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Indiana State Climate Office

Monthly Weather Report

Oct 7, 2015



<http://www.iclimate.org>

September 2015 Climate Summary

Month Summary

September was the 19th warmest and 38th driest on record in Indiana. Thunderstorms delivered heavy rainfall to northwest counties this month but repeatedly missed the south where soils quickly turned abnormally dry. September concluded with 2 southern counties in moderate drought status while 3 others declared open burn bans. The warmth and dryness did help accelerate crop progress toward maturity. Two rounds of severe weather occurred on September 4th-5th and on the 18th-19th.

Summer and its cool trend ended in September. The state average temperature for September 2015 was 69.0°F. This is 3.4°F above normal and ties September 2007. The most recent warmer Septembers were in 2002 and 2005 with a state average 69.2°F tied in 13th place. The warmest September on record averaged 71.9°F in 1925. The day split in September 2015 was 5 days of below normal temperature, 23 days above normal, and 2 days at normal. There was 1 day each when the state temperature was at least 10°F above and 10°F below normal. The highest temperature of the month in the cooperative observer network was 99°F on September 7th in Terre Haute. The coldest minimum was 40°F on four September dates at four locations.

The September state precipitation average of 2.49" was 0.60" below normal, tying 1962 as the 38th driest September on record. Recent drier Septembers include a 1.35" average in 2010, good for 12th place, and a 0.72" state average in 2004 in the 2nd spot. The driest September on record was 0.56" noted in 1897. The highest single day precipitation among cooperative stations in September 2015 was 3.35" recorded on September 30th in Marengo. The highest daily total in the CoCoRaHS network was 3.92" measured on September 19th at Leesburg 0.1 wnw. The highest monthly total in the cooperative network was 7.22" as tallied at the Indiana Dunes National Lakeshore. In the CoCoRaHS network the highest monthly total was 10.64" recorded at Portage 2.8e.

Regionally September 2015 precipitation was near normal in northern Indiana, 80% of normal in central counties, and 65% of normal across the south. Normal September precipitation ranges from 2.8" in east central to 3.3" in north central Indiana. Widespread precipitation fell on about 13 days this month.

September 1st – 7th

The first week of September was persistently warm with daily mean temperatures more than 5°F above normal. Rainfall was below normal statewide but especially in the southern third of Indiana. Hail and wind damage were reported across northern Indiana on September 4th. One Ohio River county was impacted by a wind storm the next day.

A large ridge of high pressure dominated the weather over Indiana and the eastern half of the country this week. A single storm system interrupted the ridge on September 4th and 5th when its front entered northern Indiana.

Southerly winds on the back side of the ridge slowly raised Indiana temperatures, from 5°F above normal on September 1st to 6°F above normal the next day. The warmup continued into September 3rd when the state temperature hit 9°F above normal. A stationary front in Michigan drifted south into northern Indiana on September 4th, announced by damaging thunderstorms carrying hail and wind gusts. The state temperature held steady at 9°F above normal. The stationary front retreated the next day north into Michigan. Isolated wind damage was reported along the Ohio River in the unstable warm air mass. Temperatures fell a bit that day to 7°F above normal.

There was no essential difference in the air mass north and south of the front by September 6th and the front dissolved. High pressure was reasserted from Ohio to Maine and its warm wind backflow resumed into Indiana. The state temperature rose slightly to 8°F above normal. The long lived ridge still on scene, the state temperature continued its rebound to 9°F above normal to close out the week.

Overall for the 7 days the state temperature averaged to 8°F above normal. Usually in the first week of September the daily maximum temperature should vary from 78°F to 86°F north to south across the state. The daily minimum normally ranges from 58°F in far northern Indiana to 62°F in the southwest corner of the state. The warmest daily maximum temperature among stations in the cooperative network this week was 99°F at Terre Haute on September 7th. The coolest minimum in the same network was 59°F at several locations on several dates.

Rain fell every day somewhere in the state this week. The heaviest totals fell in the northwest corner of Indiana and in the eastern third of the state but elsewhere less than a half inch was common. Regionally about 0.6" fell in the northern third of Indiana, about 0.4" in central counties, but just 0.2" across southern Indiana. These totals equate to about 80% of normal in northern and central areas of the state and 30% of normal in the south. On the morning of September 1st the CoCoRaHS observer in Van Buren measured 2.69" while on the next morning the volunteer outside Elwood had 2.43". Kentland recorded 2.39". On September 6th two Portage gages collected 2.71" and 2.29". Over the full week the Portage reading held at 2.29" while Kendallville summed to 2.20", Ossian tallied 1.94", and an observer near Marion noted 1.86".

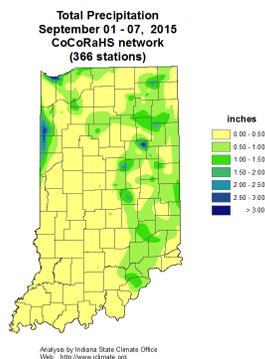
The brief stay of the stationary front in northern Indiana on September 4th set off a round of severe weather. One inch diameter hail was reported in Newton, White, Fulton, Huntington, and Wells counties. High winds in Cass and White counties damaged power lines while utility lines fell in Hancock county. All remaining reported damage was to trees and limbs in White, Pulaski, Fulton, Cass, Huntington, and Hancock counties. Some of the Cass county trees fell on roadways there. Wind speeds in many of these incidents were estimated at 50 to 65 mph.

Severe weather damage was localized on September 5th. Just one report was received of trees blown down by wind gusts in Clark county.

On September 2nd the USDA approved the extension of its agricultural disaster declaration to 8 more counties in Indiana. Low interest loans are made available to farmers in these additional counties through the local FSA office. The original declaration was earlier approved by the USDA for 53 Indiana counties. On this same day Gov. Pence sent a request to FEMA for grants to government and select nonprofits in 19 counties which were devastated by the severe storms and flooding this summer.

The September 8th edition of the USDA Indiana crop bulletin notes that the recent hot and mostly dry weather has sped up the maturity of Indiana field crops, especially corn. Many fields were stressed for lack of moisture. Unfortunately less than half the corn crop continues to be rated in good or excellent condition. Early harvest results have shown corn kernel and ear sizes were low due to lack of nitrogen and sunshine. Soybean pod counts were lower than expected. The hot temperatures were turning pastures brown which had started to impact livestock.

In response to the drier than normal August the September 8th edition of the US Drought Monitor has declared a significant portion of southern Indiana soils as abnormally dry (D0 category). This is the first mention of soil moisture deficiency by the USDM since its June 23rd edition. Generally the 18 counties with at least half their area designated in the D0 category include Gibson, Pike, Knox, Dubois, Orange, Crawford, Harrison, Washington, Lawrence, Brown, Bartholomew, Jackson, Floyd, Clark, Scott, Jennings, Jefferson, and Switzerland counties. This equates to about 18% of total Indiana land area rated as abnormally dry which leaves 82% remaining in normal soil moisture status for this time of the year.



September 8th – 14th

Temperatures slid sharply colder as the week progressed. Rain fell mostly near the middle of the week and heaviest in counties bordering Illinois and Kentucky. There were no severe weather events.

It was still very warm on September 8th with the state average temperature near 10°F above normal. Indiana was located inside a warm air mass sector as southerly winds behind a West Virginia high pressure center transported warm air northward. A new weather pattern arrived the next day. Much colder air began moving into Indiana as a cold front invaded the state. The state average temperature plummeted to 3°F above normal. The cold front slowed after crossing the Ohio River later that night. The temperature drop paused briefly on September 10th at 2°F above normal.

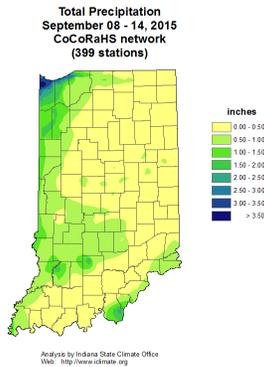
The coldest air was behind a second cold front which pushed through Indiana on September 11th. The temperature fall resumed to 5°F below normal. The next day the second front marched to Tennessee, catching and merging with the first front. Cold high pressure behind the fronts sprawled from Canada to Texas, streaming still colder air into Indiana and the Midwest. The state temperature continued downward to 9°F below normal. On September 13th the merged fronts reached the Atlantic shore. The strong ridge dominated the eastern two-thirds of the country and Indiana temperatures bottomed at 10°F below normal, the coldest day of the week. The massive ridge drifted east of Indiana on September 14th. The cold temperature skid finally ended. The state temperature started to rebound to 5°F below normal.

Overall for the week the state temperature averaged to 2°F below normal. Typically in this second week of September the daily maximum temperature should range between 76°F and 83°F north to south across the state. Daily minimums normally vary from 56°F in far northern counties to 59°F in the southwest corner of the state. The warmest daily maximum temperature among stations in the cooperative observer network this week was 97°F at Terre Haute on September 8th. The coolest minimum temperature in this same network was 40°F at Warsaw on September 12th, at Goshen Airport on September 13th, and at Spencer on September 14th.

A significant cool down of 20°F could potentially squeeze tons of moisture out of the atmosphere. Yet this week moderate to heavy rainfall was limited mostly to the west and southeast edges of the state and to a wide band along a Sullivan to Columbus line. The vast remainder of the state received less than a half inch. Regionally about 0.7" of rain fell across the northern and southern thirds of Indiana and 0.5" in central areas. These totals equate to about 70% of normal in the north, 60% in central counties, and 80% of normal across southern Indiana. There were spots with heavy rainfall. In CoCoRaHS network morning reports on September 10th the observer at Elizabeth measured 2.17" while in Oolitic 2.14" was recorded. The Plainville gage collected 1.68". On September 12th the Michigan City volunteer noted 2.00" while near Gary 1.61" was received. Over the entire week the Highland gage had tallied 3.92" while Dyer had 3.51". A Gary gage totaled to 3.09" while in Schererville 2.83" fell with 2.77" in Hobart.

The September 14th edition of the USDA Indiana crop report noted that the recent heat and dryness had sped up crop maturity. About 25% to 50% of crops have matured, which is slightly faster than last year. Some farmers have continued to irrigate to help move the maturity process along. Disease pressure remains high in late planted corn. The current cool temperatures have reduced crop stress in northern and central Indiana. Seed corn harvest had started while harvest for silage was winding up. Soybean harvesting had begun but some farmers were disappointed with poor pod sizes. Hay cuttings were ending due to slow regrowth prospects.

The September 15th edition of the US Drought Monitor indicated virtually no change in the intensity and geographic extent of abnormally dry soils in Indiana since one week prior.



September 15th – 21st

A minor warming trend the first half of this week was followed by cooling in the second half. Neither trend was extreme as daily state average temperatures held to within 5°F of normal all week long. Heavy thunderstorms with frequent lightning rumbled across northern Indiana early in the weekend as a strong cold front moved through the state. The rainfall largely missed southern Indiana, a small part of which is entering drought status. Rain from the single cold front didn't interrupt farmers long as both corn and soybean harvest was underway.

A huge dome of high pressure covered the eastern half of the country, including Indiana, for three days on September 15th – 17th. During this time the state average temperature rose from 1°F above normal to 4°F above normal with no rainfall. The only cold front of the week drew close to Indiana on September 18th yet warm winds ahead of the front pushed the state temperature to peak at 5°F above normal. The strong front reached Indiana late in the day and continued moving across the state on September 19th. The state temperature dropped to 2°F above normal with locally heavy rainfall.

A new ridge moved overhead Indiana the next day. Cool Canadian air entered the state as temperatures fell to 4°F below normal, the coldest of the week. The old cold front raced east to the Atlantic coast. On September 21st the new ridge stretched overhead Indiana and to the northeast and southwest, allowing state temperatures to recover a bit under sunny skies to end the week at right about normal.

Overall for the week the state temperature averaged to about 2°F above normal. Typically for the third week of September daily maximum temperatures should range from near 73°F in far northern Indiana to 80°F in the far southwest corner of the state. Daily minimums normally vary between 53°F and 56°F north to south across the state. The warmest daily maximum temperature this week among cooperative network stations was 91°F at Vincennes 5ne on September 19th. The coolest daily minimum in the same network was 40°F at Wanatah 2wnw on September 21st.

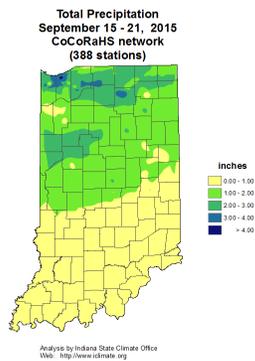
Rain fell on 3 days during the passage of the cold front. Generally at least an inch fell across the northern half of the state with very little across the southern half. More than 2 inches fell across the

northern tier of counties and in west central Indiana. Heavy rainfall of more than 4 inches drenched Lake and Porter counties near Lake Michigan. Regionally for the week about 1.9" fell across northern Indiana, 1.0" in central areas, but just 0.1" in the southern third of the state. These amounts equate to about 260% of normal in the north, 160% of normal in central counties, and just 10% of normal across the south. Rain gages in the CoCoRaHS network on the morning of September 19th caught as much as 3.92" in Leesburg, 3.21" at Portage, 2.98" in Hudson, 2.92" at Lafayette, and 2.89" near Otterbein. For the week two CoCoRaHS observers near Portage tallied 5.45" and 3.46" while Leesburg summed to 4.09". In Lake county the Hobart volunteer collected 3.48" with Crown Point close behind at 3.47".

Heavy thunderstorms rolled through northwest Indiana late on September 18th. High winds took down large trees in Laporte county. Further south wind gusts between 60 and 80 mph toppled several trees in White, Cass, and Miami counties. Some of the trees fell on power lines. Widespread power outages occurred in White county when 7 substations were impacted by fallen trees. In Tippecanoe county power was lost for some residents. Overall about 2,000 customers lost power statewide during these storms. Large hail to 1.75" in diameter was reported in Benton county.

While torrential rain caused problems in northern Indiana not enough rain fell across the south. In the September 22nd edition of the US Drought Monitor moderate drought was introduced into most of Jefferson county and in the north half of Scott county in southeast Indiana. This is the first time since June 16th that the D1 class has existed in Indiana. A large area of abnormally dry soil continued to expand in other southern counties. The D0 class spread into the northern reaches of southwest Indiana and into the south edge of west central Indiana. Generally the D0 and D1 classes covered an area south of a Montezuma to Aurora line except for portions of Knox, Daviess, Martin, Greene, Posey, Vanderburgh, Warrick, Spencer, and Perry counties. Coverage of moderate drought stood at 1% of total Indiana land area while D0 coverage increased from 18% to 30% of total Indiana area during the week ending September 22nd. No soil moisture shortage existed in 69% of Indiana, down from 82% on September 15th.

The September 21st edition of the USDA Indiana crop bulletin noted that crops continued to dry down as harvest began. Weekend storms had slowed harvest in wet northwest Indiana. A little less than half of the corn and soybean crops continued to be rated in good or excellent condition with half the corn crop having matured. Some winter cover crops had been planted. Livestock remained in good condition.



September 22nd – 30th

The last days of September were mostly warm and dry. Just one front passed through Indiana at the very end of the month which lowered the state temperature to normal. There was no severe weather. Two-thirds of the corn crop reached maturity and Indiana harvest was well underway. Burn bans were issued by commissioners in 3 southwest Indiana counties where September rainfall has been deficient.

An extended ridge of high pressure overhead Indiana stretched from Maine to Nebraska, keeping skies mostly sunny and winds light. The Indiana state temperature was 3°F above normal on September 22nd. Cold air north of Indiana spilled eastward across Canada and Michigan the next day. The cold missed Indiana and the state temperature increased to nearly 7°F above normal.

A weak cold front had developed in Michigan but dissolved on September 24th. Warmth continued in Indiana and the state temperature inched higher to 8°F above normal. A stationary front developed along the Canadian border the next day while a new storm came ashore in the southeast states. Indiana was located between these systems. The southeast storm moved up the east coast closer to Indiana on September 26th, turning skies cloudy to partly cloudy with very light rainfall in spots. The state temperature fell back again to 4°F above normal. The next day the coastal storm moved back into the Atlantic.

A high pressure ridge settled over New England and in a rerun of 5 days earlier sprawled overhead Indiana to Nebraska. Mostly sunny skies returned and the Indiana state temperature rebounded to 7°F above normal. Two fronts in sequence moved toward the Great Lakes on September 28th. Ahead of the fronts Indiana temperatures peaked to 9°F above normal, the warmest in the 9 day interval.

Strong high pressure moved out of Alberta the next day and forced the two fronts to merge as they finally reached Indiana. Cool air began to arrive in the state on September 29th with rainfall in the southern portion of the state. The cold front passed all the way through Indiana on the last day of the month, cooling state temperatures to near normal to close out the month.

The state temperature over the 9 days averaged to 6°F above normal. Typically in late September daily maximum temperatures should vary between 70°F and 77°F north to south across the state. Daily minimums normally vary from 49°F in far northern Indiana to 52°F in the far southwest corner of the state. The warmest daily temperature this week in the cooperative network was 89°F at Vincennes 5ne on September 26th. The coolest daily minimum in this same network was 43°F at numerous locations on September 22nd and 23rd.

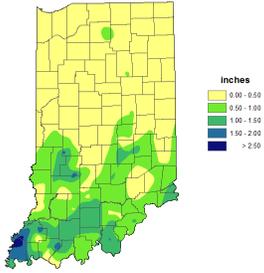
It was dry the first half of the 9 day interval. Mostly light rain was recorded from September 26th through the 28th. Much of the rain fell on the last two days during the cold frontal passage. Generally less than a half inch fell across the northern half of the state. About 1.0" to 1.5" was measured mostly south of a Vincennes to Madison line. The southwest corner of Indiana was the wettest part of the state where more than 2.5" was tallied in Gibson and Posey counties. On average regionally over the 9 days just a few hundredths of rain was measured across northern Indiana. In the central section about 0.3" was recorded while 1.1" was noted across the south. These totals equate to less than 10% of normal in the north, 40% of normal in central counties, and 110% of normal across southern Indiana.

The heaviest single day rainfall over the 9 days was found in southwest and west central Indiana in reports received the morning of September 30th. The CoCoRaHS observer at Poseyville had 1.99" that day while near Spencer 1.73" was noted. The Corydon volunteer measured 1.60" while in Reelsville 1.57" was found in the gage. The highest rainfall sums over the 9 days included 2.37" at Poseyville, 1.95" in Francisco and 1.92" at Spencer while Tennyson collected 1.80" and 1.72" was tallied at Reelsville.

According to the US Drought Monitor there was no change in Indiana drought status since its September 22nd edition. Commissioners in 3 southwest Indiana counties did issue burn bans due to the overall extended period of dryness in that region. On September 24th Dubois county declared a ban on open burning until sufficient rainfall arrived to improve those conditions. Burn bans were declared in Martin and Spencer counties the next day.

The USDA Indiana crop bulletin for September 28th stated that harvest is well underway. The wet conditions in northern Indiana a week prior had dried quickly and didn't slow harvest too much. Crops were drying and maturing at a fast pace. As expected corn and soybean yields were testing below normal due to the wet early summer. Cover crop seeding was underway and livestock were in good condition. The corn crop was estimated to be two-thirds mature, which is near normal, although less than half the crop continued to be rated at less than good or excellent condition.

**Total Precipitation
September 22 - 30, 2015
CoCoRaHS network
(357 stations)**



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

September 2015

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	68.1	64.6	3.5
North Central	67.7	63.9	3.8
Northeast	67.6	63.5	4.1
West Central	69.2	65.9	3.3
Central	68.9	65.3	3.6
East Central	68.4	64.5	3.9
Southwest	70.8	68.2	2.6
South Central	70.2	67.5	2.7
Southeast	70.0	66.9	3.1
State	69.0	65.7	3.4

Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	3.88	3.21	0.67	121
North Central	2.96	3.30	-0.34	90
Northeast	2.65	3.19	-0.54	83
West Central	2.87	3.03	-0.16	95
Central	2.00	2.99	-0.99	67
East Central	1.97	2.79	-0.82	71
Southwest	2.10	3.13	-1.04	67
South Central	1.90	3.11	-1.21	61
Southeast	2.09	2.97	-0.88	70
State	2.49	3.09	-0.60	81

Autumn (same as September so far)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	68.1	64.6	3.5
North Central	67.7	63.9	3.8
Northeast	67.6	63.5	4.1
West Central	69.2	65.9	3.3
Central	68.9	65.3	3.6
East Central	68.4	64.5	3.9
Southwest	70.8	68.2	2.6
South Central	70.2	67.5	2.7
Southeast	70.0	66.9	3.1
State	69.0	65.7	3.4

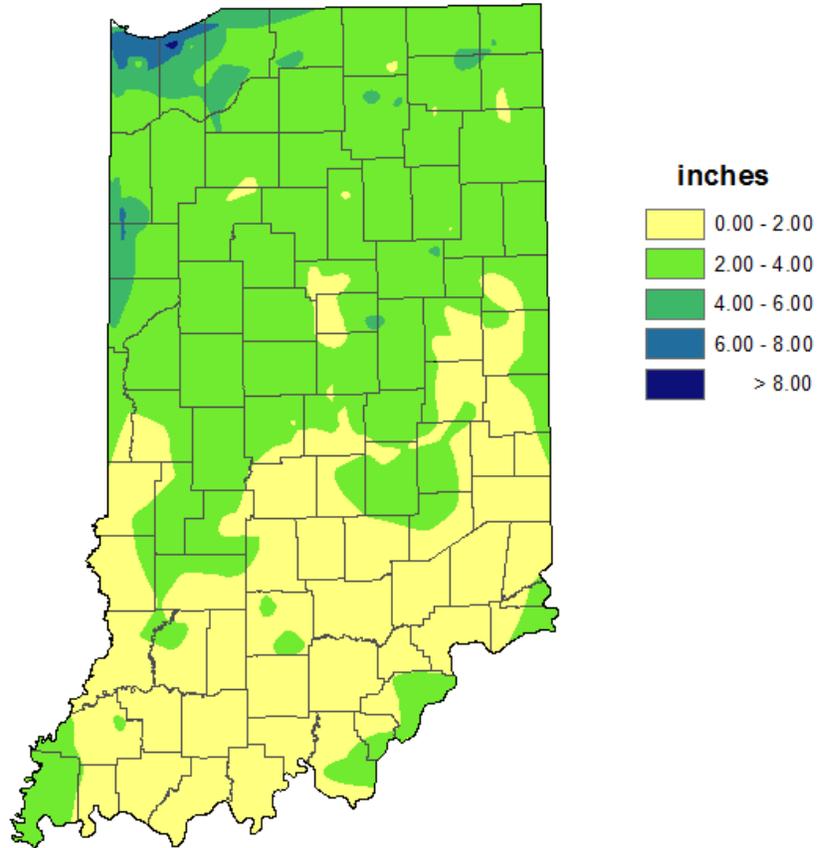
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	3.88	3.21	0.67	121
North Central	2.96	3.30	-0.34	90
Northeast	2.65	3.19	-0.54	83
West Central	2.87	3.03	-0.16	95
Central	2.00	2.99	-0.99	67
East Central	1.97	2.79	-0.82	71
Southwest	2.10	3.13	-1.04	67
South Central	1.90	3.11	-1.21	61
Southeast	2.09	2.97	-0.88	70
State	2.49	3.09	-0.60	81

2015 Annual (through September)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	51.9	53.5	-1.6
North Central	51.4	53.0	-1.6
Northeast	51.0	52.6	-1.6
West Central	54.0	55.1	-1.1
Central	54.0	54.6	-0.7
East Central	53.1	53.8	-0.7
Southwest	57.5	58.3	-0.8
South Central	57.0	57.7	-0.7
Southeast	56.2	56.8	-0.6
State	54.1	55.1	-1.0

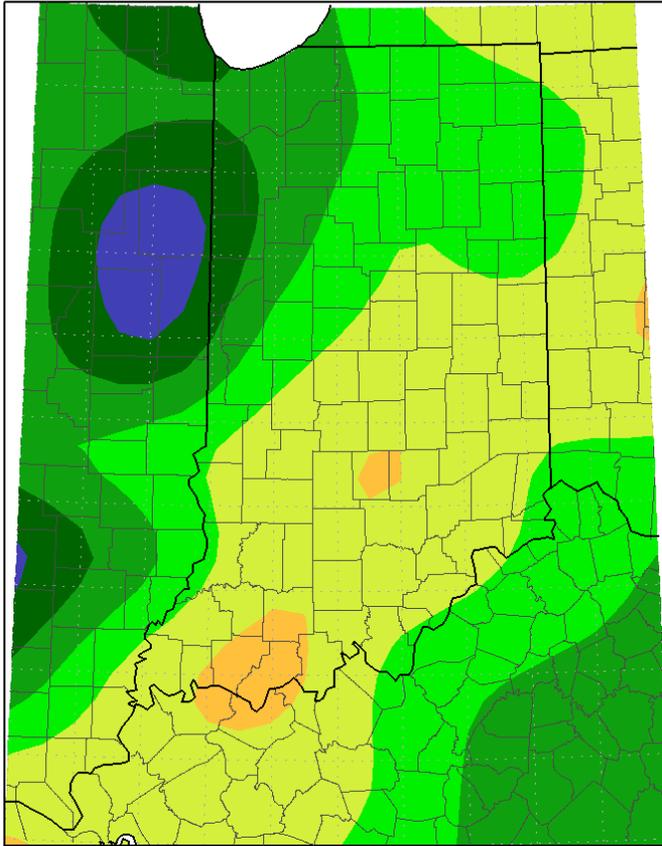
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	34.46	29.28	5.18	118
North Central	32.60	29.30	3.31	111
Northeast	33.03	28.34	4.69	117
West Central	34.76	31.77	2.99	109
Central	35.96	31.30	4.66	115
East Central	35.49	30.27	5.22	117
Southwest	40.33	34.71	5.62	116
South Central	42.06	35.04	7.02	120
Southeast	38.56	34.02	4.53	113
State	36.44	31.63	4.81	115

**Total Precipitation
September 2015
CoCoRaHS network
(397 stations)**



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

Accumulated Precipitation: Percent of Mean
September 1, 2015 to September 30, 2015

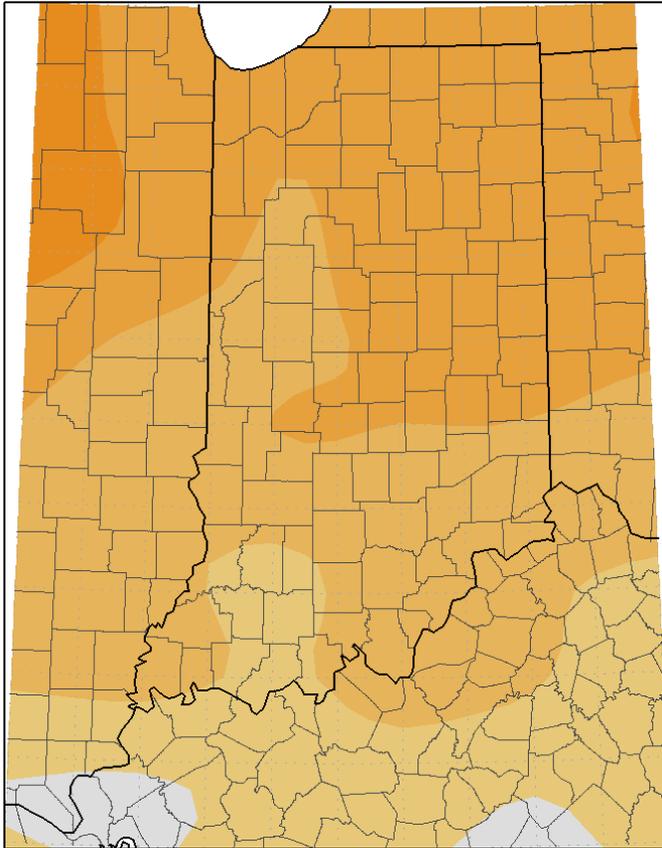


Mean period is 1981-2010.



Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
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Average Temperature (°F): Departure from Mean
September 1, 2015 to September 30, 2015



Mean period is 1981-2010.



Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 10/7/2015 9:14:55 AM 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).

▼
Statistics type: Categorical Percent Area ▼
Indiana ▼

Percent Area in U.S. Drought Monitor Categories

Show 25 entries

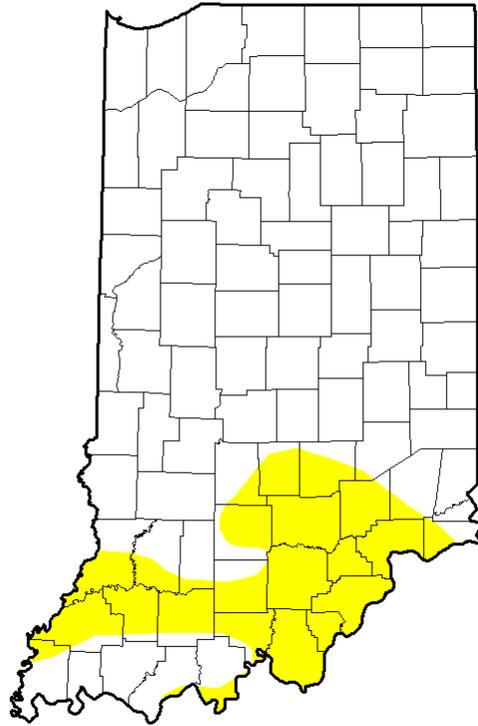
Search:

Week ▼	None ◀▶	D0 ▶	D1 ▶	D2 ▶	D3 ▶	D4 ▶
2015-09-29	69.52	29.10	1.38	0.00	0.00	0.00
2015-09-22	69.52	29.10	1.38	0.00	0.00	0.00
2015-09-15	82.26	17.74	0.00	0.00	0.00	0.00
2015-09-08	82.16	17.84	0.00	0.00	0.00	0.00
2015-09-01	100.00	0.00	0.00	0.00	0.00	0.00

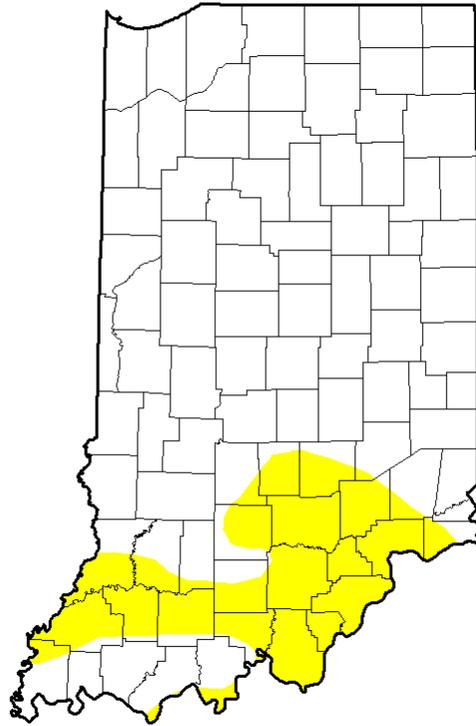
September 1st Drought Summary



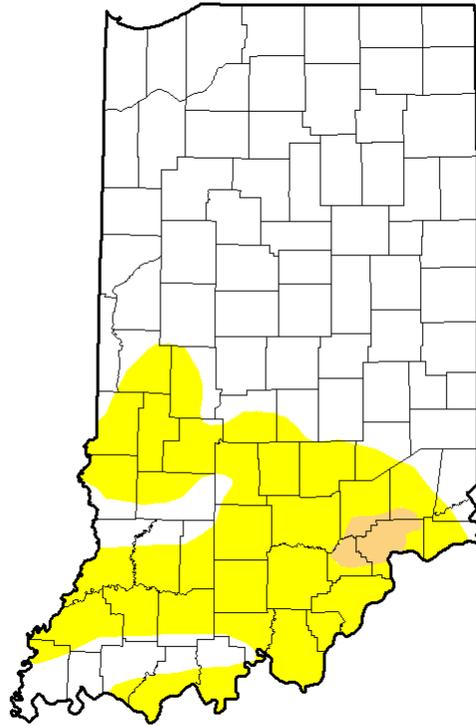
September 8th Drought Summary



September 15th Drought Summary



September 22nd Drought Summary



September 29th Drought Summary

