2010……A Review of this Past Year's Weather across central Kentucky and southern Indiana

The year 2010 through the month of November was on average one of the top 10 warmest years recorded over the past 125 years. However, our very cold December will likely prevent us from reaching our ***top 10 warmest years*** threshold. After a cold and relatively snowy January and February, April through October was especially warm, with each month averaging from 2 to 5 degrees above normal. Fall brought very dry conditions with severe drought developing by late October across southern Indiana and northern Kentucky along the Ohio River. November brought widespread rains that ended the drought. December turned sharply colder with several occurrences of snow.

This first chart below shows how rainfall this year compared with last year, which was quite wet.

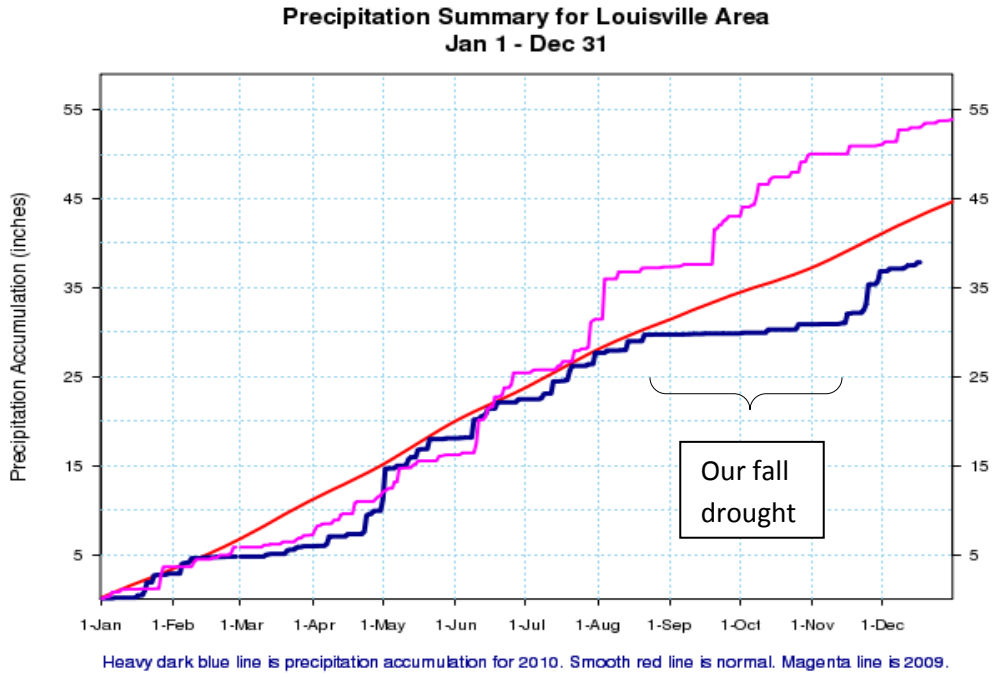


Chart tracking rainfall at Standiford Airport for 2010

2009……54 inches

Normal……..45 inches

2010 (in blue) through December 20

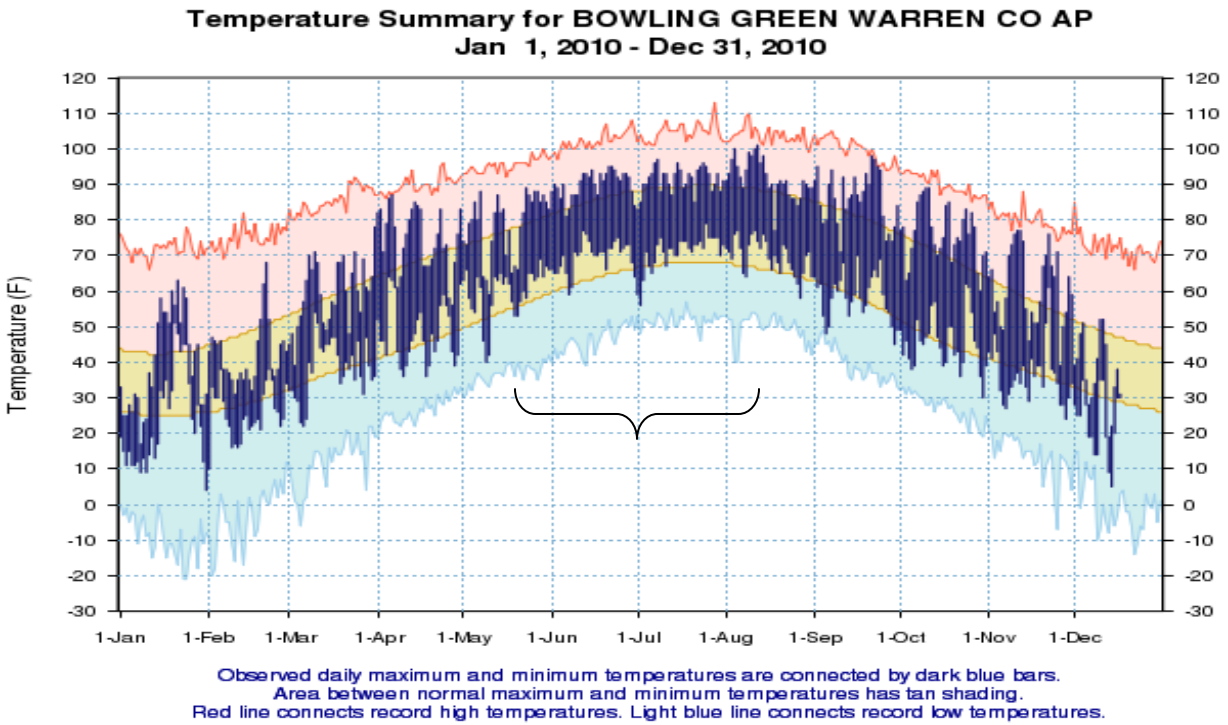


Chart showing daily temperature ranges for Bowling Green this past year (**in dark blue**). The edges of the light orange and blue shaded regions show record highs and lows for a specific date. Yellow shading shows the normal daily range for that date. Note the consistently very warm daily lows that occurred almost without interruption from mid-May through mid-August.

Monthly temperature statistics for Bowling Green, Lexington, and Louisville for 2010.

Average Monthly Temperature (Departure from Normal)	**Louisville**	**Lexington**	**Bowling Green**
January	30.1 (-2.9)	28.3 (-3.7)	31.7 (-2.5)
February	30.9 (-6.7)	28.8 (-7.6)	33.8 (-4.8)
March	49.0 (+2.1)	46.7 (+1.1)	48.9 (+1.1)
April	62.6 (+6.2) ***2**	59.4 (+4.8) ***5**	61.4 (+4.6)
May	70.5 (+4.7)	66.8 (+3.0)	69.0 (+3.2)
June	81.1 (+6.9) ***1**	76.6 (+4.4) ***7**	79.9 (+5.5) ***6**
July	82.8 (+4.5) ***3**	78.0 (+1.9)	81.1 (+2.6)
August	82.8 (+5.8) ***3**	78.1 (+3.3) ***10**	80.7 (+3.9) ***7**
September	75.1 (+5.0) ***8**	70.7 (+2.7)	72.2 (+2.6)
October	63.1 (+4.6)	58.7 (+2.1)	60.8 (+2.9)
November	49.9 (+2.3)	46.9 (+1.0)	48.8 (+1.4)
December			
Total year			

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

And for precipitation:

Monthly Precipitation (Departure from Normal)	Louisville	Lexington	Bowling Green
January	2.86 (-0.42)	3.01 (-0.33)	2.85 (-1.30)
February	1.91 (-1.34)	1.61 (-1.66)	2.07 (-2.08)
March	1.17 (-3.24) *5	1.13 (-3.28) *3	2.29 (-2.68)
April	3.97 (+0.06)	2.31 (-1.36)	3.21 (-0.78)
May	8.16 (+3.28) *10	9.95 (+5.17) *4	11.87 (+6.51) *2
June	4.39 (+0.63)	4.59 (+0.01)	6.24 (+1.95)
July	5.21 (+0.91)	6.06 (+1.25)	4.48 (-0.06)
August	2.06 (-1.35)	0.58 (-3.19) *3	5.60 (+2.24)
September	0.12 (-2.93) *2	0.61 (-2.50) *6	1.44 (-2.99)
October	1.04 (-1.75)	1.24 (-1.46)	1.84 (-1.33)
November	5.96 (+2.15)	4.46 (+1.02)	5.27 (+0.81)
December			
Total year			

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

And other miscellaneous data:

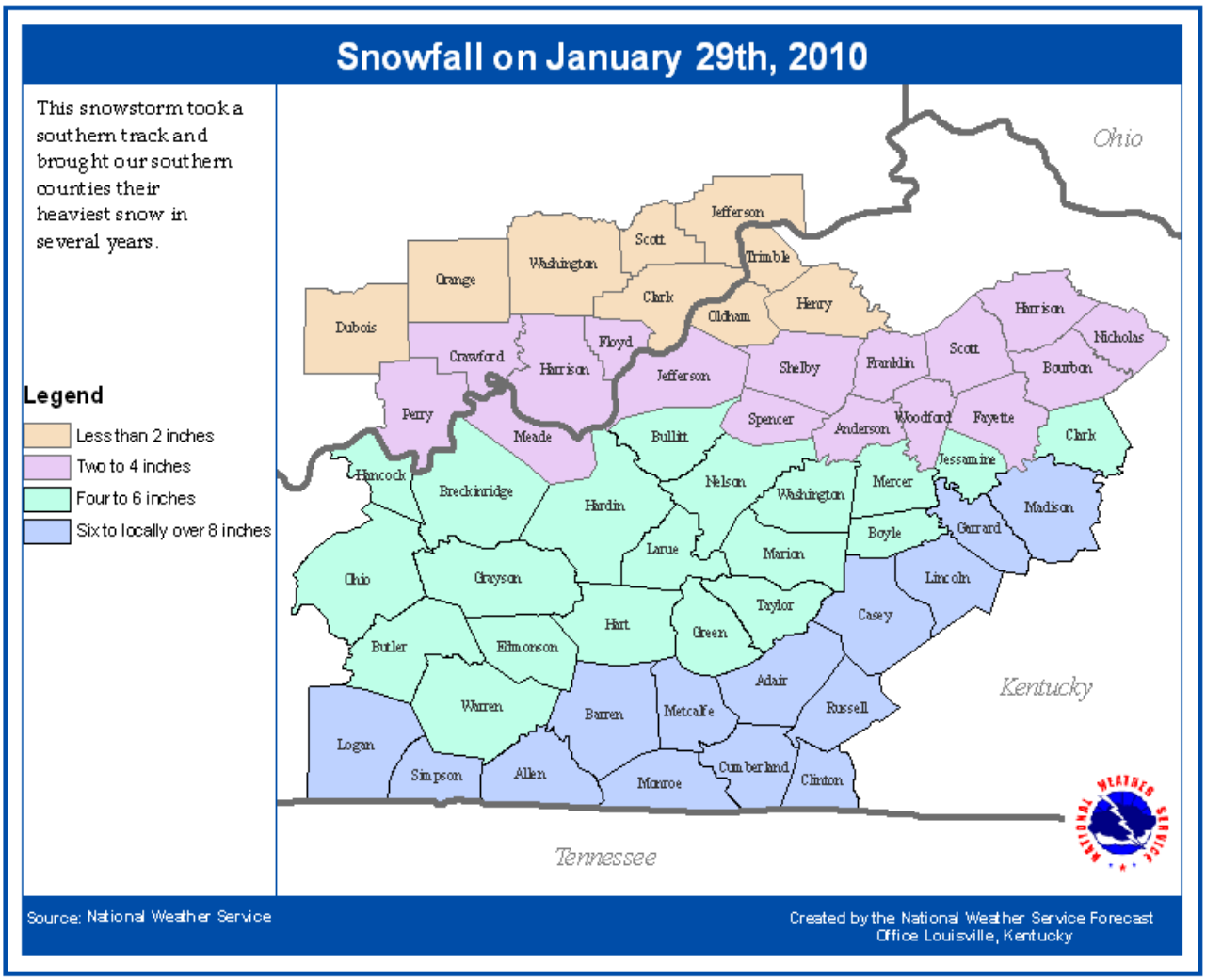
Category	Louisville	Lexington	Bowling Green
Highest temperature of 2010	102 (Aug 4)	96 (Aug 10, 12)	101 (Aug 12)
Lowest temperature of 2010	7 (Jan 3)	2 (Jan 30)	43 (Jan 30)
Yearly maximum sustained winds	40 mph (Apr 7)	43 mph (Nov 16)	37 mph (Oct 26)
Yearly maximum wind gust	51 mph (Jun 15)	60 mph (Apr 24)	53 mph (July 26)

Snow Total (Monthly Average)	Louisville	Lexington	Bowling Green
January 2010	7.1 inches	9.4 inches	8.1 inches
February 2010	13.9 inches	12.1 inches	7.2 inches
March 2010	T	T	0.0 inches
April 2010	0.0	0.0	0.0 inches
November 2010	0.1 inches	0.4 inches	T
December 2010	6.2 inches	12.4 inches	8.3 inches
2010 total	27.3 inches	34.3 inches	23.6 inches

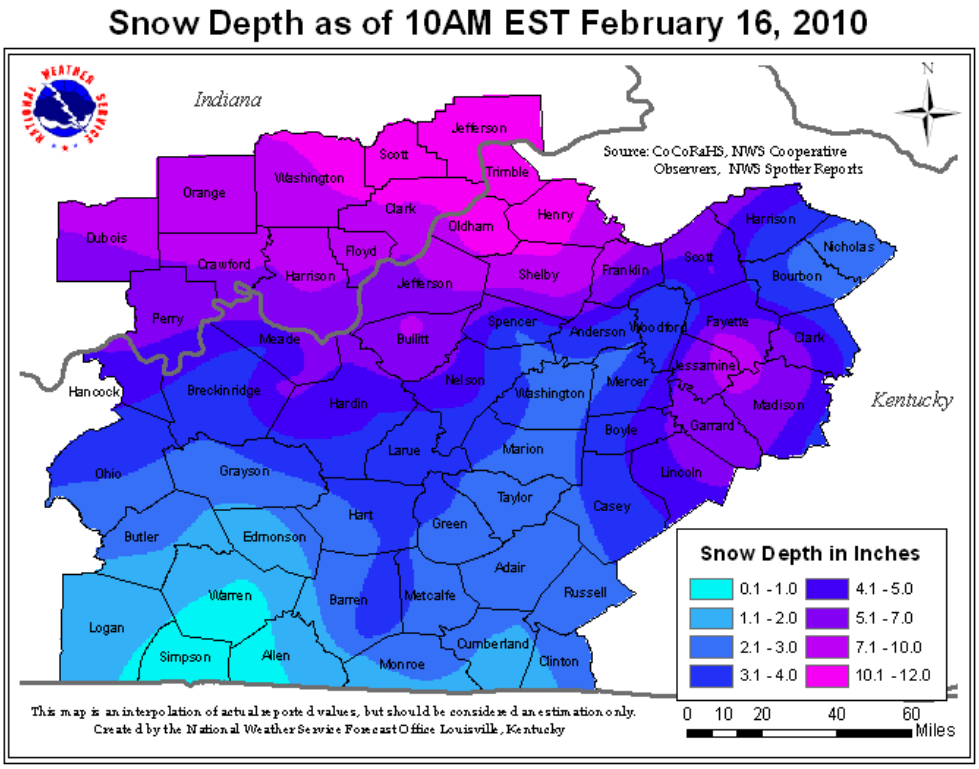
Winter….

The first couple of months of 2010 had below average precipitation, which is common during an El Nino winter. Both January and especially February had below normal temperatures and above average snowfall. Two winter storms of note are highlighted below.

The first storm developed on January 29th and took a southern track, bringing some of the heaviest single storm snow totals across our southern counties in several years. Bowling Green recorded over 5 inches. Other counties near Tennessee and Lake Cumberland averaged from 5 to 8 inches of snow. Below is a map showing snowfall from this storm.



On February 15, an Alberta Clipper tapped into moisture and took a path favorable for heavy snow over southern Indiana. Our far northern counties in Indiana such as Scott, Orange, and Jefferson received from 8 to 11 inches of snow.



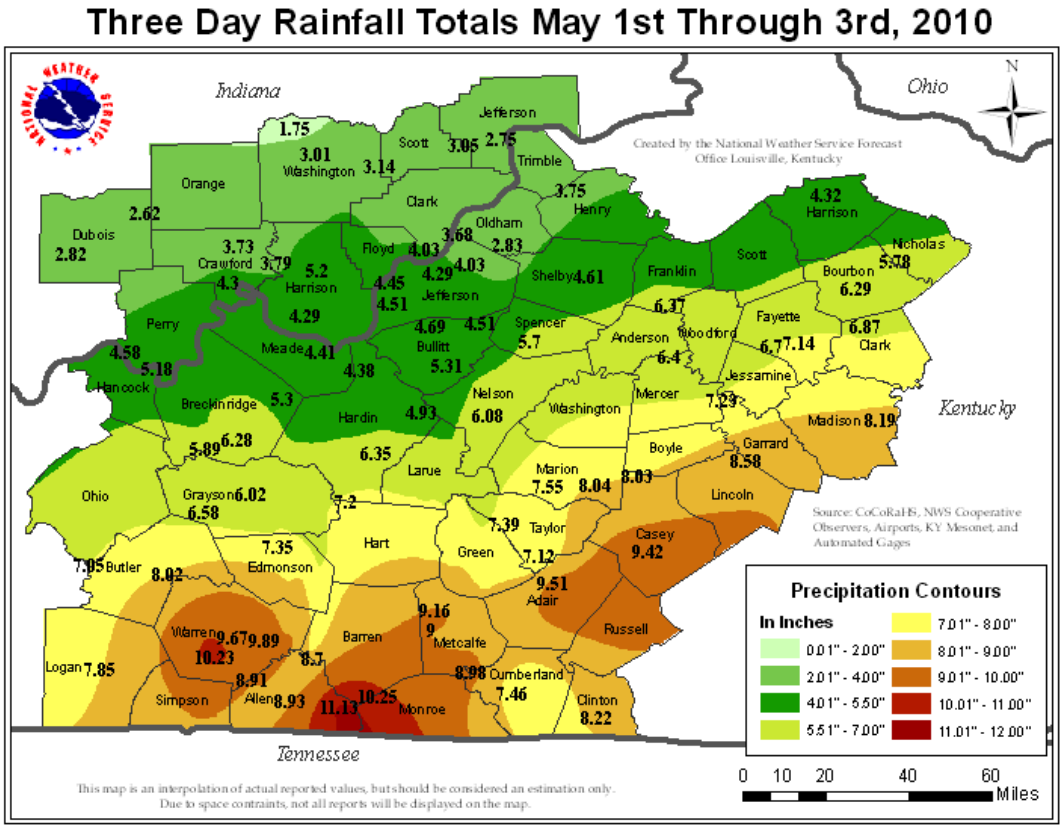
This image shows snow depth on February 16, 2010. Almost all of this snow fell during the early morning hours on the 15th.

The two pictures below are courtesy of Michael Sparks and Steve Gruebbel, respectively. The first image shows snow falling in Louisville. The second highlights drifting snow over a rural road in Franklin County.

Spring….

The heavy rains that fell May 1st and 2nd qualify as the most widespread damaging weather event of the year across central Kentucky. Over a two day period, rainfall totaled between 9 and 11 inches across our southern counties. At the Bowling Green Airport, rainfall totaled 9.66 inches on the 1st and 2nd. This set the record as the greatest 2 day rain ever recorded.

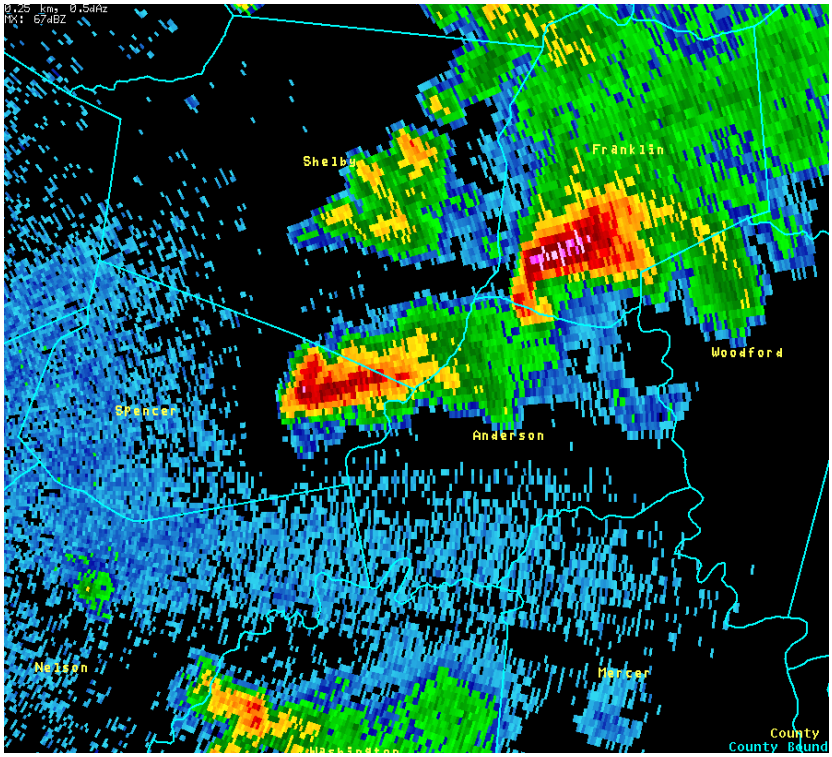
The image below shows rainfall distribution across the area during the first three days of May.



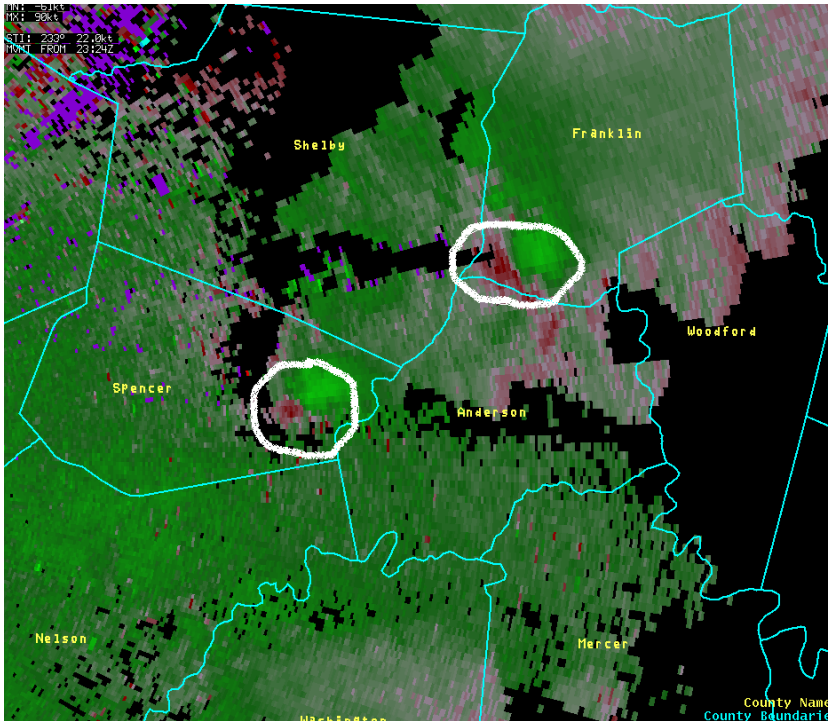
Extensive flooding resulted from this deluge. Some rivers such as Drake's Creek near Bowling Green and the Dix River in Boyle County reached their highest crests on record. The image below shows extensive flooding in LaRue County. Photo is courtesy of Kevin Harned.

Severe weather developed during the afternoon and evening of the 21st of May. One tornado touched down near Corners in eastern Breckinridge County. Prior to this, other supercells developed during the afternoon. Several dramatic pictures were taken of rotating mesocyclones and wall clouds that formed during the late afternoon across central Kentucky. The picture below was judged to be the most photogenic. This shows a well developed rotating wall cloud.

The two images below show how two of these supercells appeared on radar.



This radar image on the left shows a hook echo associated with the northeastern cell over southern Franklin County. The storm to the southwest over eastern Spencer County is a supercell as well.



This image shows weak rotation located within the white circles.

Summer….

This past summer was overall one of the warmest summers the Ohio Valley ever experienced. The graph below shows this past summer's rank, in terms of average temperatures for June through the 31st of August, for our three major airports.

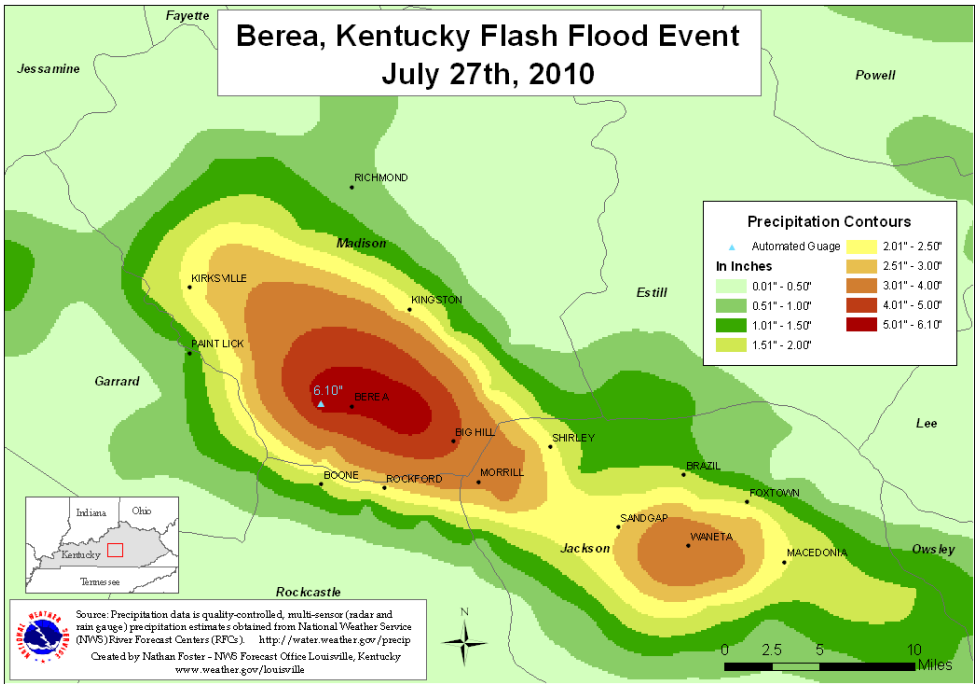
Location	**2010 Summer Average Temperature**	**Rank**	**Degrees Above Average**
Standiford Airport	82.3	1st (2nd… 80.9 in 1936)	+5.8 degrees
Lexington Airport	77.6	5th (1st… 79.6 in 1936)	+3.0 degrees
Bowling Green	80.6	3rd (1st… 82.4 in 1936)	+4.0 degrees

Tornado activity for 2010 was rather spotty with less than 10 recorded across central Kentucky and southern Indiana. No tornado brought greater than EF – 1 damage. One weak tornado was captured by this video as it moved across Adair County near Columbia. Despite its menacing appearance, this twister only brought EF – 0 damage, travelling on the ground for less than one mile.

Taken from a video courtesy of Daniel Wilson

This picture shows a funnel cloud over Lexington shortly before midnight on June 14th. Courtesy of John Bradshaw.

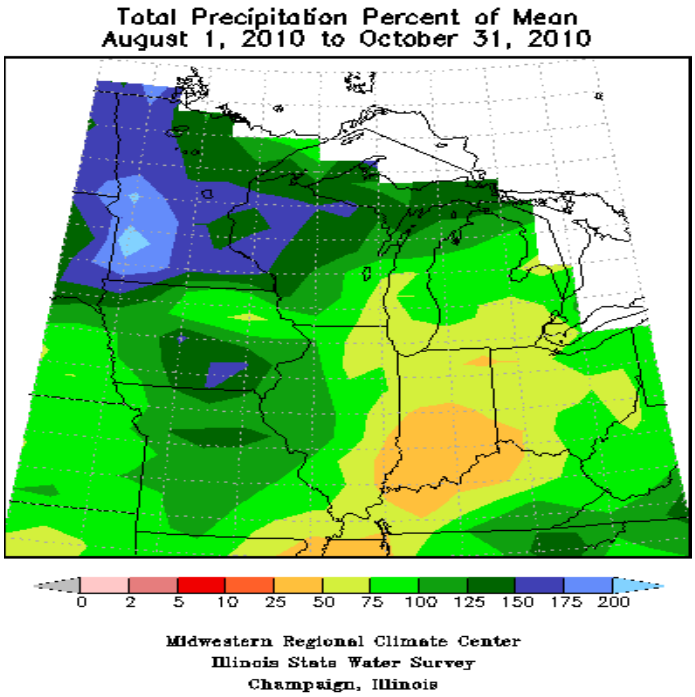
Perhaps this summer's most intense rain and worst flash flooding developed over Berea, in Madison County on July 27th. A line of thunderstorms trained over the city for several hours during the early afternoon, bringing 6 inches of rain. The resultant flooding required several water rescues and caused 800 thousand dollars worth of damage. The map below highlights the area where the greatest rains fell.



Flooding in Berea courtesy of WLEX News.

Fall….

Drought developed across the region during the fall. Unusual dryness began across southern Indiana, where very little rain fell during the month of August. A near record dry September exasperated drought conditions. By October, southern Indiana and northern Kentucky along the Ohio River experienced severe drought.



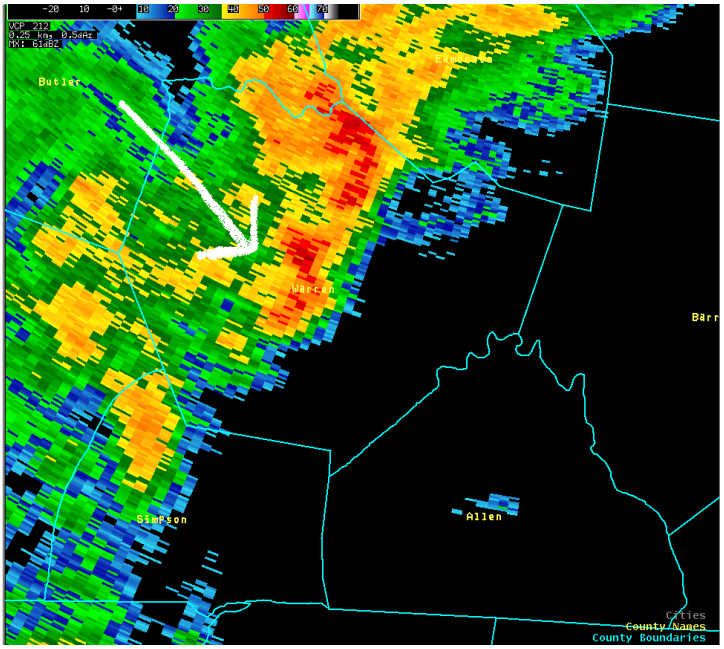
This map on the left shows total rainfall for August through October as a percentage of normal. Southern Indiana, with only 25% to 50% of average rainfall over this period, became the epicenter of severe drought.

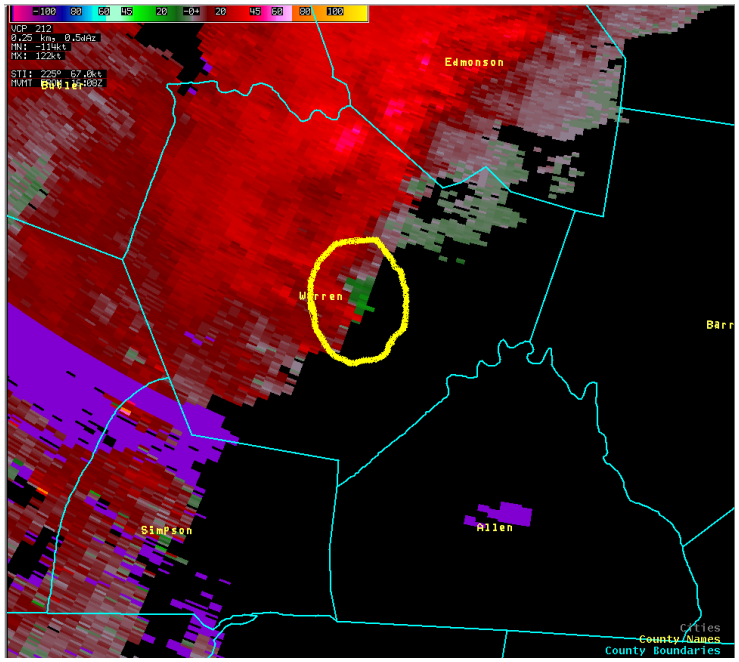
This chart below highlights several interesting features about our temperatures this past October that really illustrates our abnormally dry conditions. Dry ground combined with frequent clear days and nights to produce unusually wide diurnal temperature ranges during the month. Bowling Green for example averaged 5.9 degrees above normal for the month of October during the day…but was actually slightly cooler than normal during the night! Wide diurnal temperature ranges are normally consistent with an arid climate like the desert or the western Great Plains, not the Lower Ohio Valley!

Location	October Rainfall	2010 Departure	Average Oct. High	2010 Departure	Average Oct. Low	2010 Departure
Louisville	1.04	-1.64 in	68.4	+ 7.7	48.5	+ 1.7
Lexington	1.24	-1.36 in	66.9	+ 4.9	46.4	- 0.5
Bowling Green	1.84	-1.22 in	70.1	+ 5.9	45.7	-0.5

With such a dry fall, severe weather was scarce. However, on October 26th, a squall line produce several tornadoes and scattered wind damage as it moved across the entire region during the early afternoon. The strongest tornado rated an EF-1 ranking with estimated winds around 90 mph as it touched down just southeast of Bowling Green.

The two images below shows the tornadic storm. The first image below shows a notch where one section of the storm bulged outward ahead of the rest of the storm. This can indicate circulation. The colors in the 2nd image below shows storm relative motion. The rotation is apparent within the circled area.





The image to the left shows damage caused by this EF-1 tornado that struck just southeast of Bowling Green.