



# MONTHLY WATER INVENTORY REPORT FOR OHIO

December 2013

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<http://www.ohiodnr.gov/tabid/4191/Default.aspx>

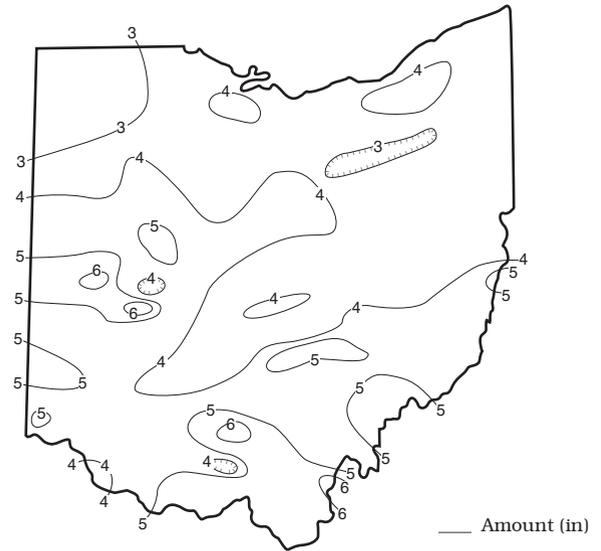
**PRECIPITATION** during December was above normal throughout Ohio with only a few scattered locations having below normal precipitation. The state average was 4.15 inches, 1.24 inches above normal. Regional averages ranged from 5.13 inches, 1.98 inches above normal, for the South Central Region to 3.26 inches, 0.63 inch above normal, for the Northwest Region. Waverly (Pike County) reported the greatest amount of December precipitation, 6.79 inches. Wauseon (Fulton County) reported the least amount, 2.46 inches.

Precipitation during December fell as both rain and snow. Most areas reported above normal snow for the month. There was measurable precipitation reported on several days in December, but only a few days had significant amounts of precipitation. Precipitation on December 5 fell as rain, but turned to snow across most of the state on December 6. Precipitation amounts were greatest in extreme southeastern Ohio where more than 2 inches was reported. Amounts decreased to the north and west to less than 0.10 inch in northwestern Ohio. Precipitation on December 14 began as snow, but turned to rain in southern Ohio. Several inches of snow fell across northern Ohio. The greatest amount of precipitation for most areas of Ohio fell as rain during December 20-23. More than 1 inch fell throughout the state with most areas reporting in excess of 2 inches and as much as 3-4 inches at some locations from west-central to north-central Ohio. Runoff from the excessive rain combined with melting snow causing widespread flooding across the state, especially in northern Ohio. Light precipitation fell across the state during the last three days of the month with generally 0.25 inch falling at most locations; however, lesser amounts fell in northwestern areas and more than 0.50 inch was reported across extreme southern and southeastern Ohio.

Precipitation for the first three months of the 2014 water year is above normal statewide. The state average is 10.99 inches, 2.36 inches above normal. Regional averages range from 12.22 inches, 2.60 inches above normal, for the Northeast Region to 9.38 inches, 1.53 inches above normal, for the Northwest Region. The 2014 water year recharge season is off to a good start as far as precipitation is concerned. With near-normal precipitation during the next few months, conditions should favor continued improvement to Ohio's water resources throughout the remainder of the recharge period.

Precipitation for the 2013 calendar year was above normal throughout most of the state with only a few locations in south-central Ohio having below normal precipitation. The state average was 42.14 inches, 3.10 inches above normal. Regional averages ranged from 44.96 inches, 5.38 inches above normal, for the Northeast Region to 38.58 inches, 3.56 inches above normal, for the Northwest Region (see Precipitation table, departure from normal, past 12 months column). Dorset (Ashtabula County) reported the greatest amount of precipitation for the year, 56.06 inches. North Georgetown (Columbiana County) reported the least amount of precipitation during 2013, 33.56 inches. An isohyetal map

## PRECIPITATION DECEMBER



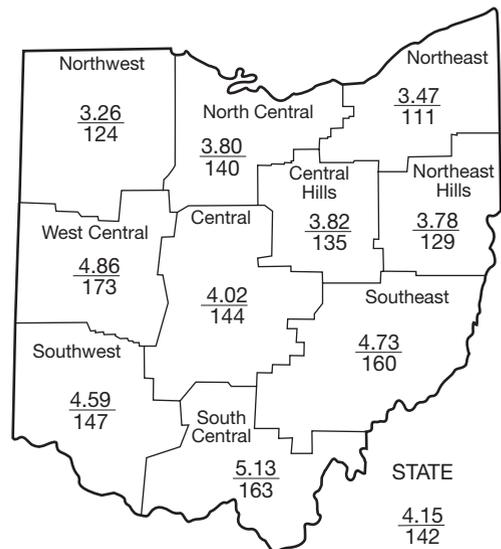
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## PRECIPITATION

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	+0.63	+1.53	+1.95	+3.56	-1.14	+1.5
North Central	+1.09	+2.07	+6.01	+7.29	+9.92	+4.4
Northeast	+0.35	+2.60	+4.72	+5.38	+7.60	+2.3
West Central	+2.05	+3.11	+2.67	+2.07	-1.58	+1.2
Central	+1.22	+2.39	+3.58	+3.08	+0.96	+1.3
Central Hills	+0.99	+2.43	+3.43	+4.32	+3.20	+1.4
Northeast Hills	+0.86	+2.29	+2.19	+1.03	-1.99	+0.8
Southwest	+1.46	+2.93	+2.92	+1.76	-3.69	+2.0
South Central	+1.98	+2.15	+3.12	0.00	-1.15	+1.4
Southeast	+1.77	+2.12	+5.11	+2.72	+2.33	+1.6
State	+1.24	+2.36	+3.56	+3.10	+1.42	

\*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



Average (in)  
Percent of normal

## 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	2,041	154	141	165	115
Great Miami River at Hamilton	3,630	10,300	289	177	145	122
Huron River at Milan	371	974	286	195	251	151
Killbuck Creek at Killbuck	464	875	219	154	177	115
Little Beaver Creek near East Liverpool	496	956	204	116	122	88
Maumee River at Waterville	6,330	9,900	181	99	109	109
Muskingum River at McConnelsville	7,422	14,060	158	117	140	93
Scioto River near Prospect	567	1,711	381	214	247	163
Scioto River at Higby	5,131	10,760	223	150	151	103
Stillwater River at Pleasant Hill	503	1,637	474	171	120	115

**STREAMFLOW** during December was above normal throughout Ohio. Flows were high enough to be considered excessive across most of the state. Flows during December were greater than flows reported during November. Preliminary data indicates that the Great Miami River at Hamilton and the Stillwater River at Pleasant Hill recorded their third highest December flow for their respective periods of record.

Streamflow at the beginning of the month was below normal throughout the state. Drainage basins in eastern and south-central Ohio had their lowest flows for the month at or near the beginning of December. Most of the remainder of the drainage basins in Ohio had their lowest flows between December 10 and 13, but a few basins had slightly lower flows around December 18 and 19. Streamflow increased rapidly as a result of widespread precipitation that fell during December

20-23. Greatest flows for the month were recorded during December 22-25 throughout the state. Flows declined from these peaks through the end of the month, but remained above normal in the southern two-thirds of Ohio while falling to slightly below normal in the northern third.

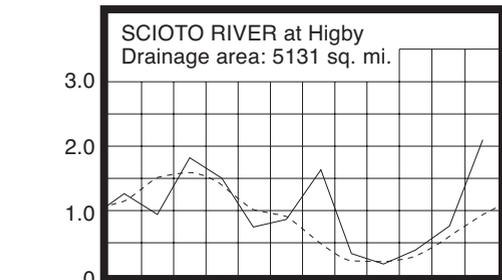
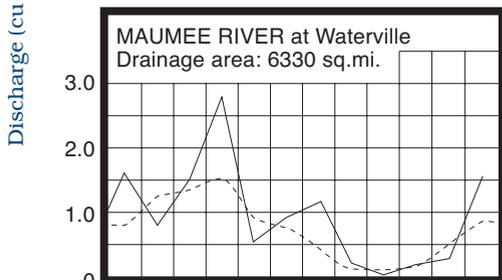
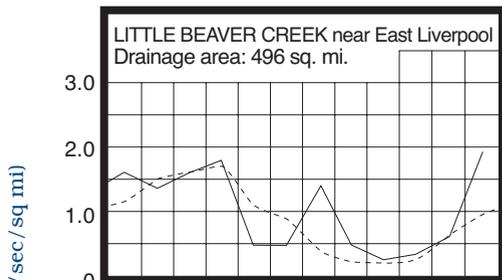
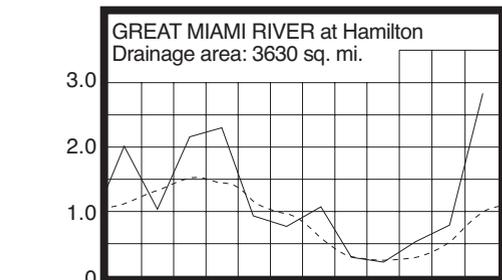
Streamflow for the 2013 calendar year was above normal throughout most of Ohio with only a few basins in eastern areas of the state having below normal flows (see Mean Stream Discharge table, past 12 months column). Streamflow during January was above normal statewide with minor flooding in northwestern Ohio. Flows during the next five months were mostly below normal as only April and June had above normal flows across much of the state. Some minor flooding occurred in March, April and June. During the second half of the year flows were above normal throughout the state. Major flooding was reported across many areas of the state during July with south-eastern Ohio being hit the hardest. Stream gauging stations indicate that flows across much of the state were at near-record July levels. Minor flooding also occurred during October and December.

**RESERVOIR STORAGE** for water supply during December increased in both the Mahoning and Scioto river basins. Storage continued to remain above normal in both basins.

Reservoir storage at the end of December in the Mahoning basin index reservoirs was 79 percent of rated capacity for water supply compared with 74 percent for last month and 73 percent for December 2012. Month-end storage in the Scioto basin index reservoirs was 96 percent of rated capacity for water supply compared with 90 percent for last month and 88 percent for December 2012.

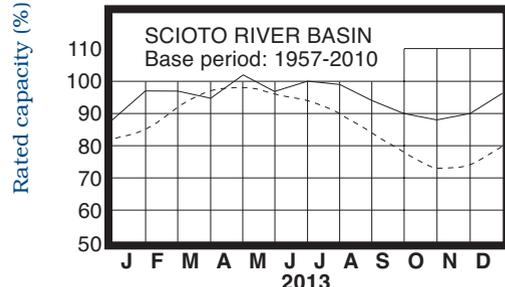
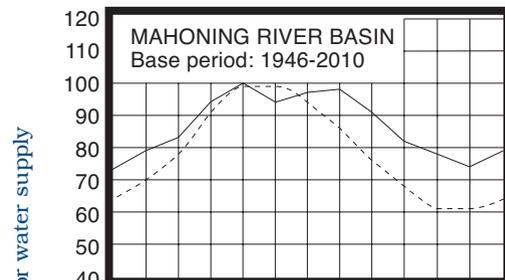
Surface water supplies were adequate throughout the 2013 calendar year. Storage in reservoirs across the state was near or above normal throughout the year. Above normal precipitation during the summer months kept reservoir levels higher than normal and helped reduce the demand for public water supplies. However, many flood control and recreational reservoirs utilized available storage during July as a result of much above normal precipitation that fell during June and July. At the end of the year, surface water supplies are in excellent condition.

## MEAN STREAM DISCHARGE



Base period for all streams: 1981-2010

## RESERVOIR STORAGE FOR WATER SUPPLY



Normal - - - - Current ———

## GROUND-WATER LEVELS

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

**GROUND WATER** levels during December rose in aquifers throughout Ohio. Net rises during December were greater than usually expected. Generally, ground water levels rose steadily throughout the month in most consolidated aquifers and deeper unconsolidated aquifers. Levels in shallow, unconsolidated aquifers were rather steady during the first three weeks of December and then responded to widespread precipitation, rising through the end of the month.

The 2014 water year recharge season is off to a good start as far as ground water supplies are concerned. Ground water levels are near or above normal in most aquifers throughout the state and current levels are above last year's levels in most aquifers across Ohio. Some consolidated aquifers of southwestern and south-central Ohio are more than 6.5 feet higher than the December 2012 levels.

Ground water storage during the 2013 calendar year improved throughout most of Ohio. At the beginning of the year, levels were below normal throughout most of the state and at record-low December levels in some aquifers in south-central and southwestern Ohio. The first five months of 2013 were not particularly favorable for ground water supplies. Precipitation was below normal statewide and ground water levels remained below normal throughout most of the state. The situation began to improve with the above normal precipitation that fell during June across most of Ohio. This was followed by much above normal precipitation during July which provided much needed recharge and reduced demand on the state's ground water supplies. Precipitation during August and September was below normal and ground water levels were still below normal across much of Ohio. Above normal precipitation during the last three months of the year was beneficial for ground water supplies and at the end of the year, ground water levels had improved to above normal throughout most of Ohio. Current levels are also higher than they were at this time last year across nearly the entire state. With near-normal precipitation and other climatic conditions, the outlook for adequate recharge during the next several months is favorable.

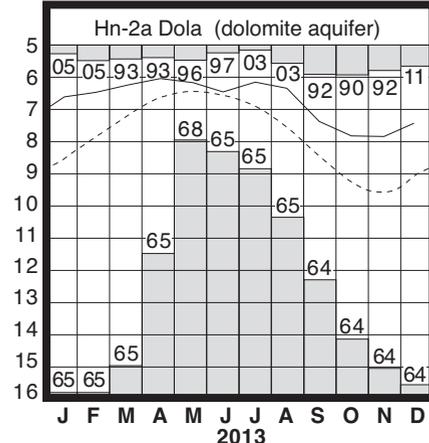
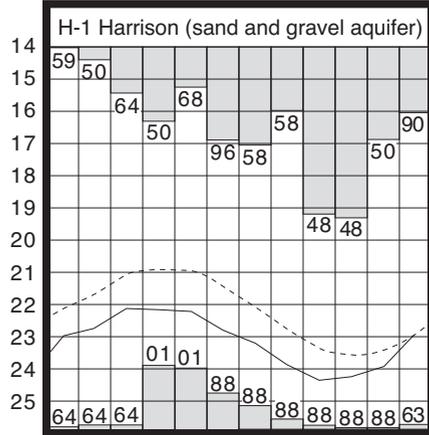
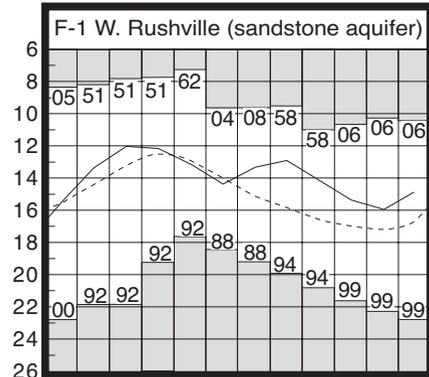
**LAKE ERIE** level declined seasonally during December. The mean level was 570.67 feet (IGLD-1985), 0.10 foot below last month's mean level and 0.13 foot below normal. This month's level is 0.39 foot above the December 2012 level and 1.47 feet above Low Water Datum.

The U.S. Army Corps of Engineers (USACE) reports that precipitation in the Lake Erie basin during December averaged 3.10 inches, 0.44 inch above normal. For the entire Great Lakes basin, December precipitation averaged 1.57 inches, 0.81 inch below normal. For calendar year 2013, the Lake Erie basin averaged 38.39 inches of precipitation, 2.97 inches above normal, while the entire Great Lakes basin averaged 35.05 inches, 2.38 inches above normal.

Lake Erie's level was below normal during the first half of the year. In response to the above normal precipitation that fell in the Great Lakes basin during June and July, the level of Lake Erie rose to above normal during July. The level of Lake Erie was at or slightly above normal during the next three months before falling back below normal during November and December. The USACE predicts that, based on the current condition of the Great Lakes basin and anticipated future weather conditions, the level of Lake Erie should remain near-normal for the next several months.

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	14.87	+1.84	+1.09	+2.70
Fa-1	Jasper Mill, Fayette Co.	Limestone	8.67	-0.04	+0.76	+6.75
Fr-10	Columbus, Franklin Co.	Gravel	43.35	+0.89	+0.45	+1.20
H-1	Harrison, Hamilton Co.	Gravel	22.94	+0.01	+0.98	+1.21
Hn-2a	Dola, Hardin Co.	Dolomite	7.42	+1.66	+0.42	-0.13
Po-124	Freedom, Portage Co.	Sandstone	76.95	+0.08	+0.20	+0.38
Tu-1	Strasburg, Tuscarawas Co.	Gravel	14.67	-0.86	+0.33	+0.17

## GROUND-WATER LEVELS

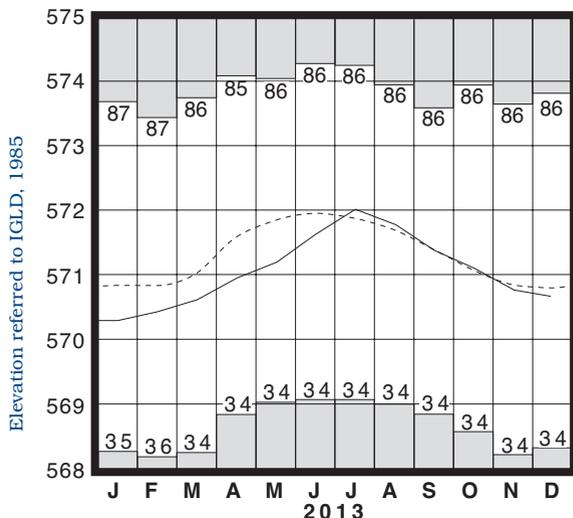


Water level (ft below land surface)

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)

and regional averages with percentages of normal precipitation for the 2013 calendar year appear below.

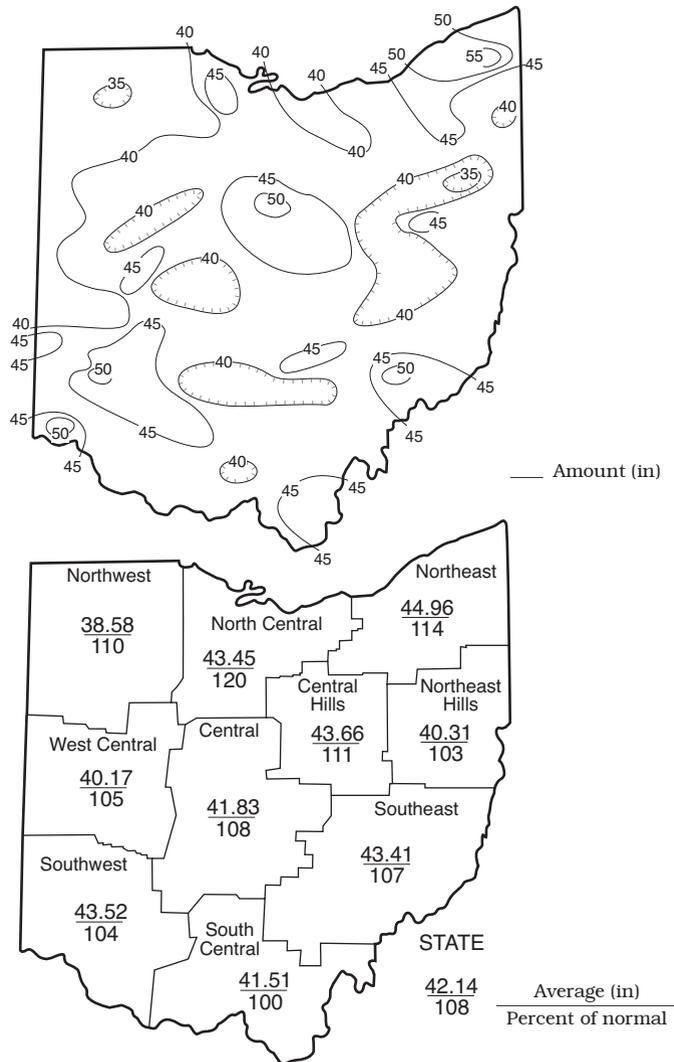
Although precipitation was above normal in western Ohio during January and the northern two-thirds of the state during April, cumulative precipitation during the first five months of the year was below normal. Much above normal precipitation during June and July was beneficial for Ohio's water resources and paved the way for an overall satisfactory growing season for agricultural crops in the state. This June and July period was the second wettest for the state during the past 131 years. August and September precipitation was below normal throughout most of the state. Above normal precipitation during the last three months of the year got the 2014 water supply recharge season off to a good start. At the end of 2013, conditions favor continued improvement in water supplies.

**SUMMARY**

December precipitation was above normal throughout most of the state. Streamflow was above normal statewide and high enough to be considered excessive across most of Ohio. Reservoir storage increased and remained at above normal levels. Ground water storage increased and was at above normal levels throughout most of the state. Lake Erie level declined 0.10 foot and was 0.13 foot below the long-term December average.

Precipitation for the 2013 calendar year was above normal statewide. Streamflow was above normal in all but a few eastern Ohio drainage basins. Reservoir storage was near or above normal throughout the year. Ground water levels improved and were above normal across most of the state at year's end. Lake Erie was below its long-term average during the first half of 2013, near or above normal from July through October, then slightly below normal during the last two months of the year.

**PRECIPITATION 2013 CALENDAR YEAR**



**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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