

Summer 2021 Review

of Weather Conditions Experienced In Central Indiana

Tied for 29th Warmest on record at Indianapolis
21th Wettest on record at Indianapolis

Temperatures

JUNE 2021

Daily temperatures were considerably less anomalous than May 2021's, with the month featuring longer periods of very warm to hot conditions and a few short cooler periods under Canadian high pressure. If a heat wave is considered to be a prolonged period of high temperatures hitting 90F or higher, then the only borderline occurrence was during the second week of the month, in isolated locations; the warmer periods were driven more by warm, humid mornings than afternoon maximums.

The cool late May blast that brought several morning lows into the 40s lingered into June, with essentially all sites at least slightly below normal through the 2nd, as readings diurnally ranged from the 50s to the 70s. A slow moderation led to a prolonged humid, and at least briefly hot period during **June 7th-13th**, as a disorganized upper ridge built over the central US. Nearly all 1st-order airports peaked in the 90s on the 11th and 12th, with 90F+ heat continuing at Terre Haute and Shelbyville through the 14th. The 12th was the hottest day of this warm spell at all sites, with both Lafayette and the Purdue farm northwest of West Lafayette hitting 98F, while 95F was reached at both the Purdue farm northeast of Vincennes (Knox Co.) and Shoals 8S (Martin Co.). Perhaps more pronounced was the humidity which held Indianapolis' low temperatures from 68F to 71F during the 7th-13th, with similar trends seen at other sites.

Northerly winds brought a respite of milder Canadian high pressure into Indiana for **June 15th-17th** as temperatures dropped to the mid to upper 50s all three mornings at essentially all sites. This drier air's temperature was quick to rebound, however, as robust southwesterly flow returned. **June 18th-20th** was quite warm to briefly hot, as many sites recorded their highest temperature of the month on the 18th (hours before the severe weather outbreak, see below). The Vincennes and Shoals sites both hit 95F again.

A broad and deep, yet quick-moving upper trough provided another quick blast of much cooler air to the region on **June 22nd-23rd**. The 22nd was the cooler day, with morning lows into at least the 50s and daytime highs only rebounding into the low to mid 70s despite the strongest sun angle of the year. Crawfordsville 6SE plummeted to 46F, while Tipton 5SW dropped to 47F.

Heat and humidity then returned for June 2021's last several days. **June 25th-30th** saw morning lows remain at 70F or above at Indianapolis. Daytime highs were less impressive as the humid air and frequent showers/thunderstorms prevented any prolonged heat, although the low 90s were reached at several sites on both the 28th and 29th.

Overall, June 2021's generally 1.5F to 2.5F above normal temperatures reversed the rather cool trend of May 2021 ... while continuing the rather warm trend of June 2020. At Indianapolis, June 2021's daily average temperatures were above normal on 18 days and below normal on 9 days. It was the 33rd warmest June for the Indianapolis Area since weather records began in 1871.

JULY 2021 TEMPERATURES

Near-normal temperatures continued June's pattern of generally non-anomalous readings, as the month featured many days slightly above normal with a few, brief cooler periods under Canadian high pressure. No heat waves occurred per se as persistent rather humid conditions kept both highs and lows moderated...although consecutive days reaching the upper 80s were commonly seen. The overall synoptic pattern placed Indiana between the broad, upper-level ridge over the western US, and a typically troughy set-up to the east. Several modest deviations from this pattern led to the few warmer/milder periods. After the month started on a seasonal note, **July 2nd-3rd** found cooler Canadian air plunging down the upper Mississippi Valley and into central Indiana. Temperatures ranged in most places from the mid/upper 50s to only the upper 70s to near 80F, despite ample sun both days. All 1st-order airports recorded their lowest temperature of the month. The Crawfordsville 6SE COOP site (Montgomery Co.) dropped to 49F early on the **3rd**.

Very warm conditions returned on **July 5th-7th**, as a large portion of the western ridge broke down, spilling eastward into the Mid-West. Diurnal ranges near the 90/70 realm were common for most locations. The Shoals 8S COOP site (Martin Co.) hit 94F on the **6th**. Another shot of milder air entered Indiana on **July 9th-11th**, courtesy of an upper wave that cut-off from the Dakotas to the lower Missouri Valley, which provided a rather cloudy, southwest flow aloft. The New Castle 3SW COOP site's (Henry Co.) daily maximum temperature only reached the low 70s on both the **9th** and **10th**. The middle of the month saw rather mundane temperatures – both from the generally cloudy/rainy conditions seen through the **16th** (see below), and then the weakly troughy-yet-partly sunny combination that followed through the **20th**.

Late month then saw the western ridge strengthen while sliding slightly eastward toward Indiana. The resultant flat upper ridge over Indiana, with a northwest flow from southern Canada, made for several summery days that did not exceed the mid 80s in most locations. The month's most prolonged very warm/hot period then followed for most of **July 24th-29th**, as the western ridge built farther east – settling over the Heartland. Excepting brief lower dewpoints that followed a weak boundary on the **27th**, these several days were quite humid while high temperatures reached the upper 80s to low 90s. The Washington 1W COOP site (Daviss Co.) had a sultry overnight low of 76F on the **26th**, while Shoals 8S rose to 93F on the **29th**. The atmosphere see-sawed yet again to end July, as back-to-back areas of Canadian surface high pressure first returned temperatures to near normal on the **30th**, before unseasonably mild

readings infiltrated the region on the **31st**. The temperature was 58F and falling when the month ended at both Bloomington and Lafayette.

At Indianapolis, July 2021's daily average temperatures were above normal on 11 days, at normal on 5 days, and below normal on 15 days. It tied for the 56th coolest July for the Indianapolis Area since weather records began in 1871.

AUGUST 2021 TEMPERATURES

The month's anomalously high temperatures averaged about 3 degrees above normal across all of central Indiana, which included both a mild first week and a consistently very warm to hot pattern for the remainder of the month. Heat waves occurred during **August 10th-12th** and **August 24th-29th**, wherein nearly all daily temperatures averaged about 10 degrees above normal for most locations. This was the hottest August for the Indianapolis Area since 2016, as well as the first year with an August hotter than July since 2016.

The monthly maximum was reached on the **24th** at all 1st-order airports, with most locations reaching the mid 90's. A few sites also tied their highest value on the **12th**, **22nd** and **27th**. 97F was the highest mark reached at any COOP site: Tipton 5 SW (Tipton Co.) on the **24th** and the Southwest Purdue Ag Center northeast of Vincennes (Knox Co.) on the **25th**. The Columbus COOP site (Bartholomew Co.) peaked at 95F on four days - the **12th**, **26th**, **27th** and **29th**. Daytime highs of 90F+ were common through August, tallying at 1st-order airports from 8 days at Lafayette to 12 at Shelbyville. Shoals 8 S (Martin Co.) counted 16 days at 90F or higher. The coolest morning for nearly all sites was observed on **August 2nd** as widespread low to mid 50's were found across the region, with 50F reported from Crawfordsville 6 SE (Montgomery Co.), to Tipton 5SW, to Farmland 5 NNW (Randolph Co.).

Indianapolis reached 80F or higher on every day, which made it only the fifth time in the Area's 150-year record, or a 30-year return period. Normally 6 days in August have high temperatures under 80F. Seventeen mornings were held to 70F or warmer, which tied for sixth most of any August since 1871 (with the record being 20 such days in 2016). August 2021's above normal readings were in contrast to the near-normal readings observed in both July 2021 and August 2020. At Indianapolis, August 2021's daily average temperatures were above normal on 23 days and below normal on 7 days. It tied for the 12th hottest August for the Indianapolis Area since weather records began in 1871, placing it in the 92 percentile.

Summer 2021 Temperature Data for Central Indiana Sites

Site	Summer 2021 Av Temperature	Summer Season Normal Temp	Difference From Normal
Indianapolis Int'l Airport	75.5	73.9	+1.6
Lafayette	75.4	72.2	+3.2
Bloomington*	75.0	73.4	+1.6
Muncie	76.1	74.4	+1.7
Terre Haute	75.6	73.9	+1.7
Shelbyville	76.4	74.2	+2.2
Indianapolis Eagle Creek AP*	75.9	74.3	+1.6

Summer 2021 Temperature Extremes Across Central Indiana

Site	Highest Temperature	Lowest Temperature
Indianapolis Int'l Airport	94 on 6/12, 6/18, 8/12, 8/24	53 on 6/22
Lafayette	100 on 6/18	52 on 8/2
Bloomington	94 on 6/12, 6/18	53 on 6/23, 8/2
Muncie	95 on 6/12	52 on 6/22
Terre Haute	96 on 6/18	53 on 8/2
Shelbyville	96 on 6/18	54 on 6/22, 8/2
Indianapolis Eagle Creek AP	94 on 6/12, 8/24	53 on 6/22

* – Temperature data missing for Indianapolis Eagle Creek on 6/21 and 6/20's max temp;
And for Bloomington's 8/5 max temp

Precipitation

JUNE 2021

The month was wetter than normal for most of central Indiana, in both rainfall frequency and amounts. The couple 4-5 day blasts of cool, dry Canadian air through the middle of the month acted as intermissions between distinct periods of daily showers. The month started wet on the **1st-3rd**, especially across southern counties where 3-day totals were as high as 3.66" at Shoals 8S (Martin Co) ... with significant rains falling on the 2nd at Indianapolis (1.19"), Bloomington (1.56") and Shelbyville (1.21"). The next round of summer showers fell from the **8th-12th**, again with the most common daily totals of 0.50-1.00" generally falling along and/or south of the I-70 corridor ... with the greater 5-day rainfall totals around 2.00" for several counties, and as high as 3.70" near Flat Rock (southern Shelby Co) ... and the greatest 1-day sum of 2.25" on the 12th near Warren Park (Marion Co).

Several rounds of intense storms on the **18th-19th** led to extreme rainfall totals of ~3-8" along a broad Terre Haute – Bloomington – Columbus zone, including 7.42" at Ellettsville 0.6 SSE (Monroe Co) and 7.41" at Spencer (Owen Co), the latter being the **greatest 1-day total in the station's 76-year record** ... while less-extreme heavy rains of 1-3" fell on several counties to the north and south of the bulls eye. Over 30 of central Indiana's river and stream gages rose to flood stage following this event, including moderate flooding on the North Fork Salt Creek at Nashville, Haw Creek at both Hope and Clifford, and Salt Creek at Harrodsburg. Moderate flooding on the East Fork of the White River at Seymour crested just shy of major flood stage.

The month ended on a humid and showery note, as showers and thunderstorms were common for June's last seven days, especially along the Wabash River Valley from Kokomo to Terre Haute. The **24th-26th** rains totaled around 2.00" to well over 3.00" for northwestern zones, including 3.73" in Covington (Fountain Co). On the **27th**, many locations saw around 1.00", with 2.60" at West Lafayette 3.3 WNW, and several reports of 1.15-1.55" over the portions of Owen and Monroe Counties that saw the 18-19th bulls eye. The **29th**'s storms brought about 2.00" to much of northern Marion County, including 2.35" in Williams Creek ... before the month ended on a rainy note: the **30th**'s early morning and evening storms totaled 0.50-1.00" on many sites, including 1.43" at the Indianapolis Int'l Airport.

Normal June rainfall totals range from 4.50 to almost 6.00" across central Indiana. June 2021's totals encompassed near normal to anomalously high values, with the region split between 3-6" over most north-central/northeastern zones, and generally 6-10" along the southern half and far northwestern counties ... while most of Marion County saw 6-9", which was greater than most adjacent counties. There were several exceptions to this pattern, however, including: several sites totaled over 10" in northwestern Monroe County, as well as neighboring portions of Owen and Morgan Counties ... as well as only 5-6" over far southwestern counties. The region's June total precipitation ranged from around 2.50" in Tipton County to nearly 13" in southeastern Owen County.

The month's generally wet pattern across central and southern counties was also exhibited at Indianapolis, Bloomington and Shelbyville, which each saw 10 days record 0.10"+ (normal for all sites is 8), while Indianapolis recorded measureable rain of 17 days (normal is 12), and Shelbyville's 8 days of 0.50"+ was double their normal tally. Following the modest rains of this April and May, Indianapolis' year-to-date total was 2.86" below normal. However, June's anomalously high rainfall essentially erased this deficit. Looking back at June 2020, Indianapolis' total precipitation was an adequate, yet near-normal 4.44"; June 2021's sum was 152% of normal. June 2021 tied for the **13th wettest** for the Indianapolis Area since weather records began in 1871.

JULY 2021 PRECIPITATION

Wetter than normal conditions continued across most of central Indiana for the second month, although rainfall frequency was near normal. The greatest rainfall events were on the 1st and during the 8th-16th, before a drier second half of the month...although a few locally moderate/heavy rainfalls did occur between the 23rd-29th. July started wet on the **1st**, with a soaking rain through the AM hours for most locations, resulting in a storm total of 4.18" near Martinsville (Morgan Co.), and several other event totals over 3.00" along the Owen-Monroe County line and in Columbus (Bartholomew Co.). Numerous reports of **flash flooding** over roads and into low-lying areas were received from Frankfort (Clinton Co.) to the west side of Indianapolis; also, a section of Indiana route 32 washed out in eastern Fountain County.

Showers and thunderstorms brought rains of 1"+ on July **6th**, **7th**, and **8th** to parts of the region. The **7th** saw several reports of 2-3" in central Tippecanoe County, with isolated 1-2" around Muncie, the Indianapolis northwest suburbs and Shoals. On the **8th** an impressive 3.18" was recorded southwest of Greensburg (Decatur Co.), while 2.60" was observed near Anderson (Madison Co.), with 1-2" seen across much of the region's central counties. Minor flooding was reported in southern Madison County. For this 3-day period, most areas totaled around 1-2".

Further showers and storms fell July **10th** through **13th**. On the **10th**, 2.97" was reported near Unionville (Monroe Co.), with 1-2" common across the southeastern half of the region. The **11th** brought numerous readings near 1" across north-central counties...before the **12th** saw 2.00" near Shepardsville (Vigo Co.), with several 1-2" reports elsewhere, especially from Indianapolis to Kokomo (Howard Co.). A scattering of observed rainfall of up to 1" was seen on the **13th** over central and eastern counties. This 4-day period found 1-2" totals for most locales, although isolated 4-day totals over 3.50" were reported in Brown, Monroe and Hamilton Counties.

The month's heaviest rains fell on July **15th** and **16th**. Through dawn on the **16th**, a patch of 2-2.5" of rain had fallen across Indianapolis' southern to eastern perimeter, while the highest totals were 2.75" in New Palestine (Hancock Co.) and 2.69" in Brooklyn (Morgan Co.), with 1-2" seen across most of the region. The following 24 hours saw even heavier rainfall totals: 3.92" east of Flat Rock, 3.75" in Tannersville (Jennings Co.), with 2-3" common elsewhere across the

southern third of central Indiana, and several observations of 1-2" along northern counties. Reports of **flooded roads** were received on the **15th** from near Flora (Carroll Co.), and on the **16th** from Bloomington. Rainfall totals for this 2-day period of 2.5-4" were common along and south of the I-70 corridor.

The prolonged mid-month wet period made **river flooding** inevitable: nearly 30 river sites entered flood stage, starting late on July 16th. Most sites were only in flood between the 17th and 21st, while downriver portions of the East Fork White and White River remained in minor flood stage through the 23rd and 26th, respectively. Flooding also occurred along several non-main stem rivers and creeks, primarily across south-central and southeastern counties, with most of these sites in flood for under 24 hours. However, Amity and Edinburgh (both in Johnson Co.), Walkerville (Shelby Co.), and Rushville (Rush Co.) were in flood for about 48 hours each. **Moderate flood stage** was reached on the East Fork White at Seymour for nearly 50 hours from the evening of the 17th to the evening of the 19th. While of noticeably shorter durations, **moderate flood** was also reached on the **17th** on Beaver Creek at Shoals and the Driftwood River southwest of Edinburgh (Bartholomew Co.)...and on the **18th** on the Little Blue River at Walkerville.

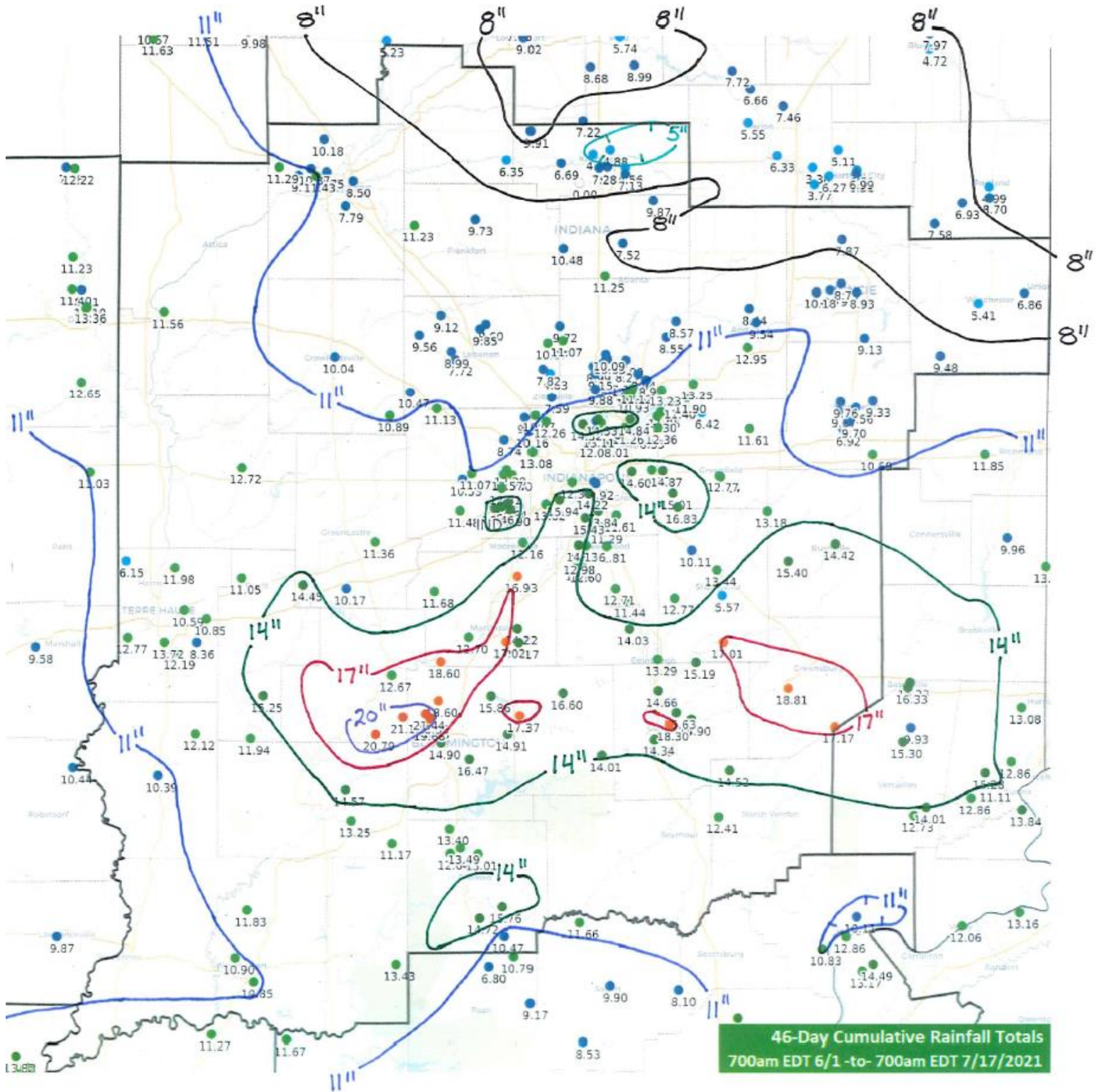
Organized rains returned with relatively lighter amounts on the **23rd** and **24th**...although on the **24th**, 2.11" was measured on the south side of Terre Haute, with 1-2" across the rest of Vigo County. On the **29th**, the same storm system that spawned two tornadoes (see below), also brought an extreme rainfall observation of **6.66"** east of Flat Rock, and 1.5-2.5" in and around Columbus. Numerous **flooded roads** were reported in southern Shelby County and a **water rescue** was performed in Hope (Bartholomew Co.). Elsewhere, these pre-frontal rains had otherwise modest measurements, with only isolated 1-2" reports.

Normal July rainfall totals range from about 3.80 to almost 5.00" across central Indiana. July 2021's totals continued June 2021's pattern: encompassing near normal to anomalously high values...as most locations were 1-4" above normal. Also similar to June 2021's pattern, there was a general north-south gradient, with 7-11" common along and south of the I-70 corridor, while 5-8" totals were the rule to the north. Most anomalous were 12-15" amounts in both Columbus (Bartholomew Co.) and east of Flat Rock (Shelby Co.), as well as several 10-11" reports near the Owen-Monroe County line. Howard County once again was the region's minimum, with generally 3-5".

The overall wet month was due more to the several moderate/heavy rain events than any persistent rainy pattern. This was perhaps most exemplified at Shelbyville where 4 days recorded 1.00"+ (normal is 1 day), while all other 1st-order airports each tallied 2 such days (normal being generally 1 day). Terre Haute, Bloomington and Shelbyville reported 6, 5 and 5 days with 0.50"+, respectively (2 days more than normal at each site)...while Muncie totaled 0.10"+ on 11 days (where the normal is only 6). Indianapolis' year-to-date precipitation total, **29.32"** through July 31st, is **1.62"** above normal. Looking back at July 2020, Indianapolis' precipitation was an adequate, yet near-normal 4.90"; July 2021's sum was 143% of normal.

July 2021 was the **22nd wettest** for the Indianapolis Area since weather records began in 1871.

June - Mid July 2021 Total Precipitation, Through the Morning of 7/17 As Reported By Central Indiana CoCoRaHS Observers



AUGUST 2021 PRECIPITATION

Typically, central Indiana’s driest summer month, August’s 3.00-3.50 inch normal precipitation seen by most locations is typically 1.00-1.50” less than June and July’s totals. This year certainly exemplified this climatological pattern with most of the region totaling 1.50-4.00”, including only 1.99” at Indianapolis international Airport, which was only 62% of normal.

The highly variable monthly totals across the region were driven by several days of isolated-scattered heavy rains from thunderstorms, particularly during the last two weeks of the month. Several 4.00-6.00” totals were reported across mainly north to north-central and southwest to south-central counties. The greatest totals were 6.64” west of Graysville (Sullivan Co.), 6.51” east of Shoals (Martin Co.), 6.21” in Avon (Hendricks Co.) And 6.09” in Anderson (Madison Co.). However, most locations saw below normal rainfall for the month, some spots significantly so. Lowest reported totals were 0.67” near paragon (Morgan Co.), and 0.70” southwest of Thorntown (Boone co.).

Heaviest daily rainfall reports included **2.17”** southeast of Noblesville (Hamilton Co.) from the storms of the **19th**; **4.38”** in Avon on the **25th**; **2.34”** Kokomo (Howard co.) on the **26th**; **4.40”** in the southeastern portion of Muncie on the night of the **29th-30th**; and **3.92”** near Shoals on the **30th** when flooded roads were reported across Lawrence County.

Early August 2021 continued late July’s generally dry trend ... although when focusing on monthly totals, August 2021’s overall dry pattern was in sharp contrast to the anomalously wet June 2021 and July 2021. Despite below normal precipitation in August, Indianapolis’ year-to-date total, **31.31”** through August 31st, is still **0.41”** above normal. August 2021’s dry trend paralleled August 2020, when Indianapolis’ measured only 2.09” for the month.

Summer 2021 Precipitation Data for Central Indiana Sites

Site	Summer 2021 Precipitation	Summer Season Normal Precip	Diff. From Normal	Greatest Daily Rainfall
Indianapolis Int’l Airport	15.84	12.57	+3.27	2.78 on 7/1
Lafayette	11.37	11.76	-0.39	1.86 on 7/8
Bloomington*	16.50INC	13.32	M	M
Muncie*	12.13INC	12.29	M	1.30 on 8/29
Terre Haute	15.05	11.97	+3.08	3.54 on 6/19
Shelbyville*	17.94INC	12.22	M	M
Indianapolis Eagle Creek AP*	11.00INC	12.59	M	2.41 on 6/10

* – Precipitation data incomplete/missing for Bloomington on 6/18, 6/19 and 8/30;
for Indianapolis - Eagle Creek on 6/20, 6/21, 8/25, 8/26 and 8/31;
for Muncie on 8/30; and for Shelbyville on 6/18 and 6/19

Severe Weather

JUNE 2021 featured an outbreak of large hail, damaging winds and flooding rains (on the 18th-19th) ... central Indiana's first tornadoes since April 2020 (25th) ... and an otherwise active second half of the month, if much more in frequency than coverage. Excepting a lone event on April 21, 2021, the region's first severe weather report since late March occurred on the evening of **June 12th** when a broken line of thunderstorms downed trees and power poles from Indianapolis to the northeastern counties, with isolated **60 mph** wind gusts and quarter-sized (**1.00"**) **hail** also impacting east-central Marion County.

A hot, humid **June 18th** led to a complex and prolonged series of severe thunderstorms ... starting with late afternoon storms across the far northeastern zones ... next, several rounds of widely scattered evening storms across generally the central and southern counties ... which then near-seamlessly morphed into a widespread mesoscale convective system shortly after midnight, which finally ended after dawn on the 19th. The first (late afternoon) storms brought a few reports of hail as large as **1.00"** just north of Muncie and farther east. Next, a potent supercell started the second (evening) round, dropping hen egg (**2.00"**) **hail** from northeastern Marion County to Markleville (Madison Co), before several reports of baseball (**2.75"**) **or larger hail** from Hancock County, including a **3.40" stone** in New Palestine. (This was only the second time in the last 10 years that hail larger than 3.00" was reported anywhere in the region, the other occasion being 4.00" hail near Montmorencie (Tippecanoe Co.) in May 2019.) The supercell maintained its strength into northern Shelby County, dropping a funnel cloud and what was likely a **macroburst**, with estimated winds of **70-90 mph** over a rural 10 square mile patch between Fairland and Fountaintown. The reported 5-10 minute duration of this intense wind was the likely cause of numerous uprooted/snapped trees and power lines, as well as the top of an older concrete grain silo being blown off. The evening storms brought several other impressive hail reports, including several of **2.50-3.00" hail** across far southeastern Putnam County, and **2.75" hail** in Cadiz (Henry Co). Very efficient rainfall production during the event's third phase through the early morning of the 19th ... lead to a broad zone of flash flooding across Owen and Monroe Counties, including downtown Bloomington, due to extreme event rainfall totals of 3-8". More isolated flash flooding was also reported along and to the north of this maximum, from Fountain County to Johnson County.

On the **25th**, **two tornadoes** touched down on the far northwestern corner of the region just before sunset (central Indiana's first confirmed tornadoes since 4/8/2020). A supercell slowly moving to the east dropped an **EF1** that tracked 2.2 miles between Dayton (Tippecanoe Co.) and Rossville (Carroll Co.) with estimated peak winds of 95 mph ... snapping trees, damaging several barns and a small windmill, and launching tree branches through a farmhouse's windows. Soon after, the same storm dropped an **EFO** north of Burlington (Carroll Co.) that tracked for 2.4 miles while dissipating and quickly starting again several times along its path, with estimated peak winds of 74 mph that uprooted trees and caused some superficial damage to buildings.

The remainder of the month saw more modest thunderstorms bring several, noticeably smaller severe events. The **20th** had a lone report of 1.00" hail near Zionsville (southwestern Hamilton

Co.) ... on the 26th there were two reports of downed trees across Tippecanoe County ... the 27th had marginally severe winds hit the Indianapolis Int'l Airport (see Miscellaneous section below) ... and the 29th found a couple slow-moving cells bring marginally severe hail to Seymour and winds strong enough to down several trees in and south of Jonesville (Bartholomew and Jackson Counties).

JULY 2021 July 2021's severe weather was technically confined to only four days, yet included a microburst and two weak tornadoes. Heavy rains led to flash flooding concerns on five days (see above), three of which were mutually exclusive from severe wind/tornado days. No severe hail (1.00"+) was reported in central Indiana during the month. July 8th featured several marginally strong-severe midday to afternoon thunderstorms, ahead of a slowly-approaching cold front. A **microburst** left wind damage along a 4-mile path between Homer and Rushville (Rush Co.). The winds significantly damaged a home's roof and side wall, destroyed or damaged several farm out buildings and trees, and blew debris 100 yards to the east. Just as the microburst diminished, the same storm continued across Rush County, braking power poles and downing trees in Rushville...before downing large tree limbs and flattening crops near New Salem. Later in the afternoon a strong storm dropped penny-sized hail (0.75") near North Vernon (Jennings Co.).

July 15ths scattered late day thunderstorms damaged a barn roof in Bringhurst (Carroll Co.) and downed trees in Quincy (Owen Co.) before the storm's leading edge intensified while approaching the Indianapolis area. Trees were downed both near Avon and in Plainfield (Hendricks Co.), with tree branches downed in Trafalgar (Johnson Co.). Then on the 16th, several rounds of late day showers and storms included a few strong cells, however, the only damage report was of small limbs downed by winds in Odon (Davies Co.).

On the 29th, hot and humid conditions combined with a cold front approaching from the north to produce several strong to severe storms in the early evening. Shelby County took the brunt of the more severe weather for not the first time this summer, including **two EF-1 tornadoes**. The first tracked 2.5 miles from southeast of Shelbyville to west of Waldron with estimated peak winds of 90 mph, as it damaged support beams on a porch, knocked down a masonry wall, snapped an antenna pole, and at times caused widespread tree damage. The second EF-1 tracked for 0.7 miles to the south of Waldron with estimated peak winds of 90 mph, as it made a narrow but intense swath of tree damage and knocked over several grave stones in the Van Pelt Cemetery. These events brought central Indiana's 2021 tornado tally to 4. Other, non-tornadic, damage in Shelby County included a partially damaged roof in Shelbyville and downed trees on the east side of Waldron. A separate storm downed a small tree just northeast of Vincennes (Knox Co.).

AUGUST 2021's severe weather was reported across 8 different days. While some afternoons/evenings had widely scattered to widespread thunderstorms, severe winds and hail were generally isolated ... excepting the intense rains and damaging winds of August 25th that impacted Indianapolis and adjacent counties. On August 7th a pulse storm dropped quarter (**1.00"**) to half dollar (**1.25"**) hail across Randolph County, before curling its motion to the southwest and then downing trees near Glenwood (Rush Co.). The 11th saw afternoon cells

combine into a strong squall line across northeastern counties, with a lone report of a metal warehouse partially collapsing on the south side of Muncie. Then on the 12th, an upper wave passing above the hot and very humid low levels led to an organized late day squall line, which produced damaging winds across southwestern zones: a large tree blew onto power lines near Farmersburg (Sullivan Co.) and large tree limbs were downed near Vincennes (Knox Co.).

The 25th featured a round of strong to severe thunderstorms north of Indianapolis, that then spread through many central/southern counties. Radar indicated numerous **microbursts/downbursts** at times through late morning and early afternoon with minor tree damage reported in Hendricks and Marion Counties. Across this same area and also through southern Putnam and northeastern Owen Counties, storms remained stationary leading to flooding.

Hot and humid conditions continued to set the stage for thunderstorms over the next two days with severe winds impacting Rush County on both occasions: on the 26th several trees were downed from Carthage to Mays ... and on the 27th several more blew down across the county, especially in Rushville where most of the city was without power. An active night of pulse storms spanned the 29th - 30th with several reports of damaging winds across northeastern counties: a tree blew into a house near Noblesville (Hamilton Co.); multiple large trees were downed, part of an airport hangar roof blown off, and portions of a corn field were blown over near Alexandria (Madison Co.); and a tree was downed onto power lines in Farmland (Randolph Co.).

For info on severe weather in other areas during the summer season, visit the Storm Prediction Center "Severe Weather Event Summaries" website at spc.noaa.gov/climo/online

Miscellaneous Weather

JUNE 2021's maximum wind gust at the Indianapolis International Airport, 59 mph (from the southwest) on the 27th, was actually Indiana's lone severe weather report that day, courtesy of a marginally severe storm that passed over the airport. Shelbyville recorded a gust of 68 mph (from the north) during the 18th's severe outbreak.

Fog was reported at Indianapolis on 11 days during the month, with no dense fog (visibility $\leq 1/4$ mile). Fog was most frequent at Eagle Creek (16 days) and Bloomington (15 days). Thunder was reported at Indianapolis on 14 days and was elsewhere most frequent at Lafayette and Bloomington (10 days each).

JULY 2021 The month's maximum wind gust at the Indianapolis International Airport was 46 mph (from the west-northwest) on the **15th**, with none of the other 1st-order airports recording any gusts of 45 mph or greater.

Fog was reported at Indianapolis on 14 days during the month, with no dense fog. Fog was, however, quite frequent at most 1st-order airports, occurring on at least 24 days at Bloomington, Lafayette, Shelbyville and Terre Haute. **Dense fog** was most frequent at Lafayette (8 days), while most common on the **5th**, **15th**, **16th**, **26th** and **28th** (at 2 sites on each of these days).

Thunder was reported on 10 days at Indianapolis, and was generally common elsewhere -- occurring on 8 to 10 days at all other 1st-order sites except Lafayette (only 5 days).

Haze from **smoke** was unusually common over central Indiana, due to upstream forest fires over both the northwestern US and near the southern Saskatchewan-Manitoba border. While at least optically-thin haze was occasionally found over much of the region from the **4th** onward...it was not until surface high pressure tracked from south-central Canada into Indiana on the **21st** that widespread smoke then reached the surface. Visibilities dropped to a persistent 4 to 6 miles during the day and much of the evening. Smoke-based haze continued to occasionally reduce visibility through the remainder of the month, especially when under the subsidence of areas of high pressure. Visibility as low as **2 miles** was reported in times of calm winds near Vincennes (Knox Co.) on the **21st**, as well as at Indianapolis Eagle Creek early in the evening on the **23rd**.

AUGUST 2021 at Indianapolis featured a maximum wind gust at the Indianapolis International Airport was 41 mph (from the west-northwest) on the **12th**. Greater peak wind gusts at other 1st-order airports included 48 mph at Muncie (from the west-southwest) on the **29th**, and 43 mph at both Lafayette (from the west on the **12th**) and Bloomington (from the south on the **27th**).

Fog was reported at Indianapolis on 11 days - mainly during the second half of the month, with dense fog (visibility \leq 1/4 mile) on the **17th** and **25th**. All other 1st-order airports saw more days with fog, ranging from 14 days at Muncie and Indy-Eagle Creek to 25 at Bloomington. Most sites saw 4-5 days of **dense fog**, with greatest prevalence on the **17th**, **19th**, **20th** and **23rd**. Bloomington reported dense fog on 7 consecutive days during the **17th-23rd**.

Thunder was reported on 9 days at Indianapolis, with the frequency at other airports ranging from 6 days at Terre Haute to 10 at Indy-Eagle Creek.

Indianapolis Summer 2021 Monthly Data

INDIANAPOLIS JUNE 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 90^\circ$	Lows $\geq 70^\circ$
June 2021	74.1	7.51	5	10
Normal June	72.5	4.95	3	5
Diff from Normal	+1.6	+2.56	+2	+5

June 2021 All-Time Ranks...

Temperature: **33rd Warmest**
Precipitation: **13th Wettest** (Tied)

INDIANAPOLIS JULY 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 90^\circ$	Lows $\geq 70^\circ$
July 2021	74.9	6.34	1	7
Normal July	75.8	4.42	7	10
Diff from Normal	-0.9	+1.92	-6	-3

July 2021 All-Time Ranks...

Temperature: **56th Warmest** (Tied)
Precipitation: **22nd Wettest**

INDIANAPOLIS AUGUST 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 90^\circ$	Lows $\geq 70^\circ$
August 2021	77.5	1.99	11	17
Normal August	74.7	3.20	6	7
Diff from Normal	+2.8	-1.21	+5	+10

August 2021 All-Time Ranks...

Temperature: **12th Hottest** (Tied)
Precipitation: **39th Driest**

INDIANAPOLIS SUMMER 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 90^\circ$	Lows $\geq 70^\circ$
SUMMER 2021	75.5	15.84	17	34
Normal Summer	74.3	12.57	17	22
Diff from Normal	+1.2	+3.27	0	+12

Summer 2021 All-Time Ranks...

Temperature: **29th Warmest** (Tied)
Precipitation: **21st Wettest**

Fall 2021 Outlook for Central Indiana

The official outlook for the 2021 fall season (September-November) from the Climate Prediction Center, indicates a greater chance for above normal temperatures across central Indiana. The outlook also indicates equal chances of above, below or near normal summer precipitation across the region.

At Indianapolis, the normal fall temperature is 55.6 degrees and the normal fall precipitation is 9.81”.

*Data prepared by the NWS Indianapolis Weather Forecast Office's Indiana State Climate Team
Questions should be referred to w-ind.webmaster@noaa.gov*