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and
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Indiana State Climate Office

Monthly Weather Report

Sep 6, 2013



<http://www.iclimat.e.org>

August 2013 Climate Summary

Month Summary

August weather began cool and wet but became progressively warmer and drier through the month. The overall cooler than normal conditions limited severe weather to mostly minor events on a handful of August days. A heat wave with little rainfall developed the last week of the month. The previous heat wave had occurred more than 5 weeks earlier, an indicator of how cool this late summer has been. The late month heat and dryness has hurt Indiana crops which at the start of this month were forecast to produce record or near record yields.

The August state average temperature was 72.1°F, or 0.6°F below normal. This ties 5 other years as the 44th coolest August in Indiana since state records began in 1895. August of last year was slightly cooler at 72.0°F as the 2012 drought relented. Some other recent cool Augusts include 2009 at 71.7°F, tied for 19th coolest, and 2008 with its 71.0°F coming in at 24th place. August 2004 was quite cool, ranking in 4th place with 68.6°F, but the coldest August on record was a 67.2° value of long ago in 1915. The day split in August 2013 was 13 days of below normal temperature, 15 days above normal, and 3 days right at normal. The daily state average temperature was 10°F or more below normal on 2 days. A scorching 100° recorded at the Evansville Museum on August 30th was the warmest official temperature in the state this month. Wanatah was again the cold spot in Indiana with a 40°F reading on August 16th.

August state precipitation averaged 1.84 inch, or 1.94 inch below normal. This ranks August 2013 as the 3rd driest August on record. In 2nd place is August 1996 with a 1.67 inch state average. Some other recent dry Augusts include a 1.87 inch value in 2010, good for 4th place. In August 2008 the state number was 2.08 inches, coming in at 9th driest. The all-time driest August was in 1897 when only 1.59 inch was recorded. Regionally August 2013 precipitation was about 75% of normal in northern Indiana, and about 40% of normal in central and southern counties. Normal August precipitation is about 3.8 inches statewide. The highest single day precipitation this month came on August 3rd at Warsaw when the cooperative station there reported 3.60 inches and the nearby CoCoRaHS station posted 4.97 inches. Widespread rain fell on about 10 days this month.

Severe weather occurred on August 2nd, 7th, 12th, 30th, and 31st. causing minor damage. Details on all these storms can be found in the weekly narratives which follow.

Abnormal dryness in 6 east-central Indiana counties as noted in the August 6th edition of the US Drought Monitor was erased by rains the following week. But rainfall after mid-August came less often, allowing abnormal dryness to return to the central third of Indiana and to four extreme northwest counties. This situation persisted to the end of the month.

August 1st – 10th

A series of weak cold fronts dipped southward into Indiana to start off August. A mostly zonal jet stream pattern in the upper atmosphere has impacted these fronts on their journey, causing slowing and eventual stalls into stationary fronts over our state. State average temperatures fell just a few degrees with each frontal passage. The first 6 days of August were a little cooler than normal, then a warm up followed to the end of the 10 day period. Rain fell every day at least somewhere in the state but the only significant amounts were tallied on August 3rd and 9th.

The month began with state average temperatures just a shade cool at 1°F below normal as a first cold front crossed Indiana. This cold front raced to the Atlantic shore the next day, pushed from behind by a high pressure center that quickly moved southeast of Indiana. A second cold front was already on the move toward Illinois but stalled in northern Indiana on August 3rd. State temperatures held steady at about 3°F below normal. The next day strong Canadian high pressure kick started the stationary front into a cold front that traveled to the Gulf states. Indiana temperatures fell to their coldest of the 10 day interval at 6°F below normal. Cool but pleasant Canadian air was transported into our state.

On August 5th and 6th the ridge slid east to New England. Indiana temperatures now rebounded to normal on southerly winds, peaking at nearly 3°F above normal by August 7th. Indiana was then squeezed by a new cold front to the north and warm front south of the state, triggering locally severe weather in a few far northern counties. This third cold front slowed to a stop in southern Indiana on August 9th. The stationary front remained there to the end of the 10 day interval. Daily state average temperatures held at 1°F to 2°F above normal after August 7th. Overall for the 10 days the state temperature averaged about 1°F below normal. In this first August week daily maximum temperatures normally range between 82°F in far northern Indiana to 88°F in the far southwest. Daily minimums typically will vary between 63°F and 67°F north to south across the state.

Rainfall was noted somewhere in Indiana on all 10 days and except for two days amounts were light. Moderate to heavy rainfall was noted the morning of August 3rd, trending heavier northward. Some of the heaviest local rainfall of all 10 days fell on that day as recorded by CoCoRaHS observers in Kosciusko county. Two volunteers in Warsaw measured 4.97 and 4.63 inches. Two Leesburg gages collected 4.44 and 4.42 inches. A Fort Wayne CoCoRaHS observer had 4.33 inches. Reports on August 9th showed central and southern Indiana had received about a half inch in this later event.

Regional totals for the 10 days in northern Indiana averaged about 2.1 inches, while 1.3 inches fell in central sections, and 0.8 inch covered the south. These totals equate to about 170% of normal in northern Indiana, near normal in central, and 60% of normal in southern Indiana. A Laporte observer accumulated the most rainfall over the 10 days with 5.87 inches. In northeast Indiana some 10 day totals included the two Leesburg observers with 5.71 and 5.26 inches, 4.07 inches in Columbia City, and 4.02 inches in Fort Wayne.

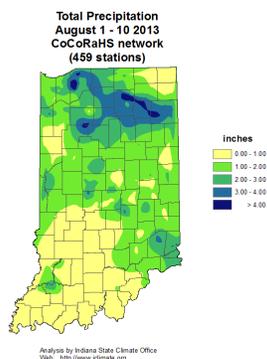
The slowing of the second cold front into a stationary system caused locally severe weather in a few northern counties late on August 2nd. Very heavy rain in north central and northeast Indiana caused flooding of creeks, streams, and underpasses in Kosciusko, Marshall, and Fulton counties. In

Kosciusko and Wabash counties high winds tore down many trees. In Allen county trees fell on power lines.

On August 7th the squeeze play put on by cold and warm fronts near Indiana resulted in another round of local severe weather. In St Joseph and Marshall counties, 60 mph gusts were reported with 1.25 inch diameter hail. High winds in Noble county caused trees to fall on power lines which blocked local roads.

Locally heavy rains hammered the northeast but showers missed dry soils in eastern Indiana. The August 6th edition of the US Drought Monitor indicated no improvement in the abnormally dry (D0 category) soils of six eastern Indiana counties: Wayne, Union, Fayette, Henry, Rush, and Hancock. The dryness in this region is considered short term by the Drought Monitor and is expected to be eliminated by future rain events.

Some agricultural experts are predicting a near record Indiana corn crop this year if the weather continues to be highly favorable. The August 5th edition of the Indiana Crop and Weather Report notes recent weather has been nearly ideal for crop development.



August 11th – 17th

This week overall was much cooler than normal but quite pleasant for summer. Very little rain fell even as cooler temperatures arrived, resulting in a mostly dry week.

A stationary front drifted south of the Ohio River on August 11th. Weak high pressure moved in but was coaxed eastward the next day as two warm fronts, one along the Michigan border and the other on the Ohio River, squeezed Indiana between them. Daily state temperatures were right about normal.

The weather map changed markedly on August 13th as very strong high pressure in Manitoba converted the two warm fronts surrounding Indiana into cold fronts. The first cold front had already passed the state by early August 13th. The second cold front was right behind the first in central Indiana. Daily state temperatures fell to 5°F below normal. By the next day the strong Canadian ridge had claimed the eastern two-thirds of the country, clearing storms from Indiana and the

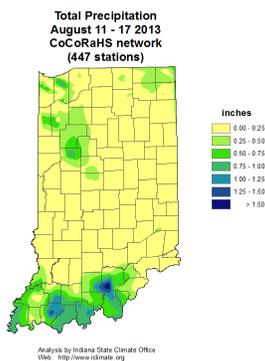
Midwest. State temperatures sank further, bottoming out at 13°F below normal, the coldest of the week.

The ridge moved rapidly east of Indiana on August 15th and a gradual warm up commenced to the end of the week. Temperatures had risen to 12°F below normal and continued rising to 9°F below normal by August 16th. That same day a reinforcement of high pressure dipped out of Canada into the Midwest, forcing storm systems and their fronts further from Indiana. Daily state temperatures continued to rise, however, ending the week nearly 6°F below normal. Overall for the week the state temperature averaged 6°F below normal. Typically in mid-August daily maximum temperatures should vary between 81°F and 88°F north to south across the state. Normal daily minimums should range from 62°F in far northern counties to 66°F in far southwest Indiana.

Rainfall was scarce this week. Amounts were very light before the two cold fronts arrived on August 13th, and afterward generally less than a quarter inch was noted. The second half of the week was dry as high pressure suppressed storm development throughout Indiana. For the week regional rainfall totals were about 0.2 inch in northern Indiana, less than 0.1 inch in central sections, and about 0.4 inch across southern Indiana. These totals equate to about 20% of normal in the north, 5% of normal in central counties, and about half of normal in southern areas. The highest single day rainfall amounts were measured on August 13th, mostly in southern Indiana. That morning Holland recorded 1.31 inch, Leopold 1.26 inch, New Salisbury 1.21 inch, and Boonville 1.20 inch. For the week overall the largest totals were found in southwest Indiana and a few more spots elsewhere. Fredericksburg had 1.80 inch, Holland 1.31 inch, Leopold 1.27 inch and New Salisbury 1.21 inch for the week. Crown Point in northwest Indiana received 1.13 inch.

Only one minor report of storm damage was recorded this week. On August 12th gusty winds blew down a tree in Floyd county just before the cold fronts moved through.

The general lack of normal rainfall late in the week is not considered in the August 13th US Drought Monitor assessment. This early week report has eliminated the east central Indiana abnormally dry area and returned the entire state to normal soil moisture status.



August 18th – 24th

It was a quiet weather week with only a single front passing through Indiana. The inactivity kept rainfall totals low while temperatures stayed fairly close to normal all week long.

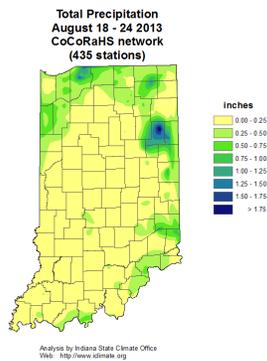
The previous week was cold and temperatures were on the rebound to start this week. On August 18th a large high pressure ridge was centered over Pennsylvania, sending southerly winds over Indiana to continue the warming trend the first half of this week. Daily state average temperatures rose from 4°F below normal to right at normal by August 20th. The expanding ridge was now rebuilding westward into Missouri, pushing back a front in South Dakota and extending Indiana's fair weather spell a few more days. This allowed the warming to continue until August 21st when temperatures peaked for the week at 3°F above normal. The next day the ridge began to relent and a storm system moved closer into Wisconsin. Temperatures now began a slow decline the rest of the week as clouds and rainfall replaced the sunshine.

On August 23rd the cold front pushed through Indiana. A new high pressure center entered the Great Lakes and shuttled northeast of Indiana as the week came to an end. State temperatures drifted only slightly lower, ending the week at normal. Overall for the week Indiana temperatures averaged to normal. Usually at this point in August daily maximum temperatures should range between 81°F and 88°F north to south across the state. Daily minimums normally vary from 62°F in far northern Indiana to 65°F in the far southwest.

In the upper atmosphere a strong massive high pressure ridge nearly dominated the country coast to coast this week. In the Midwest a small upper trough of low pressure allowed storms to develop yet kept rainfall amounts scattered and mostly light. Tiny amounts of rain fell several days this week statewide except for heavier amounts on two days when nearly a half inch fell generally in northern Indiana. Regional totals for the week ranged from about 0.4 inch across northern Indiana with about 0.1 inch elsewhere. These totals are about half of normal in the north and less than 20% of normal in central and southern Indiana. There were locally heavier amounts mostly in northeast Indiana. On the morning of August 23rd three CoCoRaHS volunteers in Bluffton reported 2.12 inches, 2.02 inches, and 1.55 inch. A Laporte observer had 1.62 inch while 1.50 inch was noted in New Carlisle. The largest totals in the state for the week were only slightly more at these same locations.

The August 20th edition of the US Drought Monitor indicated a large area of abnormal soil dryness had reappeared and covered 38% of the state. Nearly all of central Indiana, portions of 30 counties, were in this abnormally dry status (D0 category) along with Lake, Porter, Newton, and Jasper counties in northwest Indiana. The same coverage continues in Indiana in the August 27th edition of US Drought Monitor.

The Indiana Weather and Crop report also notes that soil water had been rapidly depleted by August 24th. In its soil moisture survey the USDA concluded that Indiana top soils were 55% short or very short of moisture. Subsoils were rated at 44% in these same categories. Irrigation was running at full capacity as corn on light soils was showing stress. Soybeans are in the pod fill stage and are in need of rain. While livestock remain in mostly good condition due to the recent mild temperatures, pasture and hay were deteriorating.



August 25th – 31st

The first heat wave to invade Indiana since mid-July and the ongoing dry spell highlight this final week of the month. A maximum temperature of 100°F was recorded on August 30th at the Evansville Museum, the hottest reading in the state all month. Rainfall amounts have been meager statewide since the last significant rains in early August.

At the start of the week a massive ridge in the upper atmosphere dominated nearly all the continental US states except in the Pacific northwest and New England. High pressure at ground level generated lots of heat and sunshine but little rainfall. Daily temperatures had climbed steadily over 4 days, initially at 1°F above normal before peaking at 8°F above normal on August 28th.

The upper ridge then retreated southwest, allowing a stationary front to sag to the southern Michigan border. This front drifted southward the next day to the Ohio River. A new weather system came on scene on August 31st, sending its warm front across Indiana. On these last 3 days of the week the state average temperature held steady at nearly 7°F above normal. Typically at this time of year daily maximum temperatures should vary between 80°F in northern Indiana to 87°F in the far southwest. Normal daily minimum temperatures range between 60°F and 64°F this last week of August.

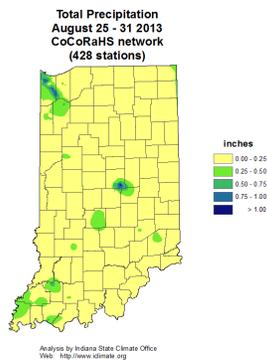
Clouds and rainfall are suppressed by the sinking air flow inside a high pressure system. No rain was observed this week through August 27th and then daily amounts were generally tiny until August 31st. A few tenths of an inch were recorded that morning except for larger amounts in locally heavy showers. Two CoCoRaHS observers in Hebron measured 1.31 inch and 1.00 inch that day. A gage in Fishers collected 1.19 inch. In Highland 0.98 inch fell and a Crown Point volunteer noted 0.96 inch. Regionally for the week about 0.1 inch of rain fell in northern and central counties while 0.2 inch was recorded in the south. These totals equate to just 10% of normal in northern and central Indiana and 20% of normal in the south.

Severe weather broke out on August 30th and 31st during the passage of the last warm front. Trees were forced down in Lake county on August 30th. The next day the weather action moved to central and southern Indiana. One inch hail was observed in Marion county. More typical were reports of wind gust damage. In the far southwest, power lines came down in Knox and Vanderburgh

counties while many tree limbs were ripped to the ground in Gibson and Vanderburgh counties. Wind gusts to 60 mph downed trees and power lines in Putnam county. In Jefferson county besides tree damage a home lost its shingles and siding, and metal objects were thrown high into the air. An analysis of the Jefferson county event concluded the damage there was caused by a microburst.

There were no significant changes in the US Drought Monitor rating of Indiana soil conditions in its August 27th edition. About 38% of the state continued to be classified as abnormally dry (D0 category).

The heat and dry weather this week stressed corn and soybean fields. The September 3rd edition of the USDA Indiana Weather and Crops report stated that corn is being forced to mature earlier than expected. Corn condition is rated at 66% good to excellent. Soybeans are turning color and moving faster to maturity but are also stressed due to disease issues and spider mites. Soybean condition is rated at 62% good to excellent. Livestock are in mostly good condition showing only minor heat stress. Pastures have declined to just 36% rated in good to excellent condition. The weekly soil moisture survey results show topsoils are drying out with 65% now rated short of very short of moisture. Subsoils have deteriorated to 56% short or very short of moisture.



August 2013

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	70.5	71.6	-1.1
North Central	70.1	71.0	-1.0
Northeast	69.8	70.6	-0.9
West Central	71.9	72.8	-0.8
Central	72.0	72.2	-0.2
East Central	71.1	71.4	-0.3
Southwest	74.6	75.2	-0.6
South Central	74.3	74.5	-0.2
Southeast	73.6	73.8	-0.2
State	72.1	72.7	-0.6

Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	2.72	3.81	-1.09	71
North Central	3.06	3.83	-0.76	80
Northeast	2.48	3.68	-1.20	67
West Central	1.31	3.96	-2.65	33
Central	1.39	3.75	-2.36	37
East Central	1.68	3.55	-1.87	47
Southwest	1.11	3.67	-2.56	30
South Central	1.36	3.91	-2.56	35
Southeast	1.93	3.90	-1.96	50
State	1.84	3.79	-1.95	49

Summer (June - August)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	70.4	71.8	-1.4
North Central	70.2	71.2	-1.0
Northeast	70.2	70.9	-0.7
West Central	71.6	73.0	-1.4
Central	71.8	72.4	-0.6
East Central	71.3	71.6	-0.3
Southwest	74.1	75.2	-1.1
South Central	73.8	74.4	-0.6
Southeast	73.2	73.6	-0.5
State	71.9	72.8	-0.9

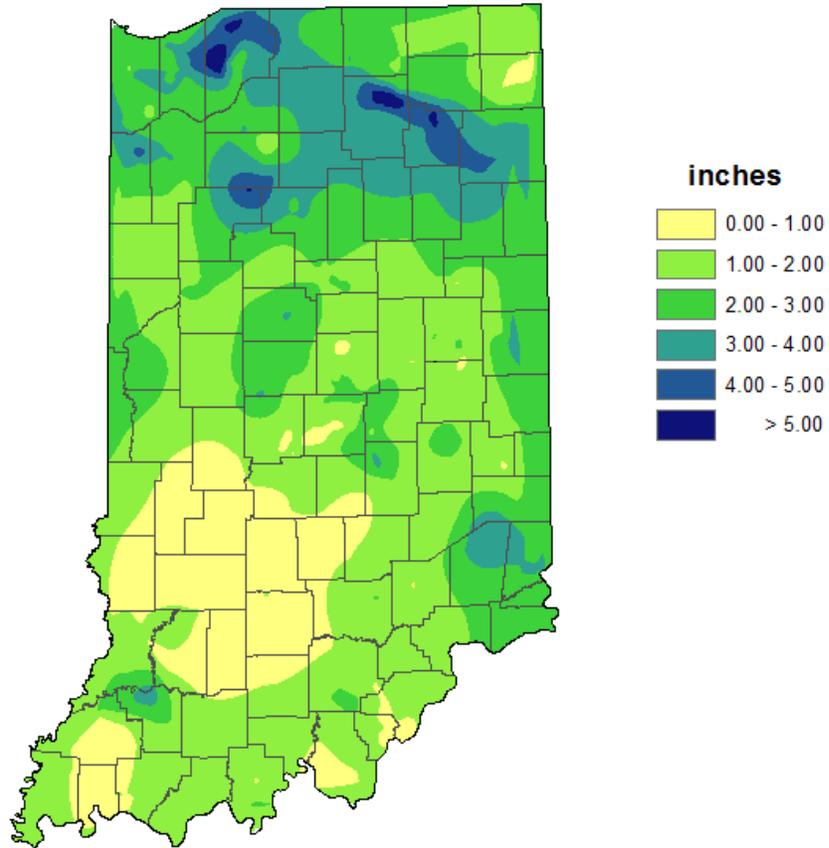
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	11.12	12.01	-0.89	93
North Central	12.66	11.93	0.73	106
Northeast	12.33	11.42	0.91	108
West Central	10.42	12.68	-2.27	82
Central	9.06	12.11	-3.05	75
East Central	9.73	11.88	-2.15	82
Southwest	13.48	12.04	1.44	112
South Central	12.90	12.32	0.58	105
Southeast	12.06	12.23	-0.17	99
State	11.47	12.08	-0.61	95

2013 Annual (through August)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	51.3	52.1	-0.8
North Central	51.1	51.6	-0.5
Northeast	51.0	51.2	-0.2
West Central	53.1	53.8	-0.7
Central	53.2	53.3	-0.1
East Central	52.8	52.5	0.3
Southwest	56.2	57.0	-0.8
South Central	55.9	56.4	-0.6
Southeast	55.2	55.6	-0.4
State	53.4	53.8	-0.4

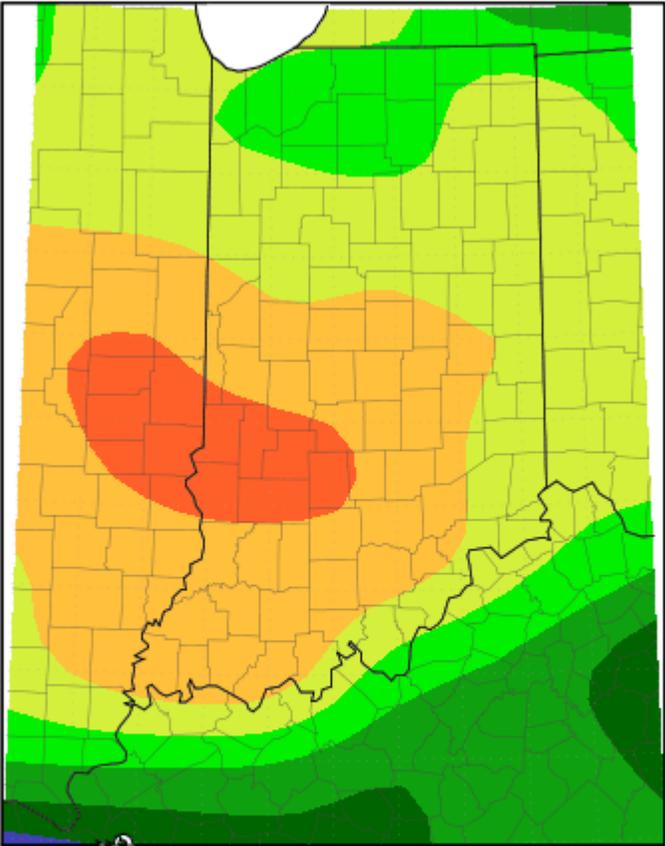
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	29.06	26.06	2.99	111
North Central	30.83	26.00	4.83	119
Northeast	28.38	25.15	3.24	113
West Central	32.18	28.74	3.44	112
Central	29.29	28.31	0.98	103
East Central	26.78	27.48	-0.70	97
Southwest	36.04	31.58	4.46	114
South Central	33.63	31.93	1.70	105
Southeast	30.51	31.05	-0.54	98
State	30.99	28.54	2.45	109

**Total Precipitation
August 2013
CoCoRaHS network
(450 stations)**



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

Accumulated Precipitation: Percent of Mean
August 1, 2013 to August 31, 2013

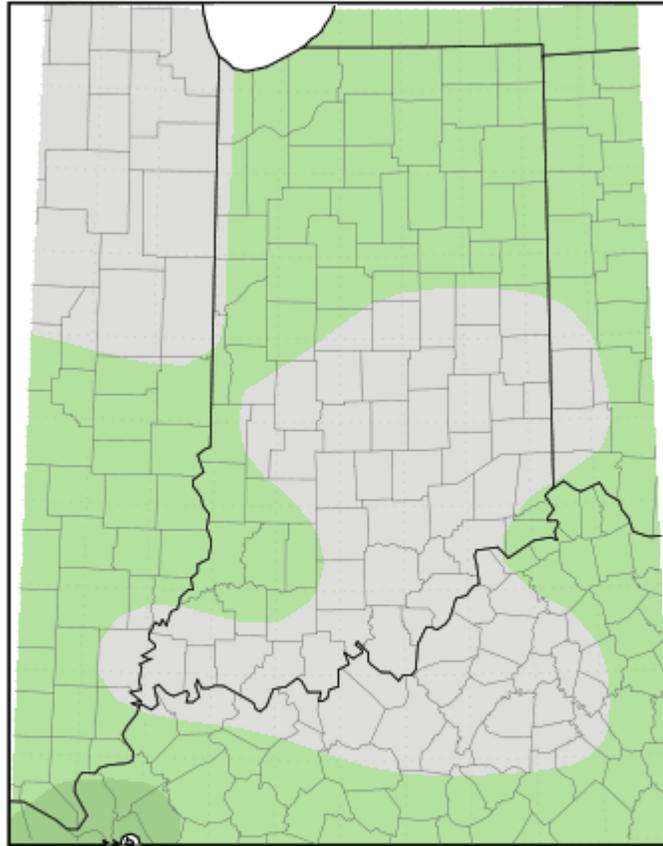


Mean period is 1981-2010.

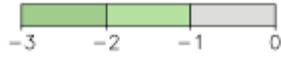


Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at: 9/5/2013 3:46:54 PM CDT

Average Temperature (°F): Departure from Mean
August 1, 2013 to August 31, 2013



Mean period is 1981-2010.



Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at: 9/5/2013 3:47:30 PM CDT

Drought Summary from the U.S. Drought Monitor

Below is a drought summary for the state of Indiana from the U.S. drought monitor. Areas in white are not experiencing any drought. Yellow areas are abnormally dry, but not considered a drought. Drought begins when the moisture levels become more severe, with beige, orange, red, and brown indicating increasing levels of drought (moderate, severe, extreme, and exceptional, respectively). The table below indicates how much of the state is not under drought conditions, and also how much of the state is under drought conditions from its respective column upwards.

For example, August 27th has 37.6% of Indiana under at *least* D0- D4 status. Normal soil moisture status (Nothing) for this time of year existed in 62.4% of all Indiana area. There were no other drought categories active at that time so D0 stands at 37.6% coverage. The D0 category (abnormally dry) is not a drought category in and of itself. Therefore there was no drought anywhere in Indiana on this date.

Indiana

Drought Severity

	D0 - Abnormally Dry		D2 Drought - Severe		D4 Drought - Exceptional
	D1 Drought - Moderate		D3 Drought - Extreme		

Week	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
September 3, 2013	63.53	36.47	1.95	0.00	0.00	0.00
August 27, 2013	62.40	37.60	0.00	0.00	0.00	0.00
August 20, 2013	62.37	37.63	0.00	0.00	0.00	0.00
August 13, 2013	100.00	0.00	0.00	0.00	0.00	0.00
August 6, 2013	94.18	5.82	0.00	0.00	0.00	0.00

August 6th Drought Summary



August 13th Drought Summary



August 20th Drought Summary

