

Winter High Wind Climatology for Blacksburg's County Warning Area

by Robert Stonefield

There is a significant weather event that happens every winter but is usually an afterthought, high winds. High winds are more common during the winter months, especially if you live in the higher elevations. These high winds are linked to cold frontal passages (Fig. 1) and developing coastal lows called Nor'easters (Fig. 2) off the Mid-Atlantic or New England coast. In the wake of a cold front, strong pressure rises and an increasing westerly low level jet will bring strong and gusty winds to the area. In the case of a Nor'easter, the pressure gradient between the deepening coastal low and high pressure to the west tightens and generates strong west to northwest winds across the area. Sustained winds of 20-40 mph with gusts up to 60 mph or more are common during these high wind events, especially across the higher terrain. Accompanying these winds are very cold temperatures. Combining the winds and cold temperatures, wind chill values usually drop into the single digits, sometimes below zero, across the mountains.

During these significant events, the National Weather Service (NWS) will issue high wind watches, warnings or advisories. High wind watches are issued when the risk of a high wind event (≥ 40 mph), sustained for 1 hour or more; or ≥ 58 mph of any duration, is significant in the 12 to 48 hour time frame, *but occurrence, location, severity, or timing is uncertain*. High wind warnings are issued when winds of ≥ 40 mph, sustained for 1 hour or more; or ≥ 58 mph of any duration, *is occurring, imminent, or has a significant probability of occurrence within 36 hours*. Advisories are issued for wind events not quite as strong as the high wind thresholds, and have a significant probability of occurrence in the first 36 hours. Wind advisory criteria is 31-39 mph sustained for 1 hour or more; or 46-57 mph of any duration. These events are defined as non life-threatening by themselves, but they could become life-threatening if caution is not exercised.



Figure 1. Cold frontal passage (blue) with wind direction (red).



Figure 2. Developing low pressure system off the Mid Atlantic coast with wind direction (blue).

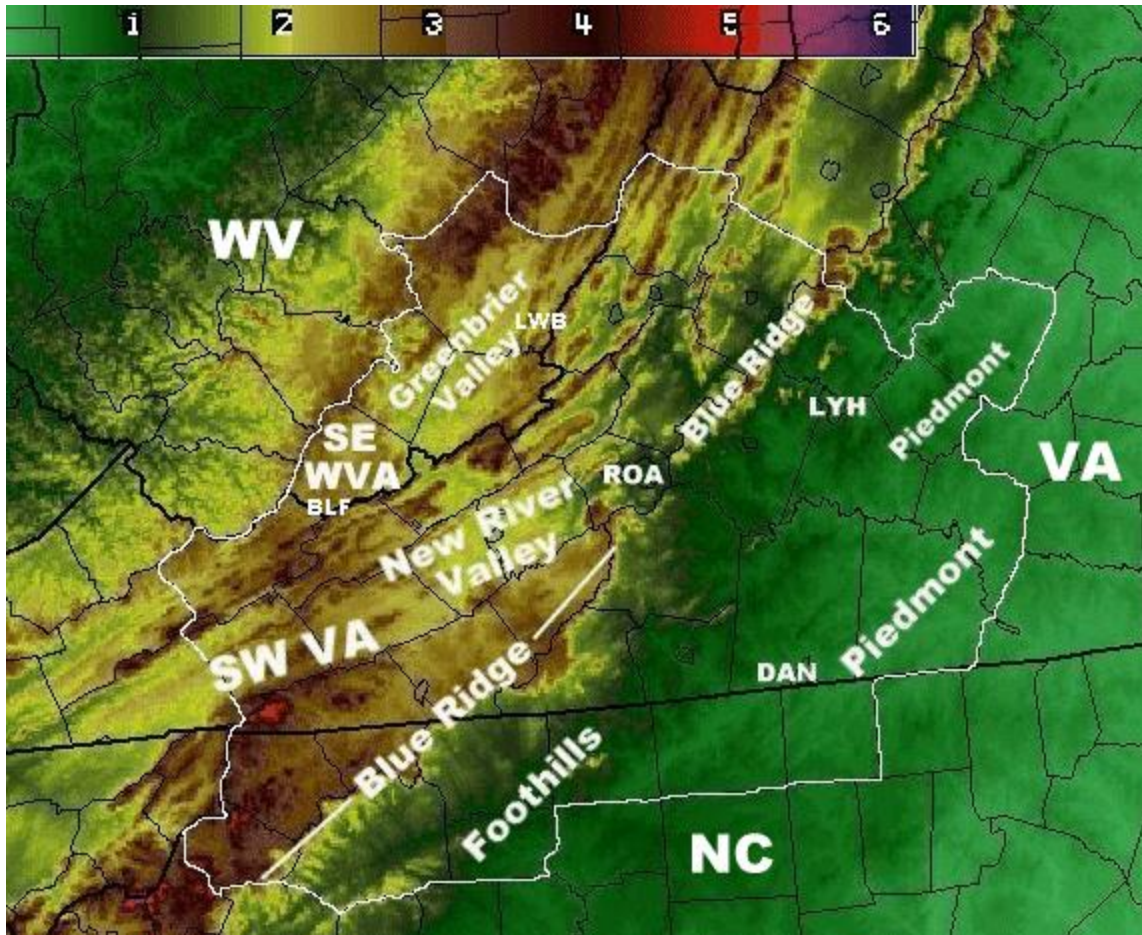


Figure 3. WFO Blacksburg County Warning area geographical break down.

High winds events (cold front and developing low pressure systems) have occurred every year (Fig.4) since the beginning of this study (1993). The most high wind reports from a cold frontal passage in one year was 2003 with 91 reports. The most reports in a year from a developing coastal low was 2007 with 93 reports.

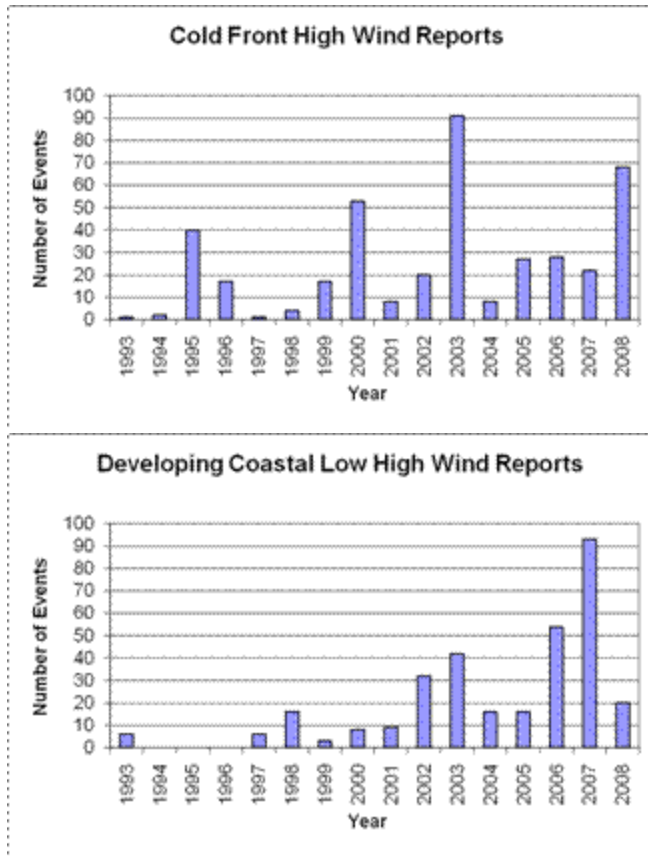


Figure 4. Cold front and developing coastal low high wind reports by year.

Generally, the stronger cold fronts do not cross the region until the winter months (Fig. 5) of December, January and February. From time to time, these strong systems can pass across the region as early as October and as late as May.

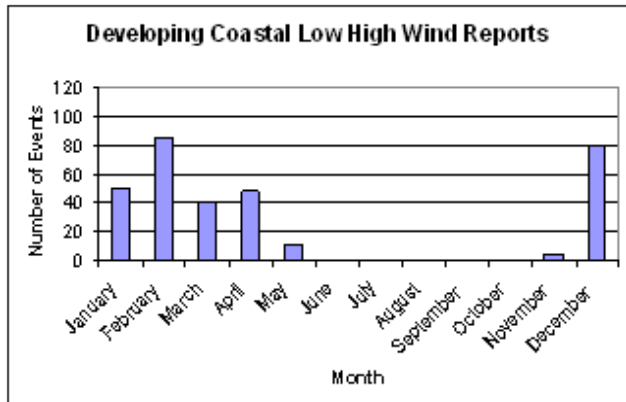
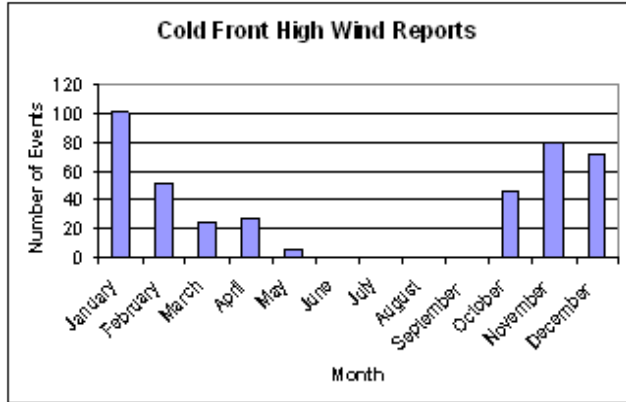
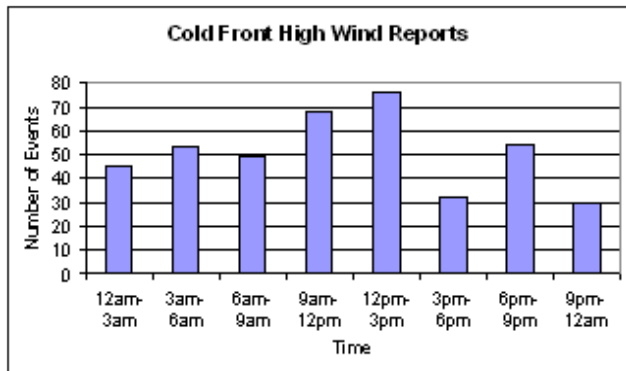


Figure 5. Cold fronts and developing coastal lows high wind reports by month.

High winds have been reported at all hours (Fig. 6) of the day and night. Typically, the high wind reports overnight are along and west of the Blue Ridge of southwest Virginia and northwest North Carolina. The winds are generally the strongest in the morning just after sunrise and in the afternoon when mixing occurs.



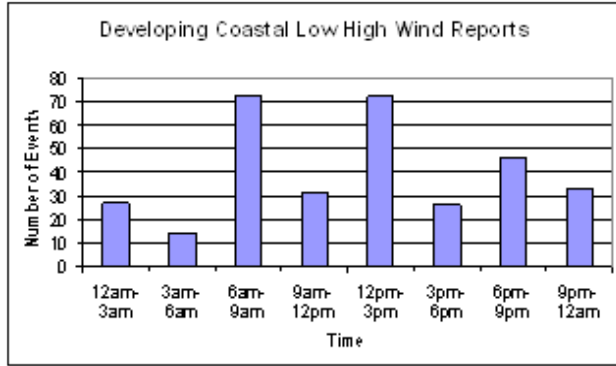


Figure 6. Cold fronts and developing coastal lows high wind reports by time of day.

During a cold front or developing coastal low high wind event, most high wind reports are along the Blue Ridge of southwest Virginia and northwest North Carolina (Fig.7). With a developing coastal low, a moderate showing of high wind reports are further east of the Blue Ridge and into the piedmont counties.

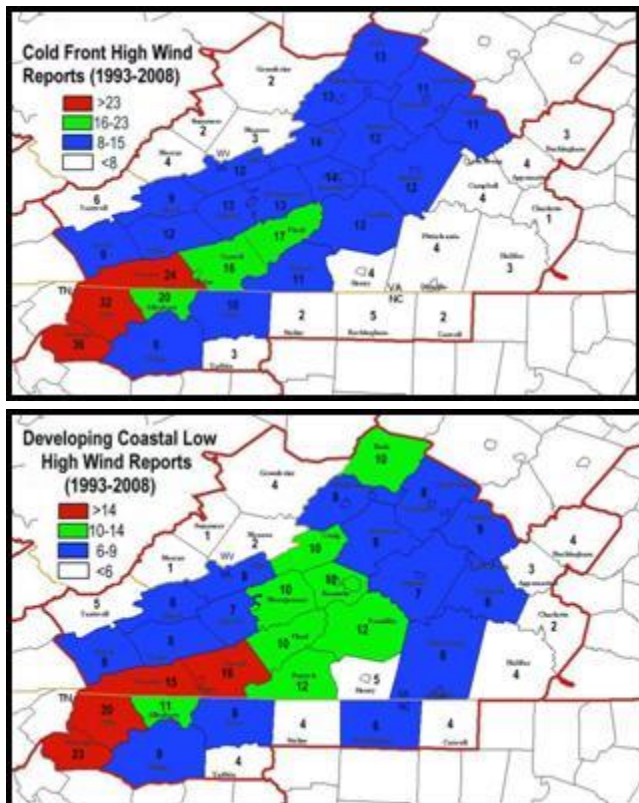


Figure 7. Cold fronts and developing coastal lows high wind reports by county.

On February 10, 2008, an exceptionally strong wind event occurred from a passing of a cold front. Hurricane force wind gusts of 74 mph or more were reported across some mountain

locations. All 40 Counties across Blacksburg's area of responsibility reported numerous power outages, large trees being uprooted, and property damage. Power lines that were downed from falling trees and limbs sparked several wildfires across the area. Three of the largest wildfires were Little Cuba (2700 acres) in Craig County, Black Horse (1500 acres) in Bedford County, and Green Ridge Mountain (about 4000 acres) in Roanoke County. The Black Horse fire in Bedford County (Figure 8-10), was started by an all-terrain vehicle operated on a restricted trail. These fires took state and local agencies and National Guard soldiers 3 days to get under control. Rain falling on the third day was a big help in controlling these fires.



Figure 8/9. Black Horse wildfire in Bedford County.

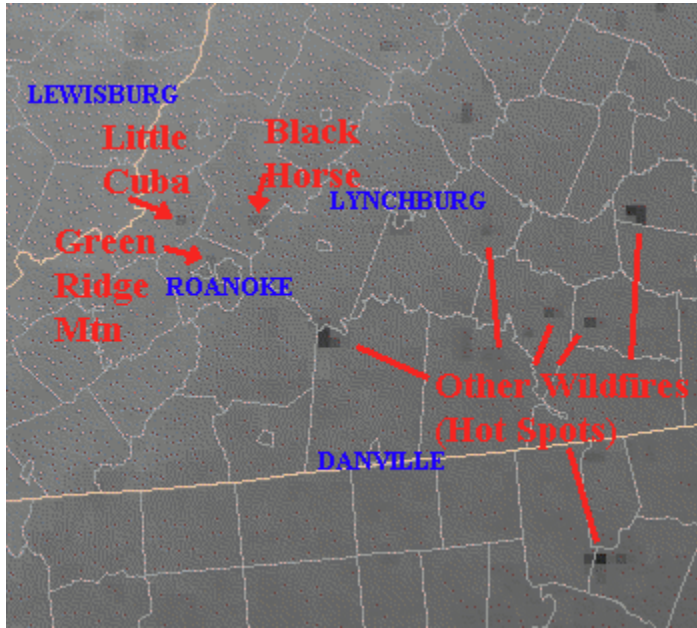


Figure 10. Infrared satellite displaying wildfires across the region on February 10, 2008.