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and  
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## Indiana State Climate Office

### Monthly Weather Report

**Nov 7, 2013**



<http://www.iclimat.org>

## October 2013 Climate Summary

### Month Summary

There were few but significant temperature and precipitation pattern changes during October. A warm first half of the month became a cold second half. Wet conditions with heavy precipitation the first week of the month turned mostly dry until the final days when wet weather returned. Severe weather erupted during the wet cycles on October 3<sup>rd</sup>, 5<sup>th</sup>, 30<sup>th</sup>, and 31<sup>st</sup> but caused no deaths of injuries. Precipitation benefited Indiana soil moisture as abnormally dry areas shrunk by 10% in coverage this month.

The October state average temperature was 54.4°F, a slim 0.4°F above normal. This gives 2013 the 57<sup>th</sup> warmest October on record in Indiana since 1895, near the middle in rank of all historical Octobers. The record warmest October was in 1947 with a 61.8°F state average. The day split in October 2013 was 14 days of below normal temperature, 16 days above normal, and 1 day at normal. The state average temperature was 10°F or more below normal on 3 days and 10°F or more above normal on 4 days. The highest temperature of the month was in Vincennes with 87°F reported on October 5<sup>th</sup>. The coolest was 22°F on October 26<sup>th</sup> at Shoals.

October state precipitation averaged 3.97 inches, which is 1.07 inch above normal. This places October 2013 in a tie with 1985 as the 27<sup>th</sup> wettest October since records began. Some recent wetter Octobers include last year when 4.02 inches fell, good for 25<sup>th</sup> place. The 6.79 inches in October 2009 holds 4<sup>th</sup> place in the ranking. A 5.09 inch value posted in October 2006 comes in at 10<sup>th</sup> wettest on record. The October 2004 value of 4.26 inches holds 21<sup>st</sup> place. The wettest October on record in Indiana was 8.51 inches way back in 1919. Regionally October 2013 precipitation was right about normal in northern Indiana, about 140% of normal in central counties, and near 160% of normal in the south. Normal October precipitation varies between 2.7 and 3.0 inches. The highest single day precipitation was noted on October 6<sup>th</sup>. In the cooperative station network Tell City recorded 5.91 inches that day. The heaviest CoCoRaHS network report that day was 5.80 inches at Mauckport.

Nearly all severe weather damage was caused by wind gusts on 4 days this month. Details can be found within the weekly narratives which follow.

## October 1<sup>st</sup> – 7<sup>th</sup>

Weather in the first and second halves of this week was quite a contrast. A steady warm up with light rainfall early on turned into a soggy mess in places amid a sharp cool down later in the week. Scattered damage caused by hail and high winds stretched north to south in western Indiana on two severe weather days.

Daily state average temperatures were on the rise day to day to start the week. The month opened with the state temperature near 6°F above normal, peaking 4 days later at nearly 16°F above normal. A cold front was moving across northern Indiana on October 2<sup>nd</sup> but stalled there the next day. A near zonal jet stream in the upper atmosphere above Indiana and high pressure over southeastern states blocked the movement of the cold front further south. The cold front transitioned into a stationary front on October 3<sup>rd</sup>. The next day this front drifted a little north into Michigan, allowing the strong Indiana warming to persist and peak.

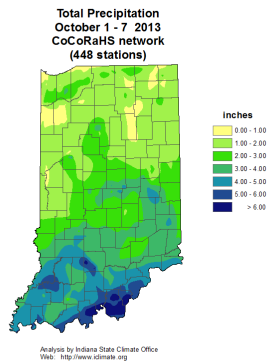
Meanwhile west of Indiana a cold outbreak was headed toward Illinois, the cold front running well ahead of the main storm system still in South Dakota. Heavy rains started in Indiana on October 5<sup>th</sup> and temperatures began to fall. The strong cold front moved through the state on October 6<sup>th</sup>, expanding a cold pool of air sprawled across the western half of the country. Indiana temperatures dropped to 5°F above normal, then to 1°F above normal to close out the week. A weak cold front in Illinois is headed to our state to reinforce the cold as the week draws to an end. Overall for the week state temperatures averaged about 9°F above normal. Daily normal maximum temperatures for this first week of October range from 66°F in far northern counties to 74°F in the far southwest. Daily minimums typically vary between 46°F and 49°F north to south across the state.

After a dry start to the week rainfall amounts ticked higher each day as much colder air moved into the state. The heaviest amounts were found in the morning reports of October 6<sup>th</sup>. Regional week totals trended higher rapidly southward. Northern Indiana totals near 1.4 inch jumped to 2.4 inches in central areas and to 3.5 inches on average across southern Indiana. These totals equate to about 180% of normal in northern counties, 290% of normal central, and 480% of normal across the south! It is no surprise then that the heaviest single day amounts fell along the Ohio River. In Harrison county the CoCoRaHS volunteer in the town of Mauckport measured a one-day total of 5.80 inches on the morning of October 6<sup>th</sup>. That same day two Leopold observers in Perry county collected 5.64 and 5.63 inches. The Tell City rain gage had 5.35 inches. In Floyd county the Lanesville reading was also 5.35 inches. With additional rain on other days, weekly totals pushed still higher. For the week the two Leopold volunteers had 7.43 and 6.86 inches. In Elizabeth 7.18 inches was noted while Galena had 6.88 inches and New Salisbury 6.66 inches.

The transition from a warm to a much colder pattern caused two severe weather days in Indiana. On October 3<sup>rd</sup> a report of 1-inch diameter hail in Lake county was noted. Two days later five reports of high wind damage were scattered in western Indiana from Warren county south to Warrick county. In Warren county some cornfields and trees were damaged and a utility pole snapped. Trees were blown down and a roof was partly blown off in Owen county. Power lines and trees fell in Knox county while trees also came down in Orange county. Finally in Warrick county fallen trees blocked a state highway.

According to the October 8<sup>th</sup> edition of the US Drought Monitor, the heavy rainfall has helped Indiana in drought recovery. All moderate drought (D1 category) has ended in the state, which had

included Lake, Newton, Benton, and Warren counties. Nine central counties have returned to normal soil moisture status this week: Hendricks, Marion, Hancock, Shelby, Henry, Rush, Randolph, Wayne, and Fayette. In summary more than half the state (53%) has recovered to normal soil moisture status according to the Drought Monitor, up from 44% a week ago. The area rated as abnormally dry (D0 category) has improved from 53% coverage a week ago to 47% this week.



## October 8<sup>th</sup> – 14<sup>th</sup>

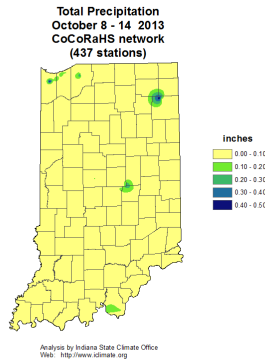
In contrast to last week there were no significant weather changes in Indiana this week. Daily state average temperatures remained within a 6°F spread and rainfall was virtually absent. Only one front crossed the state this week, holding rainfall chances to the bare minimum.

A high pressure center was overhead Indiana on October 8<sup>th</sup>. The state average temperature to start the week was about 2°F above normal. The high pressure ridge slid east to New England the next day, placing Indiana in warming southerly winds. On October 10<sup>th</sup> the same ridge retrograded westward towards Indiana, helping extend the warm up a few more days. The state average temperature lifted to 5°F above normal, then peaked at 6°F above normal by October 11<sup>th</sup>.

A new cold front in Iowa now raced eastward far ahead of its parent storm system in Manitoba. This cold front reached and crossed through Indiana on October 13<sup>th</sup>. Temperatures began to fall behind the front but rainfall did not, except for a very few scattered showers. A new high pressure center moved overhead Indiana on October 14<sup>th</sup> to finish out the week's weather. For the week state temperatures averaged about 4°F above normal. Normal daily maximum temperatures this second week of October vary between 64°F and 72°F north to south. Daily minimums typically range from 44°F in far northern Indiana to 47°F in the far southwest.

Rain fell few places this week, keeping the state average precipitation very low. Most of the moisture that did arrive was tallied on the morning of October 13<sup>th</sup>. Statewide for the week rainfall averaged about 0.01 inch, just 2% of the normal weekly total. The highest single day rainfall measured by CoCoRaHS volunteers was fairly small. The Merrillville observer reported 0.50 inch on the morning of October 13<sup>th</sup>, one of the "wettest" spots in the state this week. Laporte noted 0.35 inch this same morning while Fortville logged 0.32 inch. The largest total amounts for the week in Indiana were just as meager and aren't worth mentioning.

Despite the lack of rainfall this week the US Drought Monitor reports almost no change in Indiana soil moisture status between October 8<sup>th</sup> and 15<sup>th</sup>. There was a 1% increase in area rated in normal soil moisture status, from 53% a week ago to 54% at the end of this week. This increase was possible due to a 1% decrease in area coverage of abnormally dry Indiana soils, from 47% a week ago to 46% as of October 15<sup>th</sup>. The cooler autumn temperatures and naturally slowing evapotranspiration from crops near the end of the growing season are working to stabilize week to week soil moisture levels.



## October 15<sup>th</sup> – 21<sup>st</sup>

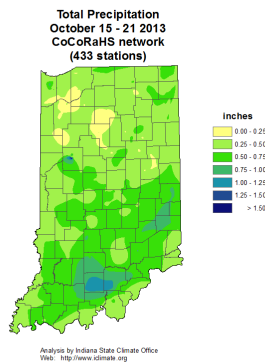
The recent drier weather trend persisted this week with a modest range in daily state average temperatures and below normal rainfall. Yet the frequency of storms increased as a series of fast Alberta clipper systems dived southeast into the Midwest.

On October 15<sup>th</sup> the state average temperature began at normal as a warm front worked its way north through Indiana. The cold front on the backside of this storm crossed the state the next day. Cooler air moved in on October 17<sup>th</sup> and the state average temperature fell to about 6°F below normal, the coolest of the week. Temperatures recovered to 1°F below normal in advance of an Alberta clipper storm system. On October 19<sup>th</sup> the clipper cold front moved slowly through Indiana before stalling along the Ohio River. The daily state temperature rose to 1°F above normal, the warmest of the week.

A strong ridge of high pressure in the Rocky Mountains spread into the Midwest. The ridge forced the stalled front rapidly east to the Atlantic coast, transformed into a re-energized cold front the next day. On October 21<sup>st</sup> the cold front of a new clipper system was moving slowly through Indiana as the week closed at 2°F below normal. Overall for the week the state temperature averaged 1°F below normal. Typical daily maximum temperatures this third October week should range between 61°F and 69°F north to south across the state. Daily minimums normally vary from 42°F in far northern counties to 45°F in the southwest corner of the state.

Rain fell on all but one day this week, but daily amounts were quite light, generally less than 0.2 inch per day. Regionally for the week about 0.4 inch was recorded across northern Indiana and a half inch in central and southern areas. These amounts equate to about 50% of normal in northern Indiana, 80% in central, and 60% of normal in the south. Locally the heaviest single day amount among CoCoRaHS reporters was 1.50 inch noted at West Lafayette on the morning of October 20<sup>th</sup>. Towns in south central Indiana measured more than a half inch on the morning of October 16<sup>th</sup>, including 0.82 inch in Fredericksburg and 0.66 inch at Paoli. A 0.58 inch reading came in from Celestine while the New Salem volunteer had 0.54 inch in the rain gage. Totals for the week showed Fredericksburg had collected 1.20 inch with 1.15 inch at Paoli. Williams recorded 0.98 inch while rainfall in two Salem rain gages summed to 0.94 inch and 0.92 inch for the week.

There was no change in Indiana drought status this week according to the US Drought Monitor. Just under half of Indiana soils were rated abnormally dry through this week at 46% coverage. The remainder of Indiana is rated in normal soil moisture status. Much of this normal region lies in the southern half of the state except for some western counties between Terre Haute and Vincennes, and east to Bloomington. Abnormally dry conditions are found primarily in the northern half of the state except for northwestern counties near Lake Michigan, then southeast to Monticello. The soil moisture survey in the October 21<sup>st</sup> edition of the Indiana Weather and Crop report is more optimistic, putting 21% of Indiana topsoils in short or very short moisture status while 32% of subsoils are in these same categories.



## October 22<sup>nd</sup> – 31<sup>st</sup>

Temperatures were well below normal to start the final 10 days of the month. It was cold enough to lay down the first snow cover of the season on October 23<sup>rd</sup>, primarily in east central Indiana. A rapid warm up at Halloween brought with it heavy rainfall and damaging wind gusts, mostly in east central and southeast Indiana.

At the beginning of the 10 day interval the daily state average temperature tracked at 12°F below normal. A hard freeze the morning of October 22<sup>nd</sup> ended the growing season generally north of a Terre Haute to Muncie line. The next day a cold front crossed the state, lowering temperatures a bit more to 13°F below normal and depositing the first snow cover of the season in parts of central and

east central Indiana. The cold air continued to pour in on October 24<sup>th</sup>. Temperatures fell to around 14°F below normal, the coldest of the 10 day interval.

A slow warming trend followed the next 4 days. A high pressure center drifted overhead and then east of the state. A new weak cold front moved through Indiana on October 27<sup>th</sup> but stalled at the Ohio River the next day. This front had little impact on the warming trend as state average temperatures inched upwards to about 5°F below normal. On October 29<sup>th</sup> yet another new cold front approached the state, squeezing Indiana between two fronts on its northern and southern borders. The state temperature fell a tad to 6°F below normal. Then the northern front pushed south across Indiana and into Kentucky where it too stalled, unable to dislodge strong high pressure over Georgia.

The Georgia high center won out, forcing the Kentucky stationary front to reverse direction and retreat northward as a warm front through Indiana and into Michigan. Indiana temperatures surged upward toward normal. The state was now positioned within a muggy warm air sector. The state temperature continued to rise, ending the month at nearly 6°F above normal. Over the full 10 days the state temperature averaged near normal. Typically in these final days of October daily maximum temperatures should vary between 58°F in far northern counties to 60°F in the southwest corner of the state. Daily minimums should range between 40°F and 43°F north to south across Indiana.

Except for the snow event on October 23<sup>rd</sup> precipitation was minimal through the first 7 days of the interval. Then humid and much warmer air arrived in Indiana on October 30<sup>th</sup>, tapped from the Gulf of Mexico. The atmosphere became heavy with moisture. According to precipitation reports early on October 31<sup>st</sup>, nearly an inch of rain was dumped on northern Indiana and around a third of an inch in central and southern regions. Over the entire 10 days about 1.2 inch of precipitation was recorded in the north and just over 0.9 inch elsewhere in the state. These amounts equate to about 150% of normal in northern Indiana, 130% in central, and near 120% of normal in southern counties. Rain which fell on Halloween after mid-morning was heavy but will be tallied into the November precipitation records. It is not included in the October numbers.

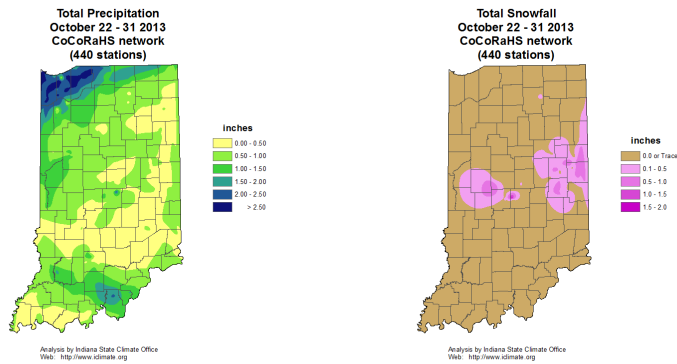
The highest single day precipitation amounts were observed in Lake county on Halloween morning. The CoCoRaHS volunteers in Munster and Westfield each measured 2.90 inches. In Highland 2.75 inches was collected while a tad less at 2.74 inches was observed in St John. The Merrillville volunteer had 2.71 inches that morning. The largest 10 day totals were also found in northwest Indiana. Westville summed to 3.05 inches and Munster to 3.04 inches. Two Laporte observers noted totals of 2.97 and 2.64 inches. The Merrillville volunteer tallied 2.90 inches for the 10 days. A detailed precipitation map indicating where the heaviest rains fell this week is shown after this narrative.

The first snowfall of the season occurred in the early morning of October 23<sup>rd</sup>. Up to an inch stuck to the ground in east central Indiana and in isolated spots of west central Indiana. Snowfall totals are shown on the map following this narrative. Even though this snow was early in the autumn season it was not the earliest on record. Look back to 19 October 1989 to find the earliest autumn snow cover for most Indiana communities.

Indiana temperatures warmed considerably a week after the snow event. Late on October 30<sup>th</sup> wind gusts and heavy rain moved into the state. On Halloween winds 60 mph to 75 mph brought

destruction to nearly 20 central and east central Indiana counties. Fallen trees were reported in all these counties and caused much of the damage. Trees slammed into houses in Wayne, Randolph, and Warrick counties. Vehicles were crushed by trees in Johnson and Wayne counties. Trees tore down power lines and caused power outages in Madison, Hamilton, Johnson, Delaware, Randolph, and Marion counties. Transformers popped and blew in Marion county. Fallen trees blocked roads in Ripley county. Farm equipment was damaged in Rush county. In Hendricks county torrential rainfall was the culprit that caused local roads to flood.

Prior to the Halloween heavy rainfall the US Drought Monitor was showing no change in Indiana soil moisture status between October 22<sup>nd</sup> and 29<sup>th</sup>. Normal soil moisture continued for 54% of Indiana land area with the remaining 46% in abnormally dry (D0) status. The soil moisture survey in the October 28<sup>th</sup> edition of the Indiana Weather and Crop report rated 15% of topsoils remaining short or very short of moisture, a 6 point improvement from a week earlier. The survey placed subsoils at 28% short or very short of needed moisture, a 4 point improvement.



## October 2013

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	52.7	52.9	-0.2
North Central	52.6	52.2	0.4
Northeast	52.5	51.8	0.7
West Central	54.2	54.1	0.0
Central	54.2	53.5	0.8
East Central	53.9	52.7	1.2
Southwest	56.8	56.7	0.1
South Central	56.1	56.0	0.2
Southeast	55.6	55.2	0.4
<b>State</b>	54.4	54.0	0.4

Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	3.39	2.92	0.47	116
North Central	2.85	2.95	-0.10	97
Northeast	2.62	2.70	-0.08	97
West Central	3.22	2.90	0.32	111
Central	4.34	2.82	1.51	154
East Central	4.16	2.73	1.44	153
Southwest	5.25	3.04	2.21	173
South Central	4.76	3.02	1.74	158
Southeast	4.81	2.98	1.83	161
<b>State</b>	3.97	2.90	1.07	137



## Autumn so far (Sep - Oct)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	59.1	58.6	0.5
North Central	58.6	58.0	0.6
Northeast	58.3	57.6	0.7
West Central	60.8	59.9	0.9
Central	60.6	59.3	1.3
East Central	60.0	58.5	1.6
Southwest	63.2	62.4	0.8
South Central	62.5	61.6	0.9
Southeast	61.9	60.9	1.0
<b>State</b>	60.6	59.7	0.9

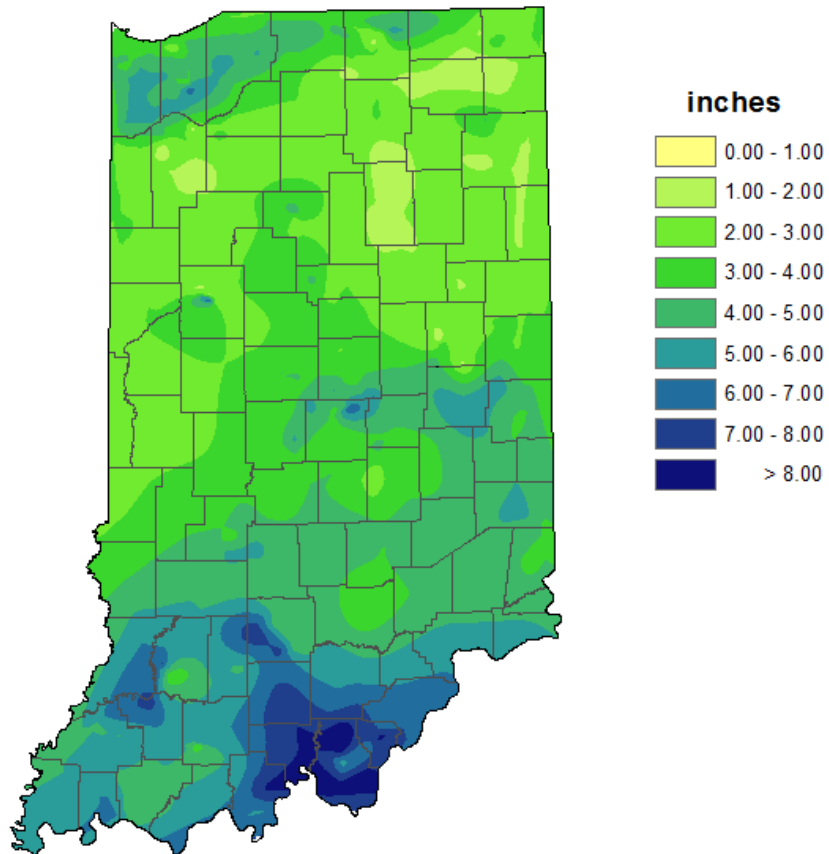
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	6.53	6.13	0.40	106
North Central	5.71	6.25	-0.54	91
Northeast	4.64	5.90	-1.26	79
West Central	5.71	5.93	-0.22	96
Central	7.56	5.81	1.75	130
East Central	7.61	5.52	2.09	138
Southwest	8.21	6.18	2.03	133
South Central	8.14	6.13	2.02	133
Southeast	8.34	5.95	2.38	140
<b>State</b>	6.96	5.99	0.97	116

## 2013 Annual (through October)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	52.9	53.4	-0.5
North Central	52.6	52.9	-0.3
Northeast	52.5	52.5	-0.0
West Central	54.7	55.0	-0.3
Central	54.7	54.5	0.2
East Central	54.2	53.7	0.5
Southwest	57.6	58.1	-0.5
South Central	57.2	57.5	-0.3
Southeast	56.5	56.6	-0.1
<b>State</b>	54.8	55.0	-0.2

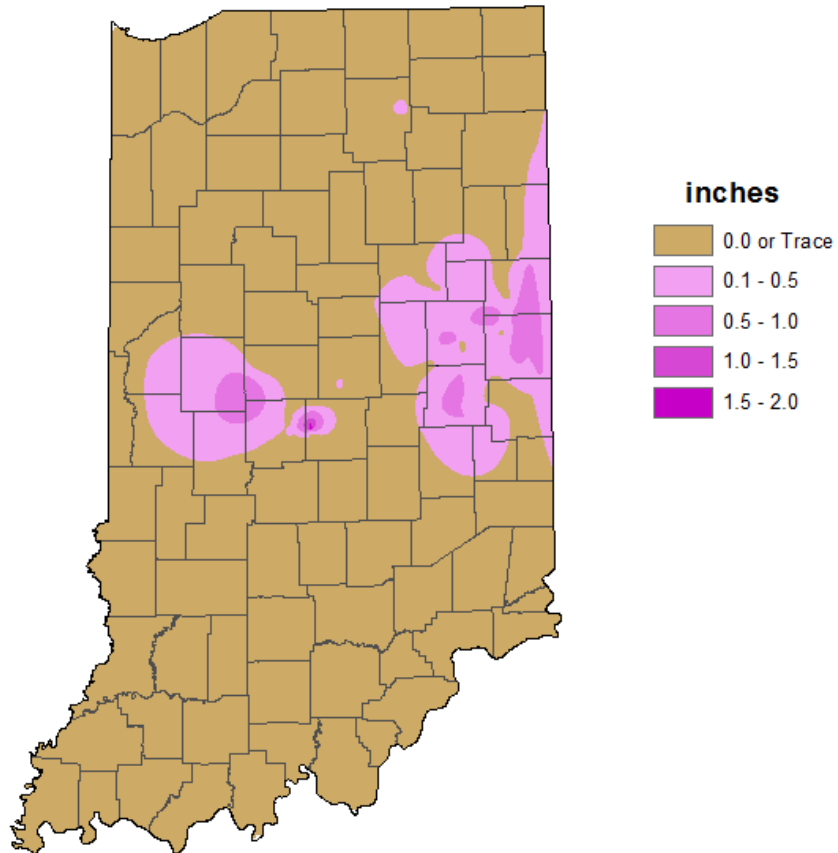
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	35.54	32.20	3.34	110
North Central	36.49	32.25	4.24	113
Northeast	32.87	31.04	1.83	106
West Central	37.88	34.67	3.22	109
Central	36.87	34.12	2.75	108
East Central	34.34	33.00	1.33	104
Southwest	44.30	37.75	6.55	117
South Central	41.75	38.06	3.70	110
Southeast	38.88	37.01	1.87	105
<b>State</b>	37.93	34.53	3.40	110

**Total Precipitation  
October 2013  
CoCoRaHS network  
(458 stations)**



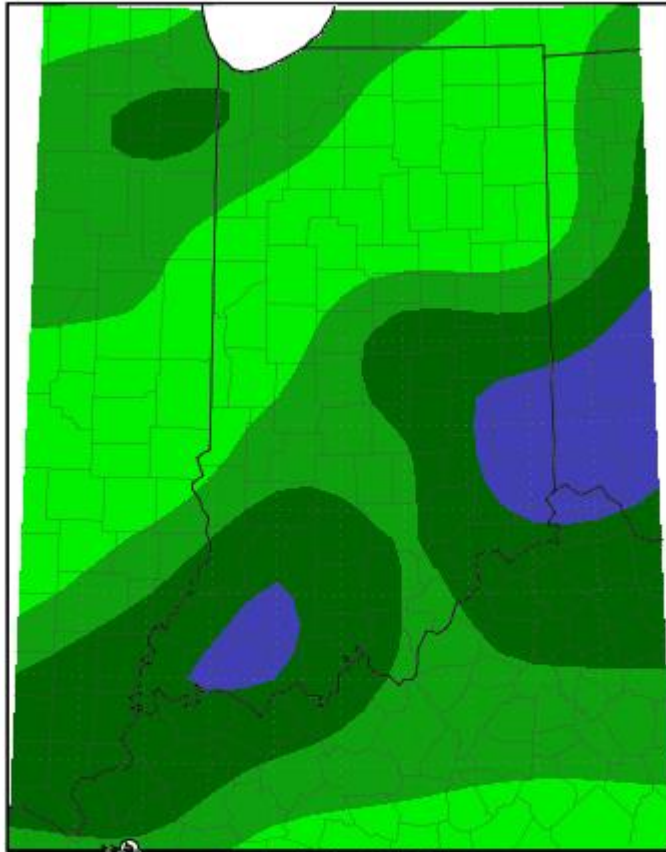
Analysis by Indiana State Climate Office  
Web: <http://www.iclimat.org>

**Total Snowfall  
October 2013  
CoCoRaHS network  
(458 stations)**

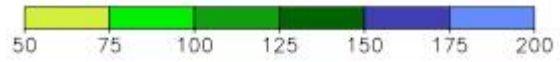


Analysis by Indiana State Climate Office  
Web: <http://www.iclimat.org>

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



Mean period is 1981-2010.



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
Generated at: 11/7/2013 9:28:21 AM CST

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



Mean period is 1981-2010.



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
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## *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:  Traditional (D0-D4, D1-D4, etc.)  Categorical (D0, D1, etc.)

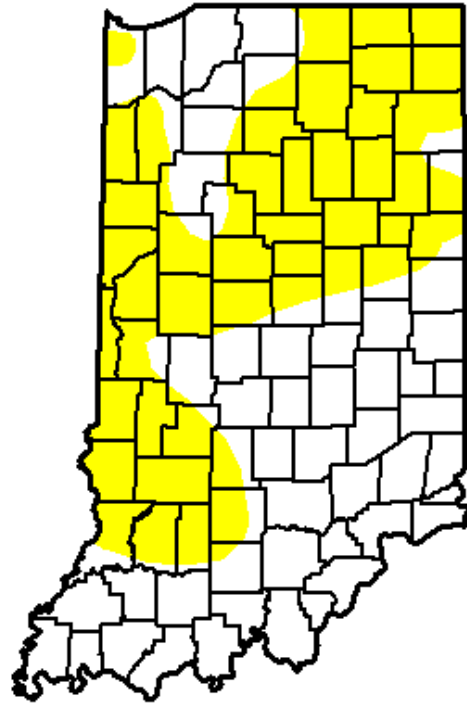
### Percent Area in U.S. Drought Monitor Categories

Week	Nothing	D0	D1	D2	D3	D4
<b>11/5/2013</b>	67.80	32.20	0.00	0.00	0.00	0.00
<b>10/29/2013</b>	53.88	46.12	0.00	0.00	0.00	0.00
<b>10/22/2013</b>	53.88	46.12	0.00	0.00	0.00	0.00
<b>10/15/2013</b>	53.98	46.02	0.00	0.00	0.00	0.00
<b>10/8/2013</b>	53.34	46.66	0.00	0.00	0.00	0.00
<b>10/1/2013</b>	43.89	52.99	3.12	0.00	0.00	0.00

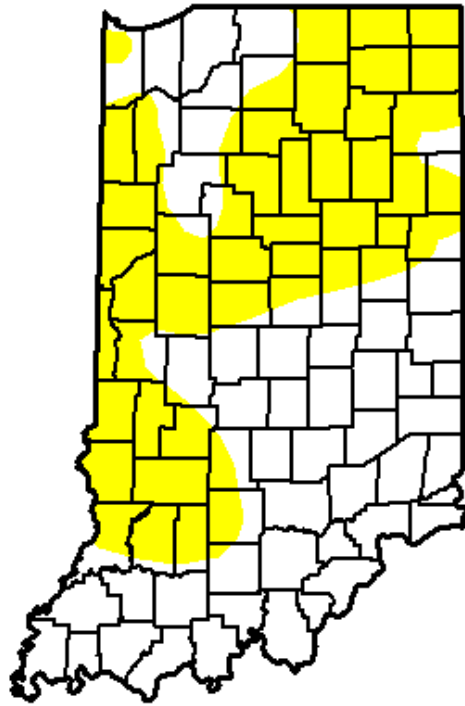




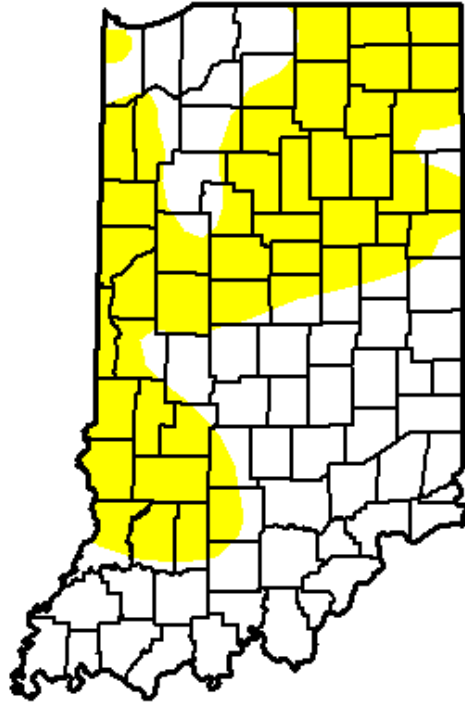
*October 8th Drought Summary*



*October 15<sup>th</sup> Drought Summary*



*October 22<sup>nd</sup> Drought Summary*



*October 29th Drought Summary*

