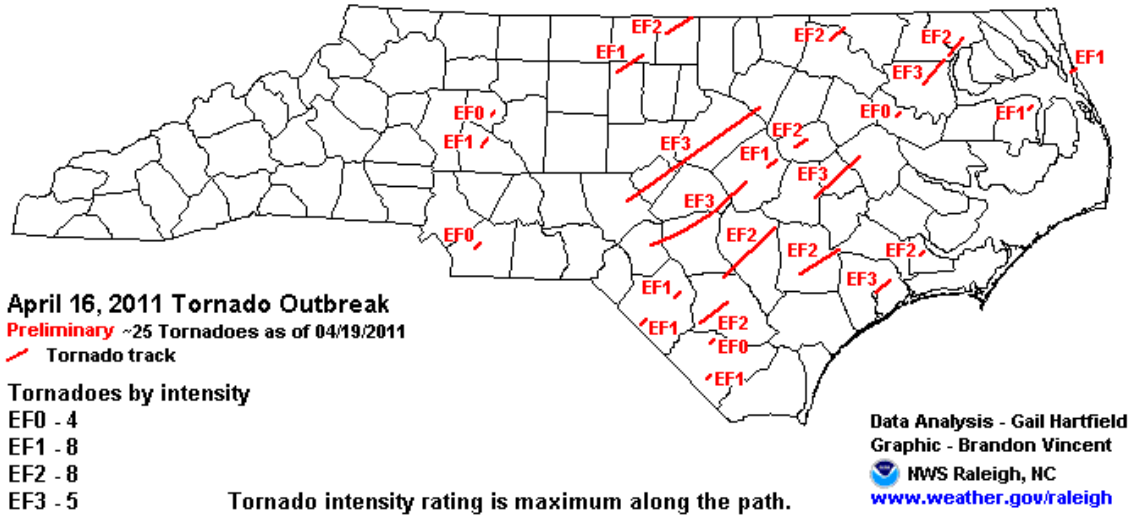


# April 16, 2011 North Carolina Tornado Damage and Enhanced Fujita Scale

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On April 16, 2011 several supercell thunderstorms spawned damaging and lethal tornadoes that swept across 20 counties in North Carolina. The following is a summary of the Enhanced Fujita or EF-scale ratings for various locations according to initial NWS reports. It should be noted that the EF rating assigned to a tornado path is based on the maximum damage observed at the location. A structure situated in the path of an EF3 storm can have EF1 damage.

Duplin Co.	EF0
Greene Co.	EF3
Pitt Co.	EF1
Jones Co.	EF2
Onslow/Craven Cos.	EF3
Lee/Wake Cos.	EF3
Hoke/Cumberland/Harnett Cos.	EF3
Johnston Co.	EF1
Wilson Co.	EF2
Bladen Co.	EF2
Robeson Co.	EF1
Bertie Co.	EF3

Bertie Co. (2)	EF2
Union Co.	EF0
Rowan Co.	EF1
Davie Co.	EF0
Caswell Co.	EF1

The damage associated with low intensity storms can still be quite severe. Using analysis of the 1999 Oklahoma City tornado outbreak, DeSilva, Kruse and Wang (2006) find that even structures with F0 damage ratings can suffer a wide range of economic losses. Some structures with F0 damage had lost as much as 93% of their value. Another conclusion was that for storms that produced damage of F1 or higher, the dominant focus is life safety.

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	<b>0</b>	<b>65-85</b>
1	73-112	79-117	1	86-109	<b>1</b>	<b>86-110</b>
2	113-157	118-161	2	110-137	<b>2</b>	<b>111-135</b>
3	158-207	162-209	3	138-167	<b>3</b>	<b>136-165</b>
4	208-260	210-261	4	168-199	<b>4</b>	<b>166-200</b>
5	261-318	262-317	5	200-234	<b>5</b>	<b>Over 200</b>

Source: <http://www.spc.noaa.gov/faq/tornado/ef-scale.html>

### Enhanced Fujita and Fujita Scale:

In 1971, Fujita published research under the Satellite and Mesometeorology Research Project on proposed characteristics of tornadoes and hurricanes by area and

intensity (1971). The Fujita scale (F-scale) and the winds associated with the damage scale were based on a 12-step interpolation between the hurricane criteria of the Beaufort wind scale, and the threshold for Mach 1.

The F-scale primarily utilizes damage to structures, plants, and automobiles as keys for assessment, not the appearance of the funnel. The entire premise of estimating wind speeds from visible damage is largely a judgment call and varies according to how experienced the surveyor is. Marshall (2002) stated, "Assigning F-scale numbers to structures on the degree of damages is a subjective visual procedure. However, when trying to derive the intensity of the winds, it is important to consider how well the buildings are constructed and to recognize weak links or flaws within such structures." Residences are usually non-engineered, so there will be greater uncertainty in an F-scale rating.

The Enhanced Fujita Scale (EF-scale) was adopted in 2007 on the basis of the recommendation of Mehta and McDonald (2004). The EF-scale placed further emphasis on the fact that it is a damage scale that leads to estimates of wind speed based on the observed damage.

## References

DeSilva, D., J.B. Kruse and Y. Wang (2006) "Catastrophe Induced Destruction and Reconstruction," *Natural Hazards Review* 7(1), pp19-25.

Fujita T.T. (1971) "Proposed Characterization of tornadoes and hurricanes by area and intensity," Satellite and Mesometeorology Research Project Report 91, University of Chicago, 42pp.

Marshall, T.P. (2002) "Tornado Damage Survey at Moore, Oklahoma," *Weather and Forecasting* 17, pp582-598.

Mehta, K.C. and J.R. McDonald (2004) "A Recommendation for an Enhanced Fujita Scale," Texas Tech University NIST Report under NIST/TTU Cooperative Agreement Award 70NANB8H0059. 98 pp. <http://www.spc.noaa.gov/fag/tornado/ef-ttu.pdf>