



MONTHLY WATER INVENTORY REPORT FOR OHIO

July 2013

Compiled By Scott C. Kirk

Hydrologist

Water Inventory Unit

PRECIPITATION during July was noticeably above normal throughout most of the state with only a few locations, mainly in extreme western Ohio, having below normal precipitation. The state average was 6.90 inches, 2.77 inches above normal. This ranks as the fourth wettest July for the state as a whole in 131 years of record. Regional averages ranged from 8.81 inches, 4.99 inches above normal, for the North Central Region to 5.54 inches, 1.30 inches above normal, for the West Central Region. All 10 of the state's climatic regions ranked in the top 15 wettest July's of record, including the wettest for the North Central Region, second wettest for the Southeast Region, fifth wettest for the Northwest Region and sixth wettest for both the Central and Northeast regions. Marion (Marion County) reported the greatest amount of July precipitation, 13.40 inches, which is about 300 percent of normal. Ft. Recovery (Mercer County) reported the least amount, 2.03 inches.

Precipitation during July fell as showers and thunderstorms, with many storms producing severe weather and locally heavy downpours. Rain fell nearly daily at many locations during the first 11 days of the month. Most of the state received at least 2 inches of rain during this period, but less was reported in west-central and areas of southwestern Ohio. The greatest amount of rain fell in parts of north-central, central and southeastern Ohio where 6-9 inches were reported. Locally severe storms developed during July 8-10 with heavy rain, damaging winds and tornadoes. More than 4.5 inches of rain was reported in areas of central, north-central and southeastern Ohio. Flash flooding occurred at many locations. After a few days of much needed dry weather across most of the state, rain returned on July 19. Storms were common during July 19-24 in many areas of the state with 1-2 inches of rain reported across most of Ohio. Some areas in central, southeastern and northeastern Ohio received as much as 3 inches from these storms and there were unofficial reports of more than 6 inches of rain in parts of Cuyahoga County. The last week of July was drier, but not without precipitation. Showers and scattered storms during July 27-28 and again on July 31 brought more than 0.5 inch of rain from southwestern to northeastern Ohio, but less than 0.5 inch in much of northwestern and southeastern areas of the state. For more information on the storms of July, see Notes and Comments at the end of this report.

Precipitation for the 2013 water year is above normal throughout most of the state; only a few areas, mainly in southwestern Ohio, have slightly below normal precipitation. The state average is 35.97 inches, 3.68 inches above normal. Regional averages range from 39.46 inches,

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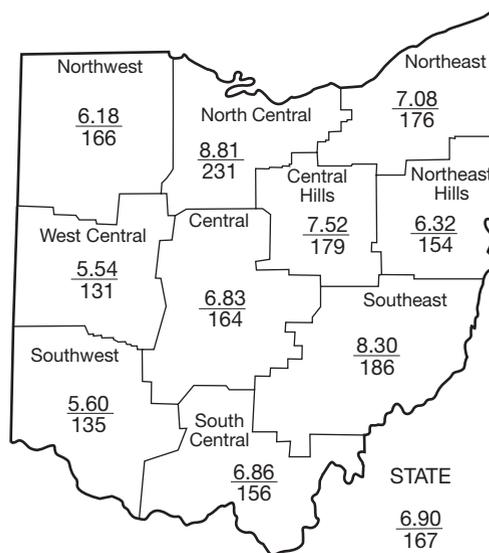
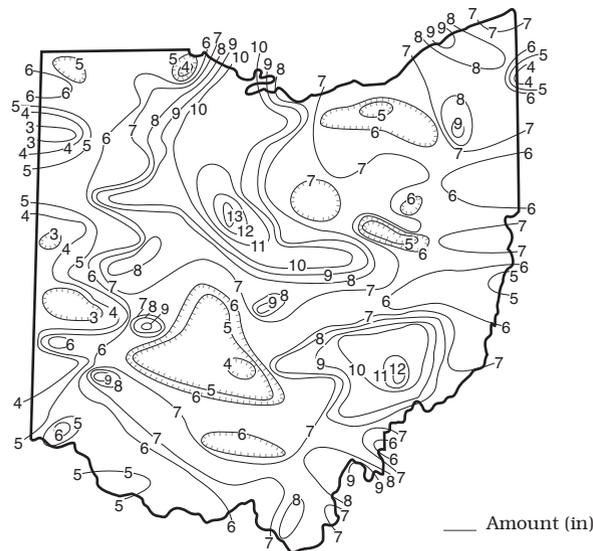
PRECIPITATION

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	+2.45	+2.13	+2.68	+5.36	+10.33	+1.0
North Central	+4.99	+5.47	+5.98	+11.19	+18.14	+3.3
Northeast	+3.05	+5.04	+4.15	+9.05	+16.12	+1.4
West Central	+1.30	-0.64	+0.43	+3.69	+7.66	-1.1
Central	+2.66	+2.49	+2.92	+4.43	+8.39	+0.0
Central Hills	+3.32	+4.94	+5.09	+7.61	+11.91	+0.8
Northeast Hills	+2.22	+3.13	+1.81	+3.24	+5.66	-0.7
Southwest	+1.45	+1.62	+0.20	-0.16	+4.46	-0.9
South Central	+2.45	+2.31	-0.73	+1.28	+5.07	-0.5
Southeast	+3.83	+4.08	+1.73	+4.24	+8.46	+0.8
State	+2.77	+3.04	+2.40	+4.97	+9.59	

*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

PRECIPITATION JULY



Average (in)
Percent of normal

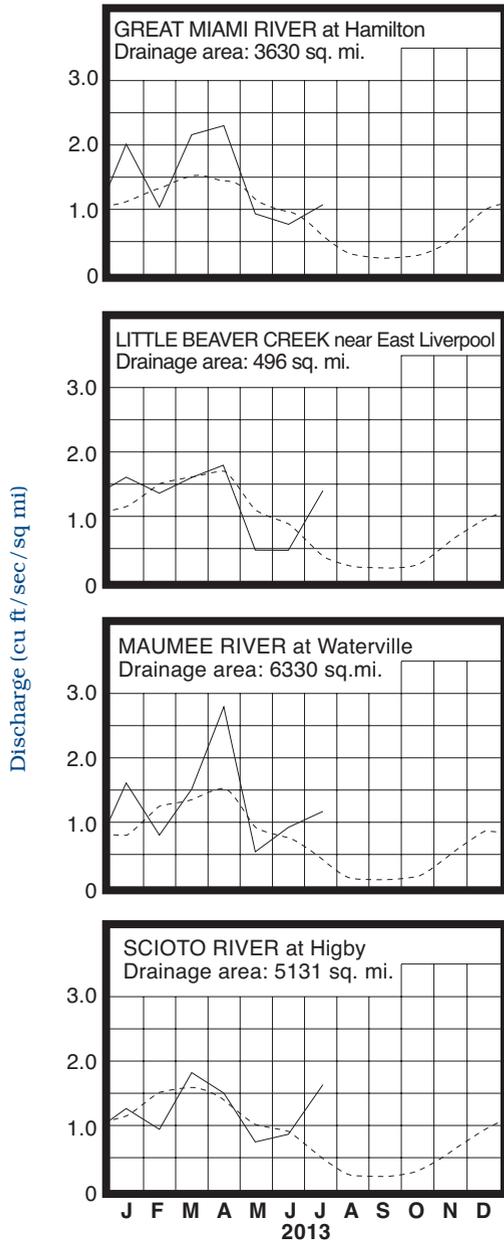
MEAN STREAM DISCHARGE

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	1,581	742	166	98	104
Great Miami River at Hamilton	3,630	3,886	186	80	99	99
Huron River at Milan	371	1,305	1,412	185	125	149
Killbuck Creek at Killbuck	464	1,192	611	154	115	104
Little Beaver Creek near East Liverpool	496	714	382	84	87	80
Maumee River at Waterville	6,330	7,432	281	100	107	97
Muskingum River at McConnelsville	7,422	17,950	387	125	98	86
Scioto River near Prospect	567	1,686	1,047	156	137	152
Scioto River at Higby	5,131	8,340	331	100	92	90
Stillwater River at Pleasant Hill	503	170	80	55	85	97

STREAMFLOW during July was above normal throughout most of the state. The only basins that experienced below normal flows for the month were in the west-central areas of Ohio. Flows were high enough to be considered excessive across most of the state. Flows during July were noticeably greater than the June flows throughout nearly all of Ohio, but were less in west-central areas of the state. Preliminary data indicates that flows across much of Ohio were at near-record July levels. The gauging stations at the Grand River near Painesville, the Huron River at Milan, the Killbuck Creek at Killbuck and the Muskingum River at McConnelsville all recorded their second greatest monthly flow for July. The Scioto River near Prospect recorded its third greatest July flow while the Scioto River at Higby recorded its fourth greatest.

MEAN STREAM DISCHARGE



Base period for all streams: 1981-2010

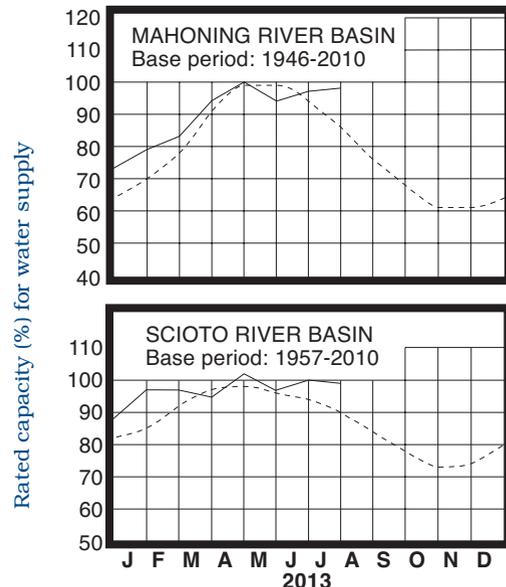
Flows at the beginning of the month were above normal statewide. Drainage basins in the north-central areas of the state recorded their lowest flows for July during the first few days of the month. Most drainage basins throughout the remainder of the state reached their lowest for the month at or near the end of July. Greatest flows for the month occurred on the first day of July in basins in west-central Ohio. Greatest flows across the remainder of the state occurred during July 9-12 following widespread and often heavy rain that fell during July 8-10. Flooding occurred across many areas of the state as a result of excessive rainfall, with basins in north-central, central and southeastern Ohio being hardest hit. Flows decreased from these peaks during the next week, but then increased rapidly from the rains of July 20-24. Many of the flows were excessive with small stream and urban flooding again a problem across many areas of the state following another round of excessive rain. Most drainage basins in eastern Ohio were still flowing at above normal levels at the end of the month, but basins in western Ohio were at below normal flows.

RESERVOIR STORAGE for water supply during July increased slightly in the Mahoning River basin and decreased slightly in the Scioto River basin. Storage remained above normal in both basins.

Reservoir storage at the end of July in the Mahoning basin index reservoirs was 98 percent of rated capacity for water supply compared with 97 percent for last month and 68 percent for July 2012. Month-end storage in the Scioto basin index reservoirs was 99 percent of rated capacity for water supply compared with 100 percent for last month and 84 percent for July 2012.

As a result of the much above normal precipitation during July, many flood control and recreational reservoirs in the state held back water to minimize potential flooding downstream. Water levels in some reservoirs reached notably high levels, in some cases resulting in flooded roads, and closed campgrounds and beaches.

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 July rose in many aquifers across the state, and in aquifers where levels declined, the declines were much less than typically observed during the month. July is usually a time when ground water levels decline seasonally throughout Ohio.

The above normal precipitation across most of the state during the past two months has been beneficial for ground water supplies. In response to the above normal precipitation, many aquifers had unusual net rises during July; five of the seven index observation wells presented in this report were higher during July than the levels observed during June. Only in areas where precipitation was below normal did ground water levels decline steadily and end the month lower than they were during June. Levels in consolidated aquifers in northwestern, eastern and southeastern Ohio, and unconsolidated aquifers in central areas of the state are above normal. However, levels across much of the state remain below normal, although they are much improved from levels recorded one year ago. Current levels are higher than they were during July 2012 throughout nearly the entire state. Ground water storage is in a favorable position and should remain favorable through the remainder of the summer high-use period. The Ohio Agricultural Statistics Service reports that near the end of July, soil moisture was rated as being short in 5 percent of the state, adequate in 71 percent of the state, and surplus in 24 percent of the state.

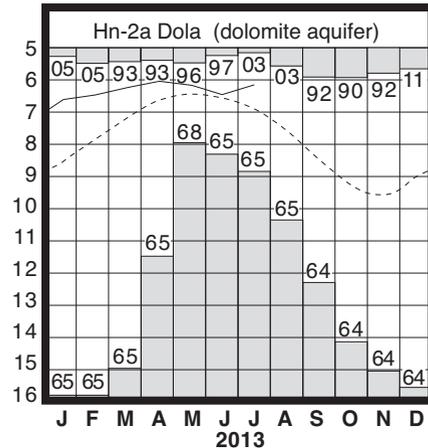
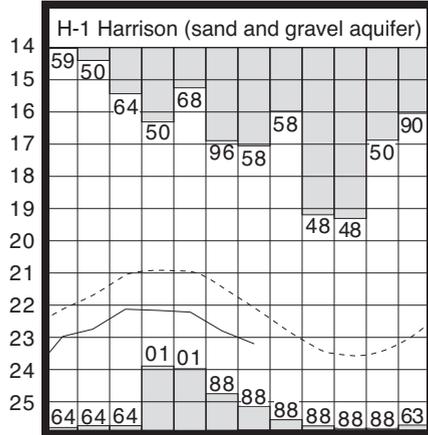
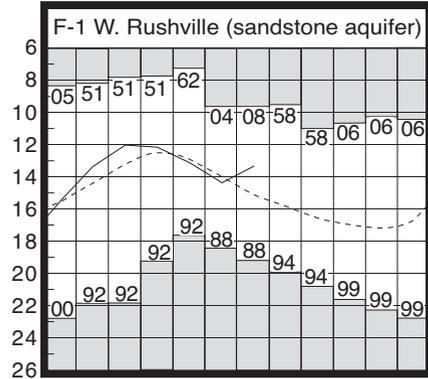
LAKE ERIE level rose during July. The mean level was 572.01 feet (IGLD-1985), 0.39 foot higher than last month's mean level and 0.13 foot above normal. This month's mean level is 0.68 foot above the July 2012 level and 2.81 feet above Low Water Datum.

The U.S. Army Corps of Engineers (USACE) reports that precipitation in the Lake Erie basin during July averaged 5.04 inches, 1.65 inches above normal. For the entire Great Lakes basin, July precipitation averaged 3.96 inches, 0.80 inch above normal. For calendar year 2013 through July, the Lake Erie basin has averaged 23.66 inches of precipitation, 2.94 inches above normal, while the entire Great Lakes basin has averaged 20.84 inches, 2.73 inches above normal.

In addition, the USACE reports that based on the current condition of the Great Lakes basin and anticipated weather conditions, the level of Lake Erie should range from near normal to about 3 inches below normal during the next 6 months. Deviations from the anticipated weather patterns could result in the level of Lake Erie ranging from about 7 inches above normal to as much as 14 inches below the normal seasonal level.

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	13.31	+1.81	+1.06	+1.85
Fa-1	Jasper Mill, Fayette Co.	Limestone	8.54	-0.48	-0.26	+1.10
Fr-10	Columbus, Franklin Co.	Gravel	43.41	+0.24	+0.01	+0.67
H-1	Harrison, Hamilton Co.	Gravel	23.20	-1.11	-0.40	+0.56
Hn-2a	Dola, Hardin Co.	Dolomite	6.16	+0.74	+0.30	+1.75
Po-124	Freedom, Portage Co.	Sandstone	76.67	-0.22	+0.01	-0.57
Tu-1	Strasburg, Tuscarawas Co.	Gravel	13.54	-0.61	+0.09	+1.62

GROUND-WATER LEVELS

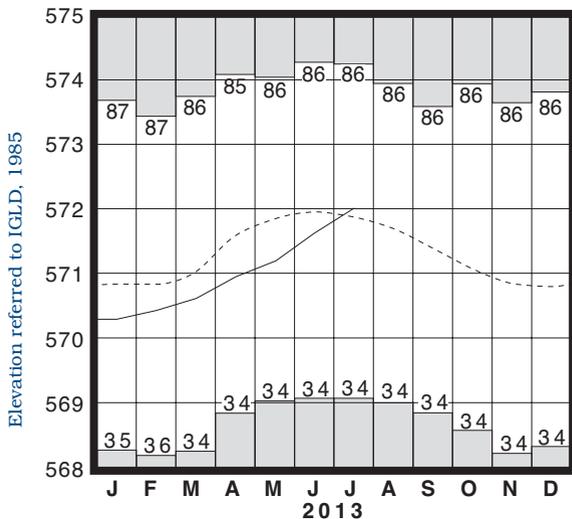


Water level (ft below land surface)

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)

7.18 inches above normal, for the Northeast Region to 31.67 inches, 2.89 inches above normal, for the Northwest Region.

Precipitation for the 2013 calendar year is also above normal throughout most of the state; only the South Central Region has below normal precipitation. The average for the state is 26.06 inches, 2.40 inches above normal. Regional averages range from 28.36 inches, 4.57 inches above normal, for the Central Hills Region to 24.32 inches, 0.91 inch above normal, for the West Central Region.

The wet pattern that began during the last week of June continued throughout the month of July. When combined with the June precipitation, the current June-July period was the second wettest for the state during the past 131 years. The state average of 13.03 inches of precipitation is 4.99 inches above normal for the June-July period. In addition, eight of the state's 10 climatic regions ranked in the top 6 wettest June-July period of record, including the wettest for the North Central, Central Hills and Southeast regions. In July alone, several individual stations reported about one-fourth of their normal annual precipitation and a few about one-third. When combined with June's precipitation, a few stations have reported nearly one-half of their normal annual precipitation during the past two months. Preliminary data indicates Dorset (Ashtabula County) has received 21.35 inches of precipitation during the past two months, nearly 13 inches above normal. Other stations reporting more than 20 inches during the past two months are: Galion (Crawford County), 20.17 inches and Marion (Marion County), 20.09 inches. However, not all the precipitation was distributed evenly across the state. A few areas in western Ohio have received below normal rainfall during the past two months. Dayton International Airport (Montgomery County) received 6.70 inches of precipitation during June and July, 1.58 inches below normal.

SUMMARY

Precipitation during July was noticeably above normal throughout most of Ohio with the average of 6.90 inches ranking as the fourth wettest July during the past 131 years. Streamflow was above normal in all drainage basins throughout the state except for basins in west-central Ohio. Flows were high enough to be considered excessive throughout most of the state. Reservoir storage increased slightly in the Mahoning River basin, decreased slightly in the Scioto River basin, and continued to remain above normal in both basins. Ground water storage increased in many aquifers due to the much above normal precipitation. Lake Erie level rose 0.39 foot and was 0.13 foot above the long-term July average.

NOTES AND COMMENTS

Severe Storms Impact Ohio During July

Many areas of Ohio were rocked with severe storms on several days during July. High winds, heavy downpours and tornadoes were associated with many of the storms during July 8-10. More than 4.5 inches of rain was reported in Marion (Marion County), Norwalk (Huron County) Wooster (Wayne County) and New Lexington (Perry County). These rains fell on ground that was already saturated from previous rains. Flooding was widespread across the state with Morrow, Richland and Hancock counties among the hardest hit, but the worst flooding occurred in southeastern Ohio. Perry County was especially hard hit with flooding of homes and businesses in the Corning and Crooksville areas. Ohio Governor John Kasich's request for a Small Business Administration (SBA) disaster declaration was granted for Perry County as well as the contiguous counties of Athens, Fairfield, Hocking, Licking, Morgan and Muskingum. The SBA declaration enables businesses and residents who incurred uninsured losses as a result of these storms in the counties mentioned above to apply for long-term, low-interest loans. The National Weather Service (NWS) confirmed three tornadoes were spawned from the thunderstorms on July 10, although damage was minor. Additional severe storms occurred during July 19-24. Storms on July 20 and 21 were most numerous across northern Ohio. Heavy rains were associated with some of these storms with 1-3 inches common across much of northern Ohio. An area of intense downpours brought unofficial reports of 4 to 6.5 inches of rain in Lake and Cuyahoga counties in a short period of time. Many roads were flooded and thousands of basements in these counties flooded. In the city of Willowick (Lake County) it was reported that more than 5,000 basements were flooded. The NWS confirmed a tornado hit the campus of Ursuline College, located in Pepper Pike near Cleveland (Cuyahoga County) on July 20 and did significant damage to the gymnasium, as well as roof damage to other buildings and tree damage. More heavy rain fell across central Ohio on July 22 with 2-3 inches of rain reported, resulting in flash flooding that closed several roads in Franklin, Delaware and Union counties.

In spite of the problems caused by the excessive amount of rain during July, the above normal precipitation has been beneficial for the state's water resources. The wet conditions have reduced overall demand during the summer high-use period. Ground water storage increased across much of the state during the time of year when ground water levels usually decline statewide. Reservoir storage is in excellent condition throughout the state and Lake Erie level rose to above normal for the first time since April 2012.

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 Soil and Water Resources

2045 Morse Road

Columbus, Ohio 43229-6693

John Kasich
Governor

James Zehninger
Director

Karl Gebhardt
Chief

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