MONTHLY WATER INVENTORY REPORT FOR OHIO

July 2016

Compiled By Scott C. Kirk
Hydrologist, Water Inventory Unit
http://water.ohiodnr.gov/water-use-planning/water-inventory-levels

PRECIPITATION during July was below normal across much of the state, but above normal in the South Central Region and a few other isolated locations. The state average was 3.09 inches, 1.04 inches below normal. Regional averages ranged from 5.86 inches, 1.45 inches above normal, for the South Central Region to 1.91 inches, 1.82 inches below normal, for the Northwest Region. This was the tenth driest July during the past 122 years for the Northwest Region and the twelfth driest for both the West Central and Central Hills regions. Jackson (Jackson County) reported the greatest amount of July precipitation, 7.84 inches. Bucyrus (Crawford County) reported the least amount, 0.80 inches. A few other stations in northwestern and north-central areas of the state reported less than 1 inch of rainfall for the month.

Precipitation during July fell as widely scattered showers and thunderstorms. During the first week, most of the state received between 0.5 and 1 inch of rain with lower amounts reported in some areas, especially in northwestern Ohio. There were areas in parts of extreme southwestern, northeastern, south-central and southeastern Ohio that received in excess of 1.5 inches during this period. Precipitation was widely scattered during the second week of the month. Much of southern Ohio received 0.5-1.0 inch amounts while areas in northern Ohio received less than 0.25 inch. Conditions were much the same during the third week as they were during the second; however, much needed rain fell across the state on July 18. Areas in northwestern Ohio reported around 1 inch during this storm. Much of the remainder of the state reported around 0.5 inch, except for parts of east-central Ohio where much less fell. Storms became slightly more widespread during the last week of the month, but areas in northern and east-central Ohio continued to be dry. The greatest amounts of rain were again reported in areas of extreme southwestern, northeastern and south-central Ohio where more than 2 inches of rain fell.

Precipitation for the 2016 water year is below normal across much of the state, but above normal in the South Central, Southwestern and Central regions. The average for the state is 30.86 inches, 1.43 inches below normal. Regional averages range from 37.02 inches, 2.48 inches above normal, for the South Central Region to 26.43 inches, 2.35 inches below normal, for the Northwest Region.

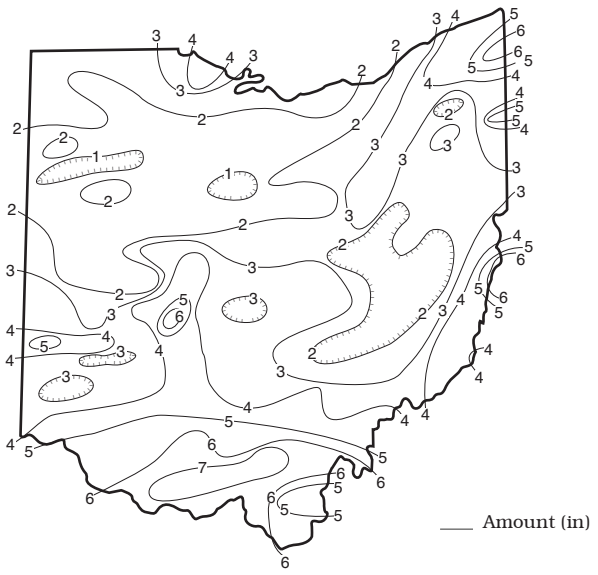
Precipitation for the 2016 calendar year is below normal throughout most of the state with only the South Central Region being above normal. The average for the state is 21.71 inches, 1.96 inches below normal. Region averages range from 27.07 inches, 1.36 inches above normal, for the South Central Region to 18.33 inches, 5.08 inches below normal, for the West Central Region.

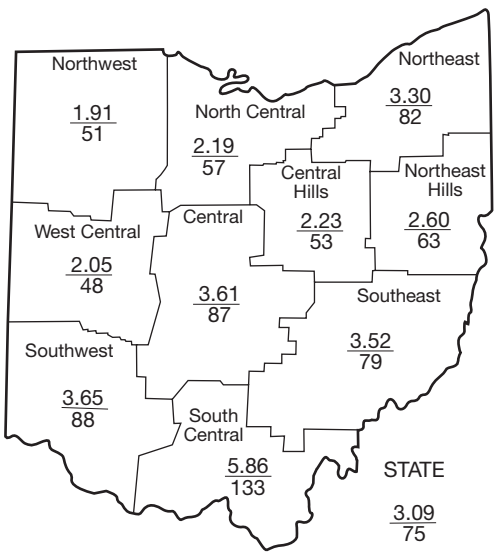
PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.) Base period 1961-2010					Palmer Drought Severity Index*
	This Month	Past 3 Mos.	Past 6 Mos.	Past 12 Mos.	Past 24 Mos.	
Northwest	-1.82	-3.27	-1.40	-3.59	+3.89	-2.3
North Central	-1.63	-3.62	-1.05	-1.96	-1.73	-3.0
Northeast	-0.73	-3.04	-0.33	-3.33	+1.04	-3.4
West Central	-2.19	-5.02	-4.05	-5.02	-1.57	-2.9
Central	-0.56	-1.65	+0.14	-2.01	-2.59	-3.1
Central Hills	-1.97	-3.50	-1.51	-4.25	-3.80	-3.4
Northeast Hills	-1.50	-3.57	-1.87	-5.62	-2.30	-4.5
Southwest	-0.50	-2.44	-0.66	-1.07	+1.54	-1.9
South Central	+1.45	+2.16	+3.14	+1.49	+5.26	-2.4
Southeast	-0.95	-1.04	+0.17	-1.26	+0.53	-3.5
State	-1.04	-2.51	-0.75	-2.68	-0.01	

*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





MEAN STREAM DISCHARGE

River and Location	Drainage Area (Sq. Mi.)	Mean Discharge (CFS)	% of Normal	% of Normal Past		
				3 Mos.	6 Mos.	12 Mos.
		This Month				
Grand River near Painesville	685	51	24	40	84	75
Great Miami River at Hamilton	3,630	972	46	44	89	104
Huron River at Milan	371	24.6	27	79	93	100
Killbuck Creek at Killbuck	464	71	36	65	83	77
Little Beaver Creek near East Liverpool	496	91	49	64	87	78
Maumee River at Waterville	6,330	723	27	71	81	80
Muskingum River at McConnelsville	7,422	1,530	33	57	84	70
Scioto River near Prospect	567	97	60	78	89	94
Scioto River at Higby	5,131	1,763	70	71	98	99
Stillwater River at Pleasant Hill	503	61	29	28	78	93

STREAMFLOW during July was noticeably below normal throughout the state. Flows across most of the state were low enough to be considered deficient. Streamflow statewide during July was less than the flows during June.

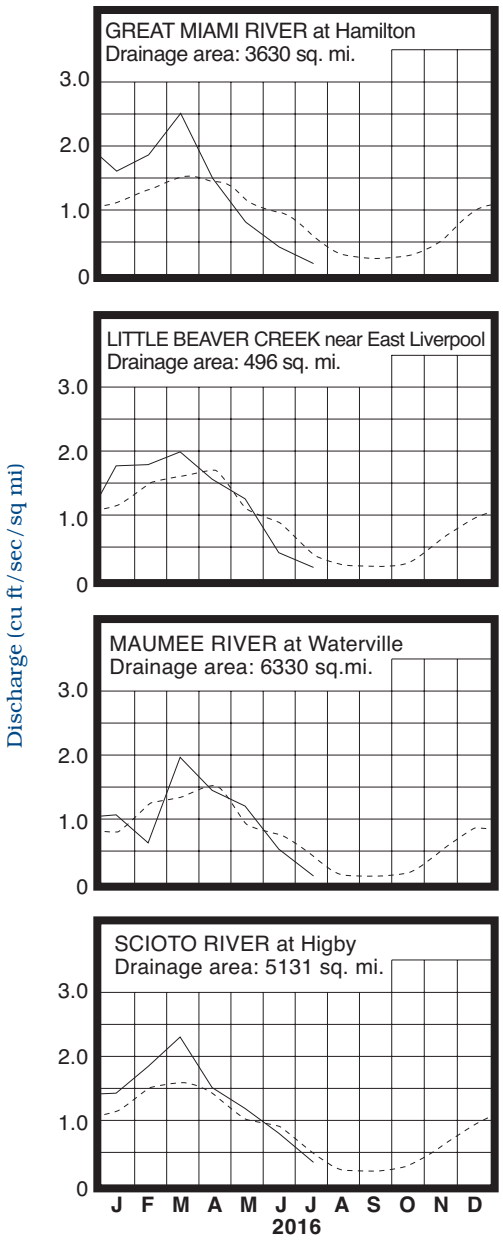
Flows at the beginning of the month were below normal throughout most of the state except in northwestern Ohio and in the Scioto River basin where flows were above normal. Flows varied across the state as they fluctuated with local precipitation. Generally, flows in northwestern, south-central and southeastern Ohio were the greatest at the beginning of July and declined throughout most of the month. Flows across west-central, southwestern and central Ohio were greatest near or just after mid-month. Streamflow in basins in the north-eastern quarter of the state recorded their greatest flow for July at or near the end of the month. Lowest flows for the month occurred during the last few days of July across most of the state, prior to the precipitation that fell late in the month. Even though flows were increasing across most of the state at the end of the month, flows remained below normal throughout most of the state; only a few basins in east-central Ohio had increased to above normal by month's end.

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

Reservoir storage at the end of July in the Mahoning basin index reservoirs was 79 percent of rated capacity for water supply compared with 88 percent for last month and 96 percent for July 2015. Month-end storage in the Scioto basin index reservoirs was 94 percent of rated capacity for water supply compared with 100 percent for last month and 98 percent for July 2015.

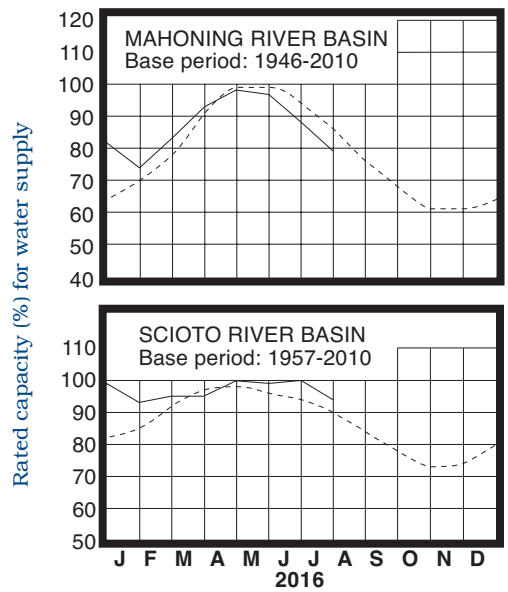
The below normal precipitation and resulting reduced streamflow across most of the state during the past two months, combined with increased evaporation and consumption have lowered storage in most reservoirs throughout Ohio. However, current surface water supplies remain adequate throughout the state.

MEAN STREAM DISCHARGE



Base period for all streams: 1981-2010

RESERVOIR STORAGE FOR WATER SUPPLY



Normal – – – – Current ———

GROUND WATER levels during July declined in aquifers throughout the state. Net ground water level declines during July from June's levels were near the expected amounts in southern Ohio, but greater in some northern Ohio aquifers.

Ground water levels declined throughout the month in most aquifers. A few exceptions were observed in shallow unconsolidated aquifers which showed some slight temporary rises following local precipitation. The below normal precipitation of the past 2-3 months across most of the state is having a negative impact on ground water storage. Ground water levels are below normal across most of the state with only some aquifers in central and southeastern Ohio remaining above normal. Index observation well PO-124 (Portage County), representing sandstone aquifers in eastern and north-eastern Ohio, reached a record-low level for July. Current ground water levels are lower than they were last year at this time, ranging from about 0.3 foot lower to more than 2.5 feet lower than the July 2015 levels. However, ground water supplies remain adequate throughout the state, but continued below normal precipitation could help to accelerate the seasonal decline in ground water until the recharge season begins. According to the Palmer Drought Severity Index, much of the state is experiencing moderate to severe drought conditions. Currently, the biggest impact the drought-like conditions are having is on agriculture as crop development is being hampered in many areas. The Ohio Agricultural Statistics Service reported that near the end of July, soil moisture was rated as being short or very short in 61 percent of the state, adequate in 34 percent of the state and surplus in 5 percent of the state.

GROUND-WATER LEVELS

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

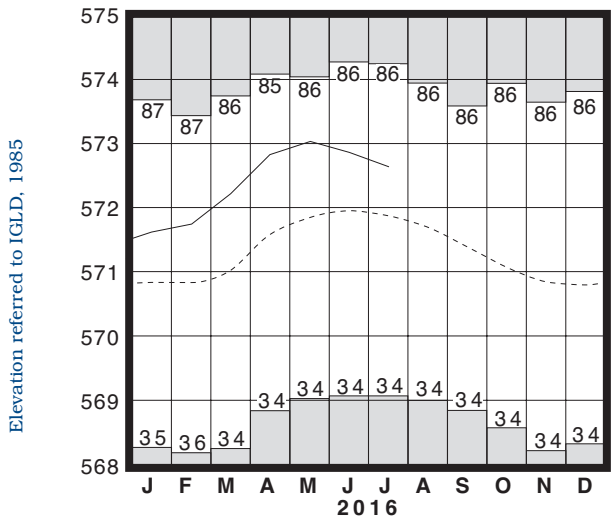
Index Well	Location	Aquifer	Mean This Month	Departure From Normal	Change in feet from:	
					Last Month	Year Ago
F-1	W. Rushville, Fairfield Co.	Sandstone	14.20	+0.92	-0.66	-2.64
Fa-1	Jasper Mill, Fayette Co.	Limestone	9.15	-1.09	-0.54	-1.00
Fr-10	Columbus, Franklin Co.	Gravel	42.54	+1.11	-0.66	-0.88
H-1	Harrison, Hamilton Co.	Gravel	23.48	-1.39	-0.56	-1.59
Hn-2a	Dola, Hardin Co.	Dolomite	6.93	-0.03	-0.09	-0.33
Po-124	Freedom, Portage Co.	Sandstone	77.49	-1.04	-0.51	-1.30
Tu-1	Strasburg, Tuscarawas Co.	Gravel	14.50	-1.57	-1.05	-2.20

LAKE ERIE level declined during July. The mean level was 572.64 feet (IGLD-1985), 0.23 foot below last month's level and 0.76 foot above normal. This month's level is 0.65 foot lower than the July 2015 level and 3.44 feet above Low Water Datum.

The U.S. Army Corps of Engineers (USACE) reports that precipitation in the Lake Erie basin during July averaged 2.45 inches, 0.94 inch below normal. Precipitation in the entire Great Lakes basin during July averaged 2.84 inches, 0.31 inch below normal. For calendar year 2016 through July, precipitation in the Lake Erie basin has averaged 18.58 inches, 2.18 inches below normal, while the entire Great Lakes basin has averaged 17.67 inches, 0.44 inch below 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 near-normal to as much as 21 inches above the normal seasonal average.

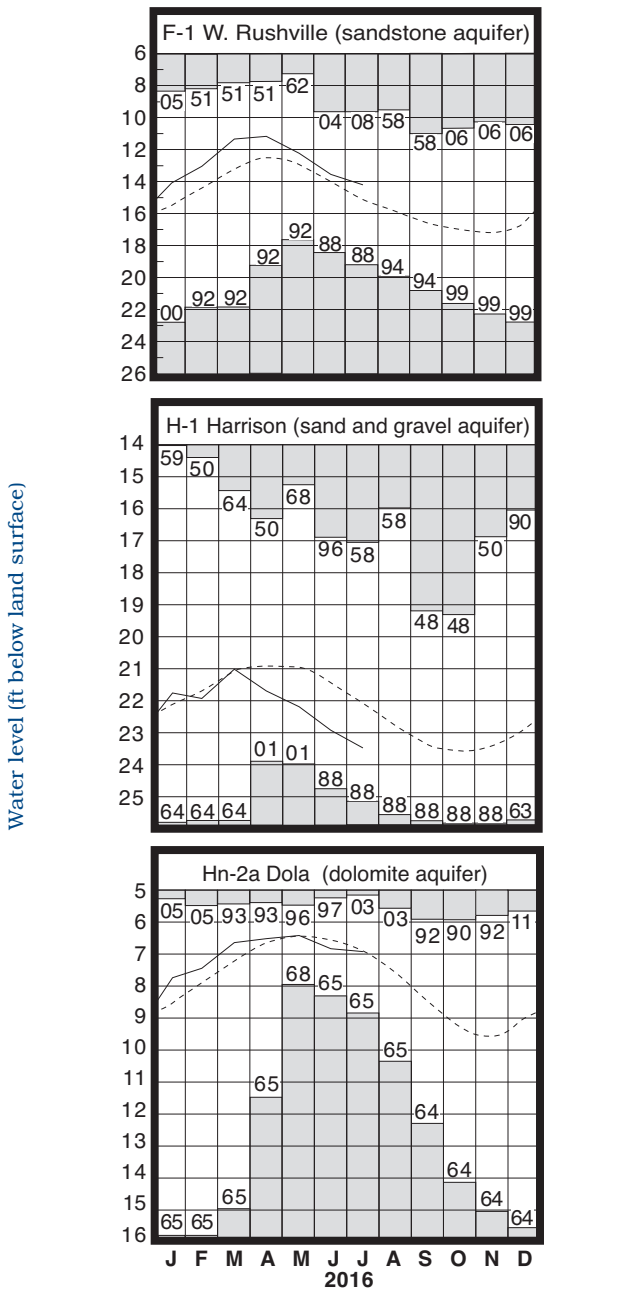
LAKE ERIE LEVELS



Base period: 1918-2010

Record high and low, year of occurrence

GROUND-WATER LEVELS



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

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

Normal – – – – Current ———

SUMMARY

Precipitation during July was below normal throughout most of Ohio, but above normal in the South Central Region and a few other isolated locations. Streamflow was below normal statewide and low enough to be considered deficient across much of the state. Reservoir storage and ground water levels declined throughout Ohio. Ground water storage is below normal across most of the state, but remains adequate. Lake Erie level declined 0.23 foot and was 0.76 foot above the long-term July average. The drought-like conditions of the past couple of months have had severe impacts on agriculture, but water supplies remain favorable.

NOTES AND COMMENTS

Division of Water Resources has New Leadership

ODNR Director James Zehringer announced on July 18, 2016 that Andrew Ware will serve an interim period as Chief of the Division of Water Resources. Andy will replace Mike Bailey, who recently accepted a position as chief of the ODNR Division of Parks and Watercraft. Mr. Ware has worked on several dam issues and serves on the Ohio Water Development Authority board. In addition to his role to oversee the Division of Water Resources through this transition period, Andy will also continue in his current role of Deputy Director, and continue to oversee the Divisions of Coastal Management and Geological Survey.

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.

Ohio Department of Natural Resources
Division of Water Resources
2045 Morse Road
Columbus, Ohio 43229-6693