



Happy
50 years
Anniversary  
MONTHLY WATER INVENTORY  
REPORT FOR OHIO
March 2004  
<http://www.dnr.state.oh.us/water/pubs/newsltrs/mwirmain.html>  
 Compiled By David H. Cashell and Scott Kirk

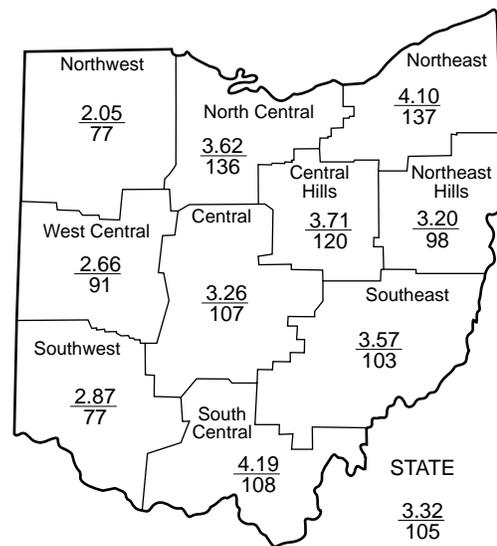
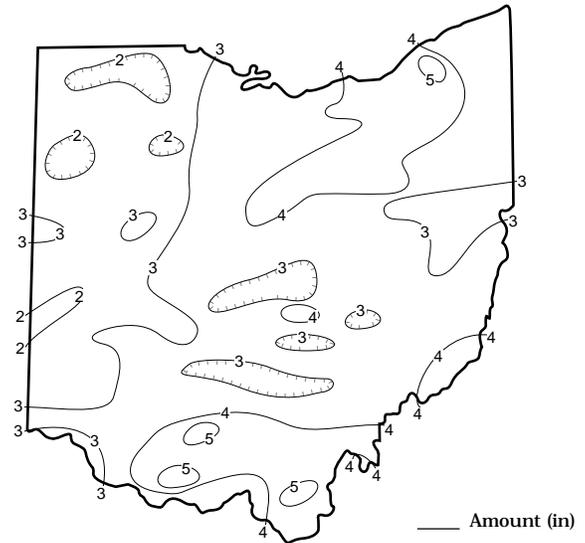
**PRECIPITATION** during March was generally above normal across the state, but below normal across the western third and in some areas of central and east-central Ohio. The average for the state as a whole was 3.32 inches, 0.15 inch above normal. Regional averages ranged from 4.19 inches, 0.30 inch above normal, for the South Central Region to 2.05 inches, 0.60 inch below normal, for the Northwest Region.

Precipitation during March fell as both rain and snow. Snow amounts were above normal in northeastern Ohio and near normal elsewhere. Chardon (Geauga County), located in the northeastern Ohio snowbelt, reported 28 inches of snow for the month, notably above the normal of 15 inches for March. Measurable precipitation fell during more than half of the days of the month; however, daily amounts on most of those days were light with a few exceptions. Precipitation fell on and off during the first 5 days of the month across the state. Precipitation amounts accumulated to generally 0.50-1.0 inch, with isolated areas of southern Ohio receiving more than 2 inches of rain. Precipitation during March 16-17 fell mostly as snow, with 2-4 inches (0.25-0.50 inch liquid, melted) reported across much of the state and 5-10 inches reported in northeastern Ohio. The most significant period of precipitation was during the last week of the month with showers occurring on several days. Precipitation amounts were generally around 1.0-2.5 inches with the lesser amounts falling across north-western Ohio. The heaviest rains during this period occurred on March 29-30 as a slow moving cold front crossed the area, dropping 1.0-1.5 inches of rain in a band from southwestern to north-central Ohio. Some minor flooding resulted from this precipitation, most notably in north-central Ohio.

Precipitation for the 2004 calendar year is above normal across most of the state, but below normal in northwestern and some areas of south-central Ohio. The average for the state as a whole is 8.46 inches, 0.46 inch above normal. Regional averages range from 10.25 inches, 1.42 inches above normal, for the Southeast Region to 4.37 inches, 2.16 inches below normal, for the Northwest Region.

Precipitation for the 2004 water year is above normal throughout most of the state, except in northwestern and areas of southwestern Ohio where it is below normal. The average for the state as a whole is 17.43 inches, 1.21 inches above normal. Regional averages range from 20.63 inches, 3.52 inches above normal, for the Southeast Region to 11.73 inches, 2.39 inches below normal, for the Northwest Region (see Precipitation table, departure from normal, past 6 months column).

**PRECIPITATION MARCH**



**PRECIPITATION**

Region	DEPARTURE FROM NORMAL (IN.) Base period 1951-2000					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-0.60	-2.16	-2.39	+6.40	+0.86	+1.2
North Central	+0.95	-0.27	+1.36	+8.02	+5.95	+3.6
Northeast	+1.11	+0.61	+0.91	+11.39	+10.05	+4.4
West Central	-0.27	+0.03	+1.56	+13.67	+13.64	+2.7
Central	+0.22	+2.26	+2.35	+10.54	+11.47	+2.7
Central Hills	+0.61	+1.37	+0.85	+8.65	+6.76	+2.8
Northeast Hills	-0.08	+1.42	+1.78	+11.90	+9.41	+3.4
Southwest	-0.84	+0.11	-0.51	+7.04	+11.34	+2.0
South Central	+0.30	-0.15	+2.50	+11.60	+15.33	+3.3
Southeast	+0.09	+1.42	+3.52	+12.05	+13.19	+3.9
State	+0.15	+0.46	+1.21	+10.09	+9.74	

\*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

River and Location	Drainage Area (Sq. Mi.)	Mean Discharge (CFS)	% of Normal	This Month		
				% of Normal Past		
				3 Mos.	6 Mos.	12 Mos.
Grand River near Painesville	685	2,328	139	123	125	144
Great Miami River at Hamilton	3,630	4,095	80	130	155	167
Huron River at Milan	371	791	132	124	164	159
Killbuck Creek at Killbuck	464	783	87	107	128	146
Little Beaver Creek near East Liverpool	496	1,003	90	132	152	171
Maumee River at Waterville	6,330	8,670	89	77	103	147
Muskingum River at McConnelsville	7,422	11,560	74	177	202	125
Scioto River near Prospect	567	949	104	117	164	182
Scioto River at Higby	5,131	6,797	75	135	146	152
Stillwater River at Pleasant Hill	503	490	68	100	143	151

**STREAMFLOW** during March was below normal across most of the state, but above normal in north-central and northeastern Ohio. Flows during March increased seasonally from the February flows across much of northwestern and north-central Ohio, but decreased elsewhere.

Flows at the beginning of the month were below normal across most of the state except for a few basins in extreme northern Ohio where they were above normal. Flows increased during the first week of March in response to the precipitation that fell during this time with the greatest flows for the month in the western third of the state observed during March 5-6. Flows decreased statewide the next 9-12 days as only light precipitation fell statewide. Low flows for the month occurred during March 15-18 across the state. Flows increased statewide

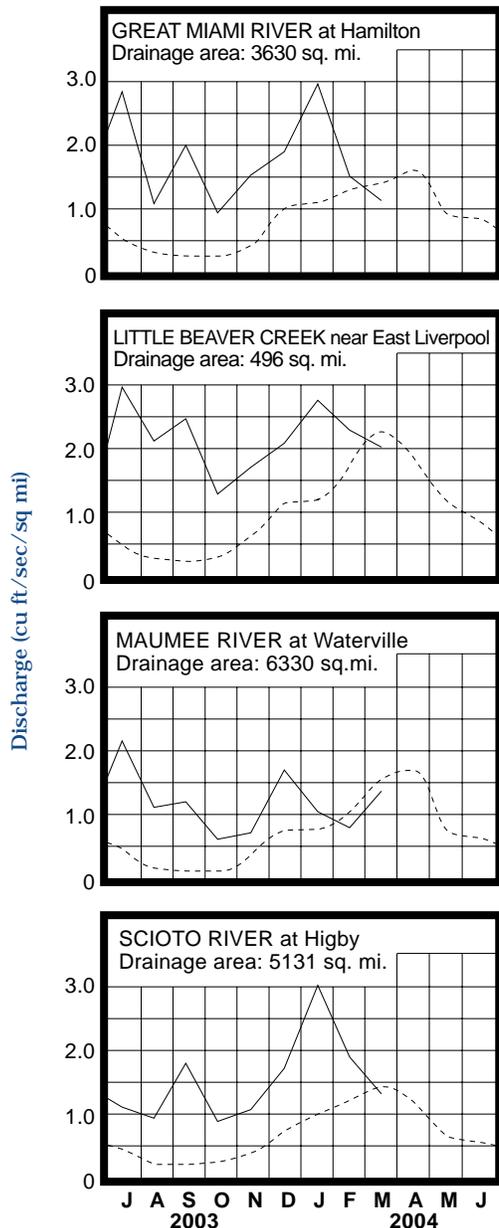
responding to precipitation that fell on March 16, 18 and 20, resulting in the greatest flows for the month in the eastern third of Ohio during March 21-23. Greatest flows for the month in the central third of the state occurred at the end of March following precipitation that fell during March 29-30. Some minor flooding was reported, most notably in north-central Ohio. Flows at the end of the month were above normal across most of the state, except for some basins in northwestern and some areas of east-central Ohio where they were below normal.

**RESERVOIR STORAGE** during March increased in both the Mahoning and Scioto river basins. Storage was near or above normal statewide.

Reservoir storage at the end of March in the Mahoning basin index reservoirs was 100 percent of rated capacity for water supply compared with 82 percent for last month and 99 percent for March 2003. Month-end storage in the Scioto basin index reservoirs was 97 percent of rated capacity for water supply compared with 95 percent for last month and 96 percent for March 2003.

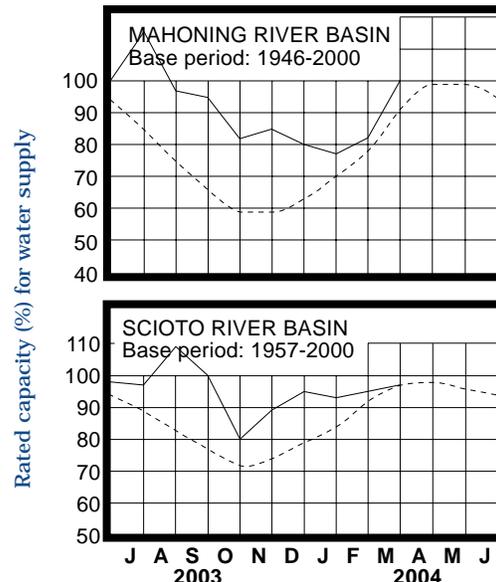
Surface water supplies are in excellent condition throughout the state. The first half of the 2004 water year has been favorable for surface water resources throughout Ohio. Recreational reservoirs are expected to soon be filling to summer pool levels.

### MEAN STREAM DISCHARGE



Base period for all streams: 1971-2000

### 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 March showed mixed responses. Net changes during March from February's levels were less than usually observed in all aquifers. Levels in most consolidated aquifers remained relatively stable throughout the month before rising near the end of March, while levels in most unconsolidated aquifers declined during the month before rising at month's end.

Ground water supplies remain adequate across the state. However, the current recharge season thus far has not been as favorable as anticipated for replenishing the state's ground water supplies. Generally, ground water levels are below normal in unconsolidated aquifers and above normal in consolidated aquifers. Current levels are higher than they were a year ago across the northern half of the state, but lower in the southern half of Ohio. With a couple of months remaining in the nominal recharge season, near normal precipitation and other climatic conditions could still provide adequate recharge to the state's ground water supplies. Soil moisture conditions across the state are favorable for additional recharge, benefiting from the precipitation that fell during the second half of March. The Ohio Agricultural Statistics Service reports that near the end of March, soil moisture was rated as being adequate in 28 percent of the state and surplus in 72 percent of the state.

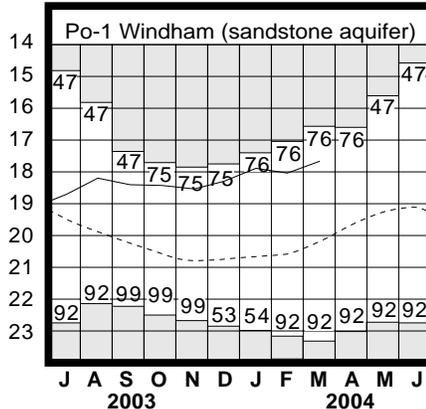
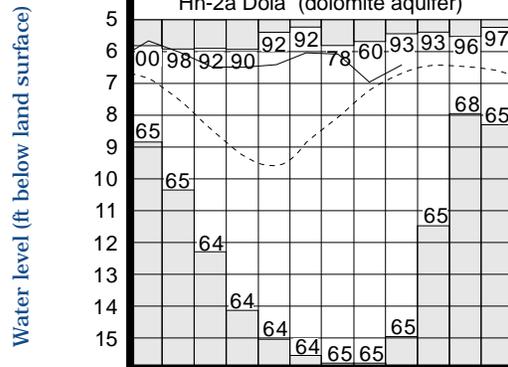
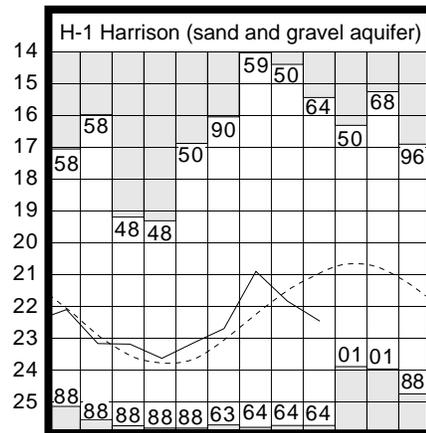
**LAKE ERIE** level rose during March. The mean level was 570.73 feet (IGLD-1985), 0.32 foot higher than last month's mean level and 0.37 foot below normal. This month's mean level is 0.55 foot higher than the March 2003 level and 1.53 feet above Low Water Datum.

The U.S. Army Corps of Engineers (USACE) reports that precipitation in the Lake Erie basin during March averaged 3.50 inches, which is 0.75 inch above normal. For the entire Great Lakes basin, March precipitation averaged 2.87 inches, which is 0.71 inch above normal. For calendar year 2004 through March, the Lake Erie basin has averaged 6.80 inches of precipitation, 0.45 inch below normal, while the entire Great Lakes basin has averaged 6.12 inches, 0.03 inch 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 between 4-7 inches below the long-term seasonal average for the foreseeable future. Deviations from the anticipated weather patterns could result in the level of Lake Erie ranging from as high as 2 inches above to as much as 16 inches below the normal seasonal average.

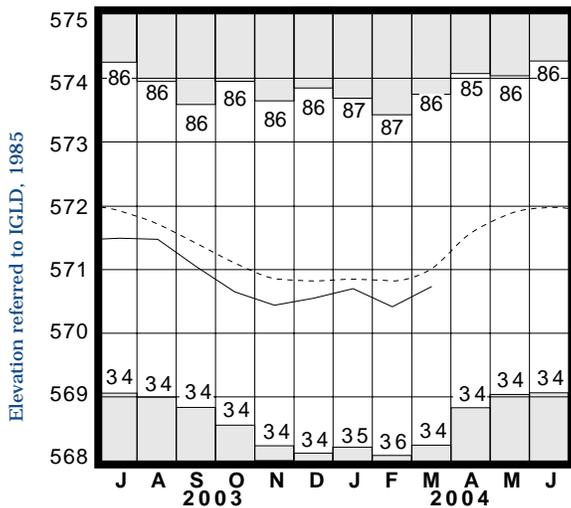
Index Well	Location	Aquifer	Mean This Month	Departure From Normal	Change in feet from:	
					Last Month	Year Ago
F-1	W. Rushville, Fairfield Co.	Sandstone	12.48	+0.84	-0.67	-0.34
Fa-1	Jasper Mill, Fayette Co.	Limestone	8.23	-1.31	-0.13	-0.33
Fr-10	Columbus, Franklin Co.	Gravel	43.66	-1.13	+0.31	+1.11
H-1	Harrison, Hamilton Co.	Gravel	22.46	-1.52	-0.63	-0.32
Hn-2a	Dola, Hardin Co.	Dolomite	6.41	+0.29	+0.56	+1.54
Po-1	Windham, Portage Co.	Sandstone	17.66	+2.53	+0.37	+3.19
Tu-1	Strasburg, Tuscarawas Co.	Gravel	12.26	-0.59	-0.48	+1.47

## GROUND-WATER LEVELS



Water level (ft below land surface)

## LAKE ERIE LEVELS



Base period: 1918-2000

□ Record high and low, year of occurrence

Base periods: H-1, 1951-2000. Hn-2a, 1955-2000.

Po-1, 1947-2000 □ Record high and low, year of occurrence

Normal - - - - Current ———

## SUMMARY

Precipitation during March was generally above normal across much of the state but below normal in the western third and in some areas of central and east-central Ohio. Streamflow was below normal across most of the state, but above normal in northwestern and northeastern Ohio. Reservoir storage increased and was near or above normal statewide. Ground water levels had mixed responses. Lake Erie level rose 0.32 foot and was 0.37 foot below the long-term March average.

## NOTES AND COMMENTS

### MWIR CELEBRATES 50 YEARS OF PUBLICATION

March 2004 marks the 50<sup>th</sup> anniversary of the *Monthly Water Inventory Report For Ohio* (MWIR). The report, first published in March 1954, was originally titled *Monthly Summary of Ground Water Levels in Index Wells in Ohio*. In January 1955, the name was changed to the *Monthly Index of Conditions Affecting Water Supply*, and in January 1973, the current title was unveiled.

For the past 50 years, the purpose of the MWIR has remained the same - to disseminate current hydrologic and other pertinent data in a timely manner and in a brief format which are sufficiently representative of current water conditions to permit an evaluation of the statewide water supply situation. These key observation points, often referred to as index stations, offer the best available data based on accuracy, length of record, minimal artificial effects on data and availability of records. In many cases, the same observation points, or stations, have been used during the past 50 years, providing for consistency and reliability of the data. Data from these stations are collected monthly by various federal and state agencies, processed immediately and made available to the ODNR-Division of Water. It is through these cooperative efforts and long-term partnerships that the MWIR has been able to endure and provide this wealth of timely information to citizens, water managers, government agencies, consulting companies, educators and many more. Special recognition goes out to the U.S. Geological Survey, National Weather Service, U.S. Army Corps of Engineers, Miami Conservancy District, the many, many ODNR employees past and present, and all the others who have assisted in the production along the way. Special thanks go to Dave Orr, the Division of Water's Electronic Design Specialist, for his many years of helping in the publication of the MWIR.

A major factor in the success of the MWIR is in the presentation. The information is presented in a brief, concise and consistent manner in a format of a technical report as opposed to a newsletter. While the author of a newsletter is always searching for new material, the type of information used in the MWIR is standardized from issue to issue. However, the Notes and Comments section of the MWIR allows the author some flexibility from the standard format to bring attention to various hydrologic or ODNR-related items. The graphical presentation of the data allows for a quick evaluation of current conditions, and also provides for an easy comparison with normal and historic records, and recent conditions and trends. Although the author may include opinions of the cause and significance of the reported information, the data allows for the reader to make their own evaluation of the current conditions.

Paul Kaser is the person responsible for originating and developing the idea of the MWIR. Paul was a long time Division of Water employee who was instrumental in developing and managing the ground water observation well monitoring program in Ohio for many years. He also authored several reports that presented and analyzed the data from this statewide network. It was through these experiences that in 1954 Paul conceived the idea to publish a monthly report that presented in brief form hydrologic data from across the state. Paul authored the report from March 1954 through mid-1966. During this time, one of the worst droughts on record plagued Ohio in the early 1960s. Paul retired in the early 1970s and moved to Arizona where he lived until his death in October 1996. Leonard Harstine, who took over authorship in 1966, has the distinction of having the longest tenure as author of the MWIR. Leonard was the author into 1987 and was responsible for redesigning the report to a smaller format, similar to the current design. Leonard retired from ODNR in 1988 and resides in Columbus. Dave Cashell became author of the MWIR in 1987. Dave oversaw the redesign of the MWIR in 1989 to the current format, a somewhat larger version that allowed for additional data and statistics to be included in each issue. Dave began his career at the Division of Water in January 1979. The current author is Scott Kirk. Scott has been with the Division of Water since March 1980. Scott has been instrumental in the preparation of the report since 2001 and has assumed the majority of the duties. However, Dave Cashell is still a major contributor to the production of the MWIR.

Many significant natural phenomena to numerous to mention have occurred during the 50 years the MWIR has been published. Among the more notable are: the January 1959 floods; the early 1960's drought mentioned above; the July 4<sup>th</sup>, 1969 flooding; the April 1974 Xenia tornado; the January 1978 blizzard; and the June 1990 Shadyside flash flooding. In addition to these major events, many other notable events have occurred throughout the years. Although many were smaller in scope, they were nonetheless as noteworthy to the people and property impacted. Many of these events will be revisited in the pages of the MWIR during the upcoming year.

A special debt of gratitude goes out to all the Division of Water and Department of Natural Resources administrations that have supported the publication of this report for 50 years. Many thanks also go to all the readers who have taken an interest in the data and information we provide in the MWIR. It is for you that the MWIR is produced. Comments and suggestions are always welcomed.

## ACKNOWLEDGMENTS



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This report has been compiled from Division of Water 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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