's costliest hurricane, as it caused about \$17.2 billion (inflation-adjusted to 2023) in damage.

SOUTH CAROLINA LANDFALLS





SC LANDFALLS: 1851-2023

DATE	NAME	CATEGORY AT SC LANDFALL	LANDFALL LOCATION
June 22, 1867	Unnamed	Hurricane 1	Isle of Palms
September 28, 1874	Unnamed	Hurricane 1	Seabrook Island
September 12, 1878	Unnamed	Hurricane 1	Edisto Beach
August 25, 1885	Unnamed	Hurricane 2	Kiawah Island
October 13, 1893	Unnamed	Hurricane 3	McClellanville
September 27, 1894	Unnamed	Hurricane 1	Hilton Head
August 31, 1898	Unnamed	Hurricane 1	Hilton Head
October 31, 1899	Unnamed	Hurricane 2	Myrtle Beach
September 14, 1904	Unnamed	Hurricane 1	Winyah Bay
September 17, 1906	Unnamed	Hurricane 1	Winyah Bay
August 28, 1911	Unnamed	Hurricane 2	Hilton Head
October 8, 1913	Unnamed	Hurricane 1	McClellanville
May 16, 1916	Unnamed	Tropical Storm	Fripp Island
July 14, 1916	Unnamed	Hurricane 2	McClellanville
October 3, 1927	Unnamed	Tropical Storm	Seabrook Island
September 19, 1928	Unnamed	Hurricane 1	Pritchards Island
August 11, 1940	Unnamed	Hurricane 2	Daufuskie Island
September 17, 1945	Unnamed	Tropical Storm	Jones Island
August 28, 1952	Unnamed	Tropical Storm	Myrtle Beach

SC LANDFALLS: 1851-2023

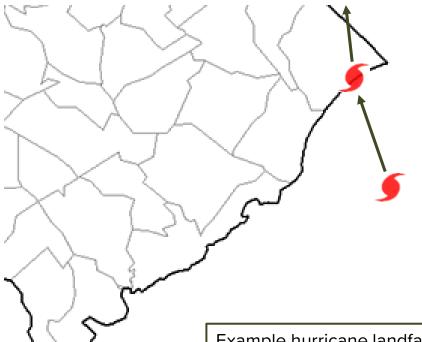
DATE	NAME	CATEGORY AT SC LANDFALL	LANDFALL LOCATION
August 30, 1952	Able	Hurricane 2	Pritchards Island
August 15, 1954	Hazel	Hurricane 4	NC-SC State Line
July 9, 1952	Cindy	Hurricane 1	Awendaw
September 29, 1959	Gracie	Hurricane 4	St. Helena Sound
August 21, 1976	Dottie	Tropical Storm	Kiawah Island
September 15, 1976	Unnamed	Subtropical Storm	Hilton Head
July 25, 1985	Bob	Hurricane 1	Pritchards Island
August 28, 1988	Chris	Tropical Storm	Jones Island
September 21, 1989	Hugo	Hurricane 4	Sullivan's Island
October 11, 2002	Kyle	Tropical Storm	Bulls Bay
August 14, 2004	Charley	Hurricane 1	Cape Romain
August 29, 2004	Gaston	Hurricane 1	Awendaw
September 6, 2008	Hanna	Tropical Storm	N. Myrtle Beach
May 7, 2015	Ana	Tropical Storm	Myrtle Beach
October 8, 2016	Matthew	Hurricane 1	McClellanville
May 27, 2020	Bertha	Tropical Storm	Capers Island
June 27, 2021	Danny	Tropical Storm	Pritchards Island
July 1, 2022	Colin	Tropical Storm	Hunting Island
September 30, 2022	lan	Hurricane 1	North Island

Appendix: Methodology For Determining Tropical Cyclone Impacts

When the center of a tropical cyclone moves onto land, the storm's landfall occurs at that location. However, tropical cyclones are large weather features with a typical diameter of about 300 miles. Because of their size, tropical cyclones can have major impacts on locations to areas far from where landfall occurs. A tropical cyclone impact is a term used to describe the effect that a tropical cyclone has, which is independent of where the storm made landfall or its intensity at the time. Some storms, such as Hurricane Helene of 1958, do not make landfall in the United States but still impact one or more states. Helene had a Category 3 impact on North Carolina and a tropical storm impact on South Carolina.

It can be challenging to judge the level of impact that a tropical cyclone has on a given state, sometimes requiring in-depth research. It is particularly challenging to determine the impact a storm had on South Carolina if it was a weaker storm or one that occurred in the distant past.

Some of this work has already been done by researchers at the Hurricane Research Division of the Atlantic Oceanographic and Meteorological Laboratory in Virginia Key, Florida. They have analyzed the hurricanes that have affected the United States and assigned hurricane landfall points and hurricane impacts for each state for every hurricane in the historical records. They also have generated a list of landfalling tropical storms in the United States.



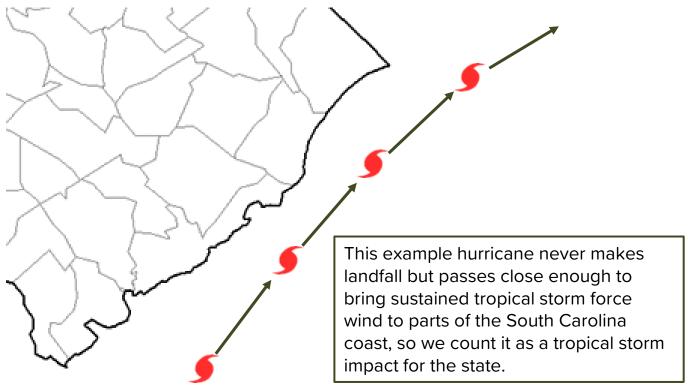
Example hurricane landfall at Myrtle Beach, highest reported sustained wind 100 mph at N. Myrtle Beach, this is a Category 2 landfall and impact for South Carolina

Example hurricane landfall at Sapelo Island, Georgia with 115 mph sustained winds, highest sustained wind reported in South Carolina 60 mph at Hilton Head, so not a South Carolina landfall but this is a tropical storm impact for South Carolina (though a Category 3 landfall and impact for Georgia).

This work is accepted by the State Climatology Office as the best documentation on hurricanes that have made landfall in South Carolina or have had the impact of a Category 1 or higher hurricane in the state. We also accept this work as the best documentation for landfalling tropical storms. However, this dataset only covers about 15 percent of the tropical cyclones and formerly tropical extratropical storms known to have impacted South Carolina.

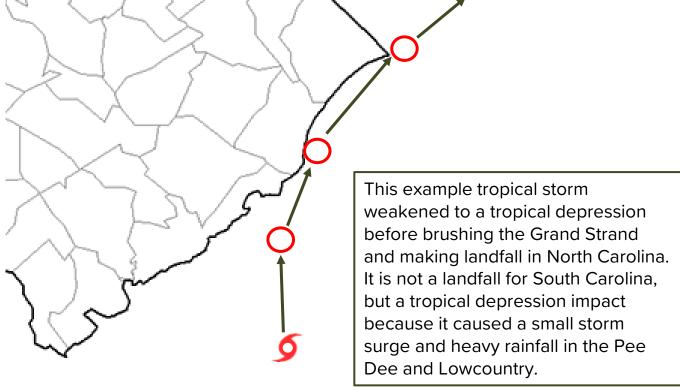
A project that began in 2018 with the work of a Climatology Office intern has been expanded to provide a more reliable and well-documented list of tropical cyclone impacts for tropical storm-level events, tropical depression-level events, and formerly tropical extratropical storms that had an impact in South Carolina.

There are a few criteria for crediting a storm as having caused a tropical storm impact on South Carolina. The first is that it made landfall as a tropical storm in South Carolina or that the storm's track in the HURDAT2 database had a point of tropical storm intensity within South Carolina. The second is that research found by or conducted by the SC State Climatology Office showed that sustained tropical storm force winds occurred in South Carolina as the storm passed through or near the state. A third is that the storm's radius of tropical storm force winds in the HURDAT2 database, where available, covers a part of the state. Another criterion, mainly used for storms before 1950, is that the tropical cyclone passed within 20 nautical miles of South Carolina while a tropical storm, or that a hurricane's center passed within 60 nautical miles of South Carolina.



There is also a category for tropical depression impacts. We have defined this as a tropical cyclone that affects South Carolina but does not cause sustained winds of tropical storm force or higher. The criteria for this are like those for tropical storm impacts. A tropical depression impact can be a landfalling tropical depression in South Carolina, a tropical cyclone that passes over the state at tropical depression intensity after making landfall elsewhere, or one that passes near South Carolina but causes notable impacts in terms of storm surge flooding, flooding rainfall, or tornadoes.

Some subjectivity becomes involved when a tropical cyclone passes at a greater distance from South Carolina. Some of these were counted as impacts because they had clear and notable effects on the state, such as flooding rain, or a tornado outbreak. Those with limited impacts, such as causing less than an inch of rainfall, were not counted as an impact. One special case is Hurricane Joaquin of 2015, which was counted as a tropical depression impact due to its role in the historic flooding in October of that year, even though its closest approach to the state was about 600 miles away.



There is one other category of impacts in our database. That is impacts from extratropical storms that were previously a tropical cyclone. Such storms can still have widespread impacts like those of tropical cyclones. Flooding rainfall and tornadoes are the most common effects that a formerly tropical cyclone can have when they cross South Carolina, but a few cause damaging wind and a storm surge. The criteria for this is like that for the tropical storm or tropical depression; their center must pass over or near the state while causing significant impacts from one or more of a tropical cyclone's hazards: damaging wind, heavy rainfall, storm surge, and tornadoes. The most recent example of such a storm was Tropical Storm Nestor of 2019, which became an extratropical storm before making landfall in Florida on October 19, then it crossed Georgia and South Carolina. South Carolina's impacts included winds gusting as high as 47 mph, rainfall of up to four inches, a small storm surge of about 1.5 feet, and one tornado in Horry County.



The track of Tropical Storm Nestor of 2019.

Green: Tropical Storm

Gray: Extratropical Storm