



Eye on the Sky

National Weather Service
Louisville, Kentucky

Fall 2000
Volume 1, Issue 3



A Newsletter for Emergency Managers and Core Storm Spotters within our County Warning Area.

New MIC Chosen for NWS Louisville

With the retirement of Marvin Maddox as Meteorologist-in-Charge (MIC) at NWS Louisville in June 2000, the search for his replacement occurred during Summer 2000. In August, Marvin's successor was named. Michael Matthews was chosen as new MIC, effective the week of September 11, 2000.

Mike spent 7 years in the U.S. Air Force where he served in the Air Weather Service. He then worked a year in the private sector, before starting with the National Weather Service as a meteorological technician in Cape Hatteras, North Carolina in 1982. In 1986, Mike transferred to the office in Richmond, Virginia, where he became a forecaster. From there, he served

as a meteorological instructor at the NWS Training Center in Kansas City in 1994, before transferring to NWS Central Region Headquarters as the Applied Technical Services Meteorologist. In 1996, Mike was selected



Retired NWS Louisville MIC Marvin Maddox (left) and new MIC Mike Matthews (right).

as MIC at the NWS office in Jackson, Kentucky where he helped "spin-up" the office to full forecast and warning responsibility. In 1998, he accepted the position of Public Program Manager at the NWS Headquarters in Silver Spring, Maryland. He now will become the MIC at NWS Louisville in September 2000. Mike has bachelor's degrees in business, public administration, and meteorology, and is working on a master's degree in public administration.

We welcome Mike to his new position at Louisville to join a dedicated, hard working staff that has strived to excel in all aspects of the forecast and warning program in the past.

The 2000 Severe Storms Season: An Early Look Back

by Norm Reitmeyer, Warning Coordination Meteorologist and Ted Funk, Science Officer

In Kentucky and southern Indiana, severe weather season generally consists of the months of April, May, and June. However, severe weather can and has occurred during every month of the year.

So far in 2000, 7 tornadoes have been verified across central Kentucky and one tornado in south-central Indiana. The Indiana tornado touched down

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Wild Fires Rampant out West: Can They Occur Here?

by Joe Ammerman, Forecaster

Wild land fires have been very much in the news lately. As of mid August, over 60,000 fires had burned about 4 million acres this year. Most of the fires this summer have occurred in the western United States. The extreme fire season can be attributed to a persistent ridge of high pressure over the western states. High pressure causes air in the atmosphere to sink toward the surface, causing the air to become warmer and drier. As a result, afternoon surface temperatures have reached into the 90s and even lower 100s with relative humidity values in some locations below 10 percent. In addition, many of the fires have occurred on the periphery of the ridge where the hot, dry air has interacted with weak fronts containing Pacific Ocean moisture that has traveled over the mountains. Thus, "high-based" thunderstorms form, whose base or bottom normally are above 10,000 feet. Because the atmosphere is so dry below this level, rain falling from the clouds evaporates before reaching the ground. However, lightning strikes still occur, many of which reach the ground and ignite fires.

While the news recently has covered the western fires, we can experience wild land fires in Ken-

tucky and southern Indiana as well. There are two times during the year when fires are most likely to occur. The spring fire season runs from mid February to mid April; the fall fire season occurs from October to mid December. Fires during the spring occur before the grass has had a chance to green up and before trees sprout new leaves. The fall season usually is more severe and occurs after the first hard frost. Leaves have begun to fall off the trees and the grass has cured out. Most fires in Kentucky and southern Indiana are started by humans. Some are accidental and started when people burn leaves and trash, and the fire gets out of hand. Others are started intentionally just to create problems for state and federal fire fighters.



During the spring and fall fire season, the National Weather Service in Louisville provides fire weather forecasts to state and federal land agencies. The forecasts are tailored to the needs of wild land fire fighters. The forecasts include sky condition, minimum and maximum temperature and humidity values, wind speeds at 20 feet off the ground, and precipitation amounts. These forecasts can be found on our Web site at www.crh.noaa.gov/lmk/firewx.htm.

Drought 2000: An Update

by Mike Callahan, Service Hydrologist

Are we still in a drought? That is the question on many peoples' mind. Looking at plants, one might be tempted to say "no." In general, lawns still are rather green (although short-term dryness can change that), gardens are growing, and crops in the fields generally look good. Thus, presently we are not really in a short-term or agricultural drought. However, following the discussion of drought in the last newsletter, the condition of plants only tells half of the story.

We entered this year with a precipitation deficit of over 7 inches around Louisville, about 13 inches



near Lexington, and about 14 inches in Bowling Green. Those deficits did not get wiped out just because the calendar rolled over to 2000. For the year-to-date (through mid August), Louisville and Lexington's total precipitation amounts were near normal, while precipitation at Bowling Green was below normal.

As result, the measure we use for determining long-term, or water supply drought, the Palmer Drought Severity Index, indicates that central Kentucky, including Louisville and Bowling Green, and the Bluegrass Region, including Lexington, are in a mild drought. A dry fall could result in worsening drought conditions. Meanwhile, a large precipitation deficit did not exist across south-central Indiana at the end of 1999, so currently the drought is over in this area.

Several communities in Kentucky still are having problems with low drinking water supplies as a

result of the drought. Several farmers in the drier locations have remarked how hard the ground is after they dig down a foot or two. This is another indicator that the long-term drought is not over for Kentucky.

What can we expect this fall? Unfortunately, the latest prediction for the Ohio Valley calls for precipitation to average below normal for central Kentucky and southern Indiana. Since fall is usually the driest time of the year, it looks like the drought in Kentucky still will be with us going into the winter. The silver lining here is that we are at least in better shape drought-wise than this time last year.

Eye on the Sky is a quarterly newsletter published by NWS Louisville for the benefit of the Emergency Managers and core spotters within our county warning area. Comments and suggestions are welcome. Please contact us by mail or email at w-lmk.webmaster@noaa.gov

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Ted Funk and Van DeWald
Chief Editors

The Kentucky Colorfall Forecast

by *Larry Dattilo, Data Acquisition Program Manager*

With fall and cooler weather just around the corner, it will not be long before leaves on trees begin to change color. Colorful trees can make for a picturesque drive across the countryside. However, it is important to know the status of the color in order to plan the most opportune time for sightseeing. Therefore, this fall the National Weather Service in Louisville again will broadcast the Kentucky Colorfall forecast on NOAA Weather Radio. The Colorfall report details current leaf conditions across the state, including the species of trees in color and the percentage of



color observed. In addition, a prediction is given of when peak color conditions are expected throughout Kentucky. The report is issued by the Kentucky Department of Travel using information gathered by volunteers across the state.

Our broadcast of the Colorfall report on NOAA Weather Radio likely will begin sometime in September and continue through the end of the color season (usually late October). In years past, for each week we received the report, it was broadcasted every Thursday and Friday from 10 AM to noon EDT and again from 5 to 7 PM EDT.

For more information, call the Kentucky Department of Travel. They will be happy to furnish you with a list of events and festivals throughout the state during the fall season.

Coming This Fall: Frost, Freeze, and the End of the Growing Season

by *Rob Cox, Forecaster*

As seasons change and summer turns into fall, cooler weather will begin to filter into the Ohio Valley. When this occurs, the protection of plants and flowers will become a concern as the growing season draws to a close. The official end of the growing season will be on Sunday, October 29, the same day clocks are turned back an hour to Eastern Standard Time (EST) and Central Standard Time (CST).

The National Weather Service in Louisville issues Frost and Freeze advisories to inform you when plants and flowers need protection prior to the

end of the growing season. These advisories are not issued after the official end of the growing season, even if vegetation still is alive or cold air threatens. The average time for the first occurrence of 32 degrees or lower in Kentucky is late October. The definitions below clarify the differences between a Frost and Freeze advisory.

The official end of this year's growing season will be on Sunday, October 29.

A Frost advisory is issued when the temperature of objects such as cars, trees, roofs, and the ground is expected to fall below 32 degrees Fahrenheit. These objects lose heat faster than the surrounding air; in fact, the air temperature at 5 feet

above the ground (the standard observing height) can be several degrees warmer than these objects. If the frost period is severe enough, it is called a "killing frost" which can end the growing season prematurely.

A Freeze advisory is issued when the air temperature at 5 feet above the ground is expected to be below 32 degrees Fahrenheit over a widespread area for a significant amount of time. A freeze may or may not be accompanied by frost depending on wind speed and moisture content of the air. If the temperature falls low enough, then a "killing freeze" may occur, which can kill all but the hardiest crops.

Here are some tips to protect your plants if the National Weather Service issues a Frost advisory.

1. Water your garden thoroughly before night-fall. Soil moisture released into the air around your plants overnight may keep the air slightly warmer.
2. Use an electric fan to circulate air around

your plants to prevent frost from forming on them.

3. Cover your plants. To do so, create a tent with stakes placed around your plants, and newspapers, cardboard, plastic tarps, bed sheeting, or any other lightweight material draped over the stakes. If you cannot make a tent, then lay a lightweight material over the plants. This helps to slow the loss of heat from your plants. Remove the covering in the morning after the sun has melted the frost.

If a Freeze advisory is issued, the following steps can be followed.

1. Bring tender vegetation indoors if possible to protect them from the cold.
2. Cover your plants by creating a tent and draping cloth material over the stakes. Make sure that your cloth does not touch the leaves.
3. Spread mulch around the roots of your plants and make sure that the soil remains moist.

What Makes a Thunderstorm Severe?

by Ted Funk, Science Officer

Since thunderstorms can occur anytime during the year, it is important to remember the 3 criteria that classify a thunderstorm officially as severe. These include 1) large hail 3/4 inch in diameter or larger, 2) straight-line winds of 50 kts (58 mph) or more, and 3) the existence of a tornado. Certain types of wind damage, e.g., trees and power lines down, roofs blown off, etc., also make a storm severe. Radar-indicated or reported damaging wind and/or large hail require the issuance of a severe thunderstorm warning, while a tornado (observed or radar-indicated) requires a tornado warning.

On the other hand, very heavy rain and lightning also can pose a significant threat, but technically are not severe criteria. Thus, they do not warrant issuance of a severe thunderstorm warning. However, if the rain causes flash flooding, then a flash flood warning would be issued. There is no official warning for lightning as all thunderstorms, severe or not, produce potentially dangerous lightning. Therefore, it is imperative to follow lightning safety rules when a storm is nearby.

At right are lists of different hail sizes related to physical objects, and the impact of various wind speeds. Use this information as a guide when reporting severe weather phenomena to local law enforcement or to the National Weather Service.

Hail Size

- 1/4"
- 1/2"
- 3/4" (Severe Criteria)
- 7/8"
- 1"
- 1 1/4"
- 1 1/2"
- 1 3/4"
- 2"
- 2 1/2"
- 2 3/4"
- 3"
- 4"
- 4 1/2"

Description

- Pea Size
- Marble Size
- Dime Size
- Nickel Size
- Quarter Size
- Half Dollar Size
- Ping Pong Ball Size
- Golf Ball Size
- Hen Egg Size
- Tennis Ball Size
- Baseball Size
- Teacup Size
- Grapefruit Size
- Softball Size

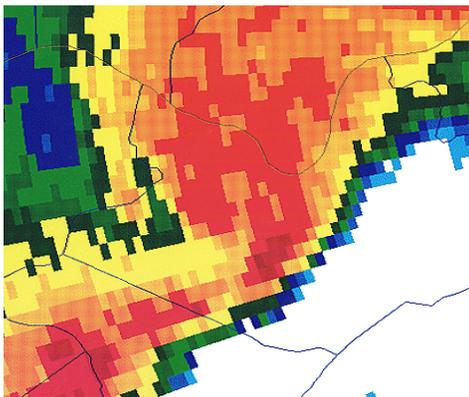
Wind Speed

- 25-31 mph
- 32-38 mph
- 39-54 mph
- 55-72 mph
- 73-112 mph
- 113-157 mph

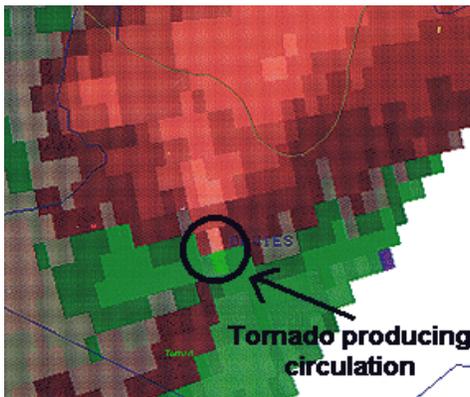
Description

- Large branches in motion; whistling in phone wires.
- Trees in motion; difficulty in walking against the wind.
- Twigs break off trees; wind impedes progress.
- Damage to chimneys and TV antennas; wind pushes over shallow-rooted trees.
- Peels off roofs; windows broken; light mobile homes pushed or overturned; moving cars pushed off road.
- Cars lifted off ground.

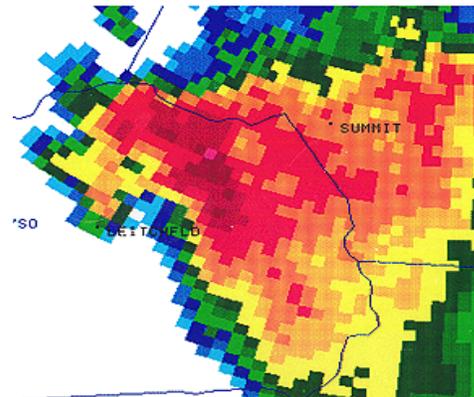
The 2000 Severe Storms Season: An Early Look Back (Continued from page 1)



WSR-88D Doppler radar reflectivity image showing a bowing line of thunderstorms (bow echo) on January 3, 2000 that produced a damaging tornado in Owensboro, Kentucky.



WSR-88D storm-relative velocity image showing a tornado producing circulation (within the circle) over Owensboro, Kentucky on January 3, 2000. This image corresponds to the reflectivity image at left.



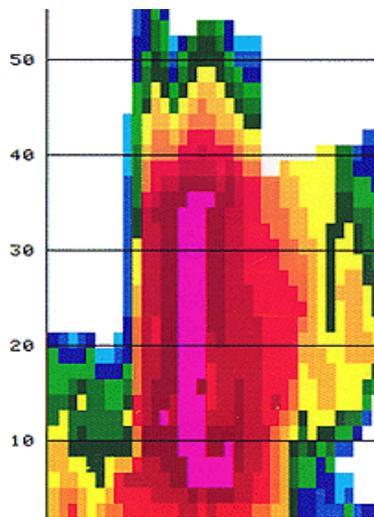
Reflectivity image showing a large supercell thunderstorm on May 23, 2000 that produced a damaging tornado in Leitchfield, Kentucky. Large hail and heavy rain occurred just east of the tornado.

briefly on January 3rd in southern Washington County, just north of Fredericksburg, and destroyed a mobile home. However, a much stronger tornado occurred that day in Owensboro, Kentucky, which produced winds up to 180 mph and F3 damage. A total of 1200 homes and businesses sustained damage, nearly half of which was severe, while about 100 were destroyed. The total damage estimate was 65 to 70 million dollars.

Although snow is much more likely to occur in early January than tornadoes, January 3rd will go down as one of the highlighted severe weather days in the year 2000. In addition, this event verifies the contention that severe weather can occur in Kentucky and south-central Indiana during any month of the year.

Another noteworthy severe weather day in Kentucky was May 23, 2000. On this date, a supercell tornado roared through Leitchfield in Grayson County and produced F3 damage and winds up to 175 mph. A number of houses were severely damaged and a few virtually destroyed, while some factories also experienced extensive damage. The tornado then dissipated as it crossed into adjacent Hart County. Total damage was estimated over 5 million dollars. Other weak tornadoes (F0 intensity) that day touched down briefly at Burdick in Taylor County south of Campbellsville, near Auburn in Logan County, and in Bowling Green. Large hail (1-2 inches in diameter) also occurred across parts of central Kentucky on May 23.

On April 20th, tornadoes touched down in eastern Washington and Mercer Counties in east-central



Reflectivity vertical cross-section showing the vertical structure of the supercell storm that produced the Leitchfield, Kentucky tornado on May 23, 2000. A very deep core of large hail and very heavy rain was present to above 40,000 feet (red and pink colors) with a storm top over 50,000 feet high.

Kentucky, causing F1 damage to a few mobile homes, a tobacco barn, roofs of houses, and numerous trees. In addition, an F0 tornado occurred briefly in the western portion of Clinton County west of Albany in south-central Kentucky. Finally, a weak tornado (F0) touched down briefly on July 5th near Little Texas in the extreme southwestern part of Fayette County, Kentucky.

This year has produced a few episodes of severe weather, but the season still has been less active compared to a few years in the middle to late 1990s. What will the rest of 2000 and the severe weather season in 2001 produce? No one really knows, so it is important to always be ready to respond if a severe thunderstorm or tornado threatens your area. Always know your safety rules for hazardous weather.

Internet Homepage Highlights

by Van DeWald, Forecaster

If you are a frequent visitor to our Internet Homepage (www.crh.noaa.gov/lmk), you probably have noticed a few changes over the last 2 months or so. All National Weather Service Central Region offices completed an extensive upgrade to a standardized format, providing a consistent navigational scheme from office to office. The colors, graphics, and backgrounds may be different, but the overall layout basically is the same. Within the coming year, National Weather Service Web sites nationwide will implement a similar standardized format. Thus, if you are surfing the Louisville, Kentucky; Sacramento, California; or Portland, Maine sites, for example, each site's page architecture should remain the same.



Our Web site provides comprehensive weather information and education. However, in the coming months, you may also begin to see additional content on our site as we try to implement fresh ideas and new concepts. One recent addition is graphical 5-minute Automated Surface Observing System (ASOS) data from 5 sites across Kentucky, including Lexington, Frankfort, Bowling Green, and the two airports in Louisville. A 24-hour floating window of data is available. Graphs are updated once each hour, including temperature, dewpoint, relative humidity, air pressure, wind direction and speed, ceiling height, visibility, heat index or wind chill, and precipitation.

And don't forget, you also can submit storm reports to us via the Internet. This is a very efficient, confidential method to convey storm information after the fact, including explicit times and locations, and details about observed storm phenomena and any damage.

NOAA Weather Radio 2000

by Steve Marien, Forecaster

In June 1999, NWS Louisville implemented new equipment and procedures for automating NOAA Weather Radio (NWR) broadcasts. This personal computer-based broadcasting console, known as the Console Replacement System (CRS), automates the process of broadcasting weather information on NWR. The CRS automatically translates written NWS products into computer synthesized voice messages and schedules them for broadcast on NWR.

The CRS brings many benefits to the NWR network. First, the technology significantly reduces the number of products NWS staff members must record manually on NWR allowing them more time to devote to critical warning and forecast duties. Second, NWS offices will be able

to air routine forecasts and other information, such as river data, climate summaries, etc., on a more regular, timely schedule. This will make it easier for listeners to tune to NWR at particular times for needed information. Third, the CRS is capable of transmitting multiple warnings simultaneously, dramatically speeding up the broadcast of warnings during severe weather events. Fourth, hourly weather conditions always are created at the same time every hour and then transmitted, even as forecasts and warnings are recorded simultaneously. Most importantly to you, our listeners, CRS technology does not require any changes to the weather band receivers you own currently, or those available for purchase in consumer electronic stores.

Currently, the CRS at NWS Louisville broadcasts forecasts, statements, hourly weather, and climate reports automatically. In

the near future, severe weather watches, warnings, and emergency broadcasts also will change from manual to automated transmission over NWR. Below is a list and brief description of the normal programming schedule on NWS Louisville's NOAA Weather Radio.

Regional Weather Synopsis:

Summarizes the weather for the next 12-24 hours across the Ohio and Tennessee Valleys, including Kentucky and Indiana.

Local 5 Day Forecast:

Valid for the NOAA Weather Radio listening area.

Hourly Weather Roundup:

Summarizes current weather conditions for cities across Kentucky and surrounding states.

Short Term Forecast:

Forecast valid for the next 0-6 hours. Updated as often as nec-

essary to reflect changing weather conditions and to enhance the local forecast.

Climatic Information:

Includes temperature and precipitation data, climatological normals, and other information.

River Summaries:

Stage and forecast information for the Ohio River and other river, reservoir, and lake data.

Other programming information as needed includes the following products.

Public Information Statements:

Give extra value added information, such as announcements, climatological anomalies, etc.

Severe Storm and Flash Flood Watches, Warnings, Statements:

Important information regarding the potential for and existing severe storms, tornadoes, and flash flooding.

Winter Storm Watches, Warnings, and Advisories:

Important information regarding the potential for and existing hazardous winter weather.



One of two PCs that comprise the CRS at NWS Louisville. From the PC, broadcasted weather information can be programmed and monitored. Meteorologists also can record weather messages manually if needed.

The capabilities of CRS and the products it broadcasts allow NWR to be your most dependable source for accurate and up-to-date weather information.

Specific Area Message Encoder (SAME)

The NWS also has implemented new NWR technology that allows listeners to receive only the warnings, watches, and other information which they desire. This technology, called the Specific Area Message Encoder

(SAME), allows broadcast of all NWR products, but adds a digital code that enables specially built receivers to receive only the information the listener chooses. This way the listener can receive severe warnings, watches, and statements only for the county he or she lives in, if desired, and not information for other counties in the NWR broadcast area.

All current and older weather radios will continue to receive all information from the NWS's CRS, but only radios with the SAME capability can be programmed to receive only specific county information. Since SAME codes are fully compatible with the FCC's Emergency Alert System, it is possible that in the near future new television sets, pagers, cellular phones, and other electronic devices will be able to receive these SAME coded messages.

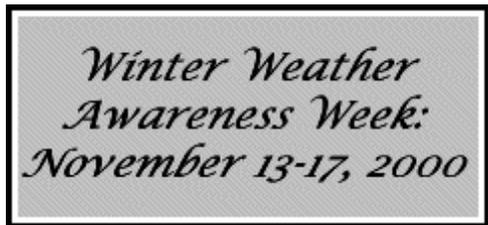
These new receivers are available at local electronics stores in your area. If you have purchased a weather radio with the SAME capability and desire to program it for specific counties, you will need the proper county codes (FIPS). County codes and weather event codes should be included in your purchase.

Winter Weather Awareness Week Set for November

by Ted Funk, Science Officer

Every November, we prepare for the upcoming winter season by designating a Winter Weather Awareness Week for central Kentucky and south-central Indiana. This year, the week of November 13-17 has been chosen. During this time, NWS Louisville will issue public information statements and safety rules concerning hazardous winter weather, including heavy snow, sleet, freezing rain, and very cold temperatures and wind chills. This in-

formation will be broadcast periodically over NOAA Weather Radio. Winter Weather Awareness Week is a good



time for you to review your safety rules and prepare for the winter season.

More details concerning winter weather products we issue, winter weather advisory and warning criteria, and snowfall climatology will be forthcoming in the Winter 2000 issue of *Eye on the Sky*.

Climatological Calendar: A Look Back and Ahead

by Chad Swain, Forecaster

The climatological calendar reviews temperature and precipitation data from recent months past and those expected in the near future. In this issue, we discuss late Spring and Summer 2000 and look ahead to Fall 2000.

The weather across south-central Indiana and central Kentucky was warmer and drier than normal in late spring and early summer. However, mid summer average temperatures fell below normal. Since spring and summer are dominated by the scattered nature of convective-type precipitation (i.e., thunderstorms), rainfall amounts across the area typically exhibit large variations. In other words, one location may experience heavy rain one day, while a nearby location receives little or no precipitation. These variations are apparent in data from Louisville, Lexington, and Bowling Green.

May 2000 produced warm temperatures, with reporting sites averaging 2-3 degrees above the monthly normal values. In addition, Louisville and Lexington received 1-2 inches below normal rainfall, while Bowling Green received an inch of rainfall above the normal value.

June also averaged warmer than normal, but to a lesser extent than May. Monthly temperatures averaged 0-1.5 degrees above normal, while rainfall at Louisville and Lexington also was above normal. Precipitation data at Louisville shows just how variable rainfall amounts can be during summer. At our National Weather Service office, June's rainfall total was 3.88 inches above normal, while at Louisville International Airport located 6 miles away, the monthly total was only about 0.5 inch above normal. Likewise, Lexington only received about 0.25 inch above normal rainfall. In contrast, Bowling Green was quite dry with rainfall about 2.5 inches below normal.

Unlike last year, temperatures in July 2000 averaged below normal, with Louisville and Lexington about 2 degrees below normal, and Bowling Green 0.5 degree below normal. All 3 stations experienced below normal precipitation, although Bowling Green was the driest. Louisville ended up 0.5 inch below normal, Lexington just over 1.5 inches below normal, and Bowling Green nearly 3 inches below.

Through the first half of August, Lexington and Bowling Green averaged 0.5-1 inch above normal rainfall, while Louisville averaged the same amount below normal. Temperatures at all 3 locations averaged near or slightly above normal through mid August.

Looking ahead to the fall, the outlook for September through November calls for the area to experience near normal temperatures and below normal precipitation. The chart below shows normal values for the specified stations during September, October, and November.

Reporting Station	Normal High/Low Temperatures				Normal Monthly Precipitation			
	<u>Sept. 1</u>	<u>Oct. 1</u>	<u>Nov. 1</u>	<u>Dec. 1</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Louisville	84/63	75/52	63/41	50/33	3.16"	2.71"	3.70"	3.64"
Lexington	82/62	73/52	61/41	49/32	3.20"	2.57"	3.39"	3.98"
Bowling Green	85/63	76/52	64/41	52/33	3.72"	3.02"	4.43"	5.03"

Astronomical Calendar

Month	New Moon	First Quarter	Full Moon	Last Quarter
September	Sept. 27	Sept. 5	Sept. 13	Sept. 21
October	Oct. 27	Oct. 5	Oct. 13	Oct. 20
November	Nov. 25	Nov. 4	Nov. 11	Nov. 18

Fall Equinox (Start of Fall): September 22 at 1:27 PM EDT
 Winter Solstice (Start of Winter): December 21 at 8:37 AM EST

NWS Mission: *“The National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters, and ocean areas for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.”*

Newsletter Feedback

We have now completed the third issue of our Newsletter, Eye on the Sky. We would really appreciate hearing a few comments from our readers. In each quarterly issue, we have tried to concentrate on the weather phenomena that are appropriate for the season. Our next issue, due December 1, will include articles related to the winter season.

Are there other topics you would like us to discuss? Do you find this publication helpful? Is the information provided useful, pertinent, and interesting? If you have Internet access, please take a couple of moments to fill out our customer survey at www.crh.noaa.gov/lmk/newsletter_survey.htm. If not, then please drop us a note in the mail (our address is located within the newsletter) or call us at 1-502-969-8842 to let us know how we are doing. Your comments are very important to us. This will allow us to better serve you. Thank You.

Regards,
The Newsletter Team
NWS Louisville