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and
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Indiana State Climate Office

Monthly Weather Report

May 6, 2013



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

April 2013 Climate Summary

Month Summary

Temperatures bounced high and low this month, keeping Hoosiers guessing which coat to wear each morning. There was no such uncertainty about precipitation. Storms produced large hail, high winds, and repeated drenching rainfall that lifted some Indiana rivers to their highest levels in over 50 years. A few hundred residents evacuated their homes. Two people died in submerged vehicles less than a mile apart within the same swollen creek.

Despite the swings in temperature April tallied only slightly cooler than normal. The state average temperature was 50.9°F, just 0.5°F colder than normal and the 56th coolest April since 1895. The most recent cooler April was in 2007 with a state average temperature of 49.5°F, coming in at the 33rd spot. Before that the 50.5°F average in 2000 landed into 47th place. April 1997 was colder at 46.9°F, good for 10th coldest. The coldest April on record was the 42.2°F reading in 1907. The day split in April 2013 was fairly balanced with 17 days of below normal temperature and 13 days at above normal. The daily state average temperature was 10°F or more above normal on 5 days and at least 10°F below normal on 6 days. The warmest temperature in the state this month was 88°F on April 17th at Boonville. Wanatah captured cold spot honors with 12°F on April 3rd.

This month was the 7th wettest April on record. The state average of 6.45 inches is 2.51 inches above normal. The most recent wetter April was two years ago when the state average was 9.42 inches, the wettest April on record since 1895. Another April with more precipitation than April 2013 was the 6.78 inch amount in 1996. Regionally April 2013 precipitation was close to double the 3.5 inch normal in northern and 3.9 inch normal in central Indiana, and near the 4.4 inch normal in the south. The highest daily cooperative station precipitation this month was 5.05 inches at Lebanon, measured on April 19th. That same day the heaviest CoCoRaHS single day precipitation amount was 5.39 inches at New Ross. Precipitation generally fell on about 18 days this month.

The snow season typically winds up in Indiana by early April. This year the white stuff hung around to April 20th when it snowed in some of our far eastern counties. Richmond measured 0.6 inch that day, which was the most recorded in the state that day and for this month. Perhaps it is now safe to say winter is finally over? A total snowfall map for April is found later in this monthly report.

The soil moisture status in a few northeastern Indiana counties had been rated as abnormally dry by the US Drought Monitor at the start of April. The heavy rainfall this month eliminated this final pocket of soil moisture deficiency leftover from the 2012 drought. Soil moisture in all Indiana

counties is now considered restored to normal status as the new planting season begins. The weekly set of April Indiana Drought Monitor maps can be found at the end of this monthly summary.

Two people died in Hamilton county in separate accidents this month when each drowned while trying to drive across the same flooded creek. The incidents occurred within a mile of one another. During this April 18th – 20th storm many residents were evacuated from their homes. Two other severe weather events occurred earlier this month resulting in large hail, wind damage, and flooded homes and roads. Details on all these storms are found in the weekly narratives which follow below.

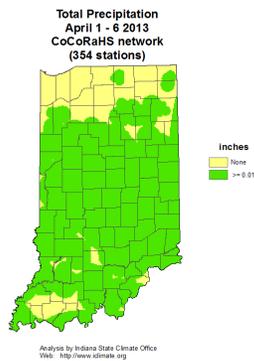
April 1st – 6th

March is now history and hopefully gone also are the snowfalls of Indiana winter. The first days of April continued the cold trend of last month but snowfall was not in the picture. A cold front pushed through Indiana on April 1st ahead of high pressure centered in North Dakota. The state average temperature began at about 8°F below normal. Cold air poured into the state behind the front for two days, dropping temperatures to 12°F below normal. The high center perched overhead Indiana on April 3rd.

A return flow of warm southerly winds commenced as the ridge moved east of the state. Temperatures were now on the rebound towards normal. Indiana temperatures rose from 12°F below normal to just 1°F below normal by April 5th. A weak cold front crossed Indiana that day but dissolved once it reached Tennessee. The front had failed to slow the warm up that was underway. Warming continued with state temperatures reaching 5°F above normal to close out the interval. Overall state temperatures averaged nearly 6°F below normal over the first 6 days of the new month. Normally at the start of April daily maximum temperatures would range between 55°F and 64°F north to south across the state. Daily minimums typically vary from 34°F in far southern counties to 41°F in extreme northern Indiana.

Except for light showers at the very start of the month, it was a dry 6 day interval. Precipitation totaled only a few hundredths inch statewide, less than 5% of normal. The heaviest local daily and interval total precipitation in the state were not heavy at all. These numbers are not worthy of mention.

Again there were no changes in Indiana soil moisture status. According to the April 2nd edition of the US Drought Monitor, less than 3 percent of total Indiana land area was classified as abnormally dry (D0 category). The remainder of the state continues to be rated in normal soil moisture status for this time of year.



April 7th – 13th

Finally it began to feel like spring had arrived in Indiana. Temperatures warmed this week, April showers tallied into heavy rainfall amounts, and there was even a severe weather day!

Temperatures started the week at 10°F above normal. A weak cold front had crossed the state but stalled at the Ohio River. This front reversed direction and retraced its path northward to central Indiana before pausing again as a stationary front. Meanwhile warm air continued to flow into the state. The state average temperature peaked at 19°F above normal on April 9th. An approaching storm system unlatched the stationary front and it resumed northward into Michigan as a warm front on April 10th. State temperatures didn't change much that day, holding at 18°F above normal. But this was a complex powerful storm with dual low pressure centers. The Michigan warm front now reverted to a cold front that would again pull stationary in central Indiana. The state average temperature fell to 7°F above normal by April 11th.

The next day an occluded front moved east through the state. Colder air now had a clear path into Indiana and temperatures plunged further to 8°F below normal, the coldest of the week. As the week ended a high pressure ridge spread into southern Indiana, ending this storm with its severe weather and precipitation. Temperatures remained at 8°F below normal to close out the week. For the week overall the state temperature averaged 7°F above normal. Typically in this second week of April daily maximum temperatures would range from 57°F in the far north to 66°F in extreme southwest Indiana. Normal daily minimums should vary from 37°F to 43°F north to south across the state.

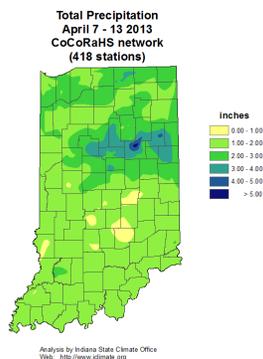
Rain fell every day this week somewhere in Indiana. Before the complex mid-week storm, daily amounts were generally light with up to a half inch reported on April 8th between Vincennes and Brookville, and on the next day in north central areas. The heaviest rainfall of the week started late on April 10th and was reported the next morning. Amounts of 1 to 2 inches fell in the north half of the state while about a half inch was noted in the south. On the last day of the storm on April 12th, up to 0.8 inch fell in the southeast portion of the state, generally south of an Evansville to Richmond line. Lingering light rain fell across northern Indiana the final day as the storm raced to the Atlantic Ocean and fair weather built into our state. On average for the week about 2.1 inches was recorded

in northern Indiana, 1.7 inch in central, and 1.5 inch across the south. These totals equate to about 250% of normal in the north, 180% in central, and 150% of normal in southern counties. The heaviest single day amounts were measured the morning of April 11th. Two CoCoRaHS observers in Marion noted 4.39 and 3.90 inches in their rain gages while two Bluffton volunteers measured 4.02 and 3.45 inches. The highest weekly rainfall totals in Indiana were very close to these one day amounts.

The powerful mid-week storm brought the first severe weather day of the year in Indiana. Storms developed on the afternoon of April 10th. Large hail damage was extensive in central Indiana affecting many homes, businesses, and vehicles. There were also some isolated reports of wind gusts. Flooded highways created problems for drivers in three counties. In west central Indiana hail up to 1.0 inch in diameter was reported in Tippecanoe, Montgomery, and Vigo counties. Hail sizes were larger in central Indiana at 1.0 to 2.0 inches, noted in Hendricks, Marion, Hamilton, Howard, and Miami counties. Roof damage was extensive in Marion county while in Hamilton county hail ripped holes in screen doors. High winds in thunderstorms brought trees down in Clinton county. In Howard county 50 mph wind gusts blew over highway construction barrels. Street flooding caused travel problems in Carroll, Clinton, and Boone counties with some power outages reported. In east central Indiana 1.0 to 2.0 inch hail also fell in Delaware and Randolph counties.

The storms roared through the overnight into early April 11th with more heavy rain, high winds, and hail. A tornado warning was issued in west central and central Indiana as heavy rain, gusty winds, and small hail persisted. No tornadoes were sighted however. The ground became so saturated that a county road collapsed in Tippecanoe county.

Earlier in the week soils in far northeast Indiana were on a drying trend. For the first time since January 8th of this year, the fraction of Indiana in normal soil moisture status dropped slightly, from 97% to 95% of total state area. The April 9th edition of the US Drought Monitor shows that all of Steuben, DeKalb, and Noble counties are now classified as abnormally dry (D0 category). Most of Kosciusko and small portions of Whitley and Elkhart county also joined abnormally dry status. Part of Lagrange county improved and has been removed from this category.



April 14 - 20

The Midwest is often an April battle ground where intense storms churn as cold and warm air masses clash for dominance. This was certainly the case in Indiana again this week as a slow moving system produced very heavy rainfall leading to near record flooding over a large portion of the state.

A warming trend was underway to start the week. Southerly winds on the backside of a high pressure center to the east lifted Indiana temperatures to 1°F above normal. A warm front crossed the state on April 15th and pushed the thermometer another 5°F higher. This narrow warm sector was overrun by a slow moving cold front the next day. The cold front lost momentum and stalled along the Ohio River on April 17th. Despite the frontal passage the state temperature continued to rise to 9°F above normal.

A triplet of low pressure centers now rode from Kansas into Illinois along the frontal boundary, again reversing its direction into a warm front on April 18th. The storm greatly intensified overnight as much colder air filled in behind it. The lagging cold front inched across Indiana on April 19th, allowing the storm ample time to squeeze tons of moisture from the atmosphere. Rainfall was very heavy and near record flooding was the result. State temperatures plummeted to 14°F below normal as the cold air moved in. The strong storm now picked up speed and moved quickly to the Atlantic coast on April 20th. High pressure finally moved into Indiana and shut down the persistent rainfall as the week closed with temperatures at 15°F below normal.

The week had begun mostly dry. The arrival of the initial low pressure center on April 15th generated moderate rainfall of about 0.7 to 1.3 inches. The triplet of low centers a few days later added to the misery, delivering another 2 to 5 inches of rainfall over already saturated ground. Regional total rainfall for the week averaged about 3.5 inches across northern Indiana, 3.8 inches in central, and 2.2 inches in the south. These totals equate to nearly 4 times the normal weekly amount in northern and central Indiana and twice normal in southern counties. Torrential rain fell in localized areas of central Indiana. The heaviest single day amount in the CoCoRaHS network was 5.39 inches reported the morning of April 19th at New Ross in Boone county. That morning two Lebanon volunteers measured 5.05 and 4.63 inches at their locations. Nearby Zionsville noted 4.57 inches while the Andrews observer reported 4.60 inches in Huntington county. Over the entire soggy week the New Ross total was 7.26 inches. Two Greencastle rain gages caught 6.93 and 6.59 inches while Jamestown had 6.83 inches and Zionsville collected 6.61 inches. A state map of the total rainfall this week is found at the end of this narrative. Note the heaviest bands of rain in a southwest to northeast pattern as storm cells rode the frontal boundary while the fronts themselves moved slowly eastward.

As the strong storm left Indiana on April 20th cold air poured into the state. There was enough moisture left in the atmosphere to produce light snowfall along the Ohio state line. Up to an inch of snow fell in extreme northeast Indiana but most other locations received a dusting. A snowfall map for the week can be seen at the end of this weekly narrative.

Indiana rivers responded immediately to the drenching rains with flash flooding. Some major rivers surged above flood stage to levels not seen in over 50 years. The Wabash River at Lafayette peaked at 25.61 feet on the evening of April 20th, the highest level since the 26.28 foot peak in 1958 and well above the flood stage of 11.0 feet. The all-time record there exceeds 33 feet which occurred

during the infamous March 1913 flood. Several roads in the area were expected to be closed for several days.

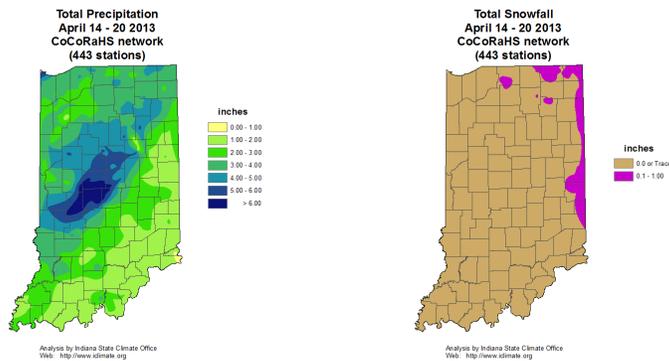
Storm damage was reported over the duration of the 5-day storm. On April 16th large hail was reported primarily in southern Indiana. One inch diameter hail was seen in Gibson, Orange, Floyd, and Jefferson counties. Hail of 1.5 to 1.75 inch was noted in Knox, Johnson, Washington, and Crawford counties. The largest hail at 2.75 inches in diameter was reported in Orange county.

Large hail continued the next day. Hail between 1.0 and 1.5 inch was reported in Crawford, Floyd, Boone, Montgomery, and Shelby counties. Hail diameter reached 1.75 inch in Johnson county and up to 2.0 inches in Brown county.

The second more deadly phase of the storm arrived on April 19th. An Arcadia man drowned in a creek when he ignored high water signs. The car he was driving was swept off a Hamilton county road. Another man repeated this mistake about a quarter mile from the first fatality. He was rescued but later died in a hospital. Seventy Carroll county residents along the Wabash River and Deer Creek in Delphi and Pittsburg evacuated their homes as flooding commenced. A state of emergency was declared in Tipton county where more than 24 people trapped by flooding were rescued by boat. In Montgomery county two people stranded on the roof of their car in a Crawfordsville campground were rescued by boat. In nearby Darlington another boat rescue was launched for a person who tried to drive across a flooded county road but became stranded in high water. In northeast Indiana 60 residents of a mobile home park in Zanesville were evacuated when a local creek overflowed its banks. The ground was so saturated in Tippecanoe county that a West Lafayette woman walking her dog fell 10 feet into a decommissioned covered lift station but was rescued without injury. High winds in Benton county caused loss of electrical power and toppled a grain bin. In Franklin and Hancock county large hail damaged a few homes. Many schools and roads were closed in northern and central Indiana the next day.

Governor Pence surveyed the cities of Kokomo, Tipton, and Elwood to begin the assessment as to whether the flood damage may qualify for federal disaster assistance. In three counties more than 100 residents have been forced to evacuate their homes.

The heavy rains over the past two weeks have wiped out the remaining abnormally dry areas of northeast Indiana. The April 16th edition of the US Drought Monitor indicates that all of Indiana is now in normal soil moisture status, that is, no D-categories remain on the map. This is the first time since 27 March 2012 that no dry areas in Indiana have appeared on the US Drought Monitor map.



April 21st – 30th

Hoosiers just could not catch a break. The heavy rain and flooding wasn't over. Another episode of rising rivers would occur into the final 10 days of this soggy April. But successive storms passing through Indiana these last days each seemed a bit weaker than the previous one.

Temperatures following the April 19th storm were quite cold as the state average temperature started off at near 12°F below normal. High pressure drifted east of Indiana on April 21st and 22nd, allowing a short warming trend. State temperatures managed to reach 2°F below normal by April 23rd. A new cold front moved into Illinois that day but was slowing down as low pressure centers southwest of Indiana were riding up the frontal boundary. The cold front did manage to pass through the state on April 24th, but its slow progress allowed rainfall in excess of 2.5 inches to drench central Indiana again.

A weaker storm quickly passed through the state on April 25th and 26th. Cooler air behind it dropped temperatures to 10°F below normal. The final warm up of the month started slowly, reaching normal by April 28th, then accelerating to end the month at nearly 10°F above normal. A weak warm front had vanished on April 27th. Another small storm over Indiana the next day dissolved on April 29th. Yet another warm front was attempting to reach Indiana the next day. Over the 10 day interval the state temperature averaged 3°F below normal. Typically in late April daily maximum temperatures should range from 64°F in far northern Indiana to 71°F in the extreme southwest. Daily minimums normally vary between 42°F and 48°F north to south.

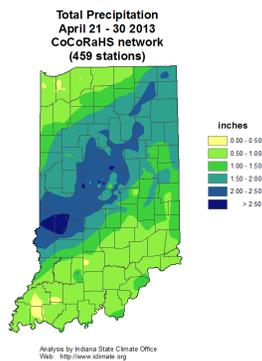
The first storm of the interval was the most significant, dumping more than 2 inches of rain generally northeast across Indiana from Terre Haute to Angola. This is a similar path as taken by the heaviest rain areas of last week. Heavy single day CoCoRaHS rainfall reports on the morning of April 24th included 2.26 inches at Clay City, 2.06 inches in Reelsville, and 1.98 inches at West Terre Haute. The weak storms from April 27th to 29th added a little more rain to the 10 day totals. Regionally about 1.6 inch was noted in northern Indiana, 1.8 inches in central, and 1.1 inch across the south. These totals equate to about 140% of normal in northern counties, 120% of normal in central sections, and 70% of normal across southern Indiana. Some of the heavier local CoCoRaHS

10 day totals came to 2.74 inches in Lebanon, 2.67 inches at Rossville, and 2.57 inches in Reelsville.

Rivers had started receding after crests on April 20th, good news for residents chased out of their homes by surging floods. Indiana rivers fell to moderate flood stage on April 21st, although many local roads bordering rivers remained closed through the next day. Then came the bad news as rivers surged once again on April 24th and roads just open a few days were re-shut. Residents who had just put away their boats used to ferry themselves between their homes and dry ground had to do it all over again.

The soggy conditions and cool temperatures of April are impacting Indiana farmers trying to start spring planting of their crops. As of the end of April the Indiana Agricultural Statistics Service reports that only 1% of acreage to be planted is complete, about two weeks behind the average pace. The cool weather has slowed down pasture growth so that cattle producers have been forced to continue feeding hay to livestock. The excess moisture could be damaging some of the winter wheat acreage.

With the ongoing excess in soil moisture around Indiana, the April 23rd edition of the US Drought Monitor reports no soil moisture shortages anywhere in the state.



April 2013

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	48.1	49.5	-1.3
North Central	47.7	48.9	-1.2
Northeast	46.8	48.5	-1.6
West Central	51.0	51.5	-0.5
Central	50.9	50.9	0.0
East Central	50.6	49.9	0.7
Southwest	54.6	54.9	-0.3
South Central	54.0	54.2	-0.2
Southeast	53.3	53.1	0.1
State	50.9	51.4	-0.5

Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	6.82	3.60	3.21	189
North Central	7.56	3.59	3.97	211
Northeast	6.85	3.47	3.38	197
West Central	8.67	3.88	4.79	224
Central	7.45	3.91	3.54	191
East Central	5.68	3.78	1.90	150
Southwest	4.85	4.45	0.41	109
South Central	4.78	4.42	0.36	108
Southeast	4.26	4.21	0.05	101
State	6.45	3.94	2.51	164

Spring (March - April so far)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	40.2	43.9	-3.8
North Central	39.9	43.3	-3.4
Northeast	39.4	42.8	-3.4
West Central	42.5	46.0	-3.4
Central	42.5	45.4	-2.9
East Central	42.1	44.4	-2.3
Southwest	46.0	49.7	-3.7
South Central	45.6	49.1	-3.5
Southeast	44.8	48.1	-3.3
State	42.6	46.0	-3.3

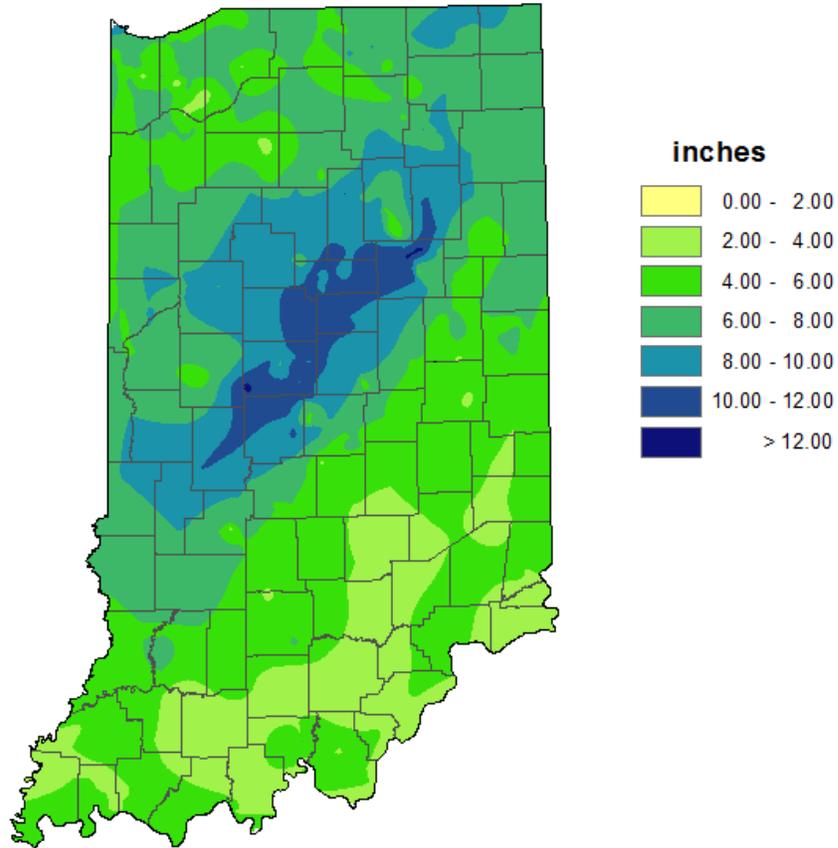
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	8.25	6.52	1.73	126
North Central	9.10	6.37	2.73	143
Northeast	8.29	6.18	2.10	134
West Central	10.39	7.23	3.16	144
Central	9.69	7.19	2.50	135
East Central	8.16	6.85	1.31	119
Southwest	8.61	8.68	-0.06	99
South Central	8.76	8.59	0.17	102
Southeast	7.98	8.16	-0.17	98
State	8.91	7.34	1.57	121

2013 Annual (through April)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	33.5	34.7	-1.2
North Central	33.3	34.4	-1.0
Northeast	33.0	34.0	-1.0
West Central	35.9	36.9	-1.0
Central	35.8	36.5	-0.7
East Central	35.4	35.7	-0.2
Southwest	39.8	41.1	-1.3
South Central	39.5	40.7	-1.2
Southeast	38.7	39.8	-1.1
State	36.2	37.2	-1.0

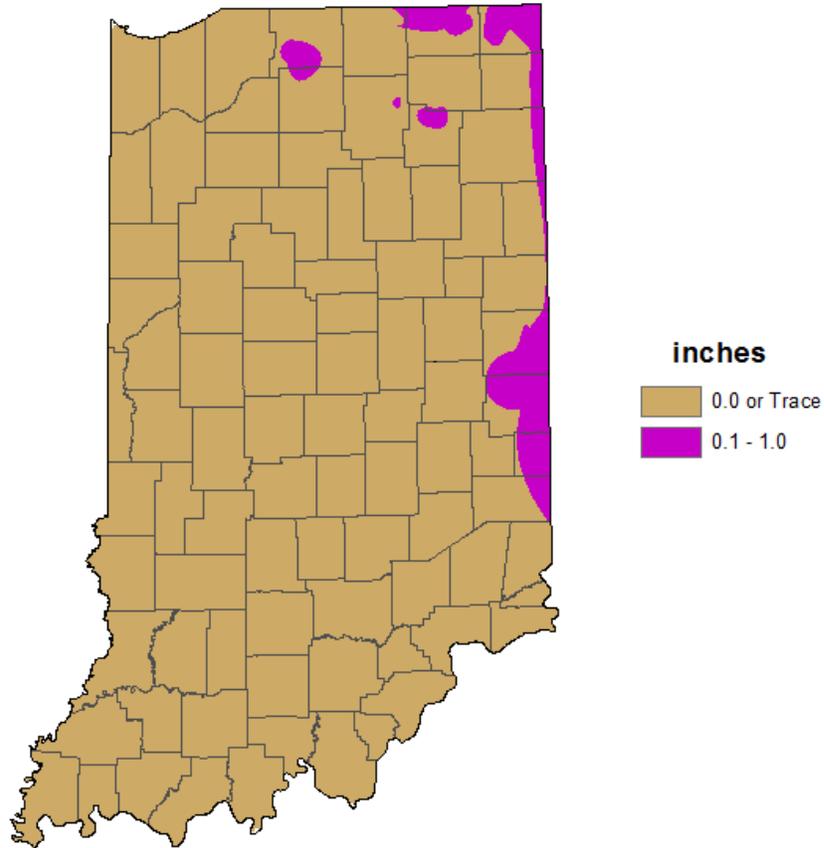
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	13.86	10.08	3.78	138
North Central	15.03	10.21	4.82	147
Northeast	13.79	9.95	3.85	139
West Central	18.07	11.68	6.39	155
Central	17.24	11.80	5.43	146
East Central	14.18	11.29	2.88	126
Southwest	17.60	14.55	3.05	121
South Central	17.01	14.61	2.40	116
Southeast	14.23	13.96	0.27	102
State	15.94	12.05	3.89	132

**Total Precipitation
April 2013
CoCoRaHS network
(469 stations)**



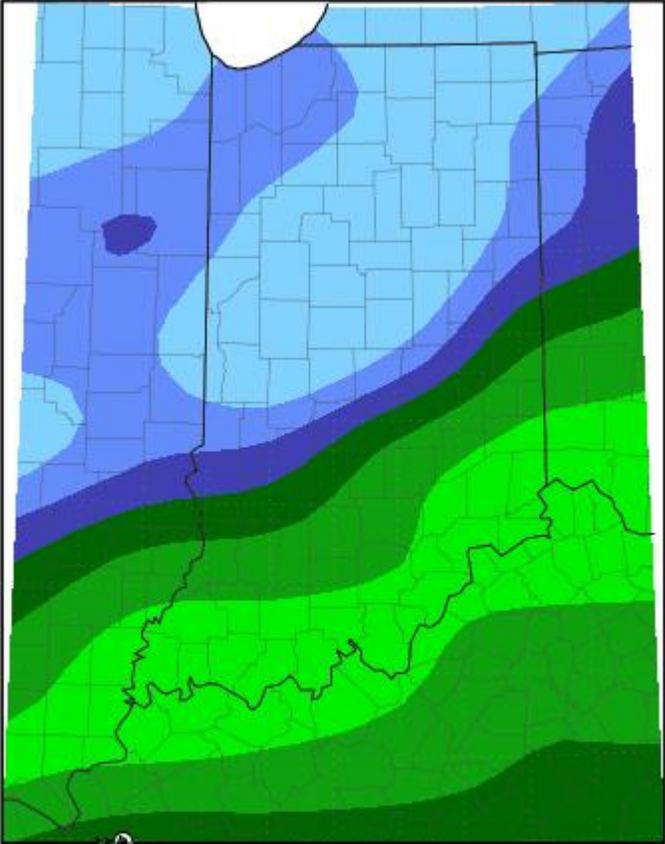
Analysis by Indiana State Climate Office
Web: <http://www.iclimat.org>

**Total Snowfall
April 2013
CoCoRaHS network
(469 stations)**

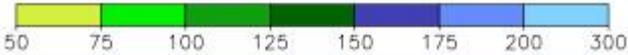


Analysis by Indiana State Climate Office
Web: <http://www.iclimat.org>

Accumulated Precipitation: Percent of Mean
April 1, 2013 to April 30, 2013

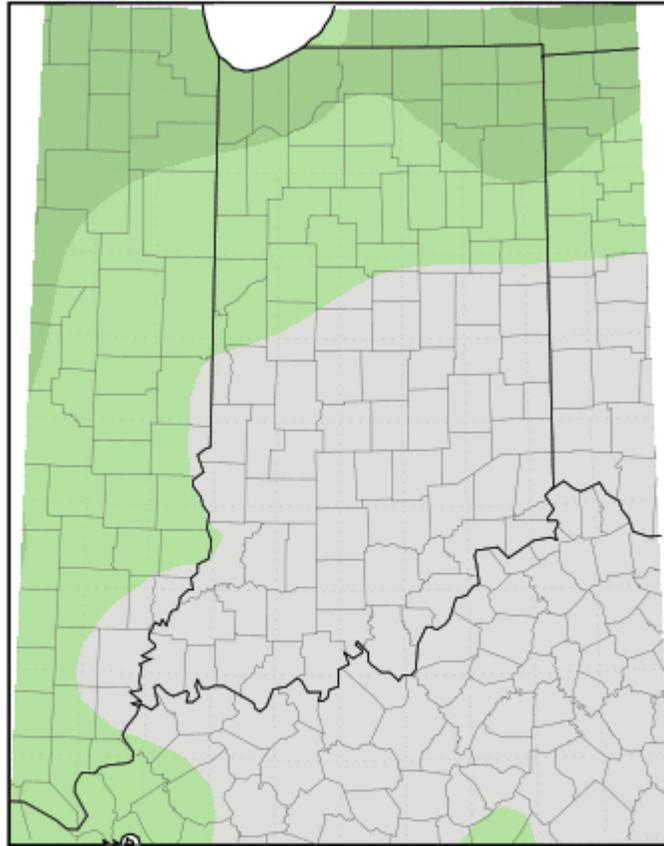


Mean period is 1981-2010.

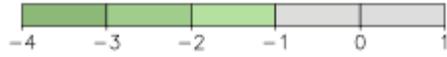


Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at: 5/3/2013 2:56:24 PM CDT

Average Temperature (°F): Departure from Mean
April 1, 2013 to April 30, 2013



Mean period is 1981–2010.



Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at: 5/3/2013 2:57:06 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, April 2nd has 2.7% of Indiana under at *least* D0- D4 status. There were no other drought categories active at this time so there are no calculations to be made. 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
April 30, 2013	100.00	0.00	0.00	0.00	0.00	0.00
April 23, 2013	100.00	0.00	0.00	0.00	0.00	0.00
April 16, 2013	100.00	0.00	0.00	0.00	0.00	0.00
April 9, 2013	94.65	5.35	0.00	0.00	0.00	0.00
April 2, 2013	97.34	2.66	0.00	0.00	0.00	0.00

April 2nd Drought Summary



April 9th Drought Summary



April 16th Drought Summary



April 23rd Drought Summary



April 30th Drought Summary

