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and
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Indiana State Climate Office

Monthly Weather Report

Oct 5, 2012



<http://www.iclimate.org>

September 2012 Climate Summary

Month Summary

Summer slipped away and it felt a lot more like autumn in Indiana this month with cool temperatures and much above normal rainfall. The remnants of Hurricane Isaac didn't live up to the hype at the start of the month, spawning a tornado nobody even noticed and at most delivering about 4.5 inches of rainfall. There were 4 severe weather days in September, all but one of these during the first week. The cool and wet weather trend helped relieve but not eliminate Indiana drought conditions. At the end of the month corn harvest was 8 days ahead of schedule and mandatory burn bans remain in just 3 Indiana counties. The first autumn freeze occurred at a few locations on September 24th.

The state average September temperature was 64.2°F, a cool 1.5°F below normal. This created a 4-way tie with 1937, 1950, and 1994, as the 29th coolest September on record. The most recent cooler September in 2006 had a 62.4°F temperature, ranking in 8th place. Other recent cool Septembers include a 63.5°F temperature in 2001 in 20th place, and 63.4°F in 2003, good for 19th place. The day split for September 2012 shows 18 days of below normal temperature, 2 days at normal, and 10 days with above normal temperature. On one day the state average temperature was at least 10°F below normal. The warmest official temperature in the state was 96°F on September 2nd at Mount Vernon and Poseyville. The lowest daily official September temperature was 28°F recorded on September 24th at Wanatah. The first freezing temperature of the autumn season was noted at 15 of 100 cooperative stations reporting September data so far.

The state precipitation total was 5.38 inches, a surplus of 2.29 inches above normal. This ranks this month as the 12th wettest September on record since 1895. The most recent wetter September was last year with 5.48 inches, falling in at 11th place. Some other recent wetter Septembers were the 6.16 inches of 1993, ranking at 5th, and the 6.21 inches noted in 2003, good for 4th place. Rainfall this month was generally about 90% of normal in northern Indiana and 220% of normal in central and southern Indiana. The highest daily cooperative station rainfall measurement this month was 3.79 inches as recorded on September 8th at Middletown. Among CoCoRaHS reports the heaviest single day rainfall reading was 5.33 inches at Darmstadt on September 18th. Precipitation generally fell on about 17 days around Indiana this month.

Severe weather occurred on four September days. The remnants of Hurricane Isaac spawned a 38-second long EF-0 tornado, captured on a news webcam in downtown Indianapolis on September 1st. Were it not for the webcam the event would have gone unnoticed. High wind damage occurred in far southwest and southeast Indiana on September 5th. Two days later wind damage was far more

extensive and widespread across much of the state. Later in the month on September 21st a west to east band of hail and high wind caused damage across central Indiana. Details on all the severe weather events follow in the weekly narratives.

September 1st – 8th

Two significant storms impacted Indiana this week: the remnants of Hurricane Isaac and a strong cold front a few days later. The remnants of Isaac moved so slowly northward from Louisiana, finally reaching Missouri as September arrived. Warm temperatures and the transport of tropical humidity into Indiana were quite noticeable this week. Rain fell every day in our state and temperatures held above normal until the last day.

The week opened with temperatures 4°F above normal, peaking at 9°F above normal by September 4th. Then the remnants of Isaac moved east of Indiana and temperatures slipped lower each day, to 4°F above normal on September 7th, just before a strong cold front moved through. The week closed at 4°F below normal in a cooler, more pleasant air mass. Overall this week temperatures averaged 4°F above normal. Typically this first week of September daily maximum temperatures would be expected to range from 78°F in far northern Indiana to 85°F in the far southwest. Normal daily minimums range between 58°F and 61°F north to south across the state.

Light to moderate rain fell every day this week as fronts lingered in the state all week long. The heaviest rain coincided with the arrival of the two significant storms. Initial forecasts were for 6 to 9 inches of rain in Indiana from the remnants of Isaac. But very dry air over northern drought states infiltrated the core of Isaac as it moved slowly due north, drying out the storm from its inside out. The storm weakened as it sprawled over an ever larger area, unable to concentrate huge amounts of rain. In Indiana rainfall totals from Isaac ranged from just a half inch in northeast Indiana to a maximum of 4.5 inches in far southwest counties over 3 days. The storm had crossed Indiana as a typical warm and cold front pair, with the warm front moving through the state on September 3rd and the cold front the next day.

The tail end of the Isaac cold front stalled over Indiana on September 5th. A new cold front behind it pushed the initial front east of the state but itself then stalled over Indiana on September 7th. The air mass behind this complex of fronts was much drier and cooler and clashed with the warm humid air over Indiana, generating strong thunderstorms with heavy rainfall, commonly 2 to 4 inches. Yet another cold front reached Indiana on September 8th, finally sweeping the unsettled weather out of the state and starting a spell of autumn-like cooler and drier weather.

For the week rainfall totals averaged about 1.9 inch in northern Indiana and near 4.1 inches in central and southern regions. These totals equate to two and a half times the normal in northern Indiana and a whopping 6 times normal in central and southern parts of the state! The heaviest single day CoCoRaHS rainfall reports were received the morning of September 8th: 4.32 inches at Eaton, 3.95 inches at Winchester, 3.85 inches in Frankfort, and 3.82 inches at Plainfield. Weekly rainfall totals were impressive. The CoCoRaHS observer at Shoals measured 7.65 inches while the Noblesville gauge collected 6.64 inches. The volunteer in Eaton recorded 6.42 inches. The rainfall sum at Morristown was 6.15 inches and 6.06 inches was noted at Winchester.

The near absence of severe weather reports in Indiana the first days of September reflects just how weakened Isaac had become. On September 1st a downtown Indianapolis television webcam

tracked a spin-up tornado as it briefly touched down. The lifetime of the tornado was 38 seconds. No other severe weather reports were noted during the stay of Isaac remnants in Indiana. Later in the week, however, there was a lot more severe weather activity. On September 5th high wind damage was observed in far southwest and southeast Indiana. In Gibson county trees fell on a car, a home, and took down power poles. A tree fell on a garage in Pike county. In southeast Indiana 60 mph winds snapped trees in Harrison, Floyd, and Clark counties, falling onto roads and power lines.

Wind damage was far more extensive on September 7th. Many reports of trees ripping down power lines and falling across roads were noted in Fulton, Cass, Miami, Howard, Grant, Madison, Blackford, Wells, and Adams counties. Telephone poles were snapped by high winds in Fulton county. Winds over 60 mph tore off a barn roof in Hendricks county while trees crushed cars and fell on roads and power lines in Wayne county. Fallen trees closed roads in Switzerland and Orange counties. Wind gusts brought down still more trees in Franklin, Jennings, Washington, Clark, and Floyd counties. In southwest Indiana high winds tore roofs off 3 houses and trees tangled with power lines in Posey county. In Vanderburgh county 70 mph winds blew a barn into a road. Lightning struck trees which fell and snagged power lines, causing many power outages. Gusts in Warrick county tore a roof off a carwash. Other reports noted falling trees took out power in Spencer, Pike, and Gibson counties. While there were numerous reports of wind damage this day, there was a lone report of large hail, at 1.0 inch diameter, in Madison county.

Given the heavy rainfall amounts there are big changes for Indiana on the US Drought Monitor map this week. The September 4th edition shows all extreme (D3 category) and exceptional (D4 category) drought areas in the state have reverted to the lesser severe drought classification (D2 category). The net result of this change is the southern half of the state is almost entirely within the severe drought category. The northern boundary of severe drought has generally shifted about one county south since a week ago, now located just north of central Indiana. The remaining northern region of Indiana is rated in moderate (D1 category) drought. On an area percentage basis this leaves about 55% of Indiana in severe drought (D2 category), 33% in moderate drought (D1 category), and 12% of the state rated as abnormally dry (D0 category). Weekly Indiana Drought Monitor maps are attached near the end of this monthly summary.

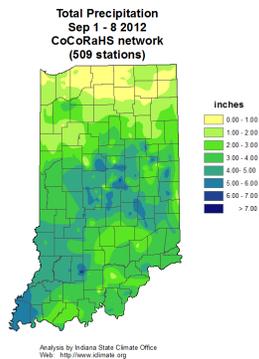
Progress toward drought recovery is reflected in the September 9th edition of the Indiana Weekly Weather and Crop bulletin. The soil moisture survey finds 48% of Indiana topsoils rated as short or very short of moisture while 76% of subsoils are in these classes. The report notes that while improving, the drought is not over. Even though water content of topsoils is obviously increasing, water is not yet running through field tiles. The report states that frequent rainfall this week has slowed the drying of cut hay although this third cutting is almost finished. Pastures are improving due to the recent rains and are rated at 13% good to excellent condition. The end of hot and dry weather continues to benefit livestock which are in mostly good condition. About 47% of the state corn crop is mature and 9% has been harvested. Soybeans are rapidly changing color, are rated in 24% good to excellent condition, and 1% of the crop has been harvested.

As the rains continue this month more counties are lifting burn bans. The list of counties which have lifted their mandatory burn bans this week and the effective dates are:

September 1 – Jefferson

September 4 – Clay, Gibson, Monroe, Owen, Ripley

September 5 – Dearborn, Orange
September 6 – Scott
September 8 – Switzerland



September 9th – 15th

This second week of September weather conditions were quite the opposite of a week ago. Gone are the mostly above normal temperatures and every day rain carried in by two major storms, the first the remnants of Hurricane Isaac. In its place was a week of cool temperatures with mostly light rainfall on just a few days. Also noticeably missing was severe weather. There were no severe weather days this week.

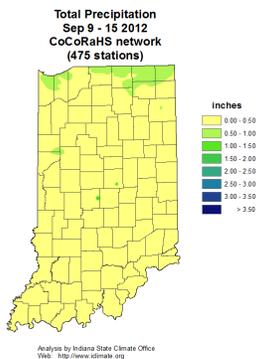
A cold front moved through Indiana on September 9th. Temperatures began the week very cool with the daily state average temperature at 6°F below normal. A high pressure center passed overhead the next day, then slid to the east on September 11th. The sunny skies and southerly winds caused daily temperatures to climb steadily over the next 4 days, peaking at 1°F above normal by September 13th. A second cold front inched southward across Indiana the next day, then slowed to a stop near the Ohio River. A helpful push from another high pressure system in Canada re-energized the stagnant front to move it on to the southeastern states. Cooler weather returned as temperatures fell a few degrees to 3°F below normal, where it remained to the end of the week. Overall this week daily state temperatures averaged about 3°F below normal. Typical for this time of year is daily maximum temperatures ranging from 76°F to 83°F north to south across the state. Daily minimums normally vary between 55°F in northern Indiana to 58°F in far southwest counties.

The two cold fronts produced the only rainfall this week. Generally in northern Indiana about 0.3 inch total rainfall was noted while central Indiana recorded near 0.1 inch. Just sprinkles fell in the south. These totals represent just a third of normal rainfall across northern Indiana, a scant 15% of normal in central sections, and less than 5% of normal in southern counties. But as is typical in summer months some local thunderstorms dumped much heavier amounts. On the morning of September 9th the CoCoRaHS observer in Avon measured 3.52 inches, the highest single day report around the state. The Fishers rain gage collected 2.51 inches while the La Fontaine volunteer recorded 1.15 inch for that date. The Avon location received a total of 3.64 inches for the full week.

The September 11th edition of the US Drought Monitor showed some improvement in Indiana drought conditions due to the rain received so far this month. About 28% of Indiana land area was reclassified this week from severe drought (D2 category) into moderate drought status (D1 category), primarily in central Indiana. Southern Indiana generally south of a Vincennes to Liberty line accounts for 27% of Indiana area which remains in severe drought status. Nine counties in the northwest corner of Indiana continue to be rated abnormally dry (D0 category), about 12% of total Indiana area. The remaining 61% of state area is in moderate drought status (D1 category). Weekly Indiana drought maps are found at the end of this monthly report.

The Indiana Weekly Weather and Crop bulletin of September 16th tells a similar story of improvement. About 17% of Indiana corn has been harvested while corn remaining in the fields is rated in 11% good to excellent condition. There is high variability in corn yields even within same fields due to the summer drought. Soybean harvest is slow to start but most fields are now mature. Remaining soybean fields are rated in 28% good to excellent condition. Pastures are rated in 15% good to excellent condition with the final cutting of hay considered the best of the season by many farmers. Livestock are holding on in mostly good condition according to the bulletin. The weekly soil moisture survey says topsoils stand at 47% short or very short of moisture. Subsoils are rated at 70% in these same categories.

Very few Indiana counties still have burn bans in effect. This week Floyd county lifted its mandatory county burn ban effective September 15th, leaving only 3 counties with burn bans still in force.



September 16th – 22nd

The chilly weather continued with below normal temperatures every day this week. A low pressure trough in the upper atmosphere above Canada greatly intensified as the week progressed, supporting a persistent flow of cold air into Indiana.

At ground level a high pressure system was east of Indiana on September 16th, trying to coax warmer air our way from southern states. Yet state average temperatures only peaked at about 2°F below normal to start the week, the warmest day of the seven. A cold front was advancing toward Indiana, suppressing temperatures gradually at first, then rapidly to 11°F below normal as the cold

front passed through on September 18th. A high pressure ridge behind the front moved quickly overhead Indiana the next day, then east to the Atlantic coast by September 20th. As it departed temperatures rebounded to 4°F below normal. On September 21st the second cold front of the week entered the state but slowed to a stop across central Indiana. This storm spawned hail and high wind damage, spread west to east across central Indiana. The next day a new cold front to the northwest nudged the stationary front, enough to resume its movement southward again. Temperatures fell a few degrees to close the week at 6°F below normal. Overall for the week daily state temperatures averaged about 5°F below normal. Usually daily maximum temperatures vary from 73°F to 80°F north to south across Indiana this third week of September. Daily minimums normally range from 53°F in far northern Indiana to 56°F in the southwest corner of the state.

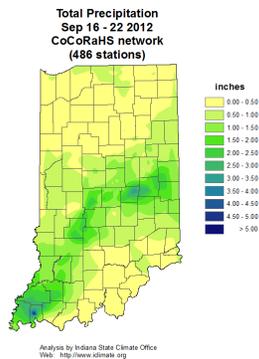
Moderate rain fell when each of the two cold fronts moved through Indiana this week. Light rain was seen off and on during the remaining days. The heaviest single day rainfall was measured by CoCoRaHS volunteers on the morning of September 18th. In Vanderburgh county two Darmstadt gages collected 5.33 and 3.10 inches, while Evansville recorded 3.67 inches, Melody Hill 4.65 inches, and Elberfeld 3.24 inches. The heaviest weekly total rainfall included 5.45 inches in Darmstadt, 3.75 inches in Evansville, and 2.83 inches in New Castle. Regionally this week about 0.50 inch of total rainfall was observed in northern Indiana, 1.3 inch in central areas, and 0.6 inch across the south. These totals equate to about 70% of normal rainfall in northern Indiana, near 90% in southern, but double normal in the central third of the state.

Severe weather broke out across central Indiana on September 21st when the second cold front stalled and became a stationary front. A west to east zone of wind and hail damage was reported in central counties that day. In Fountain county high winds tore off a barn roof and brought down power lines. Downed and uprooted trees were reported in Boone, Putnam, Hendricks, and Wayne counties. Wind gusts reached 60 mph in Hendricks county where shingles and siding were ripped off a house. Utility poles were blown down in Montgomery and Wayne counties. One inch hail was reported in Putnam and Hancock county. Larger hail up to 1.75 inch was observed in Hendricks, Marion, Hancock, and Rush counties. Hail broke home windows in Montgomery county. In Marion county power outages impacted more than 10,000 customers.

Rainfall this week was little help in reduction of existing state drought conditions. The September 18th edition of the US Drought Monitor shows only a minor change in Indiana drought ratings. Small parts of 4 counties in southwest Indiana, just northeast of Evansville, improved from severe drought status (D2 category) into the moderate drought class (D1 category). All other areas remained the same. Nearly two-thirds of the state is now in moderate drought status while the one quarter of Indiana generally south of a Vincennes to Liberty line remains in severe drought condition. Extreme northwest counties are considered abnormally dry (D0 category), not in drought. Weekly maps of Indiana drought status are available at the end of this monthly report.

The September 23rd edition of the Indiana Weather and Crop bulletin states rain this week has slowed some harvest progress as crops are drying more slowly in the field. The report says Indiana corn is now 82% mature with 26% harvested. Corn in the field is rated 11% in good to excellent condition. Soybean harvest is 10% complete with 27% of field crop in good to excellent condition. Livestock continue in mostly good condition with pastures rated at 18% in good to excellent condition. The weekly soil moisture survey counts 42% of topsoil as short or very short of moisture while subsoil is at 68% in these same categories. Improvement in soil moisture has slowed in recent weeks.

Outside burn bans continue in only 3 southern Indiana counties: Clark, Crawford, and Martin. With so few burn bans remaining no burn bans were lifted in Indiana this week.



September 23rd – 30th

The cool trend this second half of September continues. Only two of these last 8 days of the month featured temperatures above normal.

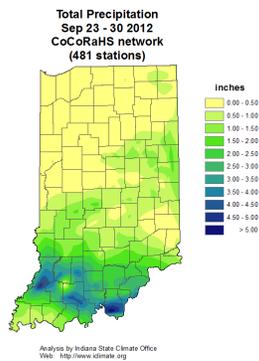
The week opened with strong high pressure centered over Indiana, resulting in mostly dry weather and temperatures around 8°F below normal. The high pressure center drifted east the next day, allowing southerly winds behind it to lift Indiana temperatures. Two warm fronts, one to the north of the state and one to the south, teamed up to quicken the warm up to 2°F above, then 3°F above normal by September 26th, the warmest of the 8 days. A sluggish cold front moved into Indiana the next day, stalled briefly, then reached the Ohio River on September 28th. Unlike this front, a second cold front right behind it raced southward from Minnesota to Alabama in just a single day. Yet another cold front, the third to cross Indiana in just 4 days, reinforced cool temperatures in the state. The thermometer had slid again behind this relentless cool push, ending the month at 4°F below normal. Given the strong warm up the first half of the week versus the sudden cool down in the second half, temperatures over the 8 days averaged to 3°F below normal. Normally in late September daily maximum temperatures range from 70°F in far northern Indiana to 77°F in the extreme southwest. Typical daily minimums vary from 49°F to 52°F north to south across the state.

With the many fronts in the area rainfall was measured somewhere in the state on 7 of the 8 days. But the two more significant rainfall days came with the warm air surge early in the week and accounted for much of the 8 day total precipitation. Regionally for the week only about 0.2 inch of rain fell across northern and 0.7 inch in central Indiana. But in southern counties the average was 2.0 inches! On a percentage basis this translates to 25% of normal in northern Indiana, about 90% of normal in central, and around 220% of normal in the south. The much heavier rain in southern Indiana is evidenced by single day rainfall amounts reported on the morning of September 26th by CoCoRaHS volunteers. On that morning two Huntingburg observers each noted 3.70 inches, while a third measured 3.40 inches in that city. The Hazleton gage collected 3.53 inches while Patoka had 3.50 inches that day. The heaviest totals over the entire 8 days included 5.45 inches at Mauckport, 4.97 inches in Hazleton, 4.35 inches at Elizabeth, and 4.19 inches in Birdseye.

Soil moisture conditions have improved dramatically in southwest and south central Indiana due to the heavy rains according to the October 2nd edition of the US Drought Monitor. The area of Indiana generally south of a Vincennes to Salem line but north of a New Harmony to Wyandotte line jumped from severe drought status (D2 category) a week ago to the no-drought classification of abnormally dry (D0 category). The southern portion of Indiana counties in the Evansville area retained their severe (D2 category) designation this week as did most of southeast Indiana. The drought status of northern and central Indiana is unchanged over the past two weeks. The Indiana weekly drought maps for September are found at the end of this monthly summary.

The September 30th edition of the Indiana Weekly Weather and Crop bulletin reports that corn and soybean harvest advanced rapidly this past week. Corn harvest is 8 days ahead of schedule while soybeans are only 2 days behind an average harvest year. Corn still in the field is rated in 11% good to excellent condition while soybeans are at 29% in these categories. Livestock continues in mostly good condition with pastures now rated in 24% good to excellent condition, showing good improvement from the height of the drought in early August. The latest cutting of hay has helped supplies but there will still be some farms with a feed shortage going into winter. The report puts Indiana topsoil at 30% short or very short of moisture while 60% of subsoil is rated in these categories. With the topsoil moisture gains wheat planting is now underway.

There is no change in county burn ban status. Three counties: Clark, Crawford, and Martin are continuing their mandatory outdoor burn bans as the calendar turns to October.



September 2012

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	62.8	64.6	-1.7
North Central	62.6	63.9	-1.3
Northeast	62.2	63.5	-1.3
West Central	63.7	65.9	-2.1
Central	63.6	65.3	-1.7
East Central	63.4	64.5	-1.1
Southwest	67.0	68.2	-1.3
South Central	66.5	67.5	-1.1
Southeast	65.4	66.9	-1.4
State	64.2	65.7	-1.5

Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	2.75	3.21	-0.46	86
North Central	2.88	3.30	-0.42	87
Northeast	2.92	3.19	-0.28	91
West Central	5.78	3.03	2.75	191
Central	6.40	2.99	3.42	214
East Central	6.36	2.79	3.57	228
Southwest	7.75	3.13	4.61	247
South Central	6.83	3.11	3.72	220
Southeast	5.69	2.97	2.72	191
State	5.38	3.09	2.29	174

Autumn so far (same as September)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	62.8	64.6	-1.7
North Central	62.6	63.9	-1.3
Northeast	62.2	63.5	-1.3
West Central	63.7	65.9	-2.1
Central	63.6	65.3	-1.7
East Central	63.4	64.5	-1.1
Southwest	67.0	68.2	-1.3
South Central	66.5	67.5	-1.1
Southeast	65.4	66.9	-1.4
State	64.2	65.7	-1.5

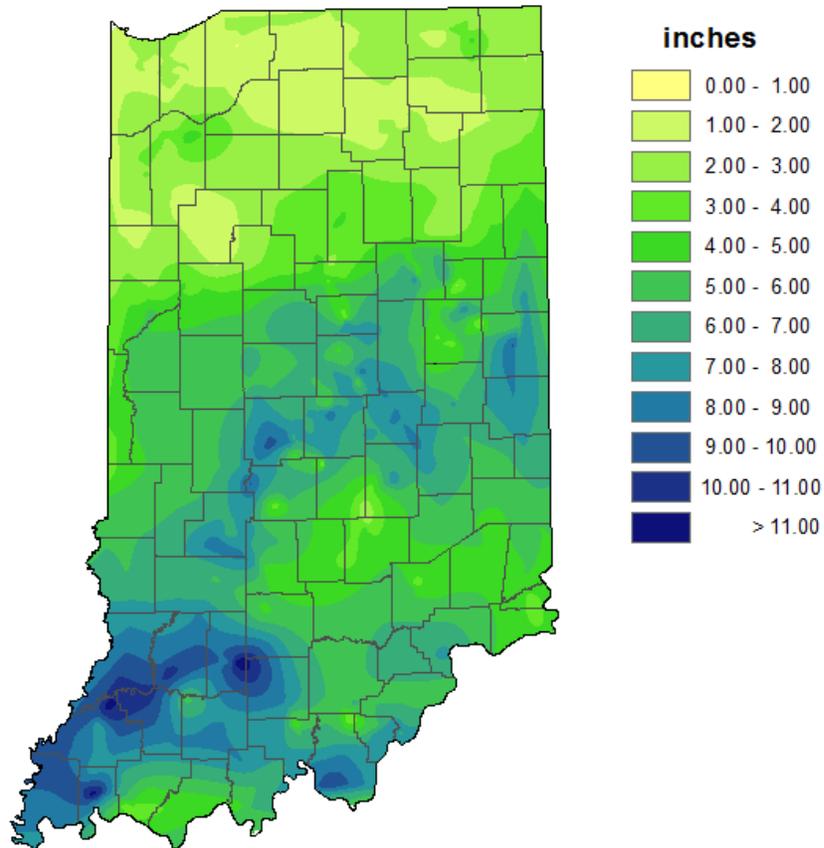
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Southeast	5.69	2.97	2.72	191
State	5.38	3.09	2.29	174

2012 Annual (through September)

Region	Temperature	Temperature	
		Normal	Deviation
Northwest	57.1	53.4	3.8
North Central	56.8	52.9	3.9
Northeast	56.6	52.5	4.0
West Central	59.1	55.0	4.0
Central	58.7	54.6	4.2
East Central	58.0	53.7	4.3
Southwest	62.4	58.2	4.2
South Central	61.5	57.6	3.9
Southeast	60.3	56.7	3.6
State	59.0	55.0	4.0

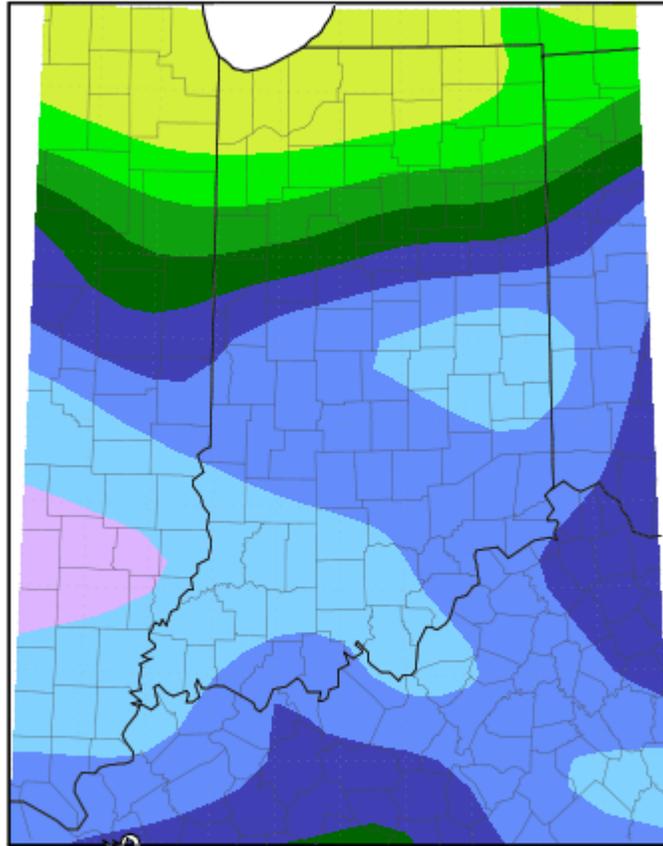
Region	Precipitation	Precipitation		
		Normal	Deviation	Percent of Normal
Northwest	23.60	29.31	-5.71	81
North Central	23.48	29.32	-5.84	80
Northeast	22.21	28.35	-6.14	78
West Central	25.03	31.78	-6.75	79
Central	28.33	31.30	-2.97	91
East Central	27.23	30.28	-3.04	90
Southwest	27.31	34.72	-7.41	79
South Central	30.26	35.04	-4.78	86
Southeast	29.73	34.03	-4.30	87
State	26.38	31.64	-5.26	83

**Total Precipitation
September 2012
CoCoRaHS network
(507 stations)**



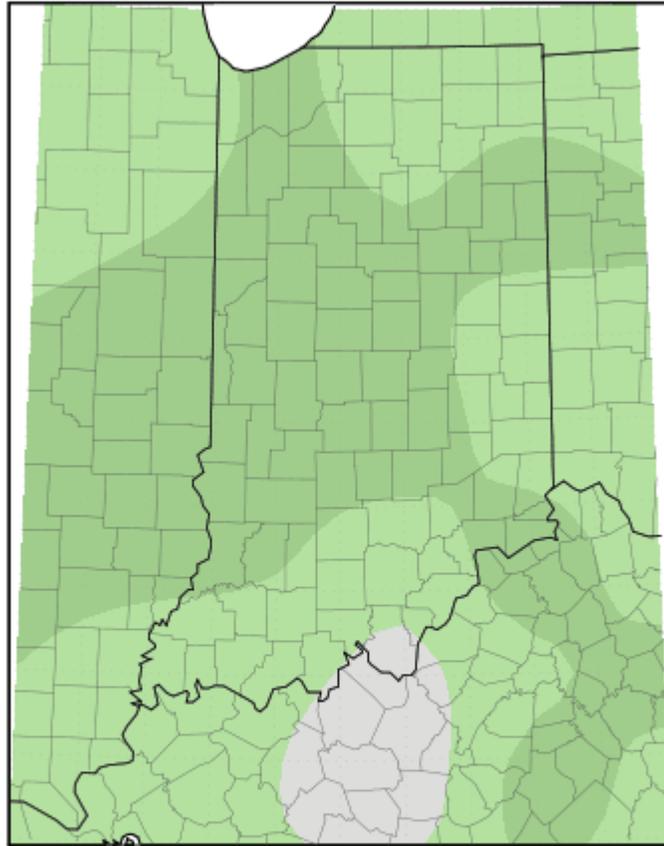
Analysis by Indiana State Climate Office
Web: <http://www.iclimate.org>

Accumulated Precipitation: Percent of Mean
September 1, 2012 to September 30, 2012

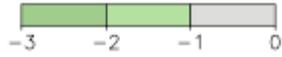


Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Average Temperature (°F): Departure from Mean
September 1, 2012 to September 30, 2012



Mean period is 1981–2010.



Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

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, September 4th has 54.7% of Indiana under at *least* D2- D4 drought status, 88.4% under at *least* D1-D4 status, and 100.0% under D0-D4. Subtracting the D2-D4 category (54.7%) from the D1-D4 category (88.4%), tells us that 33.7% of Indiana is in the D1 category alone (moderate drought). Please note, however, that these areas are not exact, and much of this drought map has been created from reports throughout the state and in estimation, so use this information as a general view rather than for specifics.

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 25, 2012	0.00	100.00	87.81	25.47	0.00	0.00
September 18, 2012	0.00	100.00	88.38	25.61	0.00	0.00
September 11, 2012	0.00	100.00	88.32	26.83	0.00	0.00
September 4, 2012	0.00	100.00	88.38	54.67	0.00	0.00

September 18th Drought Summary

