



# MONTHLY WATER INVENTORY REPORT FOR OHIO

January 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

(continued from front page)

inches above normal, for the Northeast Region to 8.72 inches, 0.49 inch below normal, for the Northwest Region.

Calendar year 1994 is off to a good start as far as precipitation is concerned. Even though the snow is inconvenient and the frozen soils reduced infiltration, water supplies should benefit from the above normal precipitation. Near-normal precipitation during the remainder of the recharge season will ensure the continued improvement in water-supply storage.

## SUMMARY

Precipitation was above normal throughout the state. Streamflow was excessive in most of Ohio's drainage basins. Moderate flooding caused by snowmelt, rainfall and ice jams occurred during the last few days of the month. Reservoir storage increased and remained at above normal levels. Ground-water storage was stable but began to increase at the end of the month. Lake Erie level declined 0.29 foot and was 0.99 foot above the long-term January average.

## NOTES AND COMMENTS

### CLINTON COUNTY WATER RESOURCES RECONNAISSANCE STUDY

The Louisville District of the U. S. Army Corps of Engineers has released the "Clinton County, Ohio Water Resources Reconnaissance Study." The study considered water supply needs for the area around Caesar Creek Lake to determine if any modifications to the Corps project are needed to meet future water supply needs. The finding of the study is that no additional water supply storage is needed in Caesar Creek Lake.

The Water Planning Unit of the Division of Water provided planning assistance in the development of this reconnaissance report. Assessments were made of area water supply systems and sources and projections made of future demand for water. In addition, an analysis of the lake's water quality was conducted by the Corps as part of the study. Copies of the report were distributed to area water suppliers and to the Division of Water where it is available for viewing.

### LOGJAM REMOVAL TASK FORCE REPORT COMPLETED

The report of the Logjam Removal Task Force (LJRTF) has been sent to the Ohio Emergency Management Agency for transmittal to the Federal Emergency Management Agency (FEMA). The Ohio Department of Natural Resources served as the lead agency for this task force. The Division of Water compiled the report. The formation of the LJRTF was recommended after the Massieville (Ross County) flooding in the "Inter-Agency Hazard Mitigation Team Report, Ohio Flooding July 1992" prepared by FEMA.

The report contains an analysis of the current situation facing landowners regarding the removal of debris from Ohio's streams, statutory and regulatory authorities related to obstruction removal, a description of the LJRTF's consensus opinion of what should be accomplished in obstruction removal projects and recommendations of several actions to facilitate those projects in the future. Copies of the LJRTF's report are available from the Division of Water (contact: Margo Fulmer at (614) 265-6757).

**PRECIPITATION** for January was above normal throughout Ohio; only a few scattered locations had below normal precipitation. The state average was 3.54 inches, 0.78 inch above normal. Regional averages ranged from 4.85 inches, 1.88 inches above normal, for the Southeast Region to 2.43 inches, 0.25 inch above normal, for the Northwest Region. Marietta State Nursery (Washington County) reported the greatest amount of precipitation for the month, 6.88 inches. Lima (Allen County) reported the least amount, 1.98 inches.

Precipitation during January generally fell as snow during most of the month especially in the northern two-thirds of the state, but as rain on several days during the last week. Many locations reported measurable precipitation on one-third to nearly one-half of the days in January, but only a few days had significant amounts of precipitation. Storms passed through Ohio on January 3-4 dumping large accumulations of snow especially in south-central and southeastern Ohio counties where more than two feet was reported in some areas. Snow emergencies were declared in many areas. Small amounts of snow continued to be added to this through mid-month as sub-freezing temperatures restricted melting. Another storm passed through Ohio on January 16-17 with additional large accumulations of snow in many areas of the state. Bitterly cold temperatures had invaded Ohio a day or two prior to this storm, but after this storm system passed through the state, record-breaking cold temperatures settled in across Ohio through the end of the week. Temperatures warmed to above freezing early the last week of the month and the snow which had accumulated all month began to melt. Another storm system arrived with the warming temperatures and unfortunately, produced widespread rain. Most areas of Ohio reported from 1 inch to more than 2 inches of rain during January 25-28. The snowmelt and rainfall, compounded by ice jams, brought many streams and rivers out of their banks. Moderate flooding was a problem statewide including the Ohio River and the Lake Erie shoreline. Governor Voinovich has requested that 20 eastern Ohio counties be declared federal disaster areas as a result of the major snowfall and flooding during the month.

Precipitation for the 1994 water year is above normal throughout most of the state with only the Northwest Region having slightly below normal precipitation. The state average is 13.32 inches, 2.99 inches above normal. Regional averages range from 14.72 inches, 3.89

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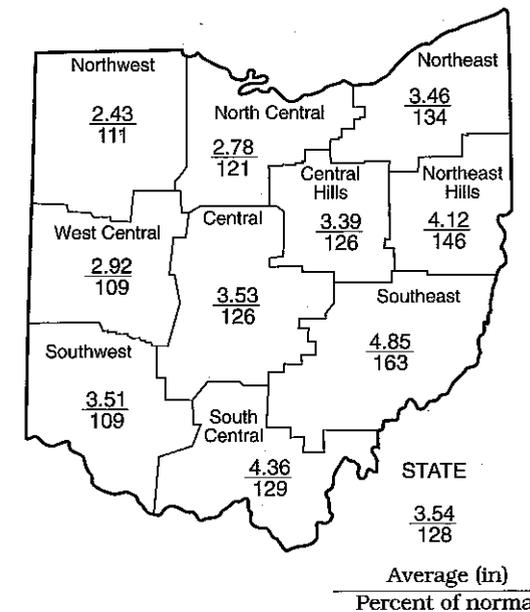
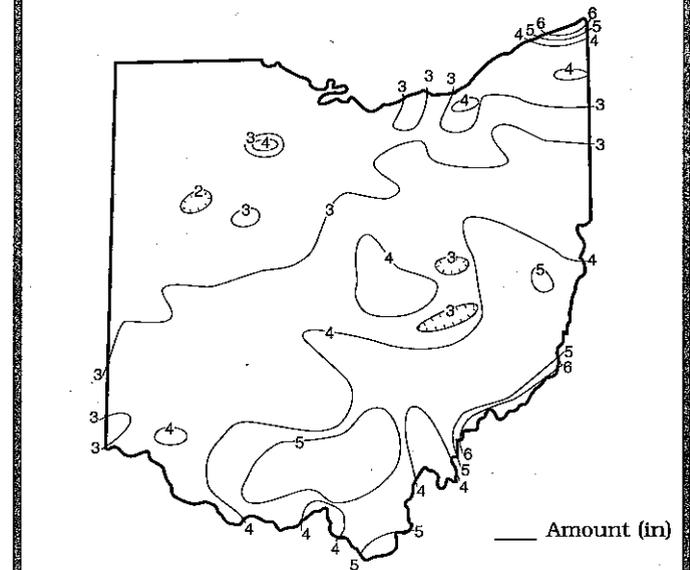
## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	+0.25	+0.04	-0.02	-0.64	+8.33	-1.1
North Central	+0.48	+2.36	+1.42	-0.64	+10.64	-0.2
Northeast	+0.87	+3.37	+4.12	+4.01	+13.66	+2.4
West Central	+0.25	+3.30	+3.20	+6.89	+12.61	+0.8
Central	+0.72	+2.95	+1.96	+3.79	+8.81	+1.9
Central Hills	+0.69	+3.45	+1.62	+2.11	+6.11	+0.6
Northeast Hills	+1.29	+3.40	+3.20	+3.18	+4.59	+2.3
Southwest	+0.28	+1.67	+1.64	+0.03	-0.84	+1.5
South Central	+0.99	+1.66	+0.34	-3.39	-9.19	+0.1
Southeast	+1.88	+2.97	+2.80	+0.42	-3.15	+1.8
State	+0.78	+2.53	+2.03	+1.60	+5.17	

\*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  
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-3.0 To -3.9 = Severe Drought  
Below -4.0 = Extreme Drought

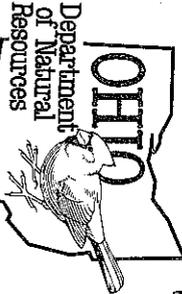
## PRECIPITATION JANUARY 1994



## ACKNOWLEDGMENTS

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 Consergency 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.



DIVISION OF WATER  
1939 FOUNTAIN SQUARE  
COLUMBUS, OHIO 43224

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Governor

Frances S. Buchholzer  
Director

James R. Morris  
Chief

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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	2,096	199	130	108	116
Great Miami River at Hamilton	3,630	6,131	207	171	158	144
Huron River at Milan	371	489	138	148	120	117
Killbuck Creek at Killbuck	464	617	164	133	117	112
Little Beaver Creek near East Liverpool	496	858	173	128	116	107
Maumee River at Waterville	6,330	5,182	165	90	76	110
Muskingum River at McConnelsville	7,422	8,575	108	133	118	109
Scioto River near Prospect	567	852	252	244	206	138
Scioto River at Higby	5,131	7,480	201	155	132	123
Stillwater River at Pleasant Hill	503	906	251	283	244	166

**STREAMFLOW** during January was above normal throughout Ohio as a result of high flows near the end of the month. Flows in most areas of the state were high enough to be considered excessive.

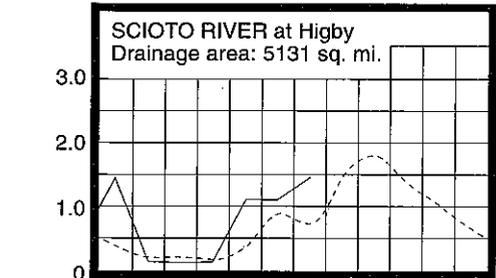
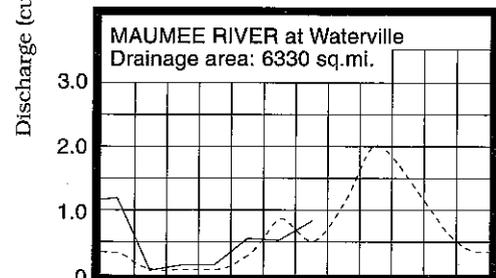
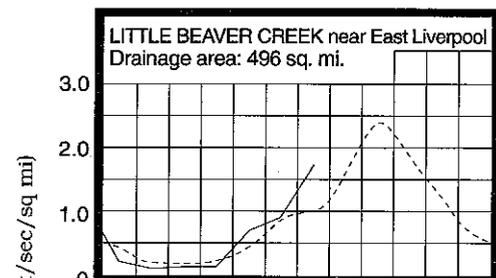
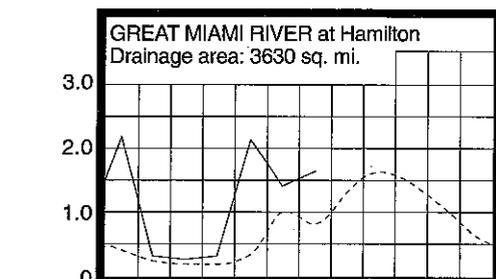
Flows at the beginning of the month were below normal throughout most of the state; only the extreme northeastern drainage basins started the month with above normal flows. Generally, flows were rather stable during most of the month, increasing slightly following precipitation and declining as soils and surface moisture re-froze. Lowest flows for January in most drainage basins occurred around mid-month. Flows increased rapidly during the last week of the month following snowmelt and precipitation. The runoff from

frozen soils, compounded by ice jams, caused moderate flooding of low-lying areas, streams and rivers and also along the Ohio River and the Lake Erie shoreline. The eastern half of the state was the most severely impacted. The greatest flows for January occurred just before the end of the month, and as January ended, flows remained excessive throughout the state.

**RESERVOIR STORAGE** for water supply during January increased noticeably in both the Mahoning and Scioto river basins. Storage remained above normal in both basins.

Reservoir storage at the end of January in the Mahoning basin index reservoirs was 92 percent of rated capacity for water supply compared with 75 percent for last month and 79 percent for January 1993. Month-end storage in the Scioto basin index reservoirs was 107 percent of rated capacity for water supply compared with 93 percent for last month and 105 percent for January 1993.

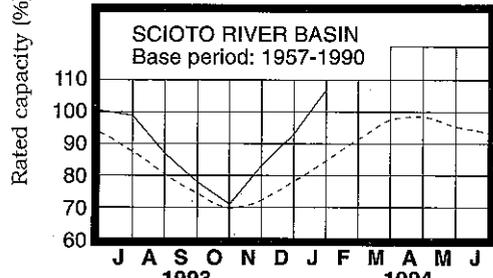
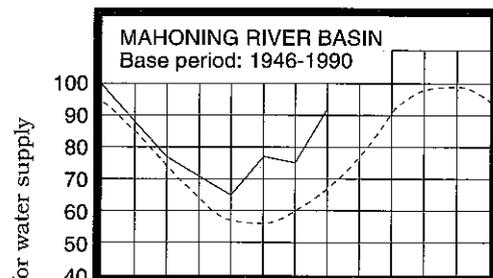
MEAN STREAM DISCHARGE



Base period for all streams: 1961-1990

Normal - - - - Current - - - -

RESERVOIR STORAGE FOR WATER SUPPLY



**GROUND-WATER LEVELS** during January were stable or declined during most of the month, but began to rise sharply near the month's end. Net changes from December's levels during January were less than usually observed.

Ground-water storage continues to remain at below normal levels in the eastern half of the state. Also, storage in most aquifers is lower than last year; however, levels in shallow aquifers, especially unconsolidated aquifers adjacent to rivers, were rising at the end of January. The frozen soils could reduce the amount of delayed recharge to deeper aquifers. Even though conditions favor continued improvement in ground-water storage, near-normal climatic conditions will be necessary to initiate and sustain the projected improvement.

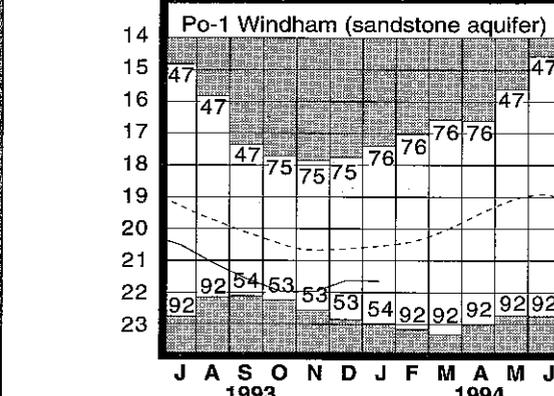
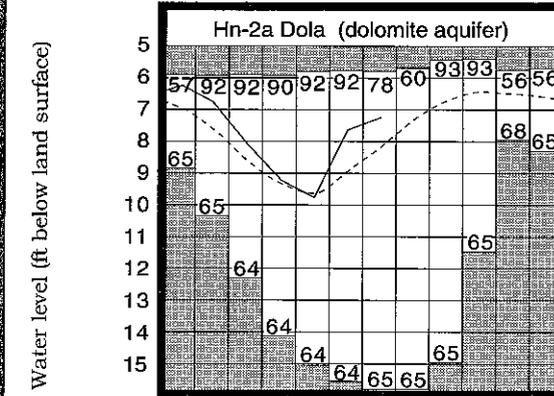
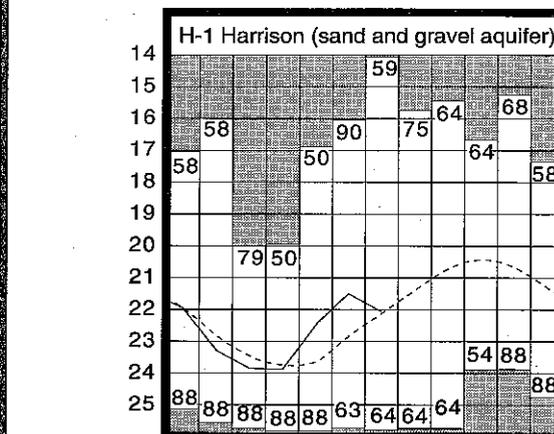
**LAKE ERIE** level declined during January. The mean level was 571.59 feet (IGLD-1985), 0.29 foot below last month's mean level and 0.99 foot above normal. This month's level is 1.24 feet below the January 1993 level and 2.39 feet above Low Water Datum.

GROUND-WATER LEVELS

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

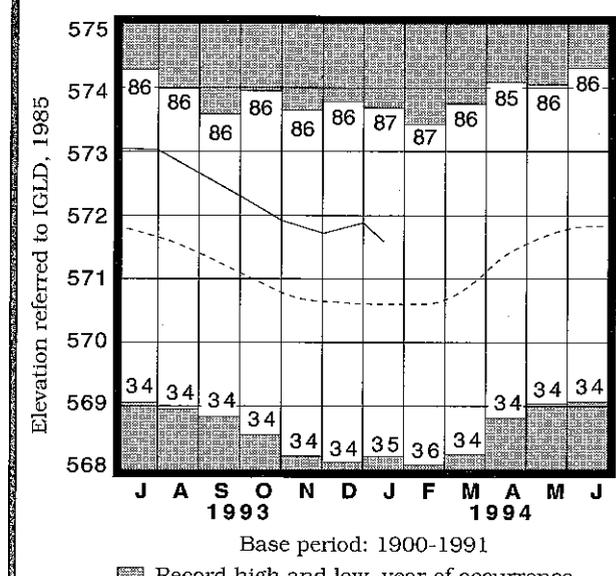
Index Well	Location	Aquifer	Mean This Month	Departure From Normal	Change in feet from:	
					Last Month	Year Ago
F-1	W. Rushville, Fairfield Co.	Sandstone	16.45	-0.90	+0.43	+1.09
Fa-1	Jasper Mill, Fayette Co.	Limestone	7.80	-0.36	+0.61	-0.44
Fr-10	Columbus, Franklin Co.	Gravel	42.78	+0.83	+0.19	-0.18
H-1	Harrison, Hamilton Co.	Gravel	22.07	+0.06	-0.48	-0.17
Hn-2a	Dola, Hardin Co.	Dolomite	7.26	+0.94	+0.37	-1.14
Po-1	Windham, Portage Co.	Sandstone	21.63	-1.08	-0.02	-0.59
Tu-1	Strasburg, Tuscarawas Co.	Gravel	15.22	-2.29	-0.01	-1.49

GROUND-WATER LEVELS



Base periods: H-1, 1951-1990. Hn-2a, 1955-1990. Po-1, 1947-1990. Record high and low, year of occurrence

LAKE ERIE LEVELS at Fairport



Normal - - - - Current - - - -



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February 1994

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Water Inventory Unit

## SUMMARY

Precipitation during February was below normal in most of Ohio with only the South Central Region receiving above normal precipitation. Streamflow was above normal statewide with some minor flooding around February 24. Ice jams caused additional problems along the Lake Erie shoreline. Reservoir storage declined slightly but remained at above normal levels. Lake Erie level declined 0.10 foot and was 0.89 foot above the long-term February average.

## NOTES AND COMMENTS WWFRP MOVES TO GWRS

The Water Withdrawal Facility Registration Program (WWFRP) was recently transferred to the Ground Water Resources Section's (GWRS) Water Inventory Unit from another Division of Water's section, Water Resources Development. Ohio Revised Code section 1521.16 requires, among other things, water withdrawal facilities with the capacity to withdraw more than 100,000 gallons of water per day (70 gallons per minute) to register with the Division of Water. Additionally, an annual report of the actual withdrawal is required to be filed with the Division.

The transfer of the WWFRP to the GWRS will improve the overall function of the program in many ways. Nearly 70 percent of the registered facilities use ground water as all or part of their source. The GWRS relies on the WWFRP information for many projects and the WWFRP is continuously reviewing the GWRS well logs. Proximity will make this effort more efficient. Also, the Division's large basic data files (well logs, ground-water levels, precipitation, etc.) are maintained in the GWRS. A central location for this data that are frequently requested by the general public, business, and other government agencies will make access easier. Overall management, QA/QC, and interaction will also be improved.

## TWO EMPLOYEES JOIN GWRS STAFF

Allan Luczyk has joined the GWRS as a water resource specialist. Al has been employed at ODNR since 1980. He previously worked for the divisions of Oil and Gas and Geological Survey as an environmental technician. In 1991, he transferred to the Division of Water where he started working with the WWFRP. At the GWRS he will continue to maintain the WWFRP data files, provide technical assistance and answer requests for information.

Al has a Bachelor of Science degree from Bowling Green State University with a dual major in geology and geography. After work, Al enjoys fishing, golf and various outdoor activities with his wife and three children.

Gregg Russell has joined the GWRS as a records management officer. Gregg has been employed at ODNR since 1986. He previously worked for the divisions of Reclamation and Watercraft as a data entry and computer operator. At the GWRS, Gregg will be assisting in maintaining the division's well log data base and computerization process on the Wang computer/optical disk system. Holding a degree in data processing has been a valuable asset for Gregg in his employment at ODNR. After work, Gregg can often be found walking through one of the Franklin County Metro Parks. Gregg insists that walking is the best way to unwind from a hard day at the office and a computer terminal.

**PRECIPITATION** for February was below normal throughout most of Ohio with only the South Central Region having above normal precipitation. The state average was 1.84 inches, 0.40 inch below normal. Regional averages ranged from 3.99 inches, 1.21 inches above normal, for the South Central Region to 1.03 inches, 0.84 inch below normal, for the North Central Region. Gallipolis Locks and Dam (Gallia County) reported the greatest amount of precipitation for the month, 5.27 inches. Willard (Huron County) reported the least amount, 0.52 inch. Many locations in the northern one-third of the state received less than 1 inch of precipitation in February.

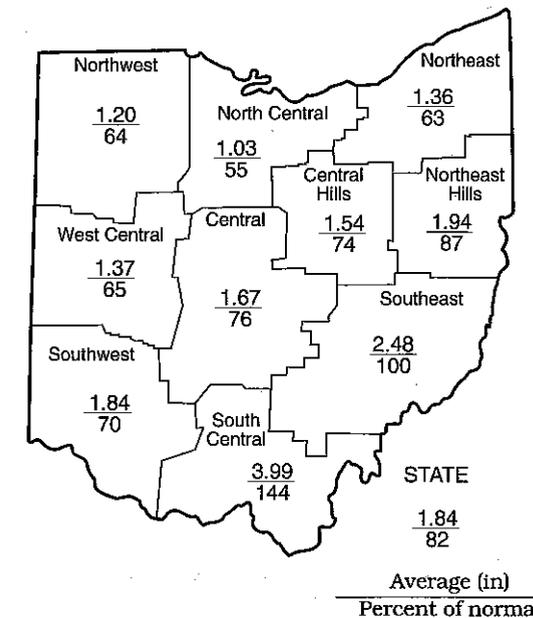
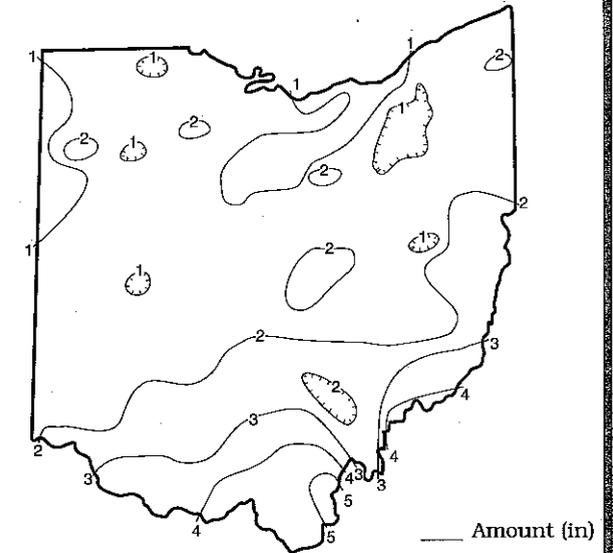
Most of the precipitation during February fell during two stormy periods. The first was during February 7-9 when the central and southern areas of the state were coated with several inches of ice caused by freezing rain. The precipitation fell as snow in the northern portion of the state. Total precipitation (liquid, melted) ranged from more than 2 inches in extreme southern Ohio to less than 0.5 inch in northern Ohio. The ice coating in central and southern Ohio remained for more than a week as temperatures consistently ranged below normal.

The second stormy period was during February 20-24. The precipitation fell as rain in most of Ohio early in this period but changed to snow statewide by the end of the five day period. Once again, the southern half of the state received the most precipitation with between 1 and 2 inches reported at most locations. The greatest amounts fell during February 23 which resulted in minor flooding in some areas.

Precipitation for the 1994 calendar year is above normal in the eastern half of Ohio and below normal in the western half. The state average is 5.38 inches, 0.38 inch above normal. Regional averages range from 8.35 inches, 2.20 inches above normal, for the South Central Region to 3.63 inches, 0.39 inch below normal, for the Northwest Region.

Precipitation for the 1994 water year is above normal throughout most of Ohio with only the Northwest Region having below normal precipitation. The state average is 15.17 inches, 2.60 inches above normal. Regional averages range from 17.91 inches, 3.79 inches above normal, for the South Central Region to 9.92 inches, 1.13 inches below normal, for the Northwest Region.

## PRECIPITATION FEBRUARY 1994



## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-0.64	-1.43	+0.64	-1.08	+8.26	-1.3
North Central	-0.84	-0.67	+2.94	-1.41	+9.89	-2.3
Northeast	-0.81	+0.03	+5.10	+3.28	+13.03	+0.3
West Central	-0.74	-0.88	+3.72	+6.13	+13.07	+1.2
Central	-0.54	-0.25	+3.79	+3.25	+9.36	+1.8
Central Hills	-0.55	-0.04	+3.97	+1.90	+6.38	-0.6
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Southwest	-0.78	-1.07	+1.73	-0.82	+0.07	+0.8
South Central	+1.21	+1.46	+3.97	-1.82	-6.96	+1.0
Southeast	-0.01	+1.21	+4.72	+0.59	-1.97	+1.9
State	-0.40	-0.09	+3.59	+1.29	+5.63	

\*Above +4 = Extreme Moist Spell  
3.0 To 3.9 = Very Moist Spell  
2.0 To 2.9 = Unusual Moist Spell  
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0.4 To -0.4 = Near Normal

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Lake Erie level data:  
U.S. Army Corps of Engineers, Detroit District.  
Palmer Drought Severity Index:  
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**MEAN STREAM DISCHARGE**

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				This Month		
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Great Miami River at Hamilton	3,630	5,018	103	135	149	147
Huron River at Milan	371	554	119	103	117	126
Killbuck Creek at Killbuck	464	1,013	145	131	120	122
Little Beaver Creek near East Liverpool	496	957	114	120	110	111
Maumee River at Waterville	6,330	8,301	118	92	88	118
Muskingum River at McConnelsville	7,422	20,426	168	136	131	121
Scioto River near Prospect	567	925	138	155	173	148
Scioto River at Higby	5,131	10,993	145	138	133	131
Stillwater River at Pleasant Hill	503	642	115	145	182	170

**STREAMFLOW** during February was above normal throughout the state. Flows in the south-central and east-central drainage basins were high enough to be considered excessive. Streamflow during February increased seasonally from the flows during January.

Flows at the beginning of the month were noticeably above normal statewide, still responding to the runoff of precipitation and snowmelt of late January. Many areas had their greatest flows for February at the start of the month. Generally, flows declined until reaching their lowest point at mid-month. Flows then began to increase slowly as ice and snow melted, and then rose sharply after February 20 following widespread precipitation.

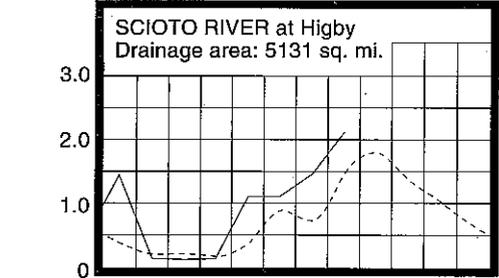
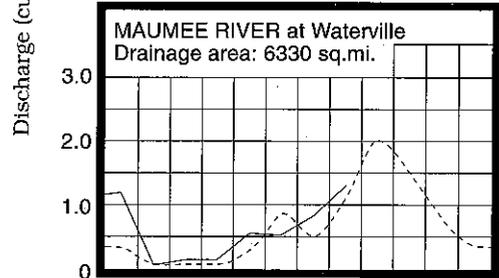
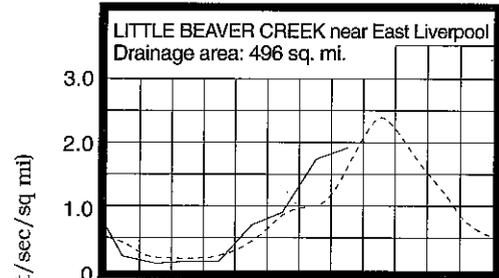
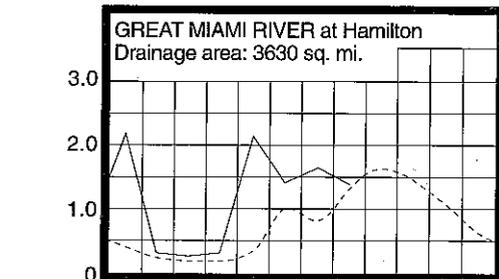
Some drainage basins had their greatest flows for the month on February 24. Minor flooding was reported in the northwestern, south-central and southeastern areas of the state. Also, ice jams caused additional flooding problems along most of the Lake Erie shoreline area. By the end of the month, flows had declined to below normal in the western half of the state but remained above normal in the eastern half.

**RESERVOIR STORAGE** for water supply during February decreased slightly in both the Mahoning and Scioto river basins. Storage remained above normal in both basins.

Reservoir storage at the end of February in the Mahoning basin index reservoirs was 88 percent of rated capacity for water supply compared with 92 percent for last month and 80 percent for February 1993. Storage at the end of February in the Scioto basin index reservoirs was 105 percent of rated capacity for water supply compared with 107 percent for last month and 104 percent for February 1993.

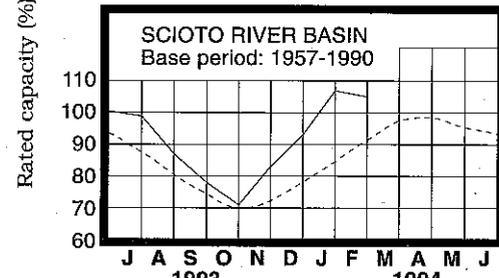
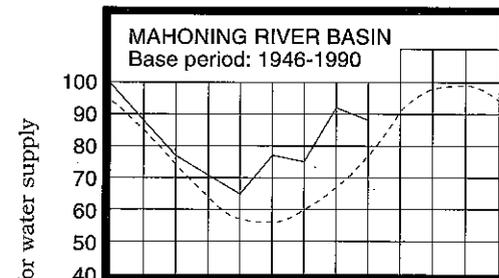
Surface-water supplies continue to remain in a favorable position across the state. Currently, both on- and off-stream reservoirs are near or above normal seasonal levels. Reservoirs that are drawn down for additional flood-water storage in the fall will be brought up to summer pool levels in April.

**MEAN STREAM DISCHARGE**



Base period for all streams: 1961-1990

**RESERVOIR STORAGE FOR WATER SUPPLY**



Normal - - - - Current - - - -

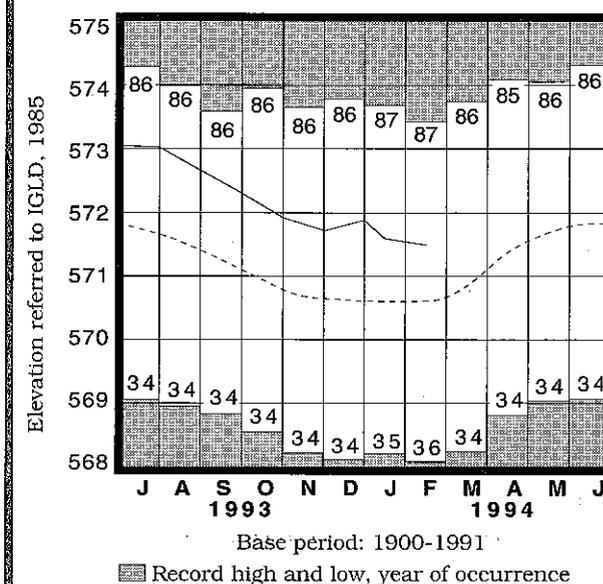
**GROUND-WATER LEVELS** during February showed mixed responses across the state. Most aquifers showed net improvement in ground-water storage during the month when compared with January, averaging near what is usually observed. Generally, levels in most shallow aquifers rose during the early part of the month and then declined during the remainder of the month; levels in deeper aquifers were variable with some declining slowly and a smaller number showing slight rises during the month.

Ground-water storage continues to be at below normal levels in the eastern half of Ohio and at above normal levels in most aquifers in the western half of the state. Levels in most deeper aquifers are lower than last year while in shallow aquifers, ground-water storage is slightly greater than last year. The progression of the 1994 water year recharge season has been mixed. Precipitation has fluctuated between above and below normal. Frozen soils often resulted in runoff instead of infiltration. A couple of months remain with the potential for important recharge. Conditions still favor continued improvement in ground-water storage, but it is now essential that near or slightly above normal precipitation occur if levels are to recover to normal.

**LAKE ERIE** level declined during February. The mean level was 571.49 feet (IGLD-1985), 0.10 foot below last month's mean level and 0.89 foot above normal. This month's level is 1.21 feet below the February 1993 level and 2.29 feet above Low Water Datum.

The U. S. Army Corps of Engineers reports that precipitation during February in the Lake Erie basin averaged 1.3 inches, 0.8 inch below normal. Precipitation during February throughout the entire Great Lakes basin averaged 1.2 inches, 0.6 inch below normal. Cumulative precipitation for 1994 in the Lake Erie basin averages 4.2 inches, 0.3 inch below normal; 1994 precipitation for the entire Great Lakes basin averages 3.3 inches, 0.6 inch below normal.

**LAKE ERIE LEVELS at Fairport**



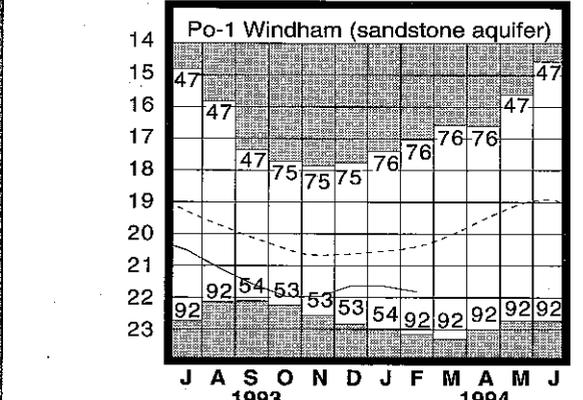
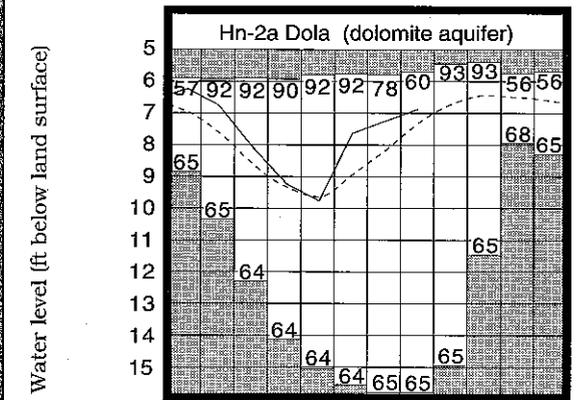
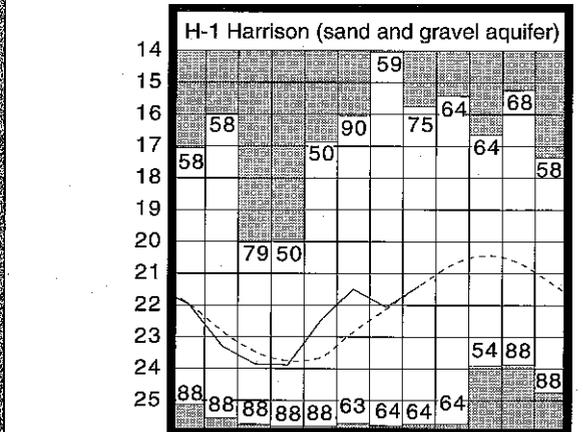
Normal - - - - Current - - - -

**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	14.53	-0.05	+1.92	+1.31
Fa-1	Jasper Mill, Fayette Co.	Limestone	7.41	-0.33	+0.39	-0.45
Fr-10	Columbus, Franklin Co.	Gravel	42.34	+0.75	+0.44	-0.25
H-1	Harrison, Hamilton Co.	Gravel	21.40	0.00	+0.67	+0.75
Hn-2a	Dola, Hardin Co.	Dolomite	6.88	+0.46	+0.38	-0.64
Po-1	Windham, Portage Co.	Sandstone	21.82	-1.42	-0.19	-0.82
Tu-1	Strasburg, Tuscarawas Co.	Gravel	13.42	-1.28	+1.80	+0.21

**GROUND-WATER LEVELS**



Base periods: H-1, 1951-1990; Hn-2a, 1955-1990; Po-1, 1947-1990  
Record high and low, year of occurrence

Normal - - - - Current - - - -

(continued from front page)

Precipitation for the first half of the 1994 water year is above normal throughout most of the state with only the Northwest Region having below normal precipitation. The state average is 18.03 inches, 2.08 inches above normal. Regional averages range from 23.61 inches, 5.40 inches above normal, for the South Central Region to 11.37 inches, 2.55 inches below normal, for the Northwest Region (see Precipitation table, departure from normal, past six months column).

**NOTES AND COMMENTS**  
**MWIR SURVIVES FORTY YEARS**

Rain, snow, sleet, floods, droughts, tornados, blizzards, ice, heat, cold, hurricanes, hail, high winds - never missed a beat.

March 1994 marks the 40th 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." Shortly thereafter, in January 1955, the name was changed to the "Monthly Index of Conditions Affecting Water Supply," and in January 1973, it received its current title.

The purpose of the MWIR has been the same for the past forty years. The intent is to present in brief form hydrologic data from across Ohio 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 data based on accuracy, length of record, minimal artificial effects on data, and availability. These data 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 and many others.

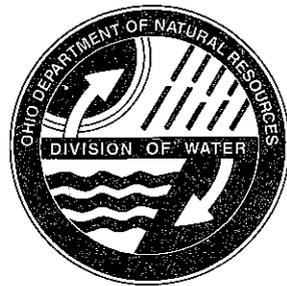
There are several other factors that have also contributed to the success of the report. One is the consistency of the data that are provided. Data from many of the sites that were initially included in the first issue of the report are still being provided today. For example, in the first report, data from thirteen observation wells were presented. Eight of these wells are still being monitored and five are still being included each month in the report. Although to a lesser extent, a similar case can be presented for the streamflow, reservoir and precipitation data. Over the years a few other types of data were presented (i.e. state lake levels, water quality), but most were included for only a few years before being discontinued.

Another factor for the success of the MWIR is in the presentation. The information is presented in a brief, concise and consistent manner. The format is that of a technical report as opposed to a newsletter. There is no need for the author to search for new material. Each month the reader can read the entire report or immediately turn to a specific section that is of particular interest to them. Although the author includes opinions of the cause and significance of the reported information, the readers are urged to examine the data and formulate their own evaluation.

Of special note is the dedication and permanence of the authors of the MWIR. Although it takes the combined efforts of many people for the complete publication of this report, only three individuals during the past forty years have had the distinction of authoring the report. Paul Kaser is responsible for originating and developing the idea of the MWIR. Paul authored the report from March 1954 through mid-1966. During his tenure, one of the worst droughts on record plagued much of Ohio (early 1960s). Paul retired in the early 1970s and moved to Arizona where he still resides. Next came Leonard Harstine who had worked for ODNR since 1959. In 1966 he accepted the challenge of authoring the MWIR and was responsible for its production through 1987. During Leonard's tenure, the report was redesigned to the smaller, yet concise format similar to the current design. Leonard saw many significant events during his authorship, but most memorable was the "Blizzard of January 1978", closely followed by the July 4, 1969 flooding and the April 1974 Xenia tornado. Leonard retired from ODNR in 1988. He still resides in Columbus, but travels frequently. His occasional visits at ODNR are enjoyed by many.

The current author is myself, David Cashell. I started working at the Division of Water in January 1979. I assumed responsibility for production of the MWIR in January 1988. In 1989, I increased the size of the report in order to incorporate some additional data and cumulative statistics. Although several drought periods have occurred during my watch, the most memorable event was the June 1990 Shadyside flash flooding.

I am proud to be associated with ODNR and such a fine publication. The previous authors, all the people who have ever assisted in the publication, and the ODNR administrations during the past forty years should be commended for their efforts in keeping this publication going. Also, the readers have always had kind and encouraging words to offer. Comments and suggestions from the readers are always welcome.



# Happy 40<sup>th</sup> Anniversary

## MONTHLY WATER INVENTORY REPORT FOR OHIO March 1994

Compiled By David H. Cashell  
Water Inventory Unit

**ACKNOWLEDGMENTS**

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.

**OHIO**  
Department of Natural Resources

DIVISION OF WATER  
1939 FOUNTAIN SQUARE  
COLUMBUS, OHIO 43224

George V. Voinovich  
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Frances S. Buchholzer  
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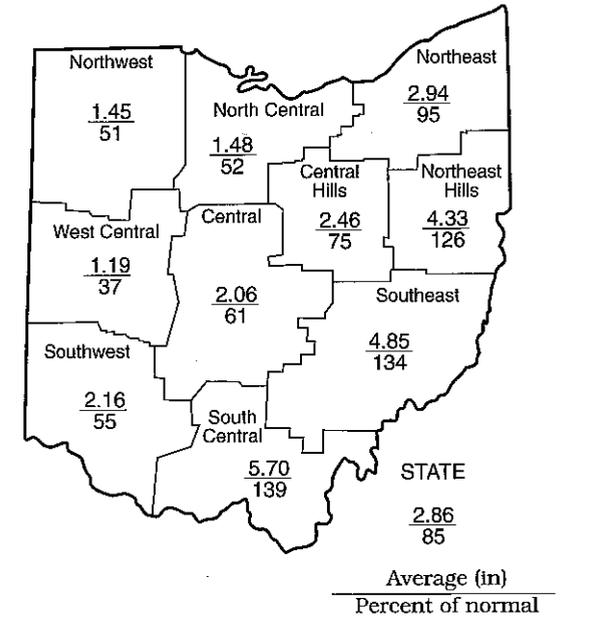
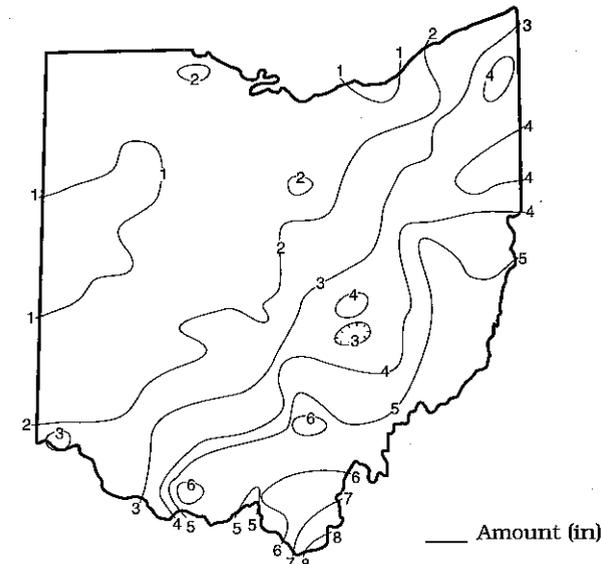
**PRECIPITATION** for March was below normal throughout most of Ohio but above normal in the eastern and south-central areas. The state average was 2.86 inches, 0.52 inch below normal. Regional averages ranged from 5.70 inches, 1.61 inches above normal, for the South Central Region to 1.19 inches, 2.07 inches below normal, for the West Central Region. This was the eight driest March on record for the West Central Region. Gallipolis Locks and Dam (Gallia County) reported the greatest amount of precipitation for March, 6.96 inches (Note: Huntington Airport, West Virginia reported 8.62 inches, its wettest March on record). McArthur (Vinton County), Sciotoville (Scioto County) and West Union (Adams County) also reported more than 6 inches of precipitation in March. St. Marys (Auglaize County) reported the least amount of March precipitation, 0.45 inch.

Precipitation during March varied greatly across the state with the largest amounts falling in the southeast, diminishing uniformly to the northwest. Many storms tracked just south and east of Ohio thus producing the greatest amount of precipitation in the southern and eastern sections of the state. The first significant precipitation for the month fell on March 9-10. The northern half of the state received snow while the southeastern area received rain. Rain amounts in southeastern Ohio of 1 to nearly 2 inches were common and in some south-central areas, more than 2 inches were reported. Scattered showers during March 13-14 produced up to 0.5 inch of rain in parts of Ohio, but generally, the middle of the month was rather dry. Storms during March 21-23 again produced from 1 to more than 2 inches of rain in southeastern Ohio tapering to only small amounts in the northwestern area. Most areas of the state received some precipitation during March 26-28. Again, the southeastern area of Ohio recorded the greatest amounts, especially on Palm Sunday, March 27. These storms were part of the same system that spawned killer tornados in Alabama.

Precipitation for the 1994 calendar year is below normal throughout most of the state but above normal in the Northeast Hills, South Central and Southeast regions. The state average is 8.24 inches, 0.14 inch below normal. Regional averages range from 14.05 inches, 3.81 inches above normal, for the South Central Region to 5.08 inches, 1.81 inches below normal, for the Northwest Region (see Precipitation table, departure from normal, past three months column).

(continued on back)

**PRECIPITATION MARCH 1994**



**PRECIPITATION**

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-1.42	-1.81	-2.55	-2.21	+6.69	-1.2
North Central	-1.38	-1.74	+0.52	-3.16	+8.58	-1.1
Northeast	-0.17	-0.11	+2.91	+2.11	+12.84	+0.4
West Central	-2.07	-2.56	+0.63	+5.06	+11.67	+0.1
Central	-1.31	-1.13	+1.90	+1.89	+7.77	+0.6
Central Hills	-0.80	-0.66	+2.51	+0.46	+5.57	-0.3
Northeast Hills	+0.88	+1.88	+4.30	+2.89	+5.78	+0.9
Southwest	-1.76	-2.26	+0.01	-1.59	-1.28	+0.1
South Central	+1.61	+3.81	+5.40	-0.21	-5.42	+1.5
Southeast	+1.23	+3.10	+5.10	+0.95	-1.13	+2.0
State	-0.52	-0.14	+2.08	+0.63	+5.12	

\*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**

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	2,155	113	123	118	103
Great Miami River at Hamilton	3,630	3,255	55	92	124	132
Huron River at Milan	371	400	57	85	103	93
Killbuck Creek at Killbuck	464	754	80	126	135	107
Little Beaver Creek near East Liverpool	496	1,392	118	130	130	100
Maumee River at Waterville	6,330	6,604	52	81	85	95
Muskingum River at McConnellsville	7,422	15,650	97	127	133	111
Scioto River near Prospect	567	486	50	97	131	118
Scioto River at Higby	5,131	6,689	73	102	115	112
Stillwater River at Pleasant Hill	503	331	40	82	145	149

**STREAMFLOW** during March was below normal in most Ohio drainage basins but above normal in the eastern area of the state where precipitation was above normal. Flows in the western half of the state were low enough to be considered deficient. Streamflow during March was less than the flows during February in most areas.

Flows at the beginning of the month were below normal throughout the state. Generally, flows declined during the first week of March. Drainage basins in eastern Ohio had their lowest flows for March during this period. Flows increased following local precipitation during the next two weeks of March. Drainage basins in the central

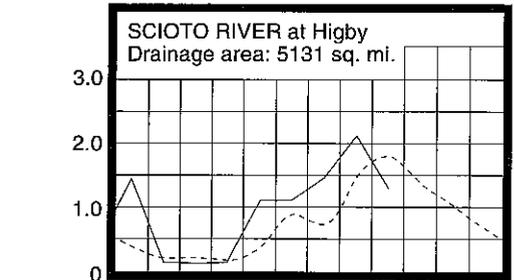
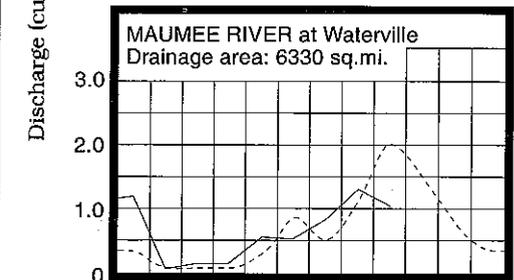
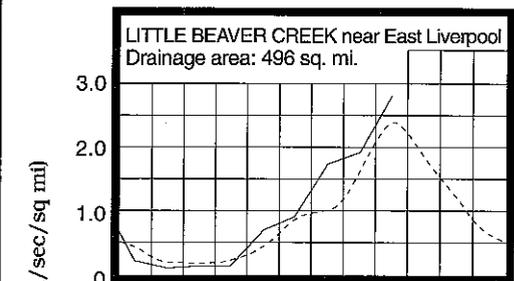
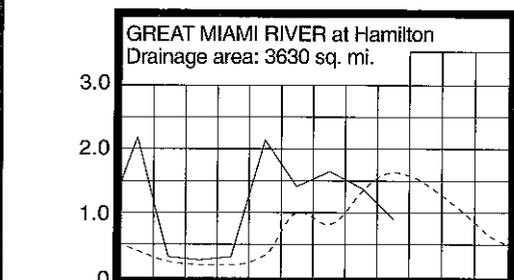
and western areas of Ohio had their greatest flows around mid-month while eastern Ohio basins had their greatest flows during March 22-24. Flows declined during the last week of March with central and western Ohio drainage basins having their lowest flows at or near the end of the month. Flows at the end of the month were below normal throughout the state.

**RESERVOIR STORAGE** for water supply increased in the Mahoning basin reservoirs but decreased slightly in the Scioto basin reservoirs. Storage remained above normal in both basins.

Reservoir storage at the end of March in the Mahoning basin index reservoirs was 97 percent of rated capacity for water supply compared with 88 percent for last month and 96 percent for March 1993. Month-end storage in the Scioto basin index reservoirs was 104 percent of rated capacity for water supply compared with 105 percent for last month and 105 percent for March 1993.

Surface-water supplies continue to remain in excellent condition throughout Ohio. Both on- and off-stream reservoirs are at or near normal seasonal levels.

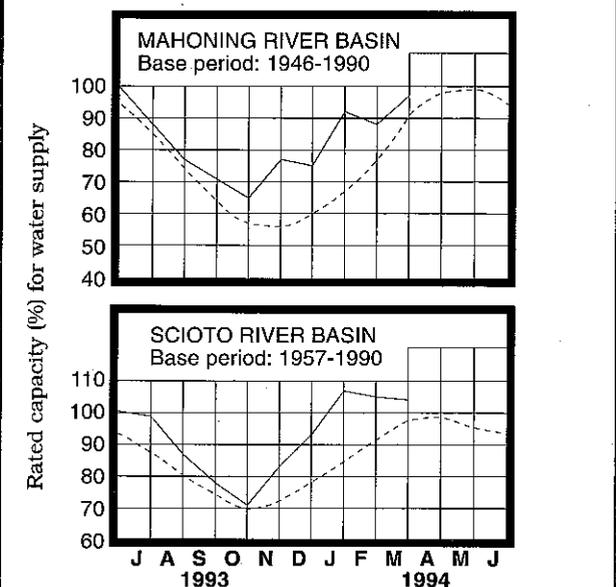
**MEAN STREAM DISCHARGE**



Base period for all streams: 1961-1990

Normal - - - - Current - - - -

**RESERVOIR STORAGE FOR WATER SUPPLY**



**GROUND-WATER LEVELS**

during March showed some improvement in most aquifers in Ohio. Net rises during March from the levels in February averaged about one-half that usually observed. Some shallow sand and gravel aquifers in western Ohio had net declines during the month. Generally, ground-water levels were stable during the first ten days of March, rose during the middle ten days and then were stable during the remainder of the month.

The below normal precipitation in much of Ohio during February and March has not been ideal for ground-water supplies. Recharge has been less than normal. Ground-water storage continues to remain below normal in most of the aquifers throughout Ohio with a few exceptions in the central and northwestern areas. Current ground-water levels are lower than the levels of a year ago throughout the state.

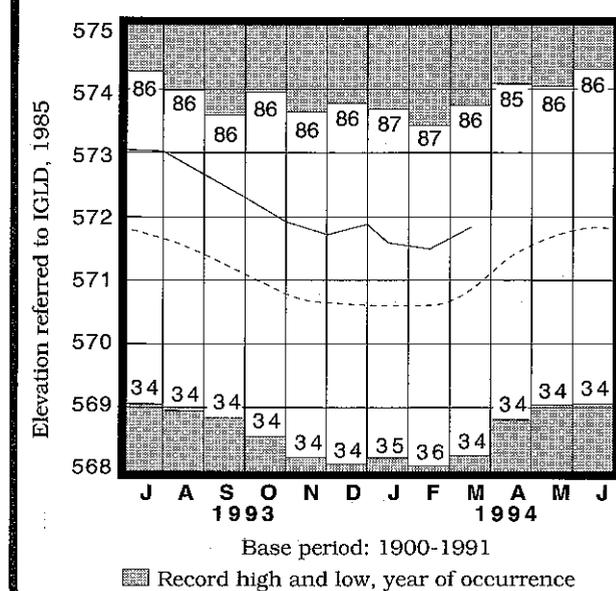
The 1994 water year recharge season will soon come to an end. Although precipitation has been above normal during the past six months in all but the Northwest Region, the past three months have seen below normal precipitation except in southeastern Ohio (see Precipitation table, departure from normal, past three and six months columns). Much of the precipitation last fall replenished the soil moisture which had been deficient due to the dry conditions in the late summer months. Ground-water storage is not expected to return to normal levels, but ample April showers can still improve the situation. Water-supply managers with ground-water sources should be concerned with the local recharge conditions and monitor their situations accordingly.

**LAKE ERIE** level rose seasonally during March. The mean level was 571.82 feet (IGLD-1985), 0.33 foot above last month's mean level and 0.95 foot above normal. This month's level is 0.88 foot lower than the March 1993 level and 2.62 feet above Low Water Datum.

**SUMMARY**

Precipitation was below normal throughout most of Ohio but above normal in the eastern and south central areas of the state. Streamflow was below normal in all but some eastern Ohio drainage basins. Reservoir storage was stable or improved slightly and remained at above normal levels. Ground-water storage improved slightly but is below normal in most aquifers statewide. Lake Erie level rose seasonally and was 0.95 foot above the long-term March average.

**LAKE ERIE LEVELS at Fairport**



Base period: 1900-1991  
Record high and low, year of occurrence

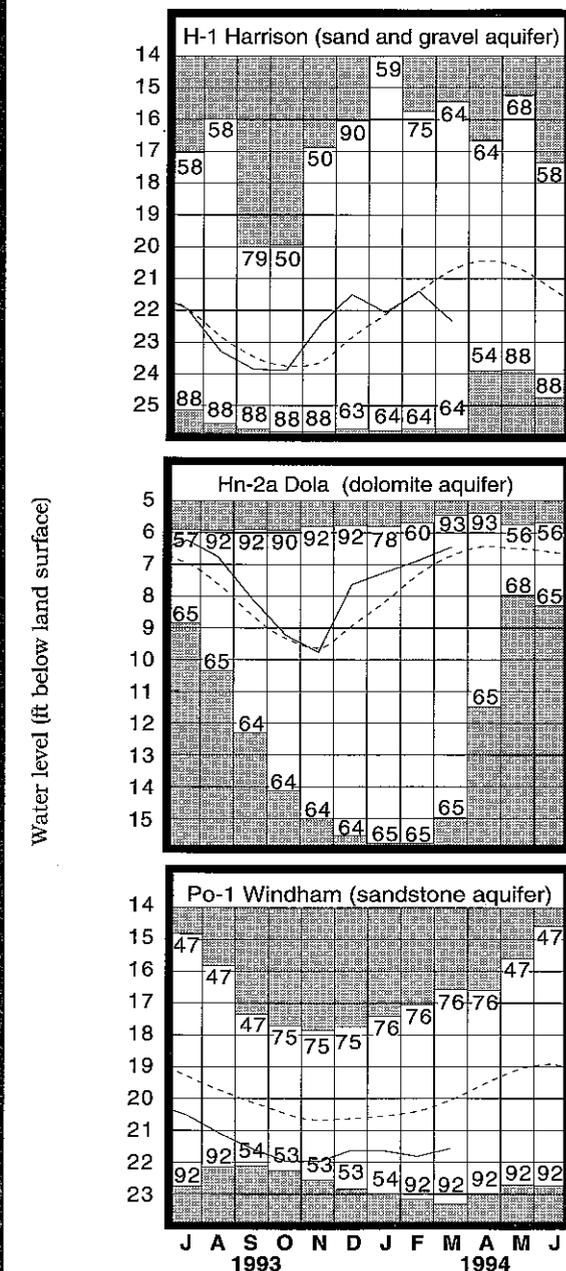
Normal - - - - Current - - - -

**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	13.76	-0.45	+0.77	-0.32
Fa-1	Jasper Mill, Fayette Co.	Limestone	7.29	-0.44	+0.12	-0.67
Fr-10	Columbus, Franklin Co.	Gravel	41.92	+0.75	+0.42	-0.39
H-1	Harrison, Hamilton Co.	Gravel	22.33	-1.62	-0.93	-1.27
Hn-2a	Dola, Hardin Co.	Dolomite	6.46	+0.32	+0.42	-0.92
Po-1	Windham, Portage Co.	Sandstone	21.56	-1.53	+0.26	-0.91
Tu-1	Strasburg, Tuscarawas Co.	Gravel	12.51	-1.11	+0.91	-0.35

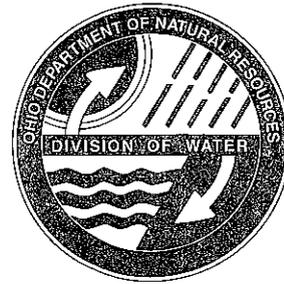
**GROUND-WATER LEVELS**



Base periods: H-1, 1951-1990. Hn-2a, 1955-1990. Po-1, 1947-1990  
Record high and low, year of occurrence

Water level (ft below land surface)

Normal - - - - Current - - - -



# MONTHLY WATER INVENTORY REPORT FOR OHIO

April 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

## SUMMARY

Precipitation was above normal throughout the state. Streamflow was above normal in all drainage basins. Reservoir storage was stable or improved slightly and remained at above normal seasonal levels. Ground-water storage improved, but remained at below normal seasonal levels in most areas of the state. Lake Erie level rose seasonally and was 1.08 feet above the long-term April average.

## NOTES AND COMMENTS

### DIVISION OF WATER HAS NEW LEADERSHIP

Ohio Department of Natural Resources' (ODNR) Director Frances S. Buchholzer recently announced the appointment of Michele Willis as acting chief of the Division of Water. Director Buchholzer also announced that James Morris, chief of the Division of Water since March 1992, would become chief of ORNR's Office of Real Estate and Land Management.

Mrs. Willis brings a strong professional background to the Division of Water. She worked for the Division of Water from 1985 to 1989 in the Dam Safety Section performing inspections and analyses of dams, reviewing dam rehabilitation plans and providing technical assistance for floodplain projects. In 1989 she accepted a project manager position with Woolpert Consultants (Columbus) where she was responsible for management and design of many types of water resources projects, flood insurance studies, NPDES stormwater permitting and private development master planning.

In 1992 Michele returned to ODNR as a project manager in the ODNR Office of Chief Engineer. She worked on many water resources projects and waste site closures, administered the Lake Erie shore erosion control permit program and coordinated the NPDES stormwater permits for ODNR facilities and projects.

Mrs. Willis is a registered professional engineer in Ohio. She attended The Ohio State University where she earned bachelor of science degrees in psychology and civil engineering. She is a member of the Association of State Dam Safety Officials, the American Water Resources Association and the Water Management Association of Ohio.

The entire Division of Water staff welcomes Mrs. Willis to her new position. We all look forward to working with Michele during the exciting and challenging years ahead. The Division of Water staff also thanks Jim Morris for his hard work and support and wishes him well in his new position.

### NEW PUBLICATIONS

The Division of Water announces the availability of the following new publications:

The Ground Water Resources of Clinton County  
by James J. Schmidt

The Ground Water Resources of Madison County  
by Michael Hallfrisch

These maps are two in a series of county ground-water resources maps which have been completed for 86 of Ohio's 88 counties. Ground-water resources maps are prepared by staff hydrogeologists. These maps show the regional ground-water characteristics based on interpretations of water well drilling records and local geology. These color-coded maps provide well log data for many point locations. Information provided by the maps include typical depths of wells, water-bearing formations and estimated yields for wells in the area.

Ground-water resources maps can be used as a guide to locate new or expand existing ground-water supplies. The maps are useful to homeowners, ground-water consultants, engineers, planners and developers.

Ground-water resources maps cost \$5.00 each plus 5.75 % sales tax\*. They can be purchased at or ordered from: ODNR Division of Water, Ground Water Resources Section, 1939 Fountain Square, Building E-1, Columbus, Ohio 43224. Make checks payable to ODNR Division of Water. If ordered through the mail, please include the correct postage and handling charges.

#### Postage and Handling Charges

Cost of Publications	Add
under \$10.01	\$2.00
\$10.01 - \$20.00	\$3.00
\$20.01 - \$50.00	\$5.00
\$50.01 - \$100.00	\$8.50
\$100.01 and over	\$10.00

\*Out of state orders do not need to include sales tax.

**PRECIPITATION** for April was above normal throughout Ohio with only a few scattered locations having below normal precipitation. The state average was 4.67 inches, 1.16 inches above normal. Regional averages ranged from 6.34 inches, 2.53 inches above normal, for the Southwest Region to 3.63 inches, 0.05 inch above normal, for the West Central Region. This was the eighth wettest April in 100 years of record for the Southwest Region. Stonelick State Park (Clermont County) reported the greatest amount of precipitation for the month, 9.06 inches. Marysville (Union County) reported the least amount, 2.66 inches.

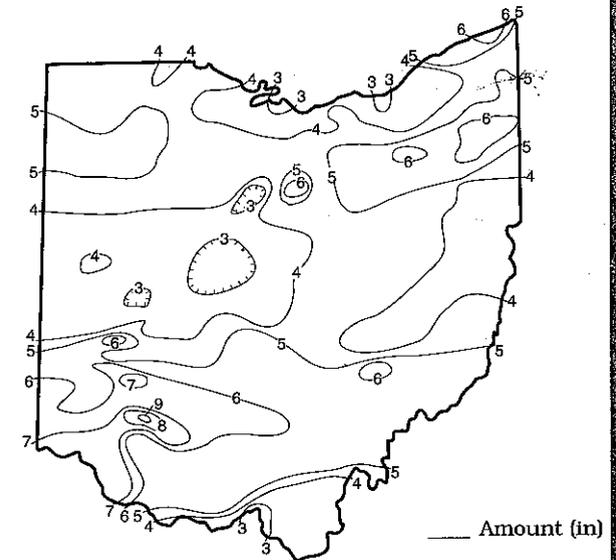
Precipitation during April fell as rain during most of the month, but snow was common during the first week. Many areas of Ohio had a white Easter on April 3. More snow fell during April 6-7 in the northern half of the state. Most of Ohio received about 1 inch of precipitation (liquid) during these two storm periods. The next week of April was very wet throughout the state. Storms started on April 9-10 with many areas in southern Ohio receiving more than 2 inches of rain with about 1 inch falling elsewhere. Storms continued during April 11-12 with the greatest amounts of more than 2 inches falling across northern Ohio. Small stream flooding was reported and many areas had water standing in the fields. Storms with high winds crossed the state on April 15. Some damage was reported.

Soils across the state were able to start drying out during the second half of April as very little precipitation was reported during April 16-25. Showers returned to Ohio the last several days of the month with about 1 inch of rain common across the state, but spotty storms in southwestern Ohio were locally severe producing greater amounts of precipitation.

Precipitation for the 1994 calendar year is above normal in the eastern and southern areas of Ohio, but below normal in the central and northwestern areas. The state average is 12.91 inches, 1.02 inches above normal. Regional averages range from 18.98 inches, 5.00 inches above normal, for the South Central Region to 9.11 inches, 2.51 inches below normal, for the West Central Region.

Precipitation for the 1994 water year is above normal throughout most of Ohio with only the Northwest Region having below normal precipitation. The state average is 22.70 inches, 3.23 inches above normal. Regional averages range from 28.54 inches, 6.59 inches above normal, for the South Central Region to 16.02 inches, 1.21 inches below normal, for the Northwest Region.

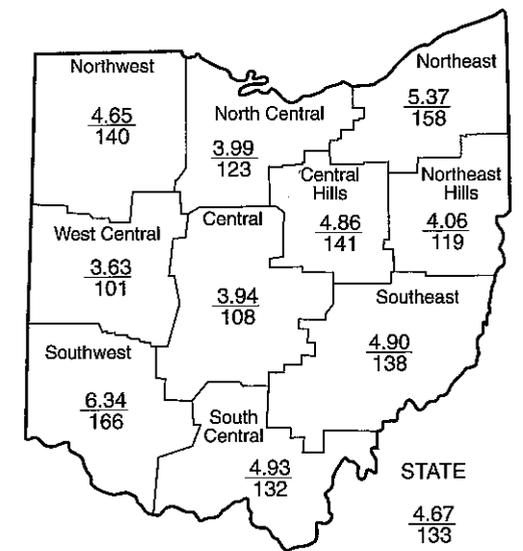
## PRECIPITATION APRIL 1994



## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	+1.34	-0.72	-0.68	-1.58	+7.83	-0.6
North Central	+0.74	-1.48	+0.88	-3.19	+8.88	-0.6
Northeast	+1.98	+1.00	+4.37	+3.90	+14.74	+0.7
West Central	+0.05	-2.76	+0.54	+4.29	+10.85	-0.2
Central	+0.28	-1.57	+1.38	+1.59	+8.38	+0.2
Central Hills	+1.41	+0.06	+3.51	+0.80	+7.59	+0.1
Northeast Hills	+0.06	+1.25	+4.65	+3.27	+7.33	+1.0
Southwest	+2.53	-0.01	+1.66	+0.15	+1.80	+1.2
South Central	+1.19	+4.01	+5.67	+1.72	-2.44	+0.9
Southeast	+1.36	+2.58	+5.55	+2.30	+1.82	+1.0
State	+1.16	+0.24	+2.77	+1.34	+6.69	

\*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  
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Below -4.0 = Extreme Drought



Average (in)  
Percent of normal

## ACKNOWLEDGMENTS

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.



DIVISION OF WATER  
1939 FOUNTAIN SQUARE  
COLUMBUS, OHIO 43224

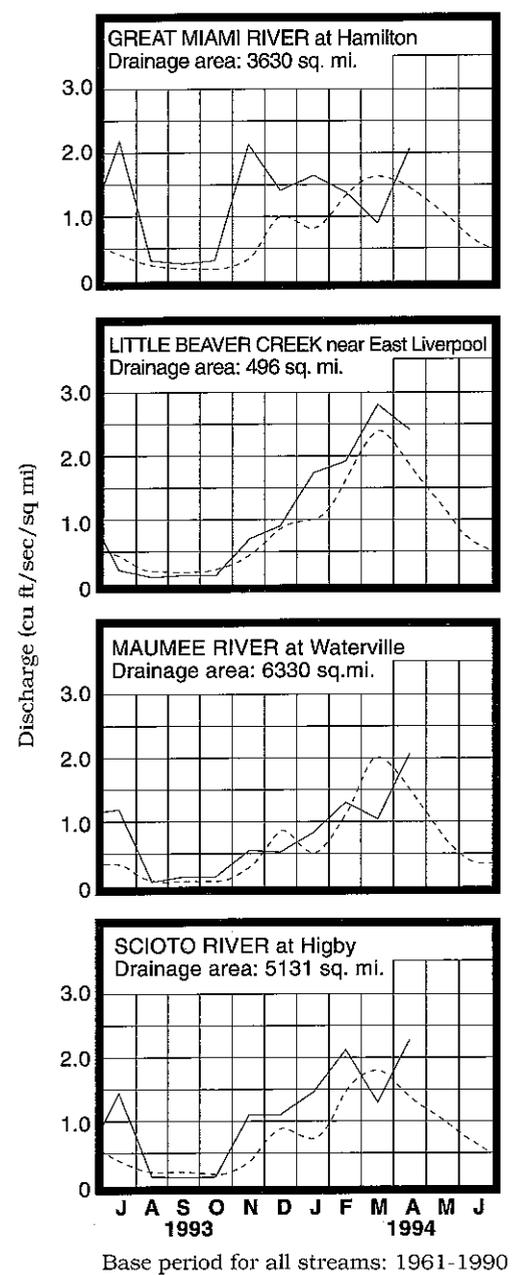
- George V. Voinovich, Governor
- Frances S. Buchholzer, Director
- Michele Willis, Acting Chief

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**MEAN STREAM DISCHARGE**

River and Location	Drainage Area (Sq. Mi.)	Mean Discharge (CFS)	% of Normal	% of Normal Past		
				This Month		
				3 Mos.	6 Mos.	12 Mos.
Grand River near Painesville	685	1,922	134	117	122	100
Great Miami River at Hamilton	3,630	7,523	142	85	129	131
Huron River at Milan	371	802	155	98	109	90
Killbuck Creek at Killbuck	464	1,244	164	127	137	110
Little Beaver Creek near East Liverpool	496	1,196	133	127	128	103
Maumee River at Waterville	6,330	13,079	137	92	93	95
Muskingum River at McConnelsville	7,422	20,350	135	133	138	116
Scioto River near Prospect	567	1,140	140	86	129	119
Scioto River at Higby	5,131	11,774	167	107	119	113
Stillwater River at Pleasant Hill	503	832	116	66	143	145

**MEAN STREAM DISCHARGE**



**STREAMFLOW** during April was above normal throughout Ohio. Flows in some eastern Ohio drainage basins were high enough to be considered excessive. Flows during April were greater than the March flows in all but the northeastern area of the state.

Flows at the beginning of the month were below normal throughout Ohio. Most drainage basins in the western half of the state had their lowest flows for April just after the beginning of the month. Flows increased noticeably after April 9 following widespread precipitation. Greatest flows for April occurred sometime during the April 10-15 period for all areas of the state. Low level flooding was common in many areas during this period. Many fields had standing water. Flows declined

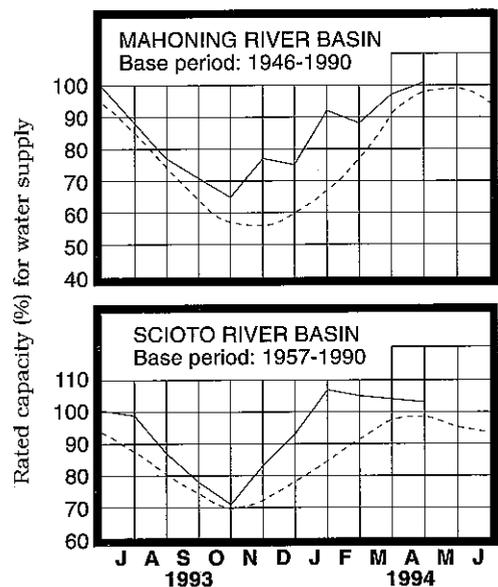
until the end of the month following these peaks with the drainage basins in the eastern half of the state recording their lowest flows for April at the end of the month. Flows were below normal statewide at the month's end.

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

Reservoir storage at the end of April in the Mahoning basin index reservoirs was 101 percent of rated capacity for water supply compared with 97 percent for last month and 105 percent for April 1993. Month-end storage in the Scioto basin index reservoirs was 103 percent of rated capacity for water supply compared with 104 percent for last month and 105 percent for April 1993.

Surface-water supplies continue to remain in excellent condition throughout Ohio. Reservoirs are near capacity as the summer season approaches.

**RESERVOIR STORAGE FOR WATER SUPPLY**



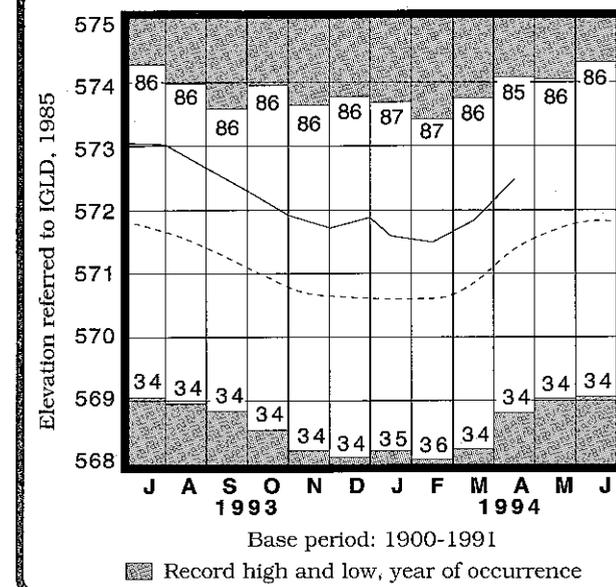
**GROUND-WATER LEVELS** during April rose in all aquifers throughout Ohio. In most areas, the net rise during April from the levels in March ranged from near normal to greater than usually observed. Generally, ground-water levels were stable during the first ten days of the month and then began to rise following widespread precipitation. Levels in most deeper aquifers continued to rise through the end of April while levels in most shallow aquifers declined during the last week of the month.

The above normal precipitation during April was a benefit for ground-water supplies; however, ground-water storage continues to remain at below normal levels throughout much of Ohio. Also, this year's levels are lower than last year's levels. Ample precipitation during the growing season will slow the natural rate of decline in ground-water storage, but little positive improvement can be expected. Ground-water storage is not expected to return to normal levels during the summer months. Although ground-water supplies are adequate throughout Ohio, water-supply managers with ground-water sources should monitor their situations as the summer discharge season progresses.

**LAKE ERIE** level rose seasonally during April. The mean level was 572.47 feet (IGLD-1985), 0.65 foot above last month's mean level and 1.08 feet above normal. This month's level is 0.73 foot lower than the April 1993 level and 3.27 feet above Low Water Datum.

The U. S. Army Corps of Engineers reports that during April, precipitation in the Lake Erie basin averaged 4.3 inches, 1.2 inches above normal. In April, the entire Great Lakes basin averaged 3.2 inches, 0.7 inch above normal. Cumulative precipitation for 1994 in the Lake Erie basin averages 10.6 inches, 0.2 inch above normal and in the entire Great Lakes basin, 8.3 inches, 0.3 inch below normal.

**LAKE ERIE LEVELS at Fairport**

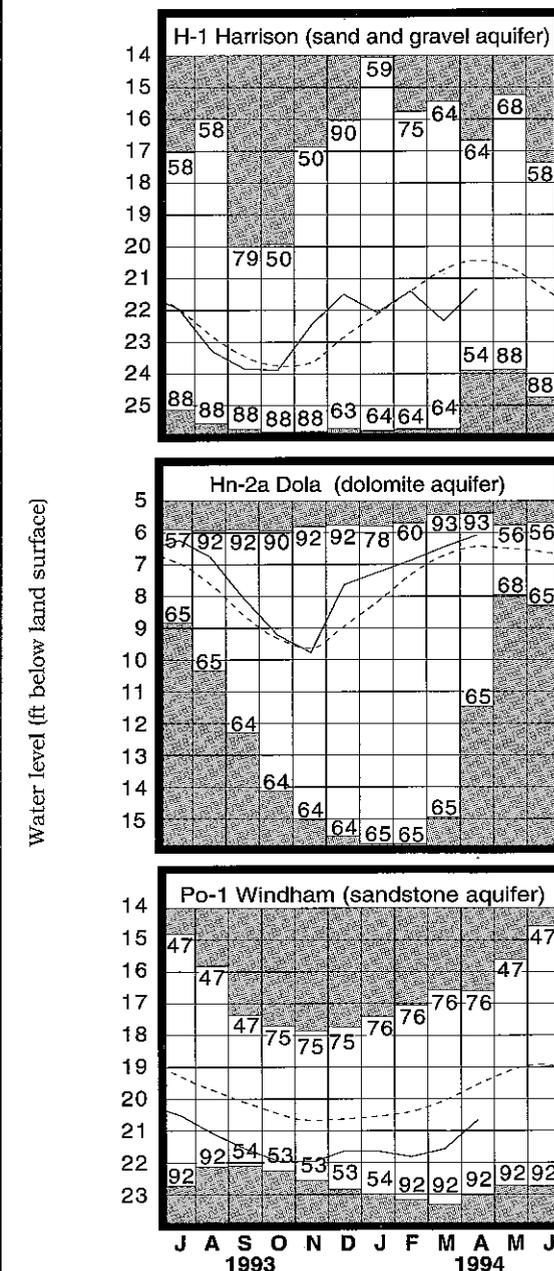


**GROUND-WATER LEVELS**

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	12.69	-0.26	+1.07	+0.40
Fa-1	Jasper Mill, Fayette Co.	Limestone	7.16	-0.42	+0.13	-0.40
Fr-10	Columbus, Franklin Co.	Gravel	41.50	+0.90	+0.42	-0.60
H-1	Harrison, Hamilton Co.	Gravel	21.32	-0.89	+1.01	-0.24
Hn-2a	Dola, Hardin Co.	Dolomite	6.08	+0.39	+0.38	-0.31
Po-1	Windham, Portage Co.	Sandstone	20.66	-1.14	+0.90	-0.57
Tu-1	Strasburg, Tuscarawas Co.	Gravel	11.61	-0.81	+0.90	0.00

**GROUND-WATER LEVELS**



Normal - - - - Current - - - -

Normal - - - - Current - - - -



# MONTHLY WATER INVENTORY REPORT FOR OHIO

May 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

## SUMMARY

Precipitation was below normal throughout Ohio. Streamflow was noticeably below normal statewide. Reservoir storage declined but remained near normal seasonal levels. Ground water levels declined in most aquifers and are below normal in most areas of the state. Lake Erie level rose seasonally and was 0.98 foot above the long-term May average.

## NOTES AND COMMENTS

### NEW PUBLICATIONS

The Division of Water announces the availability of the following new publication:

Ground Water Pollution Potential of Medina County  
by Michael P. Angle

Ground water pollution potential maps are designed to determine an area's relative vulnerability to ground water pollution. The maps can be used as a planning and management tool for administrators, commissioners, zoning boards and others to aid in making educated decisions about local development and siting of land use operations or activities that can affect ground water quality. The system optimizes the use of existing data to rank areas with respect to pollution potential to help direct investigations and resource expenditures and to prioritize protection, monitoring and clean-up efforts.

Mapping an area's potential for ground water pollution is a relatively new idea. This map uses the DRASTIC system as developed for the U.S. Environmental Protection Agency by the National Ground Water Association. DRASTIC values, as shown on the map, indicate an area's relative vulnerability to contamination through the use of a numerical rating scheme and the mapping of hydrogeologic settings. Low DRASTIC values indicate relatively low potential and high DRASTIC values indicate a high potential for contamination. Areas of similar DRASTIC values are color-coded for ease of interpretation.

Ground Water Pollution Potential maps cost \$10.00 each plus 5.75% sales tax\*. They can be purchased at or ordered from: ODNR Division of Water, Water Resources Section, 1939 Fountain Square, Building E-1, Columbus, Ohio 43224. Make checks payable to ODNR Division of Water. If ordered through the mail, please include the correct postage and handling charges.

### Postage and Handling Charges

Cost of Publications	Add
under \$10.01	\$2.00
\$10.01 - \$20.00	\$3.00
\$20.01 - \$50.00	\$5.00
\$50.01 - \$100.00	\$8.50
\$100.01 and over	\$10.00

\*Out of state orders do not need to include sales tax.

## DIVISION OF WATER NOW ACCEPTS VISA AND MASTERCARD

Effective July 1, 1994, the Division of Water will no longer be invoicing for publications or photocopying. Prepayment will be required by check, MasterCard or Visa. Checks should be made payable to ODNR Division of Water. Walk-in customers may use cash (please do not send cash in the mail). Receipts will be mailed showing purchased items and payment method.

In order for us to provide prompt service, please add the correct tax, postage and handling charges when prepaying by check.

## ACKNOWLEDGMENTS

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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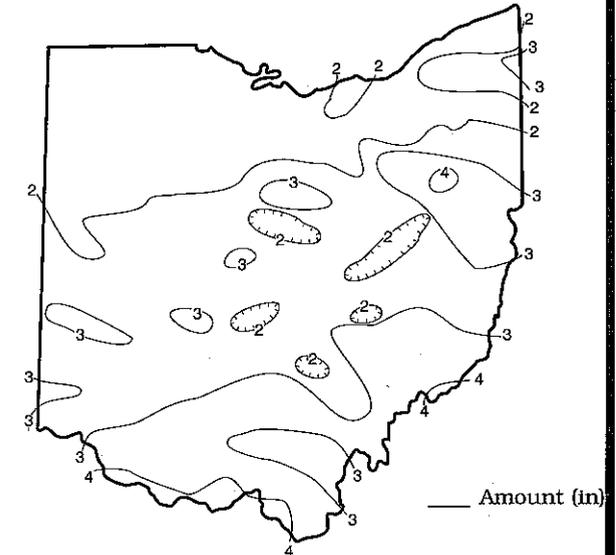
**PRECIPITATION** for May was below normal throughout Ohio; only a few locations in extreme southern Ohio had above normal rainfall. The state average was 2.53 inches, 1.22 inches below normal. Regional averages ranged from 3.36 inches, 0.57 inch below normal, for the South Central Region to 1.54 inches, 2.00 inches below normal, for the Northwest Region. This was the sixth driest May during the 100 years of record for the Northwest Region. Captain Anthony Meldahl Locks and Dam (Clermont County) reported the greatest amount of precipitation for the month, 4.94 inches. Painesville (Lake County) reported the least amount, 1.08 inches.

The weather during May was generally cool and dry. The first half of the month had more days with precipitation. Some spotty rain fell during the first couple days of May but the first significant storms crossed the state during May 6-7. Many areas in the southern half of Ohio received between 1 and 2 inches of rain and along the Ohio River, more than 2 inches fell. Spotty storms occurred around the state during May 8-9, but skies cleared on May 10 allowing a spectacular view of an annular solar eclipse. A few scattered showers were around the state on May 12, but for the second week of the month as a whole, most areas received only 0.5 inch of rain or less. After some scattered storms during May 14-16, the state began to really dry out. Farmers were able to plant field crops ahead of schedule. Stronger storms crossed the northern half of the state during May 24-26 with some areas reporting from about 1 inch to nearly 2 inches. A few showers developed in Ohio on the last day of the month, but most areas of the state were rather dry at the month's end.

Precipitation for the 1994 calendar year is above normal in the eastern half of Ohio and below normal in the western half. The state average is 15.43 inches, 0.21 inch below normal. Regional averages range from 22.34 inches, 4.43 inches above normal, for the South Central Region to 11.21 inches, 2.58 inches below normal, for the North Central Region.

Precipitation for the 1994 water year is above normal throughout most of Ohio but below normal in the North Central, Northwest and West Central regions. The state average is 25.22 inches, 2.01 inches above normal. Regional averages range from 31.90 inches, 6.02 inches above normal, for the South Central Region to 17.56 inches, 3.21 inches below normal, for the Northwest Region. The 1994 water year recharge season has apparently ended. Little recharge to ground water supplies during the summer months can be expected barring unusual or extreme climatic conditions.

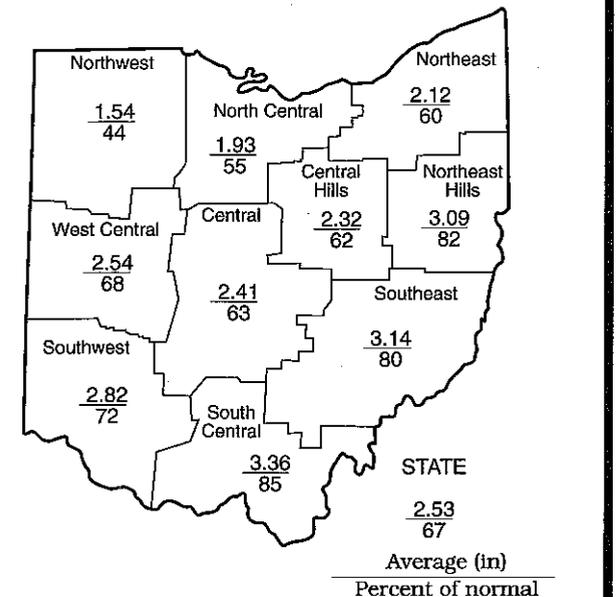
## PRECIPITATION MAY 1994



## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-2.00	-2.08	-3.51	-2.04	+6.16	-1.6
North Central	-1.58	-2.22	-2.89	-2.61	+8.18	-1.6
Northeast	-1.41	+0.40	+0.43	+4.80	+14.29	-1.2
West Central	-1.18	-3.20	-4.08	+3.79	+10.27	-1.9
Central	-1.40	-2.43	-2.68	+1.75	+7.49	-0.8
Central Hills	-1.45	-0.84	-0.88	+0.94	+7.31	-1.4
Northeast Hills	-0.69	+0.85	+1.52	+4.30	+7.53	-0.6
Southwest	-1.10	-0.33	-1.40	+0.04	+1.37	-0.5
South Central	-0.57	+2.23	+3.69	+2.39	-3.36	-0.6
Southeast	-0.80	+1.79	+3.00	+3.58	+2.19	-0.4
State	-1.22	-0.58	-0.67	+1.71	+6.16	

\*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**

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	175	28	101	107	100
Great Miami River at Hamilton	3,630	2,882	74	73	97	131
Huron River at Milan	371	54	20	77	88	90
Killbuck Creek at Killbuck	464	277	56	106	118	106
Little Beaver Creek near East Liverpool	496	353	61	103	119	102
Maumee River at Waterville	6,330	1,936	38	80	83	94
Muskingum River at McConnelsville	7,422	5,510	56	99	115	113
Scioto River near Prospect	567	127	30	74	96	118
Scioto River at Higby	5,131	3,972	75	90	108	113
Stillwater River at Pleasant Hill	503	197	51	58	87	143

**STREAMFLOW** during May was noticeably below normal throughout Ohio. Flows in most northern and western Ohio drainage basins were low enough to be considered deficient. Flows during May were considerably less than the flows during April.

Flows at the beginning of the month were below normal in most areas of Ohio; some basins in southwestern Ohio started the month with slightly above normal flows responding to a few scattered, locally severe storms at the end of April. Most drainage basins had their greatest flows for May at or near the beginning of the month. A few exceptions were noted where flows were slightly greater than those at the beginning of the month following local storms. Generally, flows declined throughout

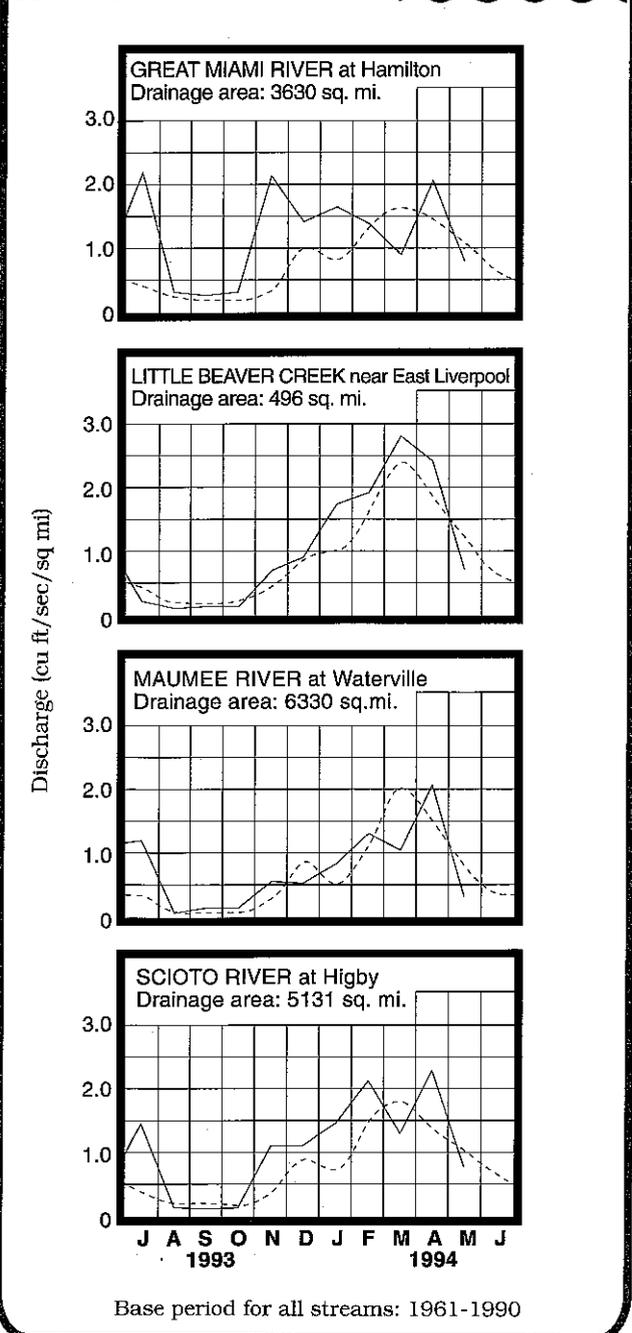
the month with the lowest flows for May occurring at or near the month's end. Flows at the end of May were deficient statewide, a response to the noticeably below normal precipitation.

**RESERVOIR STORAGE** for water supply during May declined in both the Mahoning and Scioto river basins. Storage remained slightly above normal in the Scioto basin reservoirs but fell to slightly below normal in the Mahoning basin reservoirs.

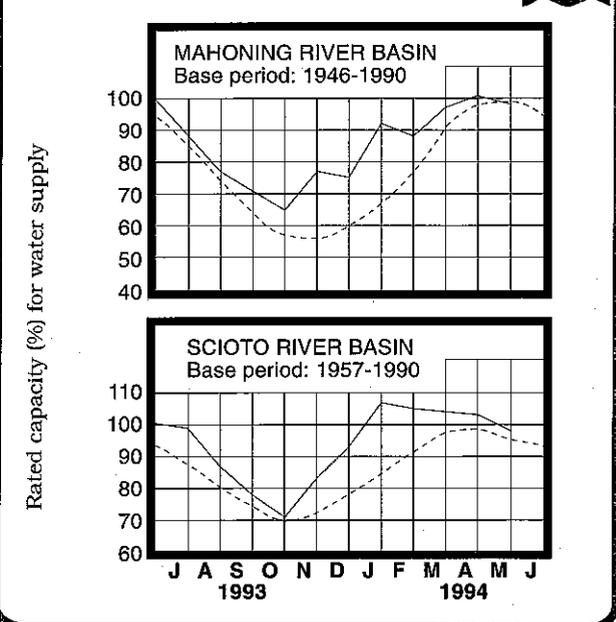
Reservoir storage at the end of May in the Mahoning basin index reservoirs was 98 percent of rated capacity for water supply compared with 101 percent for last month and 97 percent for May 1993. Month-end storage in the Scioto basin index reservoirs was 98 percent of rated capacity for water supply compared with 103 percent for last month and 99 percent for May 1993.

Surface water supplies continue to remain adequate throughout Ohio in spite of the below normal precipitation that fell during May. Storage in both on- and off-stream reservoirs is at near normal seasonal levels.

**MEAN STREAM DISCHARGE**



**RESERVOIR STORAGE FOR WATER SUPPLY**



**GROUND WATER LEVELS** during May declined in most of Ohio's aquifers; a few exceptions were noted in some deeper aquifers, especially consolidated aquifers, where levels were stable or rose slightly responding to delayed recharge from the above normal precipitation in April. Generally, ground water levels declined throughout the month except as noted above. In most areas, the net declines recorded during May were greater than usually observed.

With the below normal precipitation in May, the 1994 water year ground water recharge season has come to an end. Little recharge can be expected during the summer months; however, ample precipitation can be a benefit for agriculture and possibly reduce the rate of decline in many aquifers. The 1994 recharge season was not especially good for ground water supplies as levels in most aquifers, especially those in the eastern half of the state, did not return to normal levels. Current levels are lower than the levels of May 1993 in nearly all areas of the state. Ground water storage is at below normal levels in most areas of the state with the greatest departures, nearly 2 feet below normal, being in the eastern half of Ohio. Although ground water supplies are adequate throughout Ohio, water supply managers with ground water sources should closely monitor their situations throughout the summer and fall months.

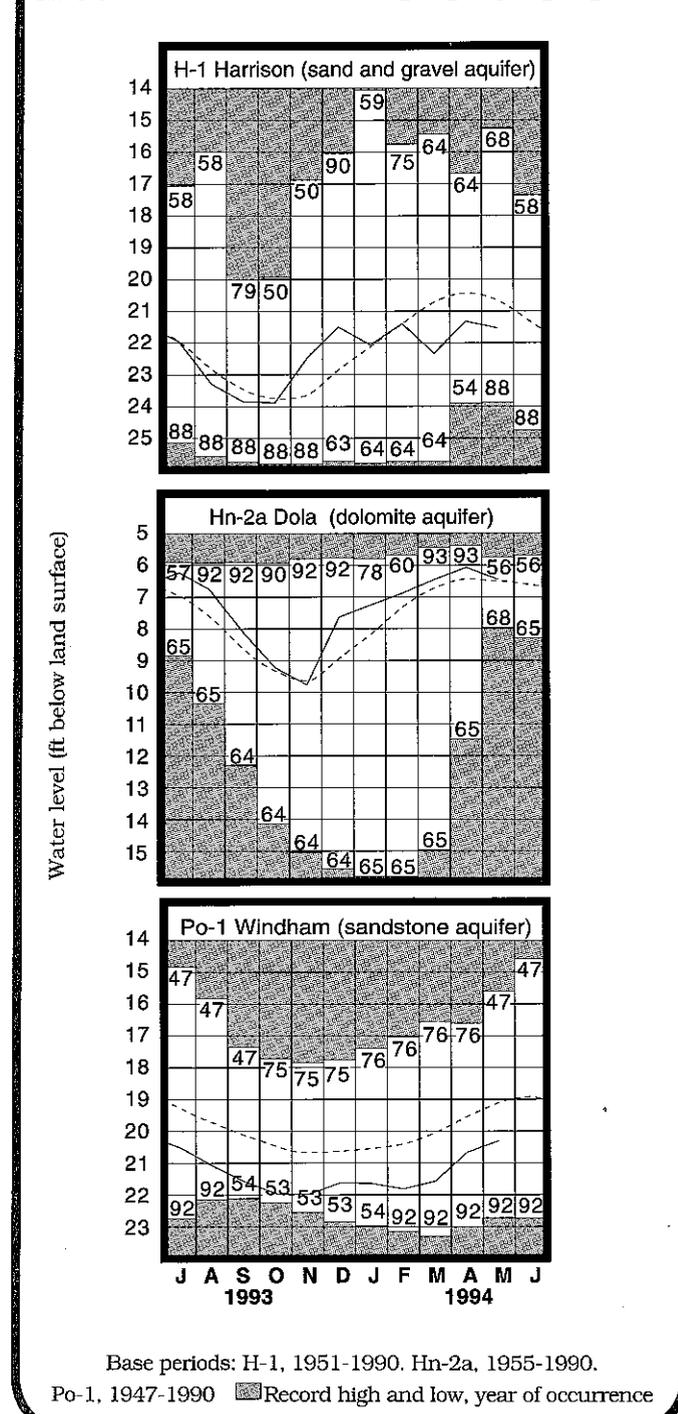
**LAKE ERIE** level rose seasonally during May. The mean level was 572.67 feet (IGLD-1985), 0.20 foot above last month's mean level and 0.98 foot above normal. This month's level is 0.43 foot lower than the May 1993 level and 3.47 feet above Low Water Datum.

**GROUND-WATER LEVELS**

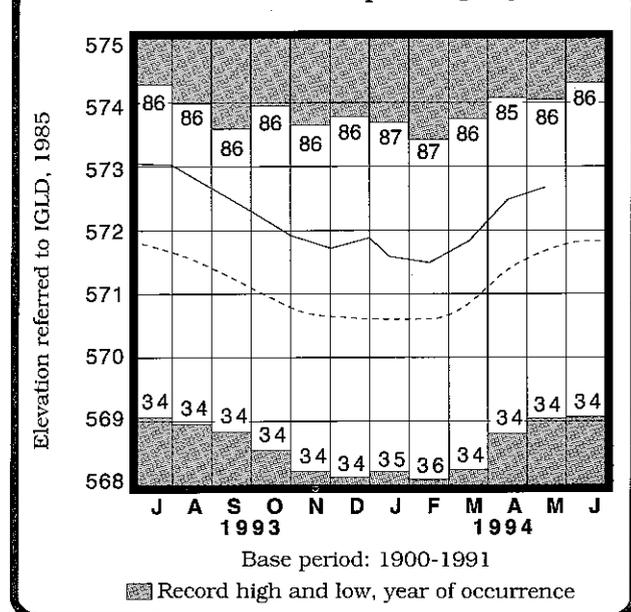
Based on daily lowest level in feet below land-surface datum

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	14.55	-1.83	-1.86	-0.51
Fa-1	Jasper Mill, Fayette Co.	Limestone	7.31	-0.29	-0.15	-0.34
Fr-10	Columbus, Franklin Co.	Gravel	41.36	+1.27	+0.14	-0.69
H-1	Harrison, Hamilton Co.	Gravel	21.55	-0.87	-0.23	+0.12
Hn-2a	Dola, Hardin Co.	Dolomite	6.47	+0.06	-0.39	-0.20
Po-1	Windham, Portage Co.	Sandstone	20.30	-1.21	+0.36	-0.36
Tu-1	Strasburg, Tuscarawas Co.	Gravel	12.23	-1.10	-0.62	-0.05

**GROUND-WATER LEVELS**



**LAKE ERIE LEVELS at Fairport**



Normal - - - - Current - - - -

Normal - - - - Current - - - -



# MONTHLY WATER INVENTORY REPORT FOR OHIO

June 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

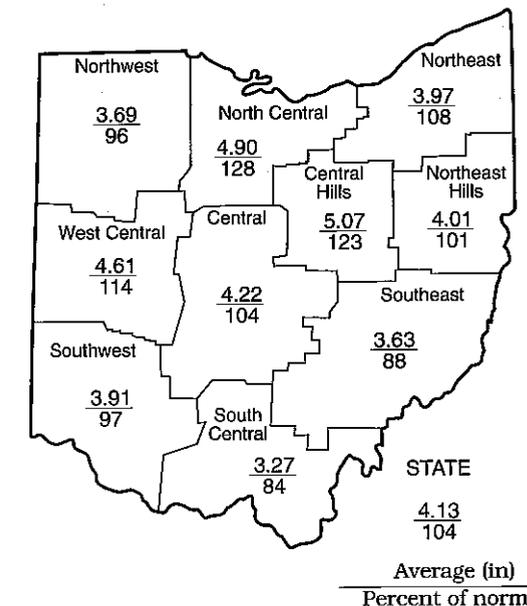
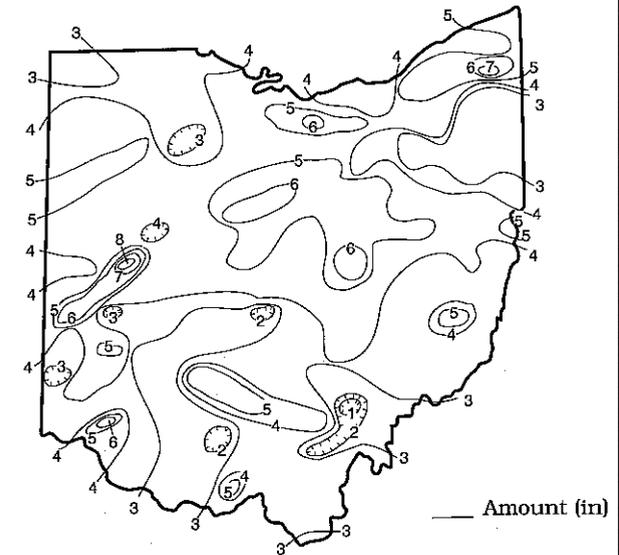
**PRECIPITATION** for June was generally above normal in the northern half of Ohio and below normal in the southern half. The state average was 4.13 inches, 0.17 inch above normal. Regional averages ranged from 5.07 inches, 0.96 inch above normal, for the Central Hills Region to 3.27 inches, 0.61 inch below normal, for the South Central Region. Sidney (Shelby County) reported the greatest amount of precipitation for the month, 8.18 inches. Athens (Athens County) reported the least rain in June, 0.68 inch.

Rainfall during June varied greatly between the first and second halves of the month. The dry conditions that started about the middle of May across most of Ohio not only continued, but worsened during the first half of June. Most areas of the state received less than 0.5 inch of precipitation during the first half of the month; a few exceptions were noted in some southern and southeastern areas where more than 1 inch of rain fell in scattered storms on June 6-7. Some locations reported less than 0.1 inch of rain during the first half of June. Concerns about drought prompted action by state and federal agencies. Farmers were very concerned about crops. Fortunately, showers began to cross Ohio after mid-month. Although widely scattered at first, as the month progressed most areas of the state received much needed rain. The last ten days of the month were the wettest for most areas in Ohio. Showers and thunderstorms were widespread. Many of these storms were locally severe producing hail, high winds and rain amounts of up to 4 inches. Most locations in Ohio received about 90 percent of their June precipitation during the last ten days of the month. At the end of June, soil moisture was reported as being adequate in 78 percent of Ohio, surplus in 10 percent of the state and short in 12 percent. The rains may have saved agricultural crops. Yields are expected to be about average if favorable growing conditions continue.

Precipitation for the first half of the 1994 calendar year is generally above normal in the eastern half of Ohio and below normal in the western half. The state average is 19.56 inches, 0.03 inch below normal. Regional averages range from 25.61 inches, 3.82 inches above normal, for the South Central Region to 14.96 inches, 2.61 inches below normal, for the Northwest Region (see Precipitation table, departure from normal, past six months column).

Precipitation for the 1994 water year is above normal throughout most of Ohio with only the Northwest Region having below normal precipitation. The state average is 29.35 inches, 2.18 inches above normal. Regional averages range from 35.17 inches, 5.41 inches above normal, for the South Central Region to 21.25 inches, 3.35 inches below normal, for the Northwest Region.

## PRECIPITATION JUNE 1994



## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-0.14	-0.80	-2.61	-3.27	+7.38	-1.9
North Central	+1.08	+0.24	-1.50	-2.00	+10.32	-2.2
Northeast	+0.29	+0.86	+0.75	+2.84	+16.47	-1.7
West Central	+0.57	-0.56	-3.12	+3.13	+10.71	-1.3
Central	+0.16	-0.96	-2.09	+1.17	+8.76	+0.2
Central Hills	+0.96	+0.92	+0.26	+0.82	+9.90	-1.4
Northeast Hills	+0.05	+0.02	+1.90	+3.96	+10.25	-1.9
Southwest	-0.14	+1.29	-0.97	-0.48	+2.01	-1.4
South Central	-0.61	+0.01	+3.82	+1.96	-3.54	-1.3
Southeast	-0.51	+0.05	+3.15	+3.64	+3.36	-1.2
State	+0.17	+0.11	-0.03	+1.19	+7.58	

\*Above +4 = Extreme Moist Spell  
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## SUMMARY

Precipitation was generally above normal in the northern half of the state and below normal in the southern half. Most of the rain fell after mid-month. Streamflow was below normal in most areas but above normal in the north-central drainage basins. Reservoir storage declined, but was only slightly below normal. Ground-water levels declined and are below normal throughout the state. Lake Erie level was unchanged from last month and was 0.85 foot above the long-term June average.

## NOTES AND COMMENTS NEW PUBLICATIONS

The Division of Water announces the availability of the following new publications:

- Ground Water Pollution Potential of Erie County by Kelly C. Smith, ERM-Midwest, in cooperation with the Ohio Department of Natural Resources, Division of Water
- Ground-Water Pollution Potential of Geauga County by Linda Aller and Karen L. Ballou, Geodesy, Inc., in cooperation with the Ohio Department of Natural Resources, Division of Water

Ground water pollution potential maps are designed to determine an area's relative vulnerability to ground water pollution. The maps can be used as a planning and management tool for administrators, commissioners, zoning boards and others to aid in making educated decisions about local development and siting of land use operations or activities that can affect ground water quality. The system optimizes the use of existing data to rank areas with respect to pollution potential to help direct investigations and resource expenditures and to prioritize protection, monitoring and clean-up efforts.

Mapping an area's potential for ground water pollution is a relatively new idea. These maps use the DRASTIC system as developed for the U.S. Environmental Protection Agency by the National Ground Water Association. DRASTIC values, as shown on the maps, indicate an area's relative vulnerability to contamination through the use of a numerical rating scheme and the mapping of hydrogeologic settings. Low DRASTIC values indicate relatively low potential and high DRASTIC values indicate a high potential for contamination. Areas of similar DRASTIC values are color-coded for ease of interpretation.

Ground Water Pollution Potential maps and the accompanying report cost \$10.00 each. They can be purchased at or ordered from: ODNR Division of Water, Water Resources Section, 1939 Fountain Square, Building E-1, Columbus, Ohio 43224. Make checks payable to ODNR Division of Water. If ordered through the mail, please include the correct postage and handling charges. Visa or MasterCard can be used for payment.

## Postage and Handling Charges

Cost of Publications	Add
under \$10.01	\$2.00
\$10.01 - \$20.00	\$3.00
\$20.01 - \$50.00	\$5.00
\$50.01 - \$100.00	\$8.50
\$100.01 and over	\$10.00

## OHIO COMPARATIVE RISK PROJECT

Comparative risk is a planning process that combines scientific assessment of risk with public values to produce environmental priorities. Ohio's project will go beyond just producing a priority list. It also will develop action strategies for policymakers and individuals to use in reducing risk. The process will focus on consensus-building and teamwork to accomplish the overall goal of creating an environmental decision-making tool.

There are four working groups involved in the project. Three technical groups will estimate human health, ecosystem and quality-of-life risks from the identified issues. The fourth working group, the public advisory group, will be responsible for coordinating public outreach and integrating scientific assessments with information about public values.

The State Agency Advisory Group, made up of heads of state agencies, will serve to advise and guide the public advisory group. Sally Prouty, ODNR Deputy Director for Resource Management, will represent ODNR Director Frances S. Buchholzer at the advisory group meetings.

The results of the project will include a State of the Environment Report and two action agendas, one for policymakers and one for individuals. All of the documents will provide valuable information to be used in long-range strategic planning.

For more information about the Ohio Comparative Risk Project, contact Michele Morrone, Ph.D., Ohio Comparative Risk Project, P. O. Box 163669, Columbus, Ohio 43216-3669, phone: (614) 644-3638.

## ACKNOWLEDGMENTS

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

- U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service: The Miami Conserancy 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.



DIVISION OF WATER  
1939 FOUNTAIN SQUARE  
COLUMBUS, OHIO 43224

George V. Vohnovich  
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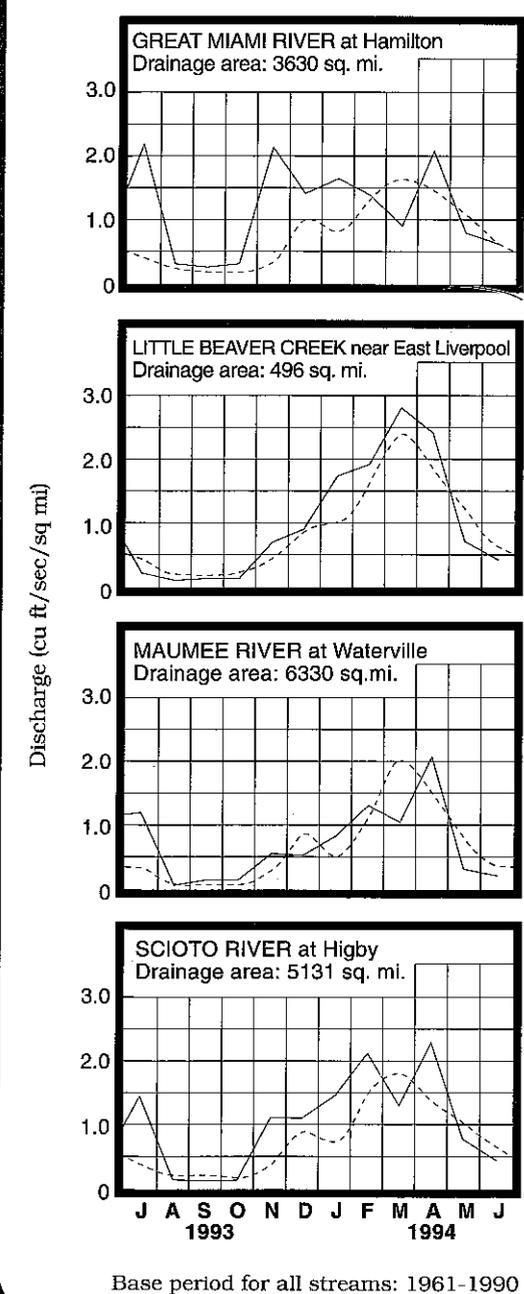
Michele Willis  
Acting Chief

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**MEAN STREAM DISCHARGE**

River and Location	Drainage Area (Sq. Mi.)	This Month Mean Discharge (CFS)	% of Normal	% of Normal Past		
				3 Mos.	6 Mos.	12 Mos.
				Grand River near Painesville	685	197
Great Miami River at Hamilton	3,630	2,322	100	91	92	129
Huron River at Milan	371	200	116	102	89	88
Killbuck Creek at Killbuck	464	155	59	97	106	103
Little Beaver Creek near East Liverpool	496	201	64	85	115	96
Maumee River at Waterville	6,330	1,239	54	78	81	85
Muskingum River at McConnelsville	7,422	2,858	48	86	107	111
Scioto River near Prospect	567	320	120	86	84	121
Scioto River at Higby	5,131	2,188	63	90	95	113
Stillwater River at Pleasant Hill	503	107	40	65	76	137

**MEAN STREAM DISCHARGE**



Normal - - - - Current

**STREAMFLOW** during June was below normal in most areas of Ohio, but above normal in the north-central area of the state. Flows in the north-western and southeastern areas of Ohio were low enough to be considered deficient. Flows during June were less than the flows during May except in north-central and extreme northeastern Ohio drainage basins where they were slightly greater.

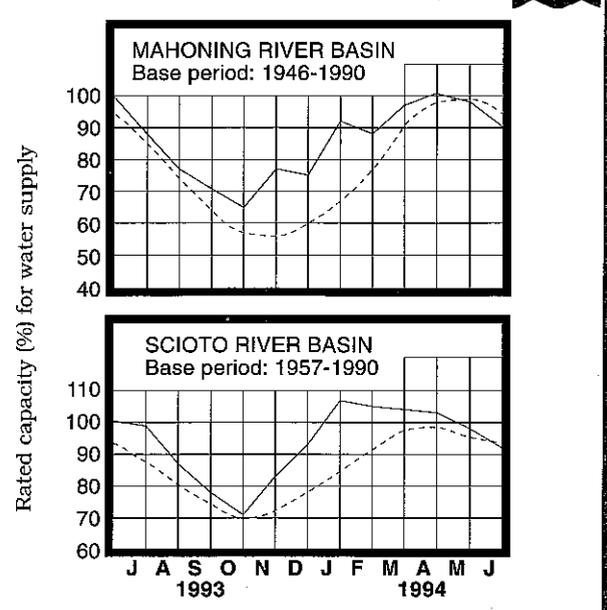
Flows at the beginning of the month were noticeably below normal statewide. Generally, flows declined until a few days after mid-month. Most drainage basins recorded their lowest flows for the month during June 17-20. Flows in most areas of the state were at markedly low levels during this period. Flows began to increase as showers and thunderstorms began to cross the state. Most drainage basins had their greatest flows for the month during June 27-30 following widespread precipitation on June 26. By the end of June, flows had improved to above normal levels.

**RESERVOIR STORAGE** for water supply during June decreased in both the Mahoning and Scioto river basins. Storage at the end of the month was slightly below normal in both basins.

Reservoir storage at the end of June in the Mahoning basin index reservoirs was 90 percent of rated capacity for water supply compared with 98 percent for last month and 100 percent for June 1993. Month-end storage in the Scioto basin index reservoirs was 92 percent of rated capacity for water supply compared with 98 percent for last month and 101 percent for June 1993.

Lakes and reservoirs throughout Ohio are at or near normal seasonal levels. Water supply reservoir levels are only slightly below normal for this time of year. The below normal rainfall and resulting reduced streamflow, high temperatures and increased demand all combined to raise concerns about potential public water supply surface sources throughout Ohio; however, the rains during the last ten days of June helped ease these concerns. At the end of June, surface water supplies are at favorable levels throughout the state.

**RESERVOIR STORAGE FOR WATER SUPPLY**



**GROUND-WATER LEVELS** during June declined in all aquifers throughout Ohio. The dry conditions of late May and early June resulted in net declines during June in ground water storage of two to four times that usually observed. Ground-water levels declined steadily throughout June in most aquifers. A few exceptions were noted in some shallow aquifers where levels stabilized or rose slightly during the last week of the month.

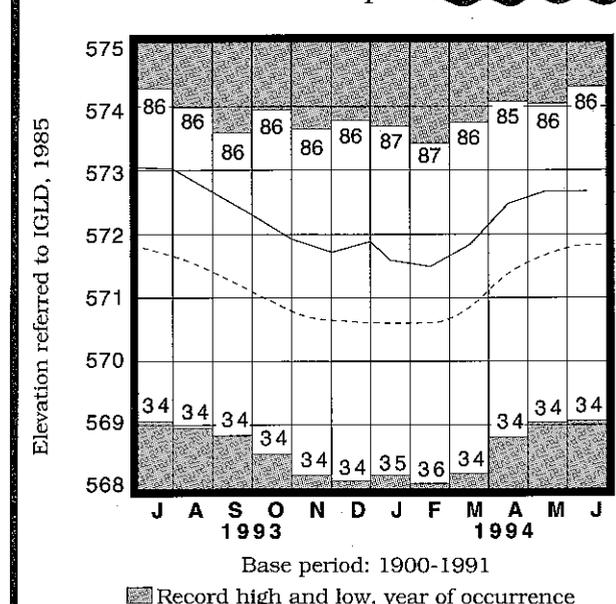
Ground-water storage is at below normal seasonal levels throughout Ohio. Levels generally range from between 0.5 and 3 feet below normal with the eastern half of the state having the greatest deficits. These current levels are not near the June record-low levels; however, the current levels are lower than the June 1993 levels. Normal or near-normal precipitation during the summer and fall months will be needed to keep levels from approaching the historic lowest levels, especially in the eastern half of the state.

Ground-water supplies remain adequate throughout Ohio. Recent rains offered some improvement in soil moisture; however, little recharge to aquifers can be expected until late fall or early winter. Water supply managers with ground water sources are encouraged to closely monitor their situations until adequate recharge has been observed.

**LAKE ERIE** level was stable during June. The mean level was 572.67 feet (IGLD-1985), the same as last month and 0.85 foot above normal. This month's level is 0.39 foot lower than the June 1993 level and 3.47 feet above Low Water Datum.

The U. S. Army Corps of Engineers reports that precipitation in the Lake Erie basin during June averaged 4.2 inches, 0.8 inch above normal. The entire Great Lakes basin averaged 3.5 inches of rain in June, 0.3 inch above normal. For the first six months of 1994, the Lake Erie basin has received an average of 16.9 inches of precipitation, 0.1 inch below normal. For the same period, the entire Great Lakes basin has averaged 14.3 inches, 0.5 inch below normal.

**LAKE ERIE LEVELS at Fairport**



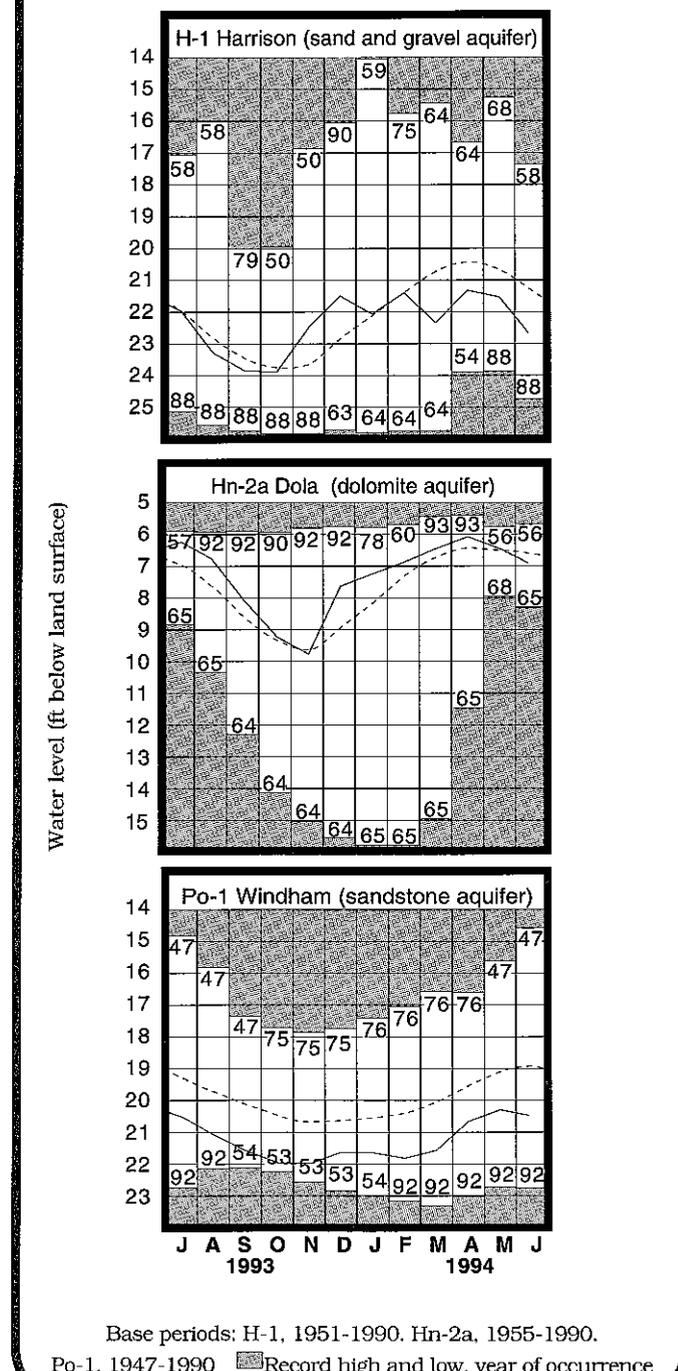
Normal - - - - Current

**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	16.75	-2.84	-2.20	-0.17
Fa-1	Jasper Mill, Fayette Co.	Limestone	7.94	-0.57	-0.63	-0.43
Fr-10	Columbus, Franklin Co.	Gravel	42.58	+0.47	-1.22	-0.97
H-1	Harrison, Hamilton Co.	Gravel	22.66	-1.36	-1.11	-1.07
Hn-2a	Dola, Hardin Co.	Dolomite	6.92	-0.29	-0.45	-0.40
Po-1	Windham, Portage Co.	Sandstone	20.47	-1.55	-0.17	-0.32
Tu-1	Strasburg, Tuscarawas Co.	Gravel	13.67	-1.78	-1.44	-0.26

**GROUND-WATER LEVELS**



Normal - - - - Current



# MONTHLY WATER INVENTORY REPORT FOR OHIO

July 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

## SUMMARY

Precipitation during July was below normal in most of Ohio but above normal in the South Central and Southeast regions. Streamflow was below normal except in the central Ohio drainage basins. Reservoir storage declined seasonally and was at below normal levels at the end of July. Ground water levels declined in most areas and were below normal in most aquifers in Ohio. Lake Erie level rose and was 1.08 feet above the long-term July average.

## NOTES AND COMMENTS

The Division of Water announces the availability of the following new publications:

*Ground Water Pollution Potential of Cuyahoga County*  
by Douglas J. Barber

*Ground Water Pollution Potential of Ottawa County*

by Kelly C. Smith, ERM-Midwest, Inc., in cooperation with the Ohio Department of Natural Resources, Division of Water

*Ground Water Pollution Potential of Seneca County*

by Kelly C. Smith and John Voytek, ERM-Midwest, Inc., in cooperation with the Ohio Department of Natural Resources, Division of Water

*Ground Water Pollution Potential of Wood County*

by Kelly C. Smith and Thomas P. Sabol, ERM-Midwest, Inc., in cooperation with the Ohio Department of Natural Resources, Division of Water

Ground water pollution potential maps are designed to determine an area's relative vulnerability to ground water pollution. The maps can be used as a planning and management tool for administrators, commissioners, zoning boards and others to aid in making educated decisions about local development and siting of land use operations or activities that can affect ground water quality. The system optimizes the use of existing data to rank areas with respect to pollution potential to help direct investigations and resource expenditures and to prioritize protection, monitoring and clean-up efforts.

Mapping an area's potential for ground water pollution is a relatively new idea. These maps use the DRASTIC system as developed for the U.S. Environmental Protection Agency by the National Ground Water Association. DRASTIC values, as shown on the maps, indicate an area's relative vulnerability to contamination through the use of a numerical rating scheme and the mapping of hydrogeologic settings. Low DRASTIC values indicate relatively low potential and high DRASTIC values indicate a high potential for contamination. Areas of similar DRASTIC values are color-coded for ease of interpretation.

Ground Water Pollution Potential maps and the accompanying report cost \$10.00 each. They can be purchased at or ordered from: ODNR Division of Water, Water Resources Section, 1939 Fountain Square, Building E-1, Columbus, Ohio 43224. Make checks payable to ODNR Division of Water. If ordered through the mail, please include the correct postage and handling charges. Visa or MasterCard can be used for payment.

### Postage and Handling Charges

Cost of Publications	Add
under \$10.01	\$2.00
\$10.01 - \$20.00	\$3.00
\$20.01 - \$50.00	\$5.00
\$50.01 - \$100.00	\$8.50
\$100.01 and over	\$10.00

## WATER WITHDRAWAL ANNUAL REPORT AVAILABLE

The "Ohio Water Withdrawal Facility Registration Program: 1993" annual report pamphlet is now available. This four-page report depicts on a statewide basis the amount of water withdrawn by registered facilities in 1993. It also details on a county basis the water withdrawals for each of the five reporting categories. Those categories are: power; public water supply; industrial; agriculture/irrigation (includes golf courses); and miscellaneous.

Substitute H. B. 662 (1988) requires the Ohio Department of Natural Resources Division of Water to establish a Water Withdrawal Facility Registration Program. Owners of all facilities (surface and/or ground water) with the capacity to withdraw 100,000 gallons of water or more per day are required to register that facility and submit annual reports of actual withdrawals pursuant to Section 1521.16 of the Ohio Revised Code.

Copies of the 1993 annual report are available from the Ohio Department of Natural Resources Division of Water, Water Resources Section, 1939 Fountain Square, Building E-1, Columbus, Ohio 43224-1336, phone (614) 265-6735.

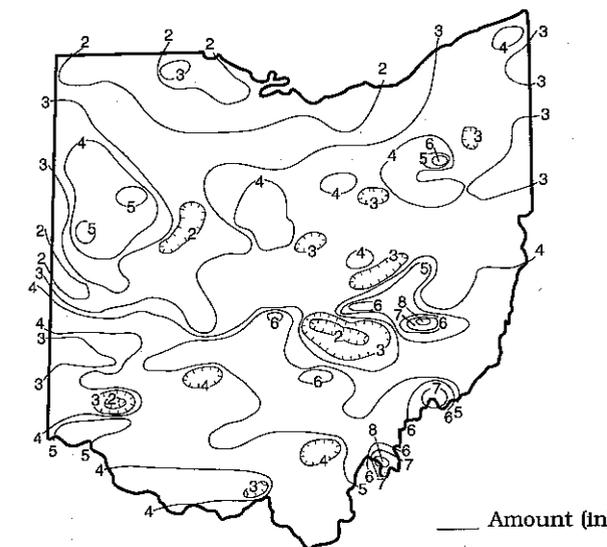
**PRECIPITATION** for July was below normal throughout most of Ohio but above normal in scattered locations, especially in the south-central and southeastern areas of the state. The state average was 3.65 inches, 0.27 inch below normal. Regional averages ranged from 5.38 inches, 1.01 inches above normal, for the Southeast Region to 2.56 inches, 0.90 inch below normal, for the North Central Region. Senecaville Lake (Noble County) reported the greatest amount of precipitation for the month, 8.59 inches; Racine Locks and Dam (Meigs County) reported 8.01 inches of rain in July. Wauseon (Fulton County) reported the least amount of July precipitation, 1.27 inches.

Rainfall during July was evenly distributed throughout the month although some of the larger storms occurred during the first half of the month. The rain fell in typical summer fashion as scattered showers and isolated, locally severe thunderstorms. Small stream and urban flooding was reported following some of these storms. Storm periods during the month included July 2-3, 7-9, 13-14, 21-22, 25 and 29. Rainfall amounts varied widely during each storm period often with less than 0.5 inch totals but ranging up to more than 2 inches at some locations. At the end of July, soil moisture was reported as being adequate in 78 percent of Ohio, surplus in 5 percent and short in 17 percent of the state.

Precipitation for the 1994 calendar year is generally below normal in the western half of the state and above normal in the eastern half. The state average is 23.21 inches, 0.31 inch below normal. Regional averages range from 30.26 inches, 4.01 inches above normal, for the South Central Region to 17.74 inches, 3.27 inches below normal, for the Northwest Region.

Precipitation for the 1994 water year is above normal throughout most of Ohio but below normal in the Northwest, North Central and West Central regions. The state average is 33.00 inches, 1.91 inches above normal. Regional averages range from 39.82 inches, 5.60 inches above normal, for the South Central Region to 24.03 inches, 4.01 inches below normal, for the Northwest Region.

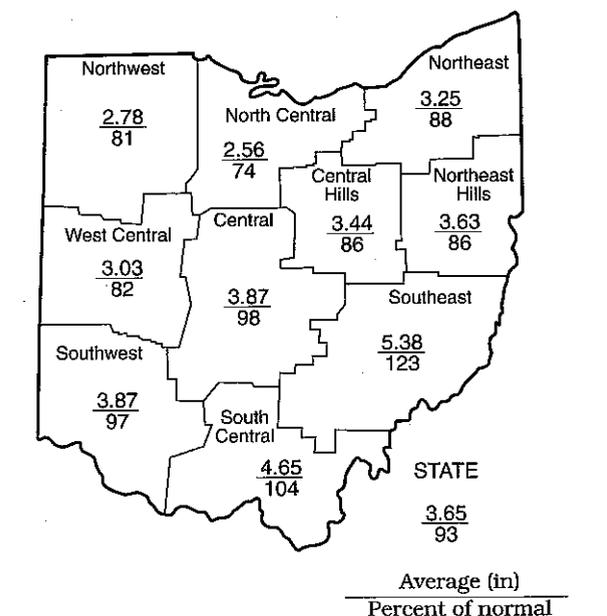
## PRECIPITATION JULY 1994



## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-0.66	-2.80	-3.52	-3.54	+3.03	-3.0
North Central	-0.90	-1.40	-2.88	-1.46	+4.18	-3.2
Northeast	-0.43	-1.55	-0.55	+3.57	+10.35	-2.7
West Central	-0.68	-1.29	-4.05	-0.85	+3.90	-0.7
Central	-0.09	-1.33	-2.90	-0.94	+2.10	+0.1
Central Hills	-0.55	-1.04	-0.98	+0.64	+2.89	-2.8
Northeast Hills	-0.58	-1.22	+0.03	+3.23	+5.19	-2.9
Southwest	-0.10	-1.34	-1.35	+0.29	-2.07	-1.6
South Central	+0.19	-0.99	+3.02	+3.36	-4.82	-1.6
Southeast	+1.01	-0.30	+2.28	+5.08	-0.01	-1.2
State	-0.27	-1.32	-1.08	+0.95	+2.50	

\*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



## ACKNOWLEDGMENTS

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Precipitation data:  
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service; The Miami Commission District; U.S. Army Corps of Engineers, Muskingum Area.  
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U.S. Geological Survey, Water Resources Division.  
Lake Erie level data:  
U.S. Army Corps of Engineers, Detroit District.  
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DIVISION OF WATER  
1939 FOUNTAIN SQUARE  
COLUMBUS, OHIO 43224

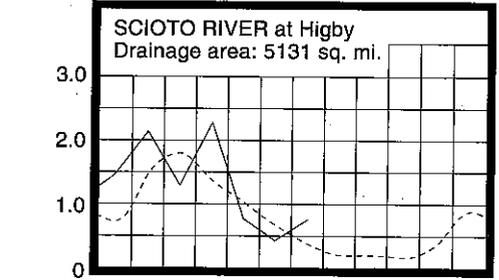
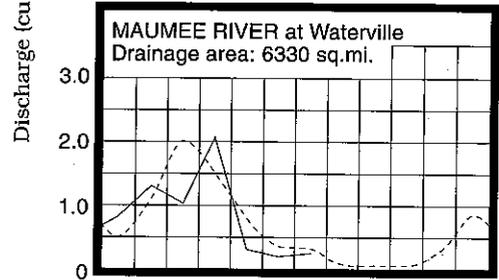
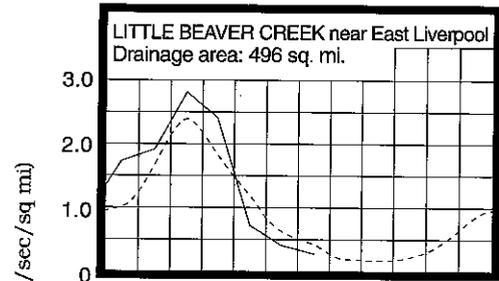
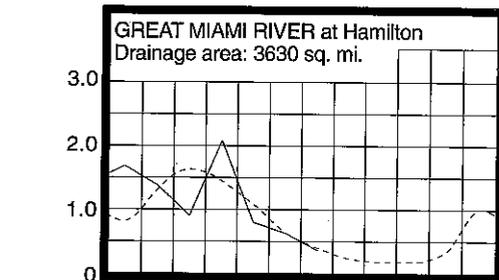
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Director  
Michele Willis  
Acting Chief

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## 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	252	88	42	96	98
Great Miami River at Hamilton	3,630	1,382	94	79	81	113
Huron River at Milan	371	35	48	49	83	88
Killbuck Creek at Killbuck	464	174	96	55	95	102
Little Beaver Creek near East Liverpool	496	134	64	50	98	96
Maumee River at Waterville	6,330	1,609	72	45	76	75
Muskingum River at McConnellsville	7,422	3,513	81	58	105	109
Scioto River near Prospect	567	450	441	90	77	115
Scioto River at Higby	5,131	3,916	196	91	93	106
Stillwater River at Pleasant Hill	503	139	101	49	65	115

## MEAN STREAM DISCHARGE



Base period for all streams: 1961-1990

Normal - - - - Current - - - -

**STREAMFLOW** during July was below normal throughout most of Ohio. The exception was in the central part of the state where flows were above normal. Flows in the Scioto River basin were high enough to be considered excessive. Generally, flows during July were greater than the flows recorded during June.

Flows at the beginning of July were above normal throughout Ohio as a result of the widespread rain during the last ten days of June. Most drainage basins recorded their greatest flows for July at the beginning of the month and the remaining basins later in the first week as showers and thunderstorms continued to cross the state. After these peak flows, flows declined steadily through the end of the month

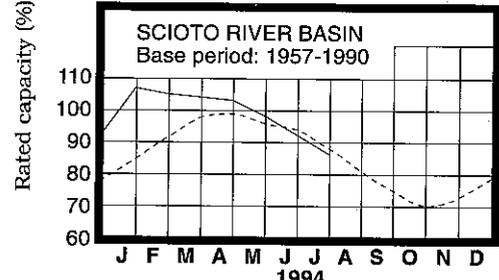
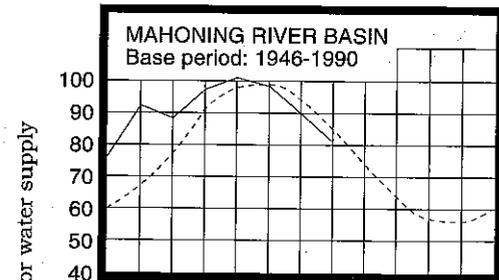
with slight rises noted following local precipitation. The lowest flows for July occurred during the last week, generally occurring around July 23 or July 29. Flows at the end of the month were below normal throughout most of the state except in the Scioto River basin where flows were noticeably above normal.

**RESERVOIR STORAGE** for water supply during July decreased in both the Mahoning and Scioto river basins. Storage at the end of the month was below normal in both basins.

Reservoir storage at the end of July in the Mahoning basin index reservoirs was 81 percent of rated capacity for water supply compared with 90 percent for last month and 89 percent for July 1993. Month-end storage in the Scioto basin index reservoirs was 86 percent of rated capacity for water supply compared with 92 percent for last month and 99 percent for July 1993.

Surface water supplies throughout Ohio continue to remain at near or slightly below normal seasonal levels. Storage in both on- and off-stream reservoirs continues to decline seasonally. Recreational lakes and reservoirs are also near normal summer pool elevations. In general, surface water supplies are at favorable levels throughout the state.

## RESERVOIR STORAGE FOR WATER SUPPLY



Base period: 1900-1991

**GROUND WATER LEVELS** during July declined in most aquifers throughout Ohio. A few exceptions were noted where levels locally were stable or rose slightly during the month in response to heavy rain just prior to the end of June and ample precipitation during July. In most aquifers, ground water levels slowly declined throughout the month or were stable during the early part of July before beginning to decline. Generally, the net declines during July from the levels recorded in June were less than usually observed.

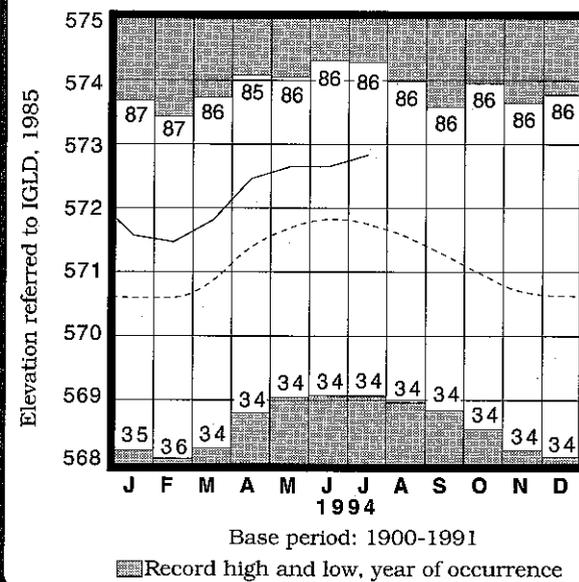
Ground water storage continues to remain at below normal seasonal levels throughout most of Ohio; a few aquifers in central and portions of northwestern Ohio are at slightly above normal levels. Aquifers in the eastern half of Ohio continue to have the greatest departures from normal with levels ranging up to nearly 3 feet below normal. Current levels range up to 1 foot lower than the levels of July 1993, but generally are not approaching any record-low levels.

Ground water supplies continue to remain adequate throughout Ohio. Water supply managers with ground water sources are encouraged to continue monitoring their specific situations through the upcoming fall and winter months.

**LAKE ERIE** level rose during July. The mean level was 572.83 feet (IGLD-1985), 0.16 foot above last month's mean level and 1.08 feet above normal. This month's level is 0.20 foot lower than the July 1993 level and 3.63 feet above Low Water Datum.

The U. S. Army Corps of Engineers' forecast indicates that Lake Erie is expected to remain above the long-term average through the end of 1994. Levels are expected to average about 1 foot above normal with a projected possible range from just above normal to nearly 1.5 feet above the long-term average.

## LAKE ERIE LEVELS at Fairport

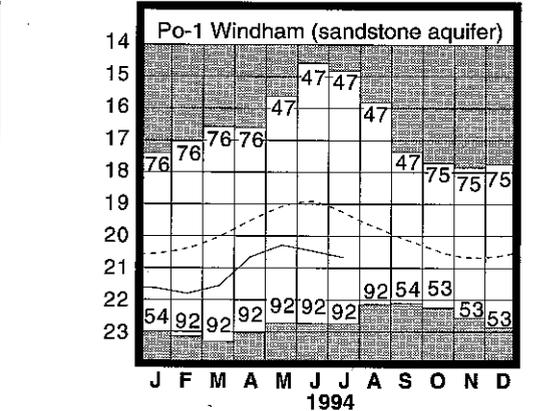
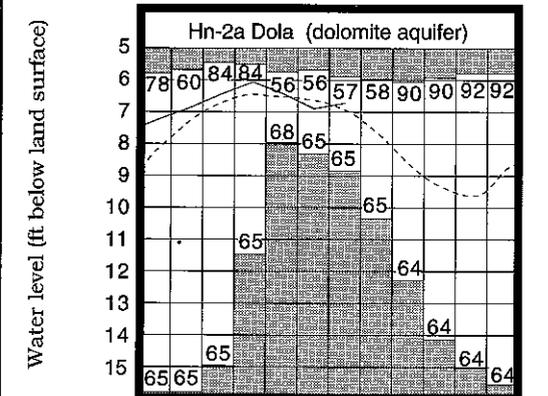
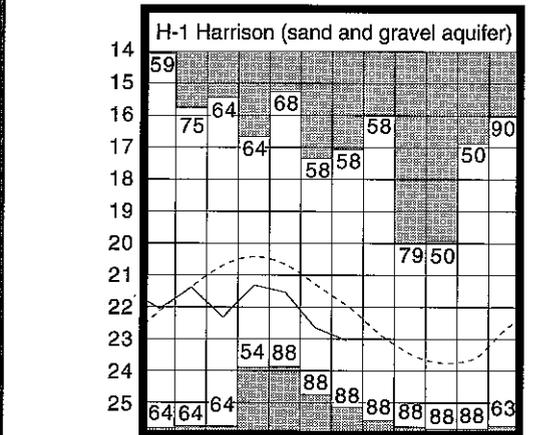


## GROUND-WATER LEVELS

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

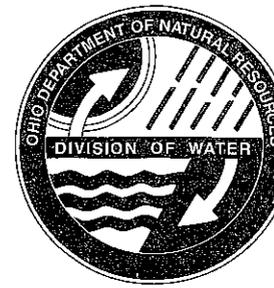
Index Well	Location	Aquifer	Mean This Month	Departure From Normal	Change in feet from:	
					Last Month	Year Ago
F-1	W. Rushville, Fairfield Co.	Sandstone	17.84	-2.72	-1.09	-0.24
Fa-1	Jasper Mill, Fayette Co.	Limestone	8.17	-0.37	-0.23	-0.31
Fr-10	Columbus, Franklin Co.	Gravel	42.96	+0.50	-0.38	-0.76
H-1	Harrison, Hamilton Co.	Gravel	23.04	-1.08	-0.38	-1.01
Hn-2a	Dola, Hardin Co.	Dolomite	6.73	+0.22	+0.19	-0.52
Po-1	Windham, Portage Co.	Sandstone	20.64	-1.40	-0.22	-0.17
Tu-1	Strasburg, Tuscarawas Co.	Gravel	14.38	-1.86	-0.71	-0.28

## GROUND-WATER LEVELS



Base periods: H-1, 1951-1990. Hn-2a, 1955-1990. Po-1, 1947-1990. Record high and low, year of occurrence

Normal - - - - Current - - - -



# MONTHLY WATER INVENTORY REPORT FOR OHIO

August 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

(continued from front page)

Precipitation for the 1994 water year is above normal throughout most of Ohio with only the Northwest and West Central regions having below normal precipitation. The state average is 37.22 inches, 2.65 inches above normal. Regional averages range from 43.42 inches, 5.31 inches above normal, for the South Central Region to 27.04 inches, 3.93 inches below normal, for the Northwest Region.

### SUMMARY

Precipitation during August was above normal throughout most of Ohio with only the South Central and West Central regions having slightly below normal precipitation. Streamflow was above normal in the eastern two-thirds of the state and below normal in the western one-third. Reservoir storage declined and ranges from slightly above to slightly below normal seasonal levels. Ground water storage declined and is below normal in most areas of the state. Lake Erie level declined and was 1.11 feet above the long-term August average.

### NOTES AND COMMENTS FACT SHEETS AVAILABLE

The Ohio Department of Natural Resources, Division of Water is preparing a series of fact sheets concerning wide-ranging topics. Fact sheets have been prepared that detail services and information available at the Division of Water. Other fact sheets cover topics and issues of interest to homeowners, scientists and others. These easily reproducible fact sheets would be ideal for distribution to small groups, at information booths, in schools and through local government offices.

Single copies of the fact sheets listed below can be ordered at no cost from the ODNR-Division of Water, 1939 Fountain Square, Building E-3, Columbus, Ohio 43224, phone (614) 265-6717.

### Fact Sheets of the Division of Water

Sheet No.	Title
1	Water Efficiency at Home
2	Water Efficiency in Your Own Back Yard
3	Water Efficiency for Private Well Owners
4	The Ohio Canal System
5	Well Abandonment Regulations ODH and Ohio EPA
6	Properly Sealing Unused Wells
7	What is a Well Screen?
8	Well Log Computerization
9	Evaluating Ground Water Pollution Potential in Ohio
10	Ground Water Resources Mapping in Ohio
11	Precipitation in Ohio
12	Floods and Flood Damage Prevention
13	Facts About Flood Insurance
14	Well Construction Materials and Techniques
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23	When Does a Well Log Need to be Filed?
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33	Dam Safety: Inspection of Concrete Structures
34	Dam Safety: Construction Permits for Dams
35	Not Available
36	Facts About Floodproofing

**PRECIPITATION** for August was above normal throughout most of Ohio; pockets of areas in south-central, west-central and north-western Ohio had below normal precipitation. The state average was 4.25 inches, 0.77 inch above normal. Regional averages ranged from 5.67 inches, 2.27 inches above normal, for the Northeast Region to 2.99 inches, 0.06 inch above normal, for the Northwest Region. Mosquito Creek Wildlife Area (Trumbull County) reported the greatest amount of precipitation during August, 8.74 inches of which 5.69 inches was observed on August 13 and 1.50 inches on August 14. Other locations reporting more than seven inches of precipitation in August were: Akron-Canton Airport (Summit County), 7.54 inches; Colebrook (Ashtabula County), 7.33 inches; Mohawk Dam (Coshocton County), 7.30 inches; and Norwalk (Huron County), 7.89 inches. New Carlisle (Clark County) reported the least amount of rain in August, only 1.37 inches. A few other locations in extreme north-western Ohio also reported less than two inches of precipitation during August.

Precipitation during August fell as showers and thunderstorms typical of the season. Locally severe storms with heavy precipitation were reported in many areas. Most areas of the state received some rain during every week of the month. During the first week of the month, storms developed during August 2 and 4-5. Most areas of Ohio received around 1 inch of rain from these storms, much less in northwestern Ohio but more than 2 inches in parts of eastern Ohio. Unusually heavy rain fell in northeastern Ohio and parts of central Ohio during August 13-14. Between 3 and 4 inches of rain was observed at many locations in these areas with unofficial readings of nearly 7 inches reported. Urban and small stream flooding, especially in northeastern Ohio, was widespread in several counties. Rainfall amounts tapered to near zero in southern Ohio during this period. Storms continued to cross the state during the second half of August. Storms during August 20-21, 28 and 31 were more typical with 0.5 inch rain amounts during each storm period common, ranging up to 1.5 inches at some locations.

Precipitation for the 1994 calendar year is generally below normal in the western half of the state and above normal in the eastern half. The state average is 27.43 inches, 0.43 inch above normal. Regional averages range from 33.86 inches, 3.72 inches above normal, for the South Central Region to 20.75 inches, 3.19 inches below normal, for the Northwest Region.

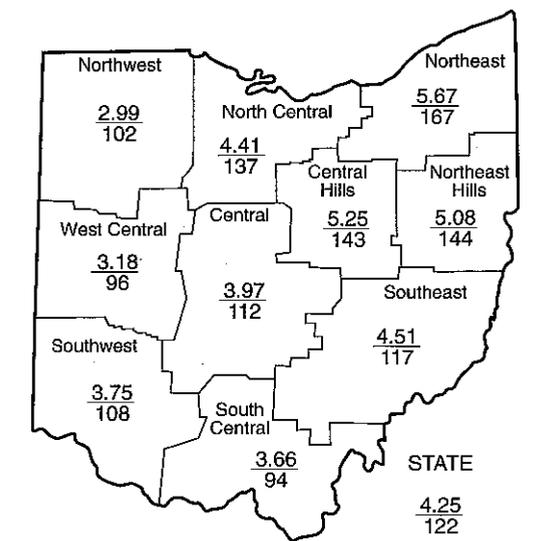
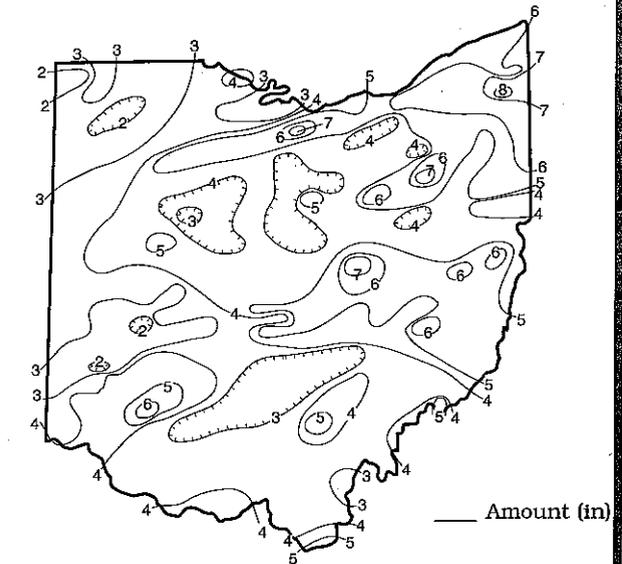
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### PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	+0.06	-0.65	-2.80	-2.16	+2.92	-1.5
North Central	+1.18	+1.28	-0.86	+2.20	+4.35	-3.1
Northeast	+2.27	+2.13	+2.53	+7.63	+10.85	+0.7
West Central	-0.12	-0.23	-3.39	+0.33	+3.59	+1.2
Central	+0.42	+0.49	-1.81	+1.92	+2.37	+0.4
Central Hills	+1.59	+2.00	+1.16	+5.12	+4.43	-1.6
Northeast Hills	+1.56	+1.13	+2.02	+7.32	+5.76	-0.1
Southwest	+0.28	+0.04	-0.25	+1.47	-1.76	-0.3
South Central	-0.23	-0.64	+1.65	+5.49	-4.29	-0.6
Southeast	+0.67	+1.07	+2.40	+7.09	+0.75	-0.4
State	+0.77	+0.67	+0.08	+3.66	+2.93	

\*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 AUGUST 1994



Average (in)  
Percent of normal

### ACKNOWLEDGMENTS

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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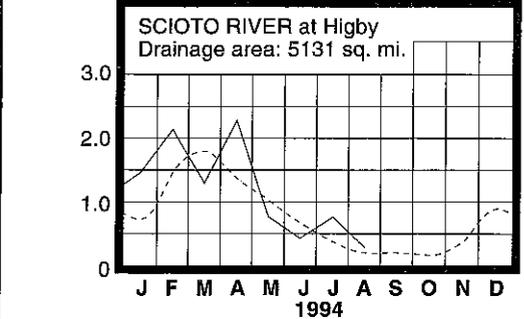
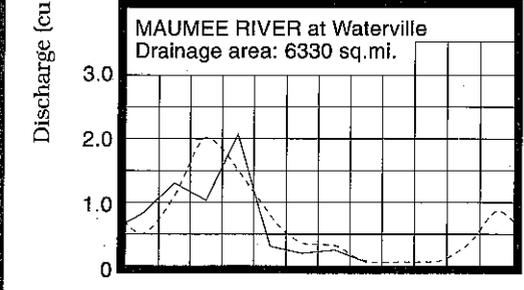
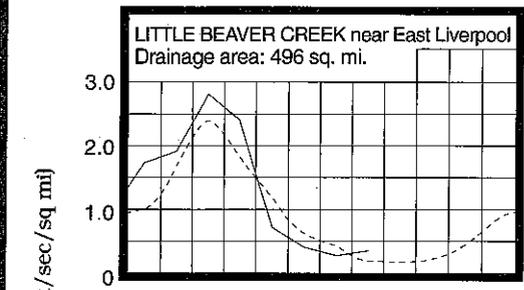
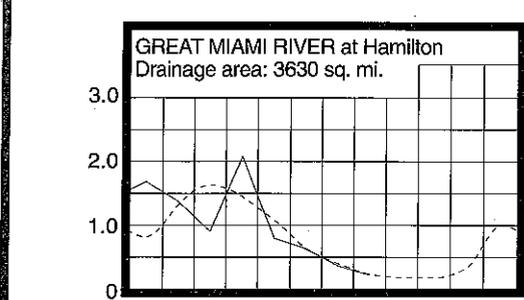
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**MEAN STREAM DISCHARGE**

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	709	633	104	91	104
Great Miami River at Hamilton	3,630	911	98	88	74	112
Huron River at Milan	371	185	385	121	82	93
Killbuck Creek at Killbuck	464	139	109	70	92	104
Little Beaver Creek near East Liverpool	496	176	169	77	91	99
Maumee River at Waterville	6,330	629	94	63	72	75
Muskingum River at McConnelsville	7,422	2,871	109	70	89	110
Scioto River near Prospect	567	68	167	152	73	116
Scioto River at Higby	5,131	1,461	125	110	86	107
Stillwater River at Pleasant Hill	503	49	84	58	52	115

**MEAN STREAM DISCHARGE**



Base period for all streams: 1961-1990

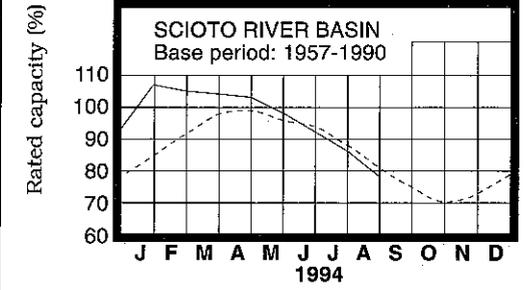
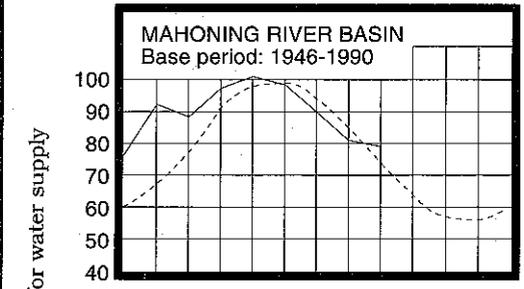
Normal - - - - Current - - - -

occurred a few days prior to the end of the month. Greatest flows for August in northern and eastern Ohio occurred after heavy showers and thunderstorms on August 13-14. Small stream and urban flooding was widespread, especially in extreme northeastern Ohio counties. Central and southwestern Ohio drainage basins had their greatest flows for August just prior to the end of the month. At the end of August, flows were mixed, being above normal in central and southeastern Ohio and below normal elsewhere.

**RESERVOIR STORAGE** for water supply during August declined seasonally in both the Mahoning and Scioto river basins. Storage was slightly above normal in the Mahoning basin reservoirs and slightly below normal in the Scioto basin reservoirs.

Reservoir storage at the end of August in the Mahoning basin index reservoirs was 79 percent of rated capacity for water supply compared with 81 percent for last month and 77 percent for August 1993. Month-end storage in the Scioto basin index reservoirs was 78 percent of rated capacity for water supply compared with 86 percent for last month and 87 percent for August 1993. Surface water supplies continue to remain at favorable levels for this time of the year.

**RESERVOIR STORAGE FOR WATER SUPPLY**



**STREAMFLOW** during August was above normal in the eastern two-thirds of Ohio but slightly below normal in the western one-third. Flows in north-central and northeastern Ohio were high enough to be considered excessive. August flows in most drainage basins decreased seasonally from the July flows, but in the northeast and north-central Ohio drainage basins, they increased sharply in response to the above normal precipitation.

Flows at the beginning of the month were below normal in the eastern half of the state and near or slightly above normal in the western half. Drainage basins in northeastern Ohio had their lowest flows for August during the first few days of the month while in the western half of the state, lowest flows

**GROUND WATER LEVELS** during August declined in all aquifers throughout Ohio. Net declines during the month were greater than usually observed in most aquifers. In most aquifers, water levels declined steadily throughout the month. Some shallow aquifers showed slight improvements following local precipitation, but quickly returned to the natural decline rate typical for August.

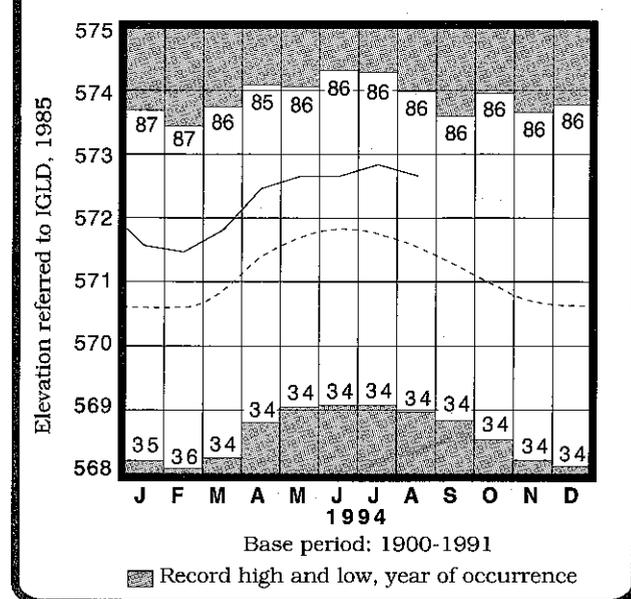
Ground water storage remains at below normal levels in most areas of the state. Some aquifers in central and northwestern Ohio continue to be at slightly above normal levels. Aquifers in the eastern half of the state continue to have the greatest departure from normal, ranging up to nearly 4 feet below normal. Index observation well F-1 (Fairfield County), representing sandstone aquifers in eastern and southeastern Ohio, reached a record-low level for August.

Current ground water levels in most aquifers are lower than the levels recorded in August 1993; in some aquifers, current levels are about the same or slightly higher than last year's levels. Ground water supplies remain adequate throughout Ohio; however, adequate precipitation during the upcoming recharge season will be needed to improve the situation. Water supply managers with ground water sources are encouraged to closely monitor their specific situations through the upcoming fall and winter recharge season.

**LAKE ERIE** level declined during August. The mean level was 572.67 feet (IGLD-1985), 0.16 foot below last month's mean level and 1.11 feet above normal. This month's level is the same as the August 1993 level and 3.47 feet above Low Water Datum.

The U. S. Army Corps of Engineers reports that precipitation in the Lake Erie basin during August 1994 averaged 4.0 inches, 0.8 inch above normal. The entire Great Lakes basin averaged 4.2 inches of rain in August 1994, 1.1 inches above normal. Cumulative precipitation for 1994 through August in the Lake Erie basin averages 23.6 inches, which is normal, and for the entire Great Lakes basin 22.3 inches, 1.3 inches above normal.

**LAKE ERIE LEVELS at Fairport**



Base period: 1900-1991  
Record high and low, year of occurrence

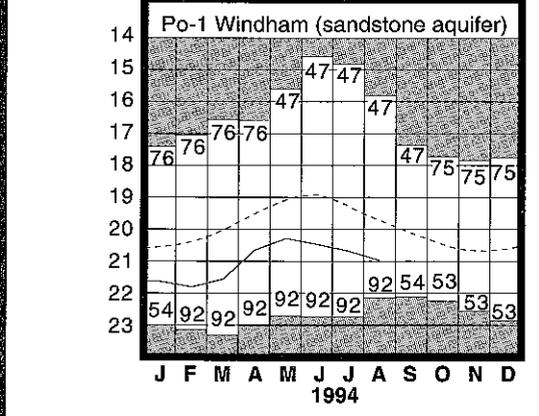
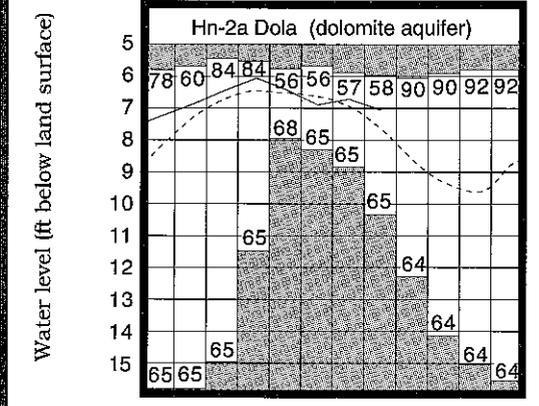
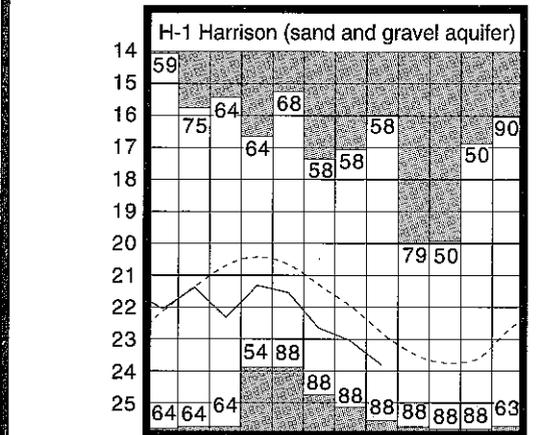
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**GROUND-WATER LEVELS**

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.
Fa-1	Jasper Mill, Fayette Co.	Limestone	8.75	-0.47	-0.58	+0.27
Fr-10	Columbus, Franklin Co.	Gravel	43.69	+0.33	-0.73	-0.76
H-1	Harrison, Hamilton Co.	Gravel	23.81	-1.00	-0.77	-0.44
Hn-2a	Dola, Hardin Co.	Dolomite	7.08	+0.58	-0.35	-0.36
Po-1	Windham, Portage Co.	Sandstone	20.97	-1.25	-0.31	+0.13
Tu-1	Strasburg, Tuscarawas Co.	Gravel	15.03	-1.94	-0.65	+0.07

**GROUND-WATER LEVELS**



Base periods: H-1, 1951-1990. Hn-2a, 1955-1990. Po-1, 1947-1990  
Record high and low, year of occurrence

Normal - - - - Current - - - -

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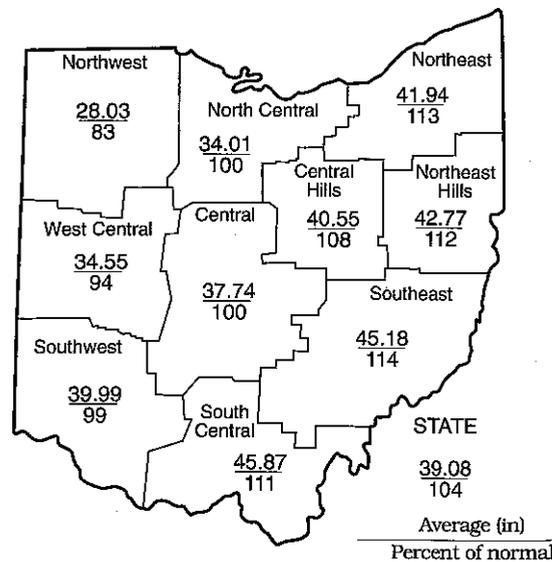
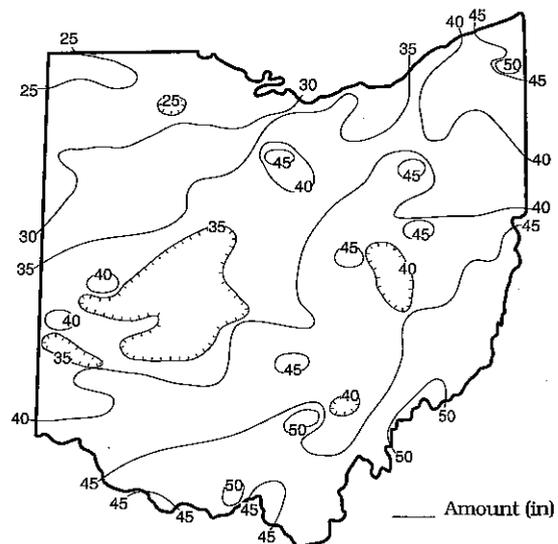
to water supplies. April brought above normal precipitation, but unusually dry weather during May and the first half of June brought an abrupt end to the recharge season. Drought-like conditions during May and June concerned farmers and water supply managers. Timely rains during the second half of June, in July and in August resulted in a satisfactory growing season for most areas of the state. The 1994 water year ended with an unusually dry September with water supply managers looking forward to the upcoming recharge season.

**SUMMARY**

Precipitation during September was below normal throughout Ohio. Streamflow was below in most drainage basins. Reservoir storage declined and ranged from slightly above to slightly below normal. Ground water storage declined and is at below normal levels in most aquifers throughout the state. Lake Erie level declined and was 1.05 feet above the long-term September average.

Precipitation for the 1994 water year was above normal in the eastern two-thirds of Ohio and below in the western one-third. Streamflow was above normal in all but the northwestern and north-central Ohio drainage basins. Reservoir storage was at above normal levels during the fall and winter months, but in late spring it fell to below normal. Ground water storage was at noticeably below normal levels in the eastern half of the state and near normal elsewhere. Lake Erie was above the long-term average throughout the water year.

**Total Precipitation 1994 Water Year**



# MONTHLY WATER INVENTORY REPORT FOR OHIO

September 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

**PRECIPITATION** during September was below normal throughout the state. The state average was 1.80 inches, 1.20 inches below normal. Regional averages ranged from 2.54 inches, 0.64 inch below normal, for the Northeast Region to 0.93 inch, 1.92 inches below normal, for the Northwest Region. This was the fifth driest September during the past 100 years in the Northwest Region. Dorset (Ashtabula County) reported the greatest amount of precipitation during September, 4.08 inches; Roseville (Muskingum County) reported 4.05 inches, the only other location reporting more than four inches for the month. Xenia (Greene County) reported the least amount of precipitation during September, 0.52 inch. Many locations in the western half of the state reported less than one inch of rain in September.

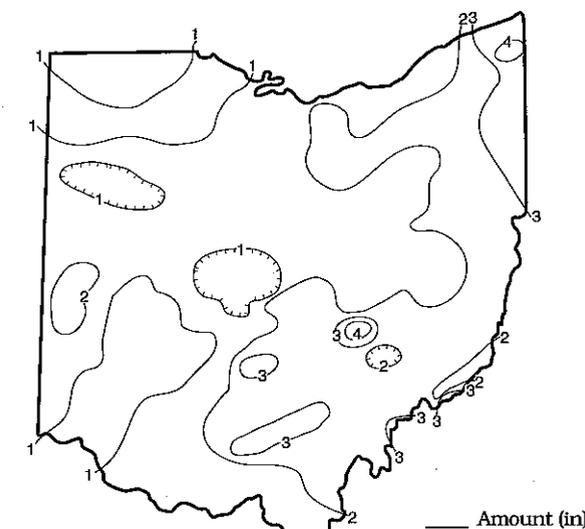
Precipitation during September was light and sparse throughout Ohio. Daily totals at any location seldom exceeded one inch with amounts usually less than 0.5 inch reported. The first half of the month was very dry in most areas of the state. Farmers and other interested attendees had beautiful weather to visit the Farm Science Review during September 20-22. Several days of rain occurred during the last week of the month in many areas of the state. Northern areas, especially northeastern Ohio, received the most rain during this period.

Precipitation for the 1994 calendar year is generally below normal in the western two-thirds of Ohio and above normal in the eastern one-third. The state average is 29.26 inches, 0.74 inch below normal. Regional averages range from 36.31 inches, 2.99 inches above normal, for the South Central Region to 21.74 inches, 5.05 inches below normal, for the Northwest Region.

Precipitation for the 1994 water year was above normal in the eastern two-thirds of the state and below normal in the western one-third. The state average was 39.08 inches, 1.51 inches above normal. Regional averages ranged from 45.87 inches, 4.58 inches above normal, for the South Central Region to 28.03 inches, 5.79 inches below normal, for the Northwest Region (see Precipitation table, departure from normal, past 12 months column). McArthur (Vinton County) reported the greatest amount of precipitation during the 1994 water year, 54.19 inches. Montpelier (Williams County) reported the least amount, 23.46 inches. An isohyetal map and regional averages with percentages of normal precipitation for the 1994 water year appear on the last page of this report.

The 1994 water year started off on a positive note as far as water supplies are concerned with above normal precipitation during three of the first four months; only December had below normal precipitation. Below normal precipitation in February and March drastically reduced the rate of recharge (continued on back)

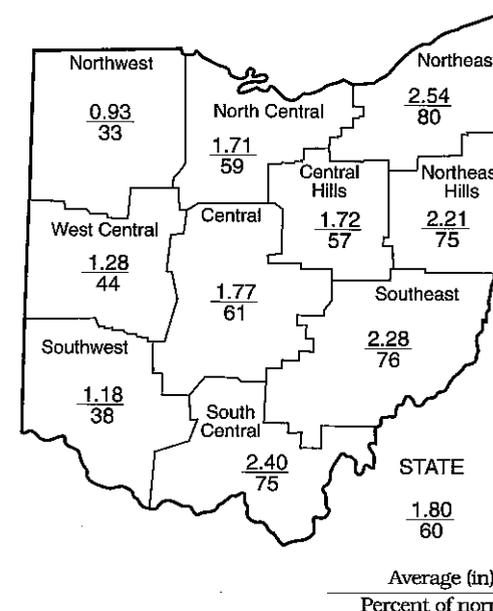
**PRECIPITATION SEPTEMBER 1994**



**PRECIPITATION**

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-1.92	-2.46	-3.20	-5.79	-1.78	-2.3
North Central	-1.17	-0.98	-0.70	-0.02	+1.68	-2.8
Northeast	-0.64	+1.20	+2.06	+4.97	+8.84	+0.8
West Central	-1.65	-2.25	-2.85	-2.14	+2.48	+0.3
Central	-1.12	-0.88	-1.74	+0.13	+1.66	-1.8
Central Hills	-1.31	-0.27	+0.65	+3.15	+2.61	-2.0
Northeast Hills	-0.73	+0.25	+0.41	+4.74	+4.64	+0.5
Southwest	-1.91	-1.74	-0.36	-0.28	-2.82	-1.2
South Central	-0.78	-0.77	-0.69	+4.58	-3.86	-0.4
Southeast	-0.71	+1.03	+1.00	+5.59	+0.87	-0.4
State	-1.20	-0.69	-0.54	+1.51	+1.46	

\*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  
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0.4 To -0.4 = Near Normal  
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**ACKNOWLEDGMENTS**

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- 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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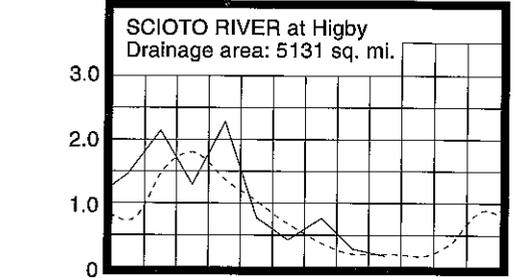
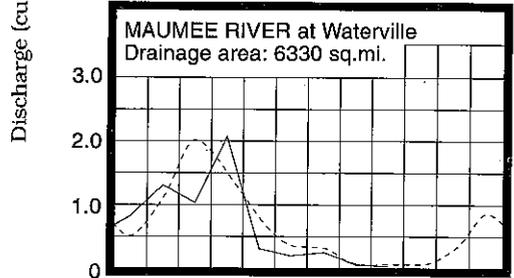
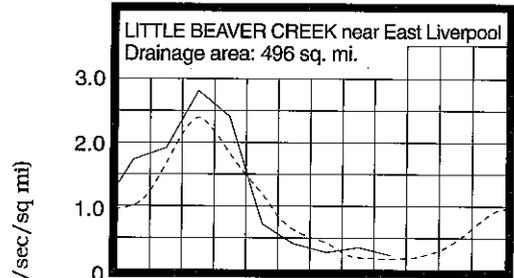
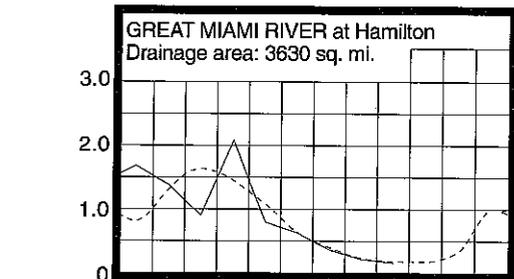
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Acting Chief

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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	31	14	102	80	103
Great Miami River at Hamilton	3,630	668	87	87	84	111
Huron River at Milan	371	43	131	128	99	94
Killbuck Creek at Killbuck	464	72	71	90	90	104
Little Beaver Creek near East Liverpool	496	115	125	89	80	99
Maumee River at Waterville	6,330	282	44	66	68	74
Muskingum River at McConnellsville	7,422	1,671	85	80	83	110
Scioto River near Prospect	567	25	81	247	104	116
Scioto River at Higby	5,131	1,028	84	122	97	108
Stillwater River at Pleasant Hill	503	37	75	76	62	114

MEAN STREAM DISCHARGE



Base period for all streams: 1961-1990

Normal - - - - Current

**STREAMFLOW** during September was below normal in most areas of the state but slightly above normal in a few drainage basins in north-central and eastern Ohio. Flows in northwestern and some northeastern Ohio basins were low enough to be considered deficient. Streamflows during September were noticeably less than the flows during August.

Flows at the beginning of the month were near or slightly above normal in most areas of the state but below normal in the northwestern and northeastern Ohio drainage basins. Most areas had their greatest flows for September at the beginning of the month or later during the first week. The exception was in some east-central basins where the month's greatest flows occurred a few days before the end of the month. Lowest flows for the month generally occurred around

mid-month in the eastern half of the state and on or about September 24 in the western half. At the end of the month, flows were below normal in almost all areas of the state.

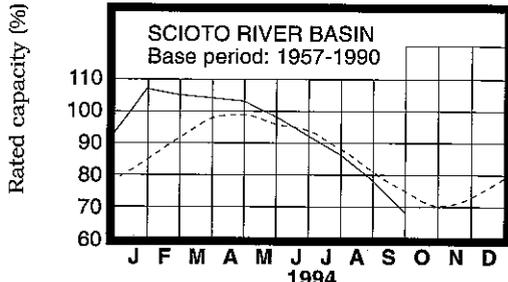
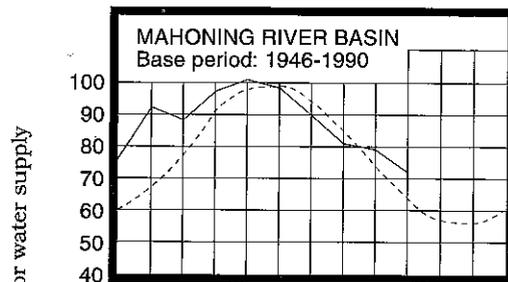
Streamflow for the 1994 water year was above normal in most areas of Ohio with only the north-central and northwestern drainage basins having below normal flows (see Mean Stream Discharge table, past 12 months column). Flows during the water year fluctuated between above and below normal mirroring the month's precipitation. Flows were unusually high during November responding to the noticeably above normal precipitation. After the January thaw, moderate flooding was widespread and often compounded by ice jams especially along the Ohio River and near Lake Erie. April showers resulted in some moderate flooding, and during the summer months, locally severe thunderstorms caused small stream and urban flooding locally, especially during August.

**RESERVOIR STORAGE** for water supply during September declined in both the Mahoning and Scioto river basins. Month-end storage was above normal in the Mahoning basin reservoirs and below normal in the Scioto basin reservoirs.

Reservoir storage at the end of September in the Mahoning basin index reservoirs was 72 percent of rated capacity for water supply compared with 79 percent for last month and 71 percent for September 1993. Month-end storage in the Scioto basin index reservoirs was 68 percent of rated capacity for water supply compared with 78 percent for last month and 78 percent for September 1993.

Surface water supplies were at favorable levels during the 1994 water year. Reservoir storage in most areas of Ohio was at above normal levels through the fall, winter and spring months. Storage fell to slightly below normal levels at the beginning of summer due to noticeably below normal precipitation during May and most of June. Reservoir storage declined seasonally through the end of the 1994 water year and although currently at below normal levels in some areas of Ohio, storage remains adequate as the 1995 water recharge season is set to begin.

RESERVOIR STORAGE FOR WATER SUPPLY



**GROUND WATER LEVELS** during September declined in all aquifers throughout Ohio. Net declines during September from last month's levels ranged from near normal to twice that usually observed. The Ohio Agricultural Statistics Service reports that at the end of September, topsoil moisture is rated as being adequate in 68 percent of the state, short in 30 percent of the state and surplus in 2 percent of the state.

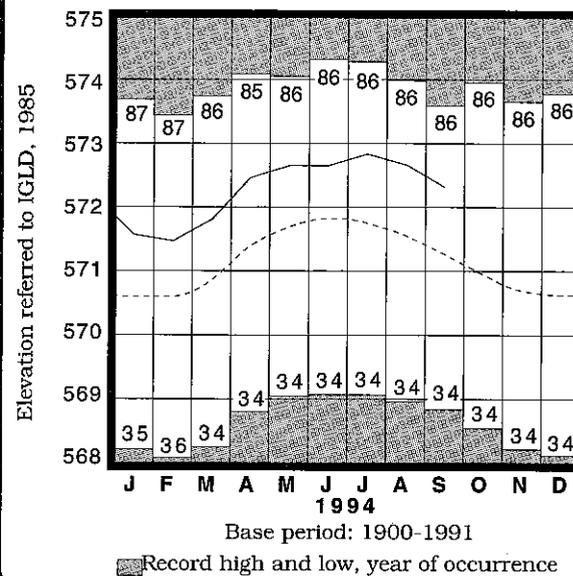
Ground water storage continues to remain at below normal levels in most areas of Ohio with only a few aquifers in northwestern Ohio having above normal levels. Some aquifers in eastern Ohio are near record-low levels for this time of the year. This month's levels are lower than the levels of a year ago in most areas of the state, but are slightly higher in a few areas where the 1994 water year precipitation has been generally greater than the precipitation during the last water year.

Ground water supplies during the 1994 water year were adequate throughout Ohio. Ground water storage at the beginning of the water year was noticeably below normal in the eastern half of the state and near to slightly below normal in the western half. The recharge season for the 1994 water year got off to a good start with above normal precipitation during three of the first four months, especially during November; however, precipitation during late winter and early spring months was below normal in most areas of the state and recharge rates were reduced. Also, the frozen ground may have played a role in the reduced recharge rates. Adequate precipitation during April was a blessing as May and most of June were unusually dry. Precipitation during the summer was spotty, and noticeably below normal in September. The 1994 water year ended as it began with ground water supplies in the eastern half of the state at noticeably below levels and in the western half at near or slightly below normal levels. Water supply managers with ground water sources should monitor their specific situation through the upcoming recharge season.

**LAKE ERIE** level declined during September. The mean level was 572.31 feet (IGLD-1985), 0.36 foot below last month's mean level and 1.05 feet above normal. This month's level is the same as the September 1993 level and 3.11 feet above low water datum.

Lake Erie level remained above normal throughout the 1994 water year. The U. S. Army Corps of Engineers projections indicate that the level of Lake Erie will remain above the long-term average for at least the next six months based on the current conditions of the lake and anticipated future weather conditions.

LAKE ERIE LEVELS at Fairport



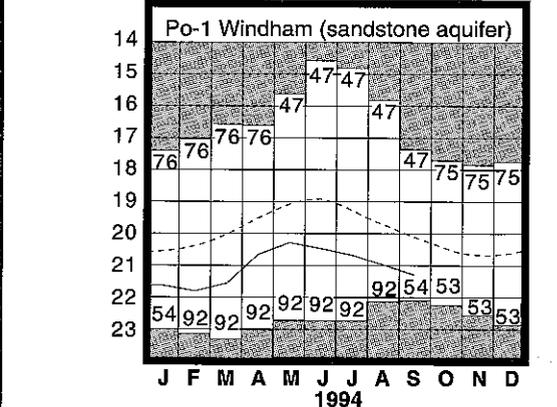
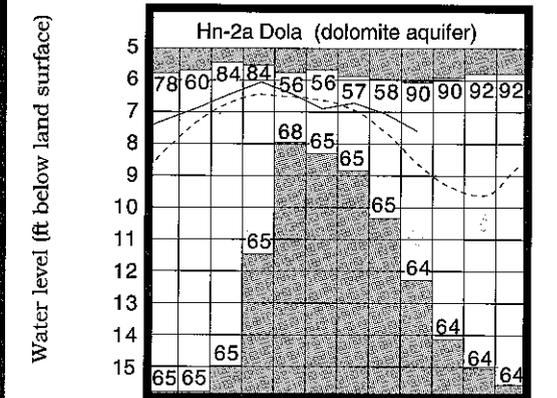
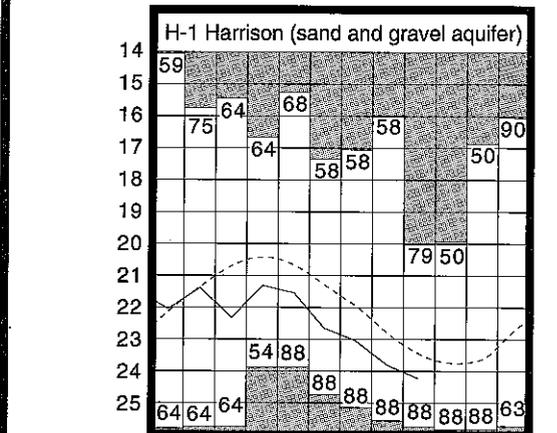
Normal - - - - Current

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.
Fa-1	Jasper Mill, Fayette Co.	Limestone	9.15	-0.48	-0.40	+1.02
Fr-10	Columbus, Franklin Co.	Gravel	44.66	-0.16	-0.97	-1.16
H-1	Harrison, Hamilton Co.	Gravel	24.23	-0.76	-0.42	-0.30
Hn-2a	Dola, Hardin Co.	Dolomite	7.60	+1.01	-0.52	+0.45
Po-1	Windham, Portage Co.	Sandstone	21.30	-1.18	-0.33	-0.29
Tu-1	Strasburg, Tuscarawas Co.	Gravel	15.54	-2.03	-0.51	+0.24

GROUND-WATER LEVELS



Base periods: H-1, 1951-1990. Hn-2a, 1955-1990. Po-1, 1947-1990

Normal - - - - Current



# MONTHLY WATER INVENTORY REPORT FOR OHIO

October 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

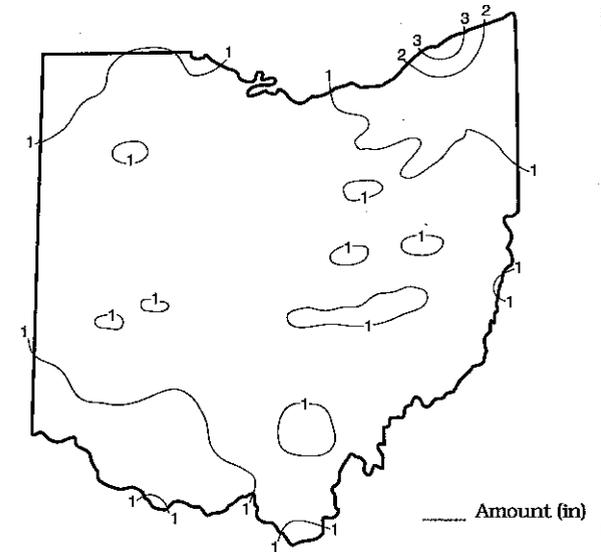
**PRECIPITATION** for October was noticeably below normal throughout Ohio. The state average was 0.92 inch, 1.42 inches below normal. This ties with October 1964 as being the tenth driest October in 112 years of record. Regional averages ranged from 1.47 inches, 1.25 inches below normal, for the Northeast Region to 0.68 inch, 1.46 inches below normal, for the North Central Region. Painesville (Lake County) reported the greatest amount of precipitation for the month, 3.02 inches. Beach City Lake (Tuscarawas County) reported the least amount of October precipitation, 0.33 inch.

Precipitation during October fell as light showers. Daily totals seldom exceeded 0.5 inch, usually much less. Most areas of the state received between 0.5 and 1.0 inch for the entire month; only a few locations in extreme northeastern Ohio received more than 1.5 inches of precipitation in October. The dry weather was beneficial for farmers harvesting crops, but also brought concerns about winter wheat germination. The Ohio Agricultural Statistics Service reports that at the end of October soil moisture was rated as being short in 72 percent of the state and adequate in 28 percent of the state.

Precipitation for the 1994 calendar year is below normal in the western, central and north-central areas of the state and above normal in the eastern and south-central areas. The state average is 30.18 inches, 2.16 inches below normal. Regional averages range from 37.29 inches, 1.73 inches above normal, for the South Central Region to 22.64 inches, 6.44 inches below normal, for the Northwest Region.

The 1995 water year (October 1, 1994 - September 30, 1995) is not off to a good start as far as precipitation is concerned. The noticeably dry conditions of this month, coupled with the noticeably below normal precipitation in September, causes concern as the recharge season begins. Adequate precipitation will be needed during the next several months to provide much needed replenishment of our water supplies, especially ground water supplies.

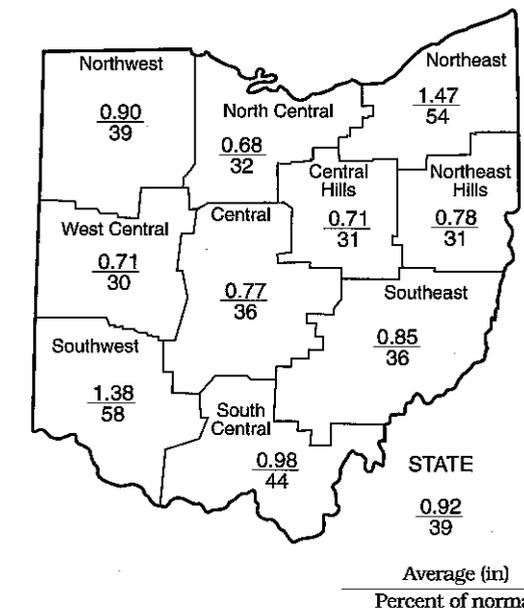
## PRECIPITATION OCTOBER 1994



## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	-1.39	-3.19	-5.93	-6.65	-3.15	-3.0
North Central	-1.46	-1.45	-2.89	-1.86	-0.12	-2.3
Northeast	-1.25	+0.38	-1.17	+3.20	+7.50	-1.1
West Central	-1.63	-3.20	-4.53	-3.91	+1.35	-2.5
Central	-1.37	-2.02	-3.57	-2.04	+0.70	-2.2
Central Hills	-1.55	-1.27	-2.31	+1.19	+1.69	-2.4
Northeast Hills	-1.75	-0.92	-2.00	+2.68	+3.36	-1.2
Southwest	-1.01	-2.64	-3.90	-2.30	-3.20	-1.5
South Central	-1.26	-2.23	-3.20	+2.40	-3.56	-1.2
Southeast	-1.48	-1.46	-1.79	+3.20	+0.57	-0.8
State	-1.42	-1.81	-3.14	-0.40	+0.54	

\*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



## SUMMARY

Precipitation was noticeably below normal statewide. This month ties with October 1964 as the tenth driest October in 112 years of records. Streamflow was below normal in most areas. Reservoir storage declined and was above normal in the Mahoning basin reservoirs but below normal in the Scioto basin reservoirs. Ground water storage declined and remained at below normal levels especially in the eastern half of Ohio where they are near record-low seasonal levels. Lake Erie level declined and was 0.63 foot above the long-term October average.

## NOTES AND COMMENTS

### NEW PUBLICATIONS

The Division of Water announces the availability of the following new publications:

Ground Water Pollution Potential of Hancock County by Kelly C. Smith, ERM-Midwest, Inc. in cooperation with the Ohio Department of Natural Resources, Division of Water

Ground water pollution potential maps are designed to determine an area's relative vulnerability to ground water pollution. The maps can be used as a planning and management tool for administrators, commissioners, zoning boards and others to aid in making educated decisions about local development and siting of land use operations or activities that can affect ground water quality. The system optimizes the use of existing data to rank areas with respect to pollution potential to help direct investigations and resource expenditures and to prioritize protection, monitoring and clean-up efforts.

Mapping an area's potential for ground water pollution is a relatively new idea. These maps use the DRASTIC system as developed for the U.S. Environmental Protection Agency by the National Ground Water Association. DRASTIC values, as shown on the maps, indicate an area's relative vulnerability to contamination through the use of a numerical rating scheme and the mapping of hydrogeologic settings. Low DRASTIC values indicate relatively low potential and high DRASTIC values indicate a high potential for contamination. Areas of similar DRASTIC values are color-coded for ease of interpretation.

Each Ground Water Pollution Potential map with its accompanying report costs \$10.00. They can be purchased at or ordered from the address listed below.

The following ground water resources maps have been revised and reprinted:

The Ground Water Resources of Delaware County by William C. Haiker (after Schmidt, 1979)

The Ground Water Resources of Lake County by James J. Schmidt

The Ground Water Resources of Summit County by James J. Schmidt

These new maps have been updated with additional hydrogeologic information obtained since their first printing. Ground water resources maps have been completed for 86 of Ohio's 88 counties.

Ground water resources maps are prepared by staff hydrogeologists. These maps show the regional ground water characteristics based on interpretations of water well drilling records and local geology. These color-coded maps provide well log data for many point locations. Information provided by the maps include typical depths of wells, water-bearing formations and estimated yields for wells in the area.

Ground water resources maps can be used as a guide to locate new or expand existing ground water supplies. The maps are useful to homeowners, ground water consultants, engineers, planners and developers. Ground water resources maps cost \$8.00 each.

Publications prepared by the ODNR Division of Water, Water Resources Section can be purchased at or ordered from:

**ODNR Division of Water, Water Resources Section**  
1939 Fountain Square, Building E-1  
Columbus, Ohio 43224-1936.

Make checks payable to ODNR Division of Water. If ordered through the mail, please include the correct postage and handling charges. Payments can also be made with Visa or MasterCard.

### Postage and Handling Charges

Cost of Publications	Add
under \$10.01	\$2.00
\$10.01 - \$20.00	\$3.00
\$20.01 - \$50.00	\$5.00
\$50.01 - \$100.00	\$8.50
\$100.01 and over	\$10.00

## ACKNOWLEDGMENTS

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.



DIVISION OF WATER  
1939 FOUNTAIN SQUARE  
COLUMBUS, OHIO 43224

George V. Vohnovich  
Governor

Frances S. Buchholzer  
Director

Michele Willis  
Acting Chief

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## 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	119	34	67	48	103
Great Miami River at Hamilton	3,630	532	70	72	69	110
Huron River at Milan	371	11	33	151	70	93
Killbuck Creek at Killbuck	464	69	69	81	61	104
Little Beaver Creek near East Liverpool	496	86	71	107	62	99
Maumee River at Waterville	6,330	276	45	45	38	73
Muskingum River at McConnelsville	7,422	1,033	55	81	56	109
Scioto River near Prospect	567	23	83	66	80	115
Scioto River at Higby	5,131	936	101	82	81	109
Stillwater River at Pleasant Hill	503	37	62	60	46	112

**STREAMFLOW** during October was noticeably below normal throughout most of state with only a few exceptions of near normal flow noted. Flows in the western and north-central Ohio drainage basins were low enough to be considered deficient. Generally, flows during October were about the same or slightly less than the flows recorded during September.

Flows at the beginning of October were below normal in most areas of the state. Daily streamflow throughout the month was relatively steady in most drainage basins as precipitation was light during the month and many streams were possibly at or approaching base flow conditions. Most drainage basins had their greatest flows for October during the first few days of the month. Lowest flows occurred at various times throughout the month in the different

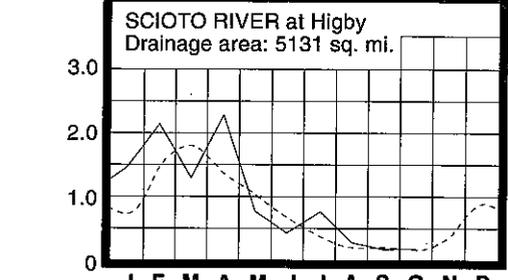
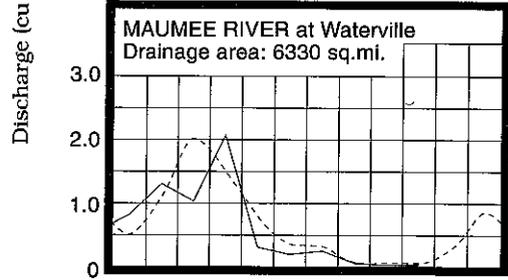
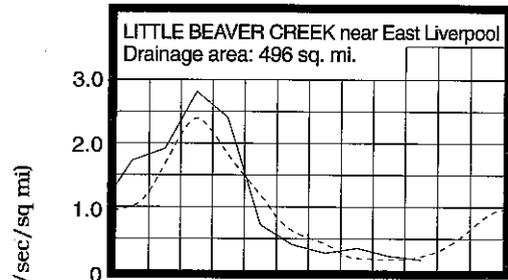
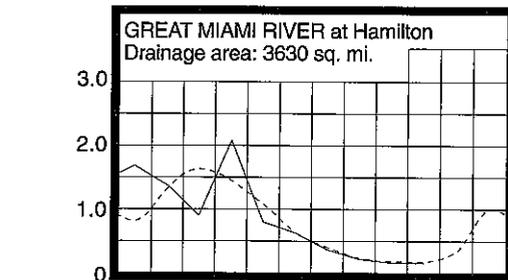
drainage basins. At the end of October, flows were noticeably below normal throughout the state.

**RESERVOIR STORAGE** for water supply during October declined in both the Mahoning and Scioto river basins. Month-end storage was above normal in the Mahoning basin index reservoirs and below normal in the Scioto basin index reservoirs.

Reservoir storage at the end of October in the Mahoning basin index reservoirs was 66 percent of rated capacity for water supply compared with 72 percent for last month and 65 percent for October 1993. Month-end storage in the Scioto basin index reservoirs was 58 percent of rated capacity for water supply compared with 68 percent for last month and 71 percent for October 1993.

Flood control reservoir operators will soon begin the annual fall drawdown. Water supply reservoir operators, especially those with off-stream sources, will pick up water as streamflows permit. Surface-water supplies are adequate at this time. Several months are still available for the increased streamflows needed to fill both on- and off-stream reservoirs before next summer's peak demand season.

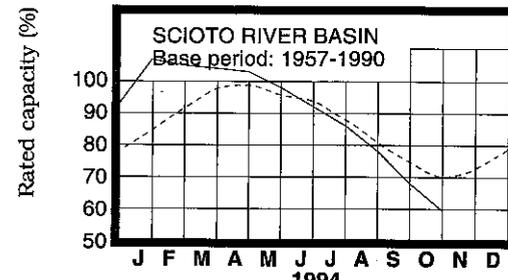
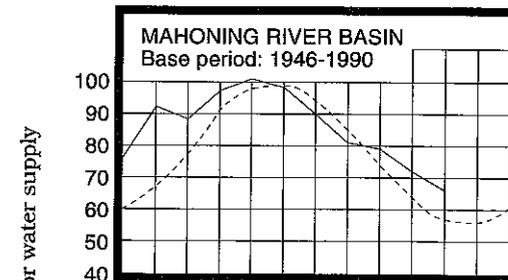
## MEAN STREAM DISCHARGE



Base period for all streams: 1961-1990

Normal - - - - Current - - - -

## RESERVOIR STORAGE FOR WATER SUPPLY



Base period: 1946-1990 (Mahoning), 1957-1990 (Scioto)

**GROUND WATER LEVELS** during October declined in all aquifers throughout Ohio. Levels declined steadily throughout the month in most aquifers. Net declines during October from last month's levels ranged from about normal to nearly six times that normally observed.

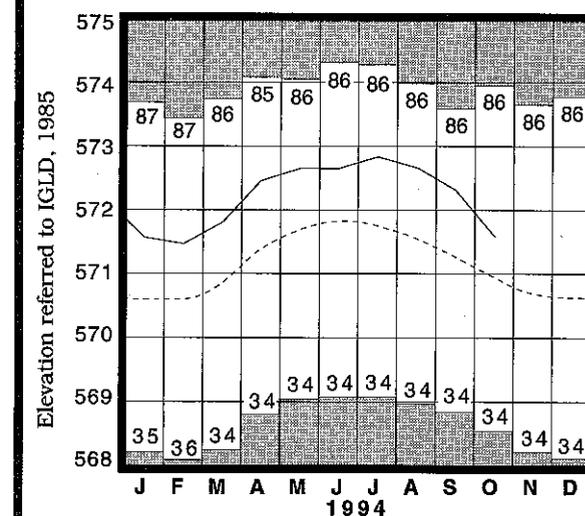
Ground water storage continues to remain at below normal levels in most areas of Ohio. Only a few aquifers in the northwestern area of the state have above normal levels. Some aquifers in the eastern half of the state are at noticeably below normal levels. Index observation well F-1 (Fairfield County), representing sandstone aquifers in eastern and southeastern Ohio, reached a record-low level for October.

The 1995 water year recharge season is not off to a good start as far as ground water supplies are concerned. Near normal climatic conditions during the next several months should result in adequate recharge to ground water supplies. Below normal precipitation during this period would have adverse effects. Water supply managers with ground water sources should closely monitor their situations throughout the recharge season.

**LAKE ERIE** level declined during October. The mean level was 571.59 feet (IGLD-1985), 0.72 foot below last month's mean level and 0.63 foot above normal. This month's level is 0.33 foot lower than the October 1993 level and 2.39 feet above Low Water Datum.

The U. S. Army Corps of Engineers reports that precipitation in the Lake Erie basin during October 1994 averaged 1.5 inches, 1.2 inches below normal. The entire Great Lakes basin averaged 2.0 inches of precipitation in October 1994, 0.8 inch below normal. Cumulative precipitation for 1994 through October in the Lake Erie basin averages 26.7 inches, 2.7 inches below normal, and in the entire Great Lakes basin 26.9 inches, 0.3 inch below normal.

## LAKE ERIE LEVELS at Fairport



Base period: 1900-1991

Record high and low, year of occurrence

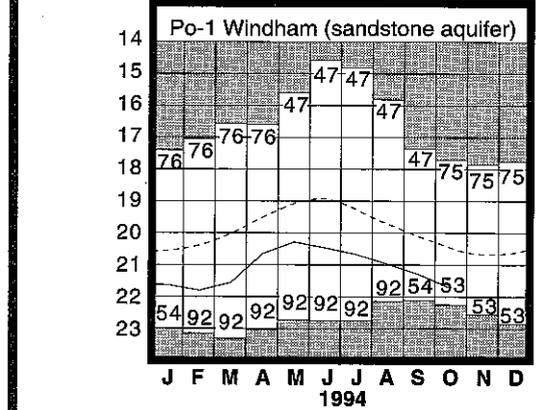
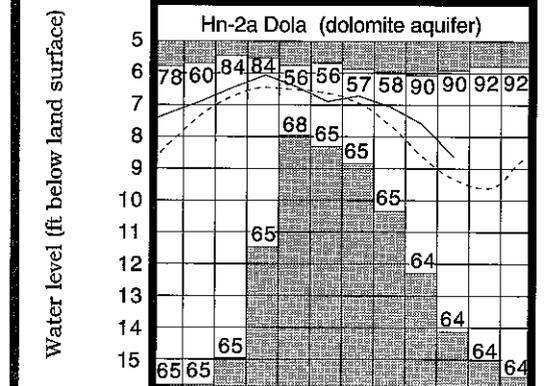
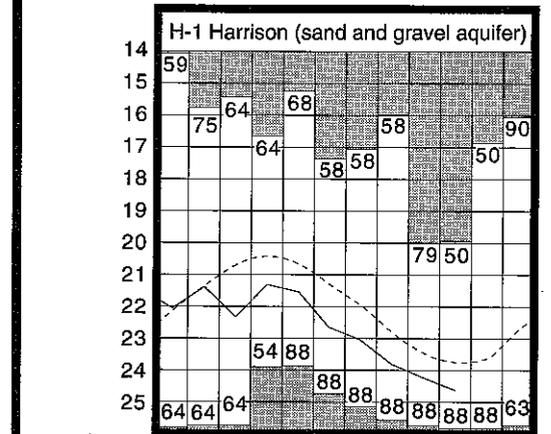
Normal - - - - Current - - - -

## 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	20.95	-4.06	-1.00	-1.03
Fa-1	Jasper Mill, Fayette Co.	Limestone	9.63	-0.62	-0.48	+2.00
Fr-10	Columbus, Franklin Co.	Gravel	45.18	-0.74	-0.52	-1.47
H-1	Harrison, Hamilton Co.	Gravel	24.61	-0.85	-0.38	-0.66
Hn-2a	Dola, Hardin Co.	Dolomite	8.65	+0.68	-1.05	+0.55
Po-1	Windham, Portage Co.	Sandstone	21.72	-1.25	-0.42	+0.26
Tu-1	Strasburg, Tuscarawas Co.	Gravel	15.96	-2.35	-0.42	+0.14

## GROUND-WATER LEVELS



Base periods: H-1, 1951-1990. Hn-2a, 1955-1990.

Po-1, 1947-1990

Record high and low, year of occurrence

Normal - - - - Current - - - -



# MONTHLY WATER INVENTORY REPORT FOR OHIO

November 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

## SUMMARY

Precipitation was above normal throughout most of the state. Streamflow was below normal in most drainage basins and low enough to be considered deficient in most areas. Reservoir storage declined and was at noticeably below normal levels in the central area of the state. Ground water storage declined in most aquifers and reached record-low levels in the eastern half of the state. Lake Erie level rose slightly and was 0.98 foot above the long-term November average.

## NOTES AND COMMENTS NEW EMPLOYEES JOIN WRS STAFF

Two new employees have recently joined the Division of Water staff in the Water Resources Section (WRS).

Gerrie McCall-Neubauer recently joined the WRS as a cartographer in the Cartography Unit. She will be producing ground water resource and pollution potential maps as well as assisting and coordinating many desktop publishing activities.

Gerrie earned a Bachelor of Arts degree in English from the University of Houston and a Master's degree in geographical information system design from The Ohio State University. She is a member of the Association of American Geographers and the American Society for Photogrammetry and Remote Sensing. Away from work, Gerrie enjoys reading, photography, and producing videos for the local cable access channel.

Patty Russell has joined the WRS as a clerk in the Technical Services Unit. She has been employed at ODNR since 1987, working previously with the Division of Wildlife in the hunting and fishing license section. At the WRS, Patty will be assisting visitors who are using the division's well logs, processing well logs on the division's computer/optical disk system and performing many other clerical duties. Away from work, Patty enjoys her grandchildren, soon to number three. She and her husband of twenty-six years, Pat, are currently planning the wedding of their last child.

**PRECIPITATION** for November was above normal throughout most of Ohio with only the South Central Region having slightly below normal precipitation. The state average was 3.10 inches, 0.45 inch above normal. Regional averages ranged from 3.97 inches, 1.37 inches above normal, for the Northeast Hills Region to 2.72 inches, 0.05 inch below normal, for the South Central Region. New Cumberland Locks and Dam (Jefferson County) reported the greatest amount of precipitation for the month, 5.00 inches. Marietta State Nursery (Washington County) reported the least amount, 1.94 inches.

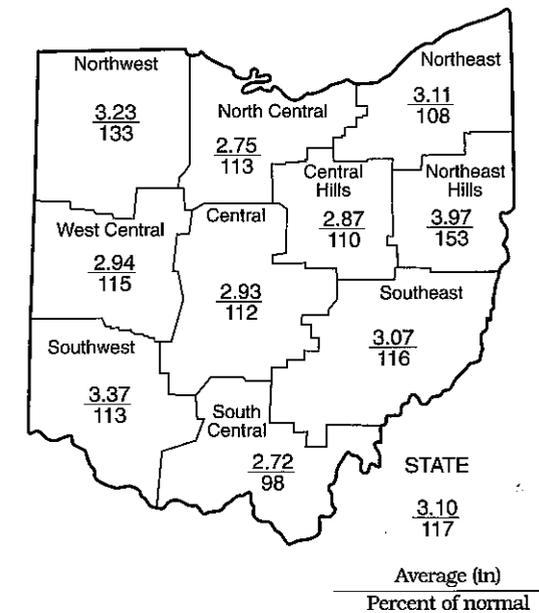
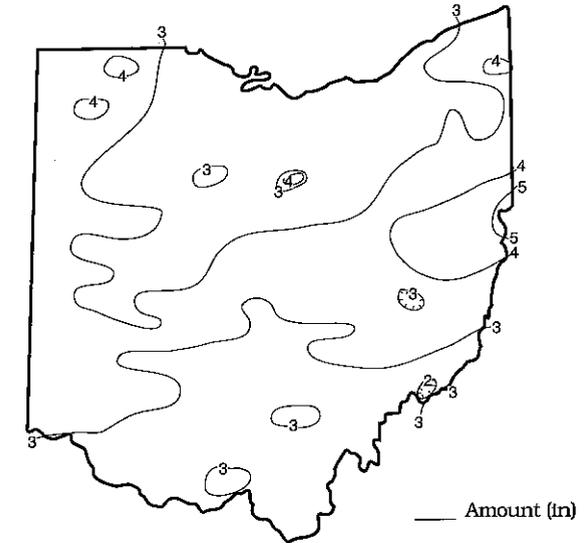
Precipitation during November fell almost entirely as rain with very little snow being reported; only small amounts of snow fell in the northeastern Ohio snowbelt area. Chardon (Geauga County), Ohio's snow capital, reported only 1 inch of snow which is about 11 inches below normal. The month started with several days of precipitation during the first week with precipitation totals for the period ranging from 0.5 to 1 inch. Many areas of Ohio received a good shower during November 9-10 with rain amounts of nearly 1 inch reported at many locations. The middle of the month was relatively dry in many areas of the Ohio, but some areas in the southern half of the state received 0.5 to nearly 1 inch of rain on November 15-16. Some rain and snow fell, especially in the northeastern area of the state, just prior to Thanksgiving. The month's most widespread precipitation fell during November 27-28 with most areas of Ohio reporting from 0.75 to about 1 inch of rain and at a few locations nearly 1.5 inches was reported.

Precipitation for the 1994 calendar year is below normal in the western, central and north-central areas of Ohio and above normal in the eastern and south-central areas. The state average is 33.28 inches, 1.71 inches below normal. Regional averages range from 40.01 inches, 1.68 inches above normal, for the South Central Region to 25.87 inches, 5.64 inches below normal, for the Northwest Region. The West Central Region's 1994 calendar year average precipitation is 27.64 inches, 6.58 inches below normal, the greatest regional departure from normal for the 1994 calendar year.

Precipitation for the 1995 water year is below normal throughout the state. The state average is 4.02 inches, 0.97 inch below normal. Regional averages range from 4.75 inches for both the Northeast Hills and Southwest regions, 0.38 inch and 0.62 inch below normal respectively, to 3.43 inches, 1.14 inches below normal, for the North Central Region.

Precipitation for the 1995 water year is off to a slow start; however, several months remain with the potential for precipitation and favorable climatic conditions needed to replenish water supplies. Soil moisture is slowly being replenished. The last report (November 20, 1994) indicated that 69 percent of the state had adequate soil moisture and 30 percent of the state had a shortage of soil moisture.

## PRECIPITATION NOVEMBER 1994



## PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	+0.80	-2.51	-3.10	-6.68	-4.86	-2.6
North Central	+0.32	-2.31	-1.04	-3.73	-2.92	-1.2
Northeast	+0.23	-1.66	+0.47	+0.90	+5.57	-0.4
West Central	+0.38	-2.90	-2.93	-6.97	-0.77	-2.3
Central	+0.31	-2.18	-1.78	-4.39	-1.08	-1.7
Central Hills	+0.26	-2.60	-0.60	-1.49	-0.15	-1.5
Northeast Hills	+1.37	-1.11	+0.02	+1.61	+3.63	-0.4
Southwest	+0.39	-2.53	-2.50	-3.87	-4.51	-1.1
South Central	-0.05	-2.09	-2.68	+0.94	-4.41	-1.3
Southeast	+0.43	-1.76	-0.63	+1.88	+0.18	-0.8
State	+0.45	-2.17	-1.48	-2.17	-0.90	

\*Above +4 = Extreme Moist Spell  
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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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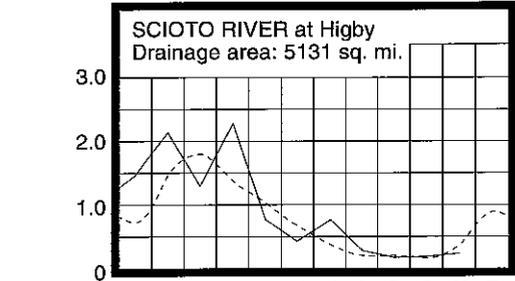
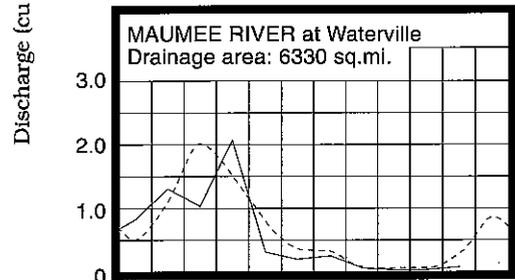
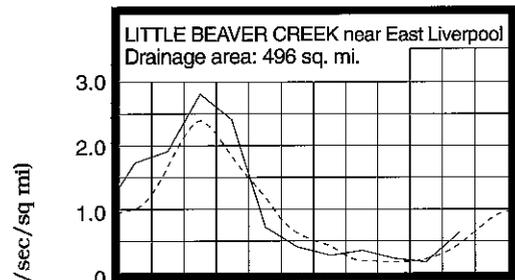
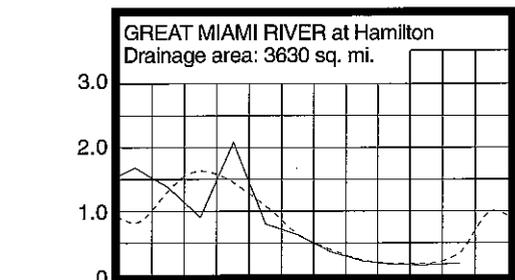
Michelle Willis  
Acting Chief

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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	319	28	23	53	92
Great Miami River at Hamilton	3,630	663	51	54	70	92
Huron River at Milan	371	24	28	33	85	85
Killbuck Creek at Killbuck	464	102	50	53	61	99
Little Beaver Creek near East Liverpool	496	315	138	93	69	99
Maumee River at Waterville	6,330	528	30	27	39	68
Muskingum River at McConnellsville	7,422	3,011	64	60	61	103
Scioto River near Prospect	567	34	35	36	111	96
Scioto River at Higby	5,131	1,256	66	66	87	101
Stillwater River at Pleasant Hill	503	66	72	49	51	77

MEAN STREAM DISCHARGE



Base period for all streams: 1961-1990

Normal - - - - Current - - - -

**STREAMFLOW** during November was noticeably below normal throughout most of the state with only a few drainage basins in extreme eastern Ohio having above normal flows. Flows in most areas were low enough to be considered deficient. Flows during November increased seasonally from the flows recorded during October.

Streamflows at the beginning of November were noticeably below normal throughout most of Ohio; the exception was in extreme eastern Ohio where flows were above normal. Drainage basins in the northern and southeastern areas of the state had their lowest flows for November during the first several days of the month while drainage basins in central and south-

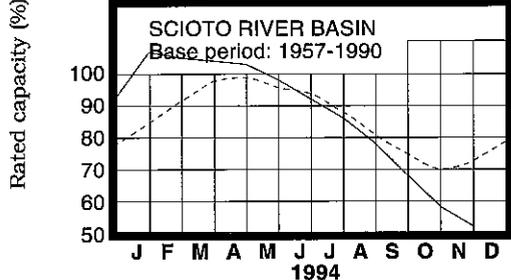
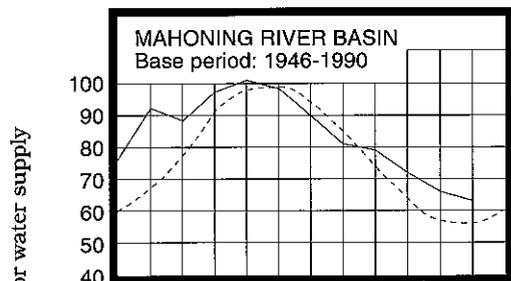
western Ohio had their lowest flows near November 26, just prior to the month's most widespread precipitation. Greatest flows for November occurred a day or two before the end of the month in most areas of the state following this precipitation. Some drainage basins across northern Ohio recorded slightly greater flows on or about November 11. Flows at the end of the month remained below normal throughout most of the state with only a few drainage basins across central Ohio having above normal flows.

**RESERVOIR STORAGE** for water supply during November declined in both the Mahoning and Scioto river basins. Month-end storage remained slightly above normal in the Mahoning basin index reservoirs. Storage continued to decline in the Scioto basin index reservoirs and fell to the lowest month-end level since January 1988.

Reservoir storage at the end of November for the Mahoning basin index reservoirs was 63 percent of rated capacity for water supply compared with 66 percent for last month and 77 percent for November 1993. Month-end storage in the Scioto basin index reservoirs was 52 percent of rated capacity for water supply compared with 58 percent for last month and 83 percent for November 1993.

Surface water supplies continue to remain adequate in spite of the noticeably below normal reservoir levels in some areas. Several months remain with potential for the increased runoff and streamflows needed to fill both on- and off-stream reservoirs.

RESERVOIR STORAGE FOR WATER SUPPLY



**GROUND WATER LEVELS** during November declined slowly or were stable in most aquifers throughout Ohio, somewhat typical of the season. A few aquifers showed net improvement in ground water storage during the month, but most aquifers continued to receive inadequate recharge to compensate for natural discharge or withdrawals. In most aquifers, net changes during November from last month's levels were greater than usually observed.

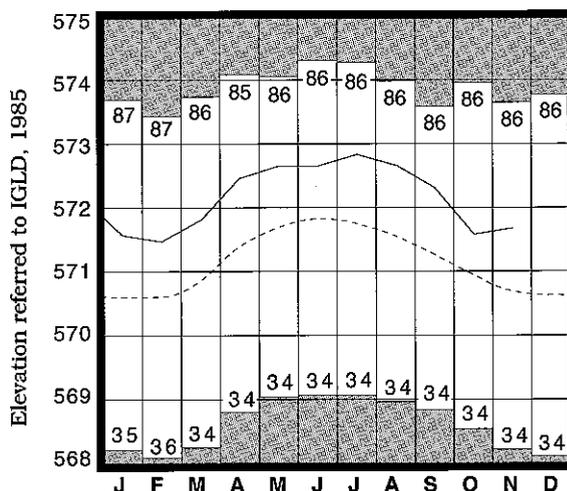
Ground water storage continues to remain at noticeably below normal levels in most areas of Ohio, especially in the eastern half of the state where levels are at or near record-low levels. Current levels range from just above normal to more than four feet below normal. During November, index observation well F-1 (Fairfield County), representing sandstone aquifers in eastern and southeastern Ohio, reached its lowest level ever observed and index observation well Tu-1 (Tuscarawas County), representing sand and gravel aquifers in eastern and northeastern Ohio, equaled its lowest level ever observed. Both of these wells have records that date back to 1947.

Ground water storage is currently averaging lower levels than last year in most areas of the state. Climatic conditions during the past few months have not been favorable for a quick start to the 1995 water year recharge season. Near normal climatic conditions during the next several months will be necessary for a favorable recharge period. Water supply managers with ground water sources should continue to closely monitor their situations throughout the recharge season.

**LAKE ERIE** level rose slightly during November. The mean level was 571.68 feet (IGLD-1985), 0.09 foot above last month's mean level and 0.98 foot above normal. This month's level is 0.04 foot lower than the November 1993 level and 2.48 feet above Low Water Datum.

Lake Erie's level has declined 1.15 feet since peaking at its highest monthly mean level in 1994 of 572.83 feet during July. Levels have been averaging about one foot above normal throughout this period. The U. S. Army Corps of Engineers predicts that Lake Erie will continue to remain above its average level for the next six months based on the present condition of the lake basin and anticipated future weather conditions.

LAKE ERIE LEVELS at Fairport



Base period: 1900-1991  
 Record high and low, year of occurrence

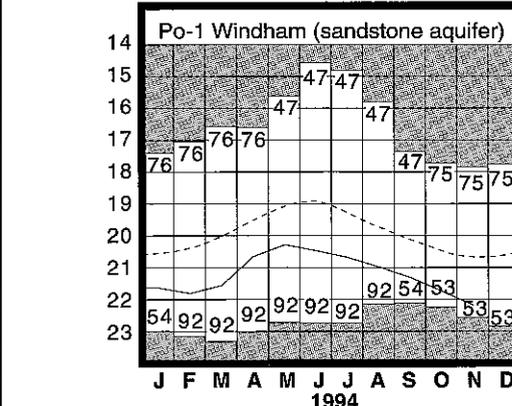
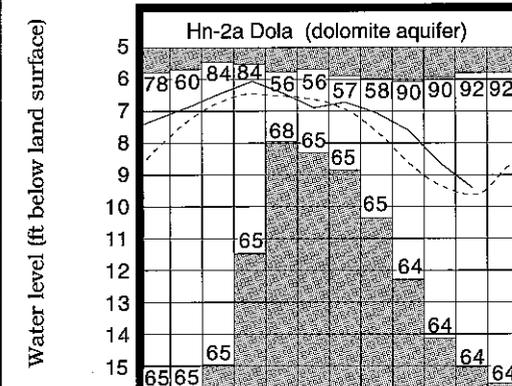
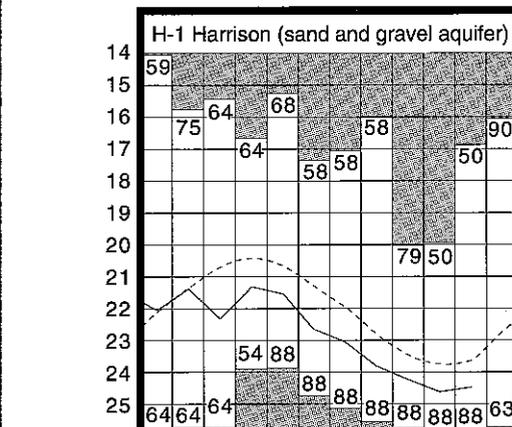
Normal - - - - Current - - - -

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	21.46	-4.20	-0.51	-2.23
Fa-1	Jasper Mill, Fayette Co.	Limestone	9.94	-0.99	-0.31	+1.46
Fr-10	Columbus, Franklin Co.	Gravel	44.83	-0.54	+0.35	-1.28
H-1	Harrison, Hamilton Co.	Gravel	24.49	-0.83	+0.12	-1.98
Hn-2a	Dola, Hardin Co.	Dolomite	9.40	+0.23	-0.75	+0.30
Po-1	Windham, Portage Co.	Sandstone	22.19	-1.51	-0.47	-0.22
Tu-1	Strasburg, Tuscarawas Co.	Gravel	16.20	-2.64	-0.24	-0.10

GROUND-WATER LEVELS



Base periods: H-1, 1951-1990. Hn-2a, 1955-1990.  
 Po-1, 1947-1990 Record high and low, year of occurrence

Normal - - - - Current - - - -



# MONTHLY WATER INVENTORY REPORT FOR OHIO

December 1994

Compiled By David H. Cashell  
Hydrologist  
Water Inventory Unit

(continued from front page)

inches, 6.91 inches below normal (see Precipitation table, departure from normal, past 12 months column). An isohyetal map and regional averages with percentages of normal precipitation for the 1994 calendar year appear below. McArthur (Vinton County) reported the greatest amount of precipitation for the year, 52.57 inches. Bowling Green (Wood County) reported the least amount, 24.48 inches.

The 1994 calendar year started with record-setting low temperatures in January. Precipitation was above normal during January, but below normal in February and March. April precipitation was above normal, but drought-like conditions developed during May and the first half of June. Timely rains during late June and in July and August guaranteed a satisfactory growing season for most of Ohio's agricultural crops. Unusually dry conditions returned to the state in September and October. September was the fifth driest September and October the tenth driest October on record. Slightly above normal precipitation during November and near normal precipitation during December helped ease the drought conditions in most areas of the state. At the end of the year, the West Central Region was classified as being in a moderate drought and the Northwest Region in a mild drought. The remainder of the state was near normal (see precipitation table, Palmer Drought Severity Index).

### SUMMARY

Precipitation in Ohio was near normal during December. Streamflow was below normal in most areas of the state. Reservoir storage increased slightly and was near normal in most areas, but remained at noticeably below normal levels in the central area of the state. Ground water storage started to improve after the middle of the month, but continued to remain at below normal levels, especially in the eastern half of the state. Lake Erie level declined slightly and was 0.96 foot above the long-term December average.

Precipitation for the 1994 calendar year was below normal in the western, central and north-central areas of the state and above normal in the eastern and south-central areas. Streamflow was below normal in nearly all drainage basins. Surface water supplies were adequate, but fell to below normal levels statewide during the summer months. In the central area of the state, reservoir storage remained at below normal levels through the end of the year. Ground water supplies were adequate but fell to below normal levels statewide by the year's end most noticeably in the eastern half of the state where they were at or near record-low levels. Lake Erie was above its long-term average throughout the year.

**PRECIPITATION** for December was near normal throughout most of Ohio with nearly all locations receiving between 2 and 3 inches of precipitation; some areas in the western area of the state had below normal precipitation. The state average was 2.59 inches, 0.01 inch above normal. Regional averages ranged from 3.00 inches, 0.04 inch above normal, for the South Central Region to 2.14 inches, 0.33 inch below normal, for the West Central Region. Mansfield Airport (Richland County) reported the greatest amount of precipitation for the month, 4.01 inches. Xenia (Greene County) reported the least amount of December precipitation, 1.21 inches.

Most of the precipitation during December fell during the first half of the month and fell as rain. Above normal temperatures during most of the month kept snowfall to a minimum, especially in the southern two-thirds of the state. Some areas in the north-central area of the state reported more than 5 inches of snow for the month, but Chardon (Geauga County), Ohio's snow capital, reported only 3 inches, more than 22 inches below normal.

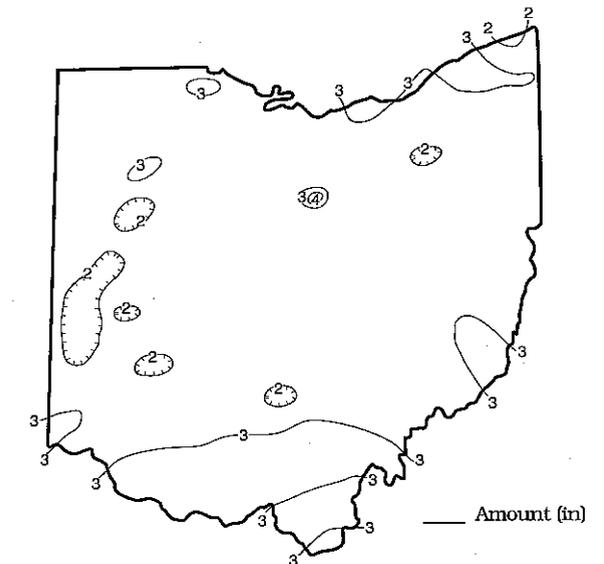
Precipitation occurred on many of the days from December 4-11. Most areas of Ohio received from 0.5 to 1 inch of rain during December 4-5 and another 0.25 inch or so during December 6-7. The greatest amount of precipitation statewide fell during December 9-11 with 0.75 inch to 1.5 inches reported. The larger amounts fell in the eastern and southern areas of the state. More rain fell on December 16 with about 0.5 inch reported in most areas of the state with slightly greater amounts falling in the north-central area. The year ended with small amounts of precipitation falling late on New Year's Eve.

Precipitation for the 1995 water year is below normal throughout the state. The state average is 6.57 inches, 1.00 inch below normal. Regional averages range from 7.29 inches, 0.42 inch below normal, for the Northeast Hills Region to 5.79 inches, 1.58 inches below normal, for the West Central Region. The 1995 water year recharge season is not off to a good start as far as precipitation and its influence on water supplies is concerned. Several months remain with the potential to provide the much needed precipitation for adequate replenishment of water supplies.

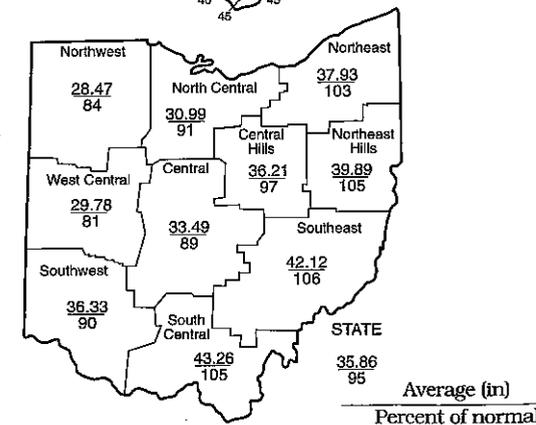
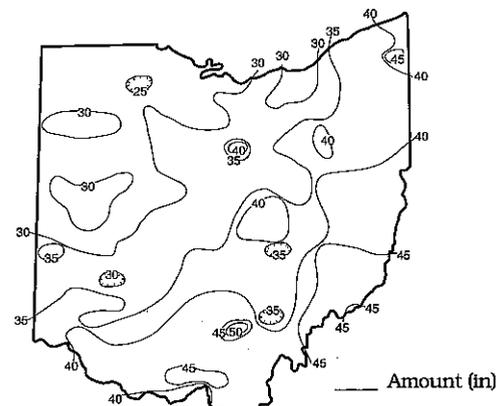
Precipitation for the 1994 calendar year was below normal in the western, central and north-central areas of Ohio and above normal in the eastern and south-central areas. The state average was 35.86 inches, 1.71 inches below normal. Regional averages ranged from 43.26 inches, 1.97 inches above normal, for the South Central Region to 28.47 inches, 5.35 inches below normal, for the Northwest Region. The West Central Region had the greatest departure from its normal precipitation during 1994 with an average of 29.78

(continued on back)

### PRECIPITATION DECEMBER 1994



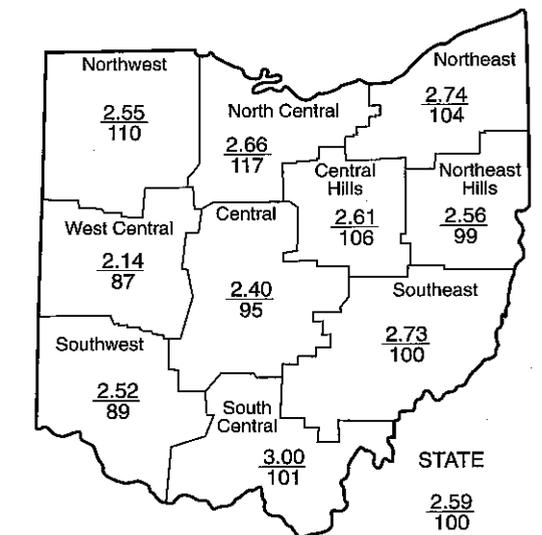
### PRECIPITATION - 1994 CALENDAR YEAR



### PRECIPITATION

Region	DEPARTURE FROM NORMAL (IN.)					Palmer Drought Severity Index*
	This Month	Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	+0.24	-0.30	-2.76	-5.35	-4.95	-1.6
North Central	+0.38	-0.81	-1.74	-3.04	-2.82	+0.2
Northeast	+0.10	-0.99	+0.21	+0.96	+5.27	+0.8
West Central	-0.33	-1.58	-3.83	-6.91	+0.43	-2.3
Central	-0.13	-1.16	-2.10	-4.12	+0.11	-0.9
Central Hills	+0.14	-1.17	-1.44	-1.19	+1.14	0.0
Northeast Hills	-0.02	-0.42	-0.21	+1.86	+4.12	+0.2
Southwest	-0.30	-1.30	-3.00	-3.94	-3.36	-0.6
South Central	+0.04	-1.16	-1.79	+1.97	-3.01	-0.6
Southeast	+0.01	-1.10	-0.03	+2.53	+1.09	-0.4
State	+0.01	-1.00	-1.67	-1.71	-0.16	

\*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

### ACKNOWLEDGMENTS

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.



DIVISION OF WATER  
1939 FOUNTAIN SQUARE  
COLUMBUS, OHIO 43224

George V. Voinovich  
Governor

Frances S. Buchholz  
Director

Michelle Willis  
Acting Chief

An Equal Opportunity Employer-M/F/H

**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	1,161	69	45	60	89
Great Miami River at Hamilton	3,630	1,168	32	41	51	81
Huron River at Milan	371	126	85	47	60	81
Killbuck Creek at Killbuck	464	192	51	55	61	94
Little Beaver Creek near East Liverpool	496	587	132	133	96	101
Maumee River at Waterville	6,330	2,027	37	31	40	66
Muskingum River at McConnelsville	7,422	5,778	81	75	73	99
Scioto River near Prospect	567	139	53	47	81	85
Scioto River at Higby	5,131	2,092	46	57	80	94
Stillwater River at Pleasant Hill	503	127	32	40	41	65

**STREAMFLOW** during December was below normal throughout most of the state with only a few drainage basins in extreme eastern Ohio having above normal flows. Flows during December increased seasonally from the flows recorded during November.

Streamflows at the beginning of the month were noticeably below normal throughout the state. Most drainage basins had their lowest flows for the month on December 4, but a few basins had slightly lower flows at the end of the month. Streamflows increased noticeably during the middle of December following most of the month's precipitation which fell during two storm periods. Most basins recorded their greatest flows for the month on or about December 11 following several days with precipitation.

Drainage basins in northwestern and north-central Ohio had their greatest flows for the month on December 18 following storms in that area of the state. Flows declined through the end of the month responding to the lack of precipitation and at the end of the month were once again below normal throughout the state.

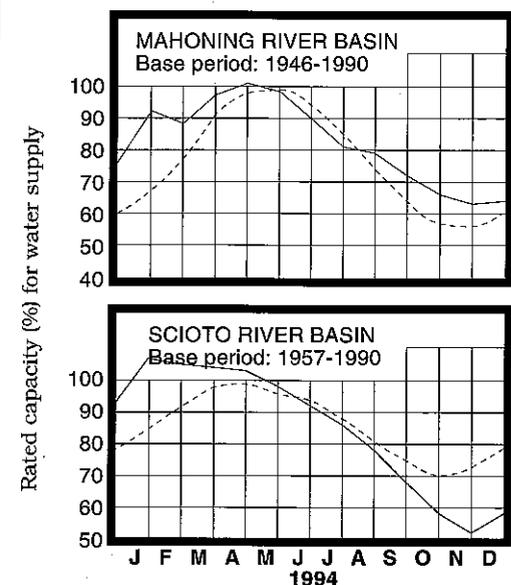
Streamflow for the 1994 calendar year was below normal throughout most of Ohio with only a few basins in the extreme eastern area of the state having slightly above normal flows (see Mean Stream Discharge table, past 12 months column). The year started with moderate flooding throughout much of Ohio following the January thaw with ice jams compounding the problems along the Ohio River and near Lake Erie. April showers resulted in some moderate flooding, and during the summer months, locally severe thunderstorms caused isolated small stream and urban flooding, especially during August. Generally, flows were noticeably below normal throughout the fall months as unusually dry conditions persisted throughout the state.

**RESERVOIR STORAGE** for water supply during December increased in both the Mahoning and Scioto river basins. Month-end storage remained slightly above normal in the Mahoning basin index reservoirs and noticeably below normal in the Scioto basin index reservoirs.

Reservoir storage at the end of December in the Mahoning basin index reservoirs was 64 percent of rated capacity for water supply compared with 63 percent for last month and 75 percent for December 1993. Month-end storage in the Scioto basin index reservoirs was 58 percent of rated capacity for water supply compared with 52 percent for last month and 93 percent for December 1993.

Surface water supplies during 1994 were adequate throughout the state. Storage was above normal during the winter and early spring months but fell to below normal levels by the start of summer as a result of dry conditions in May and most of June. Reservoir storage in the Mahoning basin recovered to slightly above normal levels by the fall where it remained through the end of the year. Reservoir storage in the Scioto basin remained at below normal levels through the end of the year and at the end of November, was at its lowest month-end level since January 1988.

**RESERVOIR STORAGE FOR WATER SUPPLY**



**GROUND WATER LEVELS** during December were stable during the first half of the month and showed some improvement during the second half in most aquifers. However, the net changes from November's to December's levels were less than usually observed.

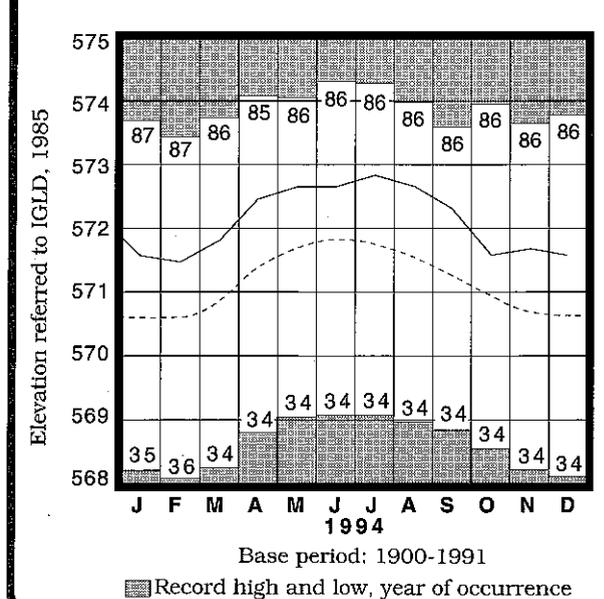
Ground water storage continues to remain at noticeably below normal levels, especially in the eastern half of the state where levels are at or near record-low levels. As an example, index observation well F-1 (Fairfield County), representing sandstone aquifers in eastern and southeastern Ohio, recorded its lowest December level ever observed and index observation well Tu-1 (Tuscarawas County), representing sand and gravel aquifers in eastern and northeastern Ohio, reached its lowest level ever observed. Both observation wells have more than 47 years of record.

Ground water supplies during 1994 were adequate throughout most of Ohio. The year started with ground water storage at below normal levels in the eastern half of the state and at near or slightly above normal in the western half. Recharge during the winter months was less than usually expected due to the below normal precipitation and frozen ground conditions that reduced recharge rates. April's above normal precipitation was beneficial, but noticeably below normal precipitation in May and most of June brought an abrupt end to the recharge season. Ground water levels declined seasonally through the summer months. An unusually dry fall in most areas of the state eliminated any hope of an early start to the current recharge season. At the end of 1994, ground water levels are noticeably lower than those of a year ago. Ground water storage throughout the state is at below normal levels and at or near record-low levels in many areas, especially in the eastern half of the state. Water supply managers with ground water sources should closely monitor their specific situations throughout the current recharge season.

**LAKE ERIE** level declined slightly during December. The mean level was 571.59 feet (IGLD-1985), 0.09 foot below last month's mean level and 0.96 foot above normal. This month's level is 0.29 foot lower than the December 1993 level and 2.39 feet above Low Water Datum.

The level of Lake Erie remained above normal throughout 1994. Its level is predicted to remain above normal for the foreseeable future based on the present condition of the lake basin and anticipated future weather conditions. The U. S. Army Corps of Engineers reports that precipitation in the Lake Erie basin during December averaged 2.7 inches, 0.1 inch above normal. The entire Great Lakes basin averaged 1.3 inches of precipitation in December, 1.1 inches below normal. For calendar year 1994, the Lake Erie basin averaged 32.7 inches of precipitation, 2.2 inches below normal and the entire Great Lakes basin averaged 31.4 inches, 0.9 inch below normal.

**LAKE ERIE LEVELS at Fairport**

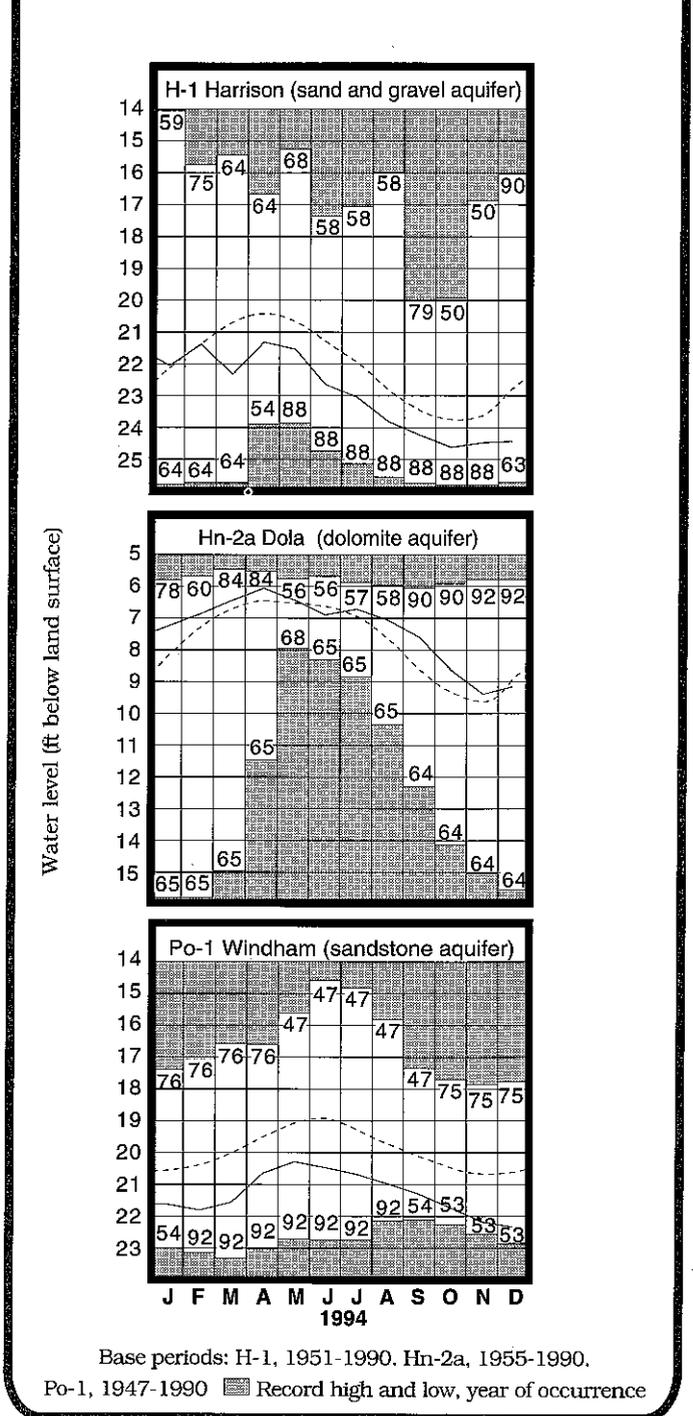


**GROUND-WATER LEVELS**

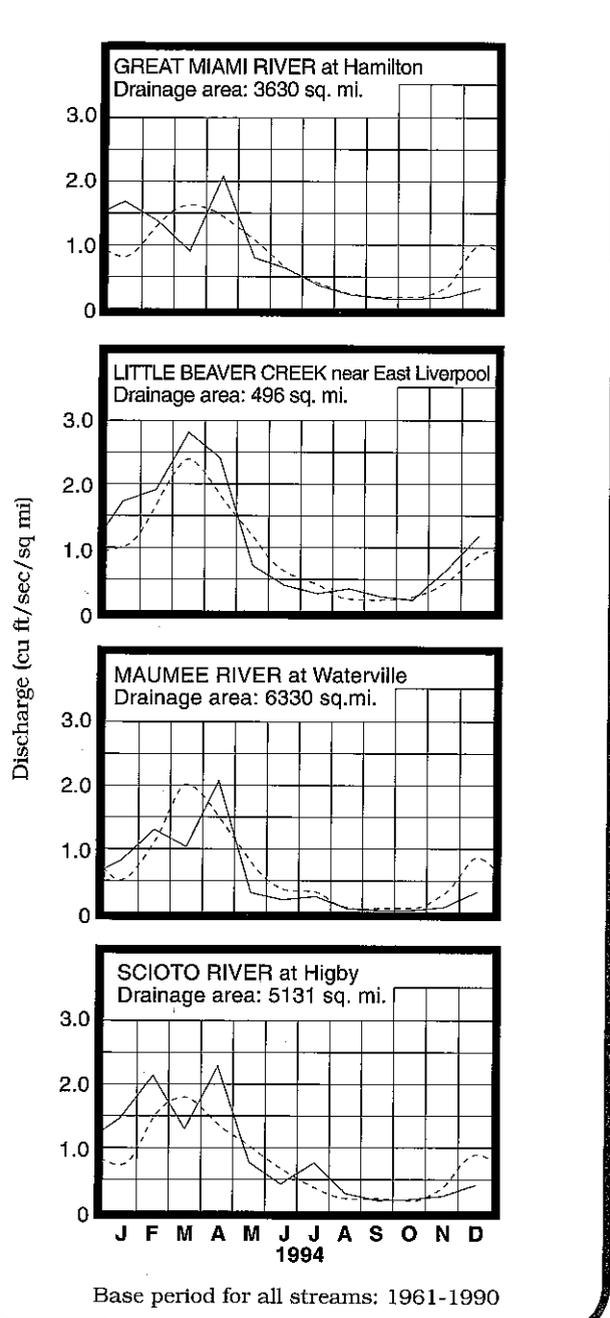
Based on daily lowest level in feet below land-surface datum

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	21.72	-4.87	-0.26	-4.84
Fa-1	Jasper Mill, Fayette Co.	Limestone	9.48	-1.32	+0.46	-1.07
Fr-10	Columbus, Franklin Co.	Gravel	44.45	-0.35	+0.38	-1.48
H-1	Harrison, Hamilton Co.	Gravel	24.45	-1.83	-0.04	-2.86
Hn-2a	Dola, Hardin Co.	Dolomite	9.18	-0.24	+0.22	-1.55
Po-1	Windham, Portage Co.	Sandstone	22.33	-1.72	-0.14	-0.72
Tu-1	Strasburg, Tuscarawas Co.	Gravel	16.21	-2.93	-0.01	-1.00

**GROUND-WATER LEVELS**



**MEAN STREAM DISCHARGE**



Normal - - - - Current - - - -

Normal - - - - Current - - - -