



History of Regional Storms and Hurricanes



STORMS: A LONG PERSPECTIVE FROM HISTORY

K. Mountford

Cove Corporation 10200 Breeden Rd., Lusby, MD 20657

ABSTRACT

Historical accounts from early seafarers and regional inhabitants of the Mid-Atlantic suggest that hurricanes and storms posed grievous conditions for the first settlers in the region. Seafarers were at the mercy of winds and waves, often surviving only through diligent and continuous bailing and luck, ultimately to ground near hospitable islands, such as Bermuda or barrier islands such as Assateague, Virginia. Recounts of colonial storm surges describe mass flooding and extensive sediment deposition. More recent Chesapeake reports rely on a vanishing oral history and accompanying local landmarks of flood heights, indicating the importance in recording regional history as baseline data for contrasting the most recent effects of large storms with those of the last century. Even until the 1930's, these storms came as an unpredicted surprise. With the ongoing practice of constructing buildings in vulnerable shoreline areas, future hurricanes and other large storms will likely continue to periodically wreak havoc on personal property and communities.

INTRODUCTION

Many modern citizens of the Mid-Atlantic region suffered major personal property loss during Hurricane Isabel for the first time in their lives. Isabel, however, was certainly not the first major storm to affect the Chesapeake area. This paper compares Isabel with other storms in Bay history, but since it is based on a talk than rather than a documented manuscript, it differs from other contributions in this proceedings volume.

The paper highlights several points based on Isabel's passage. First, early Chesapeake visitors registered shock to the major weather events they encountered, similar to the reactions of today's citizens to Isabel. Their valor and strength under adversity are models to compare with our pampered existence today. Second, the escalation of storm impacts measured in the colonial literature seems to have increased the severity of flooding as settlement density and the value of coastal property increased, the number of people recording incidents multiplied, and damage to the naturally resilient ecosystem mounted. Third, within the memory of living persons, it is possible to reach back before real understanding of storm tracks and beyond the social warning systems of radio and television relied upon today. The perspectives of individuals coping with the damage of hurricanes coming as a complete surprise are useful in interpreting modern outcries against meteorological uncertainty.

Although arguments continue about the credibility and reliability of modern forecasting, people of the 17th century had not a clue about such things. John Smith, the English explorer who is generally credited with opening the Chesapeake to European eyes, did not have to deal with this kind of second-guessing. He told his life history and embellished his record of personal valor as the occasion warranted; *everybody* remembers him. But, he had no idea in 1607 what a hurricane actually was nor had he, or any of the Virginia colonists, any sense of where major storms originated or how they traversed the region.

None of the early explorers possessed the knowledge to read the signatures of tropical storm effects in the Chesapeake forests around them. With

modern eyes, the satellite image records for the past 20 years show the signature claw marks within the region's forest that denote the passage of tornados. Although highly localized, tornadoes are catastrophic events that radically alter the immediate ecosystem for decades and perhaps centuries. Unlike the early colonial era, when such touchdowns land atop residential and commercial properties today, the strikes become marks of human and personal property devastation.

THE WRITTEN RECORD

Sea Venture and The Tempest

It is fortunate that several written records survive from the early years of European contact with the East Coast. They come to us mostly as harrowing personal accounts. William Strachey wrote of one storm late in July of 1609—a storm that was apparently recurving away from this coast and centered east of Bermuda by the time Strachey encountered it.

Because they are largely encircled by reefs impassable even to small vessels in heavy weather, the Bermudas were known to mariners as the “Devil’s Isles,” an area much feared as a place of disaster rather than salvation. The *Sea Venture*, the ship on which Strachey sailed, cruised into the “dangerous quarter” of the storm at about 33 degrees north latitude. The storm pounded the vessel for three days and four nights. To preserve the ship, they ran before the gale, which (without knowledge of the storm’s structure) kept them trapped in the strongest winds swirling about the eye and spiraling towards the center. The tale makes for fearful reading as Strachey attempts to describe the tumult [1]:

...if at any time we bore but (a scrap of sail). . .to guide her before the sea, six and sometimes eight men were not enough to hold the whipstaff in the steerage, or the tiller below in the gunner room: by which may be imagined the strength of the storm, in which the sea swelled above the clouds and gave battle unto Heaven.”

The violent wrenching literally worked the caulking out of *Sea Venture*'s seams; the crew was

sent creeping below decks with candles to look for leaks and staunch them with anything at hand. In the gunner's room, one huge leak was stuffed with “I know not how many pieces of beef,” but somewhere deep in the ship, a massive leak kept the waters rising.

The pumps began bringing up pieces of biscuit, from the 10,000 pounds of stores the ship was carrying to starving Jamestown. The ship's carpenter “tore apart the whole breadroom but found (the leak) not.” Along with the crew of 30, 120 additional people (most of whom had never been to sea) were desperately bailing and trying to stay alive. The water was five feet deep above the ship's ballast. A huge rogue wave—an unpredictable and abnormally large surface wave—completely buried the ship from her forecandle over the entire waist or central decks. The crew thought the ship was so long submerged that she would simply sink, but slowly *Sea Venture* labored up again, still floating.

When the superstitious seamen saw electrical discharges at the rigging, “St. Elmo's fire,” they thought it forebode inevitable death. Every hour, the passengers bucketed 7200 to 8000 gallons of water overboard and they had three deep pumps in continual operation pumping 4000 strokes at each 4-hour watch. Strachey estimates this freed the ship of a hundred tons of water six times a day! And *still* she was sinking. Only one person flagging of resolve, Strachey said, and the ship would instantly sink. The water in the ship's hull was 10 feet deep.

By Friday, the fourth morning, they were close to exhaustion. They agreed by that night, they would simply shut up the hatches and:

“commending our sinful souls to God, committed the ship to the mercy of the gale. Surely that night we must have done it, and that night had we then perished. But see the goodness and sweet introduction of better hope by our merciful God given unto us: Sir George Somers, when no man dreamed of such happiness, had discovered and cried land.”

Chance, along with the circling path of hurricane winds, brought them to the east side of

Bermuda. They ran *Sea Venture* between two rocks, where she jammed and remarkably failed to break up. The lot of them—men, women, and children “to the number of about 150”—dragged ashore with tools and made numerous trips back to salvage parts of the ship.

They found the Bermudas not at all the Devil’s Isles, but hospitable and mild of climate. They provisioned on hogs presumably turned loose by Spanish rovers years before to forage and breed there for future mariners. But they also harvested a strange and foolishly tame burrowing bird, the cahow, from a few of the isolated Bermuda islets where the hogs, those “invasive, non-native introduced predators” could not reach.

The group encamped there well into the following year, eventually building two small ships from what they had salvaged from *Sea Venture*. Provisioning for their subsequent voyage to Jamestown, they salted down a bunch of cahows and set off, expecting to join a thriving colony in the Chesapeake. Instead they found the settlers near death from starvation, disease, and harassment by the Native Americans at Jamestown. Ever resourceful, the new arrivals shared what remained of their travel provisions, including the salted birds, with their distressed brethren. In the last few years, archaeologist Bill Kelso and colleagues excavated the old 1600’s fort and found the bones of some of these birds in a garbage pit—provisions shared with the starving Jamestown colonists by their miraculously preserved and resourceful countrymen.

The poor, oceanic nesting cahow birds (*Pterodroma cahow* or Bermuda petrel), were simply hunted and smashed by future generations of Bermudans until no more existed. Then, in 1951, David Wingate discovered 18 nesting pairs on a rocky islet off Bermuda and subsequently devoted his life to nursing the species back to a modestly successful colony (about 180 individuals in 2003).

As a postscript, Smokey Wingrove, a scuba diver and amateur historian, stared out at the east coast rocks in Bermuda for many years and finally determined which ones had caught the hull of *Sea Venture* that July day centuries before. He found

the wreck and participated in the archaeology of the ship, helping to uncover the full effects of a hurricane almost 400 years ago. Bill Dennison (co-host of this conference) was at the Bermuda Biological Station some years ago. He SCUBA-dove to the wreck of *Sea Venture* and, from the underwater perspective, confirmed how extraordinary it was that the ship became cradled between these two supporting rocks [2].

Strachey ultimately stayed in turbulent and politically unstable Virginia for a year or so and was appointed secretary of the colony. In this capacity, he left us with one of the best period records of colonial business, the environment, and Native American customs. At the excavation of the Jamestown Fort in 1996, a brass finger-ring was found in carefully sifted soil from the street. The find was a signet ring used to press into the wax dripped to seal official correspondence. The logo on the ring—a displayed eagle with a cross on its breast—turned out to be the family emblem of William Strachey.

The storm and survival of the ship’s crew and passengers, described by William Strachey, was published in 1610 in London from a manuscript that he sent back by sea as a “true reportory” of the voyage [1]. The story created a sensation in England and was key in the creation of a play *The Tempest* by one William Shakespeare. Shakespeare refers to the dreaded “Barmoothos” isles and almost quotes Strachey’s words in describing *his* tempest.

Norwood’s Storm

Col. Henry Norwood wrote about a huge storm that also apparently missed the East Coast in late autumn 1649 [3]. The storm could have been a hurricane or a late extratropical cyclone. Norwood, his servants, and a party of colonists about *The Virginia Merchant* were also pounded at sea for days on end with every soul aboard bailing with buckets day and night with no food. The crew abandoned hope and breached the rum casks, intent on drinking themselves into a stupor to dull the prospects of drowning.

They stopped a leak discovered far below by the bos’n as he listened for the rush of water with a

rod pressed to his ear. In all that turmoil, the ship barely made it with hardly a mast or sail left. The captain had aimed for capes Charles and Henry to enter the Chesapeake, but ended up against the Delmarva barrier islands close to Assateague. Norwood and several passengers, ashore for fresh water, were literally abandoned by the crippled and still sinking ship as it fled south to Jamestown.

Several of them died—and some were eaten by their fellows—before Indians rescued them. Their rescuers led them on an arduous 50-mile trek by foot through the wetlands in January, finally arriving at an English plantation. Norwood, in addition to providing a rousing tale of survival at sea and an epic journey in the depth of winter, also gives us our first written record of the trackless cypress swamps and wet woodlands of the Maryland and Virginia Eastern Shore. He was glowing in his praise of the humanity, generosity, and heartfelt sympathy shown them by these Native American tribes.

The Tobacco Coast

In his epic book *Tobacco Coast* [4], the premier maritime historian for the Chesapeake, Arthur Pierce Middleton, wrote about the river basins being settled and put under tobacco cultivation as well as the impact of major storms and freshets that tested the wisdom of how far down on the floodplains colonists dared develop. It is not known, of course, how many of the storms recorded by early colonists were really hurricanes, though the dates give a good idea. Whether the storms turned into extratropical cyclones or maintained their structure and wind velocities is unanswerable.

Hurricano is thought to be an Arawak (that is, Caribbean Native American) word picked up by the Spanish. Middleton reports the worst storm of the period, which they called the great “Hurricane,” occurred in August 1667 with a 24-hour dwell time over the Chesapeake. The wind started northeast, backing north, and then to the southeast. One estimate was that 10,000 houses in the tidewater region were destroyed along with two-thirds to four-fifths of the crops by flooding and some hail.

The Damage Grows

“A most dreadful hurricane [modern spelling],” the worst since 1667, came in 1769. By this time, damage began taking a larger toll especially on shipping with nine ships and all the small craft driven upon shore, in addition to agricultural losses. As the basin was opened to agriculture and logged of its forests, flood heights seem to have increased. When John Smith first visited the fall line of the James River, he very perceptively estimated (using marks visible on trees and rocks) that the river rose about 8 feet in flood. By 1771, the *Gazette* documented a flood “20 feet higher than the one in 1766,” “the greatest fresh in James River ever known” [4]. The 1771 flood deposited 10 to 20 feet of sand, covered with a near-pavement of stones, on former farm fields. A ship at Warwick sounded at the peak and found the water exceeded “the common tides by more than 40 feet,” having risen at one point at the rate of 16 inches per hour.

Through correspondence with friends in different cities during the 1700’s, Ben Franklin worked out that a storm experienced in New York was the same one that had been to the southwest over Philadelphia a couple days earlier. Even by the 1933 and 1938 hurricanes, however, the impact on waterfront communities here in the Chesapeake was still largely one of surprise. The networks to predict storm paths were simply not there; while someone might telephone New York about a storm, there simply was no way at the time to tell where it was headed.

MODERN MEMORY

Homegrown Stories

Annie Murphy Jones today runs tiny Tom Jones’ Store at Wingate on the Honga River. During Isabel, several inches of water had come into the store and a boat had floated up and been stranded beside the road outside.

“I got it mostly dried out now, except in there,” Annie said, gesturing to a lower room where the water had been deeper. Everything was similar to the year before, except where the floorboards had

swelled and buckled from the water, a neighbor had taken a plane to level the boards off so the cat's bowl would sit square next to the kerosene stove.

Annie is a well of information about the early 20th century on this part of the "shore." In the very earliest days of radio here, Annie's father had a tuner that he would fire up using storage batteries in the back room (eventually recharged by a little windmill), and the children were shushed while the vacuum tubes glowed and he sat in his easy chair to listen to the crackly news. He focused even more intently on the evening comedy broadcasts, laughing in sync with thousands of families all over America to the jokes of "Fibber McGee, Lum 'n' Abner" and, Annie says: "what was that last one? "Amos and Andy. Oh! He loved them shows. . . ."

Radio provided no warning in 1933 when one August morning Mr. Murphy readied, as usual, to go off to his job at the little branch bank. There was a nor'easter, Annie said, some wind, but not much rain. "Oh no you're not," his wife lectured, "(unless) I'm going with you." Mr. Murphy looked out the window and saw the tide had already surrounded their chicken house. He told Annie's brother to go out and get the chickens, but before he could, Annie said: "a wave of water came out of the ditch and rolled the little coop over."

They thought their four cows must be drowned, but the animals swam up and rested their heads on the roof of a shed. Murphy's house was a bit higher than a neighbor's where water was coming through the windows. They dragged the non-swimming wife over, towing her through armpit-deep water while she wailed, "I won't live! Oh! I'm gone," and up the front walk where there were two gates, about 5 feet high. "Only this much was showing," Annie shows, measuring an inch and a quarter with her fingers. A buy-boat (one of the big-decked brogans or bugeyes, rigged down with power to transport oysters) floated up nearby and the men all went down to push her back into the creek before the tide went out.

Since she was living in the same house during both storms, Annie tried to compare the '38 storm with Isabel. The gates were gone, so she could not compare sea level rise based on that criterion, but

a few years ago when she broke a hip, a small third step was put in at the top of her entry. During Isabel, the tide rose up high enough that this step, level with the flooring inside, floated off. The water was just at the height of the floor joists—about what is expected given a sea level rise of some 6 to 8 inches over the previous 69 years—but it did not seep inside to soak her rugs. She shook her head, contemplating a next time. "I'm too old to haul all that stuff outside to dry at my age!"

One difference: back then residents didn't have electricity for lights or refrigerators in their home. They had literal iceboxes to which blocks of ice were carried by hand from the soft crab packing house in Wingate. Even the rare wealthier families with refrigerators had "Kelvinators" in which the motor, condenser, and washbasket-sized coils were on top. Today, wise engineers (who have never been through a flood) place the motors on the bottom, where even a few inches of salt water spell doom.

Back then, coal furnaces or woodstoves both operated entirely on mechanical principals, with no electricity needed. Lighting was by kerosene; the best was an Aladdin lamp with a high-temperature mantle replacing the usual wick. As rural electrification expanded in later years, much of the wiring and heating plants in older homes was placed in basements with outlets sometimes a mere 10 to 12 inches off the floor. A foot of flooding means salt water in the junction boxes. Sheetrock at floor level is also a disaster. Whole-house air-conditioning units are mostly on concrete pads at ground level. Neighborhood electrical transformers, for small housing clusters where the wiring is underground, are also at ground level.

One of the classic books on the Chesapeake is Gilbert Klingel's *The Bay* [5], a touchstone of what this great estuary was in the early decades of the 20th century. Klingel's daughter, the remarkable Marcia Benouameur, lived on the water at Gwynn Island in a century-old waterman's house that she and her husband Clint White had upgraded. Their home was devastated by Isabel. They had never dreamed that water could rise high enough to enter the house, taking out electricity, water, and buckling

the wide board floors that they had just sanded and varnished. An oriental chest that her father had brought back from the Far East, full of family linens and lace from generations ago, had swelled shut, trapping all these soaking wet treasures to fester and mold. A year later, the two were just beginning to get back on their feet after the expenditure of many thousands beyond insurance coverage.

Of Piers and Such

Recent hurricanes have also affected other structures, such as piers. Modern piers are often built without regard to long-term tide records. Many boats, essentially unsecured atop their electric boatlifts, floated away or were holed and sunk during Isabel. Tide staff records taken for 26 years at Osborn Cove in southern Maryland indicate that the pier there flooded just a few times in more than 2.5 decades. When the pier did flood, the poorly nailed boards flopped up and down like piano keys.

The wood making up the pier planks bears mentioning. It was heartwood red oak. At the time of the dock's death, 75 of the 50-year-old planks were still original. One has 42 annual rings across a diameter of 104 mm, showing growth of 2.4 mm·yr⁻¹ and indicative of old growth forest. Modern 2 x 4's have 13 rings in the same diameter.

In the early 70's, boatbuilder Billy Kinnon at Benedict on the Patuxent replaced his dock and specified only heartwood oak. The "sapwood" that someone had used the previous time had quickly rotted away. He paid 23 cent a board foot for the new stuff from a sawmill up the road. Outside of some fine woods purveyor, you would have a hard time trying to buy that quality wood today. The similar modern dock plank is fast-grown plantation pine or fir, about 20% thinner in cross-section and with approximately 13 rings in the same diameter. It costs about \$1.80, a little more than two times the price for 20% less wood and less than one-third the quality.

In the old days men built their own docks. Now, the number of docks belonging to passive, unhandy owners is astronomical. About 100 Patuxent River docks in the first six miles above Solomons, Maryland were hammered to pieces by

Isabel-generated waves, probably a half-million dollars worth of damage for the docks alone.

In reconstructing the author's pier, a safe margin was left to protect against flooding, building a foot or so higher than either the original pier or the neighbor's dock built in 1932. Isabel still exceeded the chart by a couple of feet, so the perspective for planning has to be extraordinarily long.

Recent Reports

By 50 years ago, newspapers were reporting named storms. Some newspapers from Calvert County, Maryland reported the devastation from Hurricane Hazel in 1954. In one, the reporter noted that she caused "thousands of dollars in damage" [6] and when the weekly paper went to press, the list of barns blown over and trees toppled onto houses was still growing. Many losses may never have been reported, so the total number of wrecked farm structures or lost boats was probably never fully reckoned. A week or two later, the same paper wrote about farm loans available from the government to help those who sustained farm losses [6]. By and large though, people simply dug in and rebuilt things on their own, dried out their salvageable possessions, and went on with it.

Looking back to Gordon Whitney's estimates of storm habitat disruption in the primeval forest, he suggests that in the northeast the blowdown cycle for an individual section of forest occurred over hundreds of years. Maryland forester Dan Boone says that the tree crowns of virgin timber stands were so high that they were subject to wind throws at the rate of about 2% to 3% each year; this downing of trees kept enough forest openings so that edge habitat and successional species made the woods diverse and always in some kind of flux.

But, clear away 40% of the tree cover for agriculture and other uses, and later convert a good portion of this land into urban and suburban development, and there is a serious problem. The same forces of destruction now visit \$300,000 and higher-value houses along with \$10,000,000 big-box stores. The region is certainly dealing with significant sea level rise (Annie Jones' front porch

demonstrates that!) and global warming may be increasing the frequency and intensity of tropical cyclones, but independent of those factors our decisions underwrite our own fates.

ON TO THE FUTURE

The NOAA's Michael Glantz, who writes for the ENSO Signal Newsletter, says that the Weather Channel probably coined the notion of "superstorms" in describing the March 1993 blow that struck the East Coast. He tended to pooh-pooh that notion a bit, but then conceded that the storm had indeed been more severe than anything in the previous century in terms of overall impact. He concludes that with advance forecasts as well as satellite and instrument records, it is now possible to set criteria and really evaluate these signal events. He hopes, as we all do, that such analyses can remain independent of political posturing on the reality or fiction of global warming and climate change. He has a good point.

As a society, as well as from the federal, state, municipal, and individual perspectives, our stupidity and stubbornness are incredible. More and more valuable property is placed close to the shoreline, where hazards even from normal erosion exist, thus assuring catastrophe whenever natural events decree.

All across the landscape of this watershed, the unwise and apparently uncontrollable sprawl of development practices have heightened the probability that communities will be in harm's way, and that we will all hear of these events and disasters in real time. Modern communication virtually assures that most of the disasters will be sensationally publicized and that the dollar costs of damage well documented. Unfortunately, the region seems trapped in this conundrum with little remedy in sight.

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