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## Indiana State Climate Office

### Monthly Weather Report



<http://www.iclimate.org>

**Aug 7, 2017**

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## July 2017 Climate Summary

### Month Summary

July weather was wild across Indiana with tornadoes, hail, wind, heavy rainfall, and floods. Local precipitation totals were extreme but surprisingly the July state average temperature was exactly normal. Severe weather occurred on 14 of 31 days, or nearly half of all July days! A driver was rescued from a submerged vehicle on July 10<sup>th</sup> but a small boy drowned in a creek the next day. Two EF-1 and one EF-0 tornado were confirmed. The wet weather was good for weeds and diseases but not so much for crops according to area farmer reports.

The July state average temperature of 74.6°F ties 1900 and 1982 as the 51<sup>st</sup> warmest July on record. Some recent warmer Julys include last year tied for 47<sup>th</sup> place. The year 2005 tied as the 41<sup>st</sup> warmest and the following year tied the 34<sup>th</sup> slot. July 2010 tied rank as 23<sup>rd</sup> warmest since state records began in 1895. The state temperature in 2002 pegged the 14<sup>th</sup> warmest position. The 6<sup>th</sup> warmest July on record was 2011. The next year landed on the list at 3<sup>rd</sup> warmest. The warmest July on record was in 1936 at 80.5°F. The day split in July 2017 was 12 days of below normal temperature, 17 days above normal, and 2 days at normal. The daily state mean temperature was never 10°F or more above or below normal. The highest temperature of the month was 100°F at Vincennes 5ne on July 22<sup>nd</sup>. The coolest was 45°F on July 12<sup>th</sup> at Columbia City.

July state precipitation averaged 6.15" which is 2.05" above normal. This puts the month near the top as the 8<sup>th</sup> wettest July since 1895. The only wetter Julys since 2000 were July 2015 with 6.23" as 7<sup>th</sup> wettest and July 2003 at 8.18" as the 2<sup>nd</sup> wettest. The wettest July on record came in 1992 when the state average reached 8.55". The heaviest single day precipitation among cooperative network stations in July 2017 was 5.65" on July 11<sup>th</sup> at Young America. The highest in the CoCoRaHS network was 5.85" on July 23<sup>rd</sup> at Celestine 0.3 wsw. The largest month total precipitation in the cooperative network was 12.34" at Williams 3 sw. In the CoCoRaHS network the largest total was 12.98" at Indianapolis 9.5 ne. Widespread precipitation fell on about 17 days this month.

Regionally July 2017 precipitation summed to nearly 155% of normal across northern Indiana, 165% in the central part of the state, and 135% of normal in the south. Normal July precipitation ranges from 3.7" in northeast Indiana to 4.4" in the west central section of the state.

## July 1<sup>st</sup> – 8<sup>th</sup>

At this time of year the contrast between cool and warm air masses becomes less and usually fronts are weak. This was the case this interval as daily state average temperatures were nearly constant for 5 consecutive days. Two of three fronts crossing Indiana stalled and washed out, that is, dissolved out of existence. Fronts were present within the state on all 8 days which prompted daily rain showers and above normal precipitation. Reports of wind damage in a single county were received on July 3<sup>rd</sup> and 6<sup>th</sup>. Hail was noted in 11 counties and wind damage in 21 counties on July 7<sup>th</sup>. Soil moisture improved in southwest Indiana but some crops drowned in eastern Indiana due to excessive rainfall.

July opened with the state temperature at 3°F above normal. A cold front passed through Indiana then stalled at the Ohio River the next morning. The state average temperature dipped to right at normal. By July 3<sup>rd</sup> this stationary front had washed out. Another stationary front was positioned over Michigan. Slightly warmer air was transported northward to Indiana by high pressure centered over Alabama, effectively placing Indiana inside a new warm sector. The state temperature rose slightly to 1°F above normal where it would remain for the next 4 days.

On Independence Day the Michigan stationary front sank south to central Indiana. This front washed out the next day. At this same time yet another stationary front hung along the Kentucky-Tennessee border. On July 6<sup>th</sup> this front migrated north to central Indiana, still classified as a stationary front. The next day this front became a cold front and marched through Indiana to Virginia. A small region of high pressure moved overhead Ohio, building a buffer zone between the Virginia cold front and another cold front moving through Wisconsin and Michigan.

On July 8<sup>th</sup> the Michigan cold front advanced to the Ohio River where it slowed. The Indiana state temperature which had held stable at 1°F above normal for several days finally tumbled to 4°F below normal as cooler air streamed in.

Over the 8 day interval the state temperature averaged right to normal. Typically to start July the daily maximum temperature in Indiana should vary from 83°F in the far northern counties to 89°F in the deep southwest corner of the state. Daily minimums usually range between 63°F and 68°F north to south across the state. The warmest temperature in the 8 days among stations in the cooperative network was 94°F on July 8<sup>th</sup> at Terre Haute ISU. The coolest temperature in that network was 50°F at Warsaw that same day.

Rain fell on all 8 days with statewide coverage and the heaviest amounts at the start and end of the interval. Showers covered the northern third of the state in morning reports on July 3<sup>rd</sup> and 4<sup>th</sup>. The southern half of Indiana received rain in the reports of July 5<sup>th</sup> and 6<sup>th</sup>.

On the total precipitation map amounts summed between 3" and 7" in two main bands: from about Laporte to Wabash and from Frankfort to Liberty. A 3" to 4" band fell in Clay, Putnam, and Hendricks counties and in the south in Martin, Dubois, and Perry counties. In contrast less than an inch covered the northeast corner, including Steuben, Lagrange, Noble, and DeKalb counties. Also light amounts accumulated along most of the Illinois border from Knox to south Newton county and in Posey county. Elsewhere 1" to 3" was common. Regionally about 1.7" was the average in the northern third of Indiana, 2.3" in central, and 1.8" in the south. These amounts equate to about 210% of normal in the north, 220% in central Indiana, and 160% across the southern region.

The heaviest single day rainfall was recorded in the July 8<sup>th</sup> morning report. The CoCoRaHS observer at Claypool measured a one day rainfall of 5.60" while in the Plymouth vicinity 4.00" was collected. The Urbana volunteer had 3.79" and at Bourbon 3.70" was noted. Over the 8 day interval the Claypool gage tallied 6.86", New Castle had 5.67", McCordsville 5.60", Lewisville 5.52", and Lynn 5.08".

Severe weather was reported on July 3<sup>rd</sup>, 6<sup>th</sup>, and 7<sup>th</sup>.

On July 3<sup>rd</sup> high winds caused trees and tree limbs to fall and block a road in Marshall county.

On July 6<sup>th</sup> wind gusts toppled a tree on to a house and brought down other trees in Elkhart county. Heavy rain required pets to be rescued from high water and roads to close in Madison county.

Severe weather damage was extensive on July 7<sup>th</sup>. Hail and wind damage were spread statewide.

Hail in Lake, Porter, Starke, and Pulaski counties ranged between 1.25" and 1.75" in diameter. In central Indiana 1.25" hail pummeled Clinton county while Wayne county had 1.00" hail. Hail sizes between 1.00" and 1.50" were reported in Morgan, Monroe, and Brown counties. In the south 1.00" hail struck Jackson county with 1.75" diameter hail noted in Scott county.

Squall lines crossed Indiana and caused extensive tree damage, downed power lines, blocked roads, and damaged vehicles and buildings. Trees in Marshall county fell on a home, on a road, and on power lines. The siding was torn off a house and trees uprooted. In neighboring Kosciusko county tree limbs fell on two roads and on a garage. Winds to 60 mph uprooted a tree in Adams county.

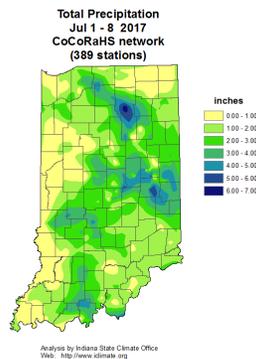
Many fallen trees entangled with power lines and poles triggering power outages in Hamilton, Madison, and Spencer counties. Also in Madison county a pole barn collapsed and a tree which fell on to a house trapped a resident inside for a time. Trees fell and blocked roads in Delaware, Henry, Franklin, Washington, Crawford, and Scott counties. Only tree damage was noted in Wayne, Fayette, Union, Floyd, and Jackson counties,

Hail broke a car windshield in Morgan county and 65 mph winds in Johnson county scattered debris on roads far and wide. In southern Indiana high winds ripped trees down onto roads and homes in Jefferson county. A porch was damaged in Clark county.

There was flooding in northern and central parts of Indiana. In Marshall and Kosciukso counties flooding was caused by 2" to 5" of rain. A flood warning was issued in Laporte county where 2" to 4" had already fallen by noon. Flood water inundated US highway 31 in Tipton county.

With the heavy rainfall soil moisture improved in southwest Indiana. All of Posey, Vanderburgh, Warrick, Pike, Gibson, and Daviess counties were restored to normal soil moisture status according to the July 4<sup>th</sup> edition of the US Drought Monitor. Only most of Knox county and half of Sullivan county remained classified as abnormally dry (D0 category). There was no change in northwest Indiana where the shorelines of Lake, Porter, and Laporte counties continued with the same D0 rating as the week prior. Overall Indiana improved from 8% of total land area rated as D0 to just 3% D0 coverage.

According to the July 10<sup>th</sup> edition of the USDA Indiana Crop Weather Report thunderstorms so far in July had limited field work activity for the 4<sup>th</sup> consecutive week. Rain was welcome in the dry southwest and northwest corners of the state but excessive rainfall saturated soils and drowned some crops in standing water in wet areas. Soybeans had turned yellow and were stunted due to the wetness while some corn was leaning due to recent hail and high wind events.



## July 9<sup>th</sup> – 15<sup>th</sup>

A cool start warmed to a mid-week peak in temperature before cooling again to the weekend. Rainfall followed this temperature curve with higher totals on warm days and lighter amounts when days were cool. Only two fronts entered Indiana during the week but they packed 5 days worth of severe weather including wind damage, flooding, and 2 tornadoes. The small acreage covered by abnormally dry soils barely changed this week. Heavy rains halted field work and wetness ramped up opportunities for crop diseases to take hold.

On July 9<sup>th</sup> Indiana skies were sunny with the state temperature at 6°F below normal. High pressure was located overhead Illinois, Indiana, Ohio, and Kentucky. The ridge moved south to Tennessee the next day, giving way to a stationary front which dropped south into lower Michigan. Indiana skies turned cloudy and the atmosphere became very unstable. Two tornadoes developed over north central Indiana between Carroll and Miami counties. The state temperature climbed to 2°F below normal as warmer air was transported north out of the Tennessee ridge.

The stationary front in Michigan continued drifting south. On July 11<sup>th</sup> this front crossed from Michigan into Indiana. Storms and heavy rain covered all but southwest Indiana, causing extensive wind damage in 11 counties of central Indiana. The rise in state temperature continued to 2°F above normal.

The stationary front retreated north to Michigan on July 12<sup>th</sup>. Heavy rainfall continued in much of northern and central Indiana. The state temperature peaked at 5°F above normal, the warmest day of the week. The next day a low center riding the front traveled from Iowa to Michigan, its cold front behind entering northwest Indiana. Rainfall throughout the state began to slow. State temperatures began a cooling trend which would continue to the end of the week, falling to 4°F above normal.

By the morning of July 14<sup>th</sup> this cold front had reached southern Indiana. Canadian high pressure entered Minnesota and transferred cooler air to Indiana. The state temperature dropped to normal with showers in central and southern Indiana. Finally the next day the cold front slowed to a halt in Tennessee. Rainfall in Indiana came to a stop. The state temperature ended the week at 5°F below normal. High pressure returned to Illinois and Indiana with mostly sunny skies, much like the week had begun.

Overall for the week the daily state temperature averaged right to normal. Usually in the second week of July the daily maximum temperature should range from 83°F to 89°F north to south across the state. Normal daily minimum temperatures vary between 63°F in far northern Indiana to 68°F in the southwest corner of the state. The warmest temperature this week in the cooperative station network was 98°F at Frankfort Disposal Plant on July 11<sup>th</sup>. The coolest temperature among stations in this same network was 45°F at Columbia City on July 12<sup>th</sup>.

Rainfall was recorded on all 7 days with the heaviest amounts in mid-week. Rain was noted nearly statewide in the July 11<sup>th</sup> morning CoCoRaHS reports, in northern and central Indiana on July 12<sup>th</sup> and 13<sup>th</sup>, in the central and south on July 14<sup>th</sup>, in northwest and northeast areas on July 10<sup>th</sup>, and in the Louisville vicinity on July 15<sup>th</sup>. The heaviest single day amounts were observed on July 12<sup>th</sup> and included 5.66" at Brooklyn with 5.41" and 5.35" near Greenwood. Over the full week 5.95" was collected north of Indianapolis, 5.79" at Brooklyn, with 5.56" and 5.55" tallied by two CoCoRaHS volunteers outside of Greenwood. The Rushville station had a 5.03" total.

Regionally about 1.5" of rainfall generally covered northern Indiana with 2.4" over central and 1.0" across southern Indiana. These amounts equate to about 180% of normal in the north, 205% in central with near normal amounts in southern Indiana. On the weekly rain map heavy amounts between 3" and 6" hit Tippecanoe, Cass, Boone, Hendricks, Hancock, Marion, Morgan, Johnson and Shelby counties. But less than an inch fell across the southern third of Indiana, in east central, and northwest parts of the state. Totals between 1" and 3" were common elsewhere.

Severe weather was reported on July 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, and 13<sup>th</sup>.

On July 9<sup>th</sup> a single report of high winds originated from Huntington county, where trees were reported down.

Two tornadoes were confirmed for July 10<sup>th</sup> along a line from Carroll to Miami counties with additional wind damage reported in the northeast quarter of the state.

An EF-0 tornado touched down in Carroll county into fields causing minor crop damage. This tornado then crossed into Cass county for a total track distance of 3.0 miles. Winds in this tornado escalated from 75 mph to 95 mph which increased its rating to an EF-1. The tornado lifted an RV and destroyed it. There was some roof damage to farms and homes and crops were downed. Roads were filled with water in Howard and Cass counties. Two schools were flooded.

An EF-1 tornado with wind speeds to 90 mph was confirmed in Miami county. It remained on the ground for 2.9 miles. Crops and trees were destroyed along with a pole barn. Also in the county trees were uprooted and buildings damaged by high winds.

In Wabash county a state trooper rescued the driver of a submerged car when he pulled him out of the vehicle to safety.

Wind gust damage was also observed July 10<sup>th</sup>, mostly in eastern Indiana. A tree limb in St. Joseph county landed on top of a vehicle while two other large limbs were taken down in Marshall county. A tree fell on to a vehicle in Huntington county. More tree damage occurred in Adams county. Winds to 70 mph took out power and brought down a fence in Henry county. Hail at 1.5" diameter was observed in Delaware county.

Extensive wind and flood damage occurred in central Indiana July 11<sup>th</sup>.

Wind damage was tallied across 11 counties between Vermillion and Wayne. As usual the biggest casualties were trees and trees falling on to roads, power lines, vehicles, and building roofs. In Vermillion county 60 mph winds downed tree limbs which knocked out power. Corn was blown down in fields. At least 15 trees were toppled in Montgomery county, and in Putnam county trees fell on to a minivan. Falling trees shattered a house window in Boone county. In Hendricks county crops and buildings were damaged. Trees snapped, took down power lines, and fell on homes in Hamilton county. Trees limbs fell on roads in Marion county and power lines were tossed onto roads in Shelby county. A barn roof was torn off there as well. In Rush county more power lines were ripped down by trees. Some of these trees fell on homes there. In Wayne county winds to 63 mph tore into large trees which fell on to power lines and the roof of an office building. Tree limbs were scattered on many roads. In southeast Indiana high winds ripped into trees, some falling on to roads in Dearborn county.

Besides wind damage there were numerous flash flood issues on July 11<sup>th</sup> due to heavy rainfall, exceeding 4" in parts of central Indiana.

The worst flooding was seen in Howard and Johnson counties where waves of storms damaged many homes and buildings. The Howard county fair was cancelled that evening and multiple roads were closed. Soils were so saturated in Howard county that basement walls collapsed in some neighborhoods, sending thousands of gallons of water pouring into homes, sealing their fate as total losses. These units will have to be torn down due to foundation damage. In other neighborhoods retention ponds overflowed and sent water into driveways and homes. There were several sandbag requests from residents in the county. The speedway and a few schools were closed due to the flooding and some vehicles were submerged. Flooding closed roads in Johnson county and a school was opened as a shelter for residents who evacuated their homes. A government office and two apartment complexes were flooded. In one apartment complex evacuations were required when a foot of water seeped inside.

Roads were also closed in Hamilton county due to the flooding. Fallen trees damaged homes. A retail store suffered roof damage.

Many parks and roads were closed as a flash flood warning was issued for Carroll, Cass, Howard, Johnson, and Owen counties. A park was closed in Hendricks county due to high water. Lightning struck at least 7 homes. A boy fell into a creek and drowned in Cass county. In Marion county 6300 customers lost power.

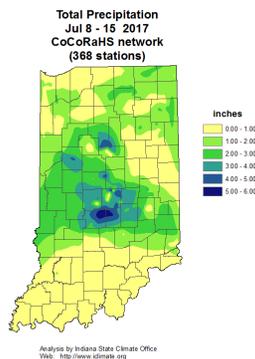
There were two local reports of wind damage in Vigo and Kosciusko counties on July 12<sup>th</sup>. In Vigo county trees came down in high winds, a flag pole was toppled, and a wooden fence was damaged. A tree fell on to a road in Kosciusko county.

On July 13<sup>th</sup> a storm pipe ruptured in Hamilton county after heavy rain and left a giant sinkhole at a busy city intersection. Local contractors said requests for repair help were non-stop as residents with flooded homes and basements needed assistance. Vehicles stalled and became stuck in Marion county after attempting to drive through high water.

Also that day two local reports of tree damage were received from Knox and Marion counties. Trees and large branches fell into roadways.

There were minor changes in abnormally dry soil coverage depiction this week in Indiana according to the July 11<sup>th</sup> edition of the US Drought Monitor. Rainfall erased D0 category moisture shortages in Porter and Laporte counties while D0 remained in extreme northwest Lake county. A new area of D0 was added in all of Elkhart county and the northwest half of Lagrange county. In Sullivan county D0 was added in the southeast while being removed in the northwest. The D0 category was erased in the east half of Knox county but continued in the west for land along the Wabash River. The D0 category was added to the northwest corner of Gibson county. Overall the net change in D0 coverage over Indiana was miniscule, remaining at 4% of total state area.

The USDA Indiana Crop Weather bulletin edition of July 17<sup>th</sup> noted that early week rainfall halted field work. About half the corn and soybean crop were rated in good to excellent condition. Disease was becoming an issue in fields due to the recent wet weather. Hay and pastures were considered to be in good condition while livestock were rated in average to good condition.



## July 16<sup>th</sup> – 22<sup>nd</sup>

The third week of July saw an extended Indiana warmup. The week began slightly cool with light rainfall amounts but the weather became progressively more humid with heavy rainfall across the north. Severe weather remained active with wind damage reported on three days and hail on one. There was no significant drying of Indiana soils according to the US Drought Monitor. The late

week heat, humidity, and flooding were only good for weeds. Some crops were left standing in water. About half of Indiana corn and soybeans were rated in good to excellent condition.

Indiana was positioned between fronts on July 16<sup>th</sup> but skies were sunny with the state temperature 2°F below normal. A wedge of cooler air pushed into Indiana the next day behind a cold front that stalled at the Ohio River. The state temperature then edged upward to 1°F below normal. The cool pocket of air collapsed on July 18<sup>th</sup> and the stalled front retreated slightly into southern Indiana. The state temperature continued its slow rise to 1°F above normal.

The stationary front washed out the next day but a warm backflow from a southern ridge took over. The state temperature barely changed. On July 20<sup>th</sup> a new stationary front moved into lower Michigan. Yet the warm backflow persisted into Indiana allowing the state temperature to climb to 3°F above normal. The next day the stationary front surged to southern Indiana as another cold front. Rainfall became heavier and spread throughout northern and central Indiana. High winds in storms across northern and central Indiana caused damage in 7 counties. The state temperature rose a few more degrees to 4°F above normal.

Like its predecessor this cold front also stalled along the Ohio River on July 22<sup>nd</sup>. The circulation around a low center which had entered Iowa pulled the stalled front back north to Michigan, triggering another round of wind damage, this time in southwest Indiana. The state temperature rose yet again to 5°F above normal to close out the week.

Overall for the week the state temperature averaged to 1°F above normal. Typically at this point in July the daily maximum temperature would range from 83°F in far northern Indiana to 88°F in the southwest corner of the state. Daily minimums normally vary between 63°F to 68°F north to south across the state. The warmest temperature of the week among cooperative networks stations was 100°F at Vincennes 5ne on July 22<sup>nd</sup>. The coolest temperature among stations in this same network was 52°F at Plymouth of July 19<sup>th</sup> and at Farmland 5nnw on July 21<sup>st</sup>.

Rainfall was reported on every day this week except the first. Rain was noted primarily in east central Indiana on July 17<sup>th</sup>, in the Louisville vicinity on July 19<sup>th</sup>, across northern Indiana on the 20<sup>th</sup>, and in northern and central Indiana on July 21<sup>st</sup> and 22<sup>nd</sup>. On no day did rain fall statewide.

The heaviest single day amounts came on the last day of the week in far northwest Indiana. On July 22<sup>nd</sup> the CoCoRaHS observer in St John measured 4.47". Outside Valparaiso the amount was 3.41". The Merrillville volunteer recorded 3.37" while Crown Point had 3.28" and 3.10" was collected in La Crosse. Over the 7 days the sum at St John reached 6.18". Crown Point tallied 4.57", Highland 4.13", Lafayette 3.97", and Winfield 3.93".

On the weekly precipitation map 4" to 6" accumulated in Lake county. More than 2" fell mostly west of a Fowler to Frankfort to Warsaw to Laporte line. At least an inch was measured mostly north of a Pence to Brookville line and south of a South Bend to Auburn line. No rain fell in a few southern Indiana counties this week. Regionally on average about 2.2" was received across northern Indiana, 1.3" in central counties, and 0.3" in the south. These amounts equate to about double the normal in northern Indiana, 120% of normal in the central section, but just 30% of normal in southern Indiana.

Severe weather was reported on July 16<sup>th</sup>, 19<sup>th</sup>, 21<sup>st</sup>, and 22<sup>nd</sup>. The first two events were localized while the latter two dates had greater areal coverage.

On July 16<sup>th</sup> there was one report of 1.00' diameter hail in Franklin county.

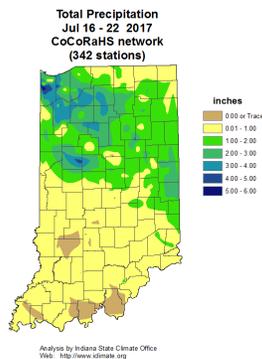
Three days later in Porter county power lines were caught in trees blown over in wind gusts.

Wind damage on July 21<sup>st</sup> stretched west to east across northern and central Indiana from Newton county to Wayne county. In Newton county structures collapsed and the roof was torn off a pole barn. A power pole and some trees were toppled by high winds. These storms also took down power lines in White county. Tree damage reports came out of Tippecanoe county. Winds were estimated at 60 mph in neighboring Boone county. In Miami county a tree fell across a road and 7 light poles crashed to the ground, causing power outages in that region. More power poles were down in Madison county while trees snagged power lines and yanked them to the ground in Delaware county. Large trees were reported down in Wayne county.

The wind damage moved to southern Indiana the next day. Trees were reported down in Greene, Knox, Gibson, Warrick, Dubois, Orange, Crawford, Spencer, and Clark counties. In Spencer county I-64 was blocked for a time by trees that had fallen on the roadway. A power pole was toppled in Orange county. Road signs were ripped down in Warrick county.

There was no change in the designation of abnormally dry soils in Indiana over the week ending July 18<sup>th</sup> according to the US Drought Monitor. Indiana land rated in the D0 category was still at 4% of total state land area with 96% in normal condition.

According to the USDA Indiana Crop Weather report for July 24<sup>th</sup> the main weather feature of the week was high heat and humidity. Spraying and some harvest activity was delayed by locally heavy showers, especially in late week. These storms resulted in localized flooding with some corn fields standing in water. About two thirds of both the corn and soybean crops had reached their reproductive stages. Half of each crop was rated to be in good to excellent condition. The immediate farming concern was the tremendous growth of weeds and the development of corn rust. Even some pastures were overgrown by weeds.



## July 23<sup>rd</sup> – 31<sup>st</sup>

Daily state average temperatures were not extreme these final 9 days of July. That didn't stop extreme storm development, however. A common theme throughout July has been severe weather events, such as another tornado which touched down in White county on July 23<sup>rd</sup>. Isolated wind damage was reported 3 days later. Temperatures were cooler than normal on 6 of the 9 days this interval. Rainfall again tracked temperature with heavier amounts on the warmer days at the start and middle of the interval. Small areas of drier soil began to disappear. Crops did better with cooler temperatures and less rainfall relative to earlier in the month.

The state temperature registered at 3°F above normal on July 23<sup>rd</sup>. A cold front was moving through Indiana, spawning a tornado, causing thunderstorm wind gust damage, and dumping heavy rainfall. The front reached the Ohio River the next day, pushed south by a Wisconsin high pressure center. The Indiana state temperature fell to 1°F below normal as the cooler air spread across the state.

On July 25<sup>th</sup> the high center expanded its reach from Indiana to eastern Quebec. As the ridge settled overhead the Indiana temperature dipped to 4°F below normal under mostly sunny skies. The old cold front stalled in Tennessee. The ridge left Indiana and traveled east the next day. A warm backflow of air to Indiana reversed the temperature trend and the state temperature edged upward to 1°F below normal under sunny skies.

A warm front crossed the state into northern Indiana on July 27<sup>th</sup>, then stalled there. The state temperature rose a bit more to 1°F above normal. A new surge of high pressure into the Great Lakes forced the northern Indiana stationary front south to the Ohio River. The state temperature didn't change but another round of rainfall covered the state.

The Great Lakes ridge gained strength and expanded to the southwest on July 29<sup>th</sup>. The Ohio River stationary front was driven south as a cold front to the Gulf states. Cooler air was transported to Indiana from Canada, dropping the state temperature to 5°F below normal and ending the rain showers. The strengthening ridge advanced the cold front to Florida the next day and brought refreshing weather to Indiana. The state temperature nudged upward to 4°F below normal under sunny skies and light winds.

On the last day of July the ridge overhead Indiana greatly expanded to cover the eastern half of the country. The state temperature lifted a few degrees to 1°F below normal to close out the month with pleasant weather conditions.

Rain fell statewide on July 23<sup>rd</sup>, 24<sup>th</sup>, and 28<sup>th</sup> and nearly statewide on July 27<sup>th</sup>. Showers were confined to the Ohio River valley on July 29<sup>th</sup> and were scattered around Indiana on July 25<sup>th</sup>. Only 3 of the 9 days in this interval had no rain. The heaviest single day rain amounts were reported on July 23<sup>rd</sup> in southwest Indiana. The CoCoRaHS volunteer at Celestine measured 5.85" while near Shoals 4.19" was collected. The rain gage at Loogootee had 4.11", Santa Claus 4.00", and in the vicinity of Evansville 3.90" was observed. Over the 9 days the largest rain totals among CoCoRaHS participants included 7.66" near Shoals, 6.46" outside Holland, 6.13" in Huntingburg, 5.77" at Loogootee, and 5.59" near to Evansville.

On the 9 day precipitation totals map 2" to 4" was noted in the southwest quarter of Indiana with 7" to 10" extremes in parts of Martin, Dubois, and Orange counties. At least an inch of rain was recorded generally in the southern third of the state. Under an inch was tallied in parts of northern and central Indiana. It was dry on all days in the northeast section of Steuben county. Regionally on average about 0.4" of rain fell in northern Indiana, 1.0" in central areas, and 2.6" in the south. These amounts equate to about 40% of normal in the north, 80% in central, and 230% of normal across southern Indiana.

There were 2 severe weather days on July 23<sup>rd</sup> and 26<sup>th</sup>.

On July 23<sup>rd</sup> an EF-0 tornado was confirmed in White county. This tornado had 85 mph winds and was on the ground for 1.8 miles. A home had its shingles removed and a garage nearby was damaged. Trees were uprooted or snapped and a porch was tossed from one side of a house to the other. The home's roof was lifted, shifted, then slammed down again. The residents of the house were not allowed to return. A corn field on this property showed damage. Some tree and barn roof damage was noted where the tornado ended.

More wind damage was evident in 4 counties. In Pulaski county a tree snagged a power line and ripped it to the ground where it continued to burn and smoke. Trees were uprooted or snapped and a power pole downed in White county. A tree smashed a vehicle in Howard county. More trees yanked down power lines. In Allen county 2 trees were snapped.

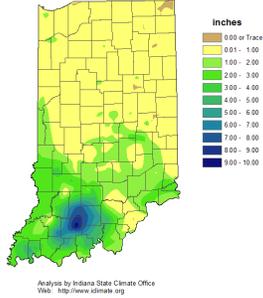
Flooding kept Clinton county roads closed a day after heavy rains fell there.

There was an isolated report of trees falling on to a roadway in Pike county on July 26<sup>th</sup>.

According to the US Drought Monitor the small proportion of Indiana soils that remained abnormally dry were gradually being eliminated. The Indiana USDM map of July 25<sup>th</sup> indicated all abnormally dry D0 category soils in Lake county have been erased. The other two drier regions in far northern and southwestern Indiana remained. The map on the following week dated August 1<sup>st</sup> showed that the D0 region of southwest Indiana, consisting of parts of Sullivan, Knox, and Gibson counties, had been removed from the D0 category. The only remaining region of D0 soils contained most of the two counties of Elkhart and Lagrange. This area constituted 2% of total Indiana land area which continued in abnormally dry status. The remaining 98% of Indiana land was in normal soil moisture status for this time of year.

According to the July 31<sup>st</sup> edition of the USDA Indiana Crop Weather report, cooler temperatures and reduced amounts of rainfall the final week of July benefited crop development. Corn and soybeans held their ground as half these crops were rated in good to excellent condition. Farmers who grow specialty crops continued to irrigate to insure adequate water for growth and reproduction. Some fields in southern Indiana remained waterlogged, however, and some corn was lodged due to strong winds. Cutting and baling of hay were progressing.

**Total Precipitation  
Jul 23 - 31 2017  
CoCoRaHS network  
(329 stations)**



## July 2017

<b>Region</b>	<b>Temperature</b>	<b>Temperature</b>	
		<b>Normal</b>	<b>Deviation</b>
Northwest	73.1	73.6	-0.6
North Central	72.6	73.1	-0.6
Northeast	72.5	72.8	-0.4
West Central	74.7	74.8	-0.1
Central	74.1	74.3	-0.2
East Central	73.5	73.5	0.1
Southwest	77.8	77.1	0.7
South Central	77.0	76.3	0.7
Southeast	75.8	75.5	0.3
<b>State</b>	74.6	74.6	0.0

<b>Region</b>	<b>Precipitation</b>	<b>Precipitation</b>		
		<b>Normal</b>	<b>Deviation</b>	<b>Percent of Normal</b>
Northwest	6.42	3.86	2.56	166
North Central	5.81	3.80	2.01	153
Northeast	5.30	3.66	1.64	145
West Central	6.10	4.39	1.71	139
Central	7.47	4.26	3.21	175
East Central	7.08	4.10	2.98	173
Southwest	5.20	4.26	0.93	122
South Central	6.07	4.32	1.75	141
Southeast	5.89	4.12	1.77	143
<b>State</b>	6.15	4.10	2.05	150

## Summer (June - July so far)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	72.1	71.9	0.3
North Central	71.5	71.3	0.2
Northeast	71.2	71.0	0.2
West Central	73.3	73.1	0.1
Central	72.5	72.5	-0.0
East Central	72.0	71.7	0.4
Southwest	75.7	75.2	0.4
South Central	74.8	74.4	0.4
Southeast	73.7	73.5	0.1
<b>State</b>	73.1	72.8	0.2

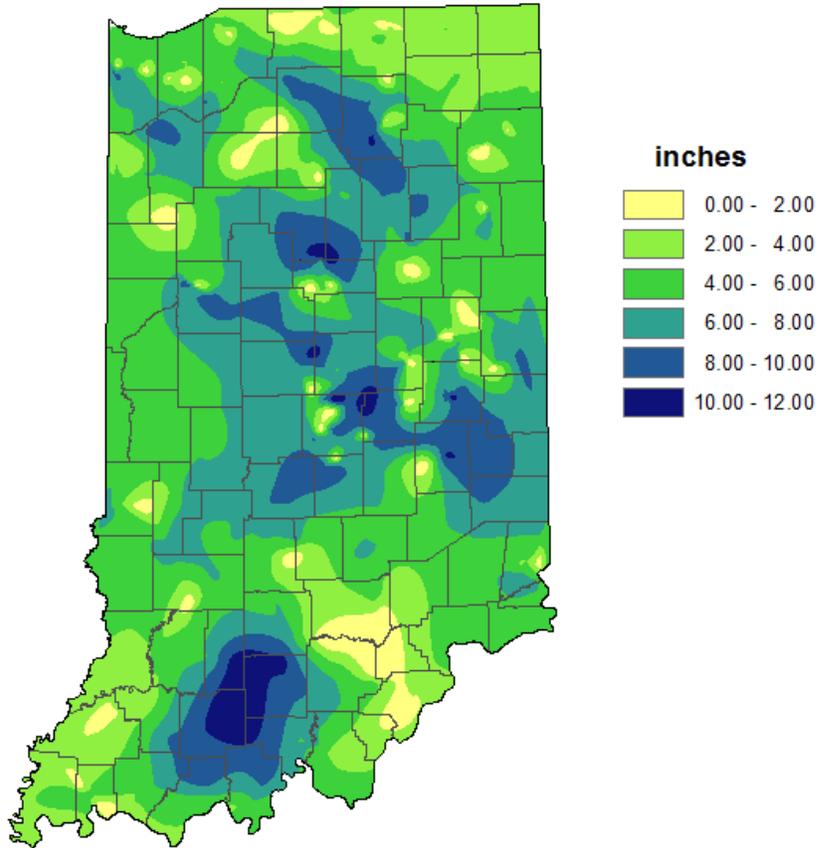
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	10.54	8.20	2.34	129
North Central	9.86	8.10	1.76	122
Northeast	9.45	7.74	1.71	122
West Central	10.12	8.72	1.40	116
Central	12.79	8.36	4.44	153
East Central	12.07	8.33	3.74	145
Southwest	8.24	8.37	-0.12	99
South Central	10.08	8.41	1.67	120
Southeast	10.74	8.34	2.40	129
<b>State</b>	10.45	8.30	2.15	126

## 2017 Annual so far (Jan - Jul)

<b>Region</b>	<b>Temperature</b>	<b>Temperature</b>	
		<b>Normal</b>	<b>Deviation</b>
Northwest	52.1	49.2	2.9
North Central	51.8	48.8	3.0
Northeast	51.6	48.4	3.2
West Central	54.7	51.0	3.6
Central	54.3	50.6	3.8
East Central	53.8	49.7	4.1
Southwest	58.1	54.4	3.7
South Central	57.7	53.8	3.9
Southeast	56.5	52.9	3.6
<b>State</b>	54.6	51.1	3.5

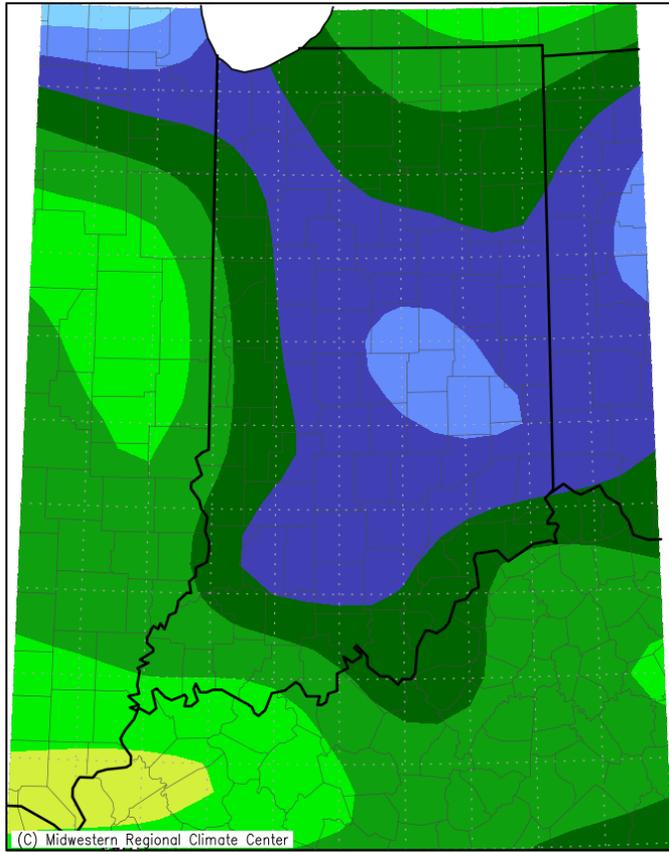
<b>Region</b>	<b>Precipitation</b>	<b>Precipitation</b>		
		<b>Normal</b>	<b>Deviation</b>	<b>Percent of Normal</b>
Northwest	29.93	22.25	7.67	134
North Central	29.68	22.17	7.51	134
Northeast	30.54	21.46	9.08	142
West Central	30.68	24.78	5.91	124
Central	35.27	24.56	10.71	144
East Central	33.98	23.93	10.05	142
Southwest	27.87	27.91	-0.04	100
South Central	30.89	28.02	2.87	110
Southeast	33.74	27.15	6.59	124
<b>State</b>	31.35	24.75	6.60	127

**Total Precipitation  
July 2017  
CoCoRaHS network  
(393 stations)**



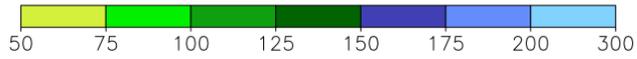
Analysis by Indiana State Climate Office  
Web: <http://www.iclimate.org>

Accumulated Precipitation: Percent of Mean  
July 1, 2017 to July 31, 2017



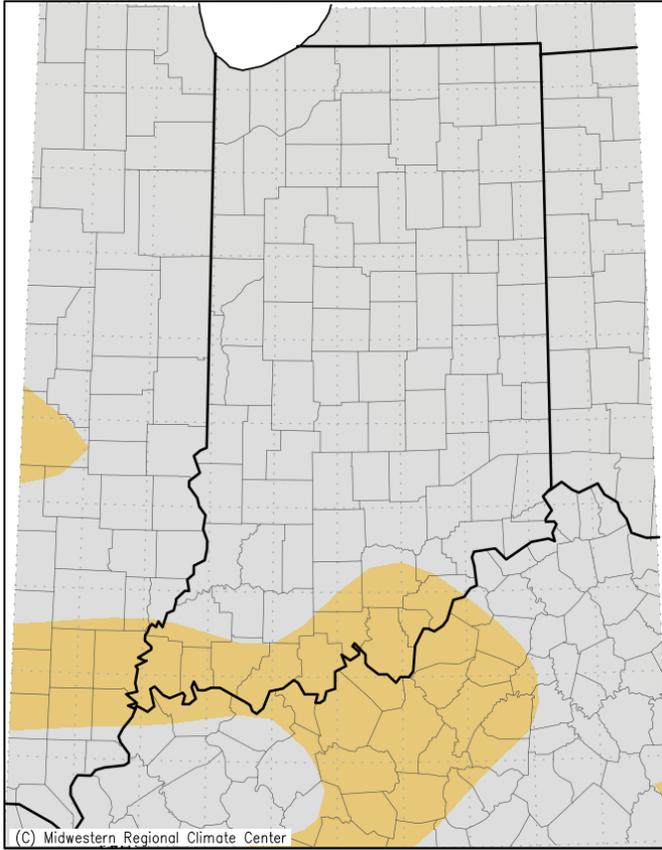
(C) Midwestern Regional Climate Center

Mean period is 1981–2010.



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
Generated at: 8/3/2017 4:02:08 PM CDT

Average Temperature (°F): Departure from Mean  
July 1, 2017 to July 31, 2017



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
Generated at: 8/3/2017 4:03:04 PM CDT

## *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 ▼

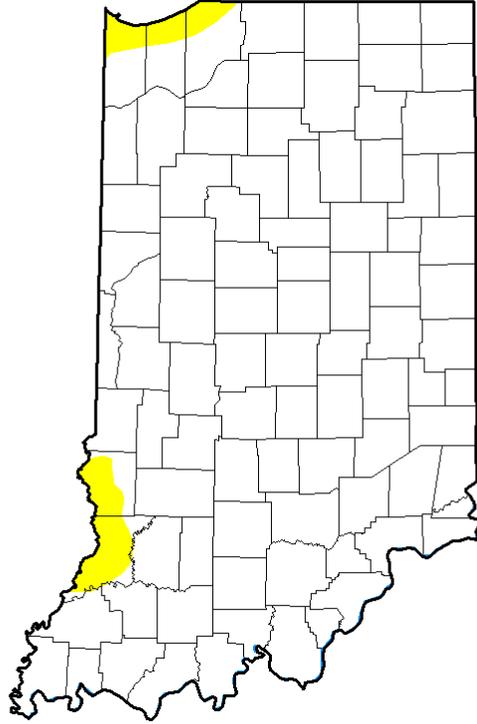
### Percent Area in U.S. Drought Monitor Categories

Show 25 ▼ entries

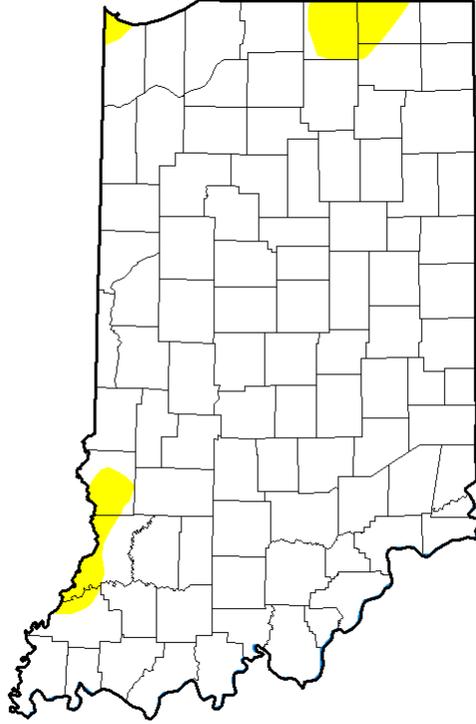
Search:

Week ▼	None ⚙	D0 ⚙	D1 ⚙	D2 ⚙	D3 ⚙	D4 ⚙
2017-08-01	98.18	1.82	0.00	0.00	0.00	0.00
2017-07-25	96.60	3.40	0.00	0.00	0.00	0.00
2017-07-18	96.36	3.64	0.00	0.00	0.00	0.00
2017-07-11	96.39	3.61	0.00	0.00	0.00	0.00
2017-07-04	96.76	3.24	0.00	0.00	0.00	0.00

*Jul 4<sup>th</sup> Drought Summary*



*Jul 11<sup>th</sup> Drought Summary*



*Jul 18<sup>th</sup> Drought Summary*

