A HISTORY OF STORMS ON THE SOUTH CAROLINA COAST

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There really is not much that can be said. The hurricane, an act of God, passed our way, and in a couple of hours undid what it had taken man years to do, and will take him a long time to rebuild. What has happened has happened. Looking backward will do no good. But the experience... can be used as a guide as plans are made for the future. -- The State (Columbia), 10/18/54
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L. W. J.
HURRICANES, cyclones, and heavy gales were once—not very long ago—a common experience of the people who lived on the coast and sea islands of South Carolina. They were "a part of the climate." They "belonged" to expectation.¹ Every generation had its "horrid" or "disastrous" or "great" storm which wrecked large parts of the human environment. The great and marked event gave color and focus to a lifetime. Stories and ballads about it were handed down, and survivors sometimes "remembered" it in formal observance, as black folk of the Combahee River country as recently as 1967 "remembered" the monster hurricane of 1893 with night-long vigils and prayer meetings during the month of August.²

Indians whose ancestors walked South Atlantic shores several millennia before the coming of white men told early English settlers of Carolina about 1680 of a tremendous hurricane of legend which "raised the water over the tops of the trees" at the site of Charleston. The first tropical storm of record subsequent to English settlement made its appearance in August, 1686. It was known as the "Spanish Repulse Hurricane" because it may have saved the infant colony—a few hundred men, women, and children spread thinly between the Cooper River and Port Royal Sound—from annihilation by a formidable invasion force from nearby Spanish Florida. (Carolina extended the boundary of English Empire well to the south in North America, encroaching on lands claimed by Spain.) On the evening of August 25, 1686, gale winds drove two units of the invasion fleet ashore and forced the Spaniards to break off their primary attack at Charleston. But the storm scourged the English colonists while saving them. An idea of the havoc the storm left behind appears in a mournful letter from a local official to the Lords Proprietors in London:
The whole country seems to be one entire map of devastation. The greatest part of our houses are blown down and still lie in their ruin, many of us not having the least cottage to secure us from the rigor of the weather. The long incessant rains have destroyed almost all our goods which lie intombed in the ruins of our houses. Our corn is all beaten down and by means of continued wet weather lies rotting on the ground.

Our fences are laid flat so that the little corn that escaped the storm is devoured or destroyed by our hogs and cattle. Abundance also of them were killed in the tempest by the falls of trees which in infinite number are blown down and lie in confused heaps all over the country so that most of our cattle are in great danger of running wild, there being scarce any probability of finding them out or possibility of driving them home when they are found.

In some places for 3 or 4 miles together there is scarce one great tree standing. All paths being so impassable that there is no traveling on horseback and scarce any on foot, whereby all society and communication with our neighbors, one of the greatest comforts of our lives, is for many years rendered extraordinary difficult. With the falls of trees the foods of our hogs is likewise destroyed which will cause them all to run wild; or which is as bad, they will all be starved from these and the like calamities which now attend us. We have too great reason to fear the near approach of famine to complete all our miseries which we pray God in his mercy to direct from us.

Colonial South Carolina was--and the state of South Carolina is--situated on a northwestern edge of a major hurricane "corridor" which originates in the Atlantic Ocean just above the Equator. Almost fourscore times between the first storm of 1686 and the last significant storm, "David," in 1979, about once every four years, coastal South Carolina was visited (and importantly affected) by tropical storms. The storms levied a heavy toll of human lives and property, for this coast and its sea islands are open, largely unprotected, and low-lying--the highest elevations are rarely as high as twenty feet above sea level--and since the 18th century have been increasingly filled with people, with several towns and clusters of farms which grew into cities, ports, large-scale agricultural enterprises, and vacation centers. Destructive as were the swirling winds, greater damage was usually caused by the "storm surge," the great dome of violently agitating, wind-swept water, sometimes approaching ten feet high, which crashed into and over islands, beaches, and shores near the "eye" of the storm,
a bulldozer sweeping away everything in its path, accounting for nine out of ten hurricane fatalities. The most destructive storms moved against the coast directly from the ocean, approaching from the south and southeast. If storm surge and lunar high tide coincided, the cataclysmic effect was compounded, as with the great hurricane of 1752, which propelled a seventeen-foot tidal wave directly over Charleston, already a flourishing seaport of five thousand inhabitants. "The flood," began an account in The South-Carolina Gazette, September 19, 1752,
came in like a bore, filling the harbor in a few minutes: Before 11 o'clock, all the vessels in the harbor were on shore, except the Hornet man-of-war, which rode it out by cutting away her main-mast; all the wharves and bridges were ruined, and every house, store, &c. upon them beaten down, and carried away (with all the goods, &c. therein) ... and great quantities of merchandise, &c. in the stores on Bay-street damaged, by their doors being burst open: The town was likewise overflowed, the tide or sea having rose upwards of Ten feet above the high-water mark at spring-tides, and nothing was now to be seen but ruins of houses, canows, wrecks of pettiaugas and boats, masts, yards incredible quantities of all sorts of timber, barrels, staves, shingles, household and other goods, floating and driving, with great violence, thro' the streets, and round about the town. The inhabitants, finding themselves in the midst of a tempestuous sea, the wind still continuing, the tide (according to its common course) being expected to flow 'till after one o'clock, and many of the people already being up to their necks in water in their houses; began now to think of nothing but certain death: But ... they were soon delivered from their apprehensions; for, about 10 minutes after 11 o'clock, the wind veered to the E.S.E., and S.W., very quick, and then ... the waters fell about 5 feet in the space of 10 minutes, without which unexpected and sudden fall, every house and inhabitant in this, must, in all probability, have perished."

Many did perish, including nine who drowned on Sullivan's Island and twenty German immigrants who died of injuries sustained when their ship was driven from an anchorage in the harbor and dashed to pieces on the shore. About 500 buildings were blown down and washed away. The people of Charleston had to rebuild their city: on receipts from rice and indigo they built better than before, creating a community whose impressive residences and public buildings earned it
the accolade, "The most perfect Georgian city in the world." 6

The normal hurricane season was July through October, as suggested by a perennial popular rhyme:

June, too soon.
July, stand by.
August, don't trust.
September, remember.
October, all over. 7

On rare occasions, tropical storms struck the South Carolina coast as early as May (as in 1934). The latest arriving significant storm made its appearance in the last two days of October, 1792. But the great majority of storms--51 out of the total of 76, 18 out of 34 major storms, and 9 of 10 great storms--had their debut during August or September. (There is a scientific explanation: trade winds are generally strongest at this season, and tropical storms wheeling out of the tropics are thus imparted strong forward and westward momentum which more often carry them over continental North America.) From the seventeenth through the nineteenth century, the storms were most often linked with the month of September, sweeping across the South Carolina coast with such regularity that "September gale" became a commonplace expression, and Low Country people had a good reason to plan early-autumn vacations to the mountains. Since the later 19th century August has vied with September on more than even terms for the designation, "month of hurricanes." 8

Just as there were hurricane months, there were also hurricane years. Such a year was 1893, when denizens of the South Carolina coast had to suffer through a gale in June and two major hurricanes in August and October. ("If there is any connection between 'sun spots' and cyclones, as some scientists affirm," declared the editor of the Charleston News and Courier, "the sun must have some large spots on it just now." 9) The August storm utterly devastated the lower coast, submerging its sea islands--St. Helena, Lady's, Hilton Head--under a storm surge of twenty feet. Perhaps two thousand South Carolinians,
most of them Negroes who lived in poverty and primitive conditions on the islands, were drowned, and thirty thousand were left homeless, with means of subsistence, growing crops ruined and boats squashed or swept away. The October storm added injury to injury while it violated popular expectations. A contemporary journalist, Joel Chandler Harris, filed a moving account of the disasters of 1893 from St. Helena Island:

The oldest inhabitant he wrote is able to remember some very severe storms, but not such another year of storms. He is able to measure the intervals that have elapsed between these disturbances, and from this measurement he has constructed the comfortable theory that after every severe storm there must be a peaceful interlude of ten or fifteen years. But to-day, as he stands in the bright sunshine, the solemn mystery of the marshes stretching away before him as far as the eye can reach, he shakes his head sadly, and digs his cane feebly into the sand. His theory has been blown northeastward into the sea, and it is no wonder he sighs as he walks by your side and points to signs of the storm's devastation that might otherwise escape the eye of a stranger. A house was here or a cabin. Nearby a shoal of dead bodies had been seen drifting along, or were washed ashore. Here was where a magnificent dock and warehouse stood, but there is nothing now to mark its site except a few scattered piles. Here a house has been staggered upon its end, there a boat has been flung into the arms of a live oak. Here a magnificent grove of live oaks has been uprooted; there a broad-beamed lighter has been lifted across the marshes; and yonder hundreds of tons of marsh sedge have been spread over arable land. This woman, standing apart, as lonely as the never-ending marshes, lost three children. She had five. In the fury and confusion of the storm, she managed to get them all in a tree. The foundations of this place of refuge were sapped, and the tree gave way before the gale, plunging the woman and her children into the whirling flood. Three were swept from under her hands into the marsh, into the estuary, and so into the sea. They were never seen any more.

In Beaufort "every warehouse and wharf" was prostrated. "Stores and offices were inundated. Immense Guano factories were blown down and the yawning sea swallowed their phosphate dredges with the heroic crews on board vainly struggling to save them. Men and boys driving their animals from the shore to higher ground were overtaken by the furious waves, swiftly borne back by the receding waves, both man and beast drowned." When Red Cross
workers reached the district, they found a great "dismal swamp" where the
dead lay about the shores unburied and the living either starving or dying
of pestilence generated by decaying bodies or stagnant ponds of sea-water left
on what had been dry land. As late as 1979, Beaufort coroner Roger Pinckney
reportedly found human remains in muddy creek bottoms on St. Helena that were
carbon-dated to the great storms of 1893.12

A human catastrophe of such magnitude has not been visited upon coastal
South Carolina since, whether due to protective measures of some sort or for
some other reason is not certainly known. The sum total of human lives lost
on this coast as a direct consequence of all tropical storms since 1900 is
about one-fortieth that of the single August storm of 1893: 1 death in 1906,
17 in 1911, 34 in 1940, 1 in 1945, 1 in 1954, 11 in 1959, and no deaths since,
for a total of 65. However, through the first six decades of the twentieth
century the values of property destroyed rose to new heights. The hurricane
called "Hazel," which ripped into the upper coast very late in the season
(October 15) in 1954, was equal in intensity and raw destructive power to the
August storm of 1893. Advance warning helped prevent equal loss of life, but
there was no staying its devastation of the human environment. "Hazel" dealt
the South Carolina coast property damages in excess of $27 million. At Garden
City her 106 miles-per-hour winds broke off the upper story of a large business
structure and flung it 300 feet into the sound.13

Despite this violent history, tropical storms generally had less than
determinative influence upon human settlements, institutions, and activities:
that is to say, their effect upon coastal South Carolina was temporary and
exceptional when viewed in the continuum of time. Individual and corporate
losses might be heavy: this crop of cotton or rice ruined, that ship or house
reduced to kindling, this life prematurely snuffed out. It was ever the same—
people bent to nature's powerful thrusts but in the corporate sense did not break: the survivors picked up the pieces and continued their former lives and former ways.

But sometimes the storms served as instruments of important change. The "September gale" of 1822 which plunged ashore between Charleston and Georgetown literally washed away a "summering" village at Cedar Island on the Santee; as a consequence, the old resort site was abandoned as dangerously low-lying, and McClellanville was founded nearby on higher ground as an alternative. The storms of 1893 were partly responsible for the demise of the phosphate industry at Beaufort, and a severe hurricane in 1911 gave the coup de grace to the district's already-troubled rice agriculture, so badly damaging diking systems that they could not be profitably repaired. Most recently a hurricane of August, 1940, struck Edisto with such devastating effect at high tide that the island's promising career as a retirement and vacation resort was dislocated and postponed:

The beach was hastily evacuated by the Coast Guard, and summer visitors drove away without taking time to gather their belongings. Only one family /the Wallar Baileys/ . . . delayed too long. When they started to drive off, their car was caught in the rising tide. Fortunately, they made it back to their large, well-built, well-anchored house on the front beach. In their retreat they watched in terror as the waves broke far inland behind their house, leaving them totally surrounded by the angry sea. The roofs of houses slid by, and sometimes even whole houses . . . . The family came safely through the storm. But they had such a fright that they sold /their property/ and left the beach for good.

Recurring storms influenced architecture in various directions at different times. For more than a century after English settlement, the prevailing view in the Low Country was that structures exposed to hurricane blasts had to be "solid mason-work." At the same time, there was always recognition of the value of tall structures. One indication was houses built on high basements, or, to put it another way, with their first stories starting half-a-story above ground. Another, more ephemeral manifestation was massive storm towers built by planters.
of the Winyah Bay-Georgetown district after the killer-hurricane of 1822. In most recent times, building codes have encouraged a combination of high and open foundations as the best proof against the upwash and scour of hurricane storm surge. (See Figure 1)

Since the 1950s, tropical storms have played a diminished role in the history of coastal South Carolina. The number of tropical storms seems to have been on the increase for all areas in the Atlantic during the past several decades. The same trend was apparent for the South Carolina coast as late as 1959. But now we are in the midst of the longest-ever interval between major storms since the founding of Charleston three centuries ago: 22 years. We are disposed to be complacent, to think that the hurricane hazard was tamed by human know-how, like polio, another case of mind over matter. The progress of science and technology in recent decades has been impressive. Well into the 19th century it was impossible to know when a hurricane was threatening or what to do about it if one came. The only warning system was the human eye and ear, which might pick up an ominous heaving of the sea sometimes evident several hundred miles ahead of a storm (and sometimes not), or other "warnings": the alligators' uneasy bellowing out of mating season, the roosters' spontaneous crowing of an evening, or the entreaties of the mysterious Gray Stranger who walked the beaches and knocked on doors. From the early 19th century it was known that tropical storms are moving systems of low atmospheric pressure which may be identified with a barometer. The advent of rapid communications with the completion of the first telegraph lines in 1845 permitted weather-watchers for the first time to apply this knowledge in a practical way: to collect weather observations from increasingly distant points and plot them on a map: a series of such weather maps became a means to "track" the movement of storms from their birth as "tropical disturbances" and forecast their probable paths
and speed of advance. Subsequent developments--new instruments like radar and aircraft and satellites and computers, new knowledge about cloud patterns, and the professionalization and bureaucratization of weather-watching and disaster relief--all did their part to insure, in our time, that hurricanes can no longer strike completely without warning or succor for the afflicted.  

But difficulties remain. Hurricanes, like the weather, are predictable only within limits. (An expert meteorologist who classified hurricanes by their movements included "right-hookers" and "south-droppers" as well as "text-bookers" and "straight-shooters" among the descriptive names.) In order to predict the points along an ocean front where wind and storm surge will present a hazard great enough to justify the expense and inconvenience of mass evacuation of the inhabitants it is necessary to know 12 to 24 hours in advance precisely where the storm center will strike land. Our current technology does not permit such a projection. Indeed, in three out of four of the greatest hurricanes of the twentieth century (in terms of impact on the South Carolina coast)--those of 1911, 1940, and 1959--fickle storms more or less confounded the experts of the Weather Service, which finally issued belated warnings for all or portions of the South Carolina coast one to three hours before the storms' arrival. The admittedly more sophisticated technology of warning and organized response based on experienced weather and disaster preparedness agencies developed since the 1950s has not yet been tested by a major storm. Yet there has occurred a remarkable latter-day concentration of human activities and habitations on the South Carolina coast, especially on the beaches north of Georgetown and on the islands south of Charleston and at Beaufort. The somewhat paradoxical consequence, it seems to many intelligent people who should know, is not food for complacency but gnawing concern and fear that this coast and this people have never been more vulnerable.

Robert Scott of the Charleston County Disaster Preparedness Agency suggests
that the best advice he can give for hurricane preparation is "cultivate a friendship in Columbia." Although this sounds defeatist in the extreme, it makes a basic point. When a hurricane warning comes, there still is not much that can be done, if one lives in a vulnerable area, except evacuate to higher ground as quickly as possible. Even this is not always (or necessarily) as easy as it sounds: the population on some beaches and most coastal islands is now so large that there may not be enough warning time for safe evacuation of people, for evacuation must be achieved by way of narrow roadways which run over low-lying embankments and bridges and are thus subject to closing by storm surge or bridge malfunction or accident. And even if all people escape, which experts like Neil Frank of the National Hurricane Center doubt, their property, valued in the billions of dollars, is captive to the storm. This has always been the price exacted of those who were drawn to the "good life" on the South Atlantic. The demand for, and soaring values of, ocean-side property in this state suggests that, as ever, people are willing to gamble that benefits outweigh a seemingly remote danger.

Now let us try, as a sort of conclusion, to understand the general meaning of the preceding analysis.

If South Carolina faces a crisis on its islands, inlets, and beach-fronts, it is one sweetened by success: coastal South Carolina has not been so prosperous since early in the nineteenth century, and sun-drenched beaches and sea islands make a tremendous contribution. Moreover, it is a crisis aided by "politics" as it has worked at all levels in the recent past. Local units of government support themselves mainly by taxes on land, and as a consequence heartily encourage any development of land which will increase assessed values. Existing federal flood insurance programs may have the same effect: its public subsidy, by shouldering a large part of the property insurance burden, has
apparently encouraged people to build homes and businesses in even the most hazardous areas.

What is to be done? At the risk of being impertinent, I offer the following suggestions.

1) Local and state governments, the Weather Service, and various emergency agencies like the Red Cross who are collectively responsible for developing and carrying out procedures for dealing with hurricanes need to establish the closest possible working relationships with each other before coordination is required in a disaster.

2) Government at all levels must create and enforce more stringent hazard mitigation zoning and building codes. If, as seems the case, the entire population of all coastal areas likely to be affected by a great hurricane cannot be evacuated by existing transportation systems within the warning time that is likely to be available, perhaps a medium-run solution is that suggested by William H. Wilcox of the Federal Emergency Management Agency: vertical evacuation, that is, instead of moving everyone to higher ground some distance from the coast, settling a portion of the endangered population into local high rise structures which have been built and certified to withstand hurricane wind and flood. More stringent building codes would make vertical evacuation feasible. More stringent hazard mitigation zoning would have the additional benefit of keeping a larger portion of beachfront areas "public" and ecologically "natural."

3) We need impartial and detailed analyses of the emergency preparedness capabilities of each of the coastal counties of the kind just completed by the South Carolina Coastal Council for Hilton Head Island.

4) We need well-conceived and perpetual public education campaigns to educate the public both to the real hazards of hurricanes and to the necessity of individual preparedness.

5) Meanwhile, we need continued good fortune.
Notes

1 Joel Chandler Harris, "The Sea Island Hurricanes," Scribner's (1899), 229.

2 R. Y. Lane, "The Hurricane of August 28, 1893," manuscript in Beaufort County Library.

3 Quoted in David M. Ludlum, Early American Hurricanes (Boston: American Meteorological Society, 1963), 41-42.

4 See Tables 2 and 3.

5 The South Carolina "coastal plain," or Low Country, is approximately 190 miles long and 25-40 miles wide and divided into unequal parts by the drainage system of the Santee River. Above the Santee, toward North Carolina, the strand is long and unbroken except for an occasional inlet, like Murrell's, and was almost entirely unused by man before the twentieth century. Below the Santee the coast is sharply indented by bays—Winyaw, Charleston, Edisto, St. Helena, and Port Royal—and rivers, and guarded by a chain of islands, many of them fertile, and was developed first by aboriginal Indians. During the first two centuries of English occupation, the lower coast was the vital center of life in the colony and state. Agriculture was ever the primary economic pursuit, with corn, rice, indigo, and cotton the major staple crops. But it was commercial farming, and a large class of people made their living as merchants, sea captains, and artisans and professional men who lived in towns that served the ocean trade. In the three decades immediately past, because of a number of social factors, particularly a national population that is increasingly elderly (and thus retired) and inured to a leisurely lifestyle by the sea, because of a concentration of naval, military, and air force installations, and because of favorable tax, cost of living, and environmental factors, newcomers have moved into all South Carolina coastal areas in record numbers. See James Henry Rice, Jr., Glories of the Carolina Coast (2nd. edition, Columbia: R. L. Bryan, 1936), pp. 5-14, for South Carolina geography.


7 News and Courier (Charleston), July 6, 1980.

8 See Table 1.

9 News and Courier, October 5, 1893.


12 Beaufort Gazette, July 13, 1981.


It is said that the legend of the Gray Stranger stemmed from two dreams that Anna Alston of Waccamaw had, 30 years apart, in which her dead father appeared to warn her of impending disasters which did occur: once in the form of a hurricane, and again in the form of Yankee soldiers. See H. R. Sass, Story of the South Carolina Low Country (Columbia, S. C., Hyer Publishing Company, n. d.), p. 260.


See News and Courier, July 6, 1981.

News and Courier, June 1, 1981.


HIGH WINDS, HIGH WATER
West Indian storm wrecked the ship Albemarle, part of the first fleet which brought Englishmen to a permanent settlement in South Carolina, off Barbados.

English colony settled at Albemarle Point (later "Charles Town" or "Charleston") in the mouth of a spacious bay formed by the Ashley and Cooper rivers (formerly so-called Kiawah and Etiwan); on Sept. 9 the Secretary of the Colony reported to the sponsors in London: "The Collony is ... safely settled and ... there only remains the preservation of it." (South Carolina and the Sea, ed. Petit)

A heavy gale, striking with sudden fury, damaged and drove away from Charleston a Spanish attack fleet, while doing much damage to the English settlement ("Spanish Repulse Hurricane")

*NOTE: I have used a scale which combines "objective" data, particularly wind speed, with situational factors. The United States Weather Service distinguishes several grades of hurricanes, which minimally pack winds of a constant 74 miles per hour, tropical storms, whose winds have a constant speed of 39 to 73 miles per hour, and tropical depressions, with wind speeds below 39 miles per hour. Since no means of determining wind velocity and central pressure, and thus distinguishing the various grades of storms, existed before the late 19th century, I have had to calculate the magnitude of earlier storms backwards, as it were, from effect to cause. Early and late, the interaction of the objective reality (the storm) and situational factors determine impact. Among the most important situational factors are the following: 1) tide stage and wind direction; 2) the spatial spread and density of people and property; 3) their vulnerability based on such variables as: land elevation, depth of coastal waters, distance to shoreline, type of shoreline (open, protected--i.e. by dunes or seawall, bay, estuary), types of property and activities and architectural styles; and 4) efficiency of social organization and economic and scientific technology.

In this study, I have given a storm a rating number (1) when all known factors suggest a tropical storm or hurricane which had significant but rather limited impact on the coast of South Carolina, a rating number (2) when the pattern indicates a tropical storm or hurricane of major proportions in terms of impact on the coast of South Carolina, and a rating number (3) when known factors suggest a storm deserves the title "great", again with reference to its impact on coastal South Carolina, particularly its people and human things.
Parish register of St. Helena’s Church on the lower Carolina coast recorded its first English birth.

Hurricane winds and storm surge "very severe, overthrowing many houses and overflowing the town" of Charleston; a large Scottish frigate Rising Sun broke up outside the bar, with at least 97 persons, new Scots immigrants, lost; other vessels in Charleston harbor also wrecked; to the north near the future Georgetown, surging wind and water cut a new channel into Winyah Bay (Bartram; Ramsay; Douglas)

Lords Proprietors of Carolina ordered the creation of a second major settlement and seaport, Beaufort, on Port Royal Sound

Storm center made landfall north of Charleston, which suffered 70 lost lives and great injury to shipping, houses, barns, plantations, and fortifications (in amount of 100,000 pounds sterling. The remarks of the Englishman Mark Catesby, who heard about this storm while doing a natural history survey in the Carolinas in 1722-1726, show the state of knowledge of hurricanes in the 1730s:

"Usually once in about seven years, [late summer] rains are attended with violent storms and inundations, which commonly happen about the time of the hurricanes that rage so fatally amongst the Sugar Islands, between the tropicks, and seem to be agitated by them or from some cause, but are much mitigated in their force by the time they reach Carolina; and tho’ they affect all the coast of Florida, yet the further they proceed, so much the more they decrease in their fury, Virginia—not having often much of it—and north of that still less. Tho’ these hurricanes are seldom so violent as in the more southern parts, yet in September 1713, the winds raged so furiously that it drove the sea into Charleston, damaging much of the fortifications whose resistance it is thought preserved the town. Some low situated houses not far from the sea were undermined and carried away with the inhabitants; ships were drove from their anchors far within land . . ."

(Ludlum)
1728 Aug. 13-14 (2)

Charleston again overflowed; large damage to buildings, wharves, and corn and rice fields outside town (Hewatt); 23 ships sunk or driven ashore as follows (Spence):

<table>
<thead>
<tr>
<th>Identification</th>
<th>Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prince George, Geo. Freist master</td>
<td>vessel</td>
<td>James Island Marsh</td>
</tr>
<tr>
<td>Charleston, Ebenezer Simmons master</td>
<td>schooner</td>
<td>Charleston</td>
</tr>
<tr>
<td>Kilgores. John Coffin master</td>
<td>snow</td>
<td>Charleston</td>
</tr>
<tr>
<td>Ruby, Joseph Goff or Gough master</td>
<td>brigantine</td>
<td>Charleston</td>
</tr>
<tr>
<td>Betty, John Tannatt master</td>
<td>brigantine</td>
<td>Charleston</td>
</tr>
<tr>
<td>Plass, Thomas Bream or Breme master</td>
<td>brigantine</td>
<td>Charleston, Qualichee Marsh</td>
</tr>
<tr>
<td>Catherine, Am. Vicary master</td>
<td>brigantine</td>
<td>Charleston</td>
</tr>
<tr>
<td>Good Intent, Walter Kippon master</td>
<td>ship</td>
<td>Charleston Harbor</td>
</tr>
<tr>
<td>Carolina Packet, Benjamin Austin</td>
<td>ship</td>
<td>Charleston</td>
</tr>
<tr>
<td>True Love, James Omer master</td>
<td>ship</td>
<td>Charleston near Racquet</td>
</tr>
<tr>
<td>Sarah, Francis Baker master</td>
<td>ship</td>
<td>Charleston on Green Bay</td>
</tr>
<tr>
<td>Mary, Henry Levergood</td>
<td>ship</td>
<td>Charleston Harbor</td>
</tr>
<tr>
<td>Buley, William Birt or Burst</td>
<td>ship</td>
<td>Charleston, White Point</td>
</tr>
<tr>
<td>Midway, William Paul master</td>
<td>ship</td>
<td>Charleston, White Point</td>
</tr>
<tr>
<td>Olive, Hugh Colebey master</td>
<td>ship</td>
<td>Charleston</td>
</tr>
<tr>
<td>Mary Ann, John King master</td>
<td>ship</td>
<td>Charleston</td>
</tr>
<tr>
<td>Thetis</td>
<td>sloop</td>
<td>Charleston, Rhett's Point</td>
</tr>
<tr>
<td>Lorir. Ja. Smith master</td>
<td>sloop</td>
<td>Charleston</td>
</tr>
<tr>
<td>Merriches, Wm. Johnson master</td>
<td>sloop</td>
<td>Charleston</td>
</tr>
<tr>
<td>Hopkins, Peter Addams master</td>
<td>sloop</td>
<td>Charleston</td>
</tr>
<tr>
<td>Tace, Benj. Haskins master</td>
<td>sloop</td>
<td>Charleston, Rhett's Point</td>
</tr>
<tr>
<td>Elizabeth, Ar. Rawlings master</td>
<td>sloop</td>
<td>Charleston</td>
</tr>
<tr>
<td>Bumper, William Smith master</td>
<td>sloop</td>
<td>James' Island marsh</td>
</tr>
</tbody>
</table>

1729

Elisha Screven, son of one of the first settlers at Winyah Bay (about 1710), laid out town of Georgetown at head of the Bay, near the confluence of the Pee Dee, Waccamaw, Black, and Sampit rivers (South Carolina and the Sea)

1752 Sept. 15 (3)

"The most violent and terrible Hurricane that ever was felt in this province" : Charleston inundated by 17 foot storm surge which obliged citizens to retire to upper stories of houses; wind and water damaged housing, fortifications, and wharves "to a considerable amount" (South-Carolina Gazette, Sept. 19, 1752; Hewatt); 30 deaths; shipping seriously damaged (after Spence):

<table>
<thead>
<tr>
<th>Identification</th>
<th>Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth. A. McGillivray</td>
<td>schooner</td>
<td>Charleston</td>
</tr>
<tr>
<td>Susanneah, Amos Ninal</td>
<td>schooner</td>
<td>Charleston</td>
</tr>
<tr>
<td>Baulk</td>
<td>schooner</td>
<td>Charleston</td>
</tr>
<tr>
<td>ten unidentified small</td>
<td>sloop</td>
<td>Isle of Pals</td>
</tr>
<tr>
<td>unidentified small</td>
<td>sloop</td>
<td>off Charleston Bar</td>
</tr>
<tr>
<td>unidentified wreck</td>
<td>vessel</td>
<td>Child's Bluff, Ashley R.</td>
</tr>
<tr>
<td>Telomochus</td>
<td>ship</td>
<td>Izard's Creek, Ashley R.</td>
</tr>
<tr>
<td>Eagle-Galley, Capt T. McDaniel</td>
<td>Frigate</td>
<td>Charleston</td>
</tr>
<tr>
<td>H. M. S. Mermaid</td>
<td>vessel</td>
<td>Mr. Wright's at Charleston</td>
</tr>
<tr>
<td>Lucy, John Bulman Master</td>
<td>vessel</td>
<td>Mr. Wright's at Charleston</td>
</tr>
<tr>
<td>unidentified new</td>
<td>schooner</td>
<td>Charleston</td>
</tr>
<tr>
<td>Nancy, John Budley master</td>
<td>schooner</td>
<td>Charleston</td>
</tr>
<tr>
<td>3 unidentified</td>
<td>schooners</td>
<td>Charleston</td>
</tr>
<tr>
<td>Nancy, John Babh master</td>
<td>sloop</td>
<td>Charleston</td>
</tr>
<tr>
<td>unidentified new</td>
<td>vessel</td>
<td>Mr. Scott's at Charleston</td>
</tr>
<tr>
<td>unidentified lately begun</td>
<td>vessel</td>
<td>Mr. Scott's at Charleston</td>
</tr>
<tr>
<td>New Industry</td>
<td></td>
<td>Charleston</td>
</tr>
</tbody>
</table>
1752 Sept. 15 (cont'd)

Charming Nancy  
Peggy & Sally  
Henry  
Endeavor  
six unidentified  
Katherine  
Dov. John Tupper master  
unidentified small  
Two Friends  
Upton  
Polly

snow  
brigantine  
sloop  
vessel  
pilot boats  
sloop  
snow  
schooner  
brigantine  
ship  
sloop

Charleston  
Charleston  
Charleston  
Charleston  
Charleston  
Charleston  
Charleston  
Charleston  
Charleston

Second major storm in this month, centered on lower coast; greatest damage to agriculture and shipping; among the vessels beat to pieces or driven ashore were (according to Spence):

Vine, Robert Makin master  
Eleven unidentified  
Africa, John Derrington master  
unidentified  
unidentified large  
unidentified  
unidentified  
unidentified  
Bristol Merchant, Capt. Parsons  
unidentified large  
unidentified

snow  
ships  
shio  
schooner  
ship  
sloop  
ship  
snow  
sloop  
snow

Cuming's Point, Morris Is.  
Charleston  
Mellicamp's Island  
Mellicamp's Island  
Ruttinton Island  
Raccoon Keys  
Raccoon Keys  
ear St. Helena  
at Kiawah  
Perry's wharf at Port Royal  
on Edisto Bar

1752 Sept. 30-Oct. 1 (2)

"A great storm at night" (Manigault Papers) which confined its destruction to flora and small craft; this list of damaged vessels from Spence:

unidentified, small  
two unidentified  
unidentified, small  
Savannah Packet  
unidentified. Archibald Stuyverne  
unidentified, George Row's  
Industry. Mr. Xeding's  
great number of small craft  
Experiment  
Dove, George Luther master  
unidentified, Willhappy's  
Dorchester Packet, Benj. Roberts

schooner  
boats  
schooner  
schooner  
schooner  
schooner  
vessels  
schooner  
sloop  
schooner  
schooner

Beresfords Dock, Charleston  
Beresfords Dock, Charleston  
Beresfords Dock, Charleston  
at Charleston dock  
at Charleston  
at Charleston  
at Charleston  
at Charleston  
oversea at Charleston  
asore at Charleston  
at Charleston

1761 June 1 (1)  
1770 June 6 (1)

1778 Aug. 10 (1)

Several ships driven ashore (Spence):

Buzzmorel  
Monsieur Caffee (French)  
9 unidentified coasters  
unidentified  
Joseph & Benjamin, Dickenson

ship  
schooner  
schooner  
sloop  
sloop

on Morris Island  
on James Island  
on James Island  
on James Island  
at Charleston Exchange dock
1781 Aug. 10 (2)  
Winds NE, abated at high tide, minimizing storm surge damage; wind damage substantial. **HMS Thetis**, part of a British invasion fleet come to suppress the American Revolution, sank at Gadsden's Wharf; also **London**, Capt. Richardson, at Eveleigh's Wharf, and several other unidentified ships (Royal Gazette, Charleston, August 11, 1781)

1733 Oct. 7-8 (1)  
Large part of year's crop of rice destroyed by salt water flow into Charleston warehouses

1784 Sept. 10 (?) (2)  
A major storm, attended by torrents of rain; struck west of Charleston; storm surge covered coastal islands; Sullivan's Island most affected; 500 deaths

1787 Sept. 19 (2)  
Substantial damage done shipping, property, crops, all along coast from Beaufort to Georgetown; 23 lives lost

1792 Oct. 30-31 (1)  
This latest-arriving significant storm drove several vessels ashore at Charleston (Spence)

1797 Oct. 19-20 (1)  
Center of storm west of Charleston; many houses unroofed by winds; 1 death (Ramsay; Ludlum); a number of vessels destroyed (Spence):

- **Winyah**
- three unidentified schooners
- unidentified coaster

opposite Gadsden's Wharf

- ship
- schooner
- schooner

march, opposite Charleston

at Boon's Wharf

1800 Oct. 4-5 (2)  
"Tremendous and destructive" winds accompanied by tides which were reported "two feet high on the wharves" at Charleston; three houses washed away on Sullivan's Island; 1 person killed (Charleston Times; Ludlum)

1804 Sept. 7-8 (3)  
Center of storm kept near coast as moved northeast; 10-11 foot storm surge from Beaufort to Georgetown; immense damage to property; Fort Johnson left in ruins; western end of Sullivan's Island laid under water; 500 lives lost; large number of vessels ruined:

- **Columbus**
- Concord, Oldrich masar
- Christopher (English)
- Tarler
- Mary
- Ann Eliza
- Venus
- several unidentified
- many coasting craft
- Lydia, Capt. Heyward
- Unanimity, Capt. Wilson
- Norfolk
- Rising Sun
- Middleton
- unidentified, Capt. Studdard
- many unidentified

ship  
wharf at Charleston

brig  
Frosoleau's Wharf, Chasn.

ship  
wharf at Charleston

brig  
Charleston

schooner  
Haw's Wharf, Charleston

schooner  
in Ashley River

schooner  
on James Island

schooner  
on James Island

vessels  
near Charleston

ship  
at Charleston

brig  
Charleston

schooner  
Charleston

ship  
Charleston

schooner  
near Charleston

wood-boats  
in arches
1804 Sept. 7-8 (cont'd)  
Pre-observation, Th. Shuomick owner  
Experiment, Capt. Miller  
unidentified, large  

("Great Gale of 1804")  
(Ramsay; Spence)

1806 Aug. 22 (1)  
Storm center passed SC at sea; salt water ruined cotton crop in low-lying fields on northern coast

1806 Oct. 8-9 (1)  
2 or 3 sloops sunk at Charleston (Spence)

1810 Sept. 11-12 (1)  
2 or 3 sloops sunk at Charleston (Spence)

1811 Sept. 10 (1)  
Tropical storm and companion tornado sank small craft at anchor in Charleston harbor and spoiled rice in waterfront warehouses

1813 Aug. 27-28 (3)  
Landfall near Charleston, where tide surged beyond 12 feet; Sullivan's Island virtually submerged; 15 lives lost; damage to property in Charleston estimated at $2 million—buildings, wharves, and ships:

| Jupiter of Saco | ship | at Charleston |
| Juno of Saco | ship | at Charleston |
| Margaret | brig | at Charleston |
| South Boston | brig | at Charleston |
| Florida | ship | at Charleston |
| Commerce | ship | at Charleston |
| Morning Star | ship | at Charleston |
| Phoenix | ship | Pritchard's Wharf, Chasn. |
| unidentified (Spanish) | schooner | at Charleston |
| Retrieve | ship | at Charleston |
| a number of unidentified | vessels | at Charleston |
| Charleston Prison Ship | vessel | at Charleston |
| Canton | ship | at Charleston |
| unidentified armed, Capt. Lord | barge | at Charleston |
| two or three unidentified, small | boats | near Ft. Johnson |
| two unidentified, small | boats | on Sullivan's Island |
| unidentified, small | boat | on S. Island, Winyah |
| three or four unidentified, small | vessel | at Charleston |
| unidentified (inland coasters) | sloop | at Charleston |
| Necessity | schooner | at Charleston |
| two unidentified river schooners | schooner | at Charleston |
| Del Carmen (Spanish) | schooner | at Charleston |
| Byron | schooner | at Charleston |
| United States | schooner | at Charleston |
| Berge No. 9 | tender | at Charleston |
| Union, Capt. Walter | barge | at Charleston |
| unidentified small (Spanish) | schooner | at Charleston |
| Concord | schooner | at Charleston |
| Salisbury | ship | at Charleston |

("Dreadful Storm of 1813")  
(Spence)

1814 Jul 1 (1)

1815 Sept. 2-4 (1)

1816

1817 Aug. 7-8 (1)

German Heinrich W. Brandes made the major discovery that tropical storms are moving systems of low atmospheric pressure which could be identified with the barometer. (Hughes)
1620 Sept. 10 (2)  
Storm surge about 11 feet at Georgetown: "About sunset the scene became truly awful... The church was blown from its foundations, and many of the inhabitants were seen removing from such houses as appeared most exposed to the... tide and wind. After dark the gale continued to increase, and about 10 or 11 o'clock there raged one of the most violent hurricanes... ever experienced here. ... There was not a house in the village could entirely resist its fury." ("Winyaw Hurricane") (Winyaw Intelligencer [Georgetown]

1822 Sept. 27-28 (3)  
Storm of very large geographical extent passed barely inland between Charleston and Georgetown; damage to Charleston waterfront great; fifteen ships washed ashore at Sullivan's Island--12 dead; at Georgetown the storm surge may have reached 15 feet; North Island in Winyah Bay overfl oved--300 deaths (Charleston Courier, Sept. 30, 1822; Ludlum)

1825 June 3-4 (1)  
Severe storm which swept the entire coast of North America; struck SC a glancing blow

1830 Aug. 13-17 (1)  
Center and major winds passed offshore, but 9-foot storm surge spilled salt water into rice fields, ruining the crop at Winyah Bay and Georgetown ("Atlantic Coast Hurricane")

1834 Sept. 4 (1)  
Winds and waves demolished bath house on East Bay, Charleston; crops hurt moderately along entire SC coast

1835 Sept. 18-19 (1)  
Charleston-to-St. Augustine packet SS Miller sank with 15 aboard off Jekyll Island, Georgia; Georgetown lashed by gale-force winds, 9-foot storm surge

1837 Aug. 16-Sept 1 (1)  
Steam packet Home, bound to Charleston from New York City, sank in heavy seas off Cape Hatteras, North Carolina, with 90 lives lost ("Racer's Hurricane") (Ludlum)

1841 Aug. 23-24 (1)  
"The stores in Market Street [Charleston] had this morning water... nearly two feet deep. Cellars in parts of the city which were never known... to contain water were overflowed." (Charleston Southern Patriot)
Aug 13. 17, 1830
1842 Oct. 4-6 (2) Storm brought highest tides "in many years" to Charleston area; heavy damage to mail packet Hayne and numerous small craft all along coast; substantial damage to rice and cotton crops; 6 deaths by drowning.

1846 Oct. 10-12 (1) A heavy gale, but from the southwest; thus there was little tidal flooding; West Tradd Street in Charleston was washed away.

1849 With the completion of the first commercial telegraph line (between Washington, D.C. and Baltimore, Md.) in 1845, many men of science and affairs saw the possibility of "forecasting" tropical storms by telegraphing ahead what was coming. In 1849, Joseph Henry, first head of the Smithsonian Institution, persuaded a number of telegraph companies to provide free time for the transmission of weather reports to a center in Washington and organized 150 widely scattered volunteers to make regular observations, measurements, and reports. (Hughes)

1850 Aug. 24 (1)

1854 Sept. 7-9 (2) Winds ESE 90 mph reported at Savannah; although SC was spared the brunt of the storm, property damage at Charleston added up to $300,000 and there were substantial losses all along the SC coast. An observer described the scene on plantations about Georgetown: "From Waverly to Pee Dee ... not one head of rice was to be seen above the water, not a bank or any appearance of the land was to be seen. It was one rolling dashing Sea, and the water was Salt as the Sea ... Many persons had rice cut and stacked in the field, which was all swept away by the flood." (Rogers)

1870 National weather service established by an act of Congress which required the Secretary of War "to provide for taking meteorological observations at the military stations in the interior of the continent and at other points in the States and Territories ... and for giving notice on the northern lakes and on the seacoast by magnetic telegraph and marine signals, of the approach and force of storms." The Secretary of War assigned these duties to the Chief Signal Officer of the Army. (Hughes)
Gale winds NE 40 mph (Charleston) traversed the entire coast; damage relatively light, but details have intrinsic interest:

In the vicinity of Beaufort--

"The wind was sufficiently strong to blow down trees and obstruct ordinary travel. The rain washed away bridges and ferries, and filled to a depth of 10 or 12 feet, streams that were a few hours before nearly dry. The swollen condition of the streams between Beaufort and Yemassee on Saturday prevented the passage of the mails from Beaufort. The Savannah River, in thirty minutes, rose four and a half feet. On the low cotton lands it may be a week or more before the water can leave them dry, owing to the lack of proper drainage. But little damage is anticipated to the corn crop, it being far enough advanced to be out of danger. Rice is considered generally safe, the fields being flooded with rain offered a strong support to the stalks against the violence of the winds. As so many of the large cotton fields of Beaufort and Colleton counties are in low lands, it is very probable the cotton there has sustained a severe loss.

"Three of the vessels, loading with phosphates at Bull River, dragged their anchors on Friday night, during the heavy blow, and went ashore on the South bank. ... No damage to the vessels is apprehended, as they lie on a muddy bank, and it is thought they will float off at the approaching ... tides."

At Charleston--

"The wind blew fresh from about Southeast, during the day changed to Northeast, increasing in force during the afternoon, accompanied by light rain. Soon after dark the wind and rain increased, the former blowing with great violence in heavy squalls, while the latter came down in torrents ... with a volume not previously known for years.

"It was not unexpected, however, as those unerring monitors, the weather reports, foretold its coming by several days, which enabled the river craft at least to secure safe moorings.

"In the city in many places trees were blown down and snapped asunder, small out houses were injured in the roofs, while shutters banged, and window sashes rattled violently."
"The rain was so furious that it got into every crevice where it could be forced, and damaged houses inside more or less. In several of the streets large holes were made—in two or three instances capacious enough to hold a carriage and horse. In the Northeastern and Northwestern parts of the city lots were flooded, and cellars and basements filled to the depth of several inches, and in some cases as many feet. On Saturday it poured unceasingly all day, and actually interfered with the prosecution of business; the draymen and carters of East Bay were compelled to abandon their accustomed haunts, and give their animals the best shelter they could from the merciless elements."

At Georgetown—

"From last Thursday night up to Tuesday there has been a storm of wind and rain of more or less violence. Floods of rain fell, but so low were our rivers, and so parched was the earth, that we believe no damage has resulted from the fall of water. The continued gale of wind has, we fear, done serious injury to the May and June rice, which is in blossom... Previous to this storm, all the lower plantations were suffering from the salt waters, which was making serious inroads upon them. Then comes the gale... While the rain has saved many of the crops from almost total loss, the winds has done so much damage as to render it doubtful whether the storm has cut short the crop of the district. One thing it certainly has done—it has equalized the loss among all the planters, instead of confining it to those threatened by salt water."

(Excerpts from accounts in Charleston Daily-Courier, August 21-22, 1871; and Georgetown Times, August 24, 1871)

1873 Oct. 16

The meteorological division of the Signal Service, popularly known as the "Weather Bureau," issued its first cautionary "hurricane warning" (Hughes)

1874 Sept. 23 (2)

Winds SE 55-60 mph (Charleston); telegraph lines down; extensive damage to rice crop; total property losses $750,000; 2 deaths by drowning at and near Charleston; Charleston press gave weather office credit "for the display of cautionary signals from midnight of the 28th, clearly showing a knowledge of the storm eight or ten hours before hand." (Charleston Weather Office Records, College of Charleston)

1876 Sept. 15-16 (1)

Storm slipped ashore at SC-North Carolina border; some damage to property on upper coast
<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Day</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1878</td>
<td>Sept.</td>
<td>11-12</td>
<td>Tail-end of storm; winds SE 44 mph (Charleston); damage minimal</td>
</tr>
<tr>
<td>1881</td>
<td>Aug.</td>
<td>27 (2)</td>
<td>Later stage of an extremely destructive storm; centered over Georgia; winds E 54 mph (Charleston); at Charleston and points north property damage confined to small craft and smaller buildings; southern areas worse off; at Beaufort a 15-foot storm surge left few wharves standing; Edingsville, a village on Edisto Island, was destroyed, abandoned by survivors; 4 lives lost</td>
</tr>
<tr>
<td>1882</td>
<td>Oct.</td>
<td>11</td>
<td>Weak tropical storm passed a little off coast at Charleston</td>
</tr>
<tr>
<td>1883</td>
<td>Sept.</td>
<td>11 (1)</td>
<td>Storm passed inland north of Georgetown</td>
</tr>
<tr>
<td>1885</td>
<td>Aug.</td>
<td>25 (3)</td>
<td>Extreme storm; winds SE 90-100 mph (Charleston) swept entire coast; property damage from wind and water in excess of $2 million; at Charleston all wharves but one were destroyed and 90% of all buildings were injured; the iron steamship Glenlivet was torn from her moorings and driven up the Ashley River, where it swept away several hundred feet of a new bridge; all the lowlands were flooded, roads rendered impassable, whole forests leveled, the damage to sea-island cotton estimated at three-fourths of the crop; at Beaufort most vessels in the harbor were driven ashore and damaged; several pilot boats were sunk with all hands lost; a village on St. Helena Island was wiped out and all residents drowned except one woman; altogether a death toll of 21 (News and Courier; &quot;The August Cyclone,&quot; 1886)</td>
</tr>
<tr>
<td>1887</td>
<td>July</td>
<td>28</td>
<td>&quot;A Dangerous Wind Reported from the Gulf, but Fortunately it Leaves Charleston out of its Course,&quot; said the headline in the News and Courier.</td>
</tr>
</tbody>
</table>

"The sensational red flag, or cautionary signal, of the signal service was displayed... yesterday. The red flag has often been run up since the August cyclone [of 1885] and is not ordinarily suggestive of any immediate unpleasantness. It is always, however, a sign of the times that is much more appreciated when it is conspicuously absent."
1888 Oct. 11 Gale NE 50 mph (Charleston); property damage slight (perhaps $1500)

1889 Sept. 23 Overland storm brought 45 mph winds (Charleston)

1890 Oct. 1 National Weather Service transferred from Department of War to Department of Agriculture (Hughes)

1893 June 16 (1) Winds E 54 mph (Charleston); small property loss on lower coast

1893 Aug. 27-28 (3) Extreme storm; winds SE 96 mph (Charleston); storm surge approached 20 feet on lower coast; St. Helena and other sea islands (Hilton Head) overflowed in considerable part; at Beaufort "the water was so high that following the storm a catfish was found gilled on a fence that surrounded the Methodist Church"; property damages assessed in the millions of dollars (perhaps $10 million); at least 2000 and perhaps as many as 3000 lives lost in coastal Carolina, primarily at Beaufort, St. Helena, and Lady's Island, from drowning (Tannehill)

1893 Oct. 13 (2) Second major storm of the season; gale winds SE 60 mph (Charleston); major impact in Georgetown district and northward, where storm surge topped 13 feet and 15 people died, largely by drowning

1894 Sept. 25-26 (1) Brisk gale produced 10 foot storm surge at Charleston; lower parts of city inundated; electricity shorted out; cotton and rice in the field and drinking water significantly hurt

Item in News and Courier, September 26, 1894:

"The bulletin board of The News and Courier was the centre of attention in Broad Street yesterday. All day long an eager group of people stood before it reading the latest cyclonic news and indulging in gloomy reminiscences of previous gales, tornadoes, and cyclones to keep up their spirits.

"On the wharves a great deal of activity was displayed in making things 'snug.' The vessels were made fast and put out extra anchors and ropes [sic]; small merchandise was hustled into warehouses, and the cotton was moved out of harm's way. The dealers in firewood were especially active, getting their stock out of danger of being swept off by the expected raging flood... The island boats were crowded with
passengers flying from the expected danger as from the wrath to come.

"Early in the day Mr. Local Forecaster Jesunoofsky had this posted on the bulletin board: 'Cyclone has curved over Southeast Florida, moving northeast. It will produce wind velocities of from forty to sixty miles per hour from the northeast Quadrant Tuesday night and Wednesday.

"All day long the weather office was a very busy place. Mr. Jesunofsky was busy forwarding reports to Washington, and very many people, anxious about the rice crops or phosphate dredges or other possessions, came to ask for news of the cyclone.

"Mr. Jesunofsky said to a Reporter who called last night at 7 o'clock:

"I am rejoiced to say that we have escaped the full fury of the storm. The cyclone has gone far out to sea . . . ""

In the aftermath, Mr. Jesunofsky or one of his associates noted in the weather journal: "Much praise has been given the Bureau for its storm work. It is estimated that $1,000,000 was saved to the community by the timely warning of the cyclone."

(Weather Service Records, College of Charleston)

1896 Sept. 29 (2)Storm of short duration, but with 62 mph winds (S) and gusts of 100-miles-per-hour; substantial property losses and 30 deaths attributed to the winds and water in Beaufort and the southern sea islands

1897 Sept. 22Gale-force winds S 52 mph (Charleston); slight damage

1898 Aug. 30-31Gale E 52 mph at Charleston; minimal damage

1898 Oct. 2 (2)Winds variable 50-70 mph (reported at Savannah): southern lowlands and islands partially submerged by 14-foot storm surge; conditions similar to that after the great tidal storm of 1893 in terms of lost property; farm crops, especially rice grown along the Combahee and Edisto rivers, suffered "incalculable loss"; but there were many fewer storm related deaths than in August, 1893--nine (9)
1902 The National Weather Service routinely collected weather data from an area comprising one quarter of the globe (Hughes)

1904 Sept. 14-15 (2) Gale winds NE 65-70 mph (Georgetown); inexplicably, storm came without warning from the Weather Service; damage to buildings, electric light and telephone and telegraph wires, and especially crops in the Georgetown district heavy, perhaps to the extent of $1.5 million; storm claimed 14 fishermen and two fishing boats in vicinity of Charleston (News and Courier, September, 1904)

1906 Sept. 17 (2) Winds NW 60 mph at Georgetown and accompanied by driving rain; "tremendous amount of damage" in Georgetown district; "turpentine industry has been practically wiped out" as up to fifty percent of pines were blown down; loss to rice planters 75%; cotton, corn, and peas also badly injured; several brick structures blown down in Kingstree; at Georgetown a score of business structures and private residences were partially wrecked:

"Trees and fences are down in every direction. Telephone and electric light wires cover the streets and last night the city was in darkness. Telegraphic communications with the outside world is cut off...

. . . The body of a drowned negro was picked up in the river . . . (News and Courier, Sept. 22, 26; 1906)

A lad of 14 years was transformed into a hero at Pawley's Island. Safe on the mainland, he and another volunteer recrossed the causeway to the island to rescue a family presumed to be marooned there. It was found that the family had moved to higher ground on the mainland earlier, and with the storm surge rolling in, the boy and his adult companion had to make their return in water that was shoulder deep and were in danger of drowning. Indeed, the older man was quickly exhausted. The boy caught him by the arm and pressed on toward the mainland, which was finally reached in safety. (News and Courier, September 25, 1906)

1906 Oct. 20 (1) Erratic storm; stood offshore at Charleston awhile and then turned southward toward Florida; winds E 64 mph at Charleston, where there was some sea flooding; rice planters again suffered; indeed, it was a hard year altogether but "There is plenty of pluck here and it is being put to good use in overcoming tremendous difficulties." (News and Courier, Oct. 23, 1906)
1908 Oct. 9-10
Weak storm brought heavy rains to northern coast

1908 Oct. 22-23
Storm centered off coast; slight damage to shipping

1910 Oct. 19-20

1911 Aug. 27-28 (3)
Extreme storm; originated "far to the north of the region common to such storms ... and moved in from the uncharted ocean, no indication of its approach being given [by the weather service] until Charleston ... came within its sphere of influence on the morning of August 27. As it moved more within the range of observation and its character became apparent, advisory, storm, and hurricane warnings were issued by the Central Office of the Weather Bureau in rapid succession, the last at 3:30 p.m., though its transmission was somewhat delayed by deranged telegraphic service. The wind attained destructive violence at about 6 p.m., and the highest recorded velocity was 94 miles per hour at 11:20 p.m., after which the recording apparatus was damaged. ... It is estimated that the highest velocity reached was 106 miles per hour. ..." (City of Charleston Yearbook: 1911) The storm center passed between Charleston and Beaufort as it came ashore, producing a storm surge of 12 feet; dealt death blow to rice agriculture, other property loss in excess of $1 million, took 17 lives; but the Isle of Palms reportedly "improved" by leveling of sand dunes (News and Courier)

1914 Sept. 17
Gale winds E 45 mph (Charleston); storm center over Georgia; effect on SC minor

1916 July 14-15 (2)
Winds hurricane force (SE 76 mph at Charleston); rainfall 16 inches at Charleston and Kingstree; severe river flooding; crops lost and roads and communications disrupted from Beaufort to NC line; no lives lost (News and Courier)

1921 Oct. 26
Winds E/SE 43 mph (Charleston); "slightest damage" to SC coast (News and Courier)

1924
A Greenville businessman, John T. Woodside, bought a portion of beach north of Georgetown and began to develop the "grand strand" (Rogers)
1924 Sept. 16-17
Gale winds SW 44 mph at Charleston; heavy rains relieved drought conditions

1924 Sept. 29-30

1926 July 28-29
Winds SE 54 (Charleston); minor effect

1927 Oct. 2-3
Winds SE 50 (Charleston); damage minimal

1928 Aug. 10-11
Tail-end of storm which arrived overland by way of Florida and Georgia; brought 50 miles per hour winds and heavy rains; minor effect in coastal SC (News and Courier)

1928 Sept. 18 (2)
Hurricane force winds (SW 75 mph at Beaufort) accompanied by 12-16 inches of rain; construction Cooper River bridge (Grace Memorial) set back; Folly Beach devastated by high tides, with homes, pavilion, and fifteen feet of beach washed away; power company and roadway damages severe; many communities--Beaufort, Holly Hill, McClellanville, Georgetown--isolated; property damage exceeded $3 million (News and Courier)

1929 Oct. 1 (1)
Winds SW 50 mph (Beaufort); 12 inches rain; lower coast stricken by fresh water flooding; Savannah River broke through swamps at Beaufort and emptied into Fort Royal Sound

1933 Sept. 6-7 (1)
Gale SE 53 mph (Charleston); record rains; damage to property in Charleston area at least $100,000, largely the doing of a tornado which developed out of the storm over Sullivan's Island

1934 May 28-30 (1)
Gale SE 53 mph (Charleston); heavy rains; flooded streets, power outage in Charleston and Beaufort; moderate damage to houses on Folly Beach, Pawleys Island; Edisto Island cotton substantially a loss

1935 Sept. 5
Gale SW 47 mph at Beaufort; glass broken at Beaufort; tornado at Walterboro; damage minor (News and Courier)

1940 Aug. 11-15 (3)
First severe hurricane to strike SC coast directly in thirty years; winds SE 85 mph (Charleston); encompassed the entire coastal region with 13-foot storm surge; 100 houses destroyed on Edisto, 200 houses on Pawleys Island; "Mosquito Fleet" of shrimp-boats demolished at Charleston; total property losses: $10 million; 34 lives lost
Aug. 11-15, 1940
1944 Oct. 20 (1) Gale NE 65 mph at Beaufort where storm lunged ashore; heavy rains, both salt and fresh water flooding; $350,000 damages to habitations, businesses, farms

1944 Beginning of routine aircraft reconnaissance which made an outstanding contribution to the forecasting of storms

1945 June 24-25 (1) Gale SW 65 mph (Charleston); 6-10 inches rainfall; some damage to crops; center of storm passed off-shore

1945 Sept. 17 (2) Major storm; winds hurricane force (SE 85 mph at Parris Island); 9 inches rain in 24 hours at Charleston; storm surge modest--9 feet; damage to property and crops substantial--$6 million; one (1) death

1945 Civil Defense, a network of local units organized and directed nationally, created to deal with the emergency of the Second World War, continued with additional responsibility of coordinating preventive and relief measures in cases of natural hazards like hurricanes (Douglas)

1947 Oct. 13 Scientists made initial experiments to calm a destructive storm by "seeding", that is, dropping dry ice on cloud formation; the results were uncertain (News and Courier)

1947 Oct. 15 (2) Hurricane-force winds (SE 65-70 mph at Parris Island) with a storm surge of 9-12 feet; property and crops suffered to tune of $3 million; Folly Beach experienced significant erosion, collapsed buildings

1949 Aug. 28-29 (1) Gale SW 54 mph and power outage at Charleston

1950 Oct. 17-25 Winds E 42 mph (Charleston)

1952 Aug. 31 (2) "Able" Storm small and "lop-sided" and "wobbling on its course" but packed 70-80 mph winds at Beaufort, which reported "two traffic deaths, fallen trees, disrupted power and telephone service, ruined cotton, smashed windows, ripped roofs"; most severe property damage occurred on Edisto Island, where many houses were washed or blown away; damages for the entire coast was set at $3 million and it would have been greater had storm not arrived at low tide (News and Courier)
1954 Aug. 28-29 (1) Gale winds pushed salt water 14 miles up Black River near Georgetown

1954 Oct. 15 (3) "Hazel" Extreme storm, most destructive in terms of lost property ever to trouble coastal SC; winds SW 106 mph at Georgetown/Myrtle Beach; tidal surge 17-18 feet on upper coast; devastation extreme on the beaches north of Georgetown, recently filled with resorts and summer cottages; whole communities were swept away; miles of "grass covered dunes from ten to twenty feet high, along and behind which beach homes had been built in a continuous line . . . simply disappeared, dunes, houses, and all; property losses totaled $27 million, but there is only one death

1955 Aug. 16-17 (1) "Diane" Center in NC; damage to property in coastal SC--$100,000

1956 Sept. 25-26 "Flossy"

1959 July 9 (1) "Cindy" Gale winds 50-60 mph; small storm moved inland across Bull's Island; produced storm surge of 10 feet at high tide at Charleston and points north; damage minor; 1 death due to a traffic mishap at McClellanville

1959 Sept. 29 (3) "Gracie" Extreme storm; packed hurricane force winds SE 80 mph; storm surge only 8.6 feet (storm arrived on lower SC coast at dead low water); property losses amounted to $12 millions; 11 lives were lost (both figures would have been much higher had tidal situation been different)

1960 July 29 "Brenda" Eye of storm remained at sea; Isle of Palms--recorded 45 mph winds; damage slight

1960 Sept. 11 (1) "Donna" Diminished hurricane which took heavy toll in Florida passed 65 miles to sea; gale winds 50-60 mph on some beaches; associated with tornadoes at Garden City and Charleston; property losses totaled $1 million due to the tornadoes

1963 Oct. 25 "Cinny"

1964 Aug. 29 (1) "Cleo" Gale winds S 50 mph at Charleston, where tornado appeared; center of storm remained at sea; minor effect

1964 Aug. 29 (1) Dying hurricane spawned two small tornadoes which damaged dwellings in Charleston and Monck's Corner
July 8, 1959

"Cindy"
Sept. 29, 1959

“Gracie”
1964 Sept. 12-13
"Dora"
Hurricane spent by passage overland; spawned
tornado at Myrtle Beach and produced heavy rains--
8 inches in 24 hours at Conway; minor damage

1966
With the advent of operational weather satellites,
US Weather Service made routine use of satellite
cloud photography to identify tropical storms in
an early stage of development. (Hughes)

1966 June 10
"Alma"
Diminished hurricane logged winds of 50 mph at
Charleston; slight damage to shipping, especially
at Beaufort

1968 June 7, 10-11
"Abby"
First storm of the season dumped ten inches of rain
on Charleston

1968 Oct. 19
"Gladys"
Center of storm with 100 mph winds passed unevent-
fully offshore

1971 Aug. 17-18
Tropical depression brought heavy rains (14 inches
in 48 hours at Charleston), flooding--waist-deep in
Georgetown--and significant beach erosion

1979 Sept. 4-5 (1)
"David"
Spent hurricane, having devastated the West Indies,
failed to live up to expectations; struck Charleston
and the northern coast at normal high tide, but the
56 mph winds generated a storm surge of only 8 or 9
feet, or 2 to 3 feet above normal high tide; pro-
property losses (there was no loss of life) totaled
$7 million--a modest amount when set over against
the potential losses--and centered on the northern
coast: 13 houses demolished at Litchfield, several
severely damaged and destroyed at Folly Beach; other-
wise the storm left tons of fallen trees and debris
Sept. 4, 1979

"David"
Table 1

SUMMARY OF TROPICAL STORMS - FREQUENCY BY MONTH

A. All Storms

Period of 1686 - 1980

<table>
<thead>
<tr>
<th>Month</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Storms</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>22</td>
<td>31</td>
<td>14</td>
<td>76</td>
</tr>
<tr>
<td>Percentage of Total</td>
<td>1.3</td>
<td>6.6</td>
<td>3.9</td>
<td>28.9</td>
<td>40.8</td>
<td>18.4</td>
<td>100% (99.5)</td>
</tr>
</tbody>
</table>

Period of 1881 - 1980

<table>
<thead>
<tr>
<th>Month</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Storms</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>10</td>
<td>11</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>Percentage of Total</td>
<td>3.0</td>
<td>6.1</td>
<td>6.1</td>
<td>30.3</td>
<td>33.3</td>
<td>21.2</td>
<td>100%</td>
</tr>
</tbody>
</table>

B. All Major and Great Storms

Period of 1686-1980

<table>
<thead>
<tr>
<th>Month</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Storms</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>9</td>
<td>18</td>
<td>6</td>
<td>34</td>
</tr>
<tr>
<td>Percentage of Total</td>
<td>0</td>
<td>0</td>
<td>2.9</td>
<td>26.5</td>
<td>52.9</td>
<td>17.6</td>
<td>100% (99%)</td>
</tr>
</tbody>
</table>

Period of 1881 - 1980

<table>
<thead>
<tr>
<th>Month</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Storms</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Percentage of Total</td>
<td>0</td>
<td>0</td>
<td>5.9</td>
<td>35.3</td>
<td>35.3</td>
<td>23.5</td>
<td>100%</td>
</tr>
</tbody>
</table>

C. Great Storms

Period of 1686 - 1980

<table>
<thead>
<tr>
<th>Month</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Storms</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Percentage of Total</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>40</td>
<td>10</td>
<td>100%</td>
</tr>
</tbody>
</table>

Period of 1881 - 1980

<table>
<thead>
<tr>
<th>Month</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Storms</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Percentage of Total</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>66.7</td>
<td>16.7</td>
<td>16.7</td>
<td>100% (100%)</td>
</tr>
</tbody>
</table>
## Table 2

**SUMMARY OF TROPICAL STORMS - AVERAGE INTERVALS**

### A. Period of 1686-1980

<table>
<thead>
<tr>
<th>Category</th>
<th>Average Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Storms (76)</td>
<td>3.9 years</td>
</tr>
<tr>
<td>Major/Great Storms (34)</td>
<td>8.6 years</td>
</tr>
<tr>
<td>Great Storms (10)</td>
<td>29.5 years</td>
</tr>
</tbody>
</table>

### B. Period of 1881-1980

<table>
<thead>
<tr>
<th>Category</th>
<th>Average Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Storms (33)</td>
<td>3.3 years</td>
</tr>
<tr>
<td>Major/Great Storms (17)</td>
<td>5.9 years</td>
</tr>
<tr>
<td>Great Storms (6)</td>
<td>16.6 years</td>
</tr>
</tbody>
</table>
### Table 3

**REAL INTERVALS BETWEEN TROPICAL STORMS**

**(LONGEST/SHORTEST) BY CLASS AND SEVERAL PERIODS**

<table>
<thead>
<tr>
<th>Period</th>
<th>All Storms (13)</th>
<th>Major/Great Storms (6)</th>
<th>Great Storms (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1686-1780</strong></td>
<td>14 years (twice: 1686-1700 and 1728-1752)</td>
<td>28 years (1752-1780)</td>
<td>15 days (1752)</td>
</tr>
<tr>
<td><strong>1781-1880</strong></td>
<td>20 years (1854-1874)</td>
<td>20 years (twice: 1822-1842 and 1854-1874)</td>
<td>9 years (1813-1822)</td>
</tr>
<tr>
<td><strong>Whole Period - 1686-1980</strong></td>
<td>63 years (1822-1885)</td>
<td></td>
<td>5 years (1954-1959)</td>
</tr>
<tr>
<td>Scale Number (category)</td>
<td>Central Pressure (millibars)</td>
<td>Winds (miles/hour)</td>
<td>Surge (feet)</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------</td>
<td>-------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1</td>
<td>&gt; 980</td>
<td>74 - 95</td>
<td>4 - 5</td>
</tr>
<tr>
<td>2</td>
<td>965 - 979</td>
<td>96 - 110</td>
<td>6 - 8</td>
</tr>
<tr>
<td>3</td>
<td>945 - 964</td>
<td>111 - 130</td>
<td>9 - 12</td>
</tr>
<tr>
<td>4</td>
<td>920 - 944</td>
<td>131 - 155</td>
<td>13 - 18</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 920</td>
<td>&gt; 155</td>
<td>&gt; 18</td>
</tr>
</tbody>
</table>
Table 5

NUMBER OF HURRICANES (DIRECT HITS) AFFECTING UNITED STATES AND INDIVIDUAL STATES 1900-1978 ACCORDING TO SAFFIR/SIMPSON HURRICANE SCALE.
[Updated from Hebert and Taylor (1975).]

<table>
<thead>
<tr>
<th>Area</th>
<th>Category Number</th>
<th>Major Hurricanes (≥3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>United States (Texas to Maine)</td>
<td>47</td>
<td>29</td>
</tr>
<tr>
<td>Texas</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>(North)</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>(Central)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>(South)</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Louisiana</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Alabama</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Florida</td>
<td>18</td>
<td>11</td>
</tr>
<tr>
<td>(Northwest)</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>(Northeast)</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>(Southwest)</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>(Southeast)</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Georgia</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>South Carolina</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>North Carolina</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Virginia</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Maryland</td>
<td>0</td>
<td>1*</td>
</tr>
<tr>
<td>Delaware</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>New York</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Connecticut</td>
<td>2</td>
<td>1*</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>0</td>
<td>1*</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>2</td>
<td>1*</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>1*</td>
<td>0</td>
</tr>
<tr>
<td>Maine</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

*Indicates all hurricanes in this category were moving faster than 30 mph.
Note: State totals will not equal United States totals and Texas and Florida sectional totals will not equal state totals.
### Table 6

**COSTLIEST HURRICANES, UNITED STATES 1900-1978**

*(More than $50,000,000 damage)*

<table>
<thead>
<tr>
<th>Hurricane</th>
<th>Year</th>
<th>Category</th>
<th>Damage (U.S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. AGNES (Fla./Northeast U.S.)</td>
<td>1972</td>
<td>1</td>
<td>$2,100,000,000</td>
</tr>
<tr>
<td>2. CAMILLE (Mississippi/La.)</td>
<td>1969</td>
<td>5</td>
<td>$1,420,700,000</td>
</tr>
<tr>
<td>3. BETSY (Florida/Louisiana)</td>
<td>1965</td>
<td>3</td>
<td>$1,420,500,000</td>
</tr>
<tr>
<td>4. DIANE (Northeast U.S.)</td>
<td>1955</td>
<td>1</td>
<td>$831,700,000</td>
</tr>
<tr>
<td>5. ELOISE (Northwest Florida)</td>
<td>1975</td>
<td>3</td>
<td>$550,000,000</td>
</tr>
<tr>
<td>6. CAROL (Northeast U.S.)</td>
<td>1954</td>
<td>3</td>
<td>$481,000,000</td>
</tr>
<tr>
<td>7. CELIA (South Texas)</td>
<td>1970</td>
<td>3</td>
<td>$433,000,000</td>
</tr>
<tr>
<td>8. CARLA (Texas)</td>
<td>1961</td>
<td>4</td>
<td>$438,000,000</td>
</tr>
<tr>
<td>9. DONNA (Fla./Eastern U.S.)</td>
<td>1959</td>
<td>4</td>
<td>$387,000,000</td>
</tr>
<tr>
<td>10. New England</td>
<td>1938</td>
<td>3</td>
<td>$300,000,000</td>
</tr>
<tr>
<td>11. HAZEL (North &amp; South Carolina)</td>
<td>1954</td>
<td>4</td>
<td>$281,000,000</td>
</tr>
<tr>
<td>12. DORA (Northeast Florida)</td>
<td>1964</td>
<td>2</td>
<td>$250,000,000</td>
</tr>
<tr>
<td>13. BEULAH (South Texas)</td>
<td>1967</td>
<td>3</td>
<td>$200,000,000</td>
</tr>
<tr>
<td>14. AUDREY (Louisiana/Texas)</td>
<td>1957</td>
<td>4</td>
<td>$150,000,000</td>
</tr>
<tr>
<td>15. CARMEN (Louisiana)</td>
<td>1974</td>
<td>3</td>
<td>$150,000,000</td>
</tr>
<tr>
<td>16. CLEO (Southeast Florida)</td>
<td>1964</td>
<td>2</td>
<td>$128,500,000</td>
</tr>
<tr>
<td>17. HILDA (Louisiana)</td>
<td>1964</td>
<td>3</td>
<td>$125,000,000</td>
</tr>
<tr>
<td>18. Florida (Miami &amp; Pensacola)</td>
<td>1926</td>
<td>4</td>
<td>$112,000,000</td>
</tr>
<tr>
<td>19. Southeast Florida/La.-Miss.</td>
<td>1947</td>
<td>4</td>
<td>$110,000,000</td>
</tr>
<tr>
<td>20. Northeast U.S.</td>
<td>1944</td>
<td>3</td>
<td>$100,000,000</td>
</tr>
<tr>
<td>21. BELLE (Northeast U.S.)</td>
<td>1976</td>
<td>1</td>
<td>$100,000,000</td>
</tr>
<tr>
<td>22. IONE (North Carolina)</td>
<td>1955</td>
<td>3</td>
<td>$88,000,000</td>
</tr>
<tr>
<td>23. Southwest &amp; Northeast Florida</td>
<td>1944</td>
<td>3</td>
<td>$63,000,000</td>
</tr>
<tr>
<td>24. Southeast Florida</td>
<td>1945</td>
<td>3</td>
<td>$60,000,000</td>
</tr>
<tr>
<td>25. Southeast Florida</td>
<td>1949</td>
<td>3</td>
<td>$52,000,000</td>
</tr>
</tbody>
</table>

1 Includes $80,000,000 in Puerto Rico.
2 Moving more than 30 miles per hour.
## Table 7

INCIDENCE OF MAJOR HURRICANES (DIRECT HITS) BY MONTHS TO AFFECT THE UNITED STATES AND INDIVIDUAL STATES ACCORDING TO THE SAFFIR/SIMPSON HURRICANE SCALE.

<table>
<thead>
<tr>
<th>Area</th>
<th>June</th>
<th>July</th>
<th>Aug.</th>
<th>Sept.</th>
<th>Oct.</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>2</td>
<td>2</td>
<td>11</td>
<td>30</td>
<td>7</td>
<td>53</td>
</tr>
<tr>
<td>(Texas to Maine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>(North)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>(Central)</td>
<td>1</td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(South)</td>
<td>2</td>
<td>3</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisiana</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mississippi</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alabama</td>
<td>1</td>
<td>2</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florida</td>
<td>1</td>
<td>1</td>
<td>14</td>
<td>5</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>(Northwest)</td>
<td>1</td>
<td></td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Northeast)</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Southwest)</td>
<td>5</td>
<td>3</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Southeast)</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Georgia</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Carolina</td>
<td>2</td>
<td>1</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Carolina</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virginia</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maryland</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delaware</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Jersey</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>1</td>
<td>3</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecticut</td>
<td>1</td>
<td>2</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhode Island</td>
<td>1</td>
<td>2</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts</td>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Hampshire</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: State totals will not equal United States totals and Texas and Florida sectional totals will not equal state totals.
Table 8

FREQUENCY OF FULL-FLEDGED HURRICANES FOR SEVERAL SECTIONS OF THE NORTHWESTERN ATLANTIC COASTLINE, 1900-1957 (The relative ratio is result of correlation of number of hurricanes and length of coastline)*

<table>
<thead>
<tr>
<th>Area</th>
<th>No. of Tropical Storms Giving Hurricane Force (constant 74 miles per hour) Winds</th>
<th>Relative Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Florida</td>
<td>18</td>
<td>12.0</td>
</tr>
<tr>
<td>Texas</td>
<td>24</td>
<td>7.2</td>
</tr>
<tr>
<td>North Carolina</td>
<td>17</td>
<td>6.2</td>
</tr>
<tr>
<td>South Carolina</td>
<td>5</td>
<td>3.1</td>
</tr>
<tr>
<td>New York/New England</td>
<td>8</td>
<td>1.5</td>
</tr>
<tr>
<td>Georgia</td>
<td>3</td>
<td>1.1</td>
</tr>
</tbody>
</table>

In 1893 we had the most terrible hurricane that this coast has experienced in a very long time.

It was Sunday August 27th, 1893. We all went to church, but it began to rain, and we hurried home.

All day the wind blew in gusts and rain fell. As evening came on the wind blew harder. Tide was due to be high about 5 P.M. and should have been low water about midnight, but as night settled down, the wind increased in velocity and the tide was held up and could not fall, so the next tide piled on top of the first, and by midnight the ocean had come in over St. Helena and Lady's Island and flooded Beaufort. The wind grew higher and higher, until it reached 125 miles per hour.

The waves of the sea dashed against houses and on the Point where we were living, all small houses were washed away; not one was left standing when morning came.

Around 1 A.M. there was a furious ringing of our door bell, and a tall negro man we knew asked if he might bring women and children to our front porch as all their houses were gone, and they had them in boats seeking shelter. My Father said "No, the piazza is about to go as it is only held up by one column. Bring them into the house". So in a room used as a private school room, and equipped with benches and chairs they were sheltered the rest of the night. Three trips of the big ferry boat were made, bringing 12 to 15 people each trip, so we had around 30 people sheltered for the night. They had lost everything they possessed except what was on their backs. When morning came, two old colored people, man and wife were drowned. One lay at our front door, the other at the back.

The wind came from the east, so I stood at the west windows and watched what was taking place. Huge waves dashed against the causeway near the house, and the wind cut them off and carried the water far back in town. Entire roofs of houses went whirling through the air to crash way back in town. All night this kept up.

Way in the worst of the storm we heard a crash. Boards from a house on the next corner from ours, probably 200 ft. away had been torn off and driven end ways through the side of our house. The house was so badly ruined we had to leave it when the storm was over.

Toward 5 A.M. the wind began to abate, and when daylight came, it was over. But what a wreck.

The water front was a shambles. The cotton gin of George Waterhouse was entirely demolished. The two great boilers were carried by the waves and landed against the bluff in front of the Sea Island Hotel.

The Steamer "Clifton," a steam boat which operated between Beaufort and Savannah, was carried by the waves to the bend beyond the Court House and placed right against the bluff. A deep channel had to be dug in order to get her afloat after the storm had passed.

Capt. George Crofut saved his tug boat by running with the wind and putting the boat against the bluff in front of the court house. This too, had to be dug out after the storm passed.
All goods stored in the basements of the stores on the waterfront were lost, unless merchants took warning on the approach of the storm and removed them to higher ground.

Roofs of the stores were torn off and Bay street a shambles. Every street in town was piled as high as the house tops with uprooted trees, demolished houses, household furniture etc. It was impossible to get through the streets without climbing over and under the debris.

For weeks fires were kept burning in the streets and dead bodies of dogs, chickens etc, were flung in and burned for they could not be buried.

Miss Clara Barton and the Red Cross came and lent all the aid they could to relieve the distress, and this was very valuable to the helpless.

Communication with the outside world was cut off, as of course we had no electricity nor telephone, so relatives from other places were much distressed until rail or boat communication could be resumed.

There was only one white person lost that I remember of. It was Dr. Hazal, brother of Mrs. Susan Rice. He was quarantine doctor on Parris Island at the outgoing sea depot, and he was drowned. We understood he lost his life in an effort to save the lives of two negro boys. There was much difficulty in getting the body to the Baptist cemetery, as streets were piled high with debris, but by many windings and sending men ahead with axes to cut the debris of trees etc. the hearse finally made it and he was buried.

But on St. Helena and Lady's Island, hundreds of people were drowned, almost entirely negro, for they had no way to escape, and the people of Beaufort town could not get to them, as there was no bridge to cross the river, boats only could be used, and these were a wreck and sunken so not available.

For weeks men hunted these islands for the bodies, and when found buried them at once, for no funerals could be held.

Well, finally all was over and Beaufort picked up and started over again.

And in Sept 29th. 1959 we were still here to undergo Hurricane "Gracie" who did her best to demolish us, but she failed and we are still on hand and getting back to normal. "Gracie" did not have the help of the ocean that 1893 did, so she did her best but the ocean did not help her.

Certified an actual survivor of both storms.

La Malott Brown

Nov. 3rd 1959

Beaufort Co. Library
APPENDIX B (Document)
PROBABLE EFFECTS OF EXCEPTIONALLY HIGH TIDES ON SELECTED AREAS OF CHARLESTON COUNTY

The following information is prepared solely as a guideline in making decisions effecting the evacuation of selected areas of Charleston County. Tide levels are given in feet above Mean Sea Level (MSL); MSL at Charleston Harbor is 2.72 feet above Mean Low Water (MLW). A predicted tide of 8'MSL would mean that the expected tide will be 8 feet above MSL or 10.7 feet above MLW.

EDISTO ISLAND - With an expected tide of 8'MSL, all beach front residents should be advised to relocate inland. Relocation should be completed before tides reach the 7'MSL point as 7'MSL tides will most likely flood all exit routes. Tides of 10'MSL or above will cause serious flooding over most of the island from the North and South Edisto rivers and residents should relocate to the Adams Run or Hollywood areas. Evacuation should take place before tides reach the 7'MSL point.

SEABROOK AND KIAWAH ISLANDS - A tide of 8'MSL will probably cause serious flooding, however, as a 5'MSL tide floods exit roads, residents planning to leave the island should be advised to do so prior to the tides reaching the 5'MSL mark. With an expected tide of 10'MSL all residents should relocate to higher ground.

FOLLY BEACH - A tide of 8'MSL will cause serious flooding with some water over exit roads. With an expected tide of 10'MSL residents should be advised to evacuate to higher ground.

JAMES ISLAND - A tide of 8'MSL will flood roads in low lying areas. Tides of 10'MSL will cause some serious flooding in residential areas near the river and bay. A tide of 15'MSL would require complete evacuation of the island. Any evacuation should commence prior to tides reaching 7'MSL.

PENINSULA CHARLESTON - Some streets of Charleston start flooding with tides of 5'MSL; with an expected tide of 10'MSL more than half the city would be flooded. With a 10'MSL tide all residents with homes along the Battery, East Bay Street and within 6 blocks of both the Cooper and Ashley Rivers should relocate to higher ground. With a forecast tide of 15'MSL all residents should be advised to evacuate the city or to relocate to sound structures along, and to one block on either side of King and Meeting Streets.

NORTH CHARLESTON - With an expected tide of 10'MSL, residents near the Cooper River should relocate at least one-half mile inland from the river as far north as Remount Road. Along the Ashley River, residents should make a similar move as far north as Middleton Gardens.

MOUNT PLEASANT - Waterfront properties in old Mt. Pleasant are mostly on a 15 to 20 foot bluff and would not be effected by 10'MSL tides, however, residents along Shem Creek and other low lying areas should relocate. Sound structures along Rifle Range Road, west of Hamlin Road, along Mathis Ferry Road and along Highway 17 should be safe in any hurricane.

ISLE OF PALMS/SULLIVAN'S ISLANDS - With an expected tide of 8'MSL all beach front residents should relocate. With a forecast tide of 10'MSL or higher all residents should evacuate the islands and relocate on the mainland. The causeway between Mt. Pleasant and Sullivan's Island will flood at about 7'MSL.

AWENDAW/MCCELENNVILLE - Residents in rural areas east of Highway 17 who are near major streams or within one-half mile of marsh areas should relocate to higher ground when tides of 12'MSL or higher are forecast. Areas adjacent to Highway 17 should be safe from any hurricane tides. Residents of McClellenville should also consider relocating if tides of 12'MSL or above are expected.

4/29/81

[Source: Charleston County Disaster Preparedness Agency]
APPENDIX C (Document)
CORAL GABLES, Fla. (AP) — From horizon to horizon, thousands of high-rise hotels, condominiums and sumptuous houses line the sun-drenched Florida coast from Pensacola to Key West to Jacksonville.

The same scene exists along the barrier islands of Texas, Alabama, Mississippi and the Atlantic Coast from Maine to Georgia where more than 60 million people have been drawn to the good life by the sea.

Neil Frank enjoys peaceful beach strolls along the coast, but the homes, hotels and high-rises he passes give him nightmares of hurricane destruction.

Frank, director of the National Hurricane Center, has become something of a latter-day Paul Reverie, delivering more than 100 speeches and lectures each year, warning people about hurricanes and pleading with local officials to make preparations before a big storm strikes.

Much of the time, people simply refuse to listen, Frank said in an interview on the eve of the June 1-Nov. 30 Atlantic hurricane season. "They don't believe a hurricane might actually barrel ashore with 200 mph winds that would collapse homes like houses of cards and push ashore huge waves that could destroy the foundations of beachfront condos."

"When you have a rare event like a hurricane, it's the natural tendency of human beings to deny the danger," Frank said. "They say: 'It's just not going to hit me.'"

Even before the official beginning of the 1981 hurricane season, Tropical Storm Arlene was born in the Caribbean and spread torrential rains over Jamaica, Cuba and the Bahamas.

On the average, six Atlantic hurricanes develop each year. During 1980, there were 11 named storms, nine of which became hurricanes.

James P. Walsh, acting administrator of the National Oceanic and Atmospheric Administration, said this country is "in the most vulnerable position in history" should a major hurricane strike.

"We just don't have the knowledge to predict what this season will bring," Frank said. "But if you're going to bet, you can bet against a hurricane hitting the southeast Florida coast. The odds are one in seven in any one year."

It's that one chance in seven that worries Frank and civil defense officials along the Atlantic and Gulf coasts. They say people living in the most vulnerable areas never have experienced the fury of a major storm.

When Hurricane David came within a few miles of the heavily populated Florida Gold Coast in 1979, hardware and grocery stores were packed with frantic people, while thousands of elderly residents on Miami Beach fled their apartments in a chaotic evacuation that revealed glaring deficiencies in Dade County's disaster plan.

"The disaster plan was a disaster," said Miami Beach Fire-Rescue Lt. Jack Narrren shortly after David brushed the area.

Following the false alarm, many Miami Beach residents vowed never again to leave their homes in the face of a hurricane.

"I'm staying home no matter what," Stella Miller said. "I don't care if the water flows over my head. If I drown, I drown. But I would never go again to a shelter — never."

Because that attitude still prevails in Miami Beach and other oceanfront cities, Frank fears that when a big storm does make landfall here the death toll could exceed the U.S. record of 6,000 deaths when a hurricane roared into Galveston, Texas in 1900.
APPENDIX D

Red Rockets to Geosynchronous Satellites; Flags to Television:
The Hurricane Warning System in Charleston, Past and Present

Robert J. Dukes, Jr.
Department of Physics
The College of Charleston
ACKNOWLEDGEMENTS

I would like to express my appreciation to Wayne Jordan for giving me the opportunity of writing this paper; to Dick Shenot of the National Weather Service for many helpful discussions; to Ellis Hodgin, former Director of the Library at the College of Charleston, for originally obtaining the Charleston Weather Records for the College of Charleston Library; to Ralph Melnick and Katina Strauch, librarians at the College of Charleston, for aiding in obtaining additional records from the National Weather Service; to Sharyn Hauck for typing parts of the manuscript; to the South Carolina Coastal Councils and to the South Carolina Sea Grant Consortium for financial support; to the Lilly Foundation for providing financial support through a grant to the College of Charleston for an internship at the Charleston Office of the National Weather Service where my interest in the problem of hurricane warning was originally aroused. Finally thanks are due my wife both for proofreading several drafts of the manuscript and for putting up with portions of the manuscript scattered from one end of the house to the other.
Hurricane! Today a hurricane is followed by the devices of modern science from the moment of its birth until the instant of its death. Born as a slight disturbance in the eastern Atlantic, fed by the warm waters of the Carribean, and finally destroyed by the land mass of the North American continent or the cold waters of the North Atlantic the typical Atlantic hurricane is measured, probed, analyzed and discussed for the two to three weeks of its life. The public is informed of its position several times daily by newspaper, radio, and television. Hurricane tracking charts are distributed by both news media and the National Weather Service. At any time a hurricane is within a few hundred miles of a N.W.S. Office much of the business of that office concerns the hurricane and a surprisingly large percentage of it consists of answering telephones which ring almost constantly expressing the questions and fears of the American public. As a contrast to the warning system of today consider the situation in the early 1800's when warnings of hurricanes were minimal and the populace ill prepared for the disaster which befell them. Today we take for granted that we should know when a hurricane is coming. We also assume that if one does threaten our homes we will be warned in time to leave and protect our lives. We are going to trace the development of this warning system from the time of settlement of the Low Country and explore the validity of our assumptions mentioned above.

The residents of the Low Country during the eighteenth century became aware of the possibility of the "September" or "Equinoctical Gale". One of the signs which pointed to the coming of such a storm was supposed to be a hot, dry summer. Ramsay in his history of South Carolina provided the basis for such a belief in his accounts of the storms of 1728 and 1752. He
explained it this way:

"By such excessive heat the air becomes rarefied, and a violent hurricane commonly follows and restores the balance. In such a case the wind usually proceeds from the northeast. These storms, indeed, seldom happen except in seasons when there has been little thunder, when the weather has been long, dry, and hot. Accordingly, on the 15th of September, 1752 a dreadful hurricane took place. In the night before it was observed by the inhabitants of Charleston that the wind at the northeast began to blow hard and continued increasing in violence until morning."

By the end of the eighteenth century inhabitants of the Low Country were aware of other signs which foretold the coming of a "September Gale". The surf would be high and would roar and the tides might be higher than normal. While these signs are indeed associated with the coming of a hurricane there were other ideas prevalent which weren't as valid. For example Ramsay gave the following formula for predicting a hurricane:

"The inhabitants of Sullivan's Island, and of the sea-coast, should be attentive to all great changes of the weather between the 1st and the 16th of September, particularly after very hot summers, and especially when an uncommon roaring is heard from the sea. It appears that hurricanes have generally come earlier in the season. The two first, in 1700 and in 1713, were on September 16th; that of 1728, was September 14th; that of 1752, September 15; that of 1804, September 8th. It is therefore more probable that the next will be before than after the 8th of September."

Actually the next three major hurricanes to hit the Low Country were on August 27, 1813; September 10, 1820; and September 27, 1822. Thus Dr. Ramsay's attempt at hurricane forecasting set the stage for many such failures to come.
This forecast was an attempt of predicting the formation of a hurricane while the stories concerning events such as roaring surf were examples of using natural effects of an existing hurricane to warn of its coming. Even today we have almost no ability to forecast the formation of a hurricane at some future date. Once one is formed we can track it and predict with some accuracy its future course. At the beginning of the nineteenth century, however, almost nothing was known about the nature of hurricanes despite the fact that their existence had been known since the time of Columbus. Even their rotary motion was unknown until the mid 1800's although Benjamin Franklin came very close to deducing this fact.  

At the time Dr. Ramsay was writing the gales were thought of as wind blowing in a straight line which commenced and then later ended. Gradually it became apparent that these gales moved across the Earth. With this discovery a tremendous idea was born. If successive positions of a storm could be established then its direction of motion could be determined and its future position found. Once this was done if some means could be found to send information about the storm faster than the storm then communities in its path could be warned. With the perfection of the telegraph in 1844 such a means was at hand. The first person to actually try to use the telegraph for the purpose of warning of storm movement was Joseph Henry, Secretary of the recently created Smithsonian institution who in 1847 wrote to the Smithsonian's Regents:

...It is proposed to organize a system of observation which shall extend as far as possible over the North American continent....The citizens of the United States are now scattered over every part of the southern and western portions of North America, and the extended lines of the telegraph will furnish a ready means of warning the more northern and eastern observers to be on the
watch from the first appearance of an advancing storm.4

By 1850 Henry had a network of 150 observers scattered across the United States and was using their reports to construct a daily weather map and post advisory weather signals on the main tower of the Smithsonian. Besides Henry other scientists were active in reporting the weather to the public. Professor Cleveland Abbe of the Cincinnati Astronomical Observatory was issuing daily weather reports which soon began to include forecasts.

The forerunner of today’s Weather Service was formed as a result of the growing desire on the part of the public for storm warnings. After a storm on the Great Lakes in 1868 had caused great destruction to shipping on the Lakes a resolution was introduced in the U.S. Congress which required the Secretary of War to take meteorological observations at the military stations and to give notice on the Great Lakes and on the seacoast by telegraph and marine signals. This duty was assigned to the Signal Service which began making observations on November 1, 1870. These were telegraphed to a number of cities along the coast in addition to being sent to the Service’s headquarters in Washington. On December 19, 1870 Sergeant J. E. Evans received a telegram which ordered him to close the Montgomery, Alabama office of the Signal Service and to report to Charleston as expeditiously as possible in order to be ready to send observations by January 1, 1871.5

When Sergeant Evans arrived in Charleston he found that many of the required observations were already being taken by the City Registrar. This was the continuation of a long tradition of monitoring the weather in Charleston dating back to the pioneering observations of Dr. John Lining in 1738. Sergeant Evans was Charleston’s first full-time paid weather observer (His pay as an Army sergeant was $17.00 per month). The original Signal
Service office was on the third floor of the Carolina Savings Bank building at 1 Broad Street in downtown Charleston. The thermometers, rain gauges, and other instruments were located on the roof of this building.6

By April, 1870 stations in Charleston, Augusta, and Wilmington were serving the Carolina coasts. These stations telegraphed reports three times daily to Washington where summaries and predictions were prepared and telegraphed back to the observers, railroad stations and the Associated Press. Initially Charleston didn’t benefit greatly from the warning service since it was on one end of the chain running from south to north along the coast and hence had no stations further south to provide the warnings. This soon changed, however, as stations were established in Savannah and then in Florida.

Shortly after the Charleston office was opened an opportunity arose for it to provide its primary service. On August 19, 1871 a weak hurricane came through the Low Country. News reports of the storm pointed out that "those unerring monitors, the weather reports, foretold its coming by several days, which enabled the river craft at least to secure safe moorings."7 Again in September, 1874 the Signal Service proved its worth when a stronger storm passed by Charleston. In the official log maintained by Sergeant McGauran, Sergeant Evans’ successor, we find the notation that the Charleston press gave the weather office credit "for the display of signals from midnight of the 28th, clearly showing a knowledge of the storm eight or ten hours before hand."8

The signals or warnings mentioned in these reports consisted of a flag flown from the roof of the building housing his office with details of the warning posted at several places throughout the city. This service was well received by the public. When the storm of August 27, 1881 cut the city off
from all telegraphic communication residents of the city formed lines at one of the posting sites, the News and Courier building, hoping for some word from the outside or some advice from the weather observer who was beginning to be the recognized expert on such storms. This storm was especially severe in Savannah where the roof of the weather office was destroyed and the instruments washed away. The news reports indicate that Mr. Ford, the weather observer, remained on duty until the last possible moment. Similar misfortune befell Sergeant McGauran’s replacement, Sergeant James H. Smith, on August 25, 1885 when his weather apparatus was carried away by a storm. This storm was much more severe than anticipated from the warnings received being one of the few cases where the actual eye of the storm passed over Charleston.

This unexpected intensity of the storm provoked very muted criticism in the press which foretold much harsher complaints in the decades to come. The Signal Service was beginning to work itself into what would prove to be a very trying position. The weather observers were required to collect statistics proving the worth of their warnings in order to justify the cost of the service. Each time an observer issued a warning he would send Washington an estimate of the value of shipping which remained in port due to this warning and hence was saved from the storm. For a typical storm the Charleston observer filed the following report:

Two schooners, southbound, one of two masts and the other of three masts, put into port for shelter at 1 P.M. after their masters saw the hurricane flags flying from the light vessel off Charleston. These vessels would have met the same fate as the others that were wrecked off Charleston that night. There were 6 steamers, 14 schooners, 2 barks, and 2 brigs and a greater number of small craft in port. The crews thereof, including passengers, numbered 202 and the cargoes consisted of
lumber, cotton, rice, rosin, clay, wheat, phosphate, turpentine, iron, domestic and manufactured goods, and miscellaneous items with a total value of $522,700.

These statistics were used by the Signal Service to prove its cost effectiveness. For example, in 1882 the following report appeared in an official publication of the Service:

Statistics enough have been obtained to give some idea of the very large amount of property that was prevented from going to sea in the cyclone or that ran into the harbor after seeing the signals. The total amount of figures sent in by the observers is $6,460,586. It is estimated at the Signal Office that at least $13,000,000 of property and many persons remained safely in harbor on account of the warning given by the Signal Office and that the savings in this one storm pays the expense of the service for at least 10 years.12

On the other hand there is another implication to such claims. That is that if the Signal Service got the credit when its warnings provided benefits then perhaps it should be blamed when the warnings are in error. As we shall see the news media and the public were not slow to attach such blame in the past and will probably continue to do so in the future.

In the 1880's another problem was confronting the Signal Service. The Army was becoming increasingly unhappy at having a large number of its personnel tied up with what was essentially a civilian function. Thus in 1890 the Weather Bureau was created as part of the Department of Agriculture and the Signal Service weather observers became civilians.13 It was during this transition that a new weather observer arrived in Charleston. His name was Lewis N. Jesunofsky. As part of the ongoing search of the Weather Service for improved techniques Mr. Jesunofsky took the rather primitive system of flags and notices which existed in Charleston on his arrival and
turned it into a system rivaling in complexity if not technology the one existing today. The details of this system are given in annual reports he sent to Washington between 1895 and 1900. One gathers, from reading these reports, that he was an excellent publicist as well as weather observer. The tone of the reports indicates that there was some question both in the local community as well as at the national level as to the usefulness of a weather service office. Lewis Jesunofsky worked hard at providing justification for his existence by providing reports like the one quoted earlier giving dollar values of ships and cargoes which remained in port due to his warnings. Evidence of his visibility in the community is provided by an notice apparently enclosed with utility bills from The Charleston Consolidated Railway, Gas, and Electric Company dated 1899 which read:

NOTICE TO CONSUMERS:

If your Bills are higher this month than last, do not complain to us. Remember the days are shorter. Go to Mr. Jesunofsky, at the Weather Bureau, and kick for longer days.

The fact that the official in charge of the local Weather Bureau office was well known enough for the electric company to refer to him by name in an advertisement indicates that he was not a person to retire into the background while the world passed him by. Evidence like this as well as his reports indicates that Mr. Jesunofsky saw himself as a person responsible to the public both in terms of his technical expertise and his ability to publicize and inform. This attitude toward positive relations with the public is still the watchword of the National Weather Service. The Weather Service had been a civilian agency for three years when disaster struck the Low Country. On August 27, 1893 a major hurricane struck the South Carolina
coast between Charleston and Savannah. Storm warnings were posted in front of the News and Courier building in Charleston over 24 hours in advance of the onset of the storm. Despite this 2000-3000 lives were lost on the sea islands south of Charleston. This tragedy pointed out a great weakness of the warning system. It is not sufficient for the Weather Service to issue a warning. The warning must be brought to the attention of the public.

Shortly after the 1893 storm the Weather Service in Charleston in the person of L. N. Jesunofsky took steps to see that in the future the public could not remain unaware of his warnings. This action on his part was in accord with the mandates coming out of the Weather Service headquarters in Washington.

The public must be informed. The system as detailed in Mr. Jesunofsky's annual reports gives ample evidence for his ability to organize and persuade since it depended to a large extent on volunteers. In the report for 1895 the following methods are given for warning the public of the approach of a hurricane: the use of the fire alarm telegraph, factory bells, factory whistles, cannon, railroad trains, railroad telegraph services, telephone exchanges, light ships, lighthouses, pilot boats, steam tugs, steam and naptha launches, steamboats, steamships, horseback carriers, flags, and rockets. Not mentioned explicitly in this list is the means of the initial warning. This was distributed as part of the standard system which had been developed nationwide for disseminating forecasts. This system depended on postal cards mailed to anyone who requested them and delivered with the regular mail. Warnings mailed in the morning were delivered to recipients in towns served by a railroad in the coastal area the same afternoon. This rapidity is one of the most astounding things about the whole system to a person of the 1980's. In one of his reports Mr. Jesunofsky mentions that 410 copies of the warning were dispatched by mail while on a typical day more
than 90,000 such cards were mailed across the country.\textsuperscript{17}

As an example of the operation of the warning system let's look at the actions taken by the Charleston Weather Bureau office in response to a hurricane warning received by them at 2:30 p.m. on October 10, 1896. Immediately the warnings were relayed by telegraph to other individuals throughout the coastal region of South Carolina for further dissemination to the public. The postal cards mentioned above were then sent to all individuals on the Weather Bureau's mailing list. The railroads serving Charleston were requested to pass the warning along through their communications systems as well as by train. Mr. Jasounofsky and his assistants (usually two) telephoned warnings throughout the downtown area. Many of these calls were to businesses which would be affected by a storm. Others were to various locations where warning flags were displayed. One such call was to His Honor, the Mayor, who raised a warning flag at City Hall. Other places displaying flags included the Quarantine station, the Life Saving Station, the Police Station, the Main Charleston Light (on Morris Island), and the Charleston Bridge (Ashley River Bridge). When night fell many of these stations fired warning rockets. Swift tugs were dispatched throughout Charleston and Georgetown harbors to warn the Master's of all vessels in those harbors. These tugs traveled throughout the harbors with whistles blowing. The warning was brought to the attention of the public at large by the sounding of a hurricane alert on the Charleston Fire Alarm signal. This alert was the sounding of twelve bells twice. Factory bells and whistles were also sounded. One can imagine that very few people in Charleston proper weren't aware that something was happening. Horseback couriers were dispatched from Mt Pleasant into Christ Church Parish and across the Charleston Bridge into St. Andrews Parish. These couriers were
charged with seeing the residents of the outlying areas were informed as to the nature of the threat. To inform them of the existence of the threat a swifter means was used. Chains of rocket stations had been established along the Ashley and the Cooper Rivers as well as on James and Johns Islands and in the Georgetown, Beaufort, and Hilton Head areas. Main rocket stations were located in Charleston, Secessionville, Legareville, and Mullet Hall. Other rocket stations were located at Mt. Pleasant, Waverly Mills, Ft. Sumter, and Brookgreen. There were several chains of rocket stations radiating out from these central stations. Each station in a chain would fire rockets when observing rockets from the preceding station. One such chain ran from Youngs Island through Martin’s Point, Edisto Island Wharf, Edisto Island (Center), Johns Island, New Cut, and Little Button. During this particular storm this last chain was particularly successful reaching a total length of 62 miles.

Besides being a service to shipping hurricane warnings were also of value to the agricultural community. Rice was still an important crop in the coastal zone of South Carolina. The President of the Rice Planters Association in Georgetown could always be counted on to spread the alarm. On this occasion he dispatched four horseback couriers to warn the surrounding agricultural area.

After each alert the inevitable post-mortem followed. The same questions plagued the Weather Bureau then as plague our modern forecasters today. On one hand the warning should be given if a hurricane is going to strike while on the other hand a warning which is a false alarm both disrupts the community unnecessarily and decreases the confidence of the public in the system. After one apparent false alarm the public was fairly vocal in expressing their dissatisfaction at having to take precautions for nothing.

The News and Courier came to Jesunofsky’s rescue on this occasion by
reporting that the storm just off the coast had been very intense and that residents of the Low Country were very fortunate to have been spared. As we shall see shortly the News and Courier would be on the other side of the fence in a few years leading an assault on the Weather Bureau for bungling a warning.¹⁹

Lewis Jesunofsky developed his storm warning system over a decade. In 1897 he added to it storm warning display towers at Moultrieville (a suburb of Charleston on the Atlantic Ocean) and at North Island. These were 50 foot steel towers with flagstaff, lantern housing attachment, and lantern shelter.²⁰ After this he temporarily considered the system complete for in his 1897 report he confessed that he could think of no further improvements to make.²¹ This situation was not to last for long since by 1899 the report revealed his attempts to get a 75 foot steel tower erected on top of the Customs House. This would carry intense lights which could be seen for a great distance offshore. The report indicates that this attempt was foiled by "the Honorable, the Secretary of the Treasury" who had jurisdiction over the Customs House and who refused permission for this tower to be built. Perhaps this was just as well for within the decade the seeds were sewn which would replace such coastal warning lights with radio communication.²² Prior to this happening, though, Lewis Jesunofsky left Charleston. Apparently he was transferred and promoted for his last report dated December 15, 1904 was signed as "Section Director".²³ The replacement for Lewis Jesunofsky was Robert Q. Grant who served as Local Forecast Officer at Charleston from 1905 to 1911. His tenure was relatively quiet and marked by good relations with the press and public. After the storm of October 10, 1910 the News and Courier remarked that the Weather Bureau had given warning enough that even if the storm had been severe everyone would have had a chance to reach safe
One of the assistants during this time was Harvey S. Cole who was apparently transferred away from Charleston around 1908 and then brought back to replace Mr. Grant when he left Charleston in 1911. In 1909, during the tenure of Robert Grant in Charleston, a ship at sea equipped with radio broadcast the warning of a storm at sea to a station on shore thus providing a new means of discovering hurricanes. This was a very needed development for the complex system for disseminating hurricane warnings as developed in Charleston would fail if there was no hurricane warning to disseminate. Unfortunately for Harvey Cole there was no radio equipped ship in the proper part of the Atlantic Ocean shortly after he had taken over the Charleston Weather Office.

On August 28, 1911 a storm which had been born far to the north of the usual breeding ground for hurricane came ashore in the Low Country. The storm apparently arose from a low pressure area which had been stationary off the Florida coast for several days. Its development and subsequent northward movement must have been fairly rapid for it suddenly appeared and struck the coast between Charleston and Savannah. When Charleston retired for the evening on Saturday night the skies were clear and a light breeze was blowing. Shortly before midnight clouds came in and by midnight a light rain was blowing. When Forecaster Cole came in at his office Sunday morning and inspected the overnight barometer records he found that instead of rising shortly before dawn as usual the atmospheric pressure at been falling since 4 A.M. The pressure at 8 A.M. was not lower than many ordinary low pressure areas which move across the country. However, when the 8 A.M. observations were telegraphed to Washington the forecasters there were taken by surprise for there should have been no low pressure area near Charleston. At 9:38 A.M. Mr. Cole received a request for a verification of the 8 A.M.
observation. After Washington was convinced that there had been no error in transmission they ordered special observations made at 10 A.M. and Noon. As a result of the 10 A.M. observations Washington issued an order to hoist storm warnings at 11 A.M. and an order for the office staff to remain on duty until further notice at 1:30 P.M. The first of several human errors which would later draw much criticism to the Weather Service occurred with the storm warning order. This telegram was not received by the Charleston Weather Office until Noon. By 1:30 P.M. the wind speed was greater than 40 miles per hour but at this time Mr. Cole did not think that the storm would develop into anything serious. As a precaution he did request that the company running ferries to Sullivan’s Island and the Isle of Palms warn people to leave early Sunday afternoon. At 4:12 P.M. Charleston received orders from Washington to issue hurricane warnings. Again this order was delayed nearly 30 minutes in transit. When a hurricane warning was received the officer in charge of the Charleston office had certain tasks according to the system set up by Lewis Jesunofsky. These included telephoning warnings, ordering the fire alarm telegraph rung 24 times, and firing warning rockets. Apparently Mr. Cole did not do the last two of these. He had been telephoning notifications to the various people on his list since the first storm warning was issued but apparently was not successful in reaching many of them on a Sunday morning.

The Monday morning News and Courier published with great difficulty immediately after the storm praised the weather service personnel for their dedication to duty but by Wednesday what was apparently a mounting tide of criticism erupted on the paper’s editorial page. Using phrases such as "most decided indignation", "eleventh hour statement", and "apparent culpability" the paper took the weather Service in general to task for not providing more
warning and Mr. Cole in particular to task for personal negligence. In addition to his failure to fire the rockets and cause the fire alarm to be sounded he was charged with assuring people that the danger had passed before the worst of the storm had struck. Mr. Cole counter-attacked in the letters column defending both himself and the Bureau and claiming that many of the excursioners who had been trapped on Sullivan's Island and the Isle of Palms had boarded ferries to the islands after the hurricane warning had been posted.

The truth concerning the placing of blame for the apparent lack of warning may never be known. Several explanations are possible. Mr. Cole had served one short tour in Charleston as an assistant a few years earlier and had returned to Charleston to take charge of the office only a few months before this storm. Thus it is probable that he may not have been as familiar the system as he could have been. Another possibility presents itself for the failure to sound the fire alarm. At the time the hurricane warning was received the winds were already of gale force. The fire alarm telegraph was an electrical system subject to wind and water damage. The annual report of its superintendent in the *City of Charleston Yearbook* states that the telegraph was out of service for three days following the storm. It could well be that the damage had occurred before Mr. Cole tried to sound the warning. Another theory was put forth in a 1964 interview by John E. Lockwood who had been in charge of the Charleston office from 1924 - 1951. Mr. Lockwood believed that the eye of the storm had passed over Charleston and Mr. Cole had been fooled by the calm conditions in the eye and had sounded the all-clear signal. We should also remember that the local observers at that time had very little autonomy. All warnings were issued by the forecasters in Washington. All the local offices were authorized to do
was to make observations and transmit warnings from Washington to the public. Whatever the truth of the matter the Weather Bureau apparently defended Mr. Cole of all charges except that of giving false assurance to the public and immediately transferred him to the Midwest.

After Harvey Cole's abrupt transfer the Bureau brought in J. H. Scott to be in charge of the Charleston office. As a result of the controversy over the August storm Mr. Scott had a good deal of fence mending to do with the press and the public. In his annual report for 1911 published in the *City of Charleston Yearbook* he reported on the 1911 storm giving some of the reasons why it would have been difficult to provide really adequate warning but not bringing up the problems associated with the performance of Mr. Cole. He closed the report by referring to the broadcast of hurricane warnings from ship to shore by saying:

Closer cooperation on the part of masters of vessels equipped with wireless apparatus which the Chief of the Weather Bureau is constantly endeavoring to secure, will render remote the possibility of a storm of this severity coming near enough to affect the readings of instruments at coast stations without advance information in regard to its location and intensity.²⁹

Mr. Scott's real baptism by fire occurred on July 14, 1916. This was the first major storm to hit South Carolina in July since the Low Country was settled and as such was not expected by the public who remembered the tradition of the "September Gale". This storm was another which came up on Charleston unannounced since it came in from the sea rather than up the coast and had not been encountered by any vessels equipped with wireless. Storm warnings were issued on the morning of the thirteenth and hurricane warnings at 7 P.M. that evening. High winds and a water spout preceded the hurricane
warnings by several hours, however. Trees were blown down as early as 1 P.M. By 11 that night all of Charleston below Broad Street was under water. Fortunately, little lasting damage was done to the city since the peak of the storm Friday morning coincided with low tide.

When the alarm was received it was disseminated in the usual ways. Warning flags were hoisted, rockets fired, and the fire alarm and various whistles sounded. There were several new innovations for this storm. The Naval Radio Station broadcast warnings to shipping, amusement companies flashed the warning on their screen, the electric advertising sign displayed the warning, and automobiles replaced the horseback couriers. There were some problems with some of the planned modes of dissemination.

Effort to communicate with McClellanville by telephone failed owing to the prostrated phone lines; and W. A. King of Mount Pleasant, who had agreed in advance to carry the warnings, upon being called upon to perform the service stated that it was utterly impossible for any person to make the trip that night on account of fallen timber. He had been up that way in the afternoon and had great difficulty in returning. All efforts to induce a courier to go to Yonges Island met similar defeat. The warnings reached Martins Point by telephone, however, and were distributed widely over that section.

As usual, a problem arose concerning the residents of the Isle of Palms and Sullivan's Island. At 4:30 P.M., even though he hadn't received an official hurricane warning from Washington, Mr. Scott began trying to advise residents of the islands to seek safety. Since communications by wire were not working with the islands he resorted to telephoning the newspapers and the Charleston-Isle of Palms Traction Company which had rail service to the islands. He also had a message sent by hand to the military at Ft. Moultrie advising them of the situation.
Tugs that had promised, for a compensation, to distribute hurricane warnings and assist people from the islands to reach the city had already sought places of safety for themselves, and their masters could not be communicated with by telephone. A. R. W. Stoesen, messenger boy, was sent in search of them with instructions to get the lighthouse tender Cypress if they were not at their wharves. This he did in the raging storm, running nearly a mile to her dock on the Ashley River. Capt. J. P. Johnson, of the Cypress, prepared at once to go to Sullivan's Island and safely transported to the city all who would come. About 125 returned on the Cypress, and large numbers spent the night in the fort.

There were also difficulties in warning the Georgetown area. The telephoned warnings didn't get through but the telegraphed ones did. Just getting the warning to Georgetown was not enough for, just as in Charleston, problems arose in disseminating it.

From Georgetown the tug E. T. Williams was sent to Waverly Mills up the Waccamaw River, and a courier walked about 3 miles across to warn the residents of Pawleys Island and Murrels Inlet. The telephone line to South Island was down; no vessel would undertake the trip to North Island or South Island, and no one would attempt the trip overland, so these stations did not receive the hurricane warnings, though the northeast storm warnings were displayed.

In the aftermath of the storm there were some complaints made about the lack of warning. This time the News and Courier editorially defended the Weather Bureau writing:

The local Weather Bureau as now constituted is highly efficient and though there has been a great improvement in the management of the weather service as a whole, there was not much warning of this blow. That seems to be nobody's fault; it is merely proof that these disturbances cannot always be detected well in advance of their actual advent. It is only the due to say that the service rendered by the
The Weather Bureau has shown a steady improvement in the last 3 or 4 years which is highly gratifying. The people of Charleston have every reason to be grateful for the vigorous efforts put forth by Observer Scott and his assistants to see that the city and neighboring islands were warned as quickly as possible of the approaching storm. Nothing that could have been done to put the public on guard was left undone, and it is due to the Weather Bureau's work that the storm damage in Charleston was not very much greater.33

For the next three decades Charleston was relatively hurricane free. On a national level the Weather Bureau tried several ways of better locating and tracking hurricanes. In 1926 radio compasses were used to track hurricanes for the first time. A Naval transport off the coast of Cuba reported hourly to a shore station on details of the hurricane's center and speed. When the hurricane moved out of the ship's range its progress was tracked by radio compass stations along the Florida coast.34

In 1928 the Weather Bureau announced that:

There are now 80 steamships which ply commercial routes of the Gulf of Mexico, the Caribbean, and to South America and which provide hurricane reports by radio. Nowadays this fleet spreads its net so close that there is not a hurricane that is not caught near its inception and charted throughout its course.35

This net worked better on paper than in actuality. The Weather Bureau needed reports of positions and motions of hurricanes as might be gathered by someone following it. The masters of the ships, on the other hand, desired primarily to avoid all hurricanes. Thus in most instances the reports received were fragmentary and not of great value.

In 1935 the function of hurricane warning was given its own home when the U.S. Hurricane Warning Service was established for the purpose of facilitating prompt exchange of weather information. Miami, Florida, was
designated as the official coordinating facility.

Also in 1935 a disturbance with winds of only 47 miles per hour passed Charleston. For this storm rumors spread faster than the truth. According to these rumors Charleston was threatened by a major storm with 125 mile per hour winds. When local law enforcement officials tried to check with the Weather Bureau as to the necessity of evacuating the sea islands the calls could not get through since all of the Weather Bureau's phones were tied up by members of the public attempting to verify the rumors.  

In the late 1930's a group of influential Florida and Gulf coast residents exerted pressure on the government to have the Coast Guard send ships into the Gulf looking for hurricanes. Due to a misunderstanding on the part of the Commandant of the Coast Guard concerning the wishes of President Roosevelt this scheme was agreed to despite severe reservations on the part of Weather Bureau officials. It was tried for several years with very little success as most Coast Guard skippers would find some compelling reason for avoiding the assignment when their vessels were requested to steam toward a severe storm.  

The next major storm to severely affect Charleston hit on August 11, 1940. This time some advance warning was given. The first report of the storm was received in the Charleston Weather Bureau office at 8:30 A.M. Friday. At that time the storm was 300 miles east of Cuba and of slight intensity. Between Friday night and Saturday night the storm was nearly stationary off the coast at Jacksonville. It was not until 8 P.M. Saturday that it became apparent that the storm would approach Charleston. At 10 P.M. Saturday night a warning was issued for Charleston for "winds reaching gale force and accompanied by unusually high tides." At that time the storm was 250 miles east northeast of Jacksonville and moving north. Local authorities began
hurriedly evacuating residents and vacationers from beaches. Again advancing technology had made some changes in the hurricane warning system. Normal communications were cut off by the storm but amateur radio operators and Naval Reserve personnel were available to handle emergency communications. Radio station WTMA stayed on the air relaying messages which were sent by shortwave from the News and Courier building. The warning was passed to outlying areas by members of the County Police Department. The storm, whose peak winds at 2:30 P.M. Sunday were barely of hurricane force, hit on a high tide. Because of this the storm tide, which did most of the damage in Charleston, was 12.7 feet. If the storm had hit on low tide then it would not be remembered as one of Charleston's major hurricanes of the century.

The storm warnings were removed at 9:30 P.M. Sunday night but the Weather Bureau was not allowed to rest. Rumors began circulating Monday afternoon that a second storm was on the way. It was to be even worse than the one on Sunday. People continually called the Weather Bureau seeking confirmation of the rumors. They just wouldn't believe the denials. In fact some became very belligerent when they were assured that the rumors were completely false.

With the outbreak of World War II the practice of broadcasting hurricane warnings was discontinued since military authorities were afraid that the enemy might pick up the warnings and gain too much valuable information. Fortunately, Charleston was spared by any major storm during the war.

Nationally a very important advance was made in 1943 when the chief flight instructor at an Army air field on the Gulf Coast made the first flight into the eye of a hurricane. This was made surreptitiously essentially on the spur of the moment. Not only was he successful in penetrating the hurricane and returning but after the first flight was over
he took another officer back into the storm. This marked the beginning of
the very successful program of hurricane reconnaissance by aircraft.

During the late forties and early fifties telegraphic communication was
replaced by teletype. The Atlantic and Gulf coasts teletype network, which
was controlled from Miami, consisted of 35 stations stretching from
Brownsville, Texas on one end to Charleston on the other.

A new tool for following hurricanes appeared as a result of World War
II. That was radar. Developed for use in tracking enemy aircraft radar
proved to valuable in also tracking storm systems — once the echoes from
storm systems stopped being ignored as clutter on the radar scope. The first
photo of a hurricane as it appeared on radar appeared in 1945 but the actual
use of radar as a device for the routine observation of hurricanes did not
occur until the mid 1950’s. During this decade long range radar was put into
operation at Nantucket, Massachusetts; Cape Hatteras, North Carolina; and San
Juan, Puerto Rico. A powerful radar unit was also located at the National
Hurricane Center in Miami. Shorter range radar units were installed at other
coastal locations from Boston, Massachusetts to Brownsville, Texas including
one at Charleston. The shorter range radar units were surplus units acquired
from the Navy. They had originally been designed for use in Naval aircraft
and had a range of 100 miles. Installation of the Charleston unit was
delayed over six months while the Weather Bureau negotiated with the City for
permission to mount the radar antenna on the airport control tower. Radar
was not a "cure-all" for hurricane problems however. The Charleston Weather
Bureau realized that there must be means of disseminating the information
gathered with the new device. In June of 1952 they reported that the
complete file of persons in outlying areas who were to be notified in the
event of a hurricane warning had been brought up to date. The warnings were
to be transmitted to them by radio, telephone and personally by the Highway Patrol. 44

Also in the early 1950's the custom of giving girl's names to hurricanes was adopted by the Weather Bureau. The origin of this custom is uncertain. A need existed for some way of differentiating between two or more storms which might be active at the same time. In 1951 and 1952 hurricanes were designated by the military phonetic alphabet. Thus we had the first storm of the system being called Able, the second Baker, and so on. In 1953 an alphabetical list of girls names was adopted as the official list of hurricane names. 45

At the same time the Weather Bureau was trying to get radar and other advanced technology operational they were facing the problem of a declining budget. In 1953 the Republican administration of Dwight Eisenhower had greatly cut the budget of the Weather Bureau. Then in 1954 a trio of storms named Carol, Edna, and Hazel both caused public criticism of the Weather Bureau and gave it ammunition in its fight for additional funds. Hazel was one of the centuries most destructive storms in the Carolinas. We will discuss this in detail in a moment but it was also a devastating storm as far north as Ontario. Earlier that year Carol had carved a path of destruction across New York and New England and Edna had threatened the same areas. The wealthy Northeast was forcibly reminded that it too was held ransom by nature's worst storm. Some of the warnings issued by the Weather Bureau for these storms hadn't contained the word "hurricane". As a result there was criticism of the Bureau from the public and press.

In a sense though the Weather Bureau was served well by these storms. The public outcry, which arose prevented the administration from closing several northern storm warning stations and induced congress to appropriate
five million dollars for an intense hurricane study and an emergency hurricane warning system. As a result of this new budget package a contract for 32 new radar units designed especially for meteorological use was issued. These were installed along the Atlantic and Gulf Coast spaced about every 200 miles. These units with a range of nearly 200 miles ensured that the eye of a hurricane could be detected about 200 miles off the coast and could be continuously followed.46

South Carolina was affected by only one of the 1954 storms and that was Hazel. Storm warnings for Hazel were hoisted at 11:00 A.M. on October 14, 1954 from Charleston north to the Virginia Capes. According to the Weather Bureau the "warnings were adjusted slightly before the center moved inland; however the affected area from Charleston northward had 24 hours warning and, of course, had been watching the movement of the storm for several days prior to the fifteenth."47

Despite the storm warnings much of South Carolina's Grand Strand was caught unprepared. Once again local legend prevailed over the warnings of the Weather Bureau. Situated north of Georgetown and extending to the North Carolina border the Grand Strand is a beach resort located in a bowl shaped depression known as Long Bay. In the past this had generally caused severe storms to pass by a safe distance at sea. As North Myrtle Beach Police Chief Merlin Bellamy put it during an interview on the occasion of the twentieth anniversary of Hazel:

We had had hurricane scares since my infancy but had never really been hit so we just weren't that concerned about Hazel. We thought Long Bay would protect us. The news was like water running off a duck's back.48

Even the local media were so convinced of the truth of
the warnings were treated more as a joke than a cause for alarm. Ashby Ward who at the time of the storm was a radio disk jockey working for the Myrtle Beach radio station was also interviewed for a twentieth anniversary article and recalled:

We knew Hazel was out there but we weren't really worried because hurricanes just didn't hit here. We followed her progress all day but we just didn't take it seriously. We even joked about it, calling Hazel our 'girlfriend'. I remember we played a song entitled 'The Wayward Wind' and got complaints. We normally signed off at 10 P.M. But we had gotten a call from the Charleston Weather Bureau saying Hazel was sitting off the coast without any definite direction so we decided to stay on the air until the danger passed.\footnote{49}

Finally the gravity of the situation dawned on the local authorities and Chief Bellamy was awakened at 11:30 P.M. with word to begin evacuation. Despite the late evacuation there was surprisingly little loss of life during the storm. From the Carolinas Hazel moved up through the Eastern United States causing heavy rains and flooding with the resultant death and destruction as far north as Canada.

In retrospect part of the blame for the late evacuation must be shared by the local populace, the media, and the Weather Bureau. The populace and media failed to pay sufficient attention to the warnings issued by the Weather Bureau while the Bureau perhaps failed to make the warnings strong enough. The majority of the blame however must be born by the storm itself. Hazel during the time of its passage from the Caribbean to the Canadian border was one of the fastest moving storms on record.

One group was singled out for special praise for their work during Hazel. These were the 762 amateur radio operations who at worked day and night at their own expense to get information pertaining to Hazel out to the
public. As a result of their activities South Carolina was selected to be the center for an amateur radio hurricane warning network to be known as the Coastal Emergency Network.\textsuperscript{50} As mentioned earlier during the aftermath of the great storms of 1954 the Weather Bureau received a massive influx of funds for the purchase of new technology. The new radar unit designed especially for meteorology arrived in Charleston in 1956 while a facsimile machine was introduced in 1955. A local teletype circuit which included Georgetown, Myrtle Beach, and Beaufort also became operational in 1955. Newspapers, radio stations, etcetera were soon added to this circuit.

In 1958 a hurricane named Helene approached the Charleston area. Again the radio amateurs went into operation setting up a network covering Charleston, North Charleston, Folly Beach, and Mt. Pleasant. The main purpose of this network was to allow various Red Cross officials to stay in touch with each other. Although Folly Beach was evacuated Helene did little damage in the Low Country.

On Tuesday, September 28, 1959 Hurricane Gracie became the last major storm to seriously affect the Charleston area. A hurricane watch was declared as early as 11:00 A.M. Monday. By 2:00 P.M. the watch had been changed to a hurricane warning. Almost an entire day after the warning had been issued the center of Gracie crossed the coast near Beaufort. With this great of a notice the evacuation of the sea islands was almost total. Fortunately Gracie came ashore at a low tide. The combination of this with the long advance warning resulted in the loss of life due to Gracie being kept to a minimum.\textsuperscript{51}

After Gracie there was a long hiatus in major hurricanes striking South Carolina. Then on Labor Day of 1979 David threatened. Although it had done major damage in the Caribbean by the time David arrived in South Carolina it
had diminished to a minor storm. Although David had little direct effect on Charleston it did allow the Weather Service to test its responses to a hurricane threat. Much new technology had been installed since the time of Gracie. Teletype circuits were supplemented by a new computer based communications network called the Automated Field Operations System or AFOS for short. AFOS is a computerized system which integrates all information compiled by the National Weather Service and feeds data to all offices using video display terminals. In the future AFOS will play a major role in maintaining communications between the local office and the National Hurricane Center in Miami. If AFOS should be disabled then communications will be carried on by telephone or single sideband radio. Another addition to the arsenal of weapons available to the Weather Service was NOAA Weather Radio. This provided a means for the Weather Service to transmit information directly to the public without the necessity of sending it through intermediaries. David revealed several problems with the system. The Weather Radio went off the air long before the peak of the storm and remained off the air for much of the storm due to loss of power at the transmitter. Information reached the public primarily by way of commercial radio and television. There was a great deal of confusion on the part of some of the radio and television personnel as to the severity of the threat.

As a result of David several remedial steps have been taken by the Weather Service according to Richard Shenot, Meteorologist in Charge at the Charleston Weather Service office. Emergency power has been provided for the Weather Radio transmitters. This should now remain on the air until and if the actual transmitting tower is destroyed by the wind. There still may be problems with communication after the destruction of the tower since the storm will be dangerous for several hours after its peak. The Charleston
Weather Service has also adopted a policy of sending hourly statements concerning the status of any major storm to the new media over the weather teletype circuit. 53

From our consideration of the aftermath of David we turn to the warning system as it exists today and to a consideration of the future. Today's warning system, like the one in the 1890's, is one of immense complexity. As we shall see it also resembles the one of the 1890's in having serious, perhaps insurmountable, defects. Suspicious cloud formations are tracked by geosynchronous satellite continuously day and night. Aircraft make reconnaissances flights into these disturbances to investigate more intimately the details of pressure, temperature, and wind speed. When the disturbance gets within range of a shore station it is tracked by radar. The radar in use today is much more sophisticated than that first installed in 1953. Today's is a fourth generation descendent of the original. Color displays enable much more information to be placed on the screen in a much more legible fashion. Once information about a disturbance has been gathered some of the world's most powerful computers at the National Hurricane Center in Miami are used to analyze the storm and attempt to predict its future. The staff of the Center make predictions for the position of the storm for 6, 12, 24, 36, 48, and 72 hours in advance. For reasons we will investigate later only the predictions for less than 24 hours are made public. If the storm becomes a possible threat to Charleston the Meteorologist in Charge of the Charleston office assumes the responsibility of coordinating the warning process. His first step is to contact the local civil defense directors in each county in this area with an advisory which gives the location of the center, the strength and movement of the storm, and changes expected within
the next 24 hours. This advisory is updated every six hours. As the threat grows a hurricane watch is declared. This step means that the Low Country has a 50% probability of receiving a direct strike from hurricane force winds within the next 36 hours. This alerts residents to the potential need for evacuation or other emergency actions and allows them time for individual planning. A watch is updated every two hours. The Civil Defense directors in each county take responsibility of informing the media, primarily by telephone. Additionally the Weather Service office sends out information on the watch on the weather teletype wire, NOAA Weather Radio, and the Associated Press and United Press teletypes. In addition to the watch there is a local weather statement issued hourly. The local Civil Defense directors also notify shippers, schools, etc. A special warning center is set up in the Weather Service office for Civil Defense, Red Cross, and media personnel to contact to obtain first hand information. In an attempt to prevent some of the problems with jammed phone lines which have occurred in the past additional lines are installed with special numbers for law enforcement agencies, the media, etc. At this time Civil Defense, Red Cross, and law enforcement officials begin to set up shelters and ready evacuation plans. As the storm gets closer the watch is changed to a warning. This means that there is imminent danger for this segment of the coast and an urgent need for immediate action to protect life and property. The responsibility for recommending specific emergency actions at this time including the evacuation of residents in areas subject to flooding rests with the National Weather Service.

We suggested earlier that there were possible defects in the warning system that might keep it from being effective in preventing loss of life. Actually the defects are not things in the system subject to remedy but
rather inherent limitations due to the nature of the threat and our lack of understanding of it. In principle the watch will be upgraded to a warning 24 hours in advance of landfall with as much leeway as possible for evacuation during daylight hours. Here we come again to the problem which has plagued the Weather Service since the time of Sergeant Evans in the 1870’s. That is the necessity to warn in time to protect life but not to warn needlessly so often that the warnings are ignored. To be able to warn accurately 24 hours in advance it is necessary to know the position of the destructive portion of the storm 24 hours hence. Since currently experts will not promise a lead time between warning and storm arrival of more than 10 hours even with predictions made with our most advanced computers it is not possible to know this. There are four different mathematical models used in predicting hurricane motion. Most of the time these models don’t agree well in position for 24 hour forecasts much less longer ones. The hurricane specialist at the National Hurricane Center must analyze and compare the results of each of these models and attempt to arrive at a consensus. This is the reason, mentioned earlier, that the National Hurricane Center doesn’t release the extended forecasts to the public. Although the advent of satellite technology and more powerful computers during the last two decades have greatly increased our understanding of hurricanes and now prevent coastal area from being surprised by unknown storms they have not increased our ability to forecast the changes in strength or movement of hurricanes. In fact, since the 1960’s progress has been slow in predicting marked changes in strength or direction more than a few hours in advance. Thus while we are no longer in danger of being surprised by completely unknown storms such as the one in 1911 sudden changes in the strength or motion of known storms such as happened in 1940 and 1954 may still take us unawares. The outlook for the
improvement of predictions in the future is not promising since it is unlikely that research underway will provide dependable means of extending the lead time in issuing a warning. This is especially true for the East coast of the United States since the accuracy of prediction depends on the direction of movement. The most accurate predictions can be made for storms moving west while the least accurate are for storms moving north or northwest like the majority of the storms which threaten the Low Country. Thus we seem to face a future with an expectation of no more than a ten hour time span for evacuation. The situation may even be worse than this. Flooding is most severe if landfall occurs at the time of astronomical high tide. This is especially true if the astronomical tide is one of the unusually high bimonthly spring tides. Flooding is also more severe if the storm approaches from the South. In this case flooding may begin in Charleston while the center of the storm is still off the coast at Jacksonville. This might shorten the lead time for evacuation even further.

Considerations such as these are especially frightening for the Charleston area. Billy W. Hodge, Director of Safety and Disaster of the American Red Cross has said "I would evacuate all of the barrier islands - Isle of Palms, Sullivan's Island, Folly, Kiawah, and Seabrook - as well as downtown Charleston." However with only a ten hour lead time such a massive evacuation may not be possible. The barrier islands have greatly increased in population in the last few years. Looking back at the 1911 and 1940 storms we see that it was not possible to evacuate these islands with warnings not too much longer than the minimum we might expect today. While the transportation network today is superior than that in the past the increase in the population to be evacuated more than offsets this. It is not even sure how many vehicles might be on evacuation routes if an evacuation is
ordered. It is possible that people might begin evacuating in advance of an actual warning and thus ease the problem. However, Hurricane David in 1979 had a negative effect on the population. People were evacuated and made uncomfortable when there was no real reason. Thus they may not be as willing to evacuate the next time it is recommended. Using considerations such as the above scenarios have been constructed which result in the loss of as many as 10,000 lives on the densely populated barrier islands.

Despite the realization of this problem on the part of governmental officials development of the barrier islands continue. Recently a plan was announced for the development of Daufuskie Island. This plan calls for about 6500 people to be on the island and for the only access to be by ferry. If an evacuation is necessary it would be by ferry and rented boats at the rate of 500 per hour to Hilton Head Island. Obviously in the event of a warning of less than 24 hours, much less one of only 10 hours this plan will not work. Also if the events of the 1916 storm are repeated those people who have agreed to rent their boats may be hard to find in the event of a real storm. If the storm should be intense or hit on high tide then the storm surge could easily cover the island. If this happens the public will seek to assess blame for the resultant loss of life. Unfortunately much of it might go to governmental agencies like the National Weather Service and Civil Defense despite the warnings that have been issued, are being issued, and will be issued that the state of our knowledge of hurricanes is not sufficient to allow the safe development of such islands.

In this paper we have traced the development of the hurricane warning system both nationally and in the Low Country from the early ideas of David Ramsay to the modern system existing today. This has essentially been a story of developing technology and the people who apply it. We have been
very lucky in Charleston when compared with some other hurricane prone regions of the world. Charleston has never suffered a direct hit from a hurricane of maximum intensity at a time corresponding to an astronomical high tide. If such an event should occur all ideas that because parts of Charleston are over three hundred years old they are safe should be forgotten and the historic city should be deserted to its fate. Hopefully, there will be sufficient warning to allow the inhabitants to do this.
NOTES


2. Ramsay, The Natural History of South Carolina, p. 177.


4. This quote and much of the material on the development of the Weather Service prior to 1871 was taken from Patrick Hughes, "American Weather Services," Weatherwise, 33 (June 1980), pp 101-111.


8. Much of the information in this paper is taken from the original records of the Charleston Office of the National Weather Service (formerly the Weather Bureau and the Signal Service). Records for the period from 1870 to 1940 are housed in the College of Charleston Library. The records since 1940 are in the Library of the Charleston Office of the National Weather Service at the Charleston Airport. The early weather records consisted of a daily journal and weekly and monthly synopses. The early daily journals, written in a diary style were very valuable. In addition several forms books which contain copies of reports submitted to Washington are available. The annual reports found in these proved to be the most valuable of the documents. In addition to the original documents the weather observer maintained a clipping file. The particular quote used here is from the Daily Journal for September 28, 1874.


15. This was found pasted in the front cover of the 1899 Daily Journal volume of the Charleston Weather Records.

17. Most of this information comes from the annual report of Mr. Jesunofsky for 1895 which is found in Volume II of the Forms Book of the Charleston Weather Records. For a general discussion of the post card system and the figure for the number mailed per day nationally see Thomas M. Kawamoto, "Via U.S. Mail - Early Weather Forecasts," Weathervise (1981), 34, 110.


20. This information was found in a copy of a report submitted to Washington dated March 28, 1905. The original is in the Archives of the College of Charleston Library.


26. Information for the discussion of the controversy surrounding the August 28, 1911 storm was taken from the News and Courier for the week of August 28, 1911; the Yearbook of the City of Charleston for 1911; the Daily Journal of the Charleston Weather Records for 1911; and an article in the Charleston Evening Post on August 27, 1911.


30. Yearbook of the City of Charleston, 1911.


35. News and Courier, September 27, 1928.


38. See the typed summary in Daily Journal, Charleston Weather Records, 1940 and the News and Courier for August 11, 1940.


42. Charleston Evening Post, November 15, 1951.

43. Charleston Evening Post for June 14, 1952 and January 24, 1953.

44. Charleston Evening Post, June 14, 1952.


49. The State, October 13, 1974.


52. This is from an interview with Richard Shenot, Meteorologist in Charge, Charleston Office, National Weather Service published in the Charleston Evening Post for September 7, 1979.

53. This is from an interview with Richard Shenot published in the Charleston Evening Post for August 30, 1981.

55. The Hurricane and Its Impact, p. 300.

56. This is from an interview with Richard Shenot published in the News and Courier, August 24, 1981.


58. The Hurricane and Its Impact, p. 295.

APPENDIX E

How the Charleston News and Courier Reported Hurricanes: Three Case Studies—Hazel, Gracie, and David

Ted Rosengarten
No news story has more intense or recurring appeal than the story of a hurricane. Summer would not be summer in the Carolinas without reports of tropical storms threatening the defenseless islands of the Carribean. Inevitably, a storm strikes land. High winds and torrential rains flatten shanty towns, wash away roads and hillsides, and sever communications. As the storm sweeps over land it loses some of its force, but it picks up energy again when it moves back over open water.

The outlines of this story are predictable enough. The course of a hurricane, however, is not predictable, and the essence of the drama of the storm is surprise. Not the absolute surprise that comes with other kinds of catastrophe, such as earthquakes and fires which give little prior notice. Rather, it is the surprise we associate with risks and uncertainties, the surprise of winning or losing at gambling. The storm is moving, where will it go next? It is coming this way, but will it reach me? It may reach me, but will it be so powerful that I will have to flee from it? If I must leave, where do I go? If I stay, what can I do to protect my property and myself? These are questions that coastal Carolinians begin asking themselves the moment they learn of a storm brewing in the tropics.

Hurricanes provide the ultimate human interest stories. This might seem strange at first, since the storms themselves are so impersonal. Hurricanes ignore wealth and race, health and age, status and individuality. Everybody in their paths is liable to suffer the same fate. We are all vulnerable to their power, and it is this vulnerability that the lawyer on Broad Street shares with the fisherman in the Grenadines.

Yet, there is something we can do about a hurricane, before it hits. We can keep ourselves informed about what it is doing and where it is going. Then, if it becomes necessary, we can batten down our belongings and move ourselves
away from the hurricane's projected path. Our preparations may display common sense, courage, or foolheartiness. It is these two latter qualities that are invariably the most newsworthy. People are more apt to listen to or read the story of a man who tried to wait out a hurricane on the porch of his beachfront cottage—he may have been blown into the sea and not heard from since, or he may have made it through the storm without a scratch—than they are the tale of a family that prudently sought shelter inland.

Property damage, especially if it runs up into the millions of dollars, and deaths, make more exciting copy than a hurricane that spares its target. Occasionally, a newspaper may be too eager to report a catastrophe, and may be led into printing a gross exaggeration. For example, on October 14, 1954, the Charleston News and Courier ran the headline, "Entire Town Razed by Hurricane Hazel in Haitian Peninsula." In the story, we learn that Haiti's third largest city, Aux Cages, was "almost swept into the sea." Two hundred people died. The next day, October 15, a banner Headline declared, "Hurricane Hazel Heads for S. C. Coast." Buried at the end of an article about storm precautions on the Atlantic coast, was a paragraph correcting the lead story in the preceding newspaper. Reports of destruction in Haiti were untrue. Aux Cages escaped with minor damage. Some houses lost their roofs, but no one died.

The danger of over-reporting like this is that the audience hears the reporter "cry wolf" once too often. Imminent danger turns out to be a light risk, after all. Why should I believe a gloomy forecast and take precautions if the odds are the hurricane won't hit me?

There is also a danger of under-reporting, which is the danger of underestimating the storm. Every story that highlights predictions is under-reported. It gives a false impression about the accuracy, or better to say, the range of error, of hurricane forecasting. It also suggests some sort of technical ascendency over the forces of nature that we simply do not have.
The News and Courier's coverage of Hurricane Gracie's early career was full of predictions that did not come true. Gracie smashed into the Carolina coast on Tuesday, September 29, 1959. Two days earlier, the newspaper had assured readers that Gracie was "no longer a hurricane," and that her threat to the United States mainland "was fading fast." The next day, Monday, when Gracie had regained hurricane strength and was taking aim at the South Atlantic coast, The News and Courier gave only seven sentences to the storm, playfully calling her "one of the pokiest hurricanes in recent years."

This kind of flagrant under-reporting, and the more sensational over-reporting, can be called dangerous because they have a direct impact on public safety. News stories about the state of the economy, or about the arms race, or about disasters in other places, do not inspire us, as a rule, to take immediate action. Hurricane reporting does more than appeal to our intellectual curiosity. It should do more. It should alert us to the real dimensions of the threat; it should advise us what steps to take to secure our property and our lives; it should tell us where to find emergency assistance. But this is not all a newspaper can do. In its editorials, a newspaper can summarize the storm and the effectiveness of civil and private responses; and it can draw lessons from the hurricane which might influence public opinion on such issues as land use and beachfront development.

In the remarks that follow, I examine newspaper coverage of three different hurricanes. I look at how the Charleston News and Courier reported Hurricane Hazel, in 1954, Hurricane Gracie, in 1959, and Hurricane David, in 1979. I try to show how hurricane reporting has changed over the last quarter century, and how specific kinds of reporting are related both to developments in tracking and predicting storms, and to the needs of the press--such as the need to force a pattern of understanding on occurrences whose direction is ambiguous.

Though my tone is critical, I should say at the outset that as a reader I
find hurricane stories more gratifying than, for example, stories about inflation or nuclear arms negotiations. I realize this is comparing carrots to tomatoes to potatoes. Nevertheless, I would not hesitate to say that hurricane coverage accomplishes more—in its reach for background and its manysidedness, in its respect for the scientific method and for the ability of the reader to understand scientific terms, in its willingness to admit the indecisiveness of evidence.

Hurricane Hazel

Hurricane Hazel killed 147 people in the United States and Canada. The storm hit land near the line between South and North Carolina, on October 15, and blew itself out north of Toronto, Ontario, after October 18. Hazel was an "extreme" hurricane. Its winds topped 115 miles per hour along the beaches, and the storm surge rose over thirteen feet. The storm damaged or destroyed most of the ocean front houses between Pawley's Island, South Carolina, and Wilmington, North Carolina.

Readers of the News and Courier first learned of Hazel nine days before she visited the Carolinas. The lead story that day, October 6, announced that Marilyn Monroe had filed for divorce from Joe Dimaggio. Beneath it, a small headline proclaimed, "Hurricane Hazel Spotted off Grenada." Hazel was the season's eighth hurricane, and she was giving no indication what direction she might take. The storm was located and first described by naval airmen in a reconnaissance aircraft—there were no satellites or unmanned instrument stations to relay storm warnings. Reporting depended on human observation. In Miami, the chief weather forecaster prudently declared that Hazel "has enough zip in it to require a close watch."

On Thursday, October 7, in a small front page article, the Miami forecaster cautioned that "thirty-six hours of watchful waiting will be required...before
we can tell much about where the hurricane is going..." On October 8, a
map appeared on the front page showing Hazel camped near Aruba, off the coast of
Venezuela, and moving westward "over a vast stretch of open waters of the Carri-
bean Sea." Noting that the storm was picking up force, a San Juan observer
warned, "This is a very dangerous hurricane." Meanwhile, South Carolina was
getting a taste of winter, as temperatures fell to 45 degrees in the midlands.

Hazel continued to increase in size and violence over the next two days.
On October 9, it was reported to be 1,000 miles southeast of Miami, 350 miles
south of Port Au Prince, Haiti. Its winds were reaching 125 miles per hour over
a 100 mile radius around the center. A Navy hurricane hunter plane continued
scouting the storm, but could not penetrate it. This gave readers some idea of
the human scale of the storm--too violent for men in an airplane to approach.

The storm was drifting westward very slowly. "Hurricanes often come to a
virtual halt," a story informed us, "when they are ready to change from one course
to another." The Miami Weather Bureau's chief forecaster predicted that Hazel
would quit her due west course and begin to move northwesterly.

The next day, the 10th, a small but informative front page story laid out
Hazel's "several choices." She could beat herself to death over open water with-
out ever striking land. She could continue westward toward Central America. Or
she could strike out in a new path and head toward Jamaica, Cuba, or the Yucatan.
The article expressed a forecaster's humility in the face of unstable conditions--
an attitude that would change by the time of the next major hurricane, and change
back again.

The October 10 edition reported the death of Grady Norton, chief forecaster
at Miami, who died while tracking Hazel. This article outlined the hurricane
theory of the man who "gave the world its first twenty-four hour hurricane fore-
casts."

In October 11, we learned that Hazel was nearing Jamaica. In South Carolina,
meanwhile, October's "bright blue weather is holding true." On October 12, Tuesday, a front page headline reported with excess alliteration, "Hurricane Hazel Hurries to Haiti." The storm's projected course "would take it well to the east" of Florida. The major weather story of the day concerned rains in Chicago, which was receiving its greatest deluge in sixty-nine years.

On the 13th, we read that Hazel "left several people dead and hundreds homeless" in Haiti, and was heading for the Bahamas. The next day the story grew. The city of Aux Cages, we read, had almost been obliterated. The storm was now 500 miles southeast of Miami, and curving toward the mainland. Next to this story was another report on the midwest rains. 40,000 fled floods in Indiana. In Charleston, however, the mercury hit a balmy 83 degrees, under clear skies.

On Friday the 15th, the day the storm hit the Carolinas, a banner headline proclaimed, rather gingerly, "Hurricane Hazel Heads for S. C. Coast, Storm Center to Hit South of Wilmington." The story said the hurricane was "slightly tamed," with winds down from 130 miles per hour to 100. (This reduced wind speed may herald less than catastrophic consequences, but a 100 mile per hour wind should never be called tame.)

Now, too, the hurricane was "suddenly erratic." Yet, for days the newspaper had been telling us how unpredictable Hazel had been; for at least a week she had been drifting and shifting course, to the dismay of forecasters. "Always erratic" would be more appropriate than "suddenly erratic."

Now that the danger of the storm had been recognized, precautions were being taken. All aircraft at Charleston Air Force Base had been evacuated. The Navy's Mine Force Ships had been moved to hurricane berths at the Navy Shipyard, up the Cooper River. Small private craft were urged to move up river, too. No mention was made of civil defense measures, or of plans to evacuate low-lying areas, or of the existence of emergency shelters. Readers were told only to check their supplies of candles, canned heat, oil lamps, and easily prepared
Dangerous as the storm was, it was not without benefits. Farmers, in particular, stood to benefit. Early rains, "coming without the full force of hurricane winds, were received with joy by farmers whose crops have been suffering from lack of moisture." This, and one other piece of information, detracted from the feeling of alarm. And that was the happy report that previous accounts of damage and loss of life in Haiti were false.

When Hazel hit, she hit hard. A storm surge of over ten feet driven by winds of 110 miles per hour smashed the resort coast above Georgetown, destroying or damaging most of the ocean front homes from Pawley's Island well into North Carolina. On Saturday, October 16, the News and Courier reported the losses. Electric, telephone, telegraph, water, and sewer systems were knocked out; fishing piers were washed away; falling trees pushed in the roofs and walls of houses and crushed automobiles. Property damage was estimated at ten million dollars. At Myrtle Beach there was little damage to the beach itself. But at the height of the blow, waves raced across 200 feet of sand and "chewed huge bites" out of the higher ground bordering Ocean Boulevard, "undercutting foundations and destroying buildings." On Pawley's Island a new housing development was wiped out "except for two houses on stilts." All the sand dunes "disappeared," and the storm surge cut "two new inlets into the creek" separating the island from the mainland.

A second story breathed a sigh of relief for Charleston. "City Escapes Hazel: Aids Stricken Area." A National Guard Medical unit and the city Red Cross offered assistance to Georgetown. A third story announced that the Small Business Administration would make disaster loans at 3 percent interest to owners of businesses and houses damaged or destroyed by the hurricane.

A whole page of photographs made the strongest statement about the tempest. Anyone who studied the pictures of crumbled houses, flooded streets, pulverized
automobiles, and burned out buildings (from fires started by damaged fuel tanks) was left with a feeling of awe for the power of a hurricane.

Coverage on the 17th followed Hazel's progress through North Carolina where at least eighteen people died and property damage exceeded that of South Carolina, then on north, up into Canada, where Hazel devastated Ontario. But for farmers in South Carolina who needed rain, Hazel was a boon. Hay crops and winter pastures, beans and cucumbers about to be harvested, the spring cabbage crop already in seed beds—all would benefit from the more than five inches of rain that fell on the lowcountry. But the rains were not enough to benefit "the Santee-Cooper's main water sources, the Broad and Catawba River Basins in western North Carolina."

Another article enumerated the losses, town by town, in the South Carolina beach resort area. Ocean Drive Beach (at Myrtle Beach): of 380 cottages, 330 damaged, 200 of them destroyed. Crescent Beach: of 105 cottages on the oceanfront, 103 destroyed. Windy Hill Beach: of 89 oceanfront beaches, 87 destroyed.

By and large, the tone of this day's coverage was upbeat. And why not, since Charleston was spared the worst of the storm? But the feeling of relief and euphoria can get in the way of perceiving the lessons of the storm. Surely, we should consider after Hazel that beachfront development is extremely risky and may also be ecologically insane. Yet, an editorial called "Storm on the Carolina Strand" urged people to rebuild what was blown down, to fill in what was washed away. "Over the years, hurricanes seldom strike the same place," the editorial informed us. Over how many years? Over enough years hurricanes will very likely strike the same place. "The attractions of beach life outweigh the occasional blows from the wind and sea." Do they? Has Killer Hazel already slipped into the category of an "occasional blow"?

In case of storm, the editorial went on, the Carolina strand is protected by "the flat countryside, excellent highways, and ease of communications which make it possible to get out." Has the editorial writer forgotten that in time
of extreme storm surge, many of those excellent highways and much of that flat
countryside will be under water? We see in this editorial what happens when a
disagreeable message clashes with an entrenched attitude—the old outlook stays
intact, and the message is distorted to fit it.

Coverage of Hurricane Hazel continued through October 20, by which time the
storm had blown itself out in northern Canada. On the 20th, the News and Courier
reported the arrival at Myrtle Beach of combat engineer troops and equipment
from Fort Bragg, North Carolina. Soldiers were to help clear up the mess along
sixty miles of South Carolina coast. Immediately they ran into difficulties, on
the issue of handling private property. In order to move buildings that were
blocking roads, troops first had to obtain signed releases from the owners, so
that they would not be charged with injuring what the hurricane had already played
havoc with.

On the very day, the 19th, that South Carolina received assurances of federal
aid for hurricane relief, Governor Byrnes requested federal drought disaster
relief to ease a water shortage in Anderson.

Hurricane Gracie

Hurricane Gracie had been news for six days, vying for space on the front
page of the News and Courier with accounts of Soviet Premier Kurschev's visit to
the United States, when she struck the lower Carolina coast. The eye of the
storm passed over St. Helena Island, ten miles east of Beaufort, on Tuesday
morning, the 29th of September, 1959. Top winds of 125 miles per hour were
reported on the waterfront. Gracie moved northwesterly and greeted Walterboro
with 100 mile-per-hour winds; then, in the same course, to Bamberg, where peak
winds hit 75 miles per hour; and then, moving more northerly, to Columbia, where
winds registered as much as 60 miles per hour. Charleston experienced a tide
six feet above normal. Fortunately, the storm hit at low tide; had it hit at
high tide the results would have been disastrous.
Gracie formed off the eastern tip of Cuba, on September 22. On the 23rd, when we first read about her, she was 400 miles east of Miami, with winds of 75 miles per hour around the center, and gale force winds for miles northwest of the center, and 150 miles southwest.

On Thursday, the 24th, up from the bottom of the page, center-left, Gracie was reported to be still east of Florida and crawling northwest, but picking up speed and losing power. Unlike coverage of Hurricane Hazel five years before, which emphasized that Hurricane's erratic nature and warned readers to follow it closely, early stories about Gracie tended to keep her remote from readers' concern, and relegate it to a kind of tropical curiosity object.

Then, on Friday the 25th, Gracie was described as "clinging" to hurricane status, as backing and filling "over an erratic course" near the Bahamas, where she "nearly lost her hurricane rating." Her expected course, we were told, would keep her moving parallel to the Florida coast and at a considerable distance off shore. The assurance of this projection contradicted the sense of erratic behavior we got from the previous paragraph of the story. No mention was made about how unreliable such projections commonly are.

Stories on the 26th, 27th, and 28th continued to play down the threat of the storm. On the 26th, it was reported that a hurricane plane flew into the storm—remember that a navy plane could not fly into Hazel—and found winds of "barely hurricane force, whipping around the eye." On Sunday, the 27th, the lead article on the front page concerned a tornado in Missouri. Beneath that we read, "Gracie Goes Out to Sea." Gracie is "no longer a hurricane," declared the report, "and her threat to the U.S. Mainland" is "fading fast." Now about 500 miles east of Cape Canaveral and moving northeast at 6 miles per hour, Gracie "appears destined to blow herself out in the Atlantic." Even if Gracie were to regain hurricane intensity, she was expected to stay away from the mainland.

These optimistic forecasts gave form to what are really formless data and
events. Predictions were clothed in the language of "destiny," as if the course and intensity of the storm were predetermined, and the job of forecasters was to discover the hidden pattern. In these circumstances, hurricane descriptions resemble wishful thinking more than reality.

On the 28th, another weather phenomenon stole the headlines. "Typhoon Vera Lashes Japan, Toll Tops 1000." Vera's maximum winds reached an astounding 160 miles per hour, higher even than a catastrophic hurricane. Gracie, at this moment, was reported to be moving west by northwest off the coast near the Florida-Georgia line. The weather report for Charleston and vicinity called for "gale force winds and rough seas some distance offshore."

In all, Gracie received only seven sentences, and nothing in them calculated to raise an alarm.

Not until the day she struck was Gracie's threat to Charleston acknowledged. On Thursday, the 29th, a banner headline proclaimed, "Gracie Takes Aim at Coast." Now she is "a howling hurricane," and a "very dangerous hurricane." It is important to remember that Gracie was always dangerous, and to view her in any other light is to be ruled by preconceptions that increase the hazards by lulling us to inaction.

Now the forecast was for violent waves and flooding tides, and for winds of up to 125 miles per hour. Again, as in Hurricane Hazel, the United States military forces were taking the storm seriously. Navy ships were taking refuge at berths in the Cooper River, and military aircraft had been evacuated.

This time, the News and Courier reported the readiness of emergency shelters. In the second section of the newspaper, devoted to local news, several articles described in greater detail preparations for the hurricane. Schools will close and the National Guard has been put on alert. There was a list of shelters served by the Red Cross in Charleston County. The shelters are designated by race: this one for whites, that one for blacks. The mention of race in a guide
for hurricane preparations shows the vigor with which old social mores hold on.

Another article on the 29th, entitled "Goat Man Blase About Storm," tells of an old man and woman living on Big Goat Island who plan to "stay it out" in defiance of any notice to evacuate. This is a familiar kind of story—think of the old man who lived on Mt. St. Helens in Washington State and who, during the recent volcanic activity, became a sort of national hero for his pluck and his follishness in refusing to leave when the volcano threatened to blow. Indeed, a late eruption buried him and his house in tons of rock and ash. As to the fate of our goat-man, however, we are left in the dark, for the story was not followed up.

Gracie smashed into the coast between Savannah and Charleston as predicted. Winds of 125 miles per hour blasted Edisto and Folly Islands. Nearly four inches of rain fell in a thirty-hour period. On Wednesday, the 30th, the day after the storm, the News and Courier ran the most extensive hurricane reporting it had ever carried in a single issue. In the lead story, the observer credited a low casualty toll to the fact that the storm hit at low tide. Still, it was "the most dangerous storm in memory" to the South Carolina Electric and Gas Company, which suffered a half-million dollars in damage to power company equipment. Gracie roused about 3,000 refugees to Charleston County emergency shelters. Seventy-five percent of the county lost electric power, and consequently, people must have been cut off from their water supplies as well. A power failure at the city waterworks interrupted the flow of tap water in the city.

A second article on the front page of Wednesday's edition summarized the "trouble-making history" of Hurricane Gracie. The article described Gracie's "pounding race" for the South Carolina coast, and paid homage to her unpredictability—a far cry from the attitude of observers only three days before.

A photograph on the front page showed the west stands of Johnson Hagood
Stadium crumbling from the wind and rain.

Finally on the front page was a list of fifteen more stories about Gracie to be found on the inside pages—including articles about the effect of the storm on the shape of the beaches, the effects on crops, on telephone service, on milk deliveries. And stories about insurance claims, rescue operations, and the roles of ham operators and the Highway Patrol.

On Folly Beach, where 200 people "rode out" the hurricane, all front row houses were damaged. Roads on the east end of the island were washed away. Crops that had benefited from the rains of Hurricane Hazel, in 1954, were hurt by the winds and rains of Gracie. Hay, Pecan, and snapbean crops suffered.

Insurance adjustors arriving in Charleston expected claims in the county to exceed two million dollars.

The County Health Director, Dr. Leon Banov, warned readers of health hazards related to the hurricane. For example, flood water was contaminating drinking water wherever people used private wells, which took in most of the people in the county. Dr. Banov instructed readers on sterilizing their water. He also cautioned about using spoiled foods from refrigerators knocked out by the power failure.

Gracie bypassed Georgetown and the Strand, though a tornado spawned by her damaged homes in Garden City.

Thursday's coverage (October 1) was also comprehensive. Articles in the main section dealt mainly with property losses and kinds of federal aid that might be made available for rebuilding. Four federal agencies would be offering funds to South Carolina residents and businessmen—the Small Business Administration, the Department of Agriculture's Agriculture Credit Service, the Rural Electrification Administration, and the Farmers Home Administration. For South Carolina to be eligible for this federal relief, her municipal, county, and state governments must spend one million dollars of their own
on relief and repairs.

Insurance claims, it was now estimated, would top 4.2 million dollars.

Other stories included an account of hurricane damage on Edisto Island; a wary look at Hurricane Hannah, churning up the Atlantic some 850 miles east of Cape Canaveral; and an excellent history of hurricane tracking and the state of meteorological knowledge, written by John Cummings of the Charleston Weather Bureau. Cummings recalled the Beaufort storm of 1893, in which at least one thousand and probably closer to two thousand people died, and the Galveston, Texas, hurricane that killed six thousand people. In both cases, the storm surge struck without warning. "This should not happen today," said Cummings, "with our search planes, radar, rapid and accurate communications. "But," Cummings added, "you must run many times when the big bad wolf does not come." Cummings made no apologies for having to warn people of a danger that might not come to pass. "We do not know enough about hurricanes yet to do differently, "but we are learning from every storm." "Maybe some day we will be good enough"—to predict perfectly the behavior of a hurricane—"but not today, and not tomorrow."

And not yet, either, as Hurricane David has demonstrated.

October 1st's edition includes a special twenty-four page supplement called "Wind, Waves and Fire." This was a biography of hurricane Gracie in photographs, a vivid statement of a hurricane's power and of human vulnerability.

Lastly, on October 2, the newspaper carried the results of a Red Cross Aerial Survey of the low country. Between Beaufort and Charleston, inland as far as Walterboro, 48 homes were destroyed, 349 homes suffered major damage, and 4,115 homes suffered minor damage.

Hurricane David

Hurricane David may be more remembered for the mosquitoes that bred in its
wake than for its storm surge or winds. Whereas Gracie was advertised as a small threat but became a destroyer, David was early on reported to be a "killer hurricane," but when he struck the lowcountry he was more like a lamb than a lion. Some people called him "a false alarm." To the News and Courier, David was an "occasion for a drill," a time when people could learn about hurricanes and emergency preparedness without experiencing the brunt of the storm.

David made the front page of the News and Courier for the first time on August 29, 1979. "One of the most dangerous storms ever to threaten the Caribbean," he was called. Before losing some of his strength, he was compared to the hurricanes of 1831, in the Barbadoes, and 1891, in Martinique.

The next day it was reported that David struck and caused heavy damage on the islands of Dominica, Martinique, and St. Lucia. Hurricane winds were radiating 50 miles from the center of the storm, and gale winds reached out 150 miles. The storm was moving slowly northwest.

On Friday, the 31st, we read more of David's havoc in the Caribbean. All buildings in the Dominican capital of Portau were reported flattened, and a number of people dead. Still heading northwest, David was predicted to miss Puerto Rico.

Then, a change occurred. On September 1, we read that Hurricane David "turned abruptly from its open-sea course Friday and slammed ashore in the Dominican Republic with winds up to 150 miles per hour."

This change in character and direction meets the newspaper's need for some development to keep a situation newsworthy. The change means, really, that the storm could pose a threat to us, though it is not yet near us. But it is showing its unpredictable nature and its capacity to regain hurricane strength over water, after it seems to play itself out on land.

In Santo Domingo, capital of the Dominican Republic, wind uprooted trees, toppled utility poles and sailed roofs off buildings "like playing cards."
David did hit Puerto Rico, in spite of predictions to the contrary, killing at least twelve people. The Governor of Puerto Rico asked that his island be declared a disaster area, because of heavy losses in coffee and sugar crops, and the destruction of thousands of houses.

On the island of Dominica, the death toll had risen to twenty-six. David's next stop might be eastern Cuba. As yet there was "no way of knowing if it might turn north toward the United States."

The storm did turn, as we know, and on September 2 it was reported that a storm watch had been posted in Florida. David had lost some energy over the mountains of eastern Cuba, but was expected to restore itself over open water. Predictions were guarded and equivocal. It might go there, or it might come here. "It could hit Florida and move up the coast, or it could move west to the Gulf of Mexico."

There was no more talk about tracking hurricanes with Navy hurricane hunter planes. Tracking in 1979 depended on photographic reports from satellites and on other data from unmanned equipment. Gone is the David and Goliath drama of mortal men duelling directly with a superior natural force. The drama is more technical. It pits the erratic nature of the hurricane against the problem-solving ability of men equipped with science.

On page 2 of Sunday's newspaper there was a map tracking the paths of Hurricane David and of a newcomer, Frederick, whose status had just been upgraded to a hurricane. A hurricane watch has been issued from Key West through Palm Beach--for Hurricane David. "Watch...does not imply immediate action," explained Dr. Neil Frank, director of the National Hurricane Center. It means that people should be ready.

Reports said that in their readiness people were stocking up on gasoline, food and liquor. Some people were planning "hurricane parties:" they must have been among the 80 percent of South Florida residents who had never experi-
enced an extreme hurricane. Not since Betsy struck in 1965 had Florida's Atlantic coast faced such a threat. On September 3, it was reported that hurricane warnings had been given from the Central Keys to Cape Canaveral, a distance of 230 miles, and a hurricane watch for the coast between Cape Canaveral and Jacksonville. A warning is more serious than a watch. It indicates a greater likelihood that the storm will strike. But in regard to David, said a Weather Bureau forecaster, "we don't have a firm feel yet of where that will be."

One article described preliminary preparations in Charleston by the Navy and the Red Cross. Another article described a hurricane as "a safety valve of nature." This piece provided unusual depth of background. A hurricane "is a necessary part of atmospheric conditions" that disperses heat built up in the tropics. Hurricanes have a purpose that we cannot appreciate while we are confronting them.

The next day's banner headline reported, "Area Bracing for David." Sure enough, David was going to hit near Charleston. Some panic buying was reported, but nothing like what went on in Florida. The Charleston County Disaster Preparedness Agency and the Red Cross are ready to act, but so far have not issued warnings to evacuate.

A second headline declared, "Hurricane Smashes Florida Coast." The story led with the news that 800 people are known dead in the hurricane in the Dominican Republic. In Florida, David has demolished mobile home trailers and blown off many house roofs. The hurricane is moving north at 8 to 10 miles per hour, packing winds of 90 miles per hour. Hurricane warnings are posted from Savannah through Charleston, and a hurricane watch from Charleston through Cape Hatteras.

David spared Charleston his strongest blow. The hurricane "abruptly changed its collision course with Charleston and roared into Savannah." The News and Courier reported on the 5th that early in the same day the storm was
centered just east of Columbia, moving northeasterly. When David struck land he was a minimal hurricane, with winds just over 74 miles per hour, and a storm surge of four to five feet. Coming near high tide, David brought flooding to many low-lying areas, and caused severe beach erosion in several places.

Here and gone, without delivering a knockout punch. It was indeed an "occasion for a drill," as the News and Courier called it. Local shelters were full, indicating that communication was active between forecasters, emergency preparation spokesmen, and residents of the lowcountry. About 5 percent of the people living on the Isle of Palms, Sullivans Island, and Folly Beach sat out the storm at home.

An article on page 2 of the second section reviewed the effectiveness of storm preparations. "Despite a few kinks, the evacuation effort prompted by Hurricane David generally ran smoothly, as an estimated 20,000 people sought temporary shelter. . . ." That is a lot of people, and it is not surprising that there were some "kinks." One of those was a problem in communication, or perhaps it was a problem of determining just who was in charge. William Wolfe, director of Charleston County's Disaster Preparedness Agency, said his agency "had some difficulty in locating shelters and providing the food that's in the shelters."

Another feature gave a hurricane chronology and noted the use of satellite photographs in tracking the storm. No more do we rely on the navy planes and the daring men who tried to penetrate the storm and relay their first hand impressions.

Also in the second section there were photographs showing Charleston area residents lashing down windows and removing boats from the water. We read that New England, which badly needed rain, was getting ready to welcome this storm.

David made news for three more days. On Thursday, the 6th, there were
contradictory reports of hurricane losses. A front page headline declared, "Grand Strand Losses Heavy." But the story contains a different message. Property damage is minimal, said the state Emergency Preparedness Division. Damage to crops is light, said the State Agriculture Department. Another headline summed up the situation: "Disaster Averted Statewide."

We might ask, how was disaster averted? By our efforts and our strategies? Or by a stroke of luck and the grace of God that the hurricane turned away and diminished at the last moment? There is no doubt that preparing for hurricanes saves lives--directly by publicizing and making available means to safety, and indirectly by keeping us alerted to the storm's potential and direction, so that we can make informed decisions about what we each must do. Yet, Emergency Preparedness spokesmen are the first to say that loss of life and property in hurricanes has been small because we have not truly been tested. It is not a question of "if" a certain oceanfront community--one that may not have been there for the last hurricane--will be hit, it is a question of "when."

Coverage of David ended on Friday, September 7. "Folly Seeks Disaster Status," read the headline. The Mayor of Folly Beach asked the Army Corps of Engineers to speed the job of refurbishing the beaches. No one mentioned here, or anywhere else in the newspaper, that beaches rebuild themselves, though not necessarily in the same places. What the mayor wants, and what everyone who builds on the beachfront wants, is for men to immobilize beaches and islands that nature makes migratory.

In a sad note to an otherwise successful evacuation effort, county school officials complained that several schools were vandalized by people who sought shelter in them. The Red Cross agrees to pay for repairs. This incident raises the tricky question of liability for state or county property utilized for shelters. Disaster preparedness officials must hope that people will not reject going to a shelter because of the risk of unrest or vandalism at the
Overall, the News and Courier's reporting of Hurricane David was thorough and professional. Readers might have benefited, however, from knowing the county's evacuation plans in advance of the storm. Perhaps the greatest single service the newspaper could add to its coverage would be to run an annual feature on hurricanes, a supplement at the beginning of the hurricane season meant to be clipped out and saved. This public service would also increase the intelligibility of the newspaper's hurricane stories when they begin to fly.

In its editorial comment, or lack of comment, the News and Courier seems no longer to see unbridled development as the only logical course for the future of the oceanfront and barrier islands. But it has not discussed alternatives to conventional ideas, either. It has not come as far as saying that there are other ways for man to show his indomitability than to build against the resistance of powerful forces of nature.

Hurricane David was taken seriously by Charleston observers from early reports on. Hurricane Gracie had to hit us on the head before we would believe her. Hurricane Hazel hesitated, gathering up her strength, before she struck the Carolinas. Each hurricane was reported in a similar sequence that, in newspaper lingo, is called a "phase structure." That is, each storm passed through phases that correspond in some measure to its actual development and in some measure to the need of the daily newspaper to supercede yesterday's news.

From coverage of the three storms, we could not conclude that our power to predict the course and intensity of hurricanes has increased much in the last quarter century. What has definitely advanced is our means of tracking, of telling just where storms are at particular moments. Having greater knowledge does not enable us to control hurricanes, but it does make us better able to
control their impact on property and human life. If a killer hurricane were to threaten Charleston today, it would be met with great confidence. Not the confidence that comes from experience, because the majority of lowcountry residents have never faced a killer storm. Rather, it is the confidence of inexperience, combined with faith in science and civil defense to carry us through. It cannot be stressed enough that this confidence and faith have yet to be truly tested.
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