

All coastal states from Texas to Maine are at risk from hurricanes. The Gulf Coast and southern states tend to have a higher risk because storms strike there with tropical force and because they have large vulnerable coastal populations. Many people in the region reside on barrier islands subject to the effects of storm surge. More hurricanes have struck Florida, due to its size and location, than any other state. In New Hampshire, we do not have as high a risk as some other states but we are not immune to the damage caused by hurricanes.

Hurricanes usually begin as small tropical waves moving westward off the African continent. Gathering heat and moisture from the warm tropical waters of the Atlantic, the storm starts to take on a life of its own as surface winds spiral inwards. When the internal winds reach 74 m.p.h. the storm officially becomes a hurricane. Although hurricane season runs officially from June through November, the peak hurricane threat exists from mid-August through September with the latter month being the most active.

When hurricanes strike land the impact can be devastating. Storm surge, a large dome of water 50 to 100 miles wide, is the greatest threat along the immediate coast and is responsible for the greatest loss of life. In 1900 more than six thousand people lost their lives in Galveston, Tex., from storm surge. As a hurricane moves inland, tornadoes, straight line and the storm's internal winds can destroy buildings and lay forests flat. Heavy rains can cause severe riverine flooding over large areas.

In the past sixty years roughly ten hurricanes have struck New Hampshire. This figure does not include tropical storms and near misses that have come our way. In fact, these storms do have a beneficial side – they bring heavy rains when the region is normally parched. In the mid sixties the lack of tropical rains caused water shortages throughout New England.

The most damaging hurricane to hit New Hampshire was the Great New England Hurricane of 1938. At 7 a.m., September 21, 1938, a massive Category 3 hurricane (111 - 130 m.p.h. winds) was moving northward at a forward speed greater than 60 m.p.h. In less than 12 hours this storm came ashore on Long Island, N.Y., and Southern New England killing 700 people and causing millions of dollars worth of damage. It traveled up the Connecticut River Valley, and by 7 p.m. the eye of the storm was passing near Keene, N.H. By 8 p.m. it was exiting via Burlington, Vt.

Coastal New England felt the full force of this storm. Having no warning of the approaching hurricane, hundreds of people were caught in beachfront communities by the large storm surge that struck at high tide. Whole communities were literally washed away.

New Hampshire certainly did not feel the full brunt of the storm, but there was considerable destruction and the loss of life, particularly in the southwestern portion of the state. Local officials had been watching the swollen rivers. During the previous weeks heavy rains had brought many of the state's rivers to flood stage. When the storm struck as much as four inches of rain fell in some areas, causing rivers to jump their banks. Winchester and Keene suffered from the worst flooding they ever experienced. Two dams burst in Weare causing massive flooding. In North Weare four people were killed when a bridge gave way.

Along with the flooding New Hampshire suffered from the strong winds that this hurricane still carried. It is estimated that the storm still had a forward speed of 50 m.p.h. far inland. This combined with strong winds in the eastern quadrant of the storm proved too much for many buildings. Church steeples, chimneys, roofs and walls succumbed to the force of these winds. The wind damage to the state's forests was truly incredible. Over two billion board feet of marketable lumber was blown down in New Hampshire alone. Falling trees were responsible for a major portion of building damage and so completely blocked roads that it was days before people in some communities could reach their neighbors.

The town of Peterborough was hard hit by this storm. Not only did its citizens suffer from the high winds, the Contoocook River flooded to its highest level ever. The flooding caused

several short circuits that started fires that, if not for the efforts of the town's firefighters, almost destroyed the entire village.

When it was over, the hurricane had left 14 dead and over \$22 million (1938 dollars) worth of damage in New Hampshire. Fallen trees blocked roadways, bridges had washed away and thousands were left homeless. The indirect impact (lost business revenues, etc.) to the state was staggering. Many companies never recovered and went out of business.

If the 1938 Hurricane were to happen today what would be its impact on New Hampshire? The state's population has more than doubled since 1938, placing more people at risk. Today many people live and work in mobile homes and other structures than have proven vulnerable to high winds. Extreme flooding has been partially mitigated by the construction of flood control dams, but the risk still exists. A look at the damage the last hurricane that affected New Hampshire offers some hints as to what a serious hurricane today might do.

When Hurricane Bob approached the New Hampshire coast it did not strike directly, but the state suffered over \$2.5 million in damages and three people lost their lives. Some roads were blocked for days and full recovery, in some cases, took months. It also may help to look at what happened to Charlotte, N.C., in 1989 when Hurricane Hugo struck. Charlotte, located 200 miles from the coast, experienced 90-m.p.h. wind gusts. Trees were blown down, crashing into homes, falling across power lines and blocking roads. Ninety-eight percent of the population was without power, some for over two weeks, and it took eight months to clear the streets of downed trees.

It is important to know the difference between a hurricane watch and warning. Everyone should have family preparedness plan and emergency supplies at home. This is especially important to those of us who must respond to disasters. As they found out in south Florida after Hurricane Andrew, if response personnel are concerned about the welfare of their families it is difficult for them to help others.

Hurricanes have struck before and they will again. The only question is "Will it happen on our watch?"

The National Hurricane Center (NHC) in Coral Gables, Florida has the responsibility of forecasting the track of tropical storms and hurricanes. Utilizing satellite imaging, the latest in weather tracking radar and flying into the storms with specially equipped aircraft the NHC is able to give advance warning to populations at risk from a hurricane strike. But hurricanes can be fickle and even with all the new technology at our disposal there is still a high degree of inaccuracy in the forecasts.

