ACKNOWLEDGEMENTS

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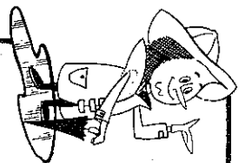
Precipitation data:
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service; The Miami Conservancy District; U.S. Army Corps of Engineers, Muskingum Area.

Streamflow and reservoir storage data:
U.S. Geological Survey, Water Resources Division.

Lake Erie level data:
U.S. Corps of Engineers, Detroit District.



ODNR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER
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SUMMARY

Precipitation for January was noticeably below normal throughout the state for the second consecutive month. Streamflow, reservoir storage and ground-water storage continues to be above normal. Lake Erie set a new monthly record high mean level for the third consecutive month. The water supply situation remains favorable throughout the state despite the below-normal precipitation during the past two months.

STATE GROUND-WATER GEOLOGIST RETIRES

Alfred C. Walker, principal ground-water geologist and administrator of the Ground-Water Inventory Section of ODNR's Division of Water, retired Jan. 31 after 33 years with the state of Ohio. Walker is known throughout the state as the expert on Ohio's ground-water geology. One must say, "Here is a man who devoted his lifework to serving the state in the development of Ohio's ground-water resources." He will be greatly missed among those deeply involved in the continuing process of developing and managing Ohio's water resources.

Walker received his undergraduate training at Denison University, the University of Michigan and Marietta College, and did post-graduate work at the University of Kansas while serving as an assistant geologist for the Kansas Geological Survey. From 1949 to 1953, he was the ground-water geologist for the Virginia Geological Survey. Walker has authored more than 70 technical publications on the subject of ground water. He is a charter member of the American Institute of Professional Geologists, the Geological Society of America, the American Geological Institute, the Water Management Association of Ohio and the National Water Well Association.

-Al Walker

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JANUARY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

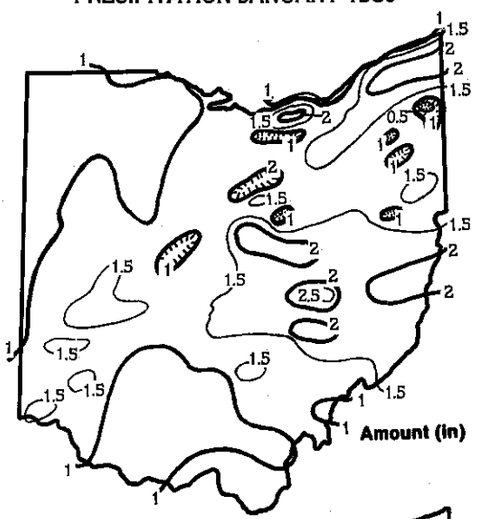
Compiled by Leonard J. Harstine and David H. Cashell

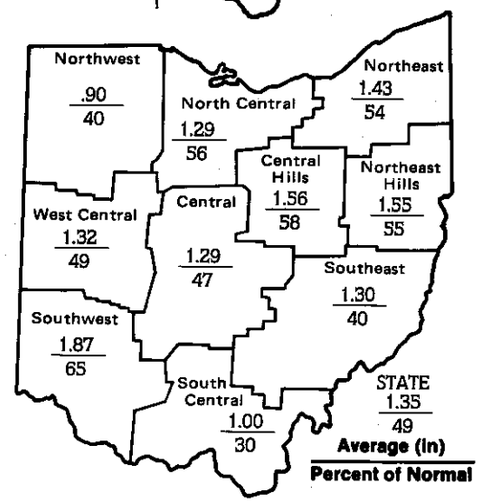
PRECIPITATION for January was noticeably below normal throughout the state. The average for the state as a whole was 1.35 inches, 1.41 inches below normal. Regional averages ranged from 1.56 inches, 1.11 inches below normal, for the Central Hills region to 0.90 inch, 1.33 inches below normal, for the Northwest region. Regional departures from normal ranged from 2.29 inches below normal for the South Central region to 1.01 inches below normal for the Southeast region. Norwich, Muskingum County, reported the greatest amount of precipitation for the month, 2.90 inches, and Mosquito Creek Lake, Trumbull County, reported the least amount, 0.38 inch.

There was minimal precipitation during the first half of the month, mostly in the form of light snow flurries. The bulk of the month's precipitation came in the form of light rain during the remainder of the month. Generally, about 50 percent of the month's precipitation fell on the 19th. About 80 percent of the state received between 0.5 and 1.5 inches of precipitation; only a small area in the northeast and the east central portions received more than 2 inches. Chardon, Geauga County, reported 25.7 inches of snow for the month, the bulk of which fell the last half of the month. Snowfall for the season thus far at Chardon totals 61.5 inches, 88 percent of normal. The below-normal precipitation during the past two months has had no serious effect on the water supply situation. This January proved to be comparatively mild and serene.

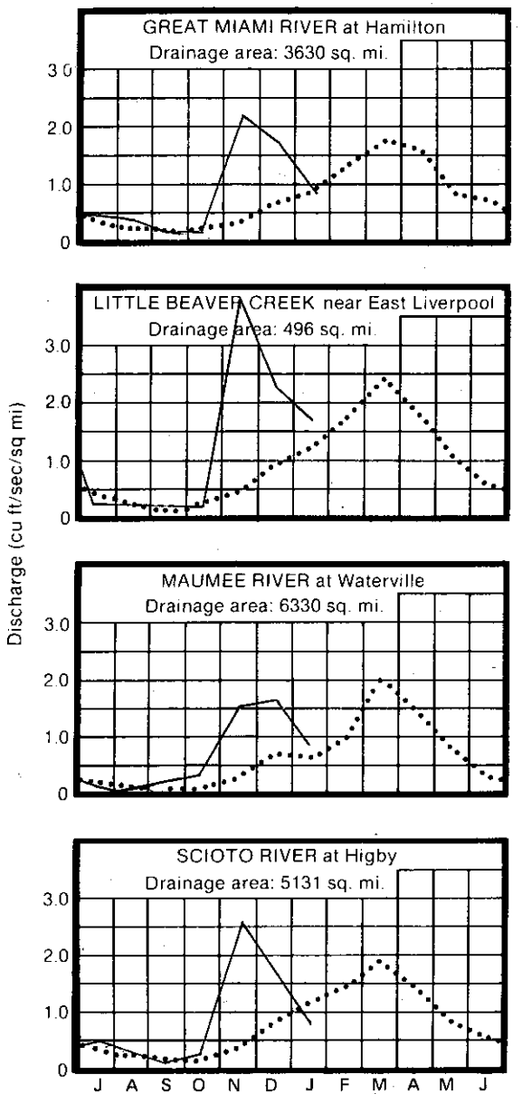
Cumulative precipitation for the first four months of the 1986 water year remains above normal throughout the state. The average for the state as a whole is 15.49 inches, 5.23 inches above normal. Regional averages range from 17.53 inches, 7.16 inches above normal, for the Southeast region to 12.33 inches, 2.91 inches above normal, for the Northwest region.

PRECIPITATION JANUARY 1986





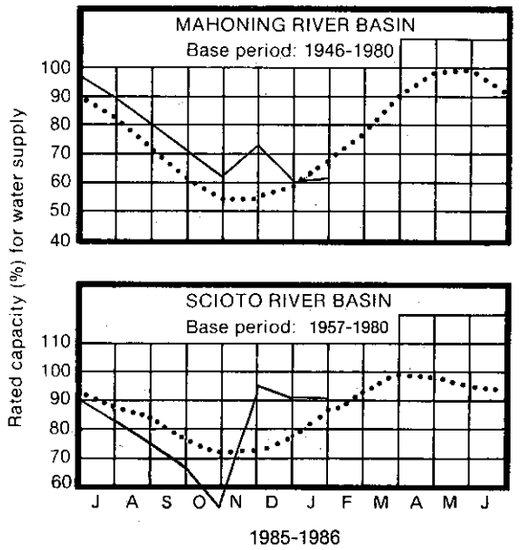
MEAN STREAM DISCHARGE



Base period for all streams: 1951-1980

normal ••••• current ——

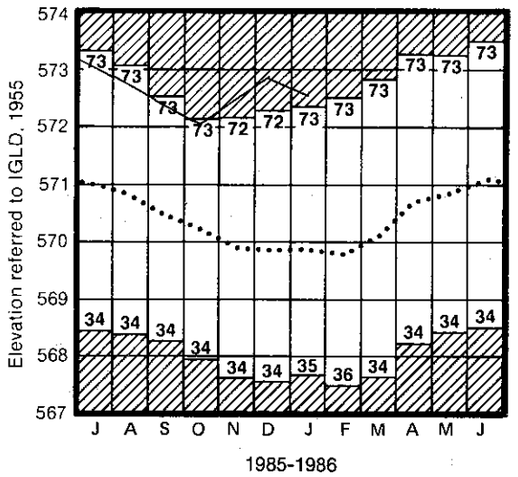
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply for January remained about the same as was observed last month and was slightly below normal in the Mahoning River basin and above normal in the Scioto River basin. Reservoir storage at the month end for the Mahoning basin index reservoirs was 62 percent of rated capacity for water supply compared to 58 percent for last month and 57 percent for January 1985. Storage at the month end for the Scioto basin index reservoirs was 91 percent of rated capacity for water supply compared to the same for last month and 72 percent for January 1985.

STREAMFLOW for January was generally normal throughout most of the state; the exception was for the Scioto River where flow was noticeably below normal. Streamflow during the first 15 days was generally above normal in the northern portion of the state and below normal in the southern portion. The below-normal precipitation in both December 1985 and January 1986 alleviated concerns about serious flooding this month following the excessive flows observed in November 1985. Mean discharge and percent of normal at the index stations were: Great Miami River, 3,213 cfs, 99 percent; Little Beaver Creek, 790 cfs, 127 percent; Maumee River, 5,376 cfs, 139 percent, and Scioto River, 3,714 cfs, 66 percent.

LAKE ERIE LEVELS



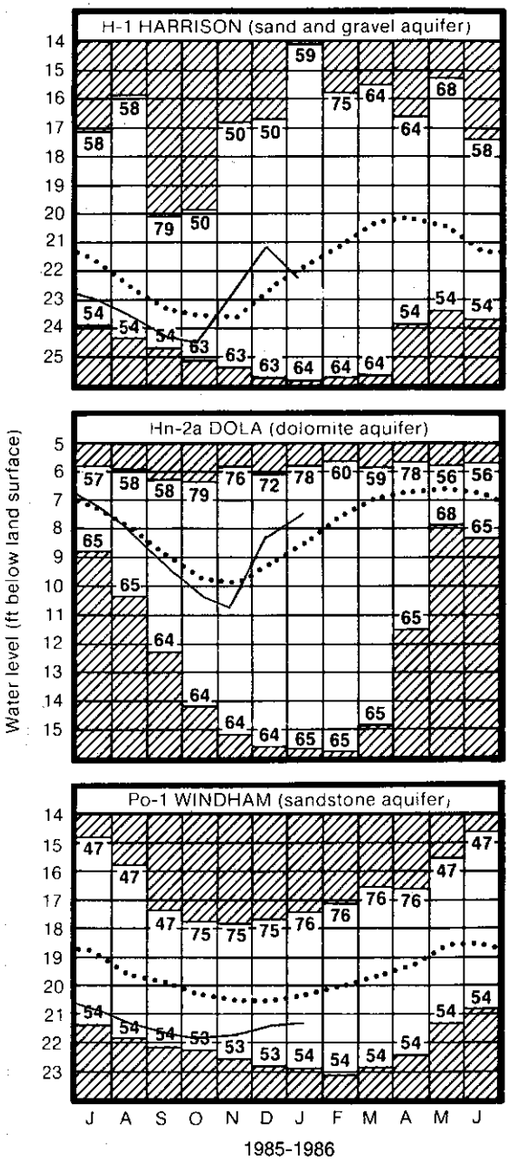
Base period: 1900-1980

LAKE ERIE declined slightly but still set a new monthly high mean level for January; this is the third consecutive month for which a new monthly record high level was set and the fifth time a new record high has been set within a year. The National Great Lakes Commission reports that precipitation for 1985 in the Great Lakes basin averaged 40.21 inches, 2.7 inches above the previous record yearly total set in 1951. Precipitation for the Lake Erie basin totaled 41.98 inches, the third highest observed in this century. Precipitation in the Lake Erie basin has been above average in 9 of the last 10 years.

The mean level for January was 572.46 feet (IGLD 1955), 0.13 foot above the previous record high set in 1973 and 1.05 feet below the all-time record high set in June 1973. The lake level is 0.28 foot below last month's mean level, 2.64 feet above normal, 0.76 foot above the level observed for January 1985 and 3.86 feet above Low Water Datum.

GROUND-WATER LEVELS for January declined during the first half of the month and rose slightly during the last half in response to recharge from precipitation. Mean level for the month showed a net decline from last month's mean levels; exceptions were in observation wells Fr-10 at Columbus and Hn-2a at Dola, Hardin County, which showed net rises. Ground-water levels are generally above normal and above those levels observed for January 1985. The ground-water storage situation remains favorable throughout the state and conditions augur well for continued improvements during the remainder of the recharge season.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

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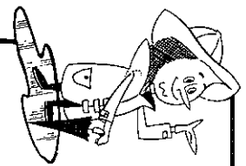

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ERIE COUNTY GROUND-WATER RESOURCES MAP AVAILABLE

The ground-water resources map of ERIE COUNTY has been published by the Ohio Department of Natural Resources, Division of Water. The multi-colored map, prepared by Alfred C. Walker, shows the regional characteristics of ground water in Erie County based upon interpretations of over 2,100 water well records and the area's geology. Well log data located on the map show the typical depth, water-bearing formation and yield for wells in the area.

Erie County is one of 53 of Ohio's 88 counties that has maps produced by the Ground-Water Inventory Section of ODNR's Division of Water in a continuing program to map the entire state. These maps can be used as a guide to locating ground-water supplies or as an aid to the expansion of present water supply systems. They will be useful to homeowners, ground-water consultants, engineers, regional planners and developers.

The Ground-Water Resources of Erie County is available for $3.50 plus $.20 sales tax and $1.25 postage and handling fee, for a total of $4.95, from the Publications Center, Ohio Department of Natural Resources, Fountain Square B-1, Columbus, Ohio 43224. Checks or money orders should be made payable to the ODNR Publications Center.

GROUND-WATER INVENTORY SECTION PROVIDES INFORMATION AND ASSISTANCE

The Ground-Water Inventory Section (GWIS) has many functions in addition to the publication of the Water Inventory Report. In addition to monitoring precipitation and water supplies throughout the state, the GWIS collects basic ground-water data, conducts ground-water research and special studies and provides information and assistance to the public and government agencies.

Well logs are the heart of the GWIS ground-water data bank. They contain information on well depth, water-bearing formations, well yields and depth to bedrock from each well drilled in the state. Currently, the GWIS has more than 600,000 well logs on file—the most comprehensive record of ground-water data in Ohio! Well log information is a valuable tool for locating both current and future ground-water resources for use in the state's development and growth.

To further locate and define areas of ground water in Ohio the GWIS conducts research and special studies. This research includes buried valley studies, dewatering of critical areas, mine site evaluations and the mapping of ground-water resources. GWIS geologists measure water levels, conduct pumping tests and other field studies when the dewatering of critical areas occurs. GWIS geologists study proposed strip mine sites to evaluate the effects of mining on the surrounding ground water. Finally, the GWIS geologists produce ground-water resources maps to show where good supplies of ground-water can be located.

All of this activity occurs so that GWIS scientists can provide information and assistance to industry, agriculture, municipalities, state agencies, drilling contractors and the general public. Each day the geologists conduct mini-studies to advise a homeowner or well-driller on the availability of ground water in a particular area. Assistance requests may also include describing proper well construction techniques or an explanation on how ground water occurs. Through such information and education Ohioans can make better decisions about using their state's rich ground-water resources.

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FEBRUARY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

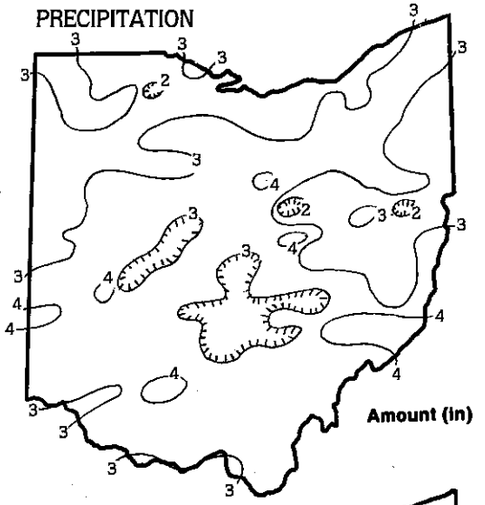
PRECIPITATION for February was noticeably above normal throughout the state. The average for the state as a whole was 3.19 inches, 0.90 inch above normal. Regional averages ranged from 3.52 inches, 0.72 inch above normal, for the Southwest region to 2.79 inches, 0.93 inch above normal, for the Northwest region. Departures from normal ranged from 1.24 inches above normal for the Central Hills region to 0.59 inch above normal for the South Central region. McConnelsville, Morgan County, reported the greatest amount of precipitation for the month, 4.67 inches; New Carlisle, Clark County, reported 4.58 inches. Carrollton, Carroll County, reported the least amount, 1.68 inches.

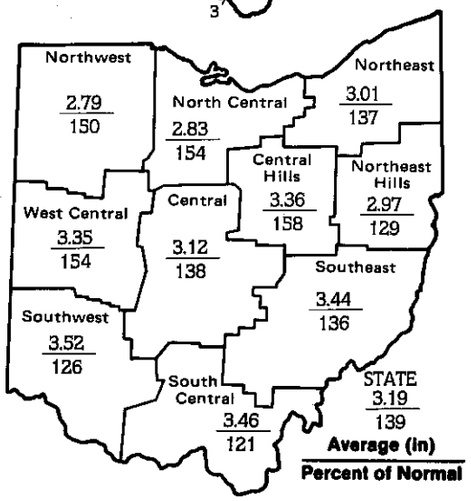
There was precipitation in the form of light rain or snow during every week except in southeast Ohio where as much as 7 inches of snow fell on the 11th. The greatest amounts of precipitation were reported on the 4th, 6th and 21st. A major portion of the state received between 2.5 and 3.5 inches of precipitation. Only a few isolated stations scattered throughout the state received less than 2 inches or more than 4 inches. Snowfall at Chardon, Geauga County, totaled 9.8 inches, less than half that normally observed for February. However, southeast Ohio received unusually heavy snows during the month; Athens reported 17.6 inches, 13 inches above normal. This was a good month for recharge to water supplies.

Cumulative precipitation for the first two months of the 1986 calendar year was generally below normal throughout the state; the only exception being the Central Hills region where precipitation was slightly above normal. The average for the state as a whole was 4.54 inches, 0.51 inch below normal. Regional averages ranged from 5.31 inches, 0.10 inch below normal, for the Southeast region to 3.69 inches, 0.40 inch below normal, for the Northwest region. Departures from normal ranged from 1.70 inches below normal for the South Central region to 0.13 inch above normal for the Central Hills region.

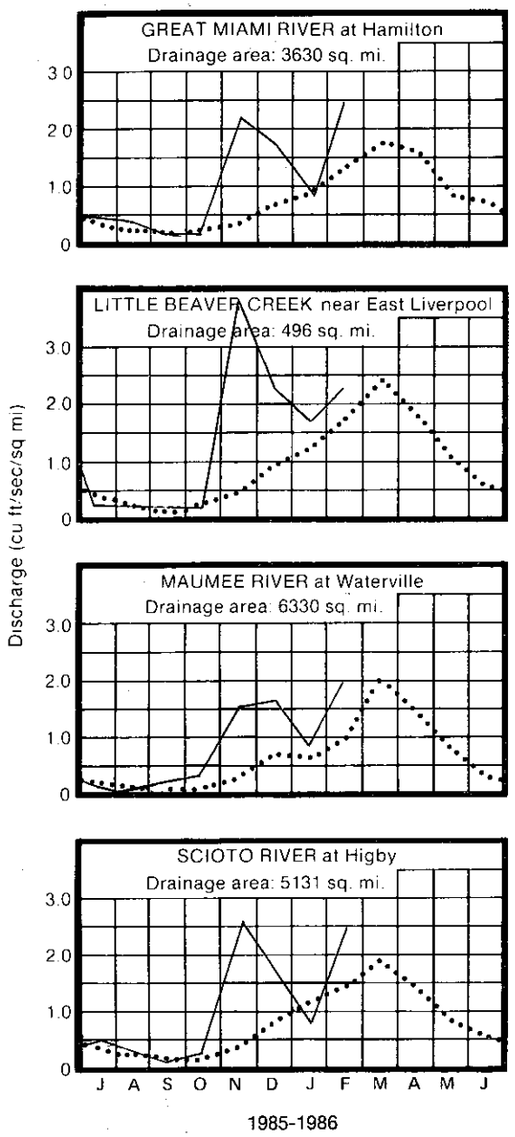
Cumulative precipitation for the first five months of the 1986 water year was noticeably above normal throughout the state; the major portion of this water year's precipitation came in November 1985. The average for the state as a whole was 18.68 inches, 6.13 inches above normal. Regional averages ranged from 20.97 inches, 8.07 inches above normal, for the Southeast region to 15.12 inches, 3.84 inches above normal, for the Northwest region. Although it has been an excellent season for recharge to water supplies thus far, the bulk of the season's recharge resulted from the excessive precipitation in November.

PRECIPITATION





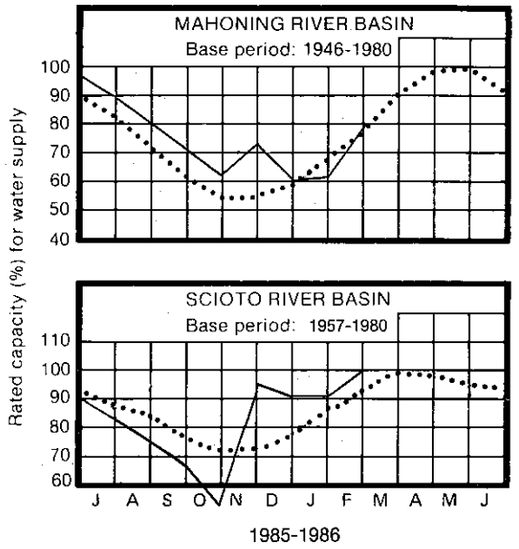
MEAN STREAM DISCHARGE



Base period for all streams: 1951-1980

normal ····· current ———

RESERVOIR STORAGE FOR WATER SUPPLY



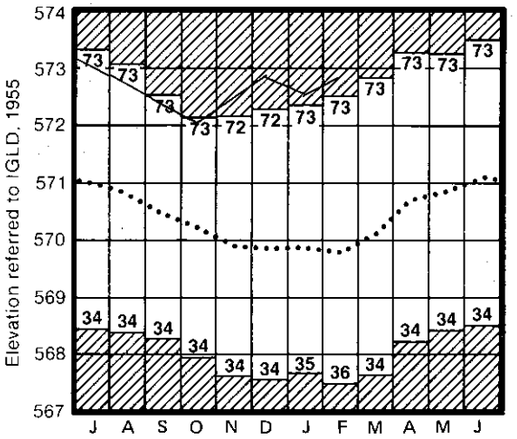
RESERVOIR STORAGE for water supply for February showed normal increases in both the Mahoning River and the Scioto River basins. Storage in both the Mahoning River and the Scioto River basins was above normal. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 78 percent of rated capacity for water supply compared to 62 percent for last month and 81 percent for February 1985. Storage at the month's end for the Scioto basin index reservoirs was 100 percent of rated capacity for water supply compared to 91 percent for last month and 101 percent for February 1985.

STREAMFLOW for February increased significantly throughout the state in response to above normal precipitation. Flows were generally excessive in most areas of the state; the only exception was in the northeast where they were in the above normal range. Flows at the month's end were about normal throughout the state. Mean discharge and percent of normal at the index stations were: Great Miami River, 8,948 cfs, 185 percent; Little Beaver Creek, 1,074 cfs, 131 percent; Maumee River, 12,678 cfs, 207 percent; and Scioto River, 12,722 cfs, 177 percent. Cumulative runoff for the water year thus far is about twice that observed last year.

LAKE ERIE mean level continued to rise significantly and set a new monthly high for February. This is the fourth consecutive month for which a new record high has been set. The U.S. Army Corps of Engineers, North Central Division, predicts that lake levels will remain extremely high for the next six months.

The mean level for February was 572.79 feet (IGLD 1955), 0.26 foot above the previous record high set in 1973 and 0.72 foot below the all-time record high set in June 1973. The lake level is 0.33 foot above last month's mean level, 2.99 feet above normal, 0.97 foot above the level observed for February 1985 and 4.19 feet above Low Water Datum.

LAKE ERIE LEVELS



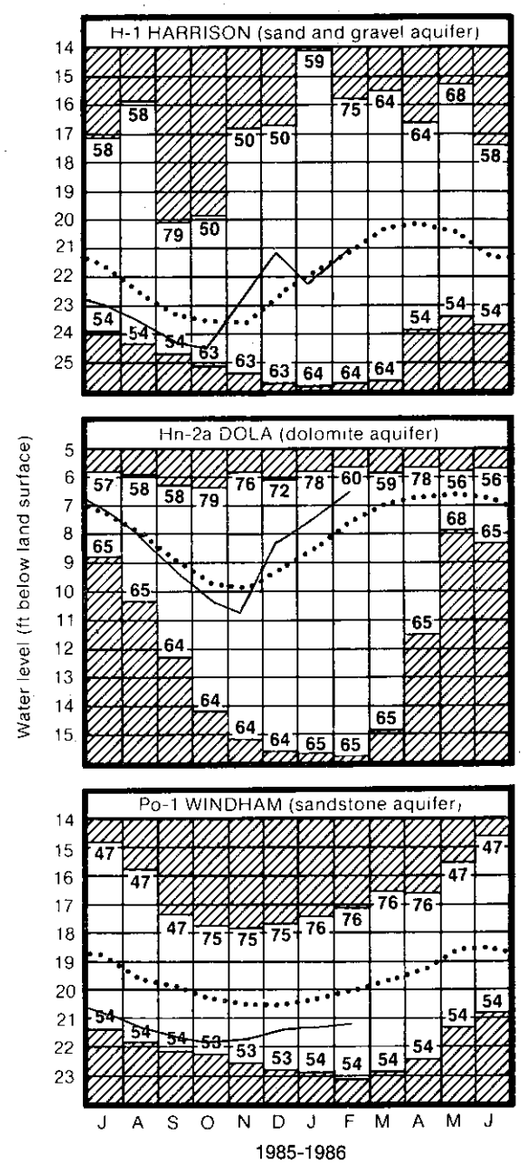
Base period: 1900-1980

GROUND-WATER LEVELS rose significantly in February in response to recharge from the above normal precipitation. Net changes in water levels from last month's mean levels were noticeably greater than normally observed. Ground-water levels were above normal in all the index wells with the exception of observation well Po-1 at Windham, Portage County, which has been consistently below normal for the past two years. Ground-water levels in all the index wells are above those levels observed last month and for February 1985. The ground-water storage situation has improved significantly throughout the state and conditions augur well for continued improvements during the remainder of the recharge period.

SUMMARY

Precipitation for February was noticeably above normal throughout the state. Streamflow, reservoir storage and ground-water storage showed noticeable increases and were generally above normal. Lake Erie level rose significantly to set a monthly record high for the fifth consecutive month. The water supply situation for Ohio has shown noticeable improvements throughout the state and should continue to do so during the remainder of the water supply recharge season.

GROUND-WATER LEVELS



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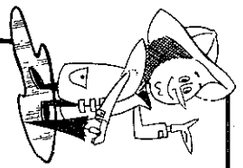

ODNR

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER
FOUNTAIN SQUARE
COLUMBUS, OHIO 43224

SUMMARY

Precipitation for March was noticeably below normal throughout the state. Reservoir storage, streamflow and ground-water storage was about normal for the state as a whole. Lake Erie level rose to a record monthly high for the fifth consecutive month. The water supply situation continues to be favorable throughout the state.

NOTES AND COMMENTS

NEW STATE GROUND-WATER GEOLOGIST

The Ohio Department of Natural Resources Division of Water announces the appointment of John E. Voytek Jr. as administrator of the Ground-Water Inventory Section (GWIS). As the new administrator, Voytek will direct the development of Ohio's ground-water resources through his staff of hydrogeologists and hydrologists. Through his guidance the Division of Water will continue to provide high quality technical information and advice on ground water in Ohio, as well as strive to develop further ground-water programs for the state.

Voytek is a certified professional geologist, a member of the American Institute of Professional Geologists and a member of the Association of Ground Water Scientists and Engineers. He is a graduate of Bowling Green State University and has taken graduate courses at various colleges and universities. Prior to joining ODNR, Voytek was associated with Johnson Screens, St. Paul, Minn.; Malcolm Pirnie Engineers at White Plains, N.Y.; the Ohio EPA; and most recently he was director of technical services for the National Water Well Association, Dublin. He has authored numerous technical publications, taught many seminars and courses on the technical aspects of ground water and associated subjects, and is a noted speaker on ground-water problems throughout the country.

NEW HYDROGEOLOGIST ADDED TO STAFF

The Division of Water Ground-Water Inventory Section has added a new hydrogeologist to its staff. David Sugar, a native of Steubenville, joined the staff in February. Sugar is a graduate of The Ohio State University (B.S.) and will be assisting in public information and ground-water resource studies.

OTTAWA COUNTY GROUND-WATER RESOURCES MAP AVAILABLE

The Ohio Department of Natural Resources Division of Water announces the availability of a new publication, "GROUND-WATER RESOURCES OF OTTAWA COUNTY," by James J. Schmidt. The multicolored map shows the regional characteristics of ground water in Ottawa County based upon interpretations of well records available and the areas's geology. Well log data located on the map show the typical depth, water-bearing formation and yield for wells in the area.

Ottawa County is one of 54 of Ohio's 88 counties that has maps produced by the Ground-Water Inventory Section of ODNR's Division of Water in a continuing program to map the entire state. These maps can be used as a guide to locating ground-water supplies or as an aid to the expansion of present water supply systems. They will be useful to homeowners, ground-water consultants, engineers, regional planners and developers.

The map is available for $3.50, plus $.20 sales tax and $1.25 postage and handling fee for a total of $4.95, from the Publications Center, Ohio Department of Natural Resources, Fountain Square B-1, Columbus, OH 43224. Checks or money orders should be made payable to the ODNR Publications Center.

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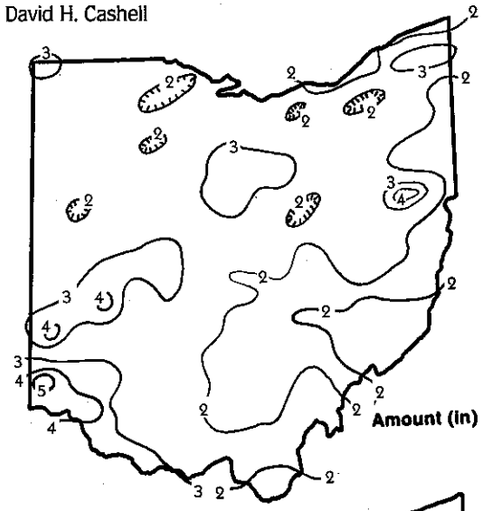
MARCH 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

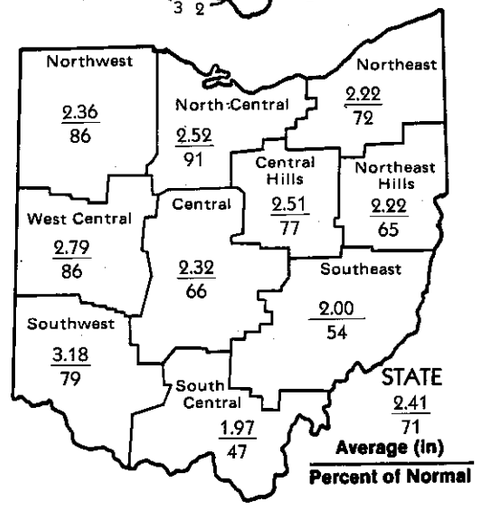


PRECIPITATION for March was noticeably below normal throughout the state. The average for the state as a whole was 2.41 inches, 1.00 inch below normal. Regional averages ranged from 3.18 inches, 0.85 inch below normal, for the Southwest region to 1.97 inches, 2.26 inches below normal, for the South Central region. The Southwest Ohio Water Company south of Venice, Hamilton County, reported the greatest amount of precipitation for the month, 5.57 inches, of which 2.25 inches fell on the 12th. Circleville, Pickaway County, reported the least amount for the month, 1.01 inches.

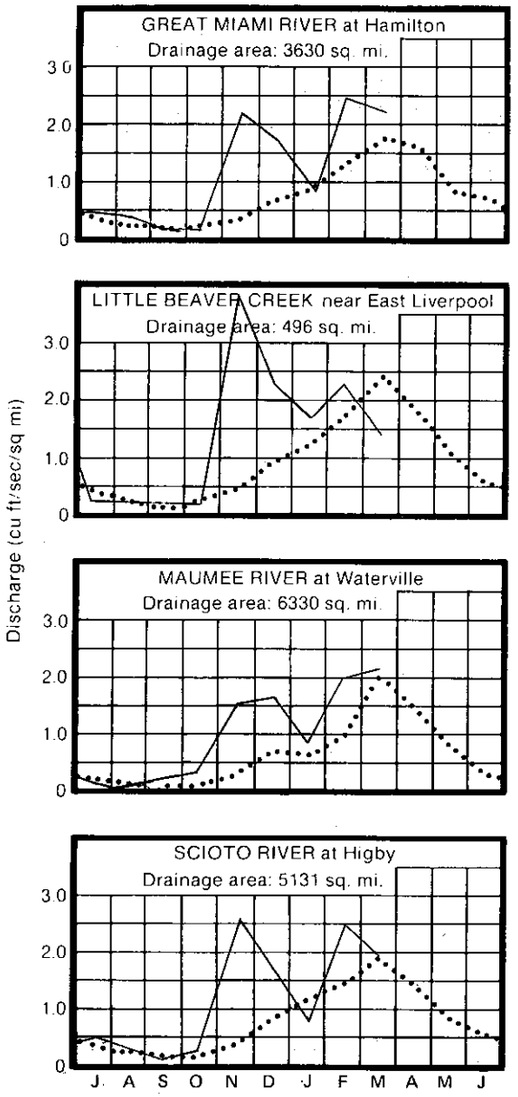
Moderate amounts of precipitation fell every week; the only exception was on the 12th when over 2 inches was observed at numerous stations in the southwest portion of the state. Generally, nearly two-thirds of the state received between 2 and 3 inches of precipitation. The southeast third received between 1 and 2 inches. Snowfall at Chardon, Geauga County, was only 8 inches, 40 percent of that usually observed for March; total for the season is 81.6 inches, 19.3 inches below normal. The below normal precipitation for March resulted in reduced recharge to ground-water supplies. This may have very well cut the recharge season short by at least a month, as conditions do not auger well for significant recharge to water supplies in the remaining month of the recharge season.

Cumulative precipitation for the first three months of the 1986 calendar year is noticeably below normal throughout the state. The average for the state as a whole is 6.95 inches, 1.51 inches below normal. Regional averages range from 8.00 inches, 2.06 inches below normal, for the Southwest region to 6.05 inches, 0.80 inch below normal, for the Northwest region. Departures from normal range from 3.96 inches below normal for the South Central region to 0.60 inch below normal for the Central Hills region.

Cumulative precipitation for the first six months of the 1986 water year continues to be markedly above normal throughout the state. However, the bulk of this surplus precipitation fell in November. The average for the state as a whole is 21.09 inches, 5.13 inches above normal. Regional averages range from 22.98 inches, 4.95 inches above normal, for the Southwest region to 17.48 inches, 3.44 inches above normal, for the Northwest region. Regional averages range from 6.69 inches above normal for the Central Hills region to 2.11 inches above normal for the South Central region.



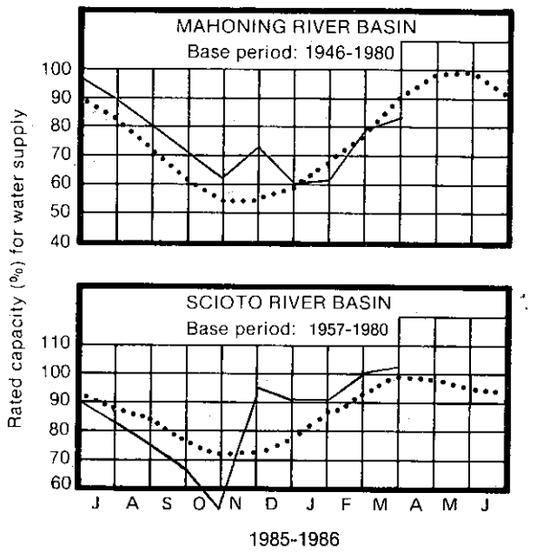
MEAN STREAM DISCHARGE



Base period for all streams: 1951-1980

normal ····· current ——

RESERVOIR STORAGE FOR WATER SUPPLY

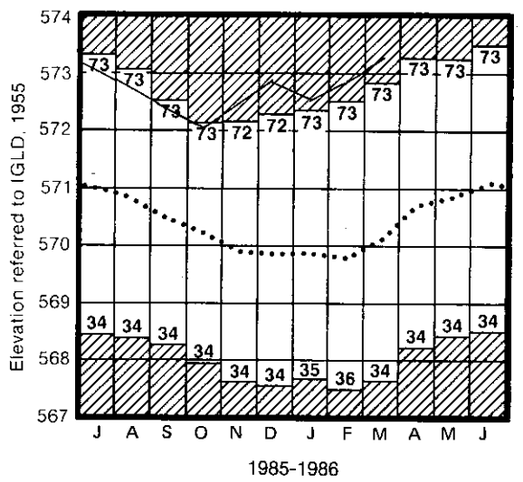


RESERVOIR STORAGE for water supply for March increased only slightly in both the Mahoning River and Scioto River basins and was much less than that usually observed. Storage in the Mahoning River basin reservoirs was slightly below normal while in the Scioto River basin it remained slightly above normal. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 83 percent of rated capacity for water supply compared to 78 percent for last month and 96 percent for March 1985. Storage at the month's end for the Scioto basin index reservoirs was 101 percent of rated capacity for water supply compared to 100 percent for last month and 102 percent for March 1985.

STREAMFLOW for March was normal throughout most of the state; the exception was in the northeast where it was deficient. Flows were generally normal to excessive through the first three weeks of the month but were noticeably below normal at the month's end. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 8,001 cfs, 131 percent; Little Beaver Creek, 692 cfs, 58 percent; Maumee River, 13,670 cfs, 107 percent; and Scioto River, 9,722 cfs, 100 percent.

Runoff was above normal for the first six months of the 1986 water year for all the index gaging stations. Cumulative runoff and departure from normal were as follows: Great Miami River, 10.47 inches, 4.24 inches above normal; Little Beaver Creek, 12.76 inches, 4.49 inches above normal; Maumee River, 9.48 inches, 3.17 inches above normal; and Scioto River, 10.83 inches, 4.08 inches above normal.

LAKE ERIE LEVELS

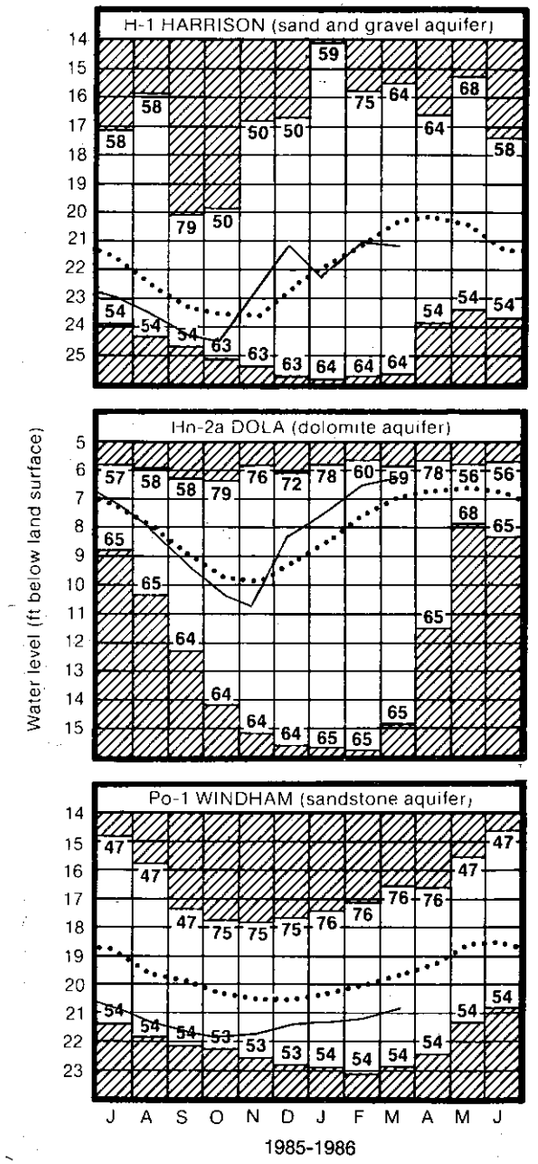


Base period: 1900-1980

LAKE ERIE level rose significantly and set a new monthly high for March. This is the fifth consecutive month for which a new record high has been set. The mean level for March was 573.16 feet (IGLD 1955), 0.28 foot above the previous record high set in 1973 and 0.35 foot below the all-time record high set in June 1973. The lake level is 0.37 foot above last month's mean level, 3.11 feet above normal, 0.30 foot above the level observed for March 1985 and 3.11 feet above Low Water Datum.

GROUND-WATER LEVELS for March were rather stable throughout the state in response to the below normal precipitation. Due to the lack of recharge, net changes from last month's mean levels were significantly below that usually observed for March. Thus, the normal recharge season for ground-water supplies may have been cut short by at least a month. Even so, ground-water levels were generally above those levels observed for March 1985. Ground-water levels are generally below normal in unconsolidated aquifers and above normal in consolidated aquifers. The ground-water storage situation for water supply continues to be favorable throughout the state.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

ACKNOWLEDGEMENTS

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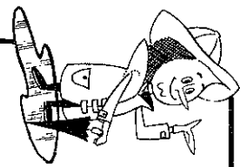

ODNR

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER

FOUNTAIN SQUARE

COLUMBUS, OHIO 43224

SUMMARY

Precipitation for April was below normal throughout the state for the second consecutive month. Streamflow, reservoir storage and ground-water storage is noticeably below normal for this time of year. Lake Erie level rose but did not set a record for the first time in six months. The water supply situation, although favorable at this time, causes some degree of apprehension about the ensuing months.

NOTES AND COMMENTS

NEW PUBLICATION

The Division of Water announces the availability of the following new publications: THE GROUND-WATER RESOURCES OF HURON COUNTY by Glenn W. Hartzell.

THE GROUND-WATER RESOURCES OF WARREN COUNTY by Alfred C. Walker.

The Ground-Water Inventory Section of the Division of Water has produced ground-water resources maps for 56 of Ohio's 88 counties in a continuing program to map the entire state. Staff hydrogeologists prepare these maps of regional ground-water characteristics based on interpretations of water well drilling records and local geology. The maps include well log data for many point locations representative of the specific areas. These data include typical depth, water-bearing formation and yield for wells in the area.

Ground-water resource maps can be used as a guide to locating ground-water supplies or as an aid to planning an expansion of present water supply systems. They are useful to homeowners, ground-water consultants, engineers, regional planners, developers and water well contractors. So far, ground-water resource maps have been published for the following counties:

Allen	Harrison	Ottawa
Ashland	Henry	Pickaway
Ashtabula	Holmes	Portage
Athens	Huron	Richland
Auglaize	Jackson	Ross
Champaign	Knox	Sandusky
Clark	Lake	Seneca
Columbiana	Lawrence	Shelby
Crawford	Licking	Stark
Cuyahoga	Logan	Summit
Defiance	Lorain	Trumbull
Delaware	Mahoning	Union
Erie	Marion	Van Wert
Fairfield	Medina	Vinton
Franklin	Meigs	Warren
Gallia	Mercer	Washington
Geauga	Miami	Wayne
Hancock	Morgan	Wyandot
Hardin	Morrow	

The maps are available for $3.50, plus $.20 sales tax and $1.25 postage and handling fee for a total of $4.95, from the Publications Center, Ohio Department of Natural Resources, Fountain Square B-1, Columbus, OH 43224. Checks or money orders should be made payable to the ODNR Publications Center.

ODNR

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER

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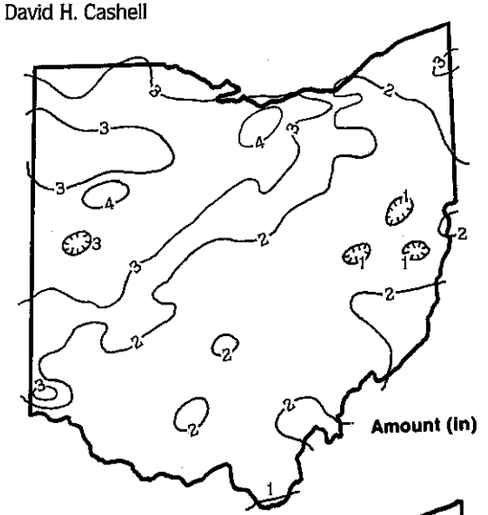
APRIL 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

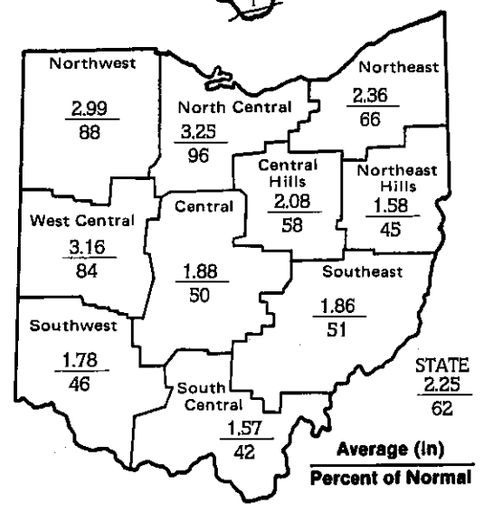


PRECIPITATION for April was noticeably below normal throughout the state for the second consecutive month. The average for the state as a whole was 2.25 inches, 1.37 inches below normal. Regional averages ranged from 3.25 inches, 0.14 inch below normal, for the North Central region to 1.57 inches, 2.18 inches below normal, for the South Central region. Lima, Allen County, reported the greatest amount of precipitation for the month, 4.53 inches and Carrollton, Carroll County, reported the least amount, 0.33 inch, a record low for April for that station.

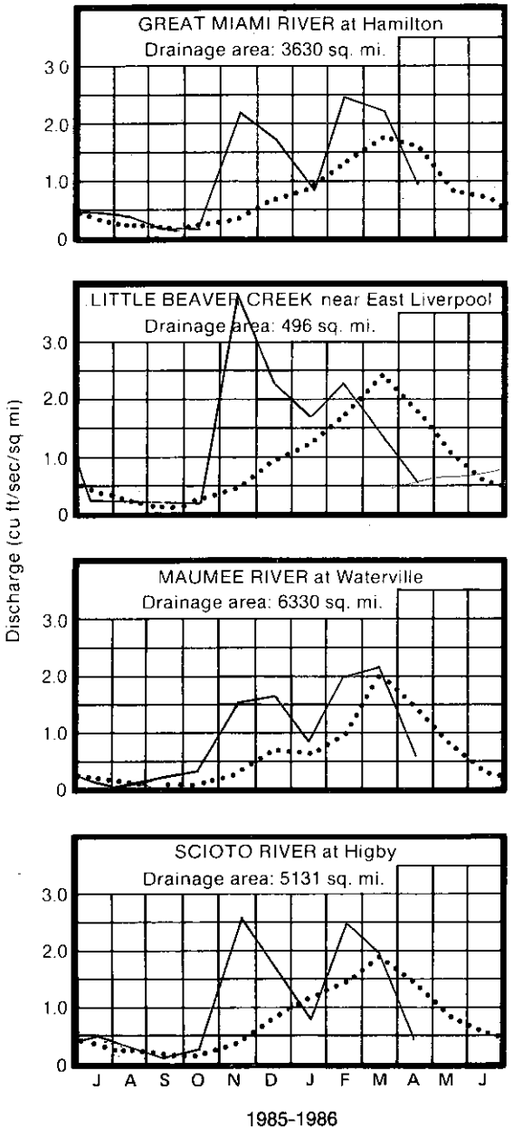
There was precipitation during every week; however, the bulk of the month's precipitation fell during the second and third weeks. Heaviest precipitation fell in the western and northern portions of the state. Generally, half of the state north of a line from Cincinnati through Delaware to Youngstown received from 2 to 4 inches and the remaining half south of this line received between 1 and 2 inches. Water supplies will be affected by the lack of recharge in both March and April as a result of the deficient precipitation. Although the effects are not significant at present, much depends on weather conditions during the next six months.

Cumulative precipitation for the first four months of the 1986 calendar year is below normal throughout the state. The average for the state as a whole is 9.20 inches, 2.88 inches below normal. Regional averages range from 10.62 inches, 1.29 inches below normal, for the West Central region to 8.00 inches, 6.14 inches below normal, for the South Central region. It is interesting to note that climatic conditions are very similar to those that existed for the first four months of 1985.

Cumulative precipitation for the first seven months of the 1986 water year continues to be noticeably above normal for most of the state; one exception is the South Central region where precipitation is slightly below normal. The average for the state as a whole is 23.34 inches, 3.76 inches above normal. Regional averages range from 24.83 inches, 4.57 inches above normal, for the Southeast region to 20.47 inches, 3.02 inches above normal, for the Northwest region. Departures from normal for the water year thus far range from 5.54 inches above normal for the North Central region to 0.07 inch below normal for the South Central region.



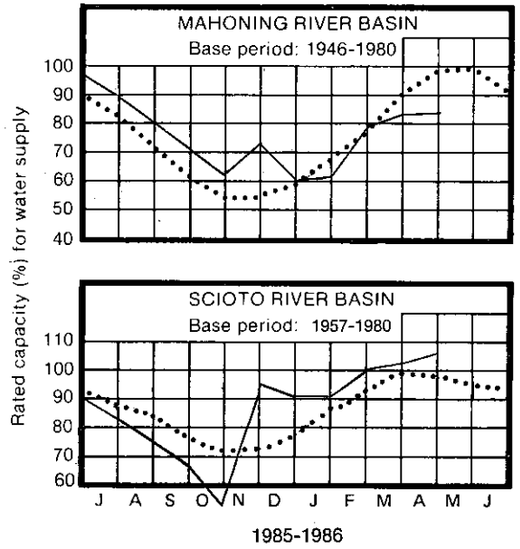
MEAN STREAM DISCHARGE



Base period for all streams: 1951-1980

normal ••••• current ——

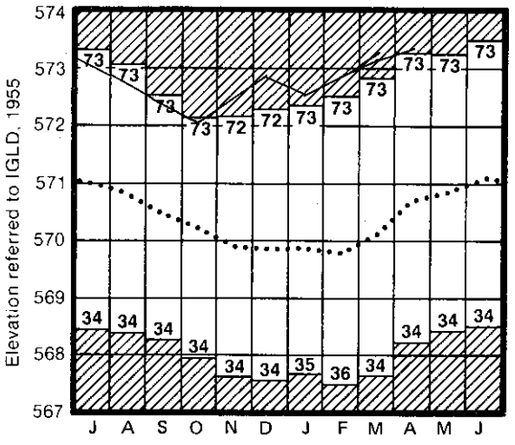
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply for April remained about the same for the Mahoning River basin while it declined slightly in the Scioto River basin. Storage was below normal in both the Mahoning River and the Scioto River basins. (Note: Milton Reservoir, which is in the Mahoning system, is down for repair and may cause some discrepancy in the Mahoning basin data during the repair period.) Reservoir storage at the month's end for the Mahoning basin index reservoirs was 84 percent of rated capacity for water supply compared to 83 percent for last month and 98 percent for April 1985. Storage at the month's end for the Scioto basin index reservoirs was 96 percent of rated capacity for water supply compared to 101 percent for last month and 99 percent for April 1985.

STREAMFLOW for April was noticeably below normal throughout the state. In fact, flows throughout the state were the lowest for April in 10 years. Flows were generally deficient for the month in most areas of the state, the exception was the Great Miami River in southwestern Ohio. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 3,591 cfs, 64 percent; Little Beaver Creek, 269 cfs, 29 percent; Maumee River, 3,833 cfs, 41 percent; and Scioto River, 2,262 cfs, 30 percent. Runoff was only about half that normally observed for April.

LAKE ERIE LEVELS

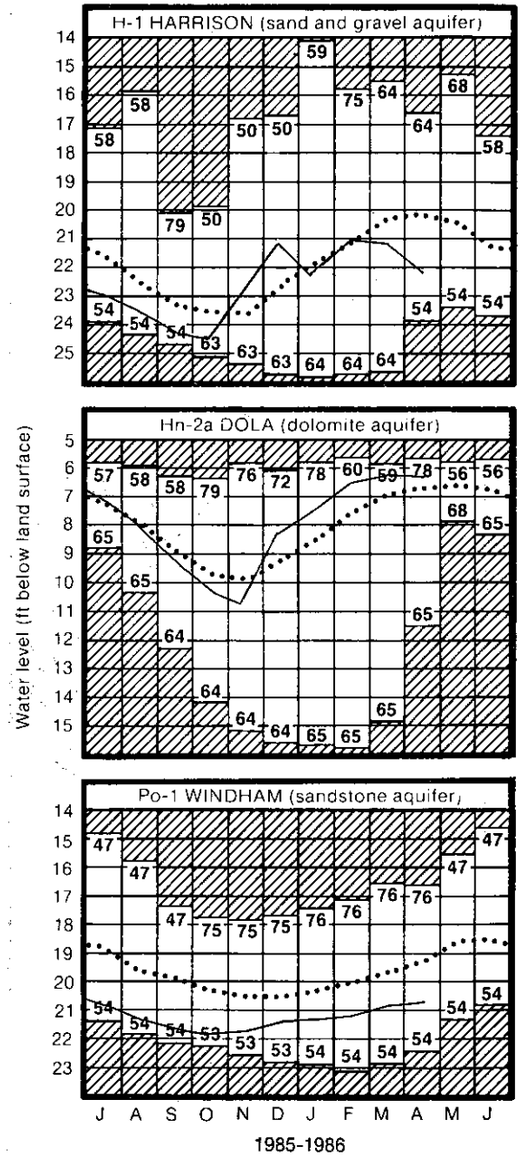


Base period: 1900-1980

LAKE ERIE level rose slightly but was 0.13 foot below the record high level set in April last year. This is the first time in six months that a new record-high level has not been observed. The mean level for April was 573.37 feet (IGLD 1955), 0.21 foot above last month's mean level and 2.76 feet above normal. The lake level is 4.77 feet above Low Water Datum.

GROUND-WATER LEVELS for April showed marked declines in unconsolidated aquifers and remained stable or rose only slightly in consolidated aquifers. Water levels usually show noticeable rises through April. However, with the continued deficiencies in precipitation there is little chance for additional recharge to ground-water storage now. Ground-water levels are generally below those levels observed for April 1985 and are noticeably below normal. The only exceptions are in consolidated aquifers in the central and northwestern portions of the state where they continue to be above normal. The ground-water storage situation, although currently favorable, could present some problems in the future. It would be wise for those depending on shallow ground-water aquifers to monitor the situation closely.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

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Lake Erie level data:
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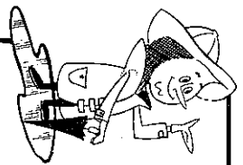

ODNR

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER
FOUNTAIN SQUARE
COLUMBUS, OHIO 43224

SUMMARY

Precipitation was below normal for the third consecutive month for most areas of the state. Streamflow, reservoir storage and groundwater storage declined and was generally noticeably below normal. Lake Erie level continues to rise and set a new monthly record high for May. It is too early to determine just what effect the precipitation deficiencies will have on water supplies as the water supply depletion season progresses. However, water supply managers should monitor their systems closely and plan accordingly.

NOTES AND COMMENTS

GROUND WATER STRATEGY

Increasing concern about wise management of Ohio's ground water resource has resulted in development of a draft for ground water protection and management strategy. The second draft of the strategy, distributed in early June, was discussed at a series of town meetings around the state during the last two weeks of June. Following the public meetings, the Ohio Environmental Protection Agency (OEPA) will incorporate the applicable comments into the strategy and then hold a formal public hearing in Columbus. Public notice will be given at least 30 days prior to the public hearing.

For information contact Larry Frimerman, Public Participation Coordinator, Ohio Environmental Protection Agency, 361 E. Broad St., Columbus, Ohio 43266-0558, phone (614) 462-8936.

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OHIO DEPARTMENT OF NATURAL RESOURCES

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DIVISION OF WATER

MAY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

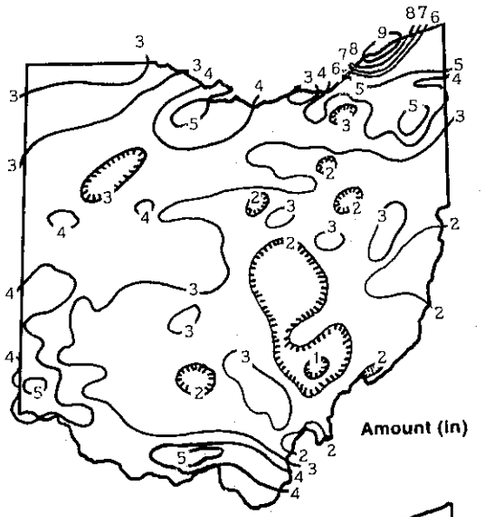
Compiled by Leonard J. Harstine and David H. Cashell

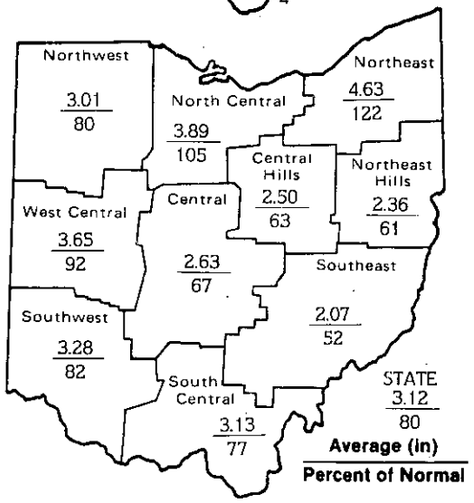
PRECIPITATION for May was below normal throughout most of the state for the third consecutive month. Only the North Central and Northeast regions recorded precipitation above normal for the month. The average for the state as a whole was 3.12 inches, 0.79 inch below normal. Regional averages ranged from 4.63 inches, 0.82 inch above normal, for the Northeast region to 2.07 inches, 1.91 inches below normal, for the Southeast region. Painesville, Lake County, reported the greatest amount of precipitation for the month, 9.76 inches, of which 7.95 inches fell on four days—May 6, 7, 16 and 19. Amesville, Athens County, reported the least amount for the month, 0.91 inch.

There were substantial amounts of precipitation during every week of the month at scattered points throughout the state. The bulk of the month's rain fell on the 6th, 7th, 16th, 19th and 27th. Generally, half of the state north of a line running from Cincinnati through Columbus to Youngstown received between 3 to 5 inches with 5 to 9.76 inches in the extreme northeast corner. The remaining half south of this line received between 1 to 3 inches. Stations in the northeast reported as much as 2.70 inches in a 24-hour period. However, in the South Central and Southeastern portion of the state continued dry conditions are beginning to put considerable stress on the water supply situation.

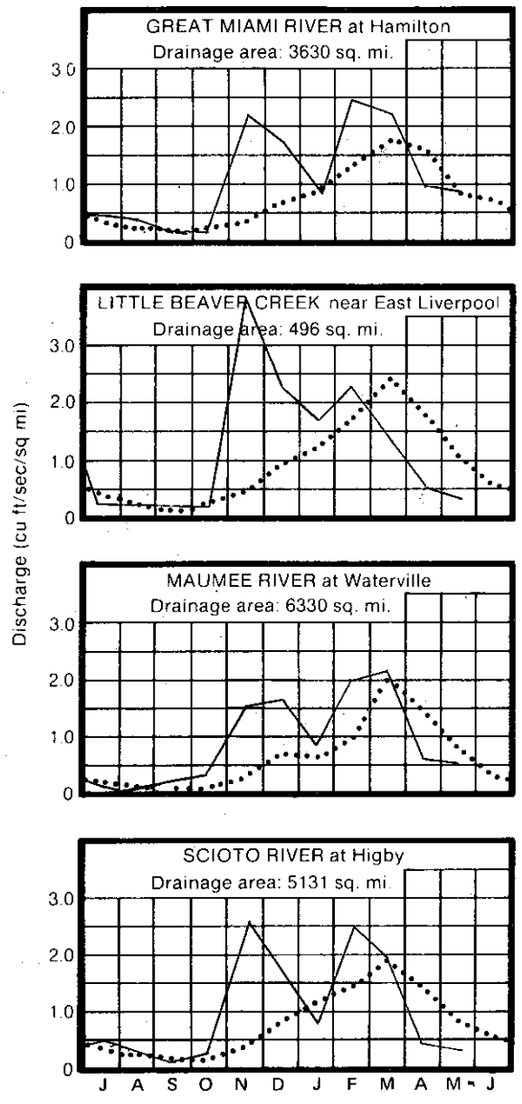
Cumulative precipitation for the first five months of the 1986 calendar year continues to be below normal throughout the state. The average for the state as a whole is 12.32 inches, 3.67 inches below normal. Regional averages range from 14.27 inches, 1.61 inch below normal, for the North Central region to 10.68 inches, 5.19 inches below normal, for the Northeast Hills region. Other regions showing excessive departures from normal for the calendar year thus far are: Central, 5.06 inches below normal; South Central, 7.08 inches below normal; and Southeast, 5.51 inches below normal.

Cumulative precipitation for the first eight months of the 1986 water year remains above normal throughout most of the state; one exception is the South Central region where it is below normal. The average for the state as a whole is 26.46 inches, 2.97 inches above normal. Regional averages range from 28.86 inches, 5.08 inches above normal, for the Northeast region to 23.48 inches, 2.29 inches above normal, for the Northwest region. Departures from normal range from 5.72 inches above normal for the North Central region to 1.01 inches below normal for the South central region.





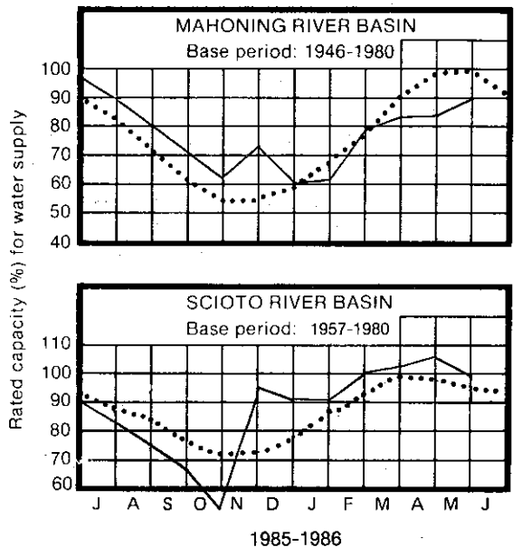
MEAN STREAM DISCHARGE



Base period for all streams: 1951-1980

normal ····· current ——

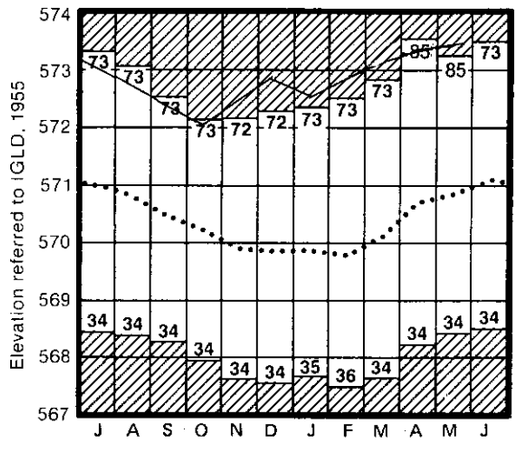
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply rose in the Mahoning River basin but remained below normal for the third consecutive month, while in the Scioto River basin storage decreased but continued to be slightly above normal. Reservoir storage in both basins continues to be favorable despite the deficiency in precipitation thus far this year. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 90 percent of rated capacity for water supply compared to 84 percent for last month and 98 percent for May 1985. Storage at the month's end for the Scioto basin index reservoirs was 89 percent of rated capacity for water supply compared to 96 percent for last month and 98 percent for May 1985.

STREAMFLOW for May was near normal in the northern and western areas of the state and deficient in the central, south central and eastern areas. Flows in the eastern and southeastern areas were noticeably below normal in response to marked deficiencies in precipitation. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 2,970 cfs, 96 percent; Little Beaver Creek, 181 cfs, 31 percent; Maumee River, 3,375 cfs, 67 percent; and Scioto River, 1,597 cfs, 34 percent.

LAKE ERIE LEVELS



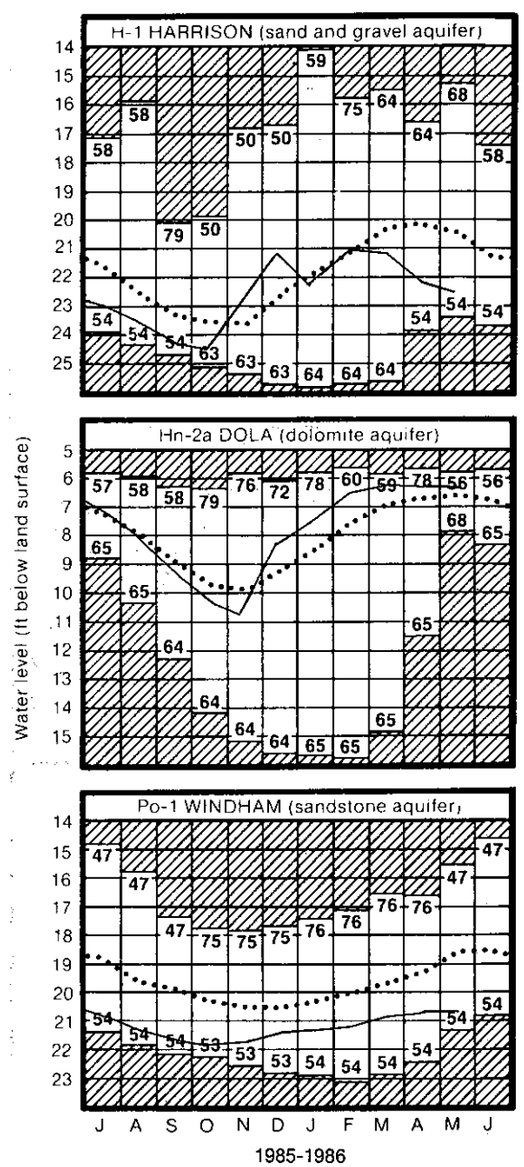
Base period: 1900-1980

LAKE ERIE level continued to rise and set a new monthly high mean level for May. The lake level is only 0.07 foot below the all time high set in June 1973. The lake has set a new record monthly high level for six of the past seven months; the record high for April was set in 1985. The mean level for May, 573.44 feet (IGLD-1955) is 0.07 feet above last month's mean level and 0.16 foot above the mean level for May 1985. The lake level is 2.52 feet above normal and 4.64 feet above Low Water Datum.

GROUND WATER LEVELS for May showed marked declines in most areas of the state, the only exceptions were in the Northeast and Southwest where water levels remained stable during the month. Net declines from last month's mean levels were generally much greater than usually observed in May. Water levels in most aquifers are markedly below normal and below those levels observed for May 1985. The water level in observation well Tu-1 near Strasburg set a new record low level for May, but was 0.39 foot above the all time record low set in November 1985.

Ground-water levels reached their peak in March, a full two months earlier than usual and began their seasonal declines early as a result of the deficient precipitation. These peak levels were generally about one foot below the peak levels normally observed in May. Thus, ground-water storage for water supply in the southern and eastern portion of the state is reaching critical levels already and the normal ground-water depletion season is just beginning. Water supply managers should be monitoring their situations closely.

GROUND-WATER LEVELS



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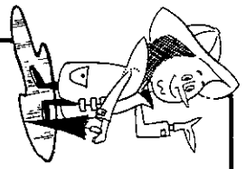

ODNR

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER
FOUNTAIN SQUARE
COLUMBUS, OHIO 43224

NOTES AND COMMENTS

LAKE ERIE SETS ALL-TIME RECORD HIGH

A new, all-time record high water level for Lake Erie, 573.70 feet (IGLD 1955), was set in June 1986, surpassing the old record of 573.51 feet (IGLD 1955), set in June 1973. New monthly high mean levels were set in five of the first six months of 1986. The recent record high water levels are not a sudden phenomenon. Since 1972-1973 when previous record monthly mean highs were set, the Lake Erie water level has been consistently above the long-term average of 570.4 feet (IGLD 1955). The current record-high lake levels are an example of a long-term fluctuation, that is, a general rising trend is apparent over a number of years. Lake Erie rose from 568.2 feet (IGLD 1955) in November 1964 to the present record level of 573.7 feet (IGLD 1955), an increase of 5.5 feet in slightly over two decades. However, this is not reflective of how fast lake levels can rise. In less than five years, November 1964 (568.2 feet, IGLD 1955) to July 1969 (572.5 feet, IGLD 1955) the water level rose 4.25 feet and by June 1973 had risen to a level of 573.51 feet (IGLD 1955), an increase of 5.25 feet from November 1964.

Despite the increasing and decreasing trends of Lake Erie water levels, there is no definite cycle. An examination of past trends since the 1900s, however, reveals that with each new period of rising lake levels the level has been higher than the previous period. For example, high lake levels in the early part of this century were followed by higher levels in the 1950s, these record levels were followed by even higher levels in the early 1970s. So far the lake levels in the 1980s are proving to be still higher. Between these periods of extremely high lake levels, there have been periods of low lake levels. Both in 1934 and 1964 record lows were noted.

The two principal factors responsible for a change in lake levels are precipitation and air temperature. Since 1967 the Great Lakes basin annual precipitation has been mostly above the long-term average; there have been very few years when this has not been true. Precipitation within the Lake Erie basin, however, for the first half of the calendar year 1986 is slightly below normal. The second major factor, air temperature, has shown a cooling trend over a similar time period in the Great Lakes region. At cooler temperatures there is less transpiration by plants and the evaporation rates from the ground and lake surface are lower. Therefore, the effects of precipitation are enhanced in the form of greater runoff.

The Ohio Lake Erie shoreline is characterized by low-lying areas (i.e., estuaries, marshes, etc.) in the west and high bluffs to the east. As a result of the high lake levels, the low-lying areas are subject to increased flooding especially from a northeasterly storm as the water is pushed from one end of the lake to the other. This storm setup can cause lake levels to rise as much as 8 feet, causing extensive damage along the Lake Erie shoreline. To the east, lakefront owners face a different problem: severe erosion. In areas where the bluffs are not characterized by shale or linestone outcrops, recession rates may be up to 10 feet per year. Homeowners have watched as their backyards and at times their homes are being swallowed up by the lake.

Erosion and flooding are natural processes that have always been associated with Lake Erie, but with a record high lake level the process is enhanced. Homeowners are advised to seek technical assistance this summer, before the winter storm season approaches.

For assistance the following may be contacted:
ODNR—Division of Geological Survey, Lake Erie Office, (419) 626-4296
ODNR—Office of Chief Engineer, (614) 265-6957
U.S. Army Corps of Engineers, Buffalo District, (716) 876-5454
Ohio Sea Grant-Lake County Cooperative Ext. Service, (216) 357-2582

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Richard F. Celeste
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Director

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JUNE 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

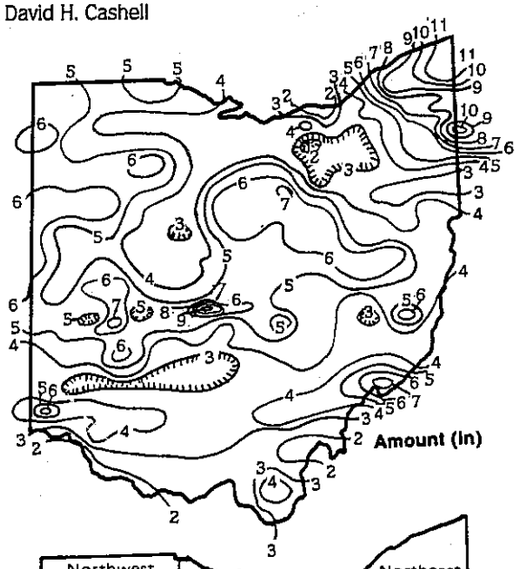
PRECIPITATION for June was noticeably above normal for most areas of the state; exceptions were in the North Central and South Central regions where it was below normal. Precipitation has been above normal for the state in only two months this year. The average for the state as a whole was 4.61 inches, 0.79 inch above normal. Regional averages ranged from 6.69 inches, 3.09 inches above normal, for the Northeast region to 2.80 inches, 0.84 inch below normal, for the South Central region. Andover, Ashtabula County, reported the greatest amount of precipitation for the month, 11.11 inches; Ashtabula reported 11.00 inches and Youngstown Airport reported 10.66 inches. Salem Center, Meigs County, reported the least amount, 1.13 inches.

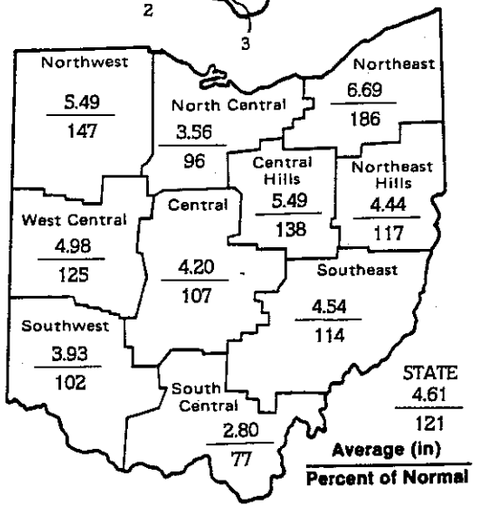
There were substantial amounts of precipitation during every week of the month in most areas of the state. The bulk of the precipitation was produced by heavy, localized thunderstorms; greater amounts resulted from very intensive storms. One of the most intensive storms was reported in Wyandot and Crawford counties where Robert Stuckey reported 5.5 inches in 3 hours about 1 mile east of Upper Sandusky at the corner of State Route 30 and County Road 34.

The heavy rains in the northeast resulted in considerable flooding in Ashtabula County, which was designated a disaster area by Gov. Celeste. Generally, about one-third of the state south of a line running from Cincinnati through Columbus to East Liverpool received less than 4 inches for the month. Thus, the southern portions of the state continue be noticeably deficient in precipitation for the year. The above normal precipitation was generally most beneficial to both agriculture and water supplies.

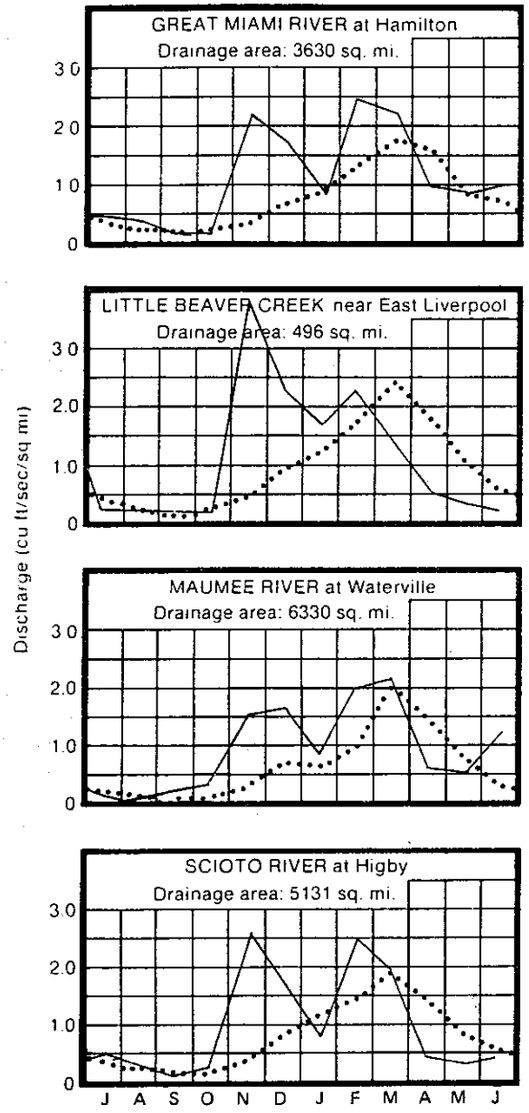
Cumulative precipitation for the first six months of the 1986 calendar year continues to be noticeably below normal for most areas of the state; the only exception is the Northeast region where precipitation is above normal. The average for the state as a whole is 16.93 inches, 2.88 inches below normal. Regional averages range from 20.34 inches, 1.43 inches above normal, for the Northeast region to 13.93 inches, 7.92 inches below normal, for the South Central region.

Cumulative precipitation for the first nine months of the 1986 water year continues to be noticeably above normal for most of the state; one exception is the South Central region where it is below normal. The average for the state as a whole is 31.07 inches, 3.76 inches above normal. Regional averages range from 35.55 inches, 8.17 inches above normal, for the Northwest region to 27.89 inches, 1.85 inches below normal, for the South Central region.





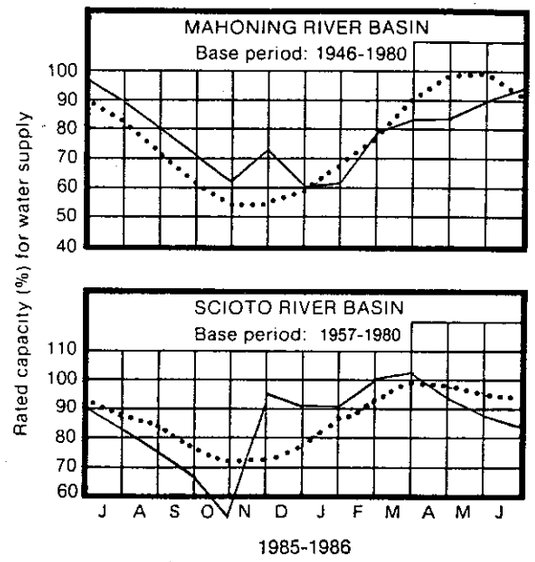
MEAN STREAM DISCHARGE



Base period for all streams: 1951-1980

normal ····· current ——

RESERVOIR STORAGE FOR WATER SUPPLY



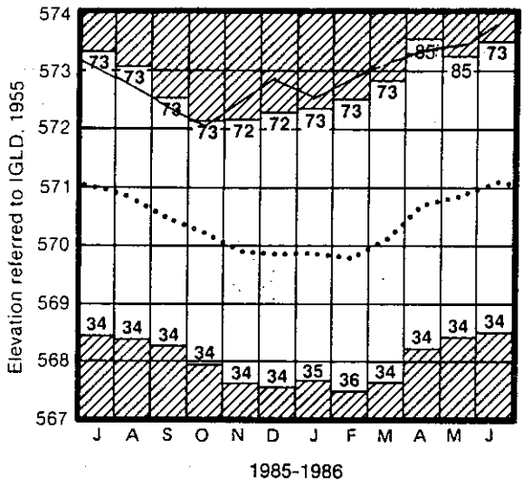
RESERVOIR STORAGE for water supply for June increased slightly in the Mahoning River basin whereas it usually shows a decrease. This was due to the excessive precipitation for June in the basin. Storage in the Scioto River basin decreased at a greater rate than usual. In most cases, where last month reservoirs had difficulty reaching summer pool requirements, they must now be brought down to summer pool. Reservoir storage rose to slightly above normal in the Mahoning River basin while in the Scioto River basin it was below normal. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 92 percent of rated capacity for water supply compared to 90 percent for last month and 95 percent for June 1985. Storage at the month's end for the Scioto basin index reservoirs was 84 percent of rated capacity for water supply compared to 89 percent for last month and 92 percent for June 1985.

STREAMFLOW for June was deficient in the east-central portion of the state, excessive in the northeast and northwest and normal elsewhere. Ashtabula County was declared a disaster area as a result of intense and continued rainfall in the first two weeks of June which resulted in extensive flooding throughout the entire county and neighboring counties. Local flooding was observed in many areas throughout the state due to heavy intensive localized thunderstorms.

Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 3,453 cfs, 158 percent; Little Beaver Creek, 102 cfs, 34 percent; Maumee River, 7,295 cfs, 331 percent and Scioto River, 2,348 cfs, 78 percent.

LAKE ERIE level for June rose significantly and set an all-time record high 0.19 foot above the previous record high set in June 1973. The lake level, which was at a near record low of 568.20 feet in November 1964, rose to a record high for August in 1969 of 572.34 feet in a short period of five years. The lake level has continued to

LAKE ERIE LEVELS



Base period: 1900-1980

fluctuate within this higher range rising to higher levels year after year and breaking previous record highs in all months in 1973. Since then the lake levels have continued to rise and have set new record highs in six of the past seven months.

The mean level for June was 573.70 feet (IGLD 1955), 0.26 foot above last month's mean level and 2.65 feet above normal. The lake level is 0.52 feet above the level observed for June 1985 and 5.10 feet above Low Water Datum.

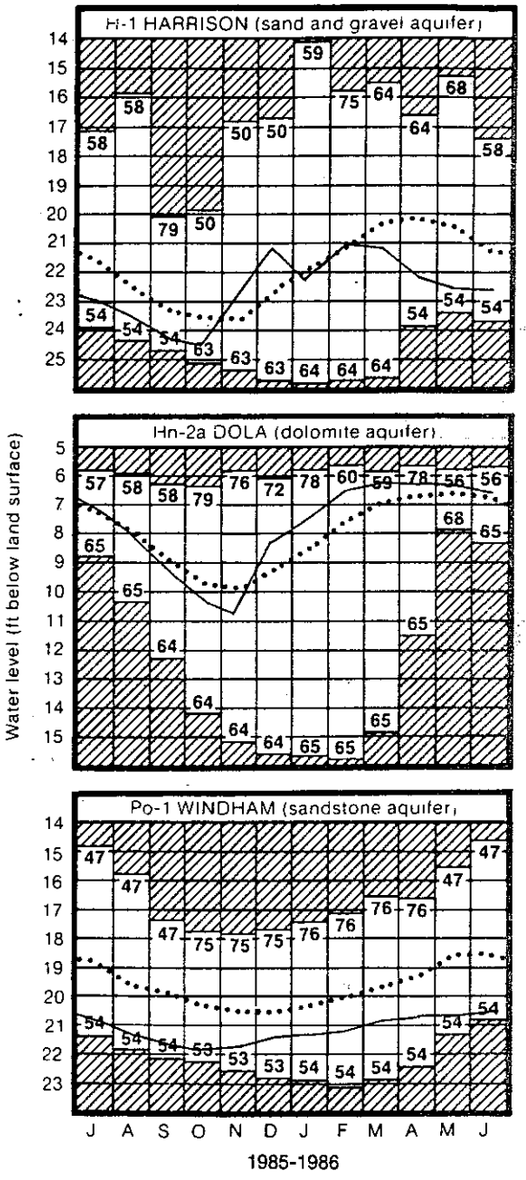
GROUND-WATER LEVELS for June declined in most aquifers in the state; the only exception was in the sandstone aquifers in the northeast where water levels rose in response to above normal precipitation in both May and June. Net declines from last month's mean levels were generally about equal to that usually observed in June. Water levels in consolidated aquifers in the northeastern portion of the state are expected to continue to rise in response to delayed recharge from the excessive precipitation.

Water levels are generally below those levels observed for June 1985 and are markedly below last year's levels in consolidated aquifers in the southern portion of the state. Observation well F-1 at Jasper Mills, Fayette County and Tu-1 near Strasburg, Tuscarawas County, reported record low levels for the month. Ground-water levels are noticeably below normal for most of the state. The only exceptions are in observation wells Hn-2a at Dola, Hardin County in the northwest and Fr-10 at the OSU Farms in Columbus. The significantly lower water levels in many areas of the state have not caused any serious problems thus far. However, ground-water users should monitor their systems closely.

SUMMARY

Precipitation for June was above normal for most of the state. Reservoir storage and streamflow remain near normal while ground-water storage is noticeably below normal. Lake Erie level set a new all-time record high of 573.70 feet (IGLD 1955). Water supply conditions throughout the state are once again favorable.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

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Lake Erie level data:
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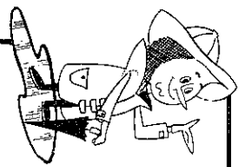

ODNR

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER
FOUNTAIN SQUARE
COLUMBUS, OHIO 43224

SUMMARY

Precipitation for July was above normal throughout most of the state for the second consecutive month. Reservoir storage, streamflow and ground-water storage have generally benefited from the above normal precipitation and remain in a favorable position in most areas. Lake Erie level decined slightly, but set a new record high for July.

NOTES AND COMMENTS

NEW PUBLICATIONS

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

THE GROUND-WATER RESOURCES OF MONTGOMERY COUNTY by James J. Schmidt.

THE GROUND-WATER RESOURCES OF CLERMONT COUNTY by Alfred C. Walker.

The Ground-Water Inventory Section of the Division of Water has produced ground-water resources maps for 58 of Ohio's 88 counties in a continuing program to map the entire state. (please refer to our April publication for a complete list of these maps). Staff hydrogeologists prepare these maps of regional ground-water characteristics based on interpretations of water well drilling records and local geology. The maps include well log data for many point locations representative of the specific areas. These data include typical depth, water-bearing formation and yield for wells in the area.

Ground-water resources maps can be used as a guide to locating ground-water supplies or as an aid to planning an expansion of present water supply systems. They are useful to homeowners, ground-water consultants, engineers, regional planners, developers and water well contractors.

By the end of 1986, the entire southwestern corner of Ohio is expected to by mapped and published. This area includes the entire Great Miami River Valley aquifer as well as the Mad River Valley aquifer, two important ground-water areas of the state.

The maps are available for $3.50, plus $.20 sales tax and $1.25 postage and handling fee for a total of $4.95, from the Publications Center, Ohio Department of Natural Resources, Fountain Square B-1, Columbus, OH 43224. Checks or money orders should be made payable to the ODNR Publications Center.

Ohio's Ground-Water Strategy Update

Ohio's Ground-Water Protection and Management Strategy will be available for public comment in late August/early September. Public hearings on the final strategy are scheduled to commence Oct. 1.

The strategy is designed as a plan or set of goals to help Ohio achieve the high level of protection needed to safeguard public health and welfare, protect Ohio's environment and preserve its economic vitality. The strategy emphasizes education and prevention of contamination rather than outlining costly ground-water cleanup methods.

For a copy of the Final Draft Strategy and a list of the public hearing dates and locations, contact: Ohio EPA, 361 E. Broad St., Columbus, Ohio 43215, ATTN: Tom Allen.

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OHIO DEPARTMENT OF NATURAL RESOURCES

Richard F. Celeste
Governor

Joseph J. Sommer
Director

Naturally OHIO the heart of it all!

JULY 1986

DIVISION OF WATER

MONTHLY WATER INVENTORY REPORT FOR OHIO

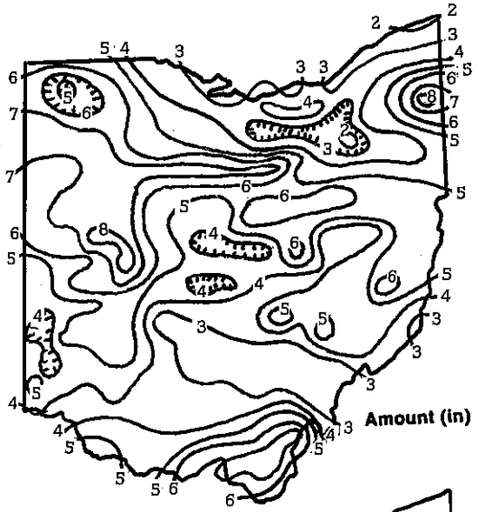
Compiled by Leonard J. Harstine and David H. Cashell

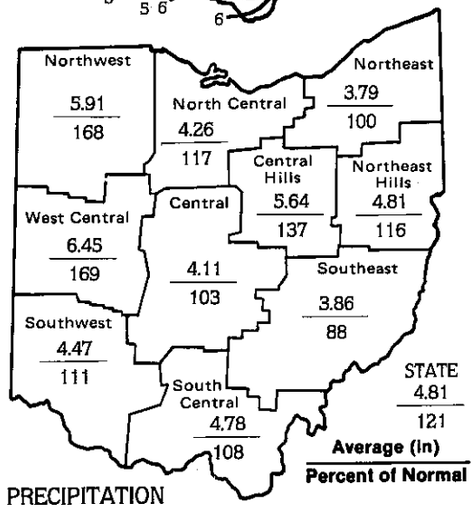
PRECIPITATION for July was above normal for the second consecutive month for most areas of the state; the only exception was the Southeast region where precipitation was below normal. The average for the state as a whole was 4.81 inches, 0.83 inch above normal. Regional averages ranged from 6.45 inches, 2.64 inches above normal, for the West Central region to 3.79 inches, 0.01 inch above normal, for the Northeast region; the Southeast region with 3.86 inches was 0.52 inch below normal. Mansfield Airport, Richland County, reported the greatest amount of precipitation for the month, 8.56 inches and the Akron city station reported the least amount, 1.45 inches.

The bulk of the month's precipitation fell during the first 16 days although isolated areas in the northwest, northeast and southern portions of the state received small amounts of rain the last week. The greatest portion of the month's rain fell on the 1st, 9th, 11th and 12th in typical heavy, summer-type thunderstorms. The precipitation in the first half of the month was most beneficial to both agriculture and water supplies in most areas. However, areas in the southern half of the state continue to be noticeably dry. Even so, deficiencies in general have not reached drought proportions as compared to previous drought periods.

Cumulative precipitation for the seven months of the 1986 calendar year continues to be below normal for the central and southern portions of the state; the northern portion continues to be above normal. The average for the state as a whole is 21.74 inches, 2.05 inches below normal. Regional averages range from 25.70 inches, 2.04 inches above normal, for the West Central region to 18.71 inches, 7.57 inches below normal, for the South Central region.

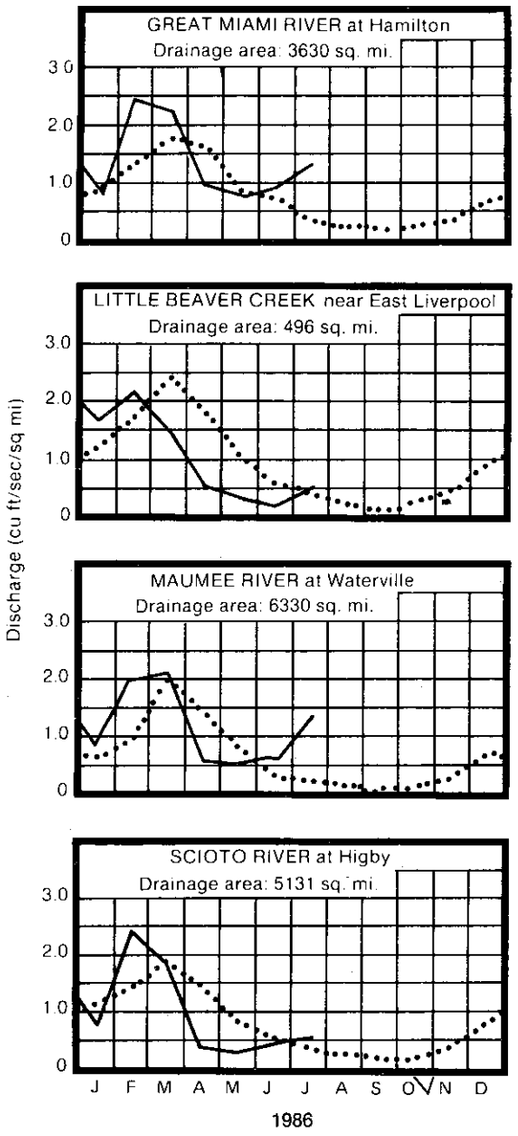
Cumulative precipitation for the 10 months of the 1986 water year continues to be noticeably above normal throughout most of the state; the only exception is in the South Central portion where cumulative precipitation has been below normal for the past four months. The average for the state as a whole is 35.88 inches, 4.59 inches above normal. Regional averages range from 39.34 inches, 8.18 inches above normal, for the Northeast region to 32.67 inches, 1.50 inches below normal, for the South Central region.





PRECIPITATION
JULY 1986

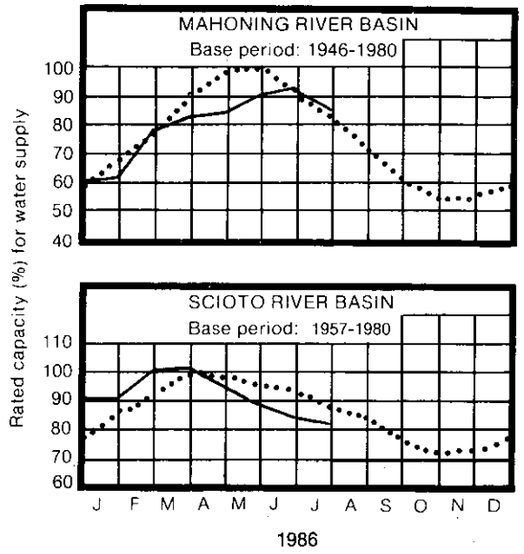
MEAN STREAM DISCHARGE



Base period for all streams: 1951-1980

normal ····· current ———

RESERVOIR STORAGE FOR WATER SUPPLY

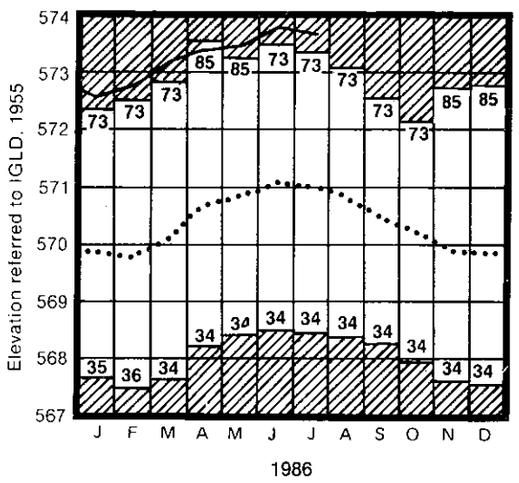


RESERVOIR STORAGE for water supply for July decreased slightly in both the Mahoning River and the Scioto River basins. Storage was slightly above normal for the Mahoning River basin reservoirs despite the draining of Milton Reservoir for repairs. Storage in the Scioto River basin remains slightly below normal. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 87 percent of rated capacity for water supply compared to 92 percent for last month and 89 percent for July 1985. Storage at the month's end for the Scioto basin index reservoirs was 83 percent of rated capacity for water supply compared to 84 percent for last month and for July 1985.

STREAMFLOW for July was excessive in most areas of the state; exceptions were in the east central and southeast where it was slightly below normal. Flows at the month's end were normal to excessive in the northern portion of the state and very low in the central and southern portions of the state. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 4,601 cfs, 342 percent; Little Beaver Creek, 260 cfs, 123 percent; Maumee River, 8,757 cfs, 653 percent; and Scioto River, 3,050 cfs, 181 percent.

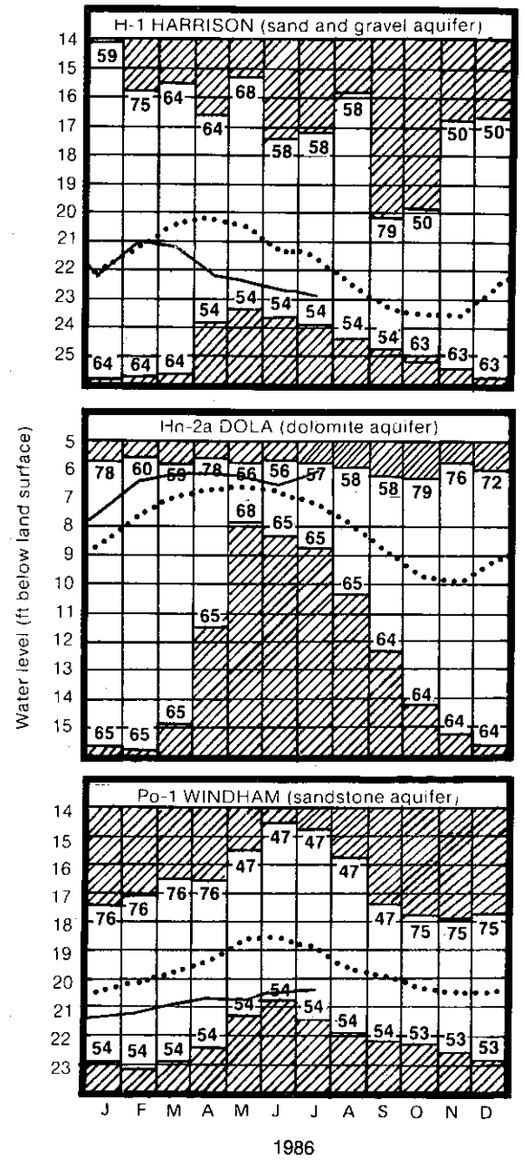
LAKE ERIE level for July declined slightly and set a new monthly record high for July—only 0.02 foot below the all-time record high set last month. This is the sixth time this year that a new monthly record high level has been established. The mean level for July was 573.68 feet (IGLD 1955), 0.02 foot below last month's mean level and 2.68 feet above normal. The lake level is 0.68 foot above the level observed for July 1985 and 5.08 feet above Low Water Datum.

LAKE ERIE LEVELS



GROUND-WATER LEVELS for July in general rose in consolidated aquifers in response to delayed recharge from above normal precipitation during the past two months while they declined slightly in unconsolidated aquifers. Water levels were above those levels observed last month in aquifers in the northern part of the state and below last month's levels in aquifers in the southern portion. Ground-water levels continue to be noticeably below normal in most areas of the state; exceptions are in index observation well Hn-2a at Dola, Hardin County and Fr-10 at the OSU Farm at Columbus where water levels continue to remain noticeably above normal. Ground-water levels throughout most of the state are generally above those levels observed in July 1985 except for the south central and southeast areas where they are noticeably below last year's levels. Observation well F-1 at West Rushville, Fairfield County, representing a consolidated aquifer, set a new record monthly low for July. There have been no reports of serious water problems thus far in the state despite the deficient precipitation in the southern portion.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

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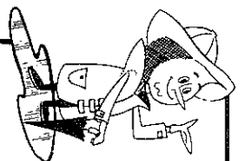

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1.79 inches above normal, for the Northeast Hills region. region to 35.90 inches, 1.65 inches below normal, for the South Central region. The Northwest region shows the greatest surplus for the water year, 8.24 inches above normal.

SUMMARY

Precipitation for August was noticeably below normal for most of the state. Reservoir storage and streamflow are about normal in the northern portion of the state and noticeably below normal in the southern portion. Groundwater storage is generally below normal throughout the state. Lake Erie level declined slightly and set a new monthly record high for August.

NOTES AND COMMENTS

NORTHEAST OHIO WATER PLAN UPDATE IN PROGRESS

The Water Planning Unit within the Division of Water is in the process of updating the public water supply portions of its five regional water plans. The Northwest Ohio Region's updated public water supply analysis was completed and a report published in June 1986. The Water Planning Unit has initiated the update for the Northeast Ohio Region, which encompasses the Little Beaver Creek and Mahoning, Ashtabula, Grand, Chagrin, Cuyahoga, Rocky and Black River basins. Updated projections of system water use will be made, projected water deficiencies will be identified and recommended projects to meet these deficiencies will be formulated. Alternatives for providing the needed water will also be analysed and presented.

The public water supply update is being undertaken in cooperation with the Ohio Environmental Protection Agency Division of Public Water Supply and with the assistance of the environmental engineering consulting firm of Havens and Emerson. It is scheduled for completion and publication during the first half of 1987.

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DIVISION OF WATER

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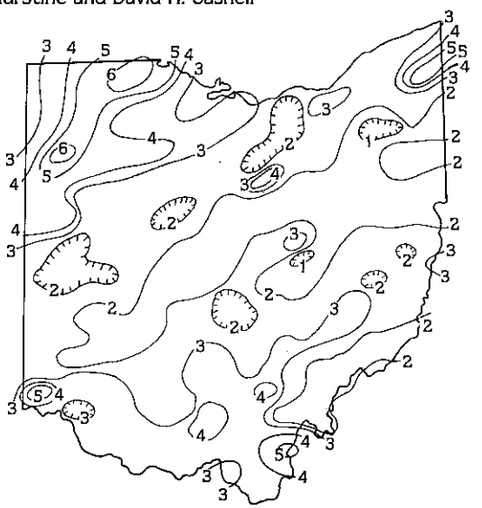
AUGUST 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell



PRECIPITATION for August was below normal throughout most of the state; the only exception was the Northwest region where precipitation was noticeably above normal. The average for the state as a whole was 2.61 inches, 0.39 inch below normal. Regional averages ranged from 4.55 inches, 6.79 inches above normal, for the Northwest region to 1.94 inches, 0.95 inch below normal, for the Northeast Hills region. Maumee State Forest near Swanton, Fulton County, reported the greatest amount of precipitation for the month, 6.79 inches and Kirwan Dam near Ravenna, Portage County, reported the least amount, 0.59 inch.

Although there was precipitation somewhere in the state during every week of the month, it was rather thin and widely scattered. Only a few widely scatter, heavy thunderstorms, which produced more than one-half inch of precipitation, were observed. Generally, most of the precipitation occurred the night of the 26th-27th when 1.0 inch or more fell throughout most areas of the state. The lack of precipitation during the month has begun to create some problems for water supplies in areas where the sources of water are marginal to begin with. Reports of reservoirs reaching critical low levels have been received, especially in the southeastern portion of the state where precipitation deficiencies are the greatest.

Cumulative precipitation for the 1986 calendar year continues to be below normal throughout the state; the only exceptions are in the Northwest, Northeast and West Central regions where it has been above normal for the past two months. The average for the state as a whole is 24.35 inches, 2.44 inches below normal. Regional averages range from 28.00 inches, 4.00 inches above normal, for the Northwest region to 21.50 inches, 5.65 inches below normal, for the Central region. Departures from normal for the calendar year range from 4.00 inches above normal for the Northwest region to 7.72 inches below normal for the South Central region.

Cumulative precipitation for the 1986 water year thus far remains above normal for most of the state; the only exception is the South Central region where it is below normal. The average for the state as a whole is 38.49 inches, 4.20 inches above normal. Regional averages range from

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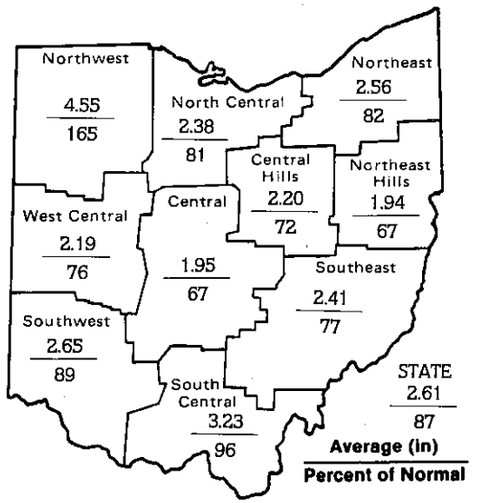
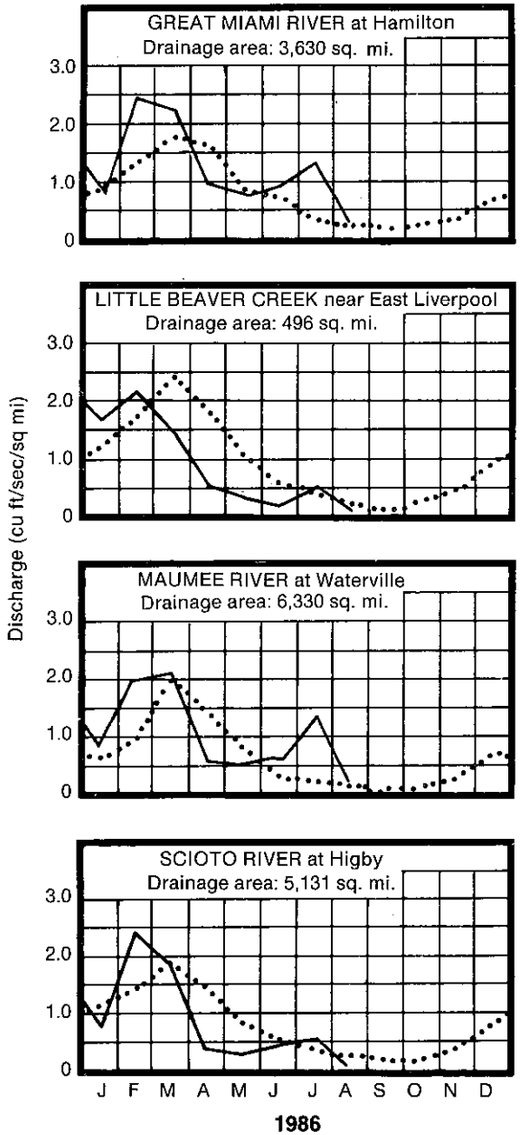


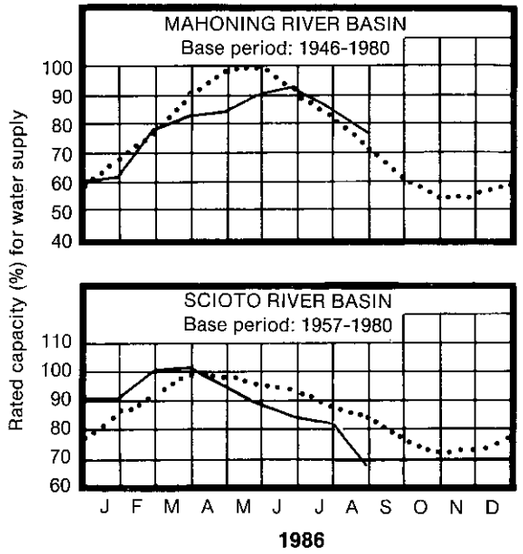
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current _____

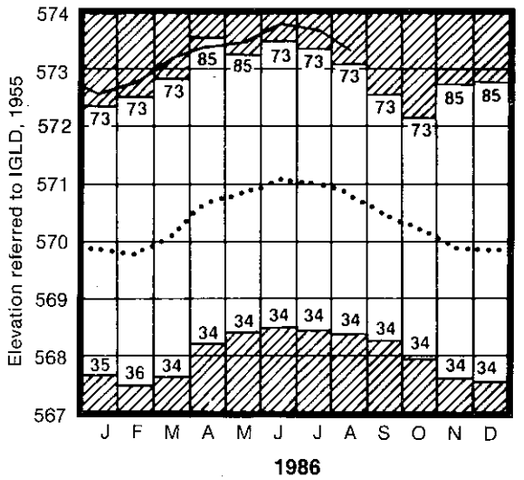
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply for August showed normal declines in the Mahoning River basin and marked declines in the Scioto River basin in response to the deficient precipitation. Storage in the Mahoning River basin reservoirs remained slightly above normal, while in the Scioto River basin reservoirs it was noticeably below normal. Reservoir storages for some communities in the south central and southeastern portion of the state are reaching critically low levels. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 77 percent of rated capacity for water supply compared to 87 percent for last month and 80 percent for August 1985. Storage at the month's end for the Scioto basin index reservoirs was 67 percent of rated capacity for water supply compared to 83 percent for last month and 75 percent for August 1985.

STREAMFLOW for August was below normal for most areas of the state; exceptions were in the northern portion of the state where it was above normal and noticeably above normal in the northwest where precipitation has been above normal during the past three months. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 928 cfs, 122 percent; Little Beaver Creek, 61.1 cfs, 56 percent; Maumee River, 1,718 cfs, 280 percent; and Scioto River, 687 cfs, 56 percent.

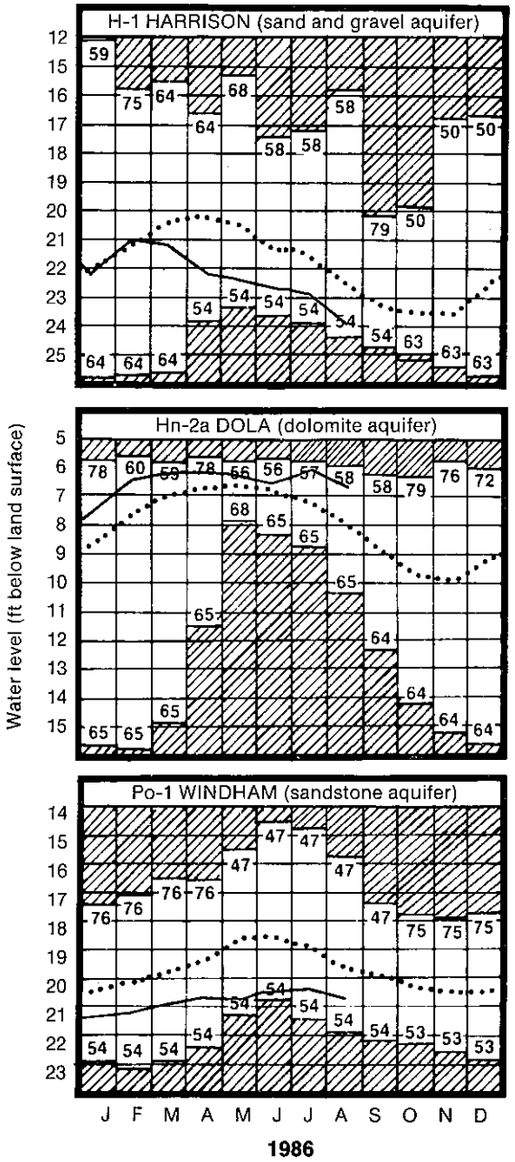
LAKE ERIE LEVELS



LAKE ERIE level for August declined slightly for the second consecutive month. However, it still set a new monthly record high for August which was 0.34 foot above the previous record set for August in 1973. New monthly record highs have been set for seven of the eight months of this year. The mean level for Lake Erie for August was 573.37 feet (IGLD 1955), 0.31 foot below last month's mean level and 2.56 feet above normal. The lake level is 0.70 foot above the level observed for August 1985 and 4.77 feet above Low Water Datum.

GROUND-WATER LEVELS for August showed noticeable declines throughout the state. Net declines from last month's levels were greater than usually observed. Water levels throughout the state were noticeably below those levels observed last month, but were above those levels observed in August 1985 in the northern portion of the state and below those levels observed last year in the southern portion. Generally, ground-water levels are below normal throughout the state; exceptions are in observation wells Hn-2a at Dola, Hardin County, and Fr-10 at OSU Farms in Columbus, which have been noticeably above normal for the past several years. Water levels in some aquifers in the southern portion of the state are approaching record low levels as a result of the drought conditions that have persisted there throughout the year.

GROUND-WATER LEVELS



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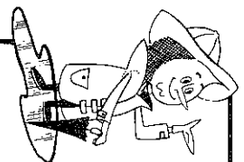
Lake Erie level data:
U.S. Corps of Engineers, Detroit District.



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OHIO DEPARTMENT OF NATURAL RESOURCES

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FOUNTAIN SQUARE

COLUMBUS, OHIO 43224

(continued from front page)

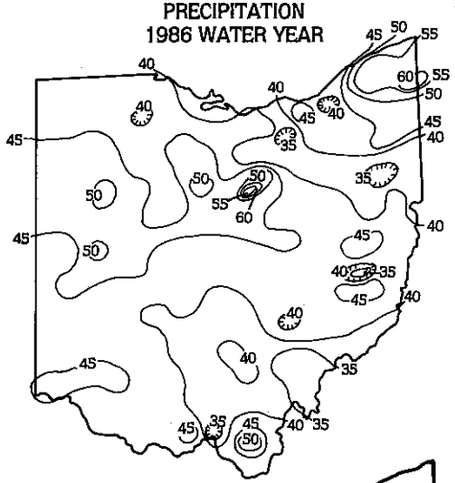
months of the recharge season, water supplies in general continued to show improvements. Precipitation during the water supply depletion period—May through September—was above normal in the northern half of the state and below normal in the southern half. Even so, the water supply situation continued to be favorable for most areas of the state. The only exception was in the southeastern part of the state where drought conditions persisted and some water supplies reach critical low levels.

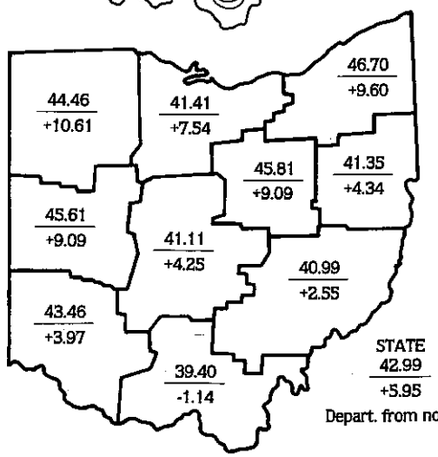
Errata: In the August report, the departure from normal for the Northwest region should have been 1.79 inches above normal, not 6.79 inches as reported.

SUMMARY

The water supply situation for the 1986 water year was generally favorable throughout the state. The only exceptions were in the south central and southeastern areas where some water supplies reached critical levels due to the drought conditions that persisted there. Precipitation for September was above normal throughout the state. Reservoir storage and streamflow improved while ground-water storage decreased slightly. Lake Erie level set a new monthly record high level for September.

PRECIPITATION
1986 WATER YEAR





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SEPTEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for September reached well above normal throughout the state. The average for the state as a whole was 4.50 inches, 1.75 inches above normal. Regional averages ranged from 6.01 inches, 3.02 inches above normal, for the Central Hills region to 3.28 inches, 0.55 inch above normal, for the Southeast region. LaRue, Marion County, reported the greatest amount of precipitation for the month, 8.64 inches and North Georgetown, Columbiana County, reported the least amount, 1.66 inches.

Substantial amounts of precipitation fell during every week of the month in most areas of the state. Storms producing more than one inch of rainfall occurred during the first, second and fourth week of the month in many areas of the state. However, a large portion of the eastern and southeastern areas along the Ohio River received less than 3.0 inches for the month. Although these rains helped to relieve some of the water problems in this area during the past several months, the water supply situation still remains serious for a few isolated cases. A large area in the central section of the state north of Dayton and Columbus received between 6.0 and 8.74 inches. About two-thirds of the state received more than 5.0 inches of rainfall for the month. Although the abundant precipitation during the month helped water supplies, it may create problems for fall harvesting.

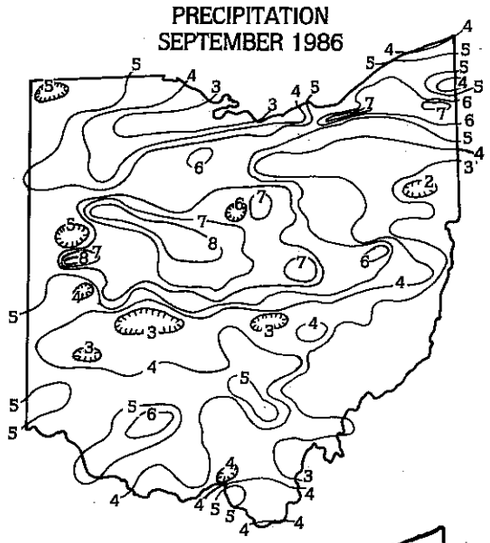
Cumulative precipitation for the 1986 calendar year thus far is above normal in the five northern regions while it is below normal in the five southern and eastern regions. Cumulative precipitation for the state as a whole is 28.85 inches, 0.69 inches below normal. Regional averages range from 33.03 inches, 6.37 inches above normal, for the Northwest region to 25.33 inches, 5.62 inches below normal, for the Southeast region; the South Central region shows the greatest departure for the calendar year, 7.21 inches below normal.

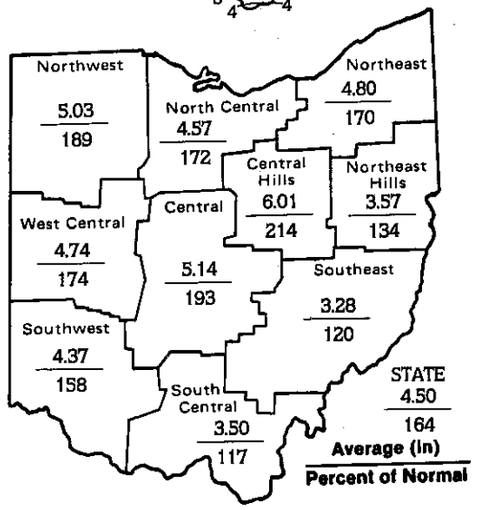
Precipitation for the 1986 water year, which began Oct. 1, 1985, and ended Sept. 30, 1986, was above normal throughout the year for most areas of the state. This was generally due to the record-breaking precipitation in November 1985. The average for the state as a whole was 42.99 inches, 5.95 inches above normal. Regional averages ranged from 46.70 inches, 9.60 inches above normal, for the Northeast region to 39.40 inches, 1.14 inches below normal, for the South Central region. Mansfield, Richland County, reported the greatest amount of precipitation for the water year, 62.54 inches and Amesville, Athens County, reported the least amount, 31.02 inches. An isohyetal map and regional averages and departures from normal for the 1986 water year appear on the back page of this report.

The water supply situation showed marked improvement during the first three months of the 1986 water year. This was primarily a result of the all-time record-breaking precipitation in November. Although precipitation was below normal during the remaining three

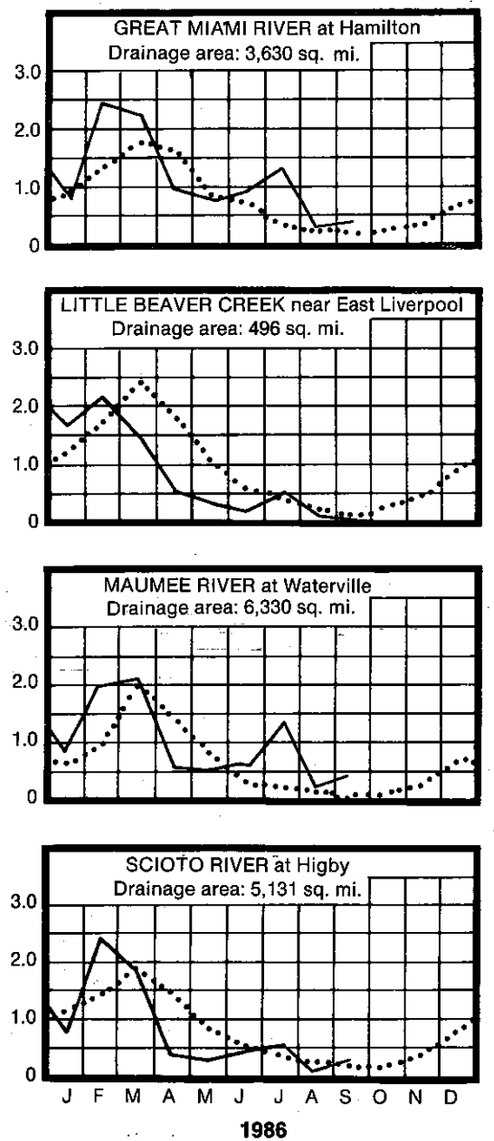
(continued on back)

PRECIPITATION
SEPTEMBER 1986





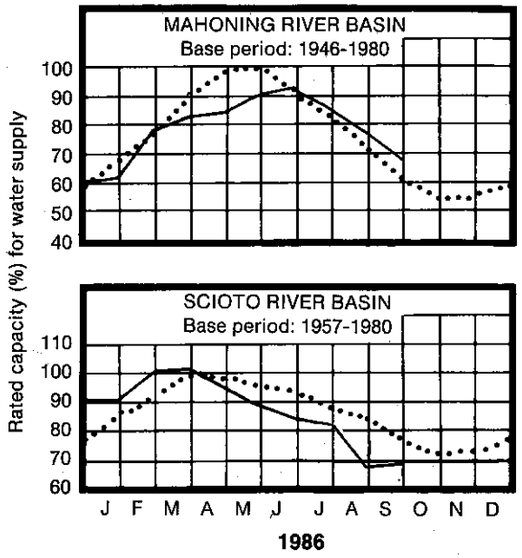
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current _____

RESERVOIR STORAGE FOR WATER SUPPLY

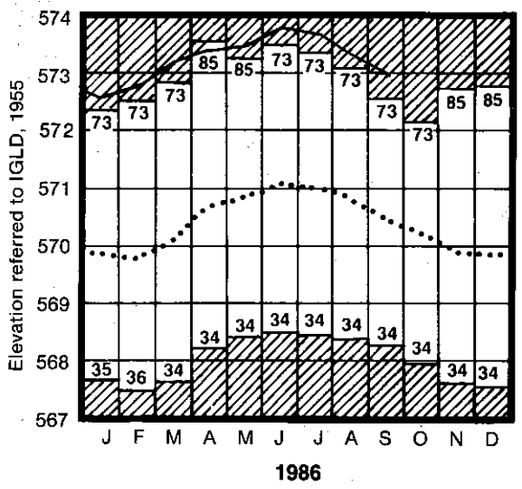


RESERVOIR STORAGE for water supply in September declined slightly in the Mahoning River basin and increased slightly at month end in the Scioto River basin in response to heavy rains during the last week of the month. Reservoir storage was above normal in the Mahoning River basin and below normal in the Scioto River basin. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 68 percent of rated capacity for water supply compared to 77 percent for last month and 69 percent for September 1985. Storage at the month's end for the Scioto basin index reservoirs was 70 percent of rated capacity for water supply compared to 67 percent for last month and 63 percent for September 1985. Reservoir storage for some communities in the south central and southeastern portions of the state benefited slightly from the heavy rains during the last week of the month. Reservoir storage for water supply was generally favorable throughout the water year; exceptions were in the southeastern part of the state where drought conditions persisted and critical levels were reported for some reservoirs.

STREAMFLOW for September was generally above normal to excessive throughout the state; the exception was in the eastern portion where it was normal to deficient. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 1,435 cfs, 215 percent; Little Beaver Creek, 42 cfs, 53 percent; Maumee River, 2,695 cfs, 691 percent; Scioto River, 1,685 cfs, 159 percent.

Streamflow was generally normal to excessive for the 1986 water year throughout most of the state; the only exception was for the eastern and southeastern portion where it was normal to deficient during the last six months. The above normal precipitation during the recharge season helped to maintain good flows throughout most of the water year. Mean discharge and percent of normal at the index gaging stations for the water year were: Great Miami River, 4,299 cfs, 129 percent; Little Beaver Creek, 543 cfs, 97 percent; Maumee River, 6,784 cfs, 131 percent; Scioto River, 5,089 cfs, 110 percent. Runoff and departures from normal for the index gaging stations for the water year were: Great Miami River, 15.76 inches, 3.52 inches above normal; Little Beaver Creek, 14.85 inches, 0.44 inch below normal; Maumee River, 14.41 inches, 3.42 inches above normal; Scioto River, 13.39 inches, 1.14 inches above normal.

LAKE ERIE LEVELS

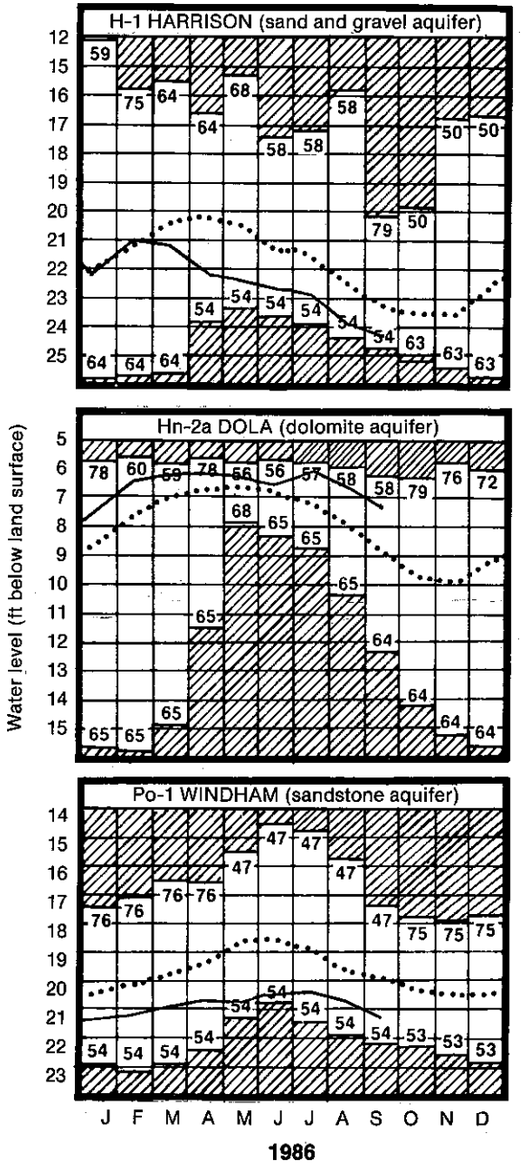


LAKE ERIE mean level for September declined slightly for the third consecutive month but set a new monthly record high for the fifth consecutive month. The mean level for September was 572.99 feet (IGLD 1955), 0.48 foot above the previous record set in September 1973. This is the lowest the lake level has been since March. Weekly records show that the lake level rose slightly during the last week of the month. Lake Erie set new record high levels for 10 of the 12 months during the 1986 water year. Only October and April failed to set record high levels.

The lake level for September is: 0.38 foot below last month's mean level, 0.56 foot above the level observed for September 1985, 2.47 feet above normal and 4.39 feet above Low Water Datum.

GROUND-WATER LEVELS for September continued to decline throughout the state despite the above normal precipitation. Water levels in all the index observation wells showed a net decline of about 0.50 foot below the mean levels for August. Generally, water levels are above those levels observed for September 1985 in consolidated aquifers and below in unconsolidated aquifers. Ground-water levels are generally below normal throughout the state; exceptions are in consolidated aquifers in the northwestern portion of the state where they are above normal. Even though the ground-water storage situation was generally favorable throughout the state during the 1986 water year, record low levels were observed in some areas during the summer months.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

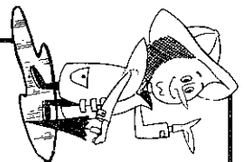
ACKNOWLEDGEMENTS

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. Corps of Engineers, Detroit District.



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NOTES AND COMMENTS

NEW PUBLICATIONS

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

THE GROUND-WATER RESOURCES OF BUTLER COUNTY by James J. Schmidt

THE GROUND-WATER RESOURCES OF HAMILTON COUNTY by Alfred C. Walker

THE GROUND-WATER RESOURCES OF LUCAS COUNTY by Michael Hallfrisch

THE GROUND-WATER RESOURCES OF PAULDING COUNTY by James M. Raab

THE GROUND-WATER RESOURCES OF PREBLE COUNTY by Alfred C. Walker

THE GROUND-WATER RESOURCES OF WOOD COUNTY by James M. Raab

The Ground-Water Resources Section of the Division of Water has produced ground-water resources maps for 64 of Ohio's 88 counties in a continuing program to map the entire state. Staff hydrogeologists prepare these maps of regional ground-water characteristics based on interpretations of water well drilling records and local geology. The maps include well log data for many point locations representative of the specific areas. These data include typical depth, water-bearing formation and yield for wells in the area.

Ground-Water resources maps can be used as a guide to locating ground-water supplies or as an aid to planning and expansion of present water supply systems. They are useful to homeowners, ground-water consultants, engineers, regional planners, developers and water well contractors. These maps are available for the following counties:

Allen	Hardin	Morrow
Ashland	Harrison	Ottawa
Ashtabula	Henry	Paulding
Athens	Holmes	Pickaway
Auglaize	Huron	Portage
Butler	Jackson	Preble
Champaign	Knox	Richland
Clark	Lake	Ross
Clermont	Lawrence	Sandusky
Columbiana	Licking	Seneca
Crawford	Logan	Shelby
Cuyahoga	Lorain	Stark
Defiance	Lucas	Summit
Delaware	Mahoning	Trumbull
Erie	Marion	Union
Fairfield	Medina	Van Wert
Franklin	Meigs	Vinton
Gallia	Mercer	Warren
Geauga	Miami	Washington
Hancock	Montgomery	Wayne
Hamilton	Morgan	Wood
		Wyandot

The maps are available for $3.50, plus $.20 sales tax and $1.25 postage and handling fee for a total of $4.95, from the Publications Center, Ohio Department of Natural Resources, Fountain Square B-1, Columbus, Ohio 43224. Checks or money orders should be made payable to the ODNR Publications Center.

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OCTOBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

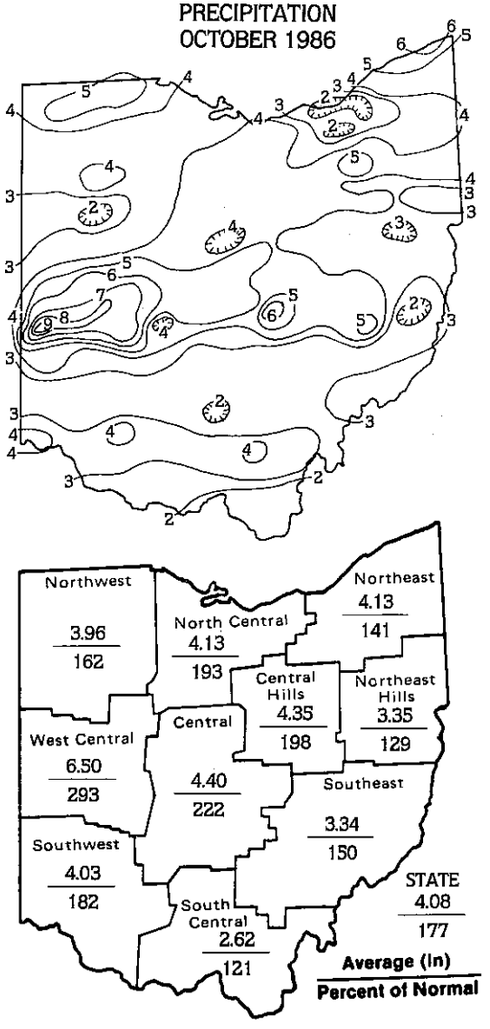
PRECIPITATION for October was noticeably above normal throughout the state. This is the second consecutive month in which precipitation has been well above normal. The average for the state as a whole was 4.08 inches, 1.77 inches above normal. Regional averages ranged from 6.50 inches, 4.28 inches above normal, for the West Central region to 2.62 inches, 0.46 inch above normal, for the South Central region. West Manchester, Preble County, reported the greatest amount of precipitation for the month, 9.88 inches, and Barkcamp State Park, Belmont County, reported the least amount, 1.06 inches.

Substantial amounts of precipitation fell in most areas of the state during October; for the west central and central areas it was excessive. The bulk of the month's rainfall fell during the first five days. During this period, the central portion received about 4.5 inches while the west central portion reported 4 to 8 inches. While there was no serious flooding, these heavy rains produced some record-high streamflows for October. About one-half of the state received between 4 to 8 inches of precipitation for the month. A wide band across the southern portion received between 2 and 3 inches while a few scattered areas received between 1 and 2 inches. The excessive precipitation has been most beneficial for water supplies throughout the state.

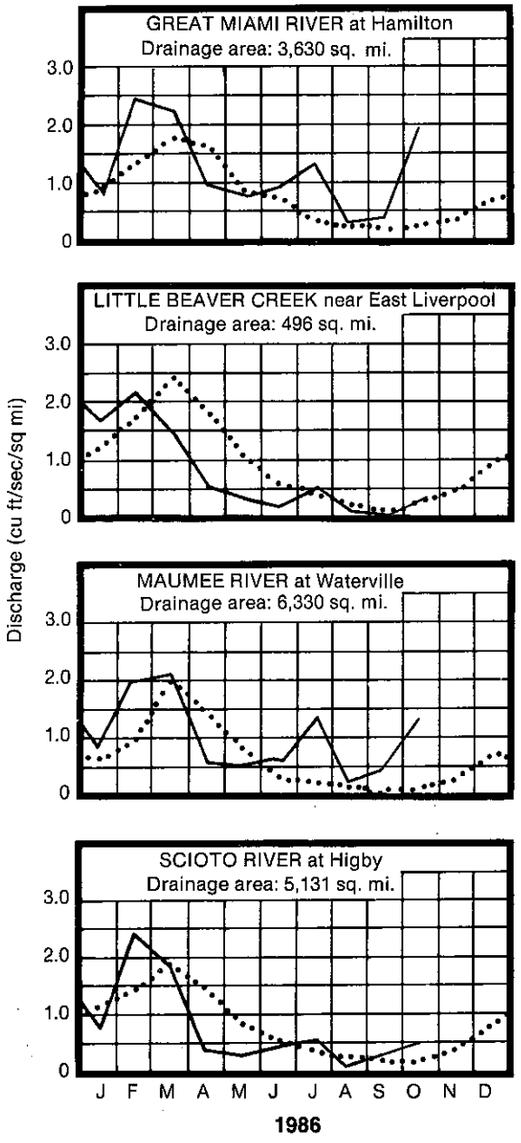
Cumulative precipitation for the 1986 calendar year thus far is generally above normal in the northern half of the state and below normal in the southern half. The average for the state as a whole is 32.93 inches, 1.08 inches above normal. Regional averages range from 39.13 inches, 7.63 inches above normal, for the West Central region to 28.06 inches, 6.75 inches below normal, for the South Central region.

This is the first month of the 1987 water year which began Oct. 1, 1986, and ends Sept. 30, 1987. The water year is a common reference period for both surface and ground-water supplies. October is generally considered the beginning of the new recharge season for water supplies. The above normal precipitation in both September and October should help to begin the new recharge season in excellent shape.

PRECIPITATION
OCTOBER 1986



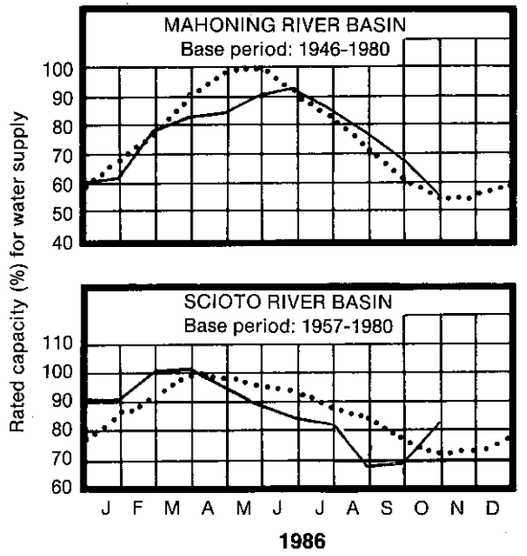
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current _____

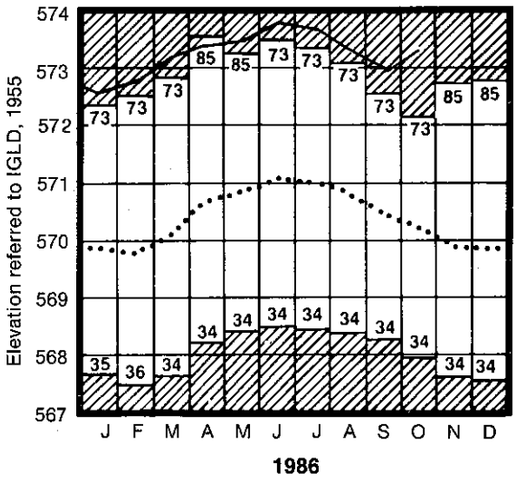
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply for October showed a normal declining trend in the Mahoning River basin while in the Scioto River basin it increased in response to the excessive precipitation in the upper portion of the basin. Reservoir storage in the Mahoning River basin was normal for October at the month's end while it was above normal in the Scioto River basin reservoirs. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 55 percent of rated capacity for water supply compared to 68 percent for last month and 61 percent for October 1985. Storage at the month's end for the Scioto basin index reservoirs was 83 percent of rated capacity for water supply compared to 70 percent for last month and 53 percent for October 1985.

STREAMFLOW for October was generally excessive throughout the state; the exception was in the east central portion where it was slightly above normal. The heavy precipitation during the first week of the month resulted in some record-high flows in the central and western portions of the state. The Scioto River gauge at Higby recorded the highest mean monthly discharge for October and the highest maximum daily flow for October for the period of record. The Great Miami River gauge at Hamilton recorded the second highest mean monthly October flow for its period of record. High flows were also observed in the Tiffin River and the Cuyahoga River. Flows remained noticeably above normal at the month's end. Mean discharge and percent of normal at the index gauging stations were: Great Miami River, 6,703 cfs, 989 percent; Little Beaver Creek, 125 cfs, 115 percent; Maumee River, 8,288 cfs, 1,493 percent; and Scioto River, 5,080 cfs, 668 percent.

LAKE ERIE LEVELS



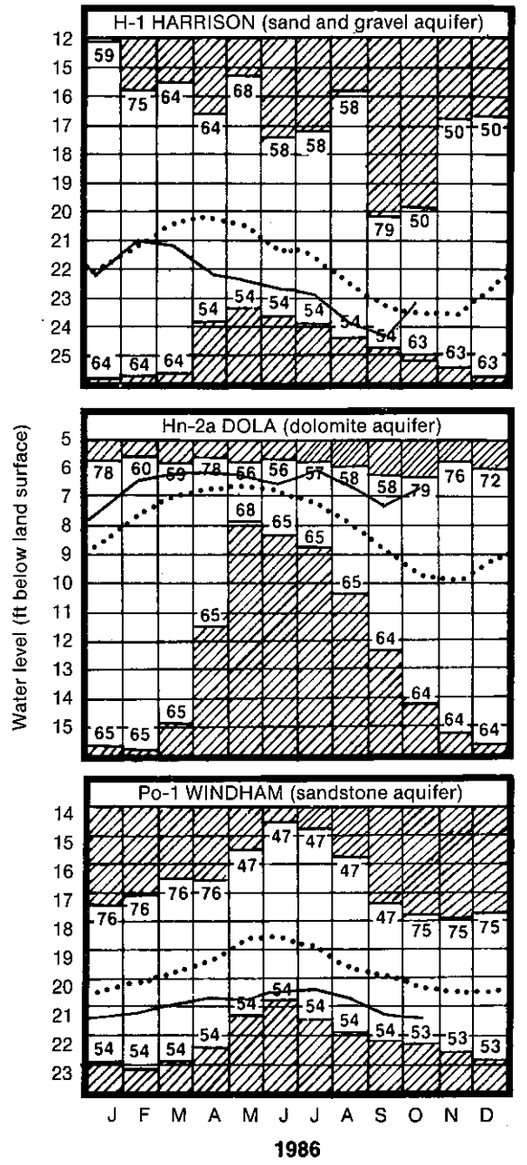
LAKE ERIE mean level showed a significant rise for October, whereas it usually continues to decline through January. Lake Erie also set a new record-high for October that was 1.20 feet above the previous record set in 1973. The mean level for October was 573.34 feet (IGLD 1955), 0.35 foot above last month's mean level and 3.14 feet above normal. The lake level is 1.30 feet above the level observed for October 1985 and 4.74 feet above low water datum.

GROUND-WATER LEVELS for October rose during the month in response to recharge from the above normal precipitation during the past two months, whereas they usually continue to decline. Water levels showed net rises in all the index wells except Po-1 at Windham in the northeast, which showed a net decline. Ground-water levels are generally above those levels observed in October 1985 and are above normal in the northern portion of the state where precipitation has been above normal and below normal in the southern portion where precipitation has been deficient. Exceptions to this are in unconsolidated aquifers which respond to recharge much quicker than do consolidated aquifers. Recharge to ground-water storage is off to a good beginning for the new recharge season as a result of the excessive precipitation during the past two months.

SUMMARY

Precipitation for October was noticeably above normal throughout most of the state. Reservoir storage, streamflow and ground-water storage improved in response to recharge from the above normal precipitation in both September and October. Lake Erie level rose and set a new record-high for October whereas it usually declines. Recharge to water supplies is off to a good start for the first month of the new 1987 water year.

GROUND-WATER LEVELS



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NOVEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

SUMMARY

Precipitation for November was above normal throughout most of the state. Reservoir storage, streamflow and ground-water storage showed some improvement in most areas of the state. Lake Erie level declined slightly but set a new record high for November.

NOTES AND COMMENTS

WINTER STORMS PRODUCE HAVOC ON LAKE ERIE

Extremely high lake levels combined with intense winds can cause serious problems for homeowners along Lake Erie. Because of the Lake's southwest-northeast axis, storms out of the northeast can and have caused severe flooding, erosion and subsequent related damage. As the winter storm season approaches, homeowners and area residents are already feeling the impacts. Reports from northwest Ohio and southeast Michigan indicate some homeowners have been temporarily evacuated due to storm events. In Ottawa County, portions of several state highways have been closed temporarily because of high water. To date, flooding has only caused inconvenience to area residents; but, as the season progresses, potential for additional damage exists. As a result of intense winds, gusting up to 45 miles per hour during the first week of December, the already record-high lake level was pushed even higher. The lake level at Toledo came within one foot of the record 576.68 feet (IGLD, 1955).

Record lake levels and associated high winds are also causing problems in northeast Ohio. Strong waves continue to undercut the shoreline. While northwest Ohio may temporarily lose a road because of flooding, northeast Ohio may lose a road permanently as a result of slumping bluffs. Such is the danger that faces parts of State Route 531 in Ashtabula County. As winter continues, everyone on the lake will have to take extra precautions and, as the weather service cautions, *be prepared to move.*

WMAO Publishes *Ohio Water Firsts*

The Water Management Association of Ohio recently published *Ohio Water Firsts* and has distributed about 3,000 copies of the book to schools, libraries, historical societies and newspapers around the state. The 90-page volume, written by Sherman L. "Jack" Frost and the late Wayne S. Nichols and edited by Bea Cornelius, features 28 stories about the people and events that made water history in Ohio.

A limited number of copies of the book are available in hardbound or soft cover. To order, contact Beth Clark at the Water Management Association of Ohio office at 445 King Ave., Columbus, OH 43201. The telephone number is (614) 424-6106.

ACKNOWLEDGEMENTS

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Streamflow and reservoir storage data:
U.S. Geological Survey, Water Resources Division.

Lake Erie level data:
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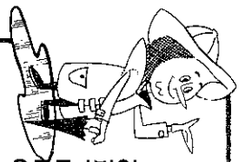

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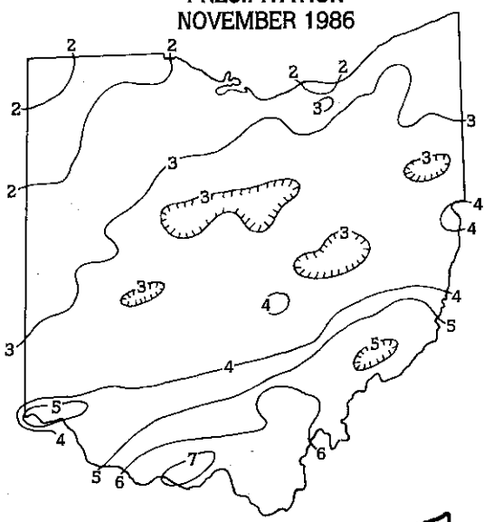
PRECIPITATION for November was above normal throughout most of the state; exceptions were in the Northwest and Northeast regions where it was below normal. This is the third consecutive month in which precipitation has been above normal. The average for the state as a whole was 3.52 inches, 0.78 inch above normal. Regional averages ranged from 5.76 inches, 2.89 inches above normal, for the South Central region to 2.02 inches, 0.54 inch below normal, for the Northwest region. Shawnee State Forest, Scioto County, reported the greatest amount of precipitation for the month, 7.26 inches, and Grover Hill, Paulding County, reported the least amount, 1.44 inches.

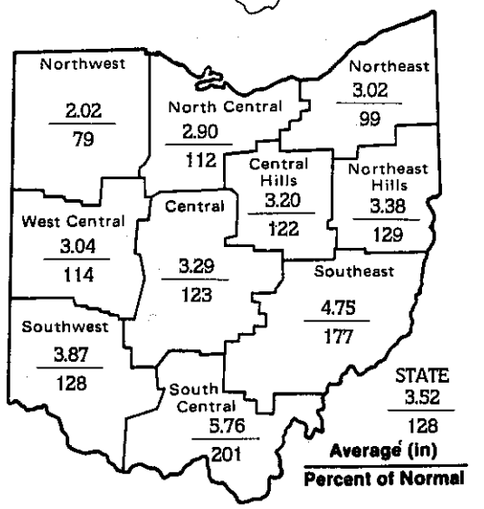
There was precipitation during every week of the month. Greatest amounts fell during the second and fourth weeks in the southern portion of the state, at which time more than one inch fell at many stations. Generally more than two-thirds of the state received between 3 and 6.5 inches of precipitation for the month; the remainder received between 1 and 3 inches. Precipitation was heaviest in the southern portion of the state diminishing to the north. The heavy precipitation in the southern portion was most beneficial to water supplies that had reached critical stages in some cases due to the persistent drought conditions.

Cumulative precipitation for the 1986 calendar year thus far is generally above normal in the northern portion of the state and below normal in the southern portion. The average for the state as a whole is 36.45 inches, 1.86 inches above normal. Regional averages range from 42.17 inches, 8.01 inches above normal, for the West Central region to 32.17 inches, 2.42 inches below normal, for the Northeast Hills region; the South Central and Southeast regions still remain 3.86 and 2.45 inches below normal respectively..

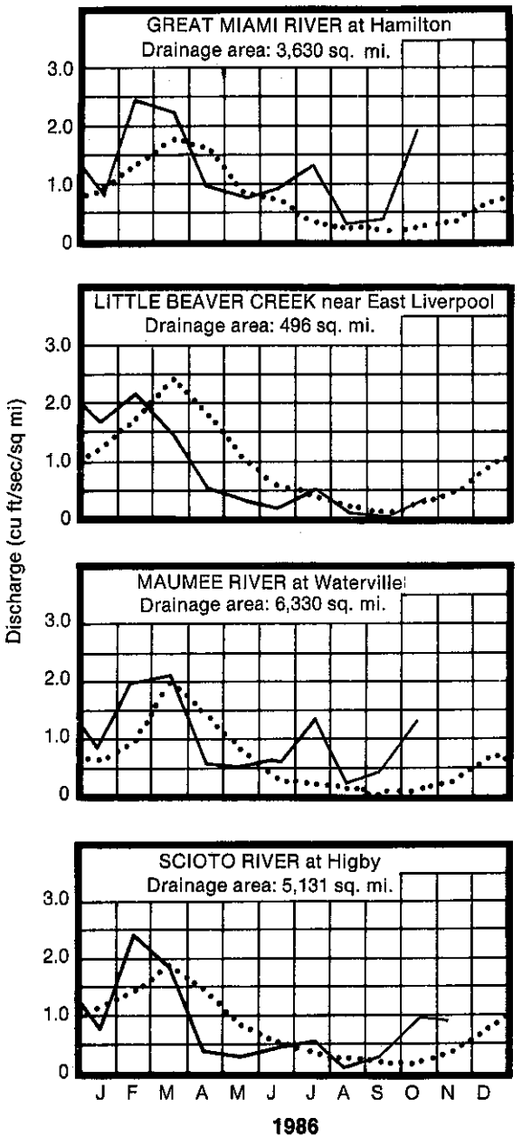
Cumulative precipitation for the first two months of the 1987 water year is above normal throughout the state. The average for the state as a whole is 7.60 inches, 2.55 inches above normal. Regional averages range from 9.54 inches, 4.66 inches above normal, for the West Central region to 5.98 inches, 0.97 inch above normal, for the Northwest region. The new water year is off to a good start with abundant precipitation.

PRECIPITATION
NOVEMBER 1986





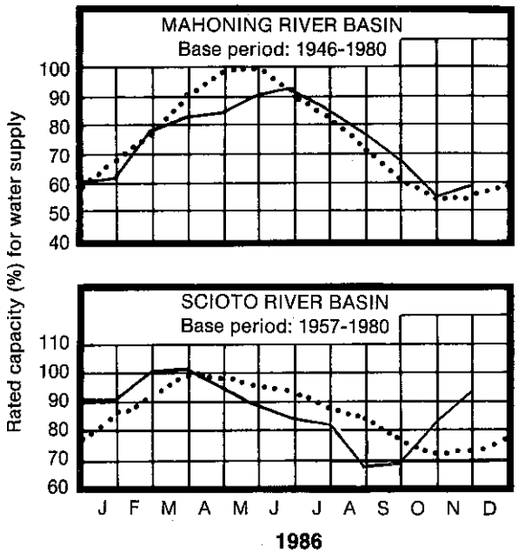
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current _____

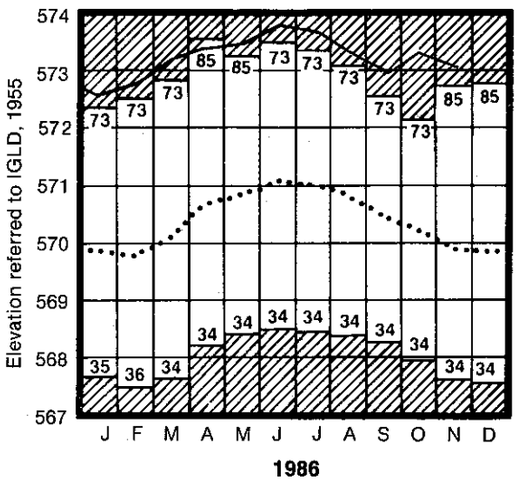
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply increased in both the Mahoning River and the Scioto River basins. Storage in the Mahoning River basin was slightly above normal while in the Scioto River basin it was noticeably above normal. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 58 percent of rated capacity for water supply compared to 55 percent for last month and 74 percent for November 1985. Storage at the month's end for the Scioto basin index reservoirs was 93 percent of rated capacity for water supply compared to 83 percent for last month and 95 percent for November 1985.

STREAMFLOW for November continued to be excessive in the southwestern and south central portions of the state and was normal elsewhere. There was considerable flooding in low-lying areas in many parts of the state following the heavy storms during the second and fourth weeks of the month. However, no serious floods were reported. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 3,978 cfs, 362 percent; Little Beaver Creek, 281 cfs, 139 percent; Maumee River, 4,196 cfs, 260 percent; and Scioto River, 4,363 cfs, 269 percent.

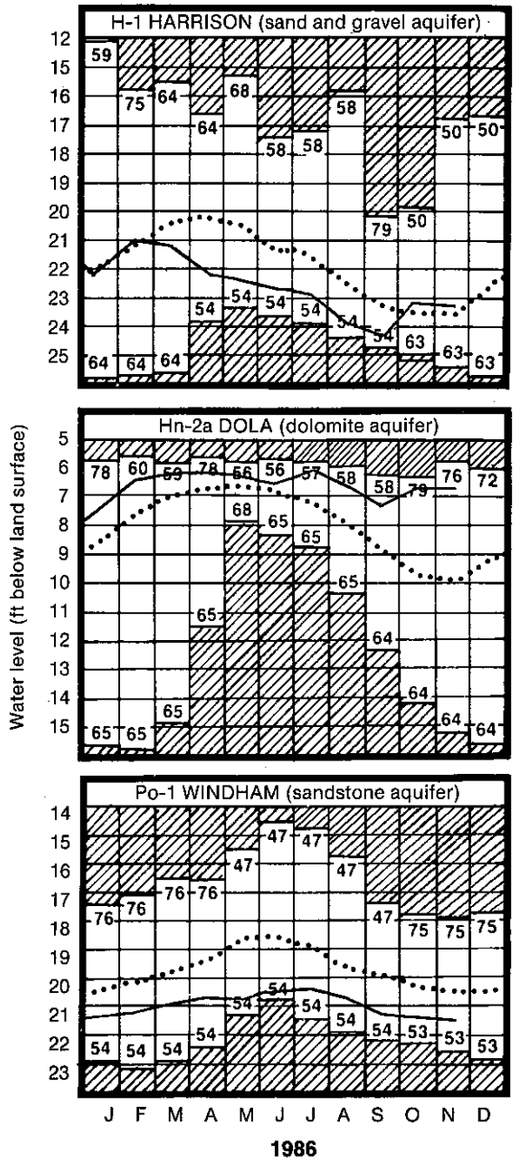
LAKE ERIE LEVELS



LAKE ERIE level for November declined slightly but still set a new record high for November 0.49 foot above the previous record set in 1985. Considerable flooding was experienced along the lake's western shoreline as a result of strong easterly winds that pushed the western edge of Lake Erie to near record levels. The mean level for November was 573.05 feet (IGLD-1955), 0.29 foot below last month's mean level, 3.13 feet above normal, and 4.45 feet above Low Water Datum.

GROUND-WATER LEVELS for November were fairly stable during the first half of the month and rose slightly during the second half in response to recharge from the above normal precipitation. About half the index wells showed net rises from last month's levels while the remaining index wells showed slight net declines. Generally water levels are above those levels observed last year in wells in the northern portion of the state and below those levels observed last year in the southern portion of the state. Ground-water levels still remain below normal in many areas of the state. It is hoped that recharge to ground water will increase substantially during the ensuing months in response to the above normal precipitation during the past two months.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

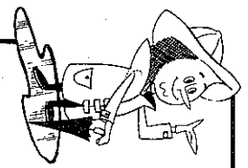
ACKNOWLEDGEMENTS

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. Corps of Engineers, Detroit District.



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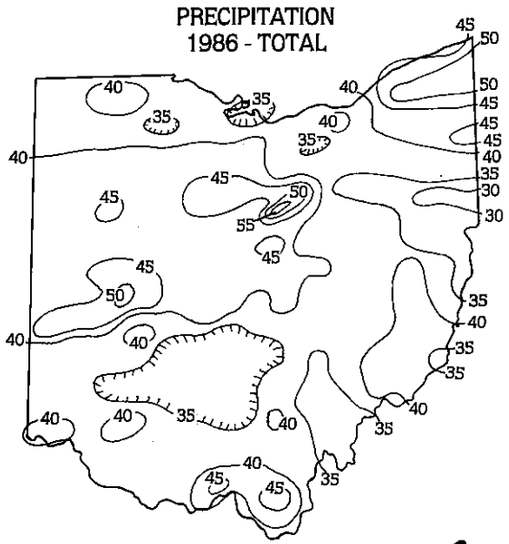
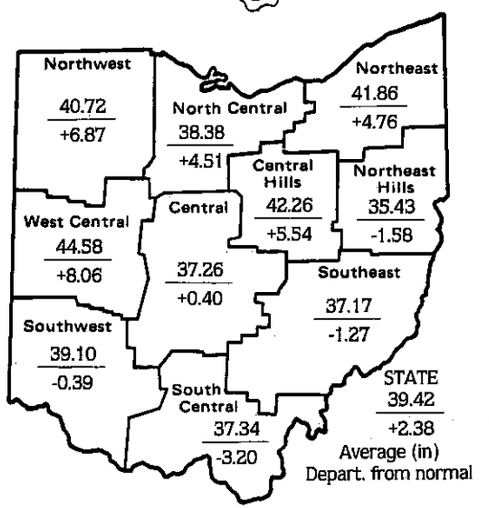
(continued from front)

West Central region to 7.69 inches, 0.50 inch above normal, for the Northwest region. Generally, the greatest surpluses of precipitation thus far in this water year are in areas of greatest deficiencies during the past year.

SUMMARY

Precipitation for December was above normal for most areas of the state. Streamflow, reservoir storage and ground-water storage have improved and are above normal throughout most of the state. Lake Erie level continued to rise and set a new record high for December.





ODNR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Richard F. Celeste
Governor

Joseph J. Sommer
Director

Naturally OHIO the heart of it all!

DECEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for December was above normal for most of the state. Exceptions were in the Northwest and Southwest regions where precipitation was slightly below normal. The average for the state as a whole was 2.97 inches, 0.52 inch above normal. Regional averages ranged from 3.75 inches, 1.18 inches above normal, for the Southeast region to 1.71 inches, 0.47 inch below normal, for the Northwest region. Shawnee Forest, Scioto County, reported the greatest amount of precipitation for the month, 5.13 inches and Hicksville, Defiance County, reported the least amount, 1.47 inches.

The bulk of the month's precipitation fell in the form of rain during the first week. Small amounts of rain fell during the remainder of the month, including in many cases only traces of snow. Thus, the last three weeks of the month were unusually dry. Snow for this December was sparse; even Chardon, the snow capital of Ohio, reported only 4.5 inches, 20 percent of normal. Generally, most areas of the state received the least amount of snow ever for the month. Generally, the eastern half of the state received 3 to 5 inches of precipitation while the western half received 1.5 to 3 inches. The above normal precipitation during the last week of November and the first week of December was most beneficial to water supplies.

Precipitation for the 1986 calendar year was generally above normal for the northern half of the state and below normal for the southern half. Precipitation for the calendar year averaged 39.42 inches, 2.38 inches above normal. Regional averages ranged from 44.58 inches, 8.06 inches above normal, for the West Central region to 35.43 inches, 1.58 inches below normal, for the Northeast Hills region. Mansfield Airport, Richland County, reported the greatest amount of precipitation for the year, 56.31 inches and North Georgetown, Columbiana County, reported the least amount, 27.37 inches. An isohyetal map and departures from normal appear on the last page of this report.

Precipitation was noticeably below normal throughout the state during the first six months and above normal during the last six months of the year. However, in the southern portion of the state, the above normal precipitation in the latter part of the year was not enough to overcome the noticeable deficiencies of the first six months. Drought conditions persisted late into the fall in the south central and southeastern portions of the state. For the most part, it was a good year for water supplies. Some water problems were experienced in the southeastern portion of the state during the late summer and early fall.

Cumulative precipitation for the first three months of the 1987 water year is above normal throughout the state. The average for the state as a whole is 10.57 inches, 3.07 inches above normal. Regional averages range from 11.95 inches, 4.71 inches above normal, for the

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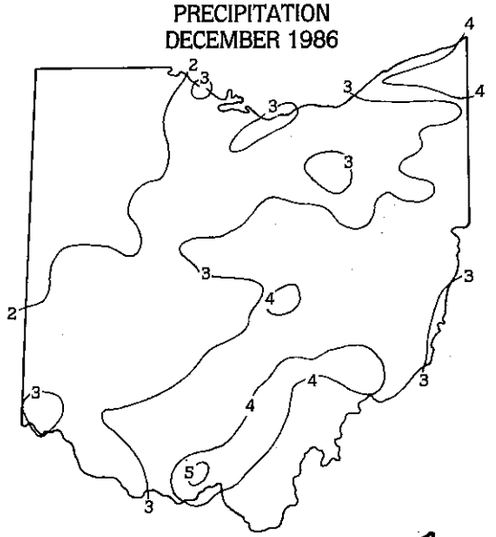
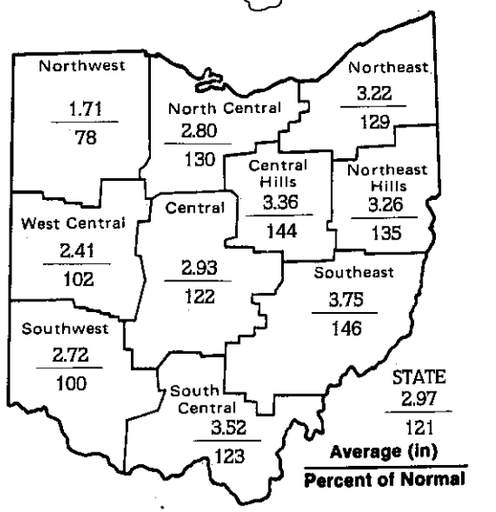
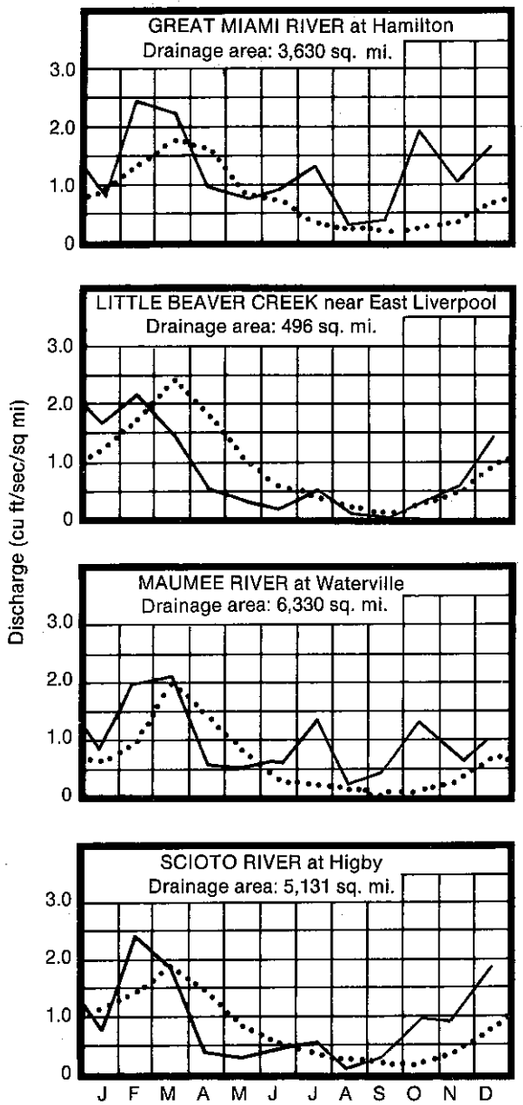




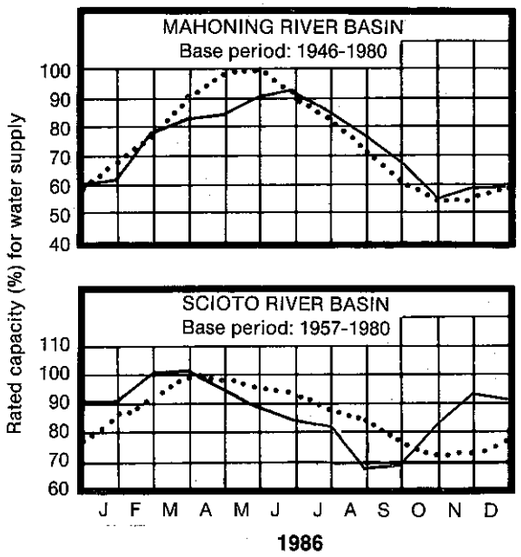
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current _____

RESERVOIR STORAGE FOR WATER SUPPLY

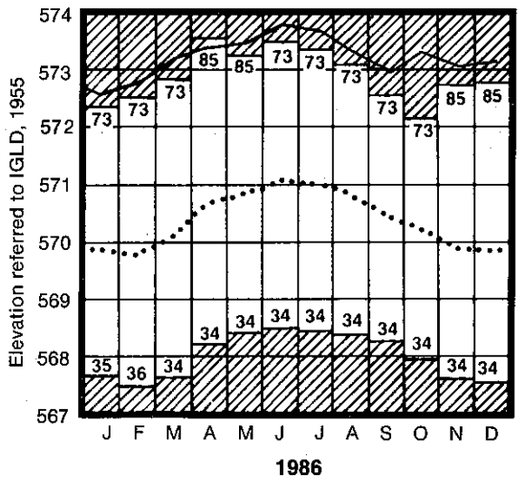


RESERVOIR STORAGE for water supply for December increased slightly in the Mahoning River basin and decreased in the Scioto River basin. Reservoir storage for the Mahoning River basin has remained normal since July despite the draining of Milton reservoir for repairs. Storage in the Scioto River basin has continued to be noticeably above normal since October. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 59 percent of rated capacity for water supply compared to 58 percent for last month and 58 percent for December 1985. Storage at the month's end for the Scioto basin index reservoirs was 91 percent of rated capacity for water supply compared to 93 percent for last month and 91 percent for December 1985.

STREAMFLOW for December was generally normal throughout the state; exceptions were in the south central and southwestern portions where flows continue to be excessive in response to heavy rains in the latter part of November and the first week of this month. Flows in the south central and southwestern portions of the state have been above normal to excessive since September in response to the generally above normal precipitation in these areas since July. Mean discharge and percent of normal for the index gaging stations were: Great Miami River, 6,163 cfs, 259 percent; Little Beaver Creek, 718 cfs, 154 percent; Maumee River, 6,343 cfs, 143 percent; and Scioto River, 9,229 cfs, 228 percent.

LAKE ERIE level rose slightly during the month and set a new record high for December, exceeding the previous record set in 1985

LAKE ERIE LEVELS

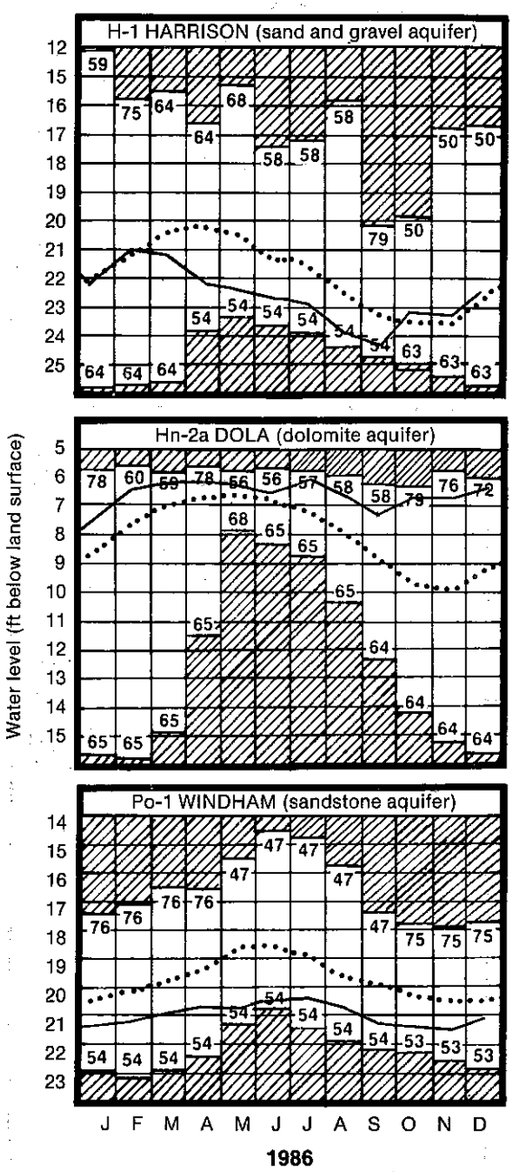


by 0.44 foot. The lake continues to rise during a period when it is usually declining. This is the eighth consecutive month for which a new record monthly high level has been set for Lake Erie. The mean level for December was 573.18 feet (IGLD 1955), 0.13 foot above last month's mean level 3.33 feet above normal and 4.58 feet above Low Water Datum. The high lake levels continue to cause considerable problems along the shoreline.

GROUND-WATER LEVELS for December rose significantly throughout the state in response to excellent recharge from the above normal precipitation in the latter part of November and the first week of December. Water levels in unconsolidated aquifers adjacent to streams showed significant declines during the last two weeks of December in response to the lack of recharge. Net rises from November's levels were significantly greater than usually observed for December. Ground-water levels are generally 1 to 3 feet below those levels observed for December 1985 in most areas of the state; exceptions to this are in consolidated aquifers in the northern portion of the state, which experienced above normal precipitation for most of the year.

Ground-water levels are generally above normal for December; the only exceptions are in observation wells Po-1 at Windham, Portage County, and Tu-1 near Strasburg, Tuscarawas County, where water levels are slightly below normal. The above normal precipitation during the past three or four months has provided for excellent recharge to water supplies throughout the state. The ground-water supply situation is much improved over that observed during the past several months.

GROUND-WATER LEVELS



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