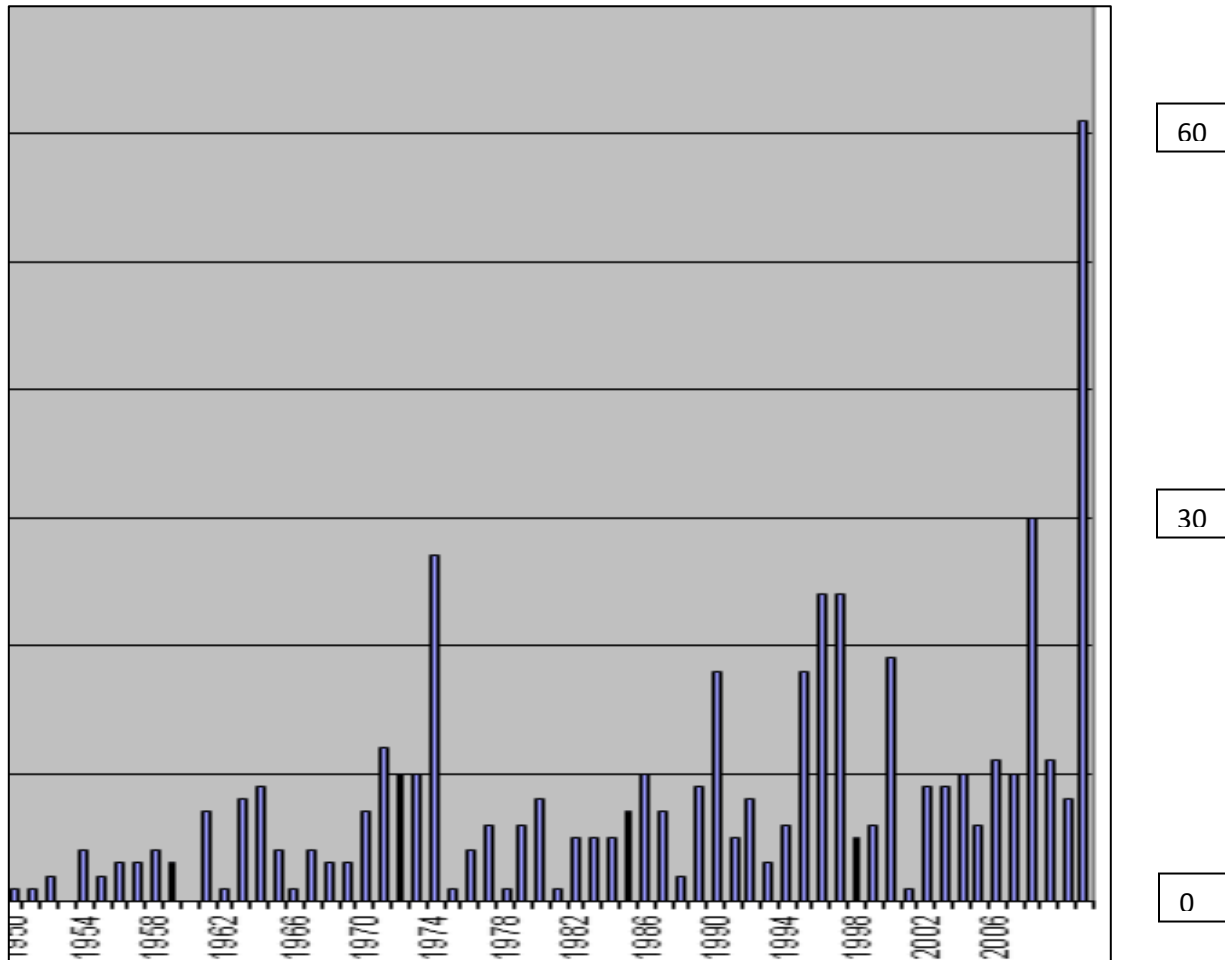


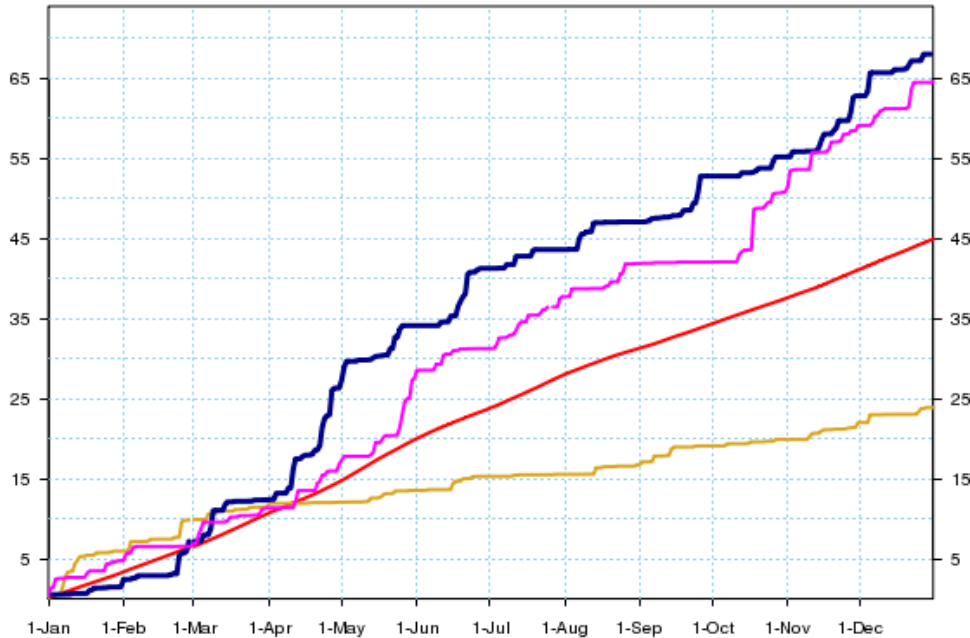
2011: A Review of the Year's Weather across central Kentucky and southern Indiana

2011 was quite an active year weather-wise across southern Indiana and central Kentucky. Aside from record or near record rainfall, we surveyed 61 tornadoes for the year. This total more than doubled our previous record number of tornadoes, which was 30 set in 2008. We can graphically compare the number of twisters that we experienced in 2011 to those surveyed over the past 60 years:



2011 was exceptionally wet, not only across our region, but all along the Ohio River. Even Paducah and Evansville had record wet years. Several cities in our region such as Louisville, Frankfort, and possibly Lexington set precipitation records. Frankfort's total 2011 rainfall of 65.46 inches beat its old record of 60.66 inches, which was measured at the Frankfort Lock #4 in 1935. These graphs below show how **rainfall for 2011** compared with **normal**, **the driest**, and the **previous wettest year on record** for Louisville, Lexington, and Bowling Green.

**Precipitation Summary for Louisville Area
Jan 1 - Dec 31**

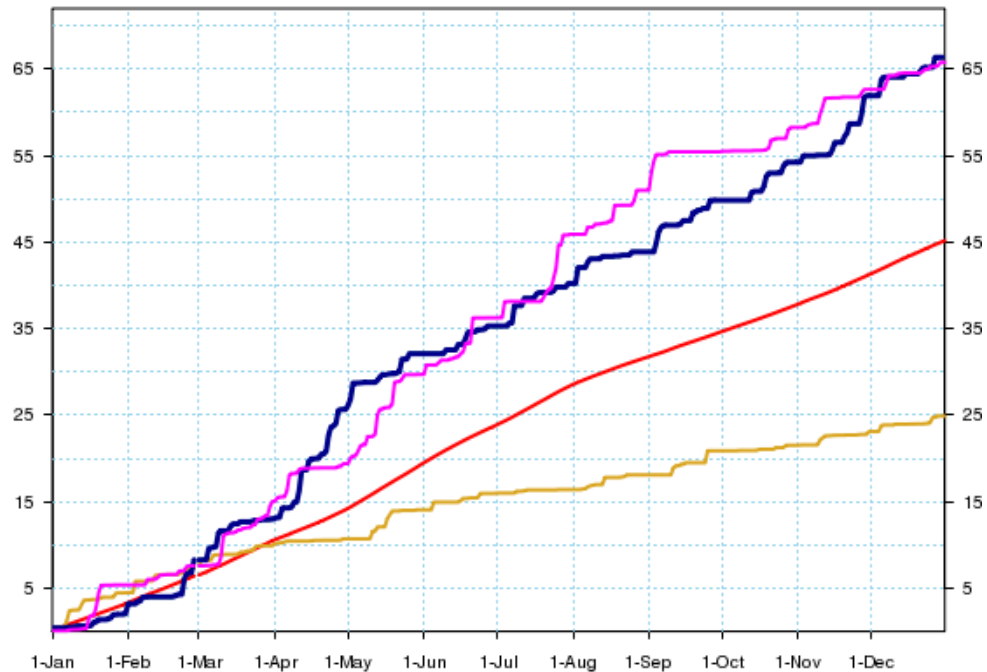


Heavy dark blue line is precipitation accumulation for 2011. Smooth red line is normal. Magenta line is 2004. Green line is accumulation for wettest period (2011). Tan line is accumulation for driest period (1930). Period of record for wettest and driest: 1872 - 2012.

**Chart tracking rainfall
at Standiford Field for
2011**

1930.....24 inches
Normal.....44.5 inches
2011 (in blue)
Previous wettest year
on record....65 inches

**Precipitation Summary for Lexington Area
Jan 1 - Dec 31**

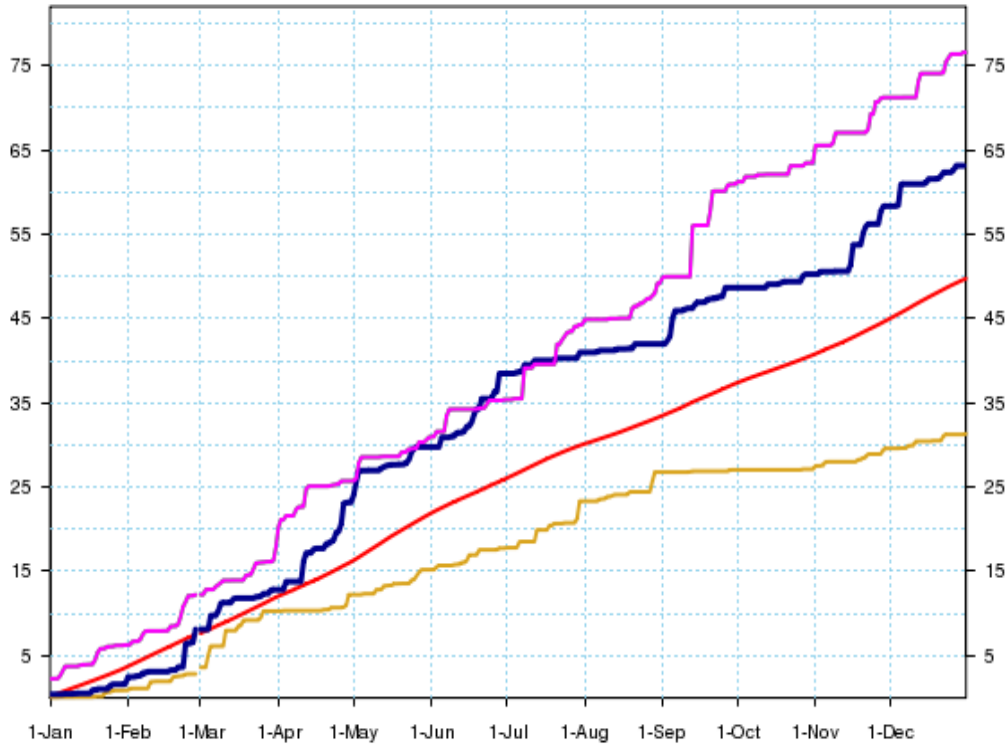


Heavy dark blue line is precipitation accumulation for 2011. Smooth red line is normal. Magenta line is 1935. Green line is accumulation for wettest period (2011). Tan line is accumulation for driest period (1930). Period of record for wettest and driest: 1872 - 2012.

**Rainfall at Lexington
Airport for 2011**

1930.....24.9 inches
Normal.....45.9 inches
2011 (in blue)
Previous wettest year
on record....65.5 inches

**Precipitation Summary for BOWLING GREEN WARREN CO AP
Jan 1 - Dec 31**



Rainfall at Bowling Green Airport for 2011

1930.....30.5 inches

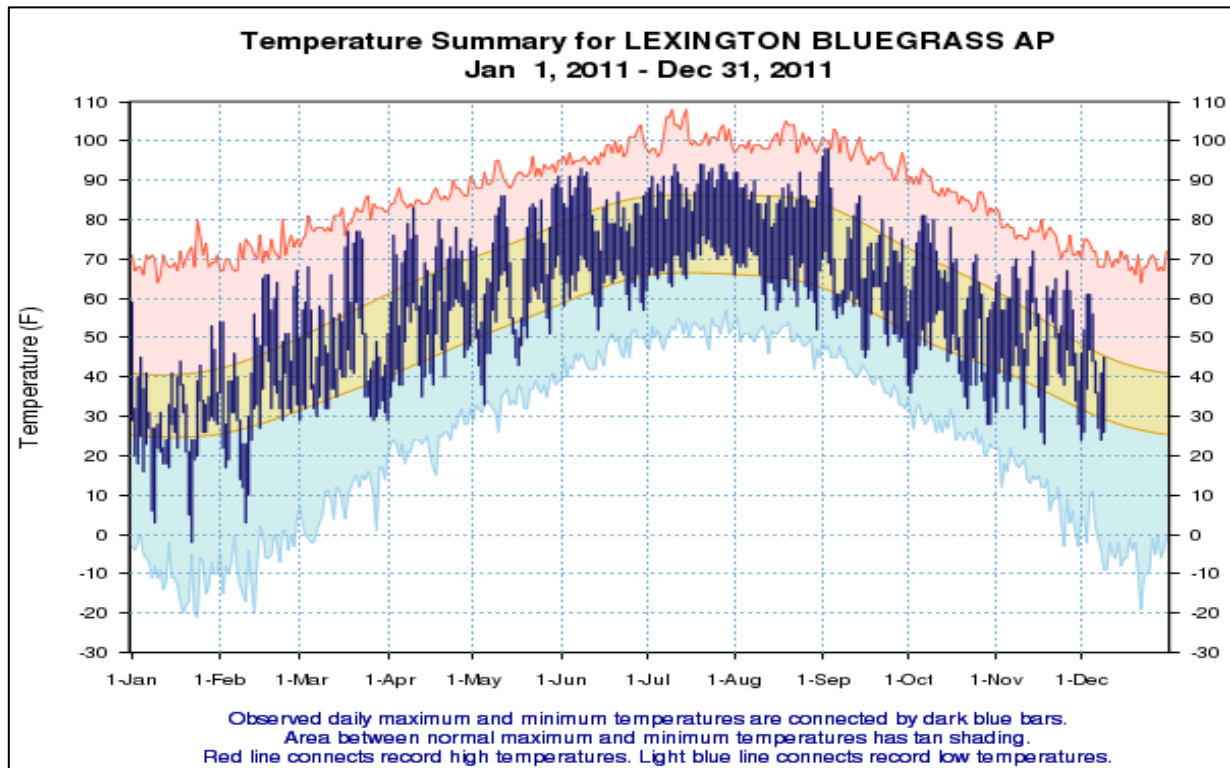
Normal.....51.6 inches

2011 (in blue)

Wettest year on record....76 inches

Heavy dark blue line is precipitation accumulation for 2011. Smooth red line is normal. Magenta line is 1979. Green line is accumulation for wettest period (1979). Tan line is accumulation for driest period (1963). Period of record for wettest and driest: 1893 - 2011.

Below is a chart showing daily temperature ranges for Lexington this past year (in dark blue). The edges of the light orange and blue shaded regions show record highs and lows for a specific date. Yellow shading shows the normal daily range for that date. Note that Lexington's warmest daily high temperatures for the whole year arrived on the 2nd and 3rd of September!



Monthly temperature statistics for Bowling Green, Lexington, and Louisville for 2011

Average Monthly Temperature (Departure from Normal)	Louisville	Lexington	Bowling Green	Frankfort
January	30.8 (-2.2)	28.5 (-3.5)	32.4 (-1.8)	28.4 (-1.9)
February	40.9 (+3.3)	38.4 (+2.0)	40.7 (+2.1)	38.1 (+4.2)
March	49.7 (+2.8)	46.6 (+1.0)	50.5 (+2.7)	46.6 (+3.6)
April	61.9 (+5.5) *5	58.2 (+3.6)	61.8 (+5.0)	58.3 (+5.8)
May	67.6 (+1.8)	63.9 (+0.1)	67.2 (-1.4)	63.5 (+1.4)
June	77.3 (+3.1)	73.4 (+1.2)	77.2 (+2.8)	73.2 (+2.5)
July	83.3 (+4.0) *2	79.4 (+3.2)	82.3 (+3.6) *9	79.5 (+3.2) *10
August	79.4 (+1.0)	75.2 (-0.1)	80.0 (+2.5)	75.1 (-0.1)
September	68.6 (-2.4)	65.8 (-2.3)	68.9 (-1.2)	65.6 (-2.0)
October	58.2 (-1.3)	54.6 (-2.4)	58.4 (-0.4)	54.2 (-2.2)
November	52.0 (+3.3)	49.8 (+3.5)	52.1 (+3.7)	49.3 (+3.3)
December	42.9 (+5.0)	40.7 (+4.7)	43.2 (+3.6)	40.5 (+5.2)
<i>Total year</i>	<i>59.4 (+1.2)</i>	<i>56.2 (+0.6)</i>	<i>59.6 (+1.6)</i>	<i>56.0 (+0.7)</i>

*..... Rank within the top 10 warmest months on record.

And for precipitation:

Monthly Precipitation (Departure from Normal)	Louisville	Lexington	Bowling Green	Frankfort
January	1.48 (-1.80)	2.04 (-1.30)	1.64 (-2.51)	1.50 (-1.65)
February	5.69 (+2.44)	6.22 (+2.95)	6.49 (+2.34)	5.85 (+2.77)
March	5.17 (+0.76)	4.69 (+0.28)	4.69 (-0.28)	4.40 (+0.36)
April	13.97 (+10.1) *1	12.7 (+9.03) *1	10.35 (+6.36) *2	13.95 (+10.3) *1
May	7.81 (+2.93)	6.45 (+1.67)	6.58 (+1.22)	8.98 (+4.37) *4
June	7.14 (+3.38) *9	3.20 (-1.38)	8.71 (+4.42) *6	3.69 (-0.71)
July	2.35 (-1.88)	4.92 (+0.27)	2.50 (-1.61)	3.96 (-0.43)
August	3.46 (+0.13)	3.64 (+0.39)	1.02 (-2.30)	3.18 (-0.18)
September	5.73 (+2.68) *9	5.97 (+3.06) *7	6.66 (+2.73) *10	5.05 (+1.72)
October	2.39 (-0.83)	4.41 (+1.28)	1.61 (-1.78)	3.17 (-0.07)
November	7.62 (+4.03) *5	7.68 (+4.15) *2	8.07 (+3.56) *7	7.60 (+3.87) *4
December	5.21 (+1.49)	4.43 (+0.61)	4.79 (+0.07)	4.13 (+0.23)
<i>Total year</i>	68.02	66.35	63.11	65.46

*.....Rank within the top 10 wettest months.

And other miscellaneous data:

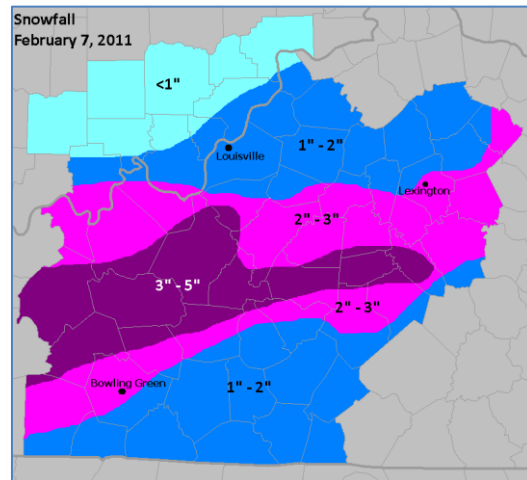
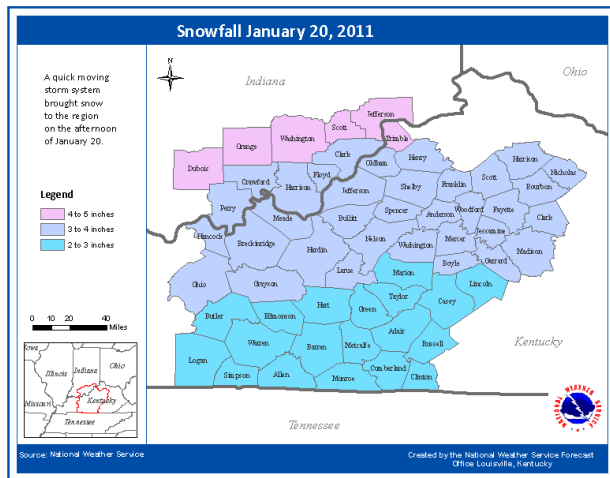
Category	Louisville	Lexington	Bowling Green	Frankfort
Highest temperature	102 (Sept 3)	98 (Sept 2,3)	103 (Aug 3)	99 (Sept 3)
Lowest temperature	6 (Jan 22)	-2 (Jan 22)	-3 (Feb 10,11)	-4 (Jan 22)
Yearly max sust. winds	47 mph (July 20)	45 mph (Apr 12)	53 mph (July 22)	43 mph (Apr 20)
Yearly max wind gust	61 mph (July 20)	62 mph (Apr 26)	74 mph (July 22)	68 mph (Apr 20)

Snow Total (Monthly Average)	Louisville	Lexington	Bowling Green
January 2011	10.0 inches	11.3 inches	7.0 inches
February 2011	1.1 inches	3.3 inches	5.9 inches
March 2011	0.3 inches	0.4 inches	0.0 inches
April 2011	0.0	0.0	0.0
November 2011	0.0	T	T
December 2011	T	T	T
<i>2011 total</i>	11.4	15.0	12.9

Winter....

The winter of 2010-11 featured a moderate to strong La Nina with cooler than normal sea surface temperatures along the equatorial Pacific. Although La Nina doesn't have a strong influence on average winter temperatures across the Lower Ohio Valley, it frequently produces above average precipitation, especially in late winter or early spring. The year 2011 started off cold and dry, however, as a persistently negative North Atlantic Oscillation (NAO) set up frequent weather patterns that brought cold air south from Canada across the Great Lakes and the Tennessee Valley. Despite less than average precipitation, several moderate snowstorms brought relatively snowy conditions to southern Indiana and the Commonwealth.

Two snowstorms of note brought an average of 3 to 6 inches of snow to southern Indiana and central Kentucky, respectively. The left image below shows snow accumulations of 4 to 5 inches across southern Indiana from a storm on January 20th. The right image below highlights snowfall from a storm on February 7th. Although temperatures on February 7th stayed just above freezing, snow fell so hard that accumulations overwhelmed the snowmelt rate.



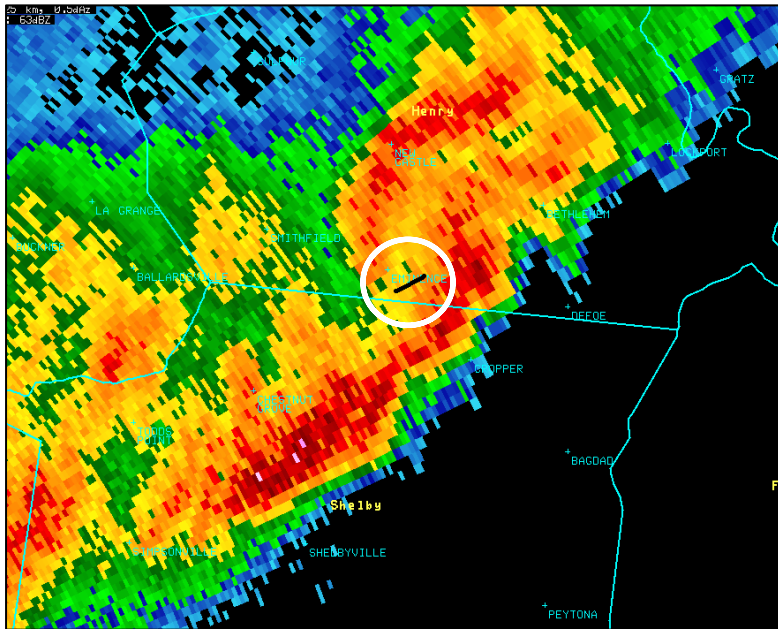


Taken in Fayette County by John Bradshaw on Jan 20th.



Taken in Elizabethtown by Robert O'Bryant on February 7th.

By mid-February, the NAO switched to a positive phase and pretty rapidly the winter across the lower Ohio Valley turned wet and much warmer. Organized severe weather struck a couple of times in February with several tornadoes. Two weak tornadoes developed across Barren County west of Glasgow on Feb 24th. A more serious and widespread outbreak developed on Feb 28th. Five tornadoes, including 2011's only tornado rated as an EF-3, developed during the early morning hours.



This radar image to the left shows the February 28th storm at the time it was producing EF-3 damage just southeast of Eminence, in Henry County. The small black line shows the tornado's path.



The picture to the left was taken by Kevin Harned of WAVE-3 news. It shows the complete demolition of a well - constructed barn.

Spring....

The spring of 2011 was warm, exceptionally wet, and stormy. March through May of 2011 brought record or near record rainfall and several tornado outbreaks, including one on April 19th & 20th that brought a record number of tornadoes (24) for any single outbreak within our forecast area.

	Rainiest March 1 st to May 31 st on record	March 1 st through May 31 st , 2011
Standiford Field	26.95 inches	26.95 inches (1 st all time)
Lexington Airport	24.56 inches (1997)	23.84 inches (2 nd all time)
Bowling Green	26.58 inches (1983)	21.63 inches (8 th all time)

Several tornadoes developed across south-central Kentucky on April 4th. The image below shows EF-1 damage on a farm from one of these tornadoes in Clinton County.



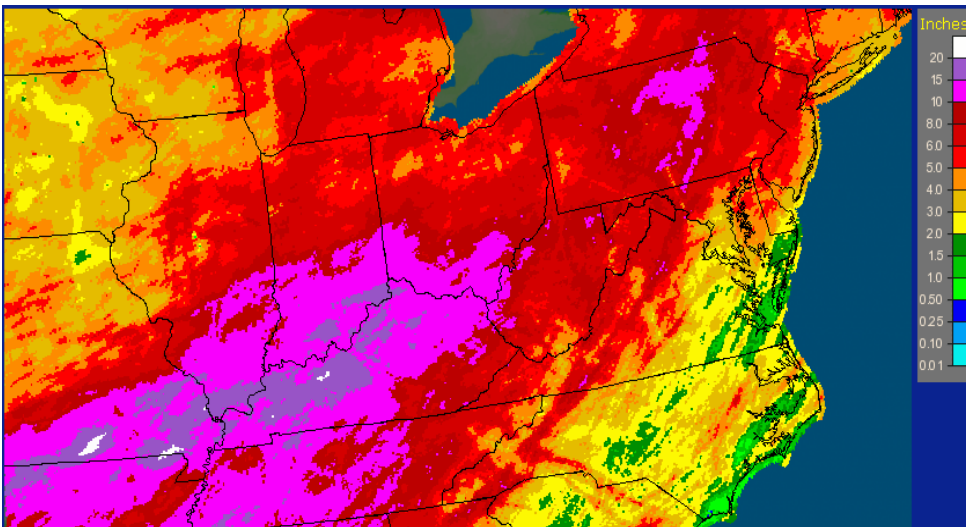
Excessive rains developed during the second week of April and continued through May 3rd. Over a three week period, between 15 and 17 inches of rain fell across southern Indiana and much of central Kentucky. This produced major flooding. The Ohio River at Louisville crested at its highest level both above and below the McAlpine locks since March of 1997.

- Patoka Lake, located in Orange County, Indiana south of French Lick, almost overtopped its dam. It reached a record height of 549.7 feet on May 3rd. Its previous record height was 547.5 feet on April 12, 2008.
- The Rough River Lake in southern Breckinridge County exceeded its previous record height of 521.4 feet – set in 1989 – by 6 feet.

- The Lost River at Bromer, located in Orange County, recorded its second highest crest ever at 14.7 feet.



This image shows water spilling through the Patoka Lake emergency overflow channel. This photo was taken by Dubois County Flight Services.

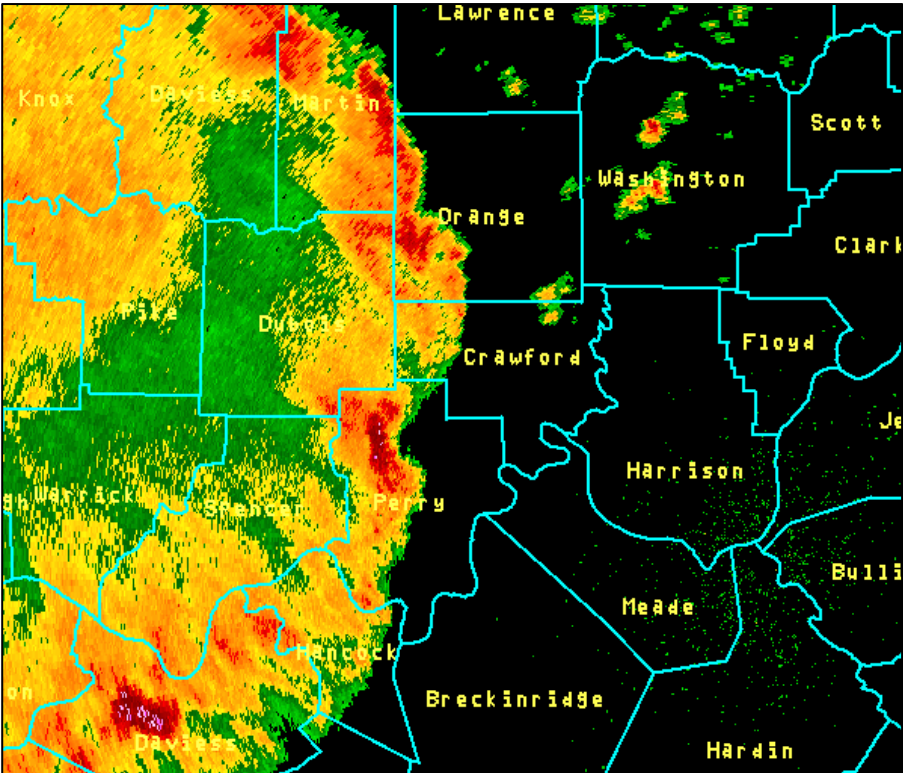


This image shows monthly rainfall for April 2011. Around 20" fell in a small area southwest of Louisville. An additional 2" to 4" of rain fell the first couple of days of May as well.

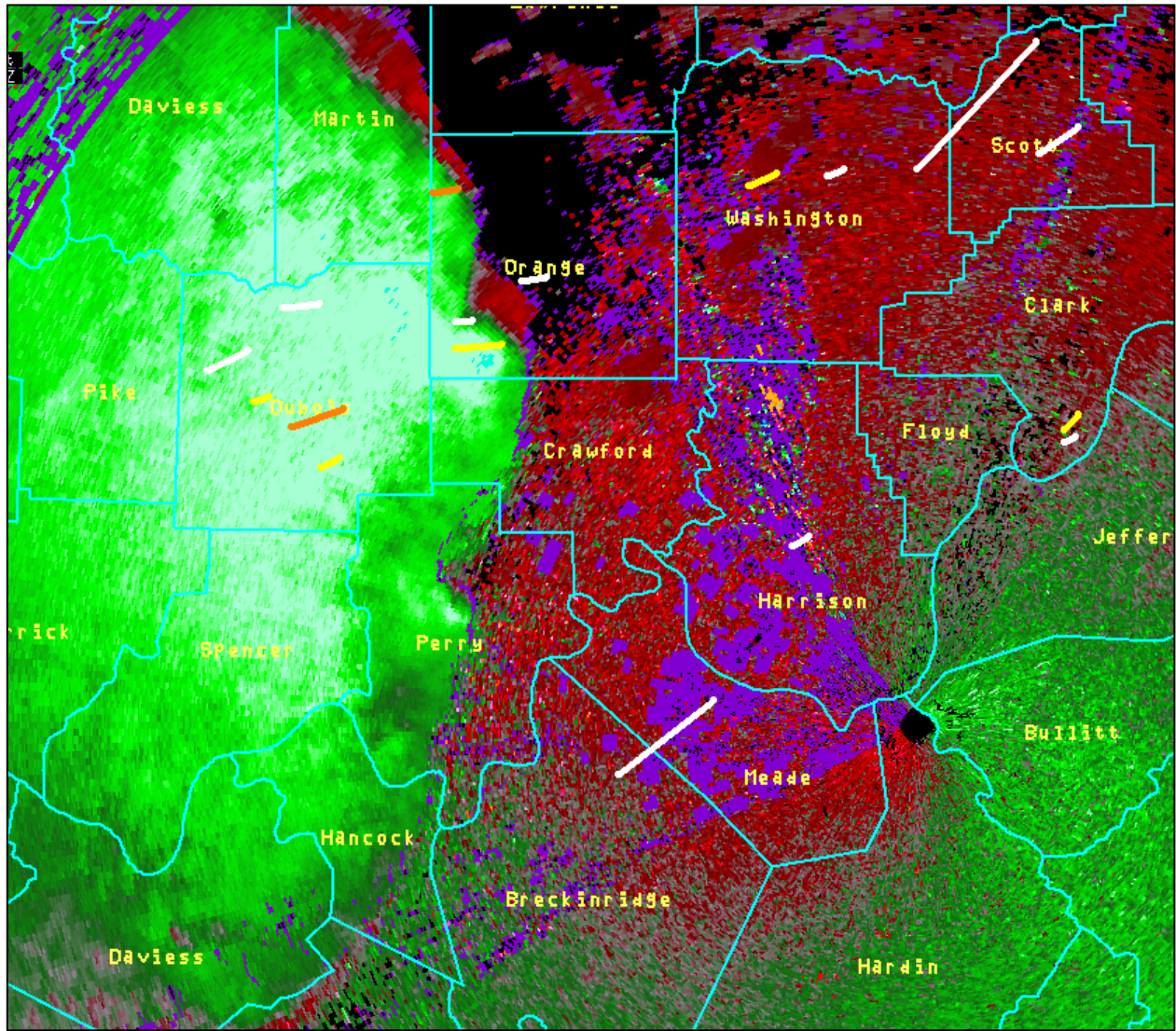


Flooding at Blackiston Mill in Clark County, Indiana. Photo courtesy of Chuck Branham for the *News and Tribune*.

A squall line during the evening and early morning hours on April 19th and the 20th brought a record number of tornadoes (24) ever recorded from a single outbreak within the Louisville forecast area. The previous record of 21 occurred during the infamous April 3, 1974 Super Outbreak. Fortunately, many of these tornadoes were relatively weak with short path lengths.

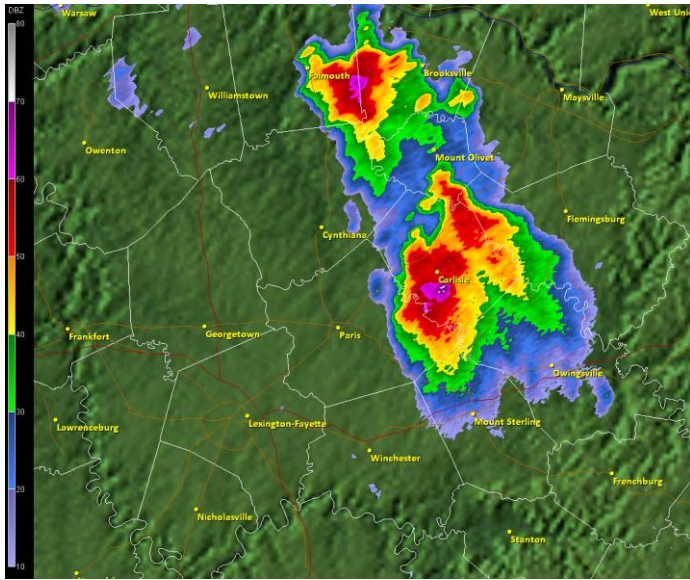


The images to the left and below show the squall line that produced numerous tornadoes late on April 19th. Several tornadic circulations are apparent in Orange County.

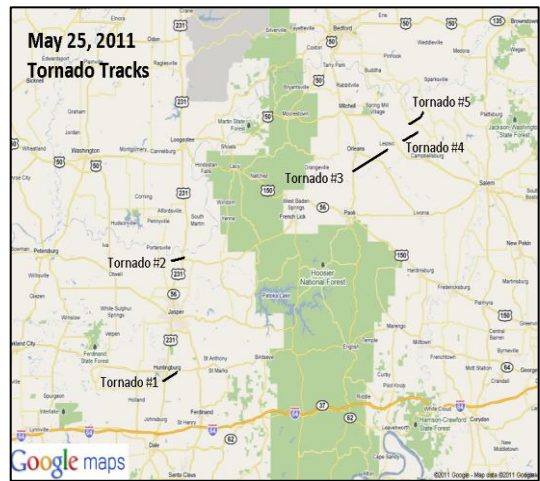


In the image above, which shows storm-relative velocity, the tracks of several of the twisters that night are shown with EF-0 in **white**, EF-1 in **yellow**, and EF-2 in **orange**.

On May 10, several supercell storms produced tennis-ball sized hail near Carlisle, Kentucky in Nicholas County northeast of Lexington. The two images below show very intense radar reflectivity and some lemon-sized hail collected near Millersburg courtesy of Tim Brewer.



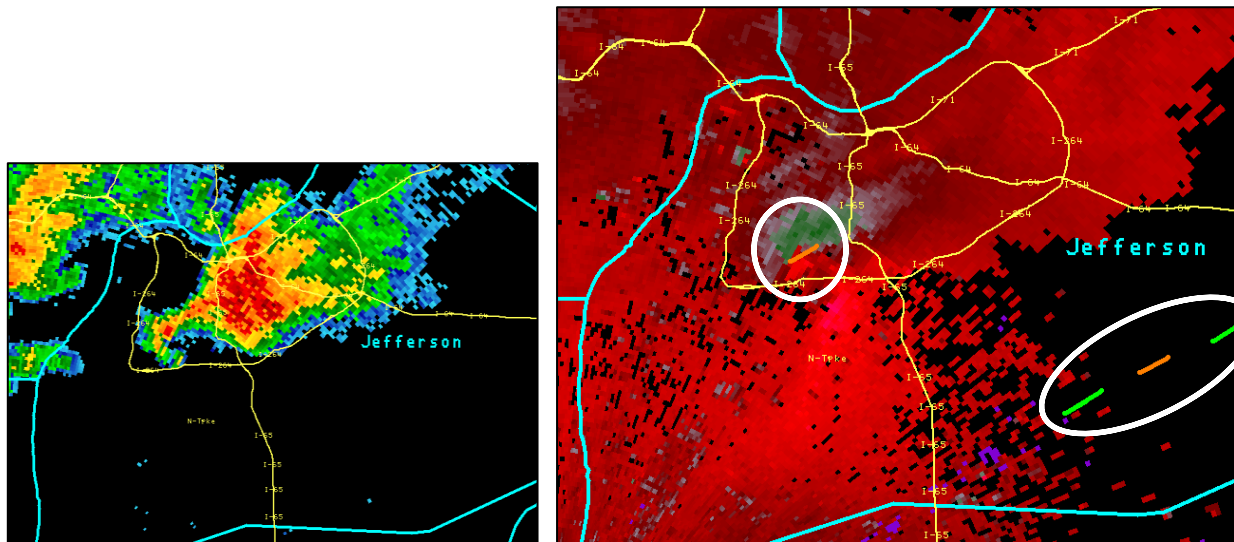
A squall line moved across southern Indiana on May 25. Five tornadoes, including two EF-2s, touched down in Dubois, Orange, and Crawford Counties. The picture to the left was taken north of Jasper by Michael Wilhite.



Summer....

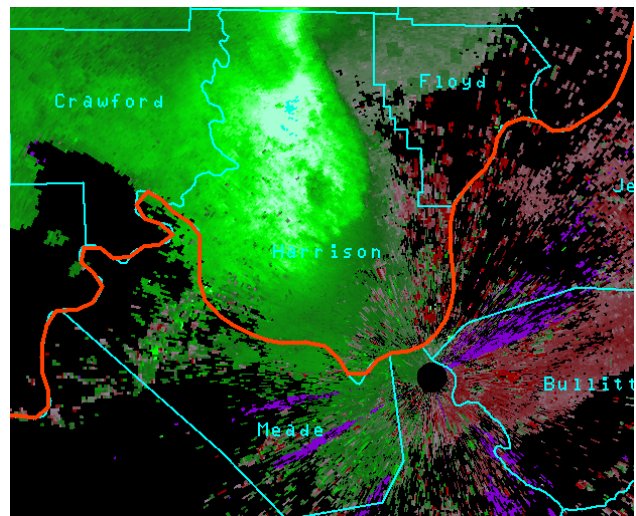
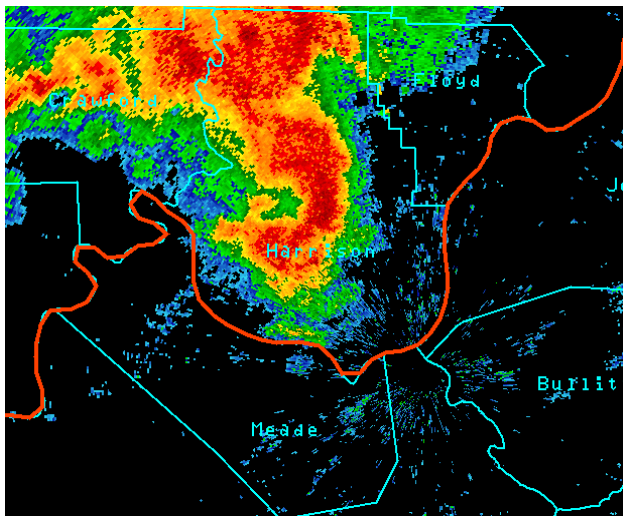
Our summer wasn't too out of the ordinary. After a wet June, the rest of the summer received more spotty rains, which is typical of the lower Ohio Valley. Although our summer was quite warm, with moderately above normal temperatures, wet soils generally tempered the effects of any hot spells and prevented any excessively hot daytime temperatures.

On June 22, several low-topped supercells developed around the Louisville area during the late afternoon and evening hours. The storms brought 5 tornadoes clustered around the Louisville Metro area, including one that damaged several horse barns at Churchill Downs. The two images below show the storm right at the time of the Churchill Downs tornado. In the image to the right, the tracks of this first twister, and 3 subsequent tornadoes near Jeffersontown are highlighted.



Damage to horse barns at Churchill Downs.

On August 13, a storm strengthened over Crawford County and charged east, developing into a bow echo. This line of storms brought widespread damage along Interstate 64 from Harrison County, Indiana all the way through Lexington. In Louisville, widespread damaging winds of 55 to 70 mph brought trees and power lines down across the northern half of the city. Damage was especially widespread near Bowman Field, where a 69 mph wind gust was recorded.

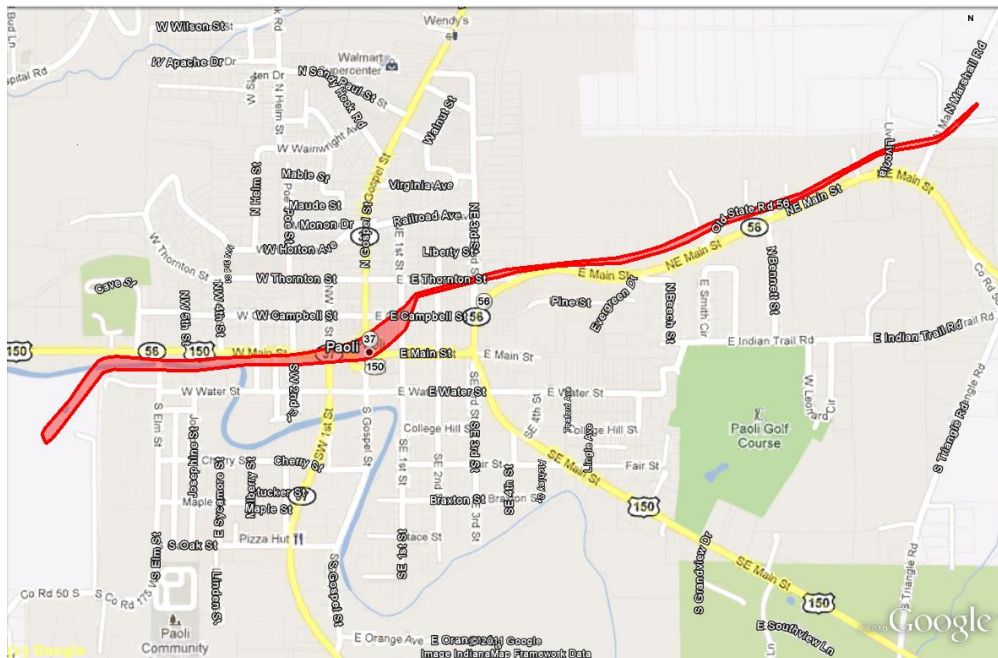


The two images above show the well developed bow echo in Harrison County, Indiana. The image to the right shows bright green colors indicating strong winds heading towards Louisville. Some of those winds were measured by Doppler radar at over 60 mph.

Fall...

Although monthly temperatures for September and October averaged slightly below normal, our hottest days of the year arrived in early September. Lexington's high of 98 on September 2nd was its warmest high temperature since August 16, 2007. The 102 degrees recorded at Standiford field became Louisville's warmest temperature since August 4, 2010.

Southern Indiana encountered yet another tornado on November 14. Although surveyed only as an EF-1, this twister managed to directly hit Paoli, located in Orange County. It even passed across a portion of Paoli's town square.



The image below shows some sheet roofing on one of the streets surrounding the Orange County Courthouse. It was taken by a National Weather Service survey team.

