

# Fall 2021 Review

of Weather Conditions Experienced in Central Indiana

*Tied for 26<sup>th</sup> Warmest on record at Indianapolis*

*12<sup>th</sup> Wettest on record at Indianapolis*

## Temperatures

### SEPTEMBER 2021

September 2021's very warm temperatures averaged about 3 degrees above normal across central Indiana, which included generally near-normal readings for the first 11 days, several ~3-day periods of unseasonable warmth between the middle and very end of the month, and several days of below normal temperatures that started on the 22<sup>nd</sup>. Afternoon highs in the mid-80s to low 90s were common on the 11th-14th, 17th-19th, and 27th-30th. Perhaps surprisingly, this was only the 5th warmest September of the last decade at Indianapolis, due to several anomalous recent Septembers between the record warmest (2019) and two others in the all-time top-15 warmest (2018, 2016). Monthly maximums were reached on the 14th, 18th, and 19th across the region, when most locations reached the upper 80s to low 90s. The coolest morning for nearly all sites was observed on September 24th as widespread low to mid 40s were found across the region.

After a hot and humid end to August, September started near to slightly below normal as a seasonably strong mass of Canadian high pressure passed from the Great Lakes to the upper Ohio Valley. Most locations dropped into the 50s on the mornings of both the 2<sup>nd</sup> and 3<sup>rd</sup>, with the lowest mark of 51F at New Castle 3 SW (Henry Co.) both mornings. On the 3<sup>rd</sup>, Indianapolis Int'l Airport's high of 78F was only the second sub-80F max in 49 days.

On the 6<sup>th</sup>, readings at most locales saw a diurnal spread of 25F or greater, with the Beck Agricultural Center northwest of West Lafayette (Tippecanoe Co.) climbing from 55F to 87F (a 32 degree rise). Most sites reached the mid to upper 80s on both the 6<sup>th</sup> and 7<sup>th</sup>, with Shoals 8 S (Martin Co.) peaking at 89F and 88F, respectively. Following the next cold frontal passage early on the 8<sup>th</sup>, high pressure and dry northwesterly flow aloft promoted generally seasonable temps through the morning of the 11<sup>th</sup>. Another transition then occurred during the day of the 11<sup>th</sup> as robust south-southwesterly breezes again boosted readings to very warm levels, with Rockville (Parke Co.) climbing from 60F to 89F (a 29 degree rise).

On the 12<sup>th</sup>-14<sup>th</sup>, all 1st-order airports averaged at least 10 degrees above normal courtesy of persistent south-southwesterly winds. The 14<sup>th</sup> was the most anomalous per lows near 70F at most locations ... with afternoon maximums as high as 92F at the Southwest Purdue AG Center

northeast of Vincennes (Knox Co.). The **15<sup>th</sup>-16<sup>th</sup>** included a brief respite to more seasonable readings as high pressure crossed the southern Great Lakes. The **17<sup>th</sup>-19<sup>th</sup>** then saw upper ridging build over the Mid-West, with the generally southerly flow again boosting afternoon highs near 90F, while the rather humid air mass held morning lows in the 60s. The **18<sup>th</sup>** was the hottest day of the month for most sites, with over a dozen COOP stations and most 1st-order airports reaching the low 90's, including **93F** at Shelbyville Municipal Airport. Tipton 5 SW (Tipton Co.) made it into the 90s all three days, including 92F on the **18<sup>th</sup>** and **19<sup>th</sup>**. 90+ marks were hit on two of the three days at 5 other stations, mainly along the Wabash Valley.

Late September featured a regime change to **noticeably cooler fall-like weather** following the passage of both a seasonably strong cold front on the **21<sup>st</sup>**...and the system's associated amplified trough, which cut-off over southern Indiana on the **22<sup>nd</sup>** before twisting northward into Canada. This cold core passing over Indiana, combined with cloudy and rainy conditions, held the **22<sup>nd</sup>**'s high temperatures 10 to 20 degrees below normal at most locations; the lowest reading was 53F at Kokomo 3 WSW (Howard Co.). Broad high pressure quickly followed the departing cut-off on the **23<sup>rd</sup>**, maintaining below normal temperatures while bringing the first 40s to most of the region since late May. All first-order airports recorded their first 50F or lower temperature on the evening of the **23<sup>rd</sup>**, which at Indianapolis tied for the 15<sup>th</sup> latest, or 90th percentile; the record latest being October 5<sup>th</sup> (2019). The **24<sup>th</sup>** featured the month's coldest morning for essentially all locations, as low to mid 40s prevailed. **40F** was hit at both Rockville and New Castle 3 SW. A reinforcing cold frontal passage early on the **25<sup>th</sup>** kept temperatures near to slightly below normal through the morning of the **26<sup>th</sup>**. The colder portions of the region recorded lows in the 40s for four consecutive days, **23<sup>rd</sup>-26<sup>th</sup>**, including Bloomington and Terre Haute.

The **26<sup>th</sup>** featured the most pronounced transition of the month, as south-southwesterly breezes that gusted as high as 28 mph boosted a 30-35 degree warm up for most sites, with Terre Haute jumping from 43F to 79F (a 36 degree rise). This ushered in consistently warm conditions that lasted through the end of the month, as most sites averaged ~10 degrees above normal over the **27<sup>th</sup>-30<sup>th</sup>**. The 80s were common across central Indiana for the final four days as ridging prevailed over Indiana, with a few 90F+ observations with Lafayette and Perrysville 4 WNW (Vermillion Co.) both hitting 90F on **9/27**, to Shoals 8 S reaching 91F on **9/28**.

September 2021's above normal temperatures continued the trend from August 2021's warmth, but were in contrast to the near-normal readings observed in September 2020. At Indianapolis, September 2021's daily average temperatures were above normal on 18 days and below normal on 10 days. It was the **30<sup>th</sup> warmest** September for the Indianapolis Area since weather records began in 1871, placing it in the 80<sup>th</sup> percentile.

## OCTOBER 2021 TEMPERATURES

October 2021's unseasonable warmth averaged about 6 to 7 degrees above normal across central Indiana, which included both anomalously warm conditions through the **14<sup>th</sup>** and overall slightly above normal weather for the remainder of the month. Daily temperatures averaged 10+ degrees above normal for most locations on the **3<sup>rd</sup>**, **7<sup>th</sup>-11<sup>th</sup>**, and **14<sup>th</sup>**. This was the

warmest October for the Indianapolis Area since 2007. Synoptically, the month's upper pattern featured longer waves and a predominant ridge over the Mid-West for most of the month's first half, which drove the unseasonable warmth for many days. The second half of October was a mix of generally slowly-passing ridges and troughs, which promoted more modest warmth between cooler multi-day periods of rain and dampness.

All 1<sup>st</sup>-order airports were 5+ degrees above normal for the first 14 days of the month, with the **10<sup>th</sup>**, **11<sup>th</sup>**, and **14<sup>th</sup>** being the most unseasonable per near-record high morning lows. The morning of the **10<sup>th</sup>** saw thermometers only drop to 70F at the Shoals 8 S COOP site (Martin Co.), while West Lafayette 6 NW (Tippecanoe Co.) and the Muncie Airport were both held to 69F. After the exceedingly warm start, the month's maximum was then reached on the **10<sup>th</sup>** at most locations, with 80s commonplace across the region and temperatures reported as high as 88F at Shoals 8 S and 86F at several other sites, including Washington 1 W (Daviess Co.) and Tipton 5 SW (Tipton Co.). Isolated locations reached their highest mark either on the **1<sup>st</sup>**: 89F at Perrysville 4 WNW (Vermillion Co.) and 86 at Vincennes 5 NE (Knox Co.) ... or the **9<sup>th</sup>**: 88F at Columbus (Bartholomew Co.).

Much cooler, crisp, Canadian air finally infiltrated the region via the **26<sup>th</sup>**'s northerly breezes, as essentially all locations then reported their lowest reading on the morning of the **27<sup>th</sup>**. The coldest spots also recorded their first freeze of the season this morning, including 27F at Farmland 5 NNW (Randolph Co.), 28F at New Castle 3 SW (Henry Co.), with several other sites reaching 32F: Crawfordsville 6 SE (Montgomery Co.), Rockville (Parke Co.), Tipton 5 SW, and West Lafayette 6 NW. Indianapolis dropped to **38F**, making it the third latest sub-40F occurrence on record, matching 10/27/1941 and being bested only by 10/29/1897 and 10/28/1919. The Frost Advisory issued for the night of the **26<sup>th</sup>-27<sup>th</sup>** was the only such product issued before the frost/freeze season was ended on October 31<sup>st</sup>.

October 2021's well above normal temperatures exemplified the trend from September 2021's warmth, but was in contrast to the near-normal readings observed in October 2020. At Indianapolis, October 2021's daily average temperatures were above normal on 24 days and below normal on 6 days. It was the **11<sup>th</sup> warmest** October for the Indianapolis Area since weather records began in 1871, placing it in the 93 percentile.

## **NOVEMBER 2021 TEMPERATURES**

November 2021 was rather cool, averaging about 1.5 to 3 degrees below normal across central Indiana, which included a chilly first week and several short (1-3 day) periods of unseasonably cold readings scattered throughout the rest of the month. Meanwhile, mild periods were infrequent/modest, past several days during the month's second week and the **17<sup>th</sup>**. A review of Novembers over the past ten years reveals a broad range of monthly average temperatures at Indianapolis Int'l Airport, ranging from 35.9°F (2014) to 48.1°F (2016), with a skew towards warmer values. November 2021 fell at the middle of this set as the 5<sup>th</sup> coolest. It was the coolest November since 2019 when a 2-4" Veteran's Day snowfall was immediately followed by a record-cold arctic blast that set all-time records for earliest maximum temperature < 25F and earliest minimum temperature < 10F (both on 11/12/2019). November 2021 was a less-

extreme counterpart; although it was still the coolest month relative to normal in half a year – as only May 2021 and the anomalously cold February 2021 have had greater temperature departures below normal this year. (Although at Indianapolis November 2021 was technically the fourth month below normal for the year when also considering a marginally-cool July.)

November 8<sup>th</sup> brought the highest temperatures for essentially all of central Indiana as sites peaked near 70F, with both the Washington 1 W (Daviess Co.) COOP station and Shelbyville Municipal Airport reaching **72F**. Coldest mornings the upper teens to lower 20s were fairly evenly distributed between the **23<sup>rd</sup>**, **26<sup>th</sup>**, and **29<sup>th</sup>**; with the respective lowest being 16F at New Castle 3 SW (Henry Co.) on the **23<sup>rd</sup>** ... **13F** at Rockville (Parke Co.) on the **26<sup>th</sup>** ... and 18F at both Crawfordsville 6 SE (Montgomery Co.) and North Vernon 2 ESE (Jennings Co.) on the **29<sup>th</sup>**. The highest minimum temperatures were reported during the period from late day on the 16<sup>th</sup> to late day on the **17<sup>th</sup>** when the mercury only dropped to **57F** at Washington 1 W and to 53F at Elnora (Daviess Co.). Conversely, the lowest maximum temperatures followed the cold morning lows on Black Friday (**26<sup>th</sup>**), as Frankfort Disposal (Clinton Co.) and Lafayette's Purdue University Airport only reached **30F**, while over a dozen other sites across northern and west-central counties failed to break 32F, including Indianapolis Int'l and Terre Haute.

Excepting a few of the typically-colder locations, central Indiana did not record a first freeze through October. However, a large mass of Canadian high pressure built into the region over November's first few days. All northern sites and many spots along the I-70 corridor reported their first freeze late on the **1<sup>st</sup>** or on the morning of the **2<sup>nd</sup>** ... all 1<sup>st</sup>-order airports outside of Marion County had dropped to 32F or lower by the end of the **2<sup>nd</sup>** ... and all corners of the region had seen a freeze by the morning of the **3<sup>rd</sup>**. The Elnora COOP remarked the 3<sup>rd</sup> had a "killing frost" as the first freeze at this southern locale hit 27F. Cold mornings continued amid the broad surface high, with five consecutive mornings in the 20s (**3<sup>rd</sup>–7<sup>th</sup>**) seen outside of the Marion County heat island, including a hard freeze observed across a majority of the region on each morning through the **6<sup>th</sup>**. The **1<sup>st</sup>–6<sup>th</sup>** was the first time since early August that Indianapolis had recorded six consecutive days with below normal readings.

November **3<sup>rd</sup>** tied for 8<sup>th</sup>-latest first freeze for the Indianapolis Area, placing it at the 95<sup>th</sup> percentile of all years since 1871. Two of the first freezes since 2000 have occurred later: 11/6/2007, and the all-time latest on **11/12/2016**. Lafayette's first freeze this year, on the **1<sup>st</sup>**, was the airport's 3<sup>rd</sup>-latest in 53 years of data. When considering the longer observation periods for the Bloomington and Terre Haute areas (since 1895 and 1896, respectively), their first freezes on the **2<sup>nd</sup>** were placed in the 81<sup>st</sup> and 83<sup>rd</sup> percentile, respectively.

November 2021's below normal temperatures were in contrast to the very warm conditions seen across both October 2021 and November 2020. However, November 2021 followed the multi-decadal trend of November showing the overall smallest warming trend (+0.2°F) of any month across central Indiana's seven 1<sup>st</sup>-order airports when comparing normal temperatures from 1981-2010 and 1991-2020. (Although, specifically, November has shown local cooling trends at Indianapolis Int'l (-0.3°F), Terre Haute (-0.2°F), and Bloomington (-0.1°F)). At Indianapolis, November 2021's daily average temperatures were above normal on 11 days and below normal on 19 days. It was the **43<sup>rd</sup> coolest** November for the Indianapolis Area since weather records began in 1871, placing it in the 71<sup>st</sup> percentile.

## *Fall 2021 Temperature Data for Central Indiana Sites*

Site	Fall 2021 Av Temperature	Fall Season Normal Temp	Difference From Normal
Indianapolis Int'l Airport	<b>57.2</b>	55.6	<b>+1.6</b>
Lafayette*	<b>55.9</b>	53.5	<b>+2.4</b>
Bloomington*	<b>57.4</b>	55.1	<b>+2.3</b>
Muncie	<b>58.5</b>	55.6	<b>+2.9</b>
Terre Haute	<b>57.4</b>	54.9	<b>+2.5</b>
Shelbyville	<b>58.6</b>	55.9	<b>+2.7</b>
Indianapolis Eagle Creek AP	<b>57.8</b>	55.5	<b>+2.3</b>

## *Fall 2021 Temperature Extremes Across Central Indiana*

Site	Highest Temperature	Lowest Temperature
Indianapolis Int'l Airport	89 on 9/18, 9/19	20 on 11/23
Lafayette	91 on 9/18, 9/19	<b>18 on 11/23</b>
Bloomington	89 on 9/14, 9/18	20 on 11/23, 11/29
Muncie	91 on 9/18	23 on 11/23
Terre Haute	91 on 9/14, 9/18	20 on 11/23, 11/29
Shelbyville	<b>93 on 9/18</b>	22 on 11/23, 11/29
Indianapolis Eagle Creek AP	91 on 9/18	21 on 11/23

\* – Temperature data is missing for **Lafayette's** 9/1 min temp and on 10/10;  
And for **Bloomington's** 10/13 max temp

# Precipitation

## SEPTEMBER 2021

Outside of the winter, September is normally central Indiana's driest month, with the 2.50" to 3.60" normally seen by most locations, in stark contrast to the early summer peak (normally ~5.00" in June). 2021, however, contrasted this climatological pattern, with most of the region totaling a much-needed 3.00-7.00", including **5.25"** at Indianapolis international Airport, which was **167% of normal**.

The Labor Day weekend began with a soaking rain on the **4<sup>th</sup>** courtesy of a wave riding along a weak cold front, as most locations picked up 0.50-1.00". A band of **1.00-2.00"** totals was found along and north of the I-70 corridor, with greatest reports of **2.54"** near Perrysville (Vermillion Co.), **2.11"** in Cumberland (Hancock Co.) and **2.00"** near Winchester (Randolph Co.). On the night of the **7<sup>th</sup>-8<sup>th</sup>**, a wide line of thunderstorms brought generally light rainfall amounts, except for far northwestern counties where a second line of storms crossed before dissipating, bringing **1.21"** to Pence (Warren Co.).

Widespread showers and storms steadily crossed the region late on the **14<sup>th</sup>** through the morning of the **15<sup>th</sup>**, bringing isolated **1.00-3.00"** rainfall totals. Greatest reports included **2.79"** at the Muncie wastewater treatment plant, **2.51"** south of Shoals (Martin Co.), and **1.87"** in Greenwood (Johnson Co.).

The **19<sup>th</sup>-23<sup>rd</sup>** brought a staunch pattern change of several rainy days from both a slowly-passing cold front during the day of the **21<sup>st</sup>** ... and the system's subsequent upper trough cutting off to a stacked low on the **22<sup>nd</sup>**, while sliding northward along the Indiana-Ohio border. Several rounds of showers and isolated thunderstorms, enhanced by Hurricane Nicolas' remnant moisture, crossed the region from the evening of the **19<sup>th</sup>** through pre-dawn on the **20<sup>th</sup>**, with greatest rains along an axis from **1.56"** in Ellettsville (Monroe Co.) to **1.99"** east of Shoals (Martin Co.). Welcomed soaking rains then continued into the daytime on the **20<sup>th</sup>** south and east of Indianapolis, before isolated afternoon cells popped later across the rest of the region. These additional 1-day rains included several patches of **1.00-2.00"** south/east of the I-70/I-69 corridors, with the greatest observation totaling **2.19"** in Columbus (Bartholomew Co.). Most locations saw about a 12-hour lull in rain late on the **20<sup>th</sup>** / early on the **21<sup>st</sup>**, but not before widespread 2-day totals of **1.00-2.00"** had fallen across south central and southeastern counties, with around **2.50"** in the Columbus area, and **3.06"** reported from Williams 3 SW (Martin Co.) ... while only 0.25-0.50" was recorded at most locations north of I-70.

Part 2 of the extended rainy period started as the cold front slowly crossed the region from west to east on the **21<sup>st</sup>**, although this produced only isolated rains, west of I-69, in the AM hours ... before scattered rain developed behind the front, in the evening, over the entire region. Generally widespread rain continued for the next 24 hours as the upper low traversed the southern and then eastern periphery of the region, while becoming stacked and cut-off from the main jet stream. Rain tapered off from southwest to northeast during the evening of the **22<sup>nd</sup>**, although occasional light showers then lingered across far northern and northeastern

zones through midday on the **23<sup>rd</sup>**. Rainfall totals for this post-frontal 2-day period ranged from just over **1.00"** along the Wabash Valley to **2.00"+** for most central and eastern zones. A **3.00-4.00"** bull's-eye extended from Bloomington to Columbus, and northward across eastern portions of the Indianapolis metro, to northern Hamilton County, with maximum reports of **4.25"** at New Palestine (Hancock Co.) and **4.18"** in Franklin (Johnson Co.).

Overall 4-day precipitation totals for the **19<sup>th</sup>-23<sup>rd</sup>** were **2.00-4.00"** for most locations, while a **5.00"+** peak was measured over the counties within the **21<sup>st</sup>-22<sup>nd</sup>'s** maximum, which were south of I-70. **5.87"** at Williams 3 SW was the greatest total, while **5.61"** was measured at Amity (Johnson Co.). The west-east gradient in overall rain totals was pronounced across the I-69 corridor, and especially Marion County - from **2.94"** near Eagle Creek Airpark to nearly **5.00"** from Southport to Cumberland. ... The soaking rains of the **22<sup>nd</sup>** brought central Indiana's first concerns of river and stream flooding since the third week of July, although rather dry antecedent soils greatly mitigated this threat. Several creeks approached bankfull conditions. Youngs Creek at Amity reached **minor flood** stage for over 36 hours, from early evening on the **22<sup>nd</sup>** through dawn on the **24<sup>th</sup>**, cresting just below moderate flood. **Minor flooding** also briefly occurred at both the North Salt Creek at Nashville (Brown Co.) and Sugar Creek near Edinburgh (Johnson Co.), on the evenings of the **22<sup>nd</sup>** and **23<sup>rd</sup>**, respectively. Several other sites peaked just below flood stage throughout the **23<sup>rd</sup>**, mainly in the vicinity of the East Fork White River, and from Marion County into all northeastern counties.

A drier, northwesterly upper-level flow then prevailed for the remainder of the month, with only light rainfall from showers accompanying a frontal passage early on the **25<sup>th</sup>** ... and locally, briefly moderate showers, during the evening of the **27<sup>th</sup>** to very early on the **28<sup>th</sup>**, also bringing light rains immediately south and east of Indianapolis.

September 2021's near to well above normal precipitation reversed August 2021's overall dry trend. These ample rains boosted Indianapolis' year-to-date total to **36.56"**, **2.52"** above normal. September 2021's wet trend was in sharp contrast to September 2020, when Indianapolis' 0.12" total made for the driest September on record, and tied for the 4<sup>th</sup> driest month since records began in 1871. September 2021 was the **23<sup>rd</sup> wettest** for the Indianapolis Area since weather records began in 1871.

## OCTOBER 2021 PRECIPITATION

While not typically quite as dry as September, October normally sees only ~2.90-3.70" of precipitation across central Indiana. October 2021, however, once again contrasted this climatological pattern, with **4.00-9.00"** totals common across the region, including **7.74"** at Indianapolis International Airport, which was an astounding **224% of normal**. Most far southern and southeastern counties saw near normal precipitation, while some of the all-time records across northwestern counties were 3-4 times normal levels. When compared to the ample precipitation that fell on central Indiana last October ... most areas south of the I-70 corridor had less rainfall in October 2021, most places along I-70 had comparable rains, and nearly all locations north of the I-70 corridor had greater totals this October. In fact, most northern locales had the wettest October in 20 years.

Tippecanoe County had the greatest monthly totals, with most sites reporting over **9.00"**, including **10.42"** on the west side of West Lafayette, **9.20"** at the Purdue University Airport and **9.14"** at the Lafayette 8 S COOP site. These were each all-time greatest totals for October, with the airport's sum even surpassing all other Lafayette-area October totals during 1901-1943 – that is, prior to the airport's period of record. Other noteworthy totals across the region's far northern tier included **8.78"** at the Kokomo 3 WSW COOP site (Howard Co.) -- the wettest October since 1919; **8.16"** at the Frankfort Disposal COOP site (Clinton Co.) -- the wettest since 1949; and **8.12"** at the Tipton 5 SW COOP site -- marking the wettest October since records began in 1971.

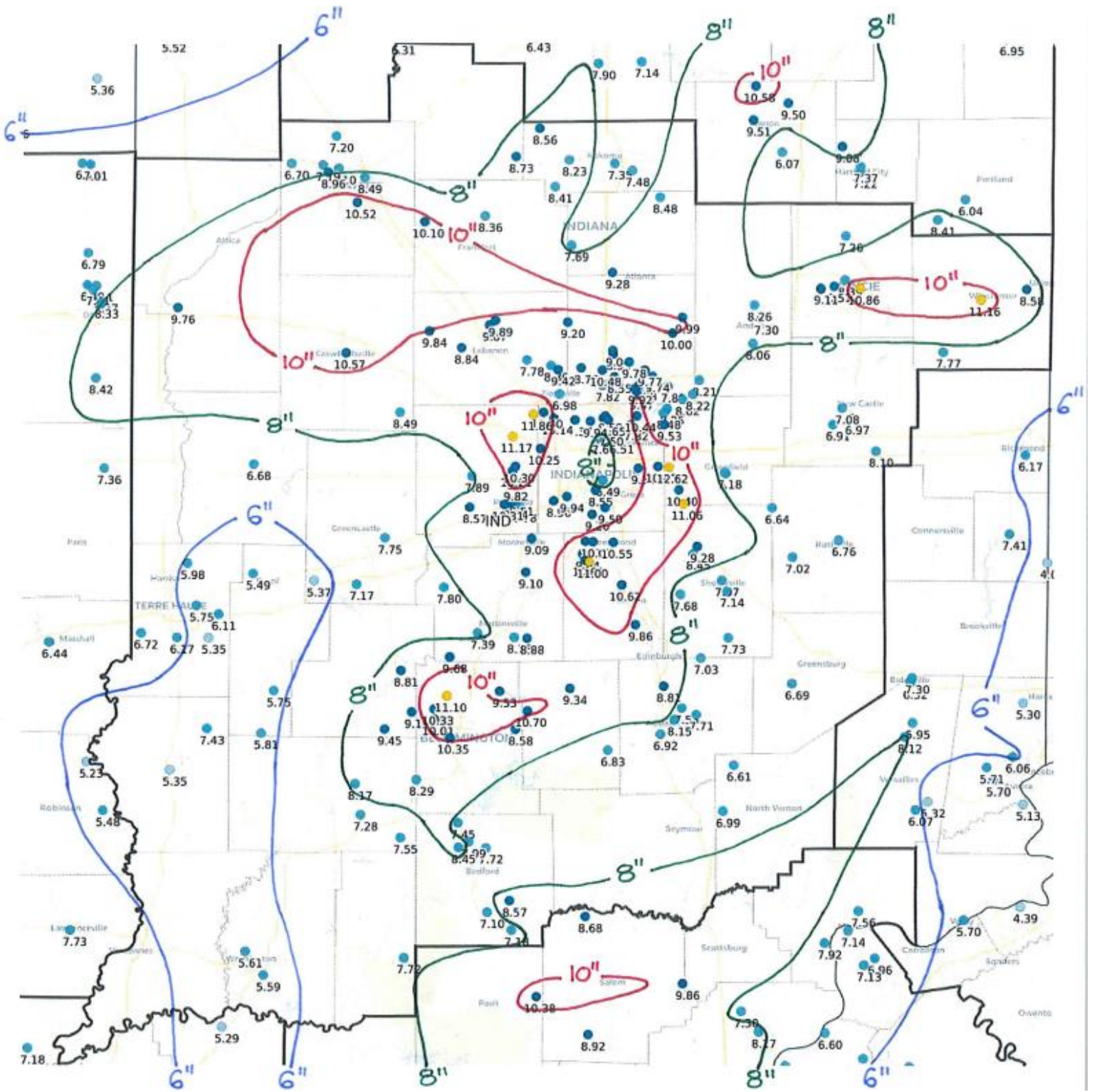
The first of several significant rainfall events occurred on the **2<sup>nd</sup>-4<sup>th</sup>**. 1-day totals through early on the **3<sup>rd</sup>** included several **1.00-2.00"** amounts across Tippecanoe County and areas near Bloomington, with up to **2.27"** in West Lafayette, **1.78"** northeast of Freeman (Owen Co.), and **1.75"** at the Vincennes 4 E COOP site (Knox Co.). Additional 1-day rains through early on the **4<sup>th</sup>** included **1.64"** in Flora (Carroll Co.), **1.53"** near Winchester (Randolph Co.), and **1.38"** at the Oolitic Purdue Farm (Lawrence Co.). The third and final 1-day period through early on the **5<sup>th</sup>** saw generally lighter rainfall, excepting a heavier patch in Hamilton County, led by **1.07"** in Fishers. 2- to 3-day storm totals were generally **0.50-1.50"**, with locally higher amounts including **2.66"** in western West Lafayette, **2.28"** in Burlington (Carroll Co.), and **2.06"** west of Freeman (Owen Co.).

The **6<sup>th</sup>** through **early on the 7<sup>th</sup>** brought many **1.00-2.00"** observations in and near both Indianapolis and Bloomington, especially along the Hendricks-Marion County line courtesy of a heavy rain band pre-dawn on the **7<sup>th</sup>**. Greatest were **2.71"** at Indianapolis-Eagle Creek Airport (Marion Co.), **2.52"** east of Brownsburg (Hendricks Co.), and **2.00"** on the west side of Bloomington (Monroe Co.). A sharp gradient was observed along the eastern edge of the **7<sup>th</sup>'s** downpour, as the Indianapolis International Airport ASOS caught **0.85"** more than the NWS office about a mile to the southeast. A mix of dry days and scattered light rainfall then filled out the rest of early October ... until the **11<sup>th</sup>'s** fast-moving showers and thunderstorms dropped light rainfall totals on most locations, with as much as **1.42"** in western Vigo County and **1.26"** around Lafayette.

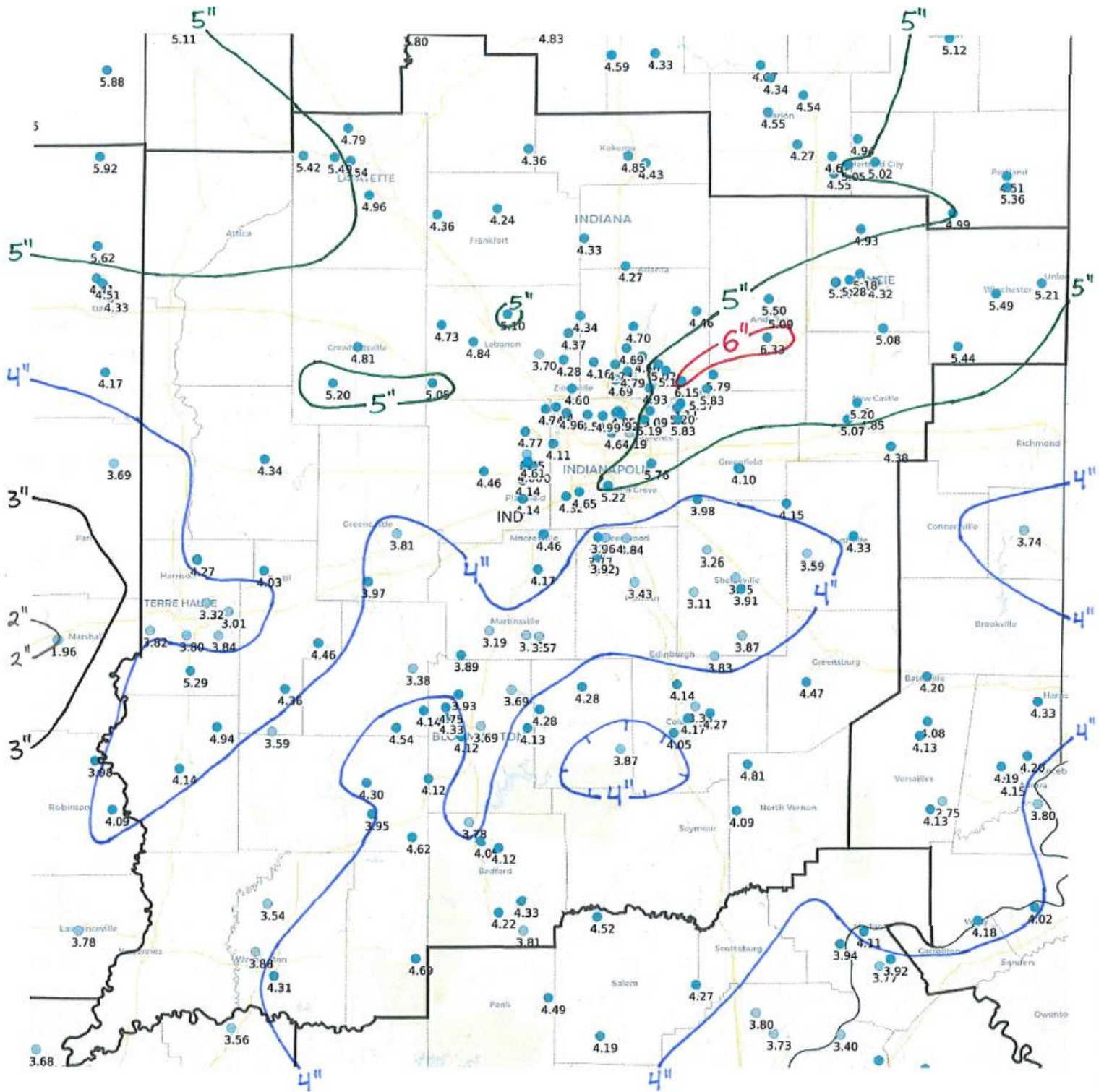
Impressive widespread heavy rainfall returned on the **14<sup>th</sup>-15<sup>th</sup>**, with 1-day totals through early on the **15<sup>th</sup>** totaling **1.00-3.00"** across all but the far western and southern extents of the region. Greatest reports were **3.37"** at Vincennes 4 E, **3.02"** near Strawtown (Hamilton Co.), and **2.64"** near Paragon (Morgan Co.). 2-day storm totals exceeded **2.00"** across most northern counties and southward along the I-69 corridor. Highest values were **3.59"** near Strawtown, **3.14"** in Brownsburg, **3.06"** near Noblesville (Hamilton Co.), and **2.98"** near Paragon. Several 1<sup>st</sup>-order airports also approached **2.00"**: Indianapolis-Eagle Creek's **1.91"**, Lafayette's **1.90"**, and Muncie's **1.85"**. Subsequently, the Wabash River rose to **minor flood stage** at both Lafayette and Montezuma between late day on the **16<sup>th</sup>** and late morning on the **18<sup>th</sup>**, although neither site was in flood for greater than 21 hours. Points downriver reached action stage for 3-6 days within the **16<sup>th</sup>-22<sup>nd</sup>** timeframe. Meanwhile, several consecutive dry days finally graced the region during the **16<sup>th</sup>-20<sup>th</sup>**, with scattered light rainfall returning on the **21<sup>st</sup>-23<sup>rd</sup>**.



### September - Mid October 2021 Total Precipitation, Through the Morning of 10/17 As Reported By Central Indiana CoCoRaHS Observers



# Mid October - November 2021 Total Precipitation, Starting the Morning of 10/17 As Reported By Central Indiana CoCoRaHS Observers



## OCTOBER 2021 PRECIPITATION (con't...)

Heavy rains fell once again onto the well-watered central Indiana on the **24<sup>th</sup>-25<sup>th</sup>**, especially along and north of the I-70 corridor. 1-day amounts through early on the **25<sup>th</sup>** were **1.00-3.00"** for most of the region, with greatest totals ranging from **3.41"** near Anderson (Madison Co.), to **3.31"** in Pence (Warren Co.), **3.19"** near Otterbein (Tippecanoe Co.), with **3.13"** east of Fishers (Hamilton Co.) and **3.04"** in Parker City (Randolph Co.). Following lighter rains later on the **25<sup>th</sup>**, 2-day storm totals measured as great as **3.63"** near Anderson.

**Widespread minor river flooding** then resumed on the upper Wabash River late day on the **25<sup>th</sup>**, and on the **26<sup>th</sup>** at Terre Haute and Riverton. Wildcat Creek at Lafayette also reached minor flood, for about 48 hours (**25<sup>th</sup>-27<sup>th</sup>**), although the Wabash's main stem points from both Lafayette to Montezuma, and Terre Haute to Riverton, remained in minor flood through the **31<sup>st</sup>**. The Wabash's peak crest passed Lafayette the night of the **26<sup>th</sup>**, slowly reaching Terre Haute by the morning of the **30<sup>th</sup>**. Meanwhile, half of the White River's forecast points also reached minor flood stage, most for 1-3 days: first at Muncie down to Ravenswood within the **25<sup>th</sup>-28<sup>th</sup>** timeframe, and then at Spencer down to Edwardsport, with the latter point flooding from early afternoon on the **28<sup>th</sup>** through the afternoon of the **31<sup>st</sup>**. None of the East Fork of the White River's points exceeded action stage. The Mississinewa River at Ridgeville (Randolph Co.) was in flood stage from the late evening of the **24<sup>th</sup>** through the afternoon of the **26<sup>th</sup>**, and in **moderate flood stage** for most of this duration, cresting 3.7 feet above flood stage. Wildcat Creek at Jerome also reached minor flood for several hours on the night of the **23<sup>rd</sup>**.

Not to be outdone, this anomalously wet October finished with a final **0.50-1.50"** or so of precipitation across most spots on the **28<sup>th</sup>-30<sup>th</sup>**, with as much as **1.76"** at the Franklin WWTP (Johnson Co.), **1.43"** in Ellettsville (Monroe Co.), and up to **~1.33"** in Delaware, Henry, and Madison Counties. As **minor flooding continued** on the Wabash River, these comparatively lighter rains led to a second, lower crest, which reached Lafayette by the morning of the **31<sup>st</sup>**.

October 2021's near to well above normal precipitation continued the same overall pattern from September 2021, although spatially the departure from normal trend was flipped – as the greatest totals flipped from southern to northern zones. The copious October rainfall boosted Indianapolis' year-to-date total to **44.30"**, increasing the corresponding surplus to **7.74"** above normal. October 2021's wet trend actually followed that of October 2020, when Indianapolis recorded 5.35", coming out of September 2020's record dry period. October 2021 was the **4<sup>th</sup> wettest** for the Indianapolis Area since weather records began in 1871, placing it in the 97 percentile.

## NOVEMBER 2021 PRECIPITATION

Following the release of the new 30-year climatological normals (1991-2020) earlier this year, November is now typically the wettest month across central Indiana from August through March; even though several of the months in this period normally see only slightly lower amounts. Around 2.90-3.70" of precipitation normally falls across the region in November. However, November 2021's totals were well short of these values, including only **1.22"** at Indianapolis International Airport, a mere **35% of normal**. This was the driest November at Indianapolis in 12 years -- since only 1.16" fell in 2009; although it was only the driest since 2012 for several other locations. Indianapolis' total was the least for any month since the record dry September 2020, although many northern counties reported less precipitation than November 2021 in February 2021.

**Widespread minor river flooding** on the Wabash River carried over from late October. The secondary, lower crest occurred at Covington on the **1<sup>st</sup>** and at Riverton on the **3<sup>rd</sup>**. Flooding ended at Lafayette on the **3<sup>rd</sup>**, Covington on the **4<sup>th</sup>**, Montezuma and Terre Haute on the **5<sup>th</sup>**, and finally at Riverton on the **7<sup>th</sup>**. When considering both months, the minor flooding's duration ranged from 9 days at Lafayette to nearly 12 days at Riverton.

Essentially all of central Indiana was rainless through the **10<sup>th</sup>**, with only occasional light events occurring through the remainder of the month. No daily reports surpassed 1.00". The greatest 1-day observation was **0.88"** through dawn on the **18<sup>th</sup>** east of Shoals (Martin Co.), which led scattered higher reports that morning of generally 0.50-0.75" south of I-70. This was the only November on record where none of the 1<sup>st</sup>-order airports reported greater than 0.40" on any day. Only November 1954 came close to resembling this lack of organized rainfall: Indianapolis, Lafayette, Terre Haute and Shelbyville all failed to collect more than 0.37" on any single day, while Bloomington's rainiest day totaled 0.50".

The season's first frozen precipitation fell over most counties between the **12<sup>th</sup>** and the **15<sup>th</sup>**, courtesy of strong back-to-back upper troughs that plunged from the upper Mid-West into the region. Flurries brought a trace of snow on the evening of the **12<sup>th</sup>** through early on the **13<sup>th</sup>** across several central counties. Most notable were the **14<sup>th</sup>**'s ~2 hours of morning snow showers, that briefly reached moderate (at Lafayette and Indianapolis - Eagle Creek) to heavy (at Muncie) intensity, before tapering off to a mix or light rain by midday as the lower atmosphere warmed. Accumulations were mainly on elevated or grassy surfaces, with generally ~0.5" reported along and north of the I-74 corridor, with several reports near 1.0" in northeast counties. Greatest reports were **1.2"** in North Anderson (Madison Co.), and 1.1" in both Carmel (Hamilton Co.) and the Tipton 5 SW COOP site (Tipton Co.). The **15<sup>th</sup>** then saw afternoon flurries across most zones, with a dusting thick enough to record 0.1" in Franklin (Johnson Co.).

November 2021's well below normal precipitation was a strong reversal from October 2021's wet pattern. Nonetheless, Indianapolis' year-to-date total rose to **45.52"**, as the corresponding surplus decreased to **4.81"** above normal. November 2021's lack of precipitation was a drop from November 2020's near normal totals, when Indianapolis recorded 3.65". November 2021 was the **13<sup>th</sup> driest** for the Indianapolis Area since weather records began in 1871, placing it in the 91<sup>st</sup> percentile.

## ***Fall 2021 Precipitation Data for Central Indiana Sites***

<b>Site</b>	<b>Fall 2021 Precipitation</b>	<b>Fall Season Normal Precip</b>	<b>Diff. From Normal</b>	<b>Greatest Daily Rainfall</b>
Indianapolis Int'l Airport	14.21	9.81	<b>+4.40</b>	2.07 on 9/22
Lafayette	13.21	8.37	<b>+4.84</b>	2.52 on 10/24
Bloomington	12.33	11.03	<b>+1.30</b>	1.39 on 9/22
Muncie	10.88	9.28	<b>+1.60</b>	2.06 on 9/22
Terre Haute*	8.04INC	9.42	M	M
Shelbyville*	11.40INC	9.95	M	2.30 on 9/22
Indianapolis Eagle Creek AP*	11.10INC	9.07	M	M

\* – Precipitation data is missing at **Indianapolis Eagle Creek AP** during 9/20-9/22;  
and incomplete at **Terre Haute** during 10/11-10/23 ... and at **Shelbyville** during 10/25-10/29

# Severe Weather

**SEPTEMBER 2021** featured sporadic thunderstorms with only two noteworthy episodes. On the evening to early morning of the **7<sup>th</sup>-8<sup>th</sup>**, an approaching cold front brought widespread thunderstorms with a few embedded, briefly strong cells.

On the **14<sup>th</sup>**, a very warm and rather humid air mass combined with an approaching cold front to set off numerous afternoon/evening thunderstorms. A couple cells were marginally severe in far northeastern counties, with reports of a downed tree and power lines, and shingles blown off a house, in and to the south of Muncie ... as well as a tree downed to the east of Farmland (Randolph Co.).

**OCTOBER 2021**'s occasional, embedded thunderstorms were non-severe excepting one evening.

Through the late afternoon and evening of the **11<sup>th</sup>**, the impressive gradient ahead of a slowly-approaching cold front promoted a strong southerly low-level jet stream (LLJ), which in turn provided the high shear environment that produced multiple lines of thunderstorms across western and north-central counties. The strongest embedded cells brought the LLJ's winds to the surface.

An initial line of thunderstorms brought an estimated **65 mph** wind gust to New Goshen (Vigo Co.), toppling a nearby 50 to 60-foot tree ... followed by an observed **60 mph** wind gust in Rockville (Parke Co.) ... before the most intense damage occurred within Attica (Fountain Co.): numerous downed trees, including onto 3 houses causing **one minor injury**, as well as roof and water damage at the high school. A brief, stronger cell caused marginally-severe, **1.00" hail** to fall at Lake Holiday (Montgomery Co.). Further early evening severe weather was reported across Tippecanoe County, including: a metal pole barn blown down in Otterbein, a measured **60 mph** wind gust at WLFJ in West Lafayette, and finally numerous trees and branches toppled from Battleground to Dayton. Tree damage was also reported in western Carroll County.

Later in the evening, another squall line with weak rotation downed numerous tree limbs within Frankfort (Clinton Co.) before blowing over 10 trees across eastern portions of Carroll County.

**NOVEMBER 2021**'s light precipitation events were devoid of severe weather – making it the fourth November in the last decade with this distinction (following 2012, 2015 and 2018).

*For info on severe weather in other areas during the fall season, visit the Storm Prediction Center "Severe Weather Event Summaries" website at [spc.noaa.gov/climo/online](https://spc.noaa.gov/climo/online)*

# Miscellaneous Weather

**SEPTEMBER 2021**'s maximum wind gust at the Indianapolis International Airport was 40 mph (from the northwest) on the **22<sup>nd</sup>**. Greater peak wind gusts at other 1<sup>st</sup>-order airports included 43 mph at Muncie (from the northwest) on the **14<sup>th</sup>**, and 41 mph at Lafayette (from the north) on the **7<sup>th</sup>**.

Fog occurred at Indianapolis on 8 days, with no dense fog observed. All 1<sup>st</sup>-order airports outside of Marion County saw fog more often, on 17 days at both Bloomington and Terre Haute and on 14 days at Shelbyville. Bloomington saw fog every day during the **15<sup>th</sup>-22<sup>nd</sup>**, while all sites observed fog during the damp **20<sup>th</sup>-22<sup>nd</sup>**. Dense fog occurred at Terre Haute, Bloomington and Lafayette on 4, 3, and 2 days, respectively.

Thunder was reported on 5 days at Bloomington and Shelbyville, 3 days at Indianapolis, and 2 days or less elsewhere ... with all sites reporting thunder on the **14<sup>th</sup>**.

**OCTOBER 2021**'s maximum wind gust at the Indianapolis International Airport was 38 mph (from the southwest) on the **3<sup>rd</sup>**. Greater peak wind gusts at other 1<sup>st</sup>-order airports all occurred on the **11<sup>th</sup>**: 54 mph at Lafayette (from the west-southwest), 50 mph at Terre Haute (from the west-southwest) and 40 mph at Shelbyville (from the south-southeast).

Fog was quite common across central Indiana, with frequency ranging from 16 days at Muncie to 28 days at Lafayette (every day except the **16<sup>th</sup>**, **20<sup>th</sup>**, and **26<sup>th</sup>**). Fog was observed on 21 days at Indianapolis. Dense fog was frequent at several sites: 8 days at Indianapolis-Eagle Creek and 4-6 days at Bloomington, Lafayette, Shelbyville, and Terre Haute. Dense fog occurred at 4 or more of these sites on both the **8<sup>th</sup>** and **13<sup>th</sup>**, and was recorded on 3 consecutive days at Shelbyville (**4<sup>th</sup>-6<sup>th</sup>**). Dense fog was not reported at Indianapolis Int'l Airport.

Thunder was reported on 9 days at both Indianapolis and Bloomington, 8 days at Muncie and Indianapolis-Eagle Creek and elsewhere 6 days or less, although all sites reported thunder on the **11<sup>th</sup>** and **25<sup>th</sup>**.

**NOVEMBER 2021**'s maximum wind gust at the Indianapolis International Airport was 45 mph (from the west-southwest) on the **12<sup>th</sup>**. Other notable 1<sup>st</sup>-order airport peak wind gusts included 46 mph from the southwest at Muncie on the **11<sup>th</sup>**, and 44 mph from the west-northwest at Terre Haute on the **14<sup>th</sup>**. The remaining four sites saw peak gusts of 38 to 40 mph on the **11<sup>th</sup>**, **12<sup>th</sup>**, or **18<sup>th</sup>**.

Fog was common across central Indiana, especially over the first three weeks of the month, with overall frequency ranging from 6 days at Muncie to 18 days at Lafayette. Fog was observed on 9 days at Indianapolis Int'l Airport, 10 days at Bloomington, and 11 days at Terre Haute. All seven 1<sup>st</sup>-order airports reported fog on the **10<sup>th</sup>**, **14<sup>th</sup>**, **17<sup>th</sup>**, **21<sup>st</sup>** and **25<sup>th</sup>**. Dense fog was not observed at Indianapolis during the month, although most sites reported dense fog on the **10<sup>th</sup>**, as did Muncie on the **14<sup>th</sup>**. Several COOP sites also reported dense fog on the **10<sup>th</sup>**, including Lebanon 6 W (Frankfort Co.) and Perrysville 4 WNW (Vermillion Co.).

Thunder was not reported at any of the seven 1<sup>st</sup>-order airports, nor any COOP sites.

# Indianapolis Fall 2021 Monthly Data

## INDIANAPOLIS SEPTEMBER 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 70^\circ$	Lows $\leq 40^\circ$
September 2021	70.2	5.25	28	0
Normal September	67.8	3.14	25	1
Diff from Normal	+2.4	+2.11	+3	-1

September 2021 All-Time Ranks...

Temperature: **30<sup>th</sup> Warmest**

Precipitation: **23<sup>th</sup> Wettest**

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## INDIANAPOLIS OCTOBER 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 70^\circ$	Lows $\leq 40^\circ$
October 2021	60.9	7.74	16	3
Normal October	55.5	3.22	11	11
Diff from Normal	+5.4	+4.52	+5	-8

October 2021 All-Time Ranks...

Temperature: **11<sup>th</sup> Warmest**

Precipitation: **4<sup>th</sup> Wettest**

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## INDIANAPOLIS NOVEMBER 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 70^\circ$	Lows $\leq 40^\circ$
November 2021	40.5	1.22	0	27
Normal November	43.3	3.45	2	22
Diff from Normal	-2.8	-2.23	-2	+5

November 2021 All-Time Ranks...

Temperature: **43<sup>rd</sup> Coolest** (Tied)

Precipitation: **13<sup>th</sup> Driest**

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## INDIANAPOLIS FALL 2021 SUMMARY

	Average Temp	Precipitation	Highs $\geq 70^\circ$	Lows $\leq 40^\circ$
FALL 2021	57.2	14.21	27	30
Normal Fall	55.6	9.81	21	34
Diff from Normal	+1.6	+4.40	+6	-4

Fall 2021 All-Time Ranks...

Temperature: **26<sup>th</sup> Warmest** (Tied)

Precipitation: **12<sup>th</sup> Wettest**



# Winter 2021-22 Outlook for Central Indiana

The official outlook for the 2021-22 winter season (December-February) from the Climate Prediction Center, indicates slightly greater chances for above normal temperatures across central Indiana. The outlook also indicates greater chances of above normal winter precipitation across the region.

At Indianapolis, the normal winter temperature is **31.5°F** and the normal winter precipitation is **7.75"**.

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