



MONTHLY WATER INVENTORY REPORT FOR OHIO

November 2002

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

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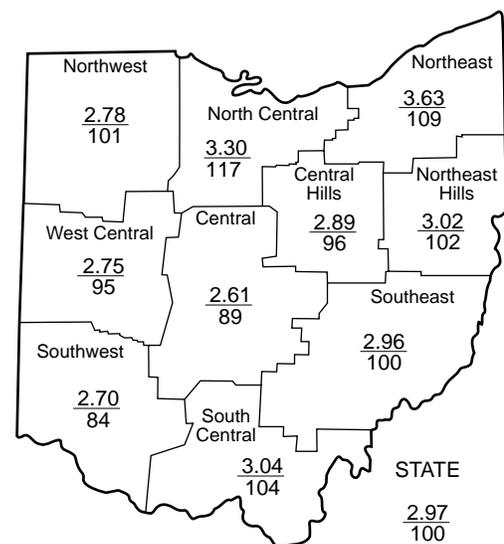
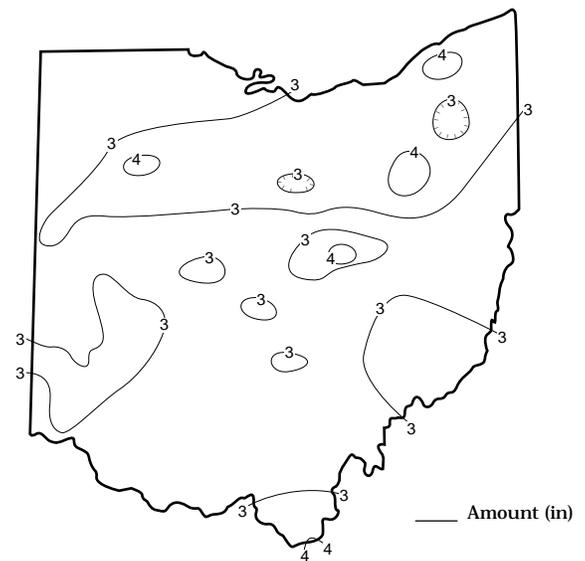
PRECIPITATION during November tended to be slightly above normal in the northern half of the state and slightly below normal in the southern half. The average for the state as a whole was 2.97 inches, 0.01 inch below normal. Regional averages ranged from 3.63 inches, 0.29 inch above normal, for the Northeast Region to 2.61 inches, 0.31 inch below normal, for the Central Region. The Akron-Canton Airport (Summit County) reported the greatest amount of November precipitation, 4.35 inches. Captain Anthony Meldahl Locks and Dam (Clermont County) reported the least amount, 2.00 inches.

Precipitation fell mainly as rain during the first three weeks of November and as snow or a wintry mix during the last week. Snowfall for the month was near or above normal statewide. A steady rain fell throughout the state on November 5. The rain was moderate in the southern half of the state bringing 0.5-1.0 inch to the area while in the northern half it was light, averaging around 0.25 inch. A strong cold front pushed through the state on November 10 bringing damaging storms, tornadoes and locally heavy downpours (see "Late Season Storms Kill Five" on the last page of this report under Notes And Comments). Most of the state received between 1-2 inches of rain from this storm. Light showers during November 15-16 brought around 0.25 inch of precipitation statewide with 0.50 inch falling locally in northeastern Ohio. Showers and scattered thunderstorms on November 21 changed to snow early on November 22 with most of Ohio receiving 0.50-1.0 inch of (liquid-melted) precipitation. Although snow accumulations were generally light, this was the first measurable snowfall of the season for most of the state. Snow fell statewide around November 26 with accumulations of about 1 inch in southern Ohio and 2-4 inches in northern Ohio.

Precipitation for the 2002 calendar year is generally above normal in the southern half of the state and below normal in the northern half. The average for the state as a whole is 35.56 inches, 0.30 inch above normal. Regional averages range from 42.20 inches, 4.62 inches above normal, for the South Central Region to 28.71 inches, 3.11 inches below normal, for the Northwest Region.

Precipitation for the 2003 water year is above normal across much of the state, but below normal in northwestern and northeastern Ohio. The average for the state as a whole is 5.87 inches, 0.42 inch above normal. Regional averages range from 7.88 inches, 2.51 inches above normal, for the South Central Region to 4.33 inches, 0.80 inch below normal, for the Northwest Region.

PRECIPITATION NOVEMBER



PRECIPITATION

Region	This Month	DEPARTURE FROM NORMAL (IN.) Base period 1951-2000				Palmer Drought Severity Index*
		Past				
		3 Mos.	6 Mos.	12 Mos.	24 Mos.	
Northwest	+0.02	-1.01	-4.49	-3.34	+0.46	-1.5
North Central	+0.47	+0.99	-2.10	-0.06	-2.64	+0.8
Northeast	+0.29	-0.08	-3.80	-1.19	-6.61	+0.2
West Central	-0.14	+1.14	-3.54	-0.27	+3.91	+1.4
Central	-0.31	+2.60	+0.56	+1.04	+2.49	+1.7
Central Hills	-0.13	+0.38	-2.60	-1.26	-4.25	+0.1
Northeast Hills	+0.06	+1.59	-2.48	-2.16	-5.54	-0.1
Southwest	-0.51	+3.52	+0.67	+4.54	+6.45	+2.4
South Central	+0.11	+3.44	+1.93	+3.91	+1.15	+2.4
Southeast	-0.01	+3.22	+0.77	+1.97	+2.98	+2.1
State	-0.01	+1.59	-1.50	+0.33	-0.16	

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

Average (in)
Percent of normal

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	326	30	20	23	80
Great Miami River at Hamilton	3,630	2,524	155	99	93	131
Huron River at Milan	371	213	225	72	39	83
Killbuck Creek at Killbuck	464	193	67	45	68	76
Little Beaver Creek near East Liverpool	496	156	47	35	47	67
Maumee River at Waterville	6,330	1,003	38	23	31	91
Muskingum River at McConnelsville	7,422	3,764	67	89	122	78
Scioto River near Prospect	567	301	311	79	48	99
Scioto River at Higby	5,131	3,100	123	76	77	95
Stillwater River at Pleasant Hill	503	59	60	17	35	107

STREAMFLOW during November was below normal in eastern and northwestern Ohio while it was above normal across southwestern, central and north-central Ohio. Flows were low enough to be considered deficient in most of eastern and west-central Ohio. Conversely, flows were high enough to be considered excessive in some north-central Ohio basins.

Flows at the beginning of November were generally below normal across much of Ohio with only a few basins in the southern half of the state having above normal flows. Flows declined the first few days of the month, but then increased statewide due to the rains on November 5. Low flows for the month occurred statewide just prior to this precipitation. Flows increased rapidly following storms that

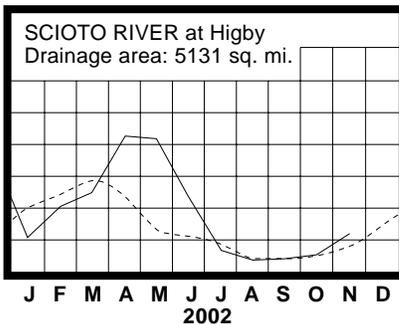
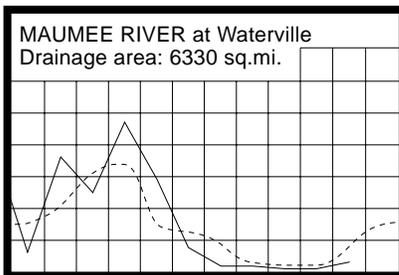
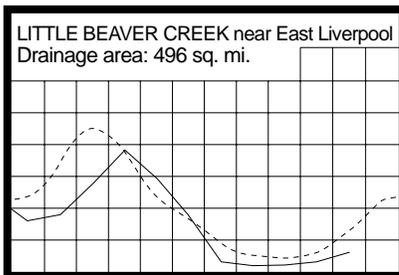
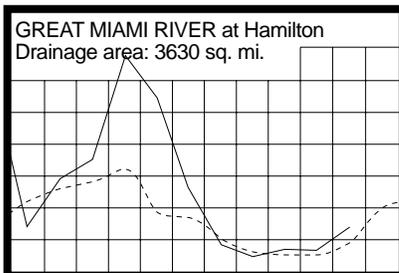
occurred on November 10. Greatest flows for the month occurred across most of the state just after these rains. Flows declined steadily from these peaks during the next week, but increased again statewide following the precipitation that occurred during November 21-22. Greatest flows for November occurred on November 23 in north-central and northeastern Ohio basins as a result of this precipitation. Streamflows declined the remainder of the month and by the end of November had fallen to below normal across most of the state, with only flows in some basins in central and north-central Ohio remaining above normal.

RESERVOIR STORAGE during November increased slightly in the Mahoning River basin and decreased in the Scioto River basin. Storage at the end of November was above normal in the Mahoning River basin and below normal in the Scioto River basin.

Reservoir storage at the end of November in the Mahoning basin index reservoirs was 66 percent of rated capacity for water supply compared with 65 percent for both last month and November 2001. Month-end storage in the Scioto basin index reservoirs was 70 percent of rated capacity for water supply compared with 72 percent for last month and 77 percent for November 2001.

MEAN STREAM DISCHARGE

Discharge (cu ft/sec/sq mi)

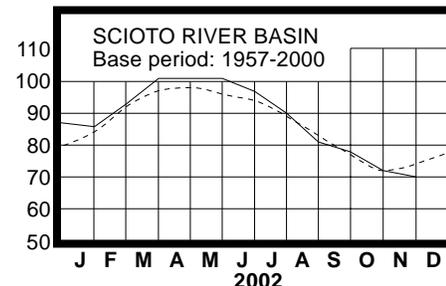
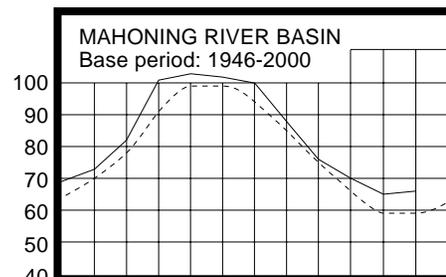


Base period for all streams: 1971-2000

Normal - - - - Current - - - -

RESERVOIR STORAGE FOR WATER SUPPLY

Rated capacity (%) for water supply



2002

GROUND-WATER LEVELS

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

GROUND WATER levels during November generally rose in the southern half of the state and declined in the northern half. Levels in most aquifers declined the first few days of the month and then rose in response to precipitation, especially after November 10. Levels in most aquifers in the southern half of the state remained stable or rose slightly the remainder of the month while in the northern half, levels in most aquifers declined from about mid-month through month's end. Net changes from October's levels were more favorable than normally expected during November in the southern half of Ohio while net declines were greater than normally expected in the northern half of the state. This is due in part to the above normal precipitation southern Ohio received during October.

The 2003 water year recharge season is off to a good start in the southern half of the state. The above normal precipitation during October and near normal precipitation in November has had a positive impact on ground water storage in the southern half of Ohio. However, ground water levels remain below normal across most of this region. The recharge season has yet to begin in northern Ohio, typically beginning during December. Levels in northern Ohio aquifers range from around 0.25 foot to more than 3.5 feet below normal. Statewide, current levels range from nearly 1 foot above to about 1 foot below the November 2001 levels. One notable exception continues to be observation well HN-2a (Dola, Hardin County), representing the carbonate aquifers of northwestern Ohio, which is more than 6 feet below the November 2001 level and more than 3.5 feet below normal. This reflects the continuing impact the below normal summer and fall precipitation is still having on aquifers in this part of the state. Although at below normal levels, ground water supplies remain adequate across Ohio. With near-normal precipitation and other climatic conditions during the next several months, ground water supplies should remain adequate statewide.

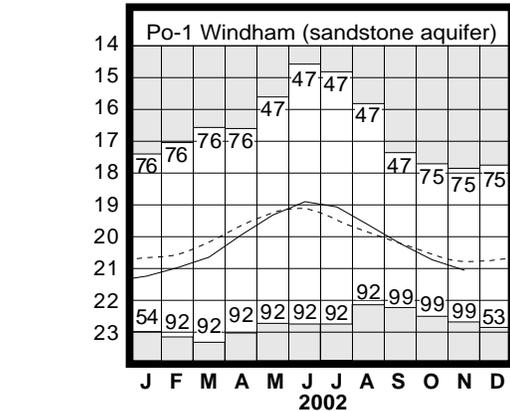
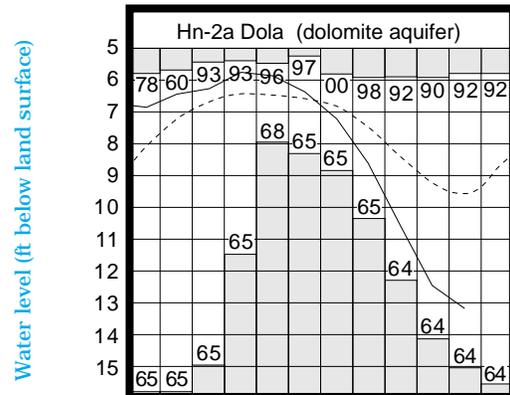
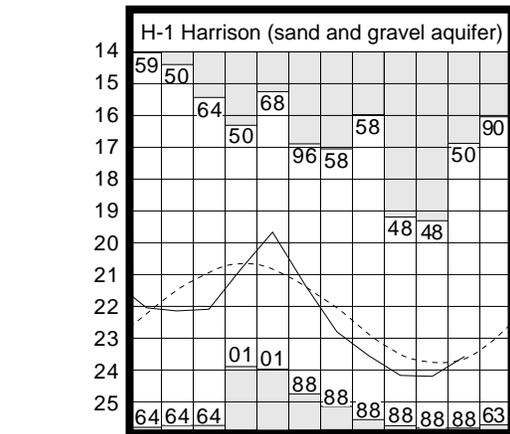
LAKE ERIE level declined seasonally during November. The mean level was 570.37 feet (IGLD-1985), 0.36 foot lower than last month's mean level and 0.50 foot below normal. This month's mean level is 0.13 foot higher than the November 2001 level and 1.17 feet above Low Water Datum.

The U.S. Army Corps of Engineers (USACE) reports that precipitation in the Lake Erie basin during November averaged 3.51 inches, which is 0.66 inch above normal. The entire Great Lakes basin averaged 2.07 inches, which is 0.68 inch below normal. For calendar year 2002 through November, the Lake Erie basin has averaged 32.01 inches of precipitation, 0.37 inch below normal, while the entire Great Lakes basin has averaged 30.12 inches of precipitation, 0.09 inch above normal.

In addition, the USACE reports that based on the current condition of the Great Lakes basin and anticipated weather conditions, the level of Lake Erie should range around 6-7 inches below the long-term seasonal average for the foreseeable future. Deviations from the anticipated weather patterns could result in the level of Lake Erie ranging from as high as 3 inches above to as much as 20 inches below the normal seasonal level.

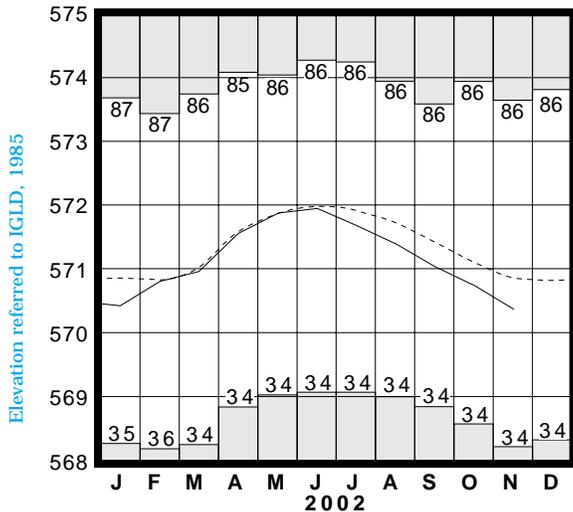
Index Well	Location	Aquifer	Mean This Month	Departure From Normal	Change in feet from:	
					Last Month	Year Ago
F-1	W. Rushville, Fairfield Co.	Sandstone	17.93	-0.35	+0.59	+0.85
Fa-1	Jasper Mill, Fayette Co.	Limestone	9.76	-0.76	+2.04	-0.26
Fr-10	Columbus, Franklin Co.	Gravel	46.08	-1.96	+0.32	+0.26
H-1	Harrison, Hamilton Co.	Gravel	23.58	+0.10	+0.62	-1.26
Hn-2a	Dola, Hardin Co.	Dolomite	13.18	-3.61	-0.73	-6.05
Po-1	Windham, Portage Co.	Sandstone	21.06	-0.27	-0.35	+0.48
Tu-1	Strasburg, Tuscarawas Co.	Gravel	16.27	-2.27	-0.03	+0.21

GROUND-WATER LEVELS



Base periods: H-1, 1951-2000. Hn-2a, 1955-2000.
Po-1, 1947-2000 Record high and low, year of occurrence

LAKE ERIE LEVELS



Base period: 1918-2000

Record high and low, year of occurrence

Normal - - - - Current ———

SUMMARY

Precipitation during November tended to be slightly above normal in the northern half of the state and slightly below normal in the southern half. Streamflow was below normal in eastern and northwestern Ohio and above normal elsewhere. Reservoir storage increased slightly in the Mahoning River basin and was above normal while it decreased in the Scioto River basin and was below normal. Ground water levels generally rose in the southern half of the state and declined in the northern half. Lake Erie level declined 0.36 foot and was 0.50 foot below the long-term November average.

NOTES AND COMMENTS

Late Season Storms Kill Five

On November 10, warm, humid air across Ohio in front of an approaching cold front were the ingredients that resulted in one of the worst late season severe weather outbreaks ever in Ohio. Strong thunderstorms producing damaging winds, heavy rain, hail and tornadoes, crossed the state during the afternoon and early evening hours on November 10. Preliminary observations by the National Weather Service indicate 15 tornadoes touched down in the state. The hardest hit area was northwest Ohio where several tornadoes touched down causing considerable damage and killing five. The most devastating was a tornado that struck Van Wert County. This particular tornado had a path of about 53 miles in length, beginning in Indiana. In Ohio, it traveled through Van Wert, Paulding, Defiance, Putnam and Henry counties. Damage in the city of Van Wert was extensive. The National Weather Service classified the tornado as an F4, with winds estimated in excess of 207 miles per hour. Many homes and businesses were completely destroyed along the track of this storm. Two people were killed by this twister in the Van Wert area; two people also died in Putnam County and one in Seneca County as a result of the violent weather. Isolated heavy downpours were also associated with some of these storms, dropping 2-3 inches of rain resulting in some street flooding in a few urban areas. At the request of Ohio Governor Bob Taft, President Bush declared Hancock, Ottawa, Paulding, Putnam, Seneca and Van Wert counties disaster areas, making people and businesses in these counties eligible to receive federal aid. Damage from the storms was evident across many areas of the state. Tornado touchdowns were also confirmed in central and northeast Ohio and strong winds from thunderstorms caused damage, especially to trees and power lines, across a wide area of the state. Early estimates put the damage figure from these storms in excess of 100 million dollars.

Alaskan Earthquake Makes Its Mark In Ohio

At 5:13 p.m. EST on November 3, 2002 a major earthquake measuring 7.9 on the open-ended Richter scale struck Alaska. The quake was centered 90 miles south of Fairbanks and was easily felt in Anchorage, 270 miles south of the epicenter. Fortunately, the quake's epicenter was in a sparsely populated area, resulting in only minor injuries. However, damage to roads was extensive and it also triggered the shutdown of the 800-mile long trans-Alaska pipeline. Inspections later revealed no major damage to the pipeline. Shock waves radiating from the epicenter of this quake traveled the 3000 miles through rock formations and reached Ohio. Seismic waves passing through rock formations cause an alternating compression and expansion of the rock. Water levels in some wells finished in certain rock formations can rise and fall with the passing of these seismic waves. Several wells in Ohio's observation well network have historically responded to earthquakes in the Western Hemisphere. The most sensitive observation well to these phenomena is VW-1, located in Van Wert (Van Wert County). Seismic waves from the November 3, 2002 Alaskan earthquake caused a 1.95 feet fluctuation of the water level in this well. Another well in the Ohio observation well network sensitive to these phenomena is DL-3, located at the Delaware Dam near Delaware (Delaware County). Seismic waves from the November 3 earthquake caused a 0.58 foot fluctuation in this well. The most notable fluctuation caused by an earthquake occurred in VW-1 on March 27, 1964 when the water level changed 5.8 feet following the Alaskan Good Friday earthquake that had a Richter scale magnitude of 8.4. An 8.4 magnitude earthquake is 50 times more powerful than an earthquake with a magnitude of 7.9. To learn more about the 2002 Alaskan earthquake and other earthquakes, visit the Ohio Department of Natural Resources, Division of Geological Survey website at: <http://www.dnr.state.oh.us/geosurvey/default.htm> and click on OhioSeis-The Ohio Seismic Network.

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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