



MONTHLY WATER INVENTORY REPORT FOR OHIO

August 2016

Compiled By Scott C. Kirk

Hydrologist, Water Inventory Unit

<http://water.ohiodnr.gov/water-use-planning/water-inventory-levels>

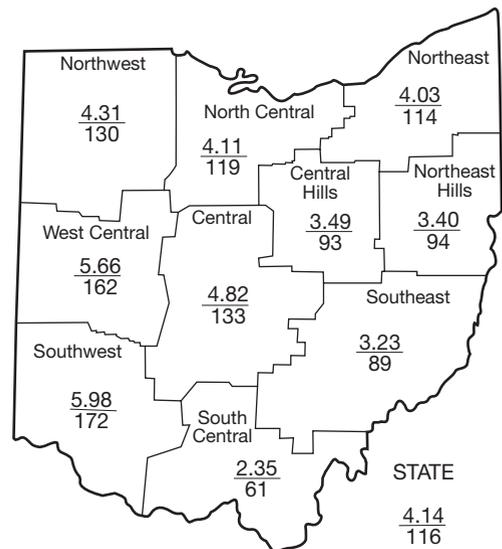
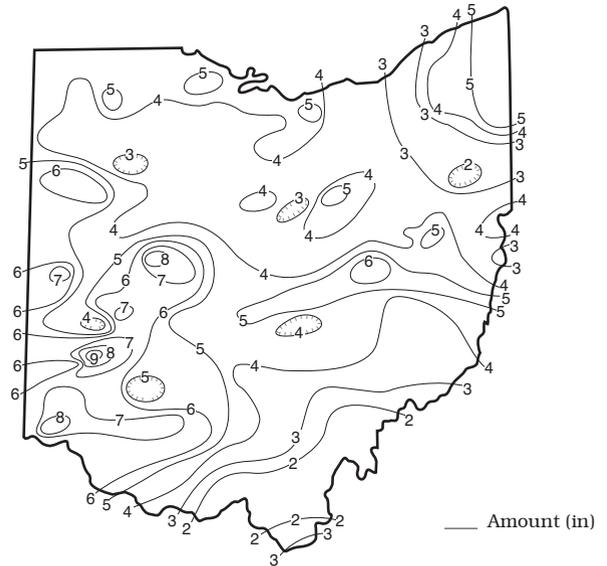
PRECIPITATION during August varied greatly across the state but was generally above normal in most of northern and western Ohio and below normal in much of the eastern and south-central areas of the state. The state average was 4.14 inches, 0.56 inch above normal. Regional averages ranged from 5.98 inches, 2.50 inches above normal, for the Southwest Region to 2.35 inches, 1.49 inches below normal, for the South Central Region. This was the fourth wettest August during the past 122 years for the Southwest Region and the sixth wettest for the West Central Region. Conversely, this was the seventeenth driest August for the South Central Region. Miamisburg (Montgomery County) reported the greatest amount of August precipitation, 9.11 inches. Salem Center (Meigs County) reported the least amount, 1.04 inches.

Precipitation during August fell in a typical summer pattern of scattered showers and thunderstorms with some storms producing heavy rains. Some of the storms were also severe with several tornadoes being reported during the month (see Notes and Comments on the last page of this report). Distribution of precipitation during the month varied greatly across the state with the greatest amounts occurring in west-central and southwestern Ohio, and the least amount occurring in south-central and southeastern areas of the state.

There were a few widely scattered showers around the state during the first few days of the month, but most areas of Ohio received little or no rain during the first eight days of August. Starting on August 9 and continuing for the next nine days, a series of showers and thunderstorms moved across the state. Much of the state received around 2.5 inches during this period with locally greater amounts reported, especially in parts of west-central and southwestern Ohio. An exception was in areas of southeastern Ohio where about 1 inch was reported. For much of southeastern and south-central Ohio, the remainder of the month was rather dry with some locations reporting less than 0.25 inch of rain for the last two weeks of August. Showers and thunderstorms brought additional heavy rain to southwestern Ohio on August 20 and to areas in northwestern, west-central and central Ohio on August 24. Some of these storms were severe and spawned several tornadoes causing damage in several counties. Scattered showers and storms were most numerous across southwestern Ohio on August 28 with some of these storms producing extremely heavy rain. Amounts of 2-3 inches were reported in a short period of time with radar estimates of as much as 5 inches across parts of Hamilton County. Some urban flooding was reported in Hamilton County following these storms. Showers and thunderstorms on the last day of August were widely scattered, but a few contained heavy rains, especially in areas of northeastern Ohio.

(continued on back)

PRECIPITATION AUGUST



Average (in)
Percent of normal

PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.) Base period 1961-2010					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	+1.00	-1.23	-0.27	-2.39	+4.97	-1.4
North Central	+0.67	-2.37	-0.87	-1.13	+0.20	-2.4
Northeast	+0.48	-1.71	-1.39	-1.20	-0.45	-3.8
West Central	+2.17	-1.43	-2.64	-2.14	+0.39	-2.7
Central	+1.20	+0.15	+0.22	+0.48	-1.06	-3.1
Central Hills	-0.28	-3.55	-2.97	-2.15	-5.40	-3.9
Northeast Hills	-0.22	-3.31	-3.22	-3.68	-6.10	-5.0
Southwest	+2.50	+1.34	+0.29	+1.26	+4.06	-1.2
South Central	-1.49	+1.06	-0.38	+1.35	+4.14	-3.2
Southeast	-0.41	-1.48	-0.99	-0.22	-0.77	-4.1
State	+0.56	-1.26	-1.23	-1.00	-0.04	

*Above +4 = Extreme Moist Spell
3.0 To 3.9 = Very Moist Spell
2.0 To 2.9 = Unusual Moist Spell
1.0 To 1.9 = Moist Spell
0.5 To 0.9 = Incipient Moist Spell
0.4 To -0.4 = Near Normal

-0.5 To -0.9 = Incipient Drought
-1.0 To -1.9 = Mild Drought
-2.0 To -2.9 = Moderate Drought
-3.0 To -3.9 = Severe Drought
Below -4.0 = Extreme Drought

MEAN STREAM DISCHARGE

This Month

River and Location	Drainage Area (Sq. Mi.)	Mean Discharge (CFS)	% of Normal	% of Normal Past		
				3 Mos.	6 Mos.	12 Mos.
Grand River near Painesville	685	138	157	22	69	76
Great Miami River at Hamilton	3,630	1,287	117	45	81	103
Huron River at Milan	371	61	142	23	97	100
Killbuck Creek at Killbuck	464	80	57	29	81	76
Little Beaver Creek near East Liverpool	496	95	86	38	80	78
Maumee River at Waterville	6,330	640	76	40	86	78
Muskingum River at McConnelsville	7,422	1,682	77	39	83	69
Scioto River near Prospect	567	77	157	81	88	93
Scioto River at Higby	5,131	1,995	179	70	94	99
Stillwater River at Pleasant Hill	503	112	154	30	71	91

STREAMFLOW during August was above normal across much of the state, but below normal in the east-central and southeastern areas of Ohio. In a few basins where precipitation was below normal, flows were low enough to be considered deficient. Streamflows in most areas during August were greater than the flows during July.

Flows at the beginning of the month were below normal throughout most of the state, but near or above normal in areas of east-central and southeastern Ohio. Flows generally declined during the first nine or ten days of the month. Low flows for the month were established during this period with most occurring on either August 8 or 9, just prior to responding to the precipitation that would fall during the next nine days. Flows increased in all drainage basins as a result of this precipitation.

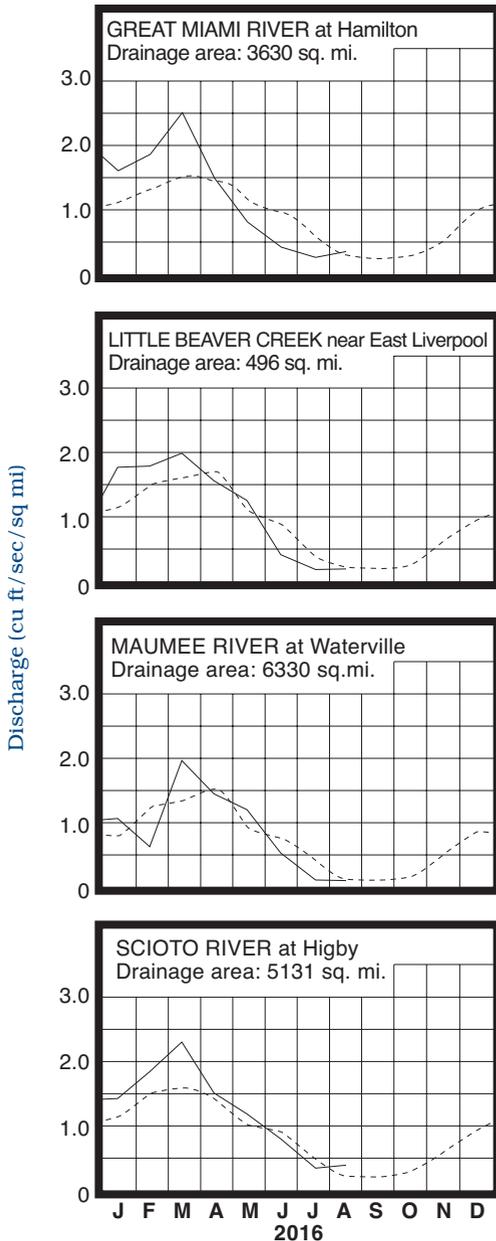
Greatest flows for August occurred at various times due to the pattern of rainfall throughout the month, but they generally occurred between August 13 and 15 in northern Ohio, during August 18-19 in central and southeastern Ohio, and between August 26 and 28 in western areas of the state. Flows declined during the last few days of the month and were below normal across much of the state, but remained above normal in basins in west-central, central and southwestern Ohio. Flooding was observed on several days across various areas of the state during August. Most of the flooding was minor, but some moderate to severe urban flooding occurred following local excessive rainfall, most notably in southwestern Ohio.

RESERVOIR STORAGE for water supply during August decreased in both the Mahoning and Scioto river basins. Month-end storage continues to be below normal in the Mahoning basin reservoirs and above normal in the Scioto basin reservoirs.

Reservoir storage at the end of August in the Mahoning basin index reservoirs was 71 percent of rated capacity for water supply compared with 79 percent for last month and 85 percent for August 2015. Month-end storage in the Scioto basin index reservoirs was 89 percent of rated capacity for water supply compared with 94 percent for both last month and August 2015.

Surface water supplies remain adequate in most areas of the state in spite of the below normal precipitation much of the state has received this summer. Above normal precipitation across much of Ohio during August helped reduce the overall demand on surface water supplies and the decreases in storage from the July levels were roughly what is normally expected for this time of the year.

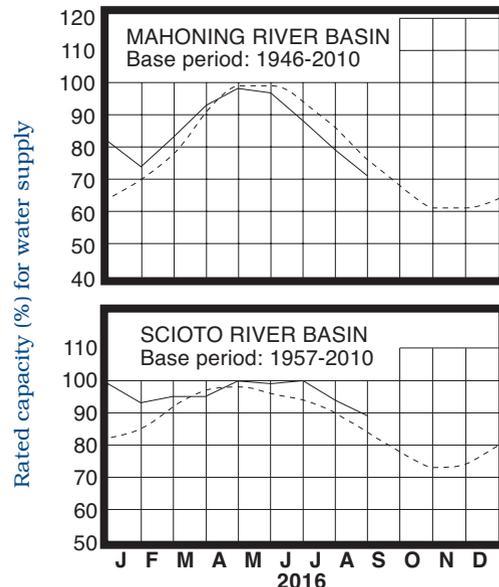
MEAN STREAM DISCHARGE



Base period for all streams: 1981-2010

Normal - - - - Current ———

RESERVOIR STORAGE FOR WATER SUPPLY



GROUND-WATER LEVELS

Based on daily lowest level in feet below land-surface datum

GROUND WATER levels during August declined seasonally. Generally, the net declines in ground water levels during August from the July levels ranged from near to greater than what is normally expected.

Ground water storage is at below normal levels in most areas of the state with only a few exceptions of above normal levels occurring in some central and southeastern Ohio aquifers. Index observation well PO-124 (Portage County), representing sandstone aquifers in eastern and north-eastern Ohio, reached a record-low level for August. Current ground water levels are lower than they were during August 2015 throughout the state by as much as 2 feet in some aquifers. Little if any recharge can usually be expected for the next two to three months. However, near normal precipitation during this period would lower the demand on ground water resources and slow down the rate of decline in ground water levels. According to the Ohio Agricultural Statistics Service, soil moisture near the end of August was rated as being short or very short in 35 percent of the state, adequate in 58 percent of the state, and surplus in 7 percent of the state. Even with ground water levels below normal and lower than last year, ground water storage appears to be adequate throughout the state.

LAKE ERIE level declined during August. The mean level was 572.38 feet (IGLD-1985), 0.26 foot below last month's level and 0.69 foot above normal. This month's level is 0.52 foot lower than the August 2015 level and 3.18 feet above Low Water Datum.

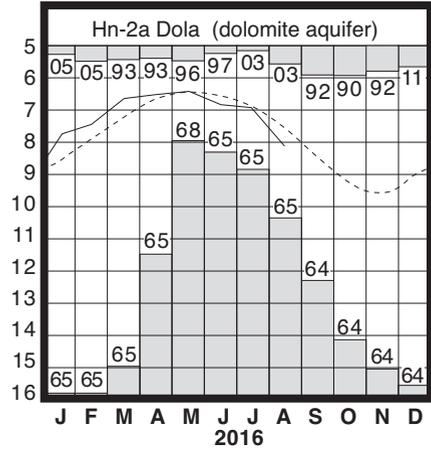
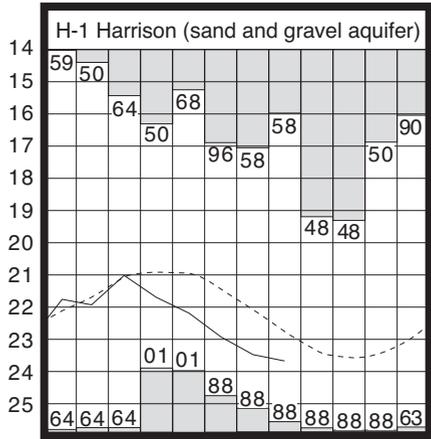
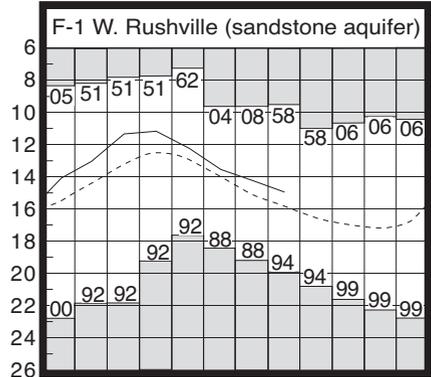
The U.S. Army Corps of Engineers (USACE) reports that precipitation in the Lake Erie basin during August averaged 4.47 inches, 1.24 inches above normal. Precipitation in the entire Great Lakes basin during August averaged 4.34 inches, 1.19 inches above normal. For calendar year 2016 through August, precipitation in the Lake Erie basin has averaged 23.05 inches, 0.94 inch below normal, while the entire Great Lakes basin has averaged 22.01 inches, 0.75 inch above normal.

In addition, the USACE reports that based on the current condition of the Great Lakes basin and anticipated weather patterns, the level of Lake Erie should remain above normal for the foreseeable future. Deviations from the anticipated weather patterns could result in the level of Lake Erie ranging from about 1 inch below to as much as 22 inches above the normal seasonal average.

Index Well	Location	Aquifer	Mean This Month	Departure From Normal	Change in feet from:	
					Last Month	Year Ago
F-1	W. Rushville, Fairfield Co.	Sandstone	14.96	+0.86	-0.76	-2.00
Fa-1	Jasper Mill, Fayette Co.	Limestone	10.15	-1.67	-1.00	-1.37
Fr-10	Columbus, Franklin Co.	Gravel	43.03	+1.17	-0.49	-1.01
H-1	Harrison, Hamilton Co.	Gravel	23.68	-0.93	-0.20	-0.77
Hn-2a	Dola, Hardin Co.	Dolomite	8.12	-0.56	-1.19	-1.02
Po-124	Freedom, Portage Co.	Sandstone	78.08	-1.35	-0.59	-1.49
Tu-1	Strasburg, Tuscarawas Co.	Gravel	15.15	-1.65	-0.65	-1.60

GROUND-WATER LEVELS

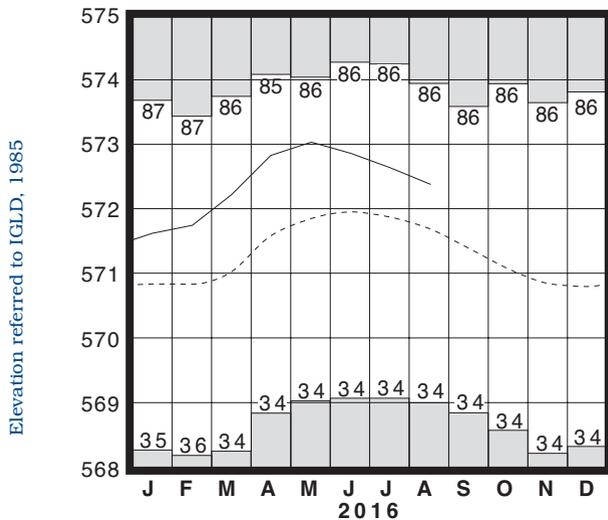
Water level (ft below land surface)



Base periods: F-1, 1947-2010; H-1 1951-2010.

Hn-2a, 1955-2010 ■ Record high and low, year of occurrence

LAKE ERIE LEVELS



Base period: 1918-2010

■ Record high and low, year of occurrence

Normal - - - - Current ———

(Precipitation continued from front)

Precipitation for the 2016 water year is below normal across most of the state, but above normal in the Central, Southwest and South Central regions. The state average is 34.99 inches, 0.88 inch below normal. Regional averages range from 41.41 inches, 2.69 inches above normal, for the Southwest Region to 30.74 inches, 1.35 inches below normal, for the Northwest Region.

Precipitation for the 2016 calendar year is below normal throughout most of Ohio with only the Southwest Region having above normal precipitation. The average for the state is 25.84 inches, 1.40 inches below normal. Regional averages range from 29.70 inches, 0.21 inch above normal, for the Southwest Region to 23.33 inches, 0.91 inch below normal, for the Northwest Region.

SUMMARY

Precipitation during August was generally above normal in most of northern and western Ohio and below normal in much of eastern and south-central Ohio. Streamflow was above normal across much of the state. Reservoir storage decreased but remained adequate throughout Ohio. Ground water levels declined statewide and are below normal across most of the state. Lake Erie level declined 0.26 foot and was 0.69 foot above the long-term August average.

NOTES AND COMMENTS

Severe Storms Leave Their Mark on Ohio

Severe storms left their mark on Ohio during August. Severe storms occurred on several days with many areas experiencing heavy rain, high winds and tornadoes.

August began rather quietly with most of the state receiving little or no rain during the first eight days of the month. Increasing moisture across the region resulted in scattered showers and thunderstorms which moved across the state during August 9-17. Heavy rain fell across areas of central and south-central Ohio on August 9 with more than 3 inches reported at some locations. Minor flooding was reported from Union, Delaware, Champaign, Licking, Adams and Brown counties. Storms on August 10 were most numerous across northern and southwestern Ohio with more than 2 inches falling at some locations. Local urban and small stream flooding was reported in several counties in southwestern Ohio including Montgomery, Preble, Greene, Clinton and Warren. More storms occurred across northern Ohio during August 11-13 with flooding reported in parts of Ashtabula, Mahoning and Trumbull counties. Showers and storms on August 14 and 15 were most numerous in the western half of the state. Some storms on August 16 and 17 were severe with heavy rain across mainly southern Ohio. Parts of Clermont, Brown and Highland counties reported more than 3 inches of rain. Minor flooding of local streams was observed, including along the Ohio Brush Creek. In addition, a small tornado touched down in Brown County on August 17. Widely scattered showers and thunderstorms occurred on August 18 and 19, but most of the state was dry during these two days. More strong storms with heavy rain returned to mainly the western half of the state on August 20. Two tornadoes touched down during these storms, one in Darke County and the other in Delaware County. Some of the most violent weather during the month occurred on August 24. Severe storms moved out of Indiana into northwestern Ohio. Several storms in northwest Ohio were tornadic with a total of 11 tornadoes confirmed by the National Weather Service. Tornadoes were reported in Wood, Paulding, Defiance, Van Wert, Henry and Putnam counties. Although most of these were small tornadoes, some of them were rather strong with estimated winds of around 130 mph, causing extensive damage to homes, buildings, trees and crops in these areas. Extremely heavy rain fell over parts of southwestern Ohio on August 28. Amounts of 2 to 3 inches were reported with radar estimates of more than 5 inches falling in some suburbs of Cincinnati (Hamilton County) in a very short period of time. Extensive damage resulted from this rain, including numerous flooded roads, basements and vehicles. Portions of Interstate 71 in the Cincinnati area were temporarily closed and many schools across the area were closed for at least two days. Portions of Interstate 75 in Montgomery County were also closed due to high water from these storms.

In spite of all the storms and number of days with some rain in the state during August, there were areas in southeastern and south-central Ohio that missed most of this rain and ended the month with substantially below normal precipitation amounts.

ACKNOWLEDGMENTS

This report has been compiled from Division data and from information supplied by the following:

Precipitation data:

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service; The Miami Conservancy District; U.S. Army Corps of Engineers, Muskingum Area.

Streamflow and reservoir storage data:

U.S. Geological Survey, Water Resources Division.

Lake Erie level data:

U.S. Army Corps of Engineers, Detroit District.

Palmer Drought Severity Index:

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service.



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Ohio Department of Natural Resources

Division of Water Resources

2045 Morse Road

Columbus, Ohio 43229-6693

John Kasich
Governor

James Zehninger
Director

Andrew Ware
Acting Chief

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