



MONTHLY WATER INVENTORY REPORT FOR OHIO

September 1999

<http://www.dnr.state.oh.us/odnr/water/pubs/newsletters/mwirmain.html>

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PRECIPITATION during September was below normal in most areas of the state, but above normal in northeastern and parts of north-central Ohio. The state average was 1.94 inches, 1.06 inches below normal. Regional averages ranged from 3.80 inches, 0.62 inch above normal, for the Northeast Region to 1.07 inches, 1.86 inches below normal, for the West Central Region. This was the 11th driest September of record for the Southwest and West Central regions and the 12th driest for the South Central Region. Chardon (Geauga County) reported the greatest amount of rain for September, 7.61 inches. Piqua (Miami County) reported the least amount, 0.59 inch.

Precipitation during September was very light and spotty for the first 28 days of the month. Several areas were extremely dry during this time, receiving less than 0.25 inch. Some scattered showers occurred on September 6-7 as remnants from Hurricane Dennis moved from the east into Ohio. Most of this precipitation was light, but a few heavier downpours were associated with this system. On September 20, a cold front pushed through the state bringing showers with 0.25-0.50 inch rain amounts to the eastern one-third of the state, but lesser amounts elsewhere. The most widespread and heaviest rain of the month occurred during September 29-30. Showers and thunderstorms associated with a cold front produced rainfall amounts generally in the 0.5-1.0 inch range in the southwestern half of the state and in the 1-2 inch range across the northeastern half of the state. However, some areas in extreme northeastern Ohio received between 2-4 inches of rain during this storm.

Precipitation for the 1999 calendar year is below normal statewide. The average for the state as a whole is 26.16 inches, 3.84 inches below normal. Regional averages range from 28.24 inches for both the Northeast and Northeast Hills regions, 0.49 inch and 2.08 inches below normal, respectively, to 23.63 inches, which is 8.45 inches below normal, for the Southwest Region. With the 1999 growing season coming to an end, precipitation amounts for the May/September period indicate how dry the season was for many areas of Ohio. For this period, the state averaged 13.24 inches of precipitation, which is 4.87 inches below normal, ranking it as the 7th driest May/September period during the past 117 years. The Southwest Region received 10.63 inches of precipitation during this period which is 7.87 inches below normal, making this the driest May/September of record for the region. Also, it was the 3rd driest May/September in the South Central Region, the 4th driest in the Central Region, the 5th driest in the Southeast Region and the 8th driest in the West Central Region.

Precipitation for the 1999 water year was below normal statewide. The state average was 32.89 inches, 4.68 inches below normal. Regional averages ranged from 36.03 inches, 2.00 inches below normal, for the Northeast Hills Region to 29.76 inches, 4.27 inches below normal for the North Central Region (see Precipitation table, departure from normal, past 12 months column). Chardon (Geauga County) reported the greatest amount of precipitation for the water year, 43.75 inches. Sandusky (Erie County) reported the least amount, 24.61 inches.

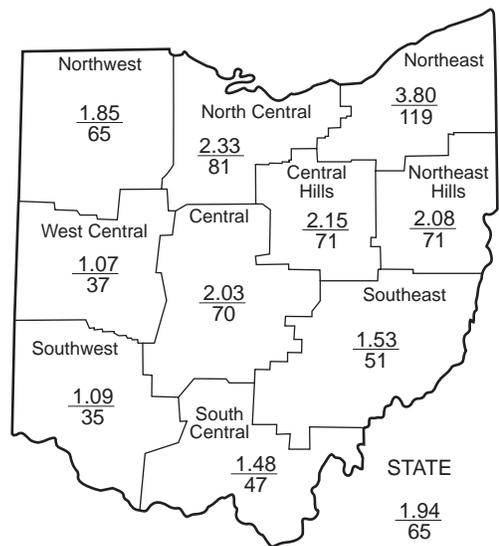
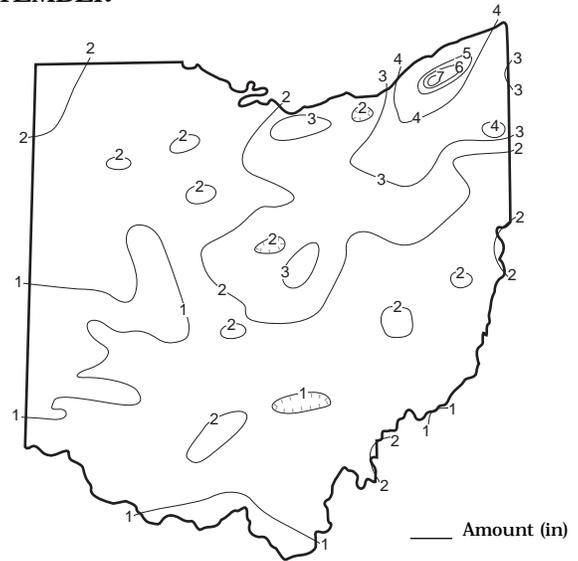
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PRECIPITATION

| Region | This Month | DEPARTURE FROM NORMAL (IN.) | | | | Palmer Drought Severity Index* |
|-----------------|------------|-----------------------------|--------|---------|---------|--------------------------------|
| | | Past | | | | |
| | | 3 Mos. | 6 Mos. | 12 Mos. | 24 Mos. | |
| Northwest | -1.00 | -1.61 | -0.83 | -3.08 | +1.88 | -2.9 |
| North Central | -0.55 | -0.64 | -1.65 | -4.27 | +0.70 | -2.3 |
| Northeast | +0.62 | +1.38 | -0.31 | -1.79 | -2.50 | -1.3 |
| West Central | -1.86 | -2.06 | -4.64 | -4.62 | -2.10 | -3.8 |
| Central | -0.86 | -1.89 | -5.99 | -5.91 | -6.22 | -4.3 |
| Central Hills | -0.88 | -0.26 | -3.57 | -3.08 | -2.45 | -2.9 |
| Northeast Hills | -0.86 | -0.93 | -3.41 | -2.00 | +1.13 | -2.9 |
| Southwest | -2.00 | -4.76 | -8.55 | -8.47 | -6.09 | -4.0 |
| South Central | -1.70 | -2.33 | -8.11 | -7.91 | -5.63 | -4.3 |
| Southeast | -1.46 | -1.86 | -6.00 | -5.48 | -1.78 | -3.7 |
| State | -1.06 | -1.50 | -4.32 | -4.68 | -2.33 | |

*Above +4 = Extreme Moist Spell
3.0 To 3.9 = Very Moist Spell
2.0 To 2.9 = Unusual Moist Spell
1.0 To 1.9 = Moist Spell
0.5 To 0.9 = Incipient Moist Spell
0.4 To -0.4 = Near Normal
-0.5 To -0.9 = Incipient Drought
-1.0 To -1.9 = Mild Drought
-2.0 To -2.9 = Moderate Drought
-3.0 To -3.9 = Severe Drought
Below -4.0 = Extreme Drought

PRECIPITATION SEPTEMBER



Average (in)
Percent of normal

MEAN STREAM DISCHARGE

| River and Location | Drainage Area (Sq. Mi.) | Mean Discharge (CFS) | % of Normal | This Month | | |
|---|-------------------------|----------------------|-------------|------------------|--------|---------|
| | | | | % of Normal Past | | |
| | | | | 3 Mos. | 6 Mos. | 12 Mos. |
| Grand River near Painesville | 685 | 114 | 51 | 25 | 51 | 50 |
| Great Miami River at Hamilton | 3,630 | 357 | 46 | 57 | 49 | 80 |
| Huron River at Milan | 371 | 16 | 49 | 67 | 83 | 80 |
| Killbuck Creek at Killbuck | 464 | 46 | 46 | 55 | 56 | 83 |
| Little Beaver Creek near East Liverpool | 496 | 38 | 41 | 55 | 55 | 85 |
| Maumee River at Waterville | 6,330 | 174 | 27 | 35 | 89 | 90 |
| Muskingum River at McConnelsville | 7,422 | 860 | 44 | 41 | 56 | 88 |
| Scioto River near Prospect | 567 | 21 | 68 | 40 | 61 | 76 |
| Scioto River at Higby | 5,131 | 496 | 41 | 39 | 41 | 70 |
| Stillwater River at Pleasant Hill | 503 | 11 | 22 | 47 | 46 | 77 |

STREAMFLOW during September was below normal throughout Ohio. Flows were low enough to be considered deficient in nearly all areas of the state. Flows for the month were less than the August flows statewide except in some northeastern Ohio basins where flows were greater than last month's due to the heavy rains which occurred near the end of September.

Streamflow at the beginning of September was below normal statewide. Greatest flows for the month were observed during the first few days of the month in the southeastern portion of the state and also in some northwestern and central Ohio drainage basins as a result of the rainfall which fell during the last week of August. Flows statewide generally declined through the first 28 days of September. Slight, temporary increases were noted in a few basins following light spotty rain showers, mainly around September 7-8 and Sep-

tember 20-21. Lowest flows for the month were reached statewide sometime during the September 17-25 period. Flows increased significantly statewide on September 29-30 in response to the heaviest and most widespread rainfall of the month. Greatest flows for September for most basins, except those mentioned earlier, were recorded on the last day of the month. Even with the increase in streamflow on September 29-30, flows at the end of the month remained below normal statewide except in some drainage basins in extreme northeastern Ohio where flows were above normal following the excessive rains which drenched the area.

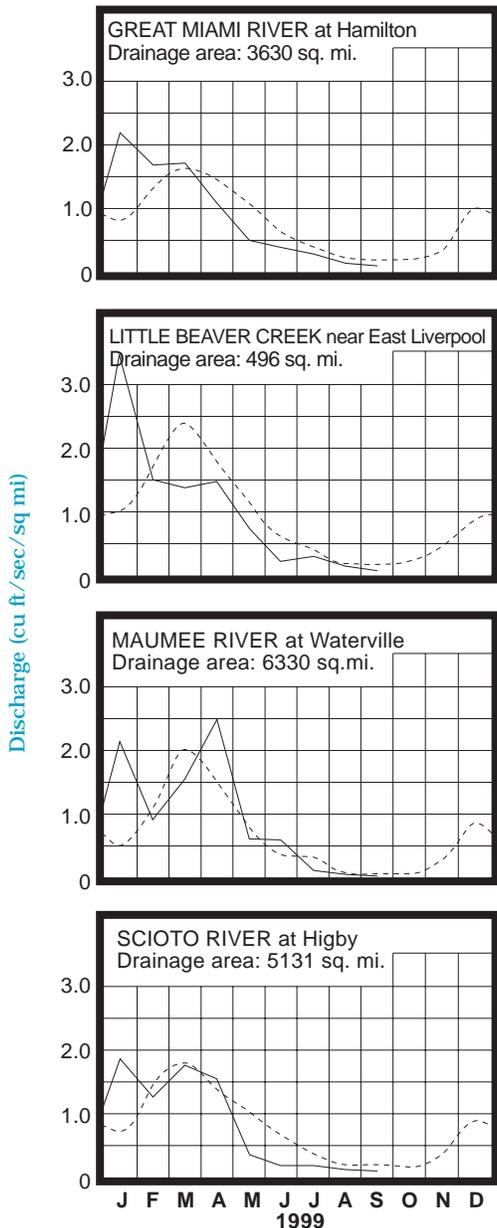
Streamflow for the 1999 water year was below normal statewide (see Mean Stream Discharge table, percent of normal, past 12 month's column). Flows during October were generally above normal in the northwestern and southeastern areas of the state, but below normal elsewhere. Streamflow during November and December was below normal statewide. January was the only month during the 1999 water year in which flows were above normal throughout the state. Snow melt along with light rain showers just after mid-month, and storms with heavier rains on January 21-22 combined to push streamflow to excessive rates across most of the state. Flows decreased during February to below normal throughout most of Ohio, but remained above normal in the western and southwestern areas of the state. Streamflow during the last 7 months of the 1999 water year was generally below normal throughout most of the state, but above normal locally in northern Ohio during April through July.

RESERVOIR STORAGE for water supply during September declined in both the Mahoning and Scioto river basins. Storage was slightly above normal in the Mahoning basin reservoirs, but remained below normal in the Scioto basin reservoirs.

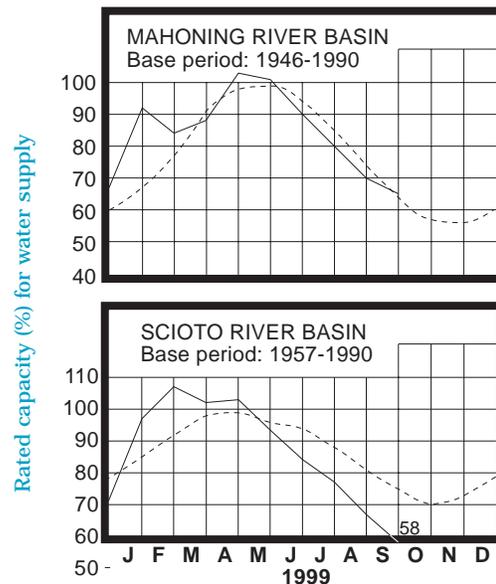
Reservoir storage at the end of September in the Mahoning basin index reservoirs was 65 percent of rated capacity for water supply compared with 70 percent for last month and 74 percent for September 1998. Month-end storage in the Scioto basin index reservoirs was 58 percent of rated capacity for water supply compared with 67 percent for last month and 72 percent for September 1998.

Although surface-water supplies remain adequate in most areas of Ohio, the drought conditions that have persisted during the past several months have had an adverse impact, especially in the southern half of the state. Reservoir storage in the Mahoning basin reservoirs was generally above normal during the 1999 water year, but fell to below normal during the summer high use period. Storage in the Scioto basin reservoirs was below normal throughout most of the 1999 water year with only the

MEAN STREAM DISCHARGE



RESERVOIR STORAGE FOR WATER SUPPLY



Normal - - - - Current ———

January-April period having above normal levels. Water supply managers throughout the state with surface-water sources should monitor their respective situations closely.

GROUND WATER levels during September declined throughout the state. Net declines during September from last month's levels were greater than usually observed. Levels steadily declined throughout the month in all aquifers. However, levels in a few shallow aquifers stabilized near the end of September following the month's greatest precipitation.

Ground water levels are below normal statewide with current levels generally ranging from 1 foot to nearly 4 feet below the normal seasonal levels. Current levels are also noticeably lower than they were a year ago ranging from more than 1 foot to nearly 3 feet below the September 1998 levels. Observation wells Po-1 near Windham (Portage County), representing sandstone aquifers in eastern and northeastern Ohio, and Tu-1 near Strasburg (Tuscarawas County), representing sand and gravel aquifers in eastern and northeastern Ohio, both reached a record-low level for September. Widespread precipitation just before the end of September improved the soil moisture conditions, but even with near-normal precipitation, ground water levels can be expected to continue to decline through at least mid-autumn. The Ohio Agricultural Statistics Service reports that, near the end of September, soil moisture was rated as being short or very short in 74 percent of the state, adequate in 25 percent of the state and surplus in 1 percent of the state. Water supply managers with ground water sources should continue to closely monitor their local situations.

The 1999 water year was not especially favorable for ground water supplies. Although supplies were adequate throughout the water year, recharge was generally less than desired and supplies were below normal throughout most of the period. Moderately severe drought conditions developed during the spring and summer months and as a result, levels declined sharply reaching new seasonal-low levels in portions of eastern and southern Ohio. At the end of the water year, levels were below normal statewide and continuing to decline sharply.

LAKE ERIE level declined seasonally during September. The mean level was 571.10 feet (IGLD-1985) which is 0.32 foot lower than last month's mean level and 0.16 foot below normal. This month's level is 1.34 feet lower than the September 1998 level and 1.90 feet above Low Water Datum.

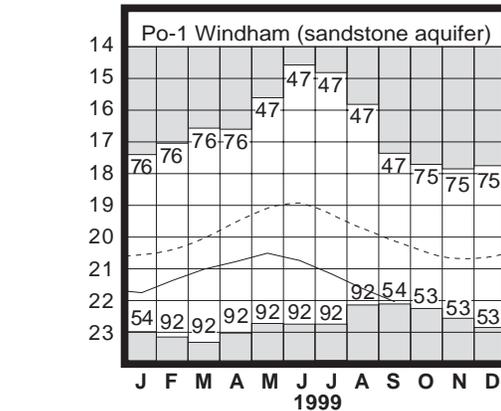
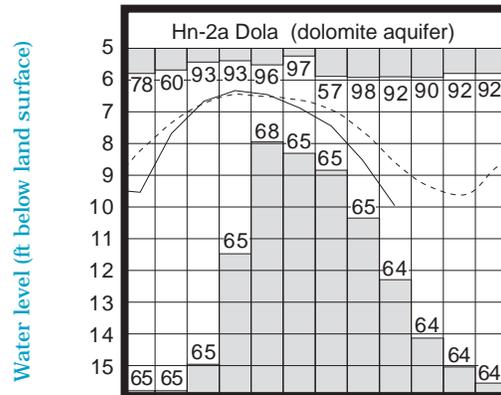
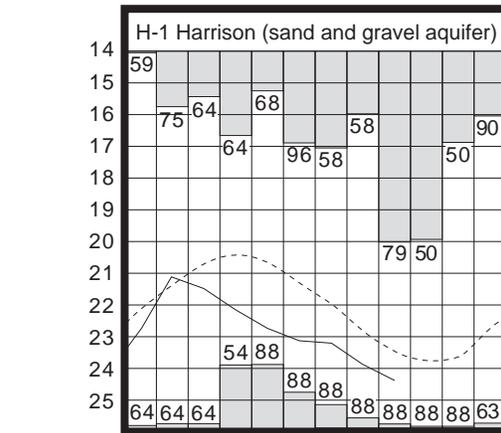
Lake Erie started the 1999 water year with its level above normal and ended the water year with its level below normal, an event unseen since the late 1960s. The level at the beginning of the water year was about the same as the 1999 summer peak that would eventually occur in mid-May. The seasonal low level occurred in mid-winter as expected, but at a level that was nearly 3 feet lower than the summer 1998 peak level. This significant decline in water levels, about twice that usually observed, can be attributed to below normal precipitation in the Great Lakes basin during late 1997 and most of 1998. After an early seasonal peak occurring in late spring, Lake Erie fell to below normal levels by early summer where it still remains. This is the first time the level of Lake Erie has been at below-normal levels during the boating season in more than 30 years. The U. S. Army Corps of Engineers (USACE) predicts that, based on the current condition of the Great Lakes basin and anticipated future weather conditions, the level of Lake Erie should remain slightly below normal for the foreseeable future.

GROUND-WATER LEVELS

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

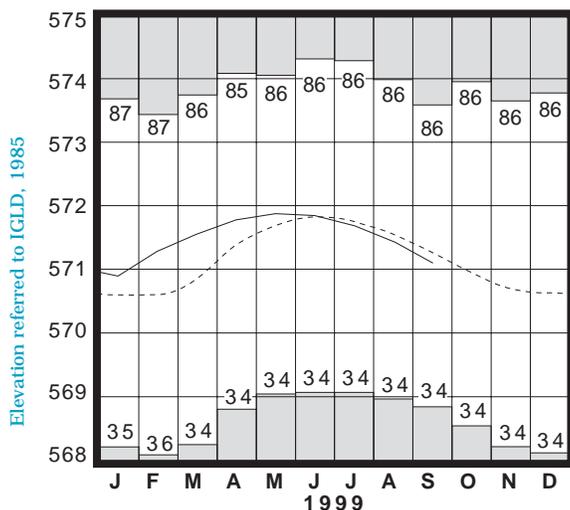
| Index Well | Location | Aquifer | Mean This Month | Departure From Normal | Change in feet from: | |
|------------|-----------------------------|-----------|-----------------|-----------------------|----------------------|----------|
| | | | | | Last Month | Year Ago |
| F-1 | W. Rushville, Fairfield Co. | Sandstone | 20.21 | -3.79 | -0.82 | -2.15 |
| Fa-1 | Jasper Mill, Fayette Co. | Limestone | 12.25 | -3.58 | -1.90 | -2.41 |
| Fr-10 | Columbus, Franklin Co. | Gravel | 46.92 | -2.42 | -0.42 | -2.18 |
| H-1 | Harrison, Hamilton Co. | Gravel | 24.38 | -0.91 | -0.51 | -1.17 |
| Hn-2a | Dola, Hardin Co. | Dolomite | 9.96 | -1.35 | -1.45 | -2.92 |
| Po-1 | Windham, Portage Co. | Sandstone | 22.04 | -1.92 | -0.42 | -1.43 |
| Tu-1 | Strasburg, Tuscarawas Co. | Gravel | 16.02 | -2.51 | -0.47 | -2.30 |

GROUND-WATER LEVELS



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

LAKE ERIE LEVELS at Fairport



Base period: 1900-1991

Normal - - - - Current - - - -

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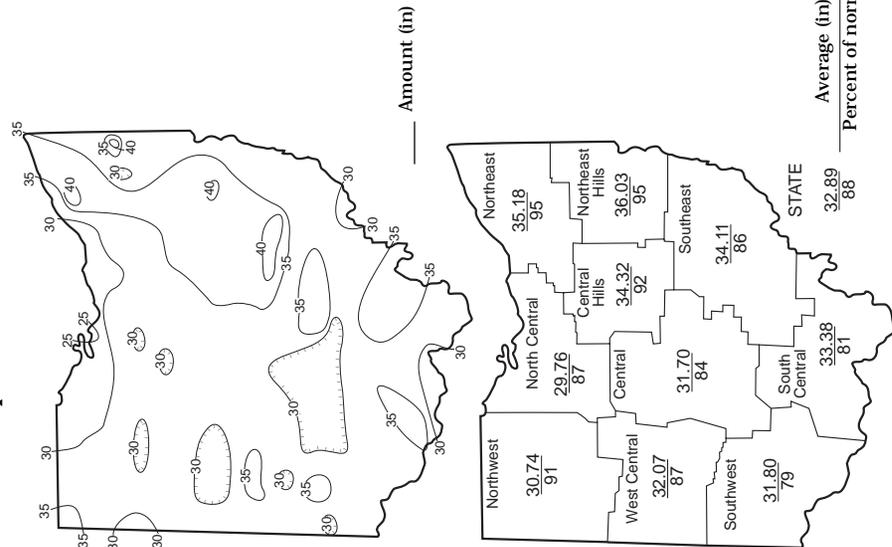
The 1999 water year started with above normal precipitation during October across most of Ohio. November was noticeably dry throughout the state, followed by near normal precipitation during December. Precipitation during January and February was above normal across most of the state. March was unusually dry, but April was wet across much of the state; however, portions of southern Ohio continued to receive below normal rainfall. May brought the return of dry weather to Ohio with noticeably below normal conditions which continued through June. It was the 8th driest May of record for the Central and Southwest regions. Drought conditions expanded in June where it was the 2nd driest June of record for the Central Hills Region, the 3rd driest for the Central and Northeast Hills regions, the 5th driest for the Southeast and South Central regions and the 9th driest for the Northeast Region. For the state as a whole it was the 18th driest May and the 9th driest June during the past 117 years. July precipitation was generally above normal in the northern half of the state, but continued below normal in the southern half. Below normal precipitation prevailed through August, except for slightly above normal rainfall in south-central and southeastern Ohio. September was dry statewide with only a few areas in northeastern Ohio recording above normal rainfall. The 1999 water year was not a particularly good one for water supplies or agriculture in Ohio. Although water supplies were adequate in most regions, the drought conditions prevalent during much of the second half of the water year stressed water supplies and hampered crop development in many areas of the state, especially in the southern half of Ohio.

SUMMARY

Precipitation during September was below normal throughout most of the state, but above normal in parts of north-central and northeastern Ohio. Streamflow was below normal statewide for the month, except in extreme northeastern Ohio basins where heavy rains at the end of the month pushed flows to above normal. Reservoir storage declined statewide and was below normal in the Scioto basin reservoirs, but slightly above normal in the Mahoning basin reservoirs. Ground water levels declined and are below normal statewide. Lake Erie level declined 0.32 foot and was 0.16 foot below the long-term September average.

Precipitation for the 1999 water year was below normal statewide. Streamflow was below normal for much of the year. Ground water levels declined for the 1999 water year and are below normal statewide. Lake Erie levels declined for the water year and were below normal for the summer boating season. In spite of drought conditions, water supplies were adequate throughout the water year.

Total Precipitation 1999 Water Year



ACKNOWLEDGMENTS

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

Precipitation data:

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

Streamflow and reservoir storage data:

U.S. Geological Survey, Water Resources Division.

Lake Erie level data:

U.S. Army Corps of Engineers, Detroit District.

Palmer Drought Severity Index:

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service.



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