

ILLINOIS WATER AND CLIMATE SUMMARY April 2004

2004 Overview (Bob Scott)

Temperatures in Illinois during April were above average, while precipitation was well below average, the tenth driest April since 1895. Soil moisture within the top 40 inches of soil was slightly below the long-term statewide average. Mean streamflows were below median heights. Shallow groundwater levels were below long-term average depths.

Temperatures across Illinois (Figure 1) for April were above average (a 1.8-degree departure). Crop Reporting District (CRD) temperatures ranged from 0.9 degree above average (southwest) to 2.5 degrees above average (east).

Precipitation amounts for the state were well below average (Figure 1). The statewide average of 1.86 inches represents a 2-inch departure or 49 percent of average. April totals were highest in the southeast CRD (2.24 inches) and lowest in the east-southeast CRD (1.28 inches). Compared to average precipitation values for April, totals ranged from 56 percent of average in the northwest CRD to 32 percent of average in the east-southeast CRD.

Soil moisture in the 0- to 40-inch (0- to 100-centimeter) layer at the end of April was slightly below normal (Figure 1). Soil moisture was generally near normal in all layers across Illinois, except for moist soils in the deepest layer over southeastern Illinois.

Mean provisional streamflow statewide was below the median flow, 67 percent of median (Figure 1). Rivers in Illinois recorded mean discharges in the normal to below normal range this month. The peak stage recorded at Beardstown on the Illinois River exceeded flood stage, but peak stages at other reporting stations on the Illinois River did not exceed flood stage. The Mississippi River at stations along the Illinois border and the Ohio River at Cairo recorded peak stages below flood stage.

Water surface levels at the end of April were below the normal pool/target operating level at 13 of 38 reporting reservoirs (Figure 1). Levels at Rend Lake, Lake Shelbyville, and Carlyle Lake were above target levels at the end of April. Lake Michigan's mean level remains below the long-term average.

Statewide, **shallow groundwater levels** continue to be below normal for the 20th consecutive month (Figure 1). Deviations from normal averaged 2.5 feet below average; levels averaged 1.6 feet lower than March levels and approximately 0.5 feet above April levels one year ago.

Note: Extended network descriptions appear in the January and July issues. Network maps are available upon request.

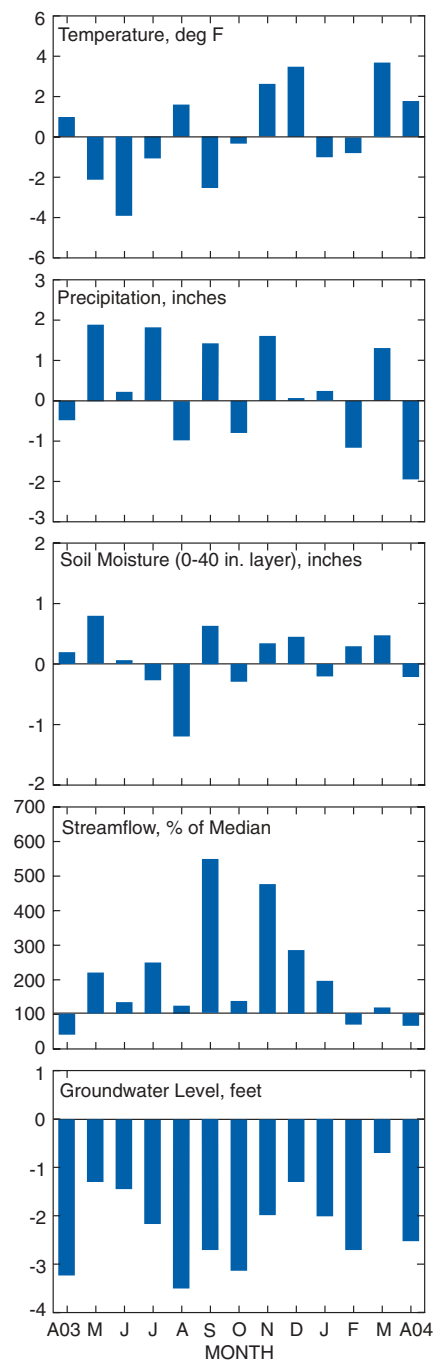


Figure 1.
Statewide departures from normal

Contact

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For more information, see www.sws.uiuc.edu/warm

Weather/Climate Information (Jim Angel and Bob Scott)

Temperatures across Illinois for April were above normal (Figure 2 and Table 1). This was the 24th warmest April since 1895. Extremes ranged from 21°F at Marengo on April 5 to 91°F at Bloomington on April 18. Statewide temperature departures for February–April and November–April were both 1.8 degrees above normal. Based on provisional data, these were the 18th and 17th warmest such periods, respectively, since 1895.

Precipitation for April was well below normal statewide (Figure 2 and Table 1), the 10th driest April since 1895. Steelville reported the highest one-day precipitation (1.86 inches), while White Hall reported the highest monthly total (3.50 inches).

Severe weather during April was headlined by a tornado outbreak in northern Illinois. There were several reports of hail 3/4–1 inch in size in northern Illinois on April 16. Fourteen separate tornadoes struck north-central and eastern Illinois on April 20 and were classified on the Fujita scale as F3 (1), F2 (2), F1 (4), and F0 (7). Utica was hardest hit with eight deaths and major damage to the downtown area. Some hail and nontornadic wind damage also were reported with these storms. High winds in southern Illinois produced several reports of downed trees and branches on April 30.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for April (Figure 3) ranged from 5 mph at Dixon Springs to near 14 mph at Bondville and Stelle. Bondville recorded the highest wind gusts for the month, 53 mph, on April 28. The prevailing wind direction during the month varied from the west-southwest to west-northwest across the state. Wind speeds in excess of 8 mph varied from 139 hours at Dixon Springs to 522 hours at Bondville and Stelle. (April has 720 hours.) Average air temperatures for April ranged from 50°F at Freeport and St. Charles to 58°F at Rend Lake and Carbondale.

Solar radiation totals in April combined strong seasonal increases with below average rainfall and cloud cover and ranged from 545 Mega-Joules per meter squared (MJ/m²) at Springfield to 608 MJ/m² at Monmouth and Belleville. Potential evapotranspiration observations varied from 4.1 inches at St. Charles to 4.8 inches at Belleville. Soil temperatures at the 4- and 8-inch levels ranged from 50°F in northern Illinois to the upper 50s in southern Illinois.

Extended climate outlooks issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climate Prediction Center for May call for warmer than normal temperatures across Illinois, especially in the southern half of the state, with below normal precipitation in far southern Illinois. Elsewhere, equal chances of

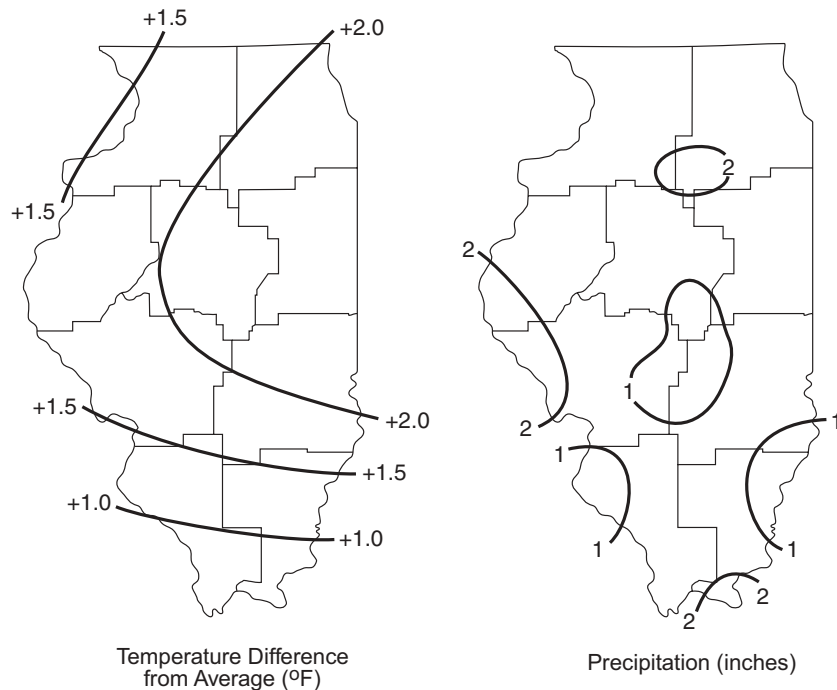


Figure 2. Illinois temperature and precipitation during April 2004

Table 1. Illinois Precipitation (inches) and Temperature (°F) by Crop Reporting District

<i>Crop Reporting District</i>	<i>Last Month</i>			<i>Last 3 Months</i>			<i>Last 6 Months</i>			<i>Last 12 months</i>		
	<i>Apr 04 Amount</i>	<i>% Avg</i>	<i>Temp Dev</i>	<i>Feb 04- Apr 04</i>	<i>% Avg</i>	<i>Temp Dev</i>	<i>Nov 03- Apr 04</i>	<i>% Avg</i>	<i>Temp Dev</i>	<i>May 03- Apr 04</i>	<i>% Avg</i>	<i>Temp Dev</i>
Northwest	1.97	56	1.8	7.49	99	2.1	15.05	111	2.2	33.15	91	0.7
Northeast	1.73	47	2.0	6.75	87	2.2	14.70	101	1.9	35.07	96	0.4
West	2.07	57	1.8	6.24	76	1.6	13.95	94	1.7	36.58	98	0.3
Central	1.92	53	2.1	6.40	77	1.9	13.42	87	1.8	35.25	95	0.2
East	1.57	44	2.5	6.95	84	2.0	15.10	96	1.8	41.19	110	0.1
West-southwest	1.99	52	1.9	6.99	77	1.6	16.58	97	1.7	40.05	106	0.1
East-southeast	1.28	32	2.0	6.84	69	1.7	18.54	97	1.7	43.34	106	0.2
Southwest	2.21	52	0.9	8.71	81	1.1	18.97	90	1.5	40.00	94	0.2
Southeast	2.24	50	1.1	8.35	71	1.2	18.38	81	1.6	39.86	90	0.4
State Average	1.86	49	1.8	7.14	80	1.8	16.05	95	1.8	38.25	99	0.3

Note: Data are provisional. Complete, quality controlled data are available about six months after a given month.

above, below, and normal precipitation are considered likely statewide. May–July outlooks call for equal chances of above, below, and normal temperatures and precipitation across Illinois.

Soil Moisture Information (Bob Scott)

Precipitation in Illinois for April was well below average statewide. Nevertheless, near average rainfall over most of the state during the last two weeks of April brought near surface soil moisture conditions to near normal levels at the end of the month (Figure 4). Moisture values ranged from 72 percent of normal at Rend Lake to 130 percent of normal at Topeka in the 0- to 6-inch layer. Conditions were also near normal in the 6- to 20-inch layer, where moisture amounts ranged from 76 percent of normal at Olney to 114 percent of normal at Topeka, with one dry observation, 49 percent of normal at Springfield. Soil moisture 20 to 40 inches deep was also close to normal statewide, with values ranging from 77 percent of normal at Peoria to 119 percent of normal at Stelle. In the 40- to 72-inch layer, observations revealed that the extreme dryness seen across north-central Illinois since last summer finally has been mitigated; however, moist soils in southeastern Illinois continued. Levels in that layer ranged from 85 percent of normal at Belleville to 196 percent of normal at Rend Lake. Overall, soil moisture in Illinois at the end of April was slightly below normal (Figure 1).

Compared to the end of last month, soil moisture has decreased considerably in the 0- to 6- and 6- to 20-inch layers, and was just slightly drier in deeper soils (Table 2). Broad decreases of 25 to 45 percent were observed near the surface in many areas, while decreases of 15 to 30 percent were common in soils 6 to 20 inches deep. Smaller decreases in soil moisture also dominated the 20- to 40-inch layer. Observations at Topeka showed a 15 percent decrease in this layer; however, changes at all other sites were less than 10 percent.

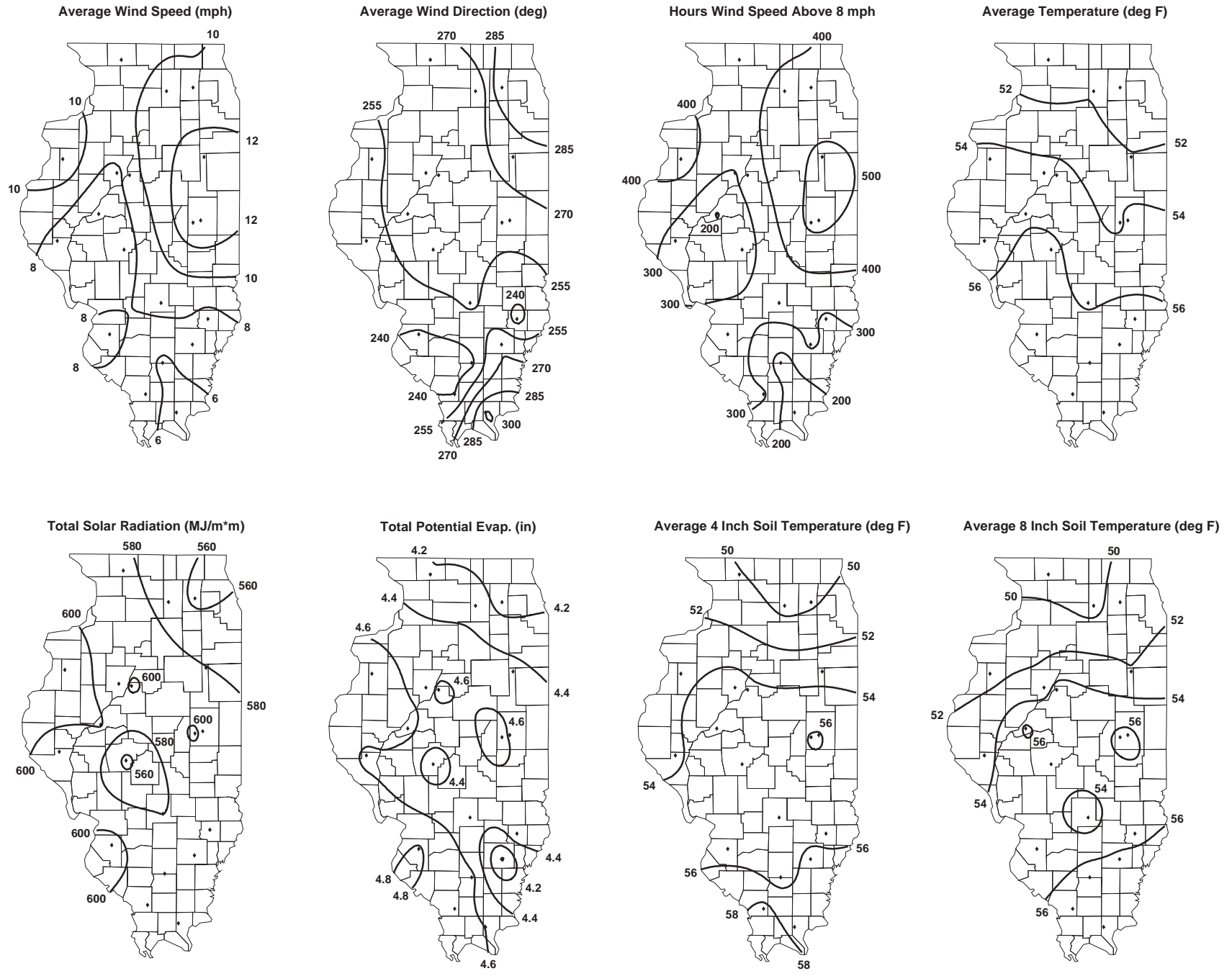
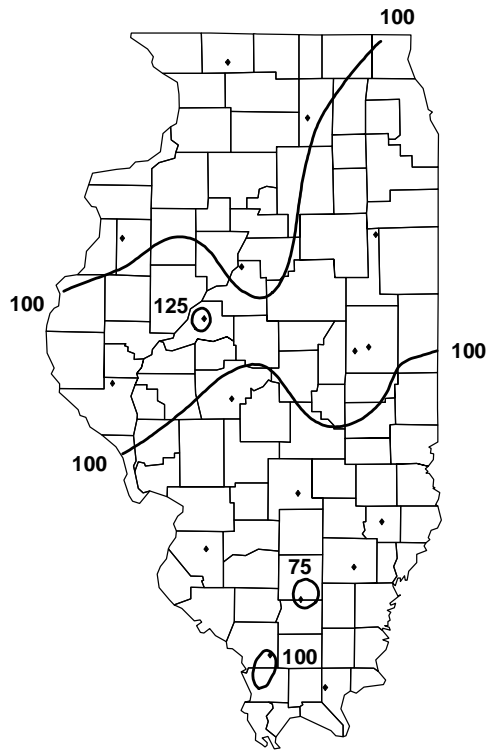
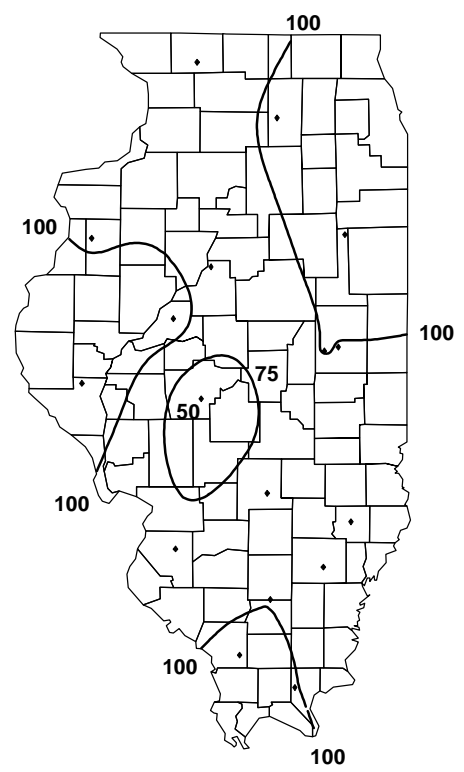


Figure 3. April monthly averages and totals as collected by the Illinois Climate Network

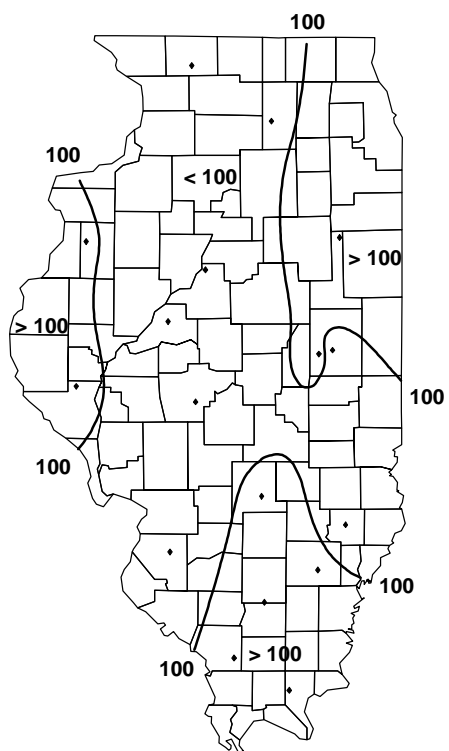
0 - 6 inch Soil Layer



6 - 20 inch Soil Layer



20 - 40 inch Soil Layer



40 - 72 inch Soil Layer

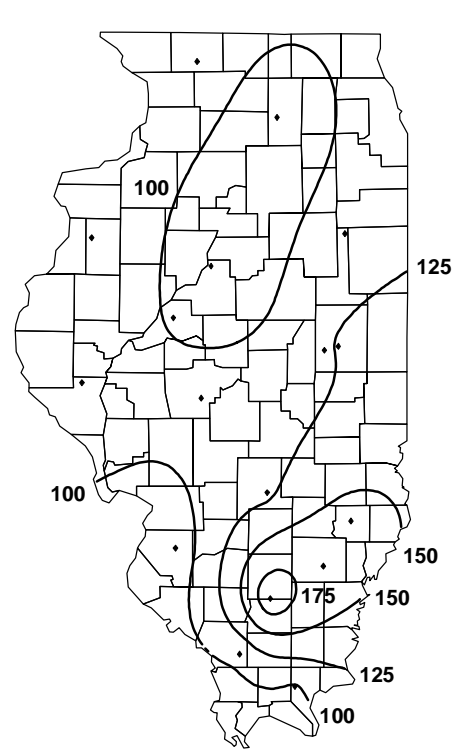


Figure 4. May 1 observed percent-of-normal soil moisture based on 1985-1995 mean

Table 2. Soil Moisture in Various Layers on April 1, 2004

<i>Location</i>	<i>Apr 1 0 - 6 (inches)</i>	<i>Change from Mar 1 (%)</i>	<i>Apr 1 6 - 20 (inches)</i>	<i>Change from Mar 1 (%)</i>	<i>Apr 1 20 - 40 (inches)</i>	<i>Change from Mar 1 (%)</i>
Freeport (NW)	2.2	-26	4.8	-5	7.1	3
DeKalb (NE)	2.7	0	5.7	6	7.3	-2
Monmouth (W)	2.1	-15	4.7	-13	7.0	0
East Peoria (C)	2.3	-9	5.2	-9	7.6	8
Topeka (C)	1.3	-10	2.9	-3	3.4	-8
Stelle (E)	2.4	-6	5.7	-4	6.9	-5
Champaign (E)	2.3	-5	5.5	0	6.8	0
Bondville (E)	2.8	6	5.6	9	8.4	1
Perry (WSW)	2.4	0	5.5	-3	8.3	0
Springfield (WSW)	2.4	16	5.4	8	8.1	3
Brownstown (ESE)	2.9	-11	5.0	2	8.5	2
Olney (ESE)	2.9	-3	4.8	1	7.2	1
Belleville (SW)	2.4	-1	5.2	-1	8.8	0
Carbondale (SW)	2.9	28	5.6	9	8.0	0
Ina (SE)	3.2	37	5.5	10	7.9	5
Fairfield (SE)	2.9	13	5.6	1	7.6	3
Dixon Springs (SE)	2.3	-3	5.0	1	8.2	1

Surface Water Information (Sally McConkey)

River and stream discharge and stage data are obtained from gaging stations operated by the U.S. Geological Survey (USGS) or the U.S. Army Corps of Engineers (USACE). The USGS gaging station network is supported, in part, by the Illinois Department of Natural Resources Office of Water Resources and the Illinois State Water Survey (ISWS), and the USACE. Provisional discharge data are obtained from direct computer access to the USGS.

Table 3 lists selected streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers, flood stage, and the provisional peak stage for the current month. The peak stage is determined from the daily morning readings posted by the National Weather Service and/or the USACE. Stations on the Illinois River recorded peak stage below flood stage this month with the exception of Beardstown where the recorded peak stage was 0.3 feet above flood stage. The Mississippi River along the Illinois border recorded peak stages below flood stage, as did the Ohio River at Cairo on April 25.

Provisional monthly mean flows for 26 streamgaging stations located throughout Illinois are shown in Table 4. Data posted by the USGS are listed if available; otherwise, daily mean discharge data posted by the USGS were used to estimate the mean flow for the month. Long-term mean flows for each month are published by the USGS. The month's median flow for each station listed in Table 4 was determined by ranking the April mean flow for each year of record, and selecting the middle value, 50 percent exceedence probability.

Mean provisional flow statewide was below the median this month (67 percent of median) and below the mean (56 percent of mean). Flows in northern Illinois were generally in the normal range except at the Kankakee River at Momence, where flows were below normal. Flows were normal to below normal in central and southern Illinois.

Water-Supply Lakes and Major Reservoirs. Table 5 lists reservoirs in Illinois, their normal pool or target water surface elevation, and other data related to observed variations in water surface elevations. Reservoir levels are

Table 3. Peak Stages for Major Rivers, April 2004

<i>River</i>	<i>Station</i>	<i>River mile*</i>	<i>Flood stage (feet)*</i>	<i>Peak stage (feet)**</i>	<i>Date</i>
Illinois	Morris	263.1	13	9.4	01
	La Salle	224.7	20	18.6	01
	Peoria	164.6	18	14.8	04
	Havana	119.6	14	13.7	05
	Beardstown	88.6	14	14.3	06
	Hardin	21.5	25	22.6	06
Mississippi	Dubuque	579.9	17	13.9	07
	Keokuk	364.2	16	9.7	10
	Quincy	327.9	17	12.5	01
	Grafton	218.0	18	16.0	29
	St. Louis	180.0	30	19.6	02
	Chester	109.9	27	22.0	03
	Thebes	43.7	33	25.7	03
Ohio	Cairo	2.0	40	34.9	25

Notes:

*River mile and flood stage from *River Stages in Illinois: Flood and Damage Data*, Illinois Department of Natural Resources, Office of Water Resources, July 1998.

**Peak stage based on daily a.m. readings, not instantaneous peak.

reported in terms of their difference from normal pool (or target level). Reservoir levels are obtained from a network of cooperating reservoir operators who are contacted each month by ISWS staff for the current water levels. The average of the month-end readings for the period of record is reported in terms of the difference from normal pool or target level (column 6 of Table 5), and the number of years of record for each reservoir also is given (column 7). Most reservoirs serve as public water supplies, with the exceptions noted in the last column.

Compared to levels at the end of March at 38 reservoirs, the water surface elevation at the end of April had risen at 6 reservoirs, was the same as last month at 8 reservoirs, and had decreased at 24 reservoirs. For the 38 reservoirs with observations reported at the end of April, 16 reservoirs had water surface levels above the normal pool (or target operating level), 9 reservoirs were at normal pool, and 13 reservoirs were below normal pool. Canton Lake remains nearly 3 feet below normal pool.

Major Reservoirs. Water levels at Carlyle Lake and Rend Lake were about the same as at the end of March. Levels at Lake Shelbyville decreased about 2 feet, toward its seasonal target level. The three lakes each remain above their seasonal target levels.

Great Lakes. Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The April mean level for Lake Michigan was 577.4 feet, compared to a mean level of 576.8 feet in 2003. The long-term average lake level for April is 578.8 feet, based on 1918–2002 data. Historically, the lowest mean level for Lake Michigan in April occurred in 1964 at 576.1 feet, and the highest level occurred in 1986 at 581.5 feet. The month-end level of Lake Michigan was 577.5 feet.

Table 4. Provisional Mean Flows, April 2004

Station	Drainage area (sq mi)	Years of record	2004 mean flow (cfs)	Long-term flows		Flow condition	Percent chance of exceedence	Days of data this month
				Mean* (cfs)	Median (cfs)			
Rock River at Rockton	6363	68	6336	7367	6796	normal	56	30
Rock River near Joslin	9549	60	8984	10,840	10,075	normal	56	30
Pecatonica River at Freeport	1326	84	1113	1224	1010	normal	43	30
Green River near Geneseo	1003	64	638	1078	960	normal	67	30
Edwards River near New Boston	445	65	286	553	443	normal	66	30
Kankakee River at Momence	2294	85	1830	3497	3559	below normal	88	30
Iroquois River near Chebanse	2091	79	1813	3221	3070	normal	69	30
Fox River at Dayton	2642	83	2327	3284	2790	normal	67	30
Vermilion River at Pontiac	579	59	540	811	673	normal	62	30
Spoon River at Seville	1636	86	776	1865	1536	below normal	76	30
LaMoine River at Ripley	1293	79	298	1583	1257	below normal	84	30
Bear Creek near Marceline	349	58	67	421	324	below normal	80	30
Mackinaw River near Congerville	767	54	760	1060	963	normal	68	30
Salt Creek near Greenview	1804	61	1832	2425	1981	normal	56	29
Sangamon River at Monticello	550	90	903	807	679	normal	35	30
South Fork Sangamon near Rochester	867	53	699	1071	781	normal	53	30
Illinois River at Valley City	26,743	64	26,560	37,460	33,795	normal	67	30
Macoupin Creek near Kane	868	74	233	1162	596	below normal	74	27
Vermilion River near Danville	1290	81	1254	1860	1579	normal	60	29
Kaskaskia River at Vandalia	1940	33	2047	2532	1998	normal	49	30
Shoal Creek near Breese	735	59	251	987	693	below normal	80	30
Embarras River at Ste. Marie	1516	89	1625	2200	1678	normal	53	30
Skillet Fork at Wayne City	464	83	111	785	701	below normal	88	30
Little Wabash below Clay City	1131	88	756	1647	1143	normal	61	30
Big Muddy at Plumfield	794	32	459	1504	1381	below normal	82	30
Cache River at Forman	244	79	142	567	517	below normal	84	30

Notes:

N/A = not available

Much below normal flow = 90-100% chance of exceedence.

Below normal flow = 70-90% chance of exceedence.

Normal flow = 30-70% chance of exceedence.

Above normal flow = 10-30% chance of exceedence.

Much above normal flow = 0-10% chance of exceedence.

*As reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 2002.

Table 5. Reservoir Levels in Illinois, April 2004

For security considerations, statewide tabular reservoir data are not available on the Internet. Specific data requests may be made to Sally McConkey at: sally@sws.uiuc.edu.

Groundwater Information (Ken Hlinka)

Comparison to Average Levels. Shallow groundwater levels in 16 observation wells, which are remote from pumping centers were below average levels for April by 2.5 feet and ranged from 14.7 feet below to 1.0 feet above average (Table 6). With the exception of two sites (Crystal Lake in McHenry County and Good Hope in McDonough County), all sites in the state reported below normal levels. Northern Illinois continues to report the largest deviations at Cambridge (Henry County) and Mt. Morris (Ogle County).

Comparison to Previous Month. Shallow groundwater levels were below those of March. Levels averaged 1.6 feet lower and ranged from 9.5 feet lower to 2.9 feet higher than March levels.

Comparison to Same Month, Previous Year. Shallow groundwater levels in April were above levels of a year ago. Levels averaged 0.5 feet higher and ranged from 4.0 feet lower to 5.9 feet above levels last year.

Table 6. Month-End Shallow Groundwater Level Data Sites, April 2004

Number	Well name	County	Well depth (feet)	This month's reading (depth to water, feet)	Deviation from			
					15-year avg. level (feet)	Period of record avg. (feet)	Previous month (feet)	Previous year (feet)
1	Galena	JoDaviess	25.00	21.33	-0.44	-0.39	-0.37	-0.08
2	Mt. Morris	Ogle	55.00	30.12	-12.92	-12.23	+2.28	+2.86
3	Crystal Lake	McHenry	18.00	3.14	+0.54	+0.95	+2.85	+3.33
4	Cambridge	Henry	42.00	20.96	-13.99	-14.66	-9.47	+5.85
5	Fermi Lab	DuPage	17.00	6.94	-2.33	-2.15	-5.17	+0.87
6	Good Hope	McDonough	30.00	4.74	+0.49	+0.85	-0.64	+3.02
7	Snicarte	Mason	42.00	39.02	-2.36	-2.31	+0.08	-1.26
8	Coffman	Pike	28.00	9.28	-1.72	-1.06	-0.96	-3.97
9	Greenfield	Greene	20.70	7.34	+0.18	-0.33	-2.15	+5.05
10	Janesville	Cumberland	11.00	5.49	-1.01	-0.92	-0.69	+0.32
11	St. Peter	Fayette	15.00	3.50	-1.41	-1.27	-2.62	-2.21
12	SWS #2	St. Clair	80.00	N/A	N/A	N/A	N/A	N/A
13	Boyleston	Wayne	23.00	4.36	-1.85	-1.58	-3.07	-1.72
14	Sparta	Randolph	27.00	5.96	-1.98	-1.15	-2.02	-1.84
15	SE College	Saline	10.19	4.32	-2.10	-1.98	-2.55	-0.13
16	Dixon Springs	Pope	8.63	3.21	-1.03	-1.22	-0.53	-1.97
17	Bondville	Champaign	21.00	3.68	-1.00	-0.91	-0.88	+0.27
Averages					-2.68	-2.52	-1.62	+0.52

Notes:

N/A - Data not available.

Addendum

Long-Term Precipitation Networks (Nancy Westcott)

Imperial Valley Precipitation. April 2004 precipitation amounts (Figure 5a) were below average, with all precipitation falling in the last week of the month. Gage amounts were highest in the northeastern portion of the network and lowest in the south-central region of the network. Individual gage totals ranged from 2.63 inches at site #3 to 1.40 inches at site #21. The 30-year, 1971–2000, average precipitation amounts for April at Havana and Mason City, are 3.45 and 3.34 inches, respectively. The April 2004 network average of 1.78 inches was about 48.5 percent of the 11-year (1992–2002) April network average of 3.67 inches.

Cook County Precipitation. April 2004 precipitation amounts were low (Figure 5b). Precipitation was greatest in the southern portion of the network and lightest in the northern portion. Precipitation values ranged from 2.42 inches at site #16 (Palos Park) to 0.82 inches at site #5 (Franklin Park). The April 2004 network average of 1.55 inches was about 42 percent of the 14-year (1990–2003) April network average of 3.66 inches.

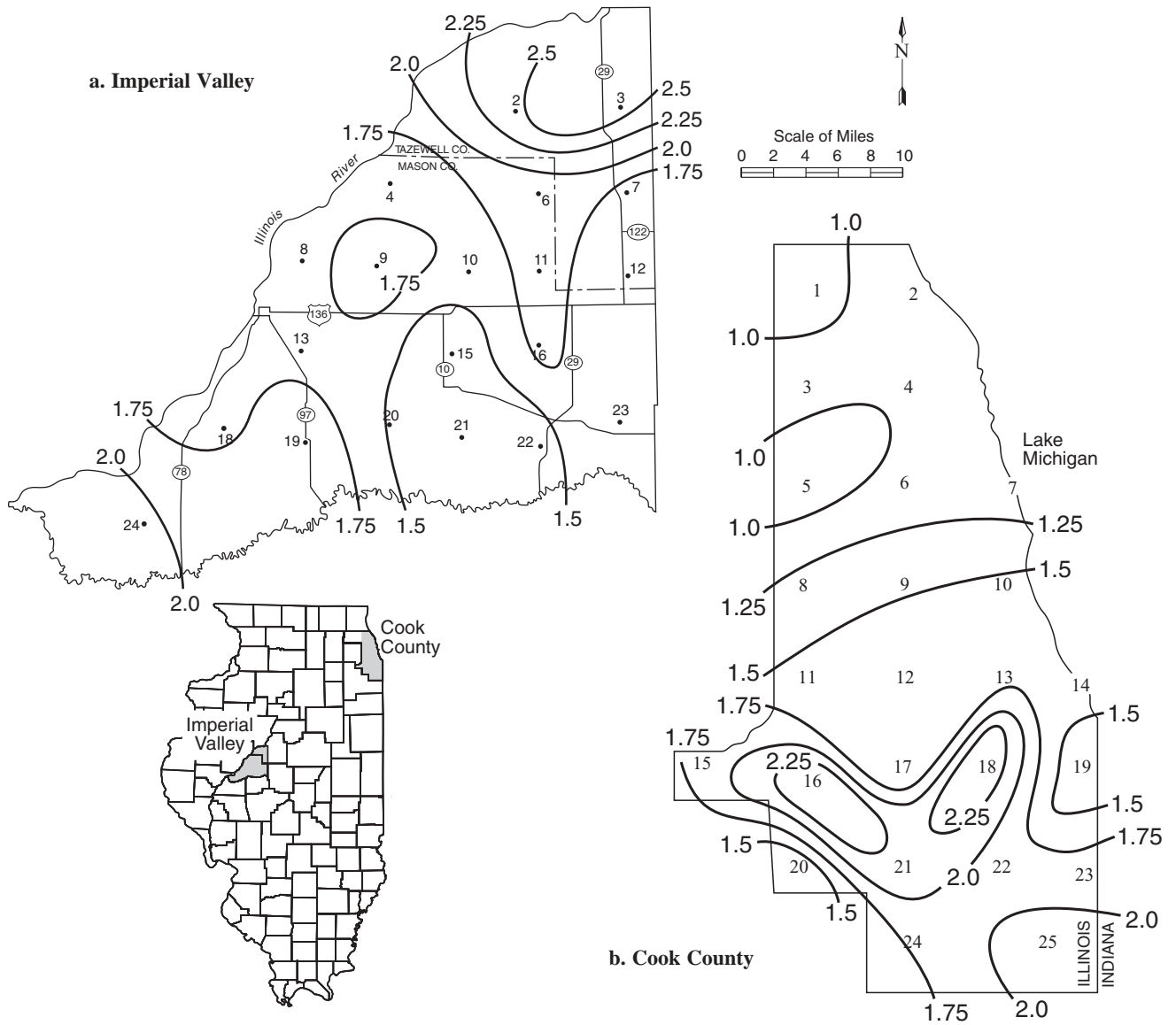


Figure 5. Long-term raingage network precipitation totals (inches) for April 2004

Data sources for information in this publication include the following:
 CPC - Climate Prediction Center, <http://www.cpc.ncep.noaa.gov/products/predictions/>
 ISWS - Illinois State Water Survey, <http://www.sws.uiuc.edu/>
 MRCC - Midwestern Regional Climate Center, <http://mrcc.sws.uiuc.edu/>
 NCDC - National Climate Data Center, <http://www.ncdc.noaa.gov/>
 NWS - National Weather Service, <http://www.nws.noaa.gov/>
 USACE - U.S. Army Corp of Engineers, <http://water.mvr.usace.army.mil/>
 USGS - U.S. Geological Survey, <http://water.usgs.gov/>
 WARM - Water and Atmospheric Resources Monitoring Program, <http://www.sws.uiuc.edu/warm/>

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