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## Indiana State Climate Office

### Monthly Weather Report

**Sep 12, 2016**



<http://www.iclimat.org>

## August 2016 Climate Summary

### Month Summary

Hot but tranquil weather the first half of August transitioned to a tormented second half with record August tornado outbreaks, 9 severe weather days, and torrential local rainfall. A new August record of 22 confirmed tornadoes was set, smashing the old record of 6 tornadoes. Amazingly there was extensive property damage but no deaths or serious injuries reported. A 33 day warm spell finally ended on August 21<sup>st</sup>. August entered the record books as the 2<sup>nd</sup> wettest August on record and among the top ten warmest.

The August state average temperature was 76.0°F. This is 3.4°F above normal and the 10<sup>th</sup> warmest August on record. The 9<sup>th</sup> warmest was August 1988 with its 76.2°F average temperature. More recently August 2007 was the 7<sup>th</sup> warmest at 76.9°F. August 1995 came in as 3<sup>rd</sup> warmest with 77.9°F. The warmest August on record was in 1947 with a scorching 78.7°F average. The day split in August 2016 was 3 days of below normal temperature, 28 days above normal, and no days at normal. There were no large daily deviations in temperature as no days were at least 10°F warmer or cooler than normal. The highest temperature of the month was 99°F on August 25<sup>th</sup> at Paoli and the coolest was 50°F on August 23<sup>rd</sup> at Crawfordsville 6se.

The August state precipitation average was 6.43", a whopping 2.64" above normal. This places August 2016 as the 2<sup>nd</sup> wettest August on record. Only the 6.85" state average in August 1977 was wetter since state records began in 1895. The heaviest one day precipitation among cooperative stations in August 2016 was 10.24" on August 16<sup>th</sup> at North Judson 3s. The highest among CoCoRaHS stations was 8.95" that same day at Walkerton 4.1ene. The largest month total precipitation in the cooperative network was 14.51" at North Judson 3s. In the CoCoRaHS network the heaviest was 17.09" at Hebron 3ssw. Widespread precipitation fell on about 16 days this month.

Regionally August 2016 precipitation was near 170% of normal in each of northern, central, and southern Indiana. Normal August precipitation ranges from 3.6" in east central to 4.0" in west central Indiana.

Moderate drought developed in a few counties of northeast Indiana early in the month during the long warm spell. This was the first drought in Indiana since the year began. Yet abnormally dry spots in central Indiana gradually disappeared in late August as heavy rains drenched this part of the state.

## August 1<sup>st</sup> – 7<sup>th</sup>

Daily mean temperatures persisted above normal throughout this opening week of August. Light rain was reported on all but one day with the heaviest amounts in the southern third of the state. Soil moisture deteriorated with the introduction of moderate drought (D1 category) in northeast Indiana, the first instance of drought in Indiana since December 29<sup>th</sup>. Crops and livestock became stressed due to hot weather with little widespread rainfall. No severe weather was reported this week.

The state temperature averaged 2°F above normal on August 1<sup>st</sup>. A stationary front was positioned at the Ohio River where it remained through the next day. On August 2<sup>nd</sup> the state temperature edged up slightly to 3°F above normal. A new cold front stalled in Wisconsin on August 3<sup>rd</sup>, leaving Indiana between two stationary fronts. The state temperature rose to 4°F above normal.

A high pressure ridge over Vermont spread westward the next day, forcing the two fronts into retreat away from Indiana. The state temperature peaked at 6°F above normal with very little rain and mostly sunny skies. High pressure from western Canada pumped cooler air into the Dakotas on August 5<sup>th</sup>. The leading edge of the cooler air was marked by a cold front in Michigan and Illinois. Indiana and states to the east were entrenched in the warm air sector. The Indiana state temperature hung on to its weekly peak at 6°F above normal.

The cold front traveled through Indiana early on August 6<sup>th</sup> but was again halted along the Ohio River as a stationary front. The state temperature fell to 4°F above normal in the cooler air. A Canadian ridge nudged the stationary front further south into Tennessee the next day, clearing Indiana skies. Cooler air continued to filter into the state dropping the daily temperature to 1°F above normal.

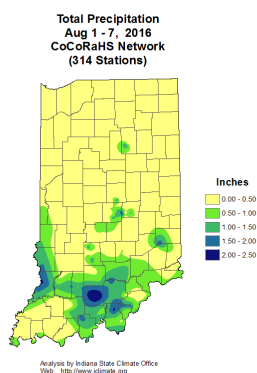
Overall for the week the state temperature averaged to 4°F above normal. Typically at the start of August the daily maximum temperature should range between 82°F in far northern counties to 88°F in the southwest corner of the state. Daily minimums normally vary between 63°F and 67°F north to south across the state. The warmest temperature of the week among cooperative network stations was 94°F at Brookville on August 4<sup>th</sup>. The coolest temperature for the week within the same network was 54°F at West Lafayette 6nw on August 7<sup>th</sup>.

Light rain was reported on all but the last day of the week. It did not rain statewide on any day. Totals were light in northern and central Indiana and in the extreme southwest portion of the state at generally under a half inch. In Knox, Lawrence, and Scott counties generally the heaviest totals were noted at 2" to 2.5". Elsewhere in southern Indiana between 0.5" and 2.0" sums were common.

The heaviest single daily amounts were measured on August 5<sup>th</sup> and 6<sup>th</sup> and included 2.67" near Fort Wayne, two reports of 1.96" and 1.76" in Batesville, 1.91" in Cumberland, and 1.60" at Wabash. Some of the largest week totals were Paoli with 2.74", New Salisbury at 2.14", and Cumberland with 1.91". Batesville came in with 1.80", and near Shoals the gage caught 1.60". Regionally only a few hundredths inch of precipitation were tallied on average in northern Indiana, less than 0.2" in central, and 0.9" across southern Indiana. These amounts equate to about 5% of normal in the north, 20% of normal in central areas, and 80% of normal in southern Indiana.

Soil moisture conditions worsened in northeast Indiana according to the August 9<sup>th</sup> edition of the US Drought Monitor. For the first time this year moderate drought was found in Indiana: in parts of Steuben, Lagrange, Elkhart, Kosciusko, Noble, DeKalb, and Allen counties. The existing abnormally dry (D0 category) area was expanded to include all of Steuben, DeKalb, and Elkhart counties, and additional parts of St Joseph, Marshall, Allen, and Kosciusko counties. In central Indiana all former D0 areas were removed. The net result was a 3% area deterioration into moderate drought, and a 2% improvement in abnormally dry coverage. There was minimal change in normal soil moisture coverage from a week earlier.

The USDA Indiana Crop Weather report for August 8<sup>th</sup> stated that corn and soybeans were certainly under stress in the hot weather with spotty rainfall. Farmers continued running irrigation wide open. Hay has slowed its growth and another cutting has stalled. Heat and poor pasture conditions have stressed livestock. Weeds were growing rapidly. Crops planted on sand were especially suffering. Leaves were dropping early in corn and stalks firing. Some soybeans were aborting their blossoms in the driest areas. Soybeans were in a critical stage of growth at the time.



## August 8<sup>th</sup> – 14<sup>th</sup>

August 14<sup>th</sup> marked the 27<sup>th</sup> consecutive day of above normal daily state temperatures in Indiana. Rainfall was recorded the last 5 days of the week with the heaviest amounts coming near the end with the only frontal passage. There were no days when rain fell statewide and no severe weather. Soil moisture improved in parts of east central and northeast Indiana with some removal of abnormally dry areas. Crops and livestock were stressed in northeast Indiana during hot days but fared better in southern Indiana where the heavier rains fell.

High pressure was overhead Indiana as the week began on August 8<sup>th</sup>. The state average temperature stood at 2°F above normal under mostly sunny skies. The ridge moved to New England the next day and set up a backflow of warmer southerly air into Indiana, allowing the state temperature to rise to 4°F above normal. On August 10<sup>th</sup> the core of the ridge drifted offshore while expanding west into Virginia, extending the Indiana backflow a few days longer. The state temperature nudged upward to 5°F above normal, then to 8°F above normal on August 11<sup>th</sup>. The Virginia ridge was quite strong and halted a Michigan cold front from advancing south, converting it instead into a warm front.

Indiana became part of a large warm air mass sector that covered the east half of the country. A cold front extended to Nebraska out of a low pressure center positioned in the Dakotas. On August 12<sup>th</sup> high pressure lunged south out of central and western Canada, reconverting the warm front into a cold front through Michigan. Indiana remained within the shrinking warm air sector with its state temperature peaking at 9°F above normal for the week. The cold front slowed greatly the next day as the east coast ridge held firm. The entire frontal system from New England to Michigan to Arkansas became virtually stationary. Indiana barely clung to the warm sector but the state temperature did fall to 6°F above normal.

While the northeast section of the front regained its momentum as a cold front on August 14<sup>th</sup>, the remaining piece from Indiana south continued as a stationary front and crawled only slightly east. With the stationary front directly overhead Indiana the state temperature ended the week at just 1°F above normal. Rainfall now turned heavy as moisture streamed northward along the front from Louisiana to Indiana.

For the week the state temperature averaged to 5°F above normal. Usually in the second week of August daily maximum temperatures would be expected to range from 81°F to 88°F north to south across the state. Daily minimums typically would vary from 62°F in far northern counties to 66°F in the southwest corner of the state. The warmest temperature of the week as recorded in the cooperative station network was 94°F at Fort Wayne Airport on August 10<sup>th</sup>, and again the next day at Goshen 3sw and Goshen Airport. The coolest temperature among stations in this same network was 56°F at Crawfordsville 6se on August 8<sup>th</sup>.

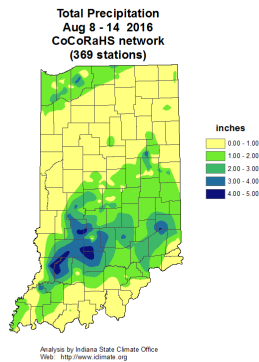
No rainfall was measured in Indiana according to the CoCoRaHS morning reports of August 8<sup>th</sup> and 9<sup>th</sup>. Then light amounts fell across parts of the state the next 3 days before gradually becoming heavier during the last 2 days of the week. On the weekly rainfall map more than an inch fell generally south of a Terre Haute to Hartford City to Winchester line but north of an Evansville to French Lick to Madison line. An area north of a Morocco to Goshen line also received more than an inch. A band of heavy 3" to 5" rain fell in spots between Vincennes and Brookville. Much of the rest of Indiana collected less than 1" for the week.

The heaviest single day rainfall was measured on the morning of August 14<sup>th</sup>. The CoCoRaHS observer outside Vincennes had 6.86" that morning while the Newberry volunteer noted 4.68". In Bicknell 4.52" was recorded, Washington had 4.43", and near Hazleton 4.20" was collected. Some of the heavier weekly totals among CoCoRaHS stations included two Spencer reports of 5.36" and 4.78", in the Bedford vicinity with 4.90", Oolitic with 4.73", and the Washington sum of 4.50". Regionally for the week about 0.7" of rain accumulated on average across the northern third of Indiana, about 1.3" over central areas, and 2.1" in the south. These amounts equate to about 80% of normal in the north, 170% of normal in central Indiana, and 260% of normal across the southern third of the state.

The August 16<sup>th</sup> edition of the US Drought Monitor reported an 8% improvement in Indiana soil moisture status from a week prior. All D0 abnormally dry areas in east central Indiana were removed, essentially along a Miami to Randolph to Wayne county line. In northern Indiana D0 status was removed from St Joseph and Marshall counties and trimmed in Elkhart, Lagrange, Steuben, DeKalb, Kosciusko, and Adams counties. A D1 moderate drought area was removed in Adams county. The net result this week with these changes is a 1% reduction in D1 moderate

drought and an 8% reduction in D0 abnormally dry area coverage in Indiana. Soils are in normal soil moisture status in 93% of total Indiana land area, in abnormally dry status in 4%, and in moderate drought status in 3% of total land area.

The USDA Indiana Crop Weather report for August 15<sup>th</sup> lamented that northeast Indiana crops were under stress due to hot and dry conditions over the past week. Corn leaves were rolling and stalks firing. Pastures and livestock were also stressed. Field irrigation in stressed areas continued. Crops in central and southern Indiana did somewhat better.



## August 15<sup>th</sup> – 21<sup>st</sup>

A month long warm spell ended on August 21<sup>st</sup> after 33 consecutive days of above normal daily state temperatures in Indiana. Along with many warm days came plenty of rain days. It rained every day this week with statewide coverage reported on two dates: August 16<sup>th</sup> and 21<sup>st</sup>. Mix in an abundance of confirmed tornadoes. There were 11 tornadoes in Indiana this week: 8 on August 15<sup>th</sup>, and 3 on August 20<sup>th</sup>. Despite all the rain there was only slight improvement in Indiana soil moisture according to the US Drought Monitor. Rain spelled relief for stressed crops and livestock yet farmers complained it was too wet in spots that were drenched by heavy rainfall.

A stationary front straddled southern Indiana on August 15<sup>th</sup>. The state temperature opened the week at 1°F above normal. Rainfall was heavy, flooding St. Joseph county, and 8 tornadoes touched down in central Indiana. The next day the stationary front morphed into a cold front, ready to march southward. The state temperature nudged higher to 2°F above normal. Moisture continued to stream north from Louisiana into Indiana as heavy rain expanded statewide.

On August 17<sup>th</sup> the wet storm moved to New England pulling the cold front east through and beyond Indiana. Rainfall slowed to moderate rates and left northwest Indiana. Skies were still cloudy and winds fairly calm. High pressure over North Carolina set up a backflow of warmer air into Indiana after the wet storm departed. The state temperature rose a tad to 3°F above normal. Not much changed on the weather map the next day but rainfall became much lighter.

The warm backflow continued on August 19<sup>th</sup>. Meanwhile an Alberta ridge plunged south into Colorado, transporting cooler air to that region. The next day the ridge shoved its leading cold front

further south into New Mexico and east to Missouri. Once again Indiana was positioned inside a warm air sector, bounded on the west by the cold front and on the north by a Michigan warm front. The unstable conditions favored the development of 3 confirmed tornadoes in northeast Indiana. The state temperature dipped to 2°F above normal.

The Alberta ridge was still on the move, reaching Kansas on August 21<sup>st</sup>. The leading cold front swept through Indiana and the state temperature fell to 2°F below normal. The light rainfall of the past few days became moderate and spread statewide.

Overall for the week the state temperature averaged to 2°F above normal. Typically at this point in August the daily maximum temperature should vary between 81°F in the northern tier of counties to 88°F in the southwest corner of the state. Daily minimums should range between 62°F and 65°F north to south across the state. The warmest temperature this week among cooperative network stations was 88°F at Rushville on August 19<sup>th</sup> and at Vincennes 5ne the next day. The coolest temperature among stations in the same network was 53°F at Shelbyville on August 20<sup>th</sup>.

Rainfall was recorded somewhere in Indiana on all 7 days and fell statewide on August 16<sup>th</sup> and 21<sup>st</sup> according to morning CoCoRaHS reports. Torrential rain fell in St Joseph county as measured on August 16<sup>th</sup>. On that day two CoCoRaHS volunteers near South Bend collected 9.95” and 8.75”. Two observers outside Walkerton had 8.95” and 8.82” in their gages. In Granger 8.48” was noted. For the full week the two Walkerton observers tallied 10.76” and 10.50”. South Bend summed to 8.60” while near Chesterton 8.69” was the total. Granger had 9.30”.

On the weekly rainfall map the extreme totals of 8” or more were found in Starke, Laporte, St Joseph, and Elkhart counties. Totals of at least 3” were found generally north of a Clinton to West Lafayette to Angola line. There was also a wedge of 3” or more delimited generally on the north by a Clinton to Liberty line and on the south by a Clinton to Leavenworth line. Most remaining areas had less than 3” with less than 1.5” in parts of Allen and Adams counties.

Regionally on average about 3.8” was common across the northern third of Indiana, 3.0” in central counties, and 2.8” across the south. These amounts equate to about 420% of normal in the north and 370% of normal in central and southern Indiana.

Severe weather occurred on 4 days this week. On August 15<sup>th</sup> there were 8 tornadoes and the already mentioned South Bend flooding. Local wind gust damage was the main complaint on August 17<sup>th</sup> and 18<sup>th</sup>. Then on August 20<sup>th</sup> northeast Indiana noted 3 more confirmed tornadoes and local wind gust damage.

Here is a table of essential facts for each of the 8 confirmed tornadoes which struck central and northeast Indiana on August 15<sup>th</sup>:

County	Time (EDT)	EF Rating	Est Peak Winds	Path	Max Width	Injuries/Death	Summary
Hendricks	5:36 PM-5:39 PM	EF-1	105 mph	1.83 miles	500 y	0	Few farm buildings.. Trailer rolled; trees uprooted
Tippecanoe	5:56 PM – 5:57 PM	EF-0	85 mph	0.51 miles	40 y	0	tree trunks snapped; corn mowed down
Hendricks	6:06 PM – 6:07 PM	EF-1	95 mph	0.42 miles	100 y	0	trees uprooted; pontoon boat pushed across street
Hendricks	6:15 PM	EF-1	95 mph	brief touchdown	50 y	0	tree trunk snapped
Hendricks/Boone	6:19 PM	EF-0	80 mph	brief touchdown	40 y	0	porch pillars removed; tree branches
Boone	6:27 PM – 6:35 PM	EF-2	115 mph	3.8 miles	150 y	0	pole barn destroyed; trunks snapped; limbs
Hamilton	7:04 PM – 7:06 PM	EF-1	105 mph	0.42 miles	100 y	0	tree trunks snapped
Howard	8:17 PM – 8:18 PM	EF-0	80 mph	0.12 miles	50 y	0	farm shed roof removed; tree limbs

Wind damage was reported in 3 counties on August 15<sup>th</sup>. In Howard county a barn was damaged and crops flattened. A tree fell across a road and limbs were downed in Boone county, and debris and structure damage were found.

In Hendricks county roofing was ripped off, power lines fell, and a traffic signal was downed. Picnic tables and outdoor furniture were blown about and there were multiple reports of limbs down. An uprooted tree blocked a road while more trees were torn down. Storm debris was scattered about and corn and soybean fields were flattened in wind gusts estimated at 100 mph.

Nearly 11” of rain resulted in severe flooding of South Bend streets. Several water rescues of vehicles were made. Two houses collapsed from the rain deluge. The foundations of 7 other homes collapsed and 13 homes were destroyed. More than a dozen county roads were closed along with 3 main roads. There were no deaths or injuries as a result of the flooding. The Red Cross opened an emergency shelter in South Bend. Flood warnings were eventually issued for 4 counties including St Joseph, Elkhart, Laporte, and Marshall.

On August 17<sup>th</sup> wind gusts toppled a tree on to a house and tore down power lines in St Joseph county. Trees were also ripped down in Kosciusko and Huntington counties.

The next day a tree was brought down and others uprooted or snapped in Porter county. Flash flooding with power outages in Lake, Porter, and Laporte counties were reported. Corn was flattened in parts of the area and some fields were flooded by the Kankakee River in Laporte county. Two roads in the county were closed.

Another tornado outbreak occurred on August 20<sup>th</sup>. This time there were 3 confirmed tornadoes with limited damaged.

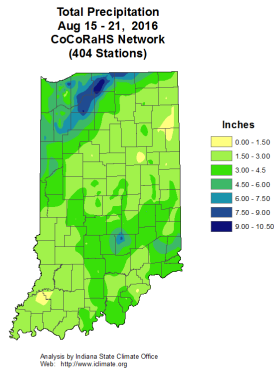
County	Time (EDT)	EF rating	Est Peak Wind	Path	Max Width	Injuries/Deaths	Summary
Elkhart	3:19 PM-3:20 PM	EF-0	70 mph	0.1 miles	50 y	0	2 homes minor damage; multiple tree limbs; corn flattened
Allen	5:42 PM-5:49 PM	EF-0	75 mph	2.4 miles	70 y	0	large tree limbs; corn flattened; tree uprooted; shingle damage; swing set rolled back-to-front yard
Kosciusko	2:53 PM-2:57 PM	EF-0	65 mph	1.6 miles	10 y	0	Crops damaged in sporadic fields

Straight line winds caused additional damage in Allen county that day and tore down a large tree and some limbs in Jay county.

According to the August 23<sup>rd</sup> edition of the US Drought Monitor there was very slight improvement in drought and soil moisture conditions this week. Moderate drought (D1 category) was removed from Elkhart, Steuben, and DeKalb counties and reduced in Lagrange and Kosciusko counties. An area of abnormally dry (D0 category) status was reduced in Elkhart county. The net coverage area by category numbers didn't change. Moderate drought continues in 2% of total Indiana land area while abnormally dry conditions persist in 4% of total area. The remaining 94% of Indiana land is still rated in normal soil moisture status for this time of year.

The August 22<sup>nd</sup> edition of the Indiana Crop Weather report stated that rain spelled relief for crops stressed by heat and lack of moisture. But rainfall this week also kept farmers out of the field due to wet conditions. While rain was adequate in some areas an overabundance in others resulted in local flooding. Some growers were unhappy with the wet soils which made weeds and plant disease prosper and hard to control. High winds in tornadoes caused minor crop flattening problems in some areas. Muddy feed lots and the halting of crop silage operations were a headache for some farmers. On a positive note livestock got a break from the heat and pastures were recovering.





## August 22<sup>nd</sup> – 31<sup>st</sup>

Violent weather was the big story again with another 11 Indiana tornadoes, all in a single day, to set a new record for any August day and for the month! Despite lots of damage there were no deaths or serious injuries in this round of severe weather. After a few cool days to start this 10 day interval, the state temperature lingered near 5°F above normal to close the month. It was wet with rain recorded on 8 of these last ten August days but never statewide. Generally less rain fell in southern Indiana than in northern and central sections. Fields were wet, hampering farmer activities, but livestock looked good.

It was a cool day on August 22<sup>nd</sup> with the state temperature at 5°F below normal. A high pressure ridge sat over the lower Great Lakes. The ridge drifted east the next day, allowing a backflow of southerly winds to begin to nudge the state temperature to 3°F below normal. The ridge center reached Virginia on August 24<sup>th</sup>. Indiana's atmosphere became more unstable as ample humidity was transported in ahead of an advancing cold front. Two supercell thunderstorms traveled across northern Indiana into northwest Ohio. These thunderstorms unleashed multiple tornadoes in central and northeast Indiana.

The state temperature bounced to 6°F above normal just ahead of the cold front the next day. By August 26<sup>th</sup> the cold front had slowed to a crawl across the northern half of Indiana where it stalled. The state temperature fell just a degree to 5°F above normal. Low pressure traveled from Oklahoma to Missouri the next day, and helped reverse the old cold front into a warm front. The state temperature barely moved to 4°F above normal.

On August 28<sup>th</sup> the warm front was on the move north across Indiana to the Michigan border. The state temperature rose to 6°F above normal. Here the front slammed into cooler air and stalled yet again. With all the back and forth movement the last few days the air masses had mixed and lost their identity and temperature differences. The front disappeared from the map on August 29<sup>th</sup>, allowing high pressure to prevail overhead Indiana with no change in state temperature.

A new low system entered Wisconsin on August 30<sup>th</sup>, its warm front reaching to southwest Indiana ahead of a new warm sector. The state temperature peaked over the 10 day interval to 7°F above normal.

Another day but the same old story. On August 31<sup>st</sup> the two fronts folded into a stationary front over central Indiana, the meeting ground for many fronts over the past 7 days. The state temperature dipped to 5°F above normal.

Over the 10 day interval the state temperature averaged to 3°F above normal. Daily maximum temperatures in late August typically range between 80°F and 87°F north to south across the state. Daily minimums normally vary from 60°F in the northern tier of counties to 64°F in far southwest Indiana. The warmest temperature observed in the cooperative station network over the 10 days was 99°F at Paoli on August 25<sup>th</sup>. The coolest temperature among stations in this same network was 50°F at Crawfordsville 6se on August 23<sup>rd</sup>.

Rain was reported on 8 days of the 10 day interval but did not cover the entire state on any day. Rainfall was heavy on several days, such as in the August 25<sup>th</sup> morning report when a CoCoRaHS observer near Marion noted 3.30". Two days later amounts of 4.06" and 3.47" were measured just outside Indianapolis. On August 29<sup>th</sup> 6.43" was collected near Hebron while 3.50" fell in Pennville.

On the weekly rainfall map more than 2" fell generally south of an Attica to Mishawaka to Fort Wayne line but north of an Attica to Shelbyville to Winchester line. Torrential rains of more than 5" was seen in downtown Indianapolis, and along a Monticello to Wabash to Portland line before heading north to Fort Wayne. In contrast less than 1" was tallied generally across the southern third of Indiana and in Steuben county. Some of the highest weekly spot totals included 6.51", 6.28", and 6.02" in Marion county outside the city, 5.13" near Cumberland, and 4.88" near Muncie.

Regionally over the 10 day interval about 2.0" was recorded across the northern third of Indiana, 1.9" across central sections, and 1.0" in the south. These amounts equate to about 180% of normal in the north, 160% of normal across central Indiana, and 80% of normal across southern counties.

Severe weather continued unabated this month. Reports of tornadoes, wind damage, and large hail were received on half of the 10 days in this interval. The most destructive day by far was August 24<sup>th</sup> when 11 tornadoes hit Indiana, 5 of these in Howard county alone.

### **August 24**

A state of emergency was declared in Howard county. A Starbucks shop was destroyed and about half the buildings at an apartment complex lost their roofs, causing heavy damage. Air conditioning units mounted on apartment rooftops came crashing to the street, falling on nearly 30 parked cars. About 80 homes were destroyed, 170 homes had major damage, and another 1,000 homes had at least some damage. One resident was trapped in their home. A house in Russiaville was destroyed. Emergency officials opened 3 shelters around Kokomo where at least 400 people checked in and remained through August 26<sup>th</sup> while widespread power outages continued. More than 27,000 customers had no power in Kokomo and 39,000 statewide. About 20 people suffered minor injuries due to flying debris but none were serious. A tree fell on a truck and tree stumps lay in yards.

In Montgomery county grain wagons were lifted 500 feet into the air, then dropped into a field. Tall corn was leveled over at least 225 acres. Barns were damaged or destroyed, grain silos were toppled on to a highway, roads were closed, and trees snagged power lines. A home and shed lost their roofs. All together about 30 structures were affected. There were no injuries.

In Carroll county a resident lost his garage and his barn was flattened. The tornado turned his truck about face while blowing out two windows. Power lines were down in the area.

In Marion county lightning started a downtown house fire. One inch hail pummeled some spots and power lines were down. There were 8 emergency runs due to high water and flooding around Indianapolis.

Lightning struck a historical theatre in Tippecanoe county, destroying its chimney.

In Allen county 5 homes and 2 barns were destroyed in the tornado there.

A large tree was blown down in Huntington county.

Here is a table of essential facts for each of the 11 confirmed tornadoes which struck central and northeast Indiana on August 24<sup>th</sup>:

<b>County</b>	<b>Time (EDT)</b>	<b>EF Rating</b>	<b>Est Peak Winds</b>	<b>Path Length</b>	<b>Max Width</b>	<b>Injuries /Deaths</b>	<b>Summary</b>
Montgomery	2:38-2:48 pm	EF-2	120 mph	5.38 miles	125 y	0	Major damage homes and barns; trees
Howard	3:20-3:34 pm	EF-3	152 mph	8.78 miles	300 y	20 minor injuries	Homes and businesses damaged; Starbucks destroyed
Marion	4:18-4:19 pm	EF-0	80 mph	0.37 miles	100 y	0	Home windows out; building roof damage
Carroll/Howard	5:40-6:22 pm	EF-1	100 mph	17.24 miles	100 y	0	Barns wall & roof; garage foundation; trees
Howard	7:00-7:02 pm	EF-1	85 mph	1.51 miles	50 y	0	Garage, trees and crops damaged
Howard	7:16-7:20 pm	EF-0	75 mph	2.96 miles	75 y	0	Road sign; billboard; trees
Wells	4:59-5:00 pm	EF-0	65 mph	0.4 miles	20 y	0	Branches; barn siding; well house into pond; grain wagons lifted

Howard	6:58-7:00 pm	EF-0	80 mph	0.7 miles	75 y	0	Damaged homes and trees
Allen	5:27-5:39 pm	EF-3	160 mph	5.26 miles	500 y	0	Homes damaged, barn destroyed, trees, crop damage
Adams	5:49-6:03 pm	EF-1	100 mph	7.62 miles	50 y	0	Crops, partial barn roofs, trees broken or uprooted
Miami	6:13-6:14 pm	EF-0	70 mph	.06 miles	20 y	0	Roof shingles and sheeting; large tree limbs; power lines

### **August 25**

Lots of tree limbs came down in Marion county due to high winds there.

### **August 26**

One inch hail was noted in Hamilton county. Wind gusts to 60 mph tore down trees and power lines there as well. In Marion county trees snapped and large tree limbs broke and fell on the ground. One tree fell on to a home. Heavy rain flooded streets in the county. Homes were damaged and thousands had no power. Some residents had to wait to get back into their homes.

### **August 27**

Wind damage moved from central to southeast Indiana. Gusts ripped down trees in Franklin, Dearborn, and Ripley counties.

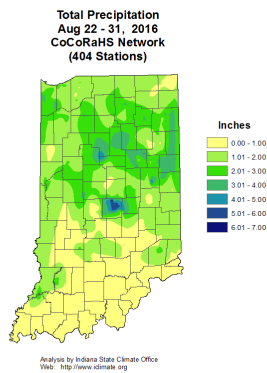
### **August 28**

Hail and wind damage reached statewide. Large trees were snapped or uprooted in Elkhart county in far northern Indiana. To the south a tree fell on a house and power was knocked out in Miami county. Very large hail to 1.75" diameter was observed in Cass county and winds were reported to 70 mph, damaging many more trees. In Grant county wind gusts to 58 mph took down trees which fell into power lines. One inch diameter hail was observed in Grant, Madison, and White counties. In Delaware county city streets were flooded, prompting home water rescues after heavy rains in a very short time. Firefighters had to carry people out of their homes and to an open shelter. In southern Indiana a tree fell on a house in Knox county. At a campground in Gibson county trees fell on to campers. Wind gusts in Orange county tore the roof off a barn and took down several trees.

According to the US Drought Monitor edition of August 30<sup>th</sup> there was very little change in Indiana soil moisture and drought status from a week earlier. The net state coverage by abnormally dry (D0 category) soils remained at 4% while soils rated in moderate drought (D1 category) were still 2% of

total Indiana land area. The vast majority of Indiana was still rated in normal soil moisture status for this time of year, at 94% coverage. A fraction of D1 soils improved to the D0 category in Lagrange and Kosciusko counties, a tiny change of 0.7% in total land area.

The USDA Crop Weather report for August 29<sup>th</sup> indicated scattered storms throughout Indiana had increased soil moisture and slowed down field work. There was isolated crop damage where tornadoes raced through fields. The report notes small pockets of drought in northeast Indiana remain, but fields with standing water and muddy fields are actually hurting more of the total crop area. High dew points were promoting corn rot and mold. Livestock are in good shape.



## August 2016

<b>Region</b>	<b>Temperature</b>	<b>Temperature</b>	
		<b>Normal</b>	<b>Deviation</b>
Northwest	74.5	71.6	2.9
North Central	74.6	71.0	3.6
Northeast	74.5	70.6	3.8
West Central	75.7	72.8	2.9
Central	75.7	72.2	3.5
East Central	75.6	71.4	4.2
Southwest	78.0	75.2	2.8
South Central	77.7	74.5	3.2
Southeast	77.6	73.8	3.9
<b>State</b>	76.0	72.7	3.4

<b>Region</b>	<b>Precipitation</b>	<b>Precipitation</b>		
		<b>Normal</b>	<b>Deviation</b>	<b>Percent of Normal</b>
Northwest	8.11	3.81	4.29	213
North Central	6.47	3.83	2.64	169
Northeast	4.84	3.68	1.16	131
West Central	5.40	3.96	1.43	136
Central	6.76	3.75	3.01	180
East Central	6.61	3.55	3.06	186
Southwest	6.40	3.67	2.73	174
South Central	6.66	3.91	2.74	170
Southeast	6.31	3.90	2.41	162
<b>State</b>	6.43	3.79	2.64	170

## Summer (June - August)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	73.1	71.8	1.4
North Central	72.9	71.2	1.7
Northeast	72.9	70.9	2.0
West Central	74.5	73.0	1.5
Central	74.3	72.4	1.9
East Central	74.1	71.6	2.5
Southwest	77.3	75.2	2.1
South Central	76.7	74.4	2.2
Southeast	76.1	73.6	2.4
<b>State</b>	74.7	72.8	1.9

Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	17.45	12.01	5.44	145
North Central	14.16	11.93	2.23	119
Northeast	11.80	11.42	0.38	103
West Central	15.96	12.68	3.27	126
Central	17.27	12.11	5.16	143
East Central	13.97	11.88	2.09	118
Southwest	16.81	12.04	4.77	140
South Central	17.41	12.32	5.09	141
Southeast	15.80	12.23	3.56	129
<b>State</b>	15.87	12.08	3.79	131

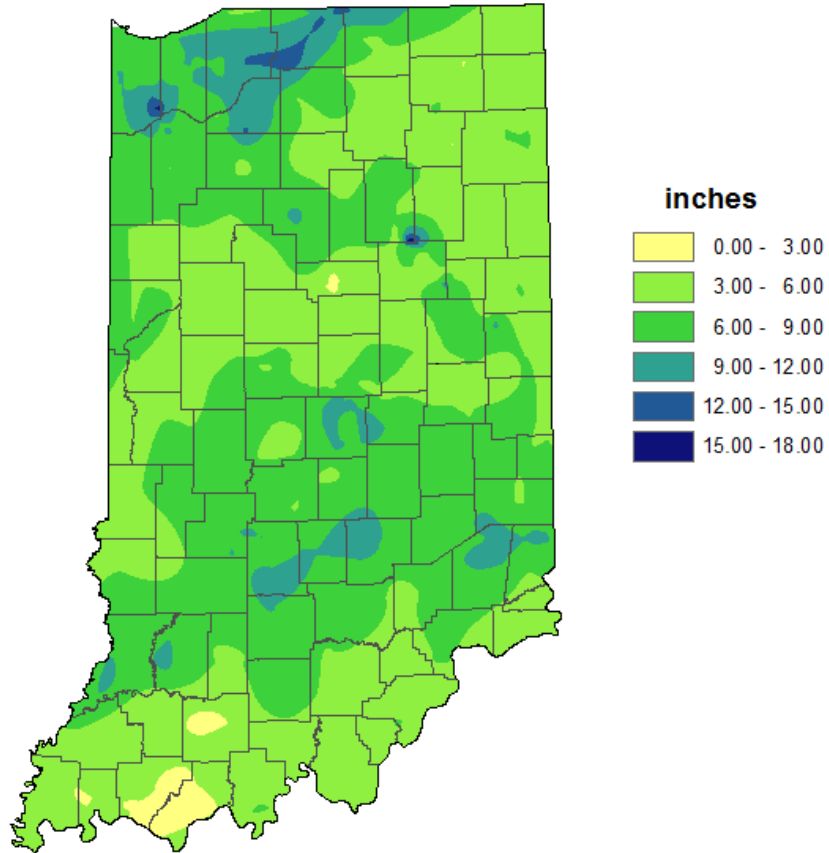
## 2016 Annual so far (Jan - Aug)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	53.6	52.0	1.6
North Central	53.4	51.5	1.8
Northeast	53.4	51.2	2.2
West Central	55.7	53.7	2.0
Central	55.6	53.2	2.4
East Central	55.2	52.4	2.8
Southwest	58.7	57.0	1.7
South Central	58.3	56.4	1.9
Southeast	57.6	55.5	2.1
<b>State</b>	55.8	53.7	2.0

Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	30.54	26.09	4.44	117
North Central	27.48	26.02	1.45	106
Northeast	24.84	25.16	-0.32	99
West Central	30.37	28.75	1.63	106
Central	34.21	28.32	5.89	121
East Central	30.18	27.49	2.70	110
Southwest	37.62	31.58	6.04	119
South Central	39.67	31.94	7.74	124
Southeast	35.40	31.06	4.34	114
<b>State</b>	32.58	28.55	4.02	114

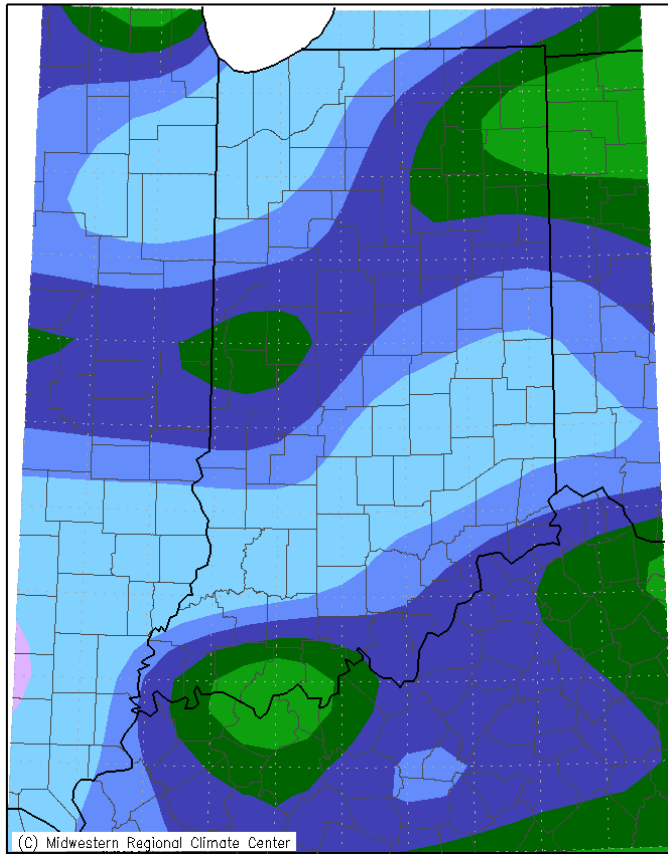


**Total Precipitation  
August 2016  
CoCoRaHS network  
(417 stations)**



Analysis by Indiana State Climate Office  
Web: <http://www.iclimat.org>

Accumulated Precipitation: Percent of Mean  
August 1, 2016 to August 31, 2016

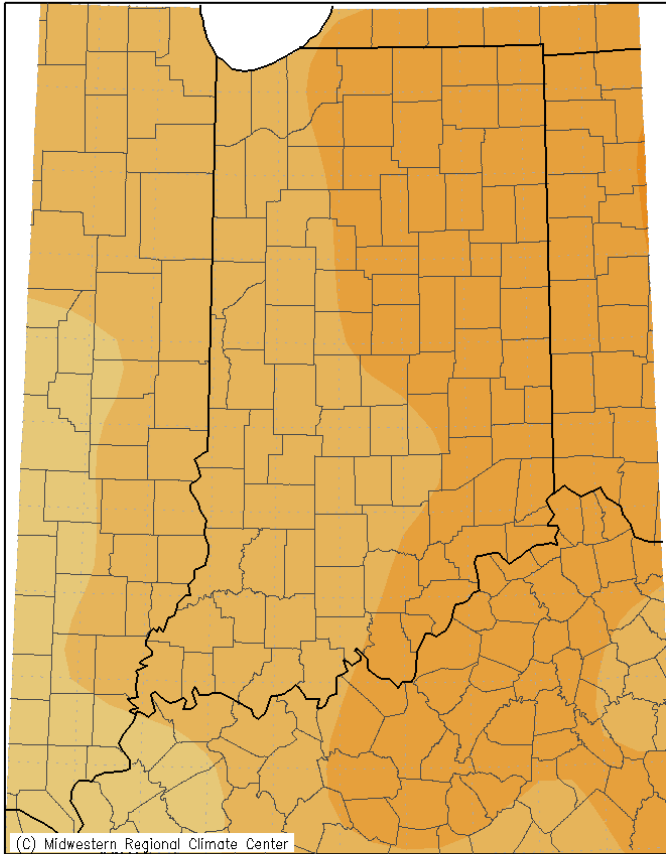


Mean period is 1981-2010.



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
Generated at: 9/9/2016 1:47:25 PM CDT

Average Temperature (°F): Departure from Mean  
August 1, 2016 to August 31, 2016



Mean period is 1981–2010.



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
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## *Drought Summary from the U.S. Drought Monitor*

Below is a drought summary for the state of Indiana from the U.S. Drought Monitor. Areas in white are not experiencing any drought. Yellow areas are abnormally dry, but not considered a drought. Drought begins when the moisture levels become more severe, with beige, orange, red, and brown indicating increasing levels of drought (moderate, severe, extreme, and exceptional, respectively). The table below indicates what percentage of the state is drought free, and how much of the state is in drought by degree of severity (D1 - D4 category).

▼
Indiana ▼
Statistics type: Categorical Percent Area ▼

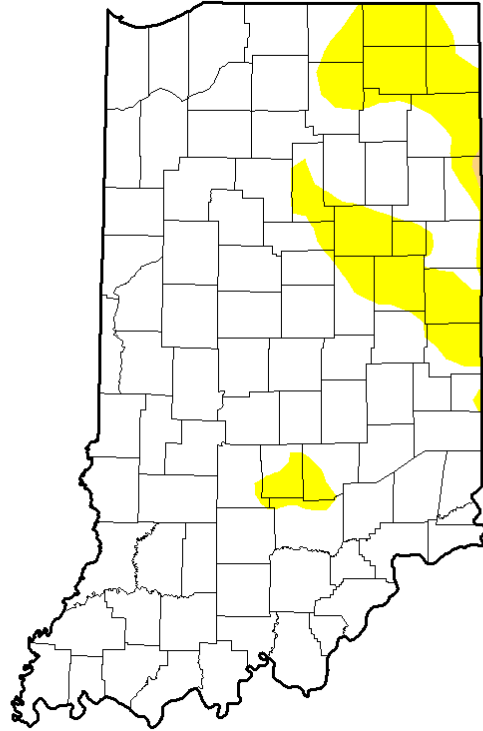
### Percent Area in U.S. Drought Monitor Categories

Show  entries

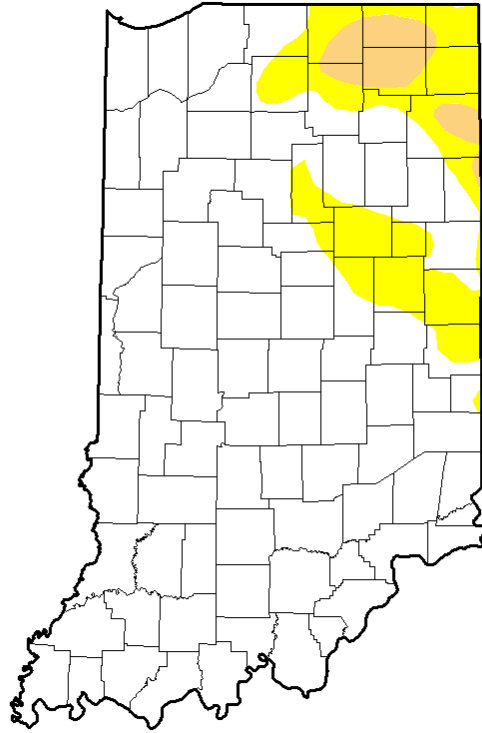
Search:

Week ▼	None ⬆️	D0 ⬆️	D1 ⬆️	D2 ⬆️	D3 ⬆️	D4 ⬆️
2016-09-06	94.30	3.80	1.91	0.00	0.00	0.00
2016-08-30	94.30	3.80	1.91	0.00	0.00	0.00
2016-08-23	94.34	3.75	1.91	0.00	0.00	0.00
2016-08-16	93.68	3.67	2.65	0.00	0.00	0.00
2016-08-09	84.62	12.16	3.22	0.00	0.00	0.00
2016-08-02	86.13	13.78	0.09	0.00	0.00	0.00

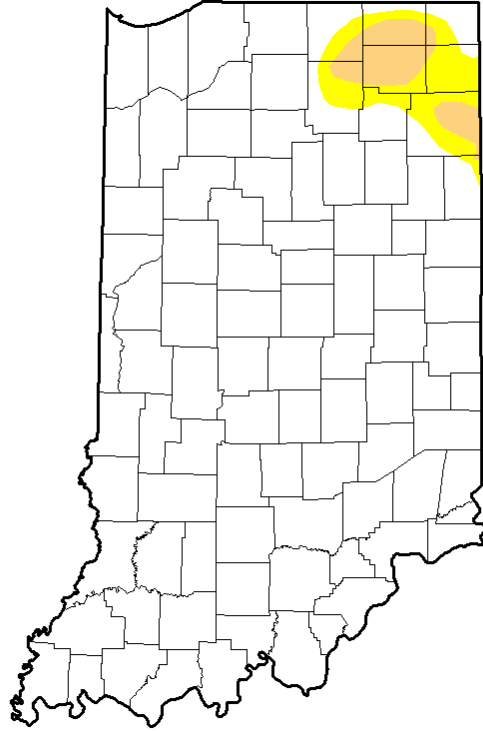
*Aug 2<sup>nd</sup> Drought Summary*



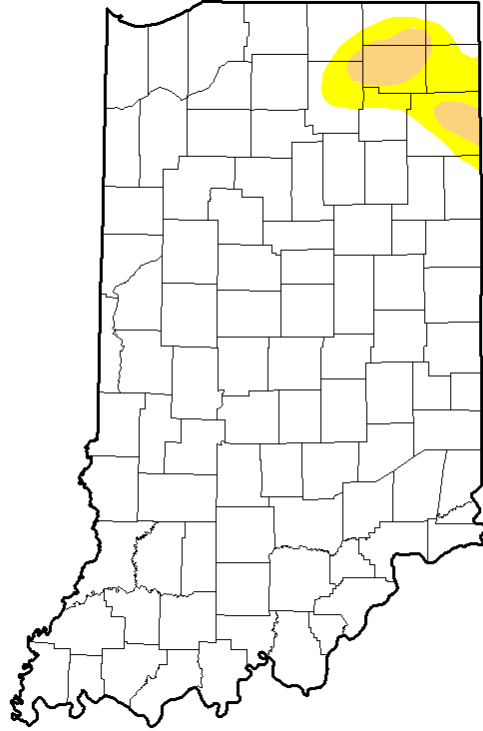
*Aug 9<sup>th</sup> Drought Summary*



*Aug 16<sup>th</sup> Drought Summary*



*Aug 23<sup>rd</sup> Drought Summary*





*Aug 30<sup>th</sup> Drought Summary*

