Flash Flood - The Madison County Flood of June 27, 1995

The Madison County Flood on June 27, 1995 was the worst flash flood that Virginia had seen since the remnants of Camille dropped up to 30 inches of rain one night in Nelson County in August 1969. The Nelson County flood ranks as one of the nation's worst flash floods of this century. The floods and landslides led to the death of 117 people. The Madison County event was chosen because it is closer to the Baltimore-Washington region. The fact that only one person died versus over 100 in Nelson County can be attributed to three significant factors. 1) It was well forecasted. Flash Flood Warnings did not even exist in 1969. The National Weather Service in Sterling contacted the State Emergency Operations Center early that morning informing them that a significant flood was likely. 2) Early response and heroic actions by emergency responders made a big difference. Early warning by NWS to the state allowed them to call in resources before the flooding began to threaten lives. One Coast Guard helicopter came all the way from Elizabeth City, NC. As conditions worsened through the day, the operators of the helicopters risks there lives flying in low visibility into mountain valleys to pluck people from roof-tops and carry them to safe shelter. Some 80 people were rescued! In 1969, there was little preparation for disasters and response to such situations took time to organize and gear up. Time that can cost lives. State and local emergency management has evolved greatly since 1969 and they are far more prepared to deal with such disasters before they even start. 3) The Madison County flood occurred in daylight when people could see rising water and attempt to move to safety and emergency responders could see people on roof tops and pluck them off. In Nelson County, people were asleep and awoke as their houses floated off their foundations.



The weather that set up the flood included a semi-tropical air mass over the region; an upper level low over the Mississippi Valley which sent impulses/disturbances to the northeast across the area helping to trigger thunderstorms; slow moving cold front sliding south along the front

range of the Appalachians and over the coastal plain which helped to focus where the thunderstorms were occurring; and the high pressure to the north which set up a westward flow of moist air from the oceans into the mountains. The mountains helped to lift the air where it condensed into clouds and rain. The focus for thunderstorm development on June 27 was the intersection of the weak cold front which stalled across the area and the upslope (east side) of the Blue Ridge mountains. A large thunderstorm complex developed early that day over Rappahannock County and slowly moved south over Madison County becoming nearly stationary over the southwest corner where it dumped 20 or more inches of rain in a relatively short period of time.

Other heavy thunderstorms also occurred that day with additional flash flooding and some damaging mud/landslides (debris flows) in Nelson and Albemarle Counties in Virginia and the Keyser/Westernport area of Mineral County, West Virginia and Allegany County, Maryland. These areas as well as Madison and Rappahannock County saw rainfall rates of as much as 5 inch per hour which after a couple hours is enough to cause land to give way. Areas susceptible to these landslides are where the ground slopes at 30 degrees or more from the horizon. Soil conditions were already wet from earlier rains during the week. Therefore, rain that was absorbed caused the ground to become unstable in some areas. Most of the rain turned to runoff which created a rapid rise on small streams and creeks and eventually into the smaller rivers. Soon water was out of its banks flooding roads, homes, and businesses and cutting off communication lines. While Doppler radar indicated that rainfall amounts suggested that major flooding would occur, the first "ground truth" report came from a Skywarn Amateur Radio observer. Skywarn is a volunteer network of people who pass reports of severe weather onto the National Weather Service. He reported that 10 inches of rain had fallen between 10 am and 2 pm in the town of Etlan in the north part of the county. During the heaviest rain, radar was estimating 3.2 inches an hour for portions of the county. This ground truth report told us that our radar was underestimating rainfall by as much as one half . Indeed, conditions were bad. Nearly all roads and every bridge in the county were damaged or washed away. Half the farms sustained damage. The entire hay crop was lost and half the corn crop. Hundreds of livestock were killed and 500 to 1000 miles of fencing was damaged or washed away. In Madison County alone, total damages were estimated at \$64 million with an additional \$29 million in agricultural losses. The estimated cost of recovery to get the farm land suitable once more for crops may be as high as \$1000 per acre. There was only one death in the county which was due to a home collapsing on a woman. An additional death occurred with flooding in Rappahannock County and one in Warren County.

The rainfall and flood waters from Madison and Orange Counties flowed into the Rapidan River. The Rapidan gets its name from the fact that it responds quickly (water rises rapidly) and it exceeded flood stage during the morning hours. The picture below is where the Rapidan crosses the Route 29. This picture was taken near its crest at that point around 2 pm in the afternoon. The USGS stream gage near Ruckersville in Greene County was destroyed by the raging water. The flood crest was estimated from high water marks to have reached 31.6 feet. This is a 500-year flood for that gauging point. This exceeded the old record of 20.8 feet set at that point in October 1942 by almost a foot. Downstream at the Culpeper gage, the river crested at 30.4 feet which exceeded the previous record of 30.3 feet set back on October 16, 1942. This is equivalent to a 100-year flood at Culpeper.

The Rapidan River flows into the Rappahannock River, which was also accumulating rains from northern Madison County, Rappahannock and Culpeper Counties. On the 28th, the river crested 5 feet above flood stage at Remington. Farther downstream on the 29th, the river crested in the city of Fredericksburg at 7 feet above flood stage. The forecast point for the city is at the city dock which has a staff gage. Substantial damage was reported at both locations, and at numerous other along the river.