

## ILLINOIS WATER AND CLIMATE SUMMARY November 2006

### November 2006 Overview (Bob Scott)

Temperatures in Illinois during November were above average, and precipitation was near average. Soil moisture within the top 40 inches of soil was below the long-term statewide normal. Streamflows were above median heights. Shallow groundwater levels continued to be below long-term average depths for the 20th consecutive month.

**Temperatures** across Illinois (Figure 1) for November were above average (a +2.4-degree departure). Crop Reporting District (CRD) temperatures ranged from 0.3 degrees above average (southeast) to 3.5 degrees above average (northwest).

**Precipitation** amounts for Illinois in November were near average (Figure 1). The statewide average of 3.35 inches represents a +0.03-inch departure or 101 percent of average for the month. Rainfall totals varied from 2.85 inches (93 percent of average) in the east CRD to 4.38 inches (101 percent) in the southeast CRD. Divisional percent-of-normal extremes for the month ranged from 83 percent (east-southeast) to 125 percent (northwest).

**Soil moisture** in Illinois in the 0- to 40-inch (0- to 100-centimeter) layer at the end of November was slightly below normal (Figure 1). Conditions near the surface were near normal. Deeper layers continued to be dry in central Illinois, but normal to above normal elsewhere.

**Mean provisional streamflow** statewide was above the median flow in November, 193 percent of median (Figure 1). Rivers in Illinois recorded monthly mean discharges in the much below normal to much above normal range this month. Peaks on major rivers did not exceed flood stage.

**Water surface levels** at the end of November were below the normal pool/target operating level at 17 of 32 reporting reservoirs. At the end of the month, Rend Lake and Carlyle Lake were 2.2 and 1.7 feet above their respective seasonal target levels, while Lake Shelbyville was 0.4 feet below its target level. Lake Michigan's mean level remains below its long-term average.

Statewide, **shallow groundwater levels** continued to be below normal with an average departure of -0.4 feet. Levels averaged 0.8 feet higher than October levels. Combined with the change in normal monthly groundwater levels between October and November, a 0.1-foot decrease in departure from last month was observed (Figure 1). Levels were approximately 2.1 feet above November levels of last year. The well at Greenfield reported a record low for November.

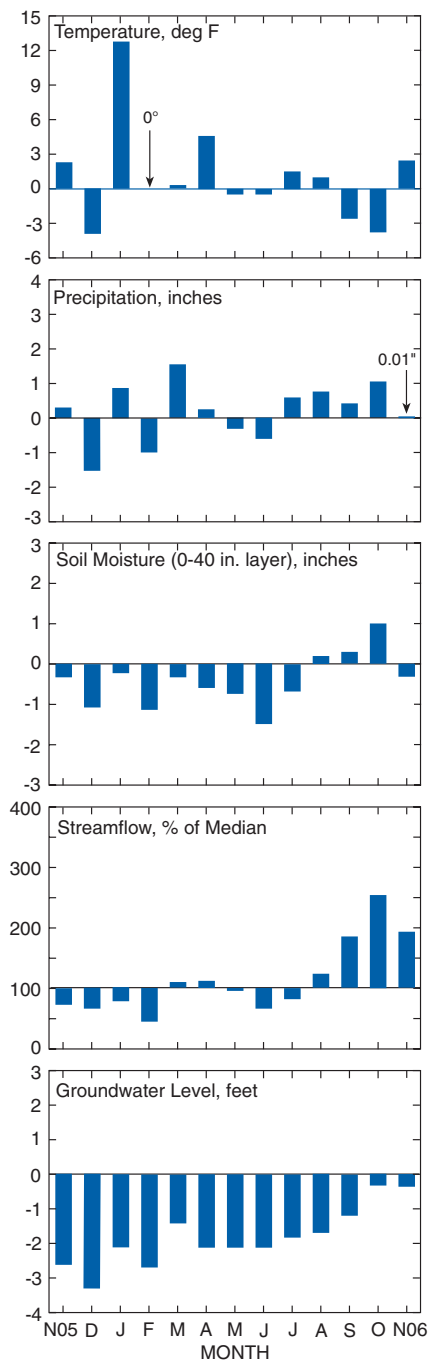


Figure 1.  
Statewide departures from normal

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

### Contact

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## Weather/Climate Information (Jim Angel and Bob Scott)

**Temperatures** across Illinois for November were above normal (Figure 2 and Table 1), the 24th warmest November since 1895. Extremes ranged from 14°F on November 4 at Elizabeth (Jo Daviess County) to 80°F on November 9 at Belleville (St. Clair County).

**Precipitation** for November was near normal statewide (Figure 2 and Table 1). La Harpe (Hancock County) reported the highest one-day precipitation, 3.20 inches on November 30. Flora (Clay County) reported the highest monthly total, 5.35 inches.

No significant **snowfall** or **severe weather** was reported in Illinois during November. A major ice storm began on November 30, but storm data at most sites were observed on December 1 and will be reported next month.

**Illinois Climate Network (ICN) Data.** Average daily wind speeds in Illinois for November (Figure 3) ranged from 3.8 mph at Dixon Springs to 11 mph at Bondville and Monmouth. Highest wind gusts, near 45 mph, were recorded at Bondville on November 10, 15, and 16. The prevailing wind direction was southerly across central Illinois but had a strong westerly component across the remainder of the state. Wind speeds in excess of 8 mph varied from a total of 60 hours at Rend Lake to 516 hours at Monmouth. (November has 720 hours.) Average air temperatures in November ranged from 40°F at DeKalb and Freeport to 47°F at Dixon Springs, Carbondale, and Fairfield.

Solar radiation totals in November varied from 171 Mega-Joules per square meter (MJ/m<sup>2</sup>) at St. Charles to near 230 MJ/m<sup>2</sup> in far southern and western Illinois. Potential evapotranspiration totals ranged from 1.1 inches at St. Charles to 1.6 inches at Belleville. Soil temperatures at the 4-inch level ranged from 39°F at Big Bend to 51°F at Carbondale. Soil temperatures at the 8-inch level were similar and varied from 43°F at Big Bend to 55°F at Carbondale.

**Extended climate outlooks** issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climate Prediction Center for December call for above normal temperatures and equal chances of above, below, and normal precipitation. Outlooks for climatological winter (December–February) call for above normal temperatures and below normal precipitation across the state.

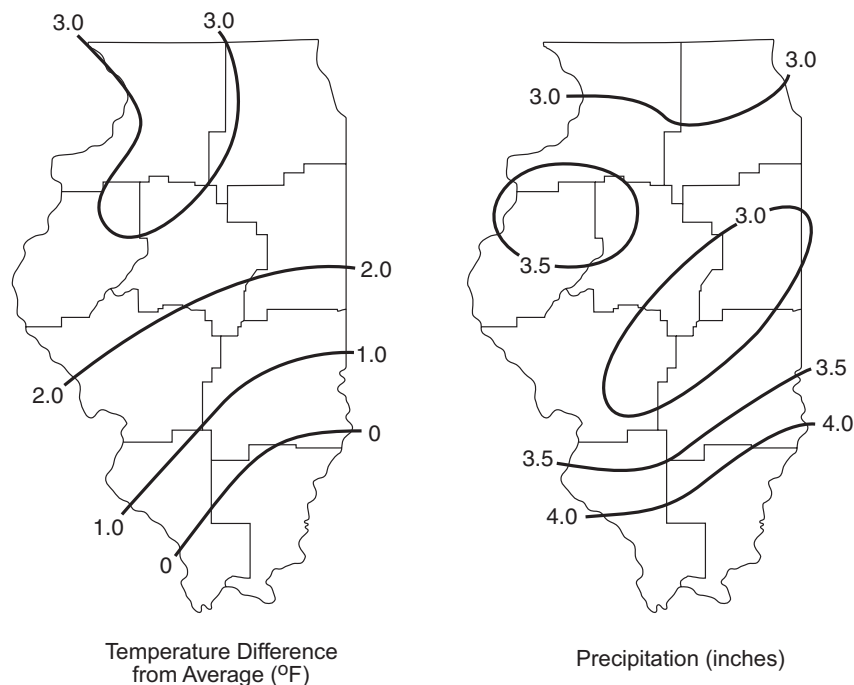


Figure 2. Illinois temperature and precipitation during November 2006

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

Crop Reporting District	<u>Last Month</u>			<u>Last 3 Months</u>			<u>Last 6 Months</u>			<u>Last 12 Months</u>		
	Nov 06 Amount	% Avg	Temp Dev	Sep 06- Nov 06	% Avg	Temp Dev	Jun 06- Nov 06	% Avg	Temp Dev	Dec 05- Nov 06	% Avg	Temp Dev
Northwest	3.20	125	3.5	9.66	111	-1.0	21.62	102	-0.2	37.76	104	1.2
Northeast	3.01	104	3.2	12.28	136	-1.2	23.89	114	-0.2	40.65	111	1.1
West	3.53	123	3.2	8.48	90	-1.0	17.51	83	0.0	30.49	81	1.3
Central	3.39	115	3.2	9.25	103	-0.9	19.79	96	-0.1	34.95	94	1.2
East	2.85	93	2.8	10.17	114	-1.1	22.22	107	-0.4	39.54	105	0.8
West-southwest	2.95	87	2.5	9.41	102	-1.4	19.53	98	-0.2	32.41	86	1.1
East-southeast	3.19	83	1.2	10.89	110	-1.9	21.34	100	-0.6	41.95	102	0.7
Southwest	4.09	96	0.8	13.98	133	-1.9	24.64	114	-0.4	44.42	104	0.9
Southeast	4.38	101	0.3	16.85	162	-2.1	29.89	140	-0.5	53.09	119	0.9
<b>State Average</b>	<b>3.35</b>	<b>101</b>	<b>2.4</b>	<b>11.00</b>	<b>117</b>	<b>-1.4</b>	<b>22.00</b>	<b>105</b>	<b>-0.3</b>	<b>39.00</b>	<b>101</b>	<b>1.0</b>

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

### Soil Moisture Information (Bob Scott)

Precipitation was near average across most of Illinois during November, except for slightly below average totals in southwestern Illinois. Combined with rainfall in prior months, soil moisture conditions observed near the surface were near normal across Illinois, except for below normal conditions in southwestern Illinois (Figure 4). Values in the 0- to 6-inch layer ranged from 57 percent of normal at Belleville to 132 percent at DeKalb. Values in the 6- to 20-inch layer were closer to normal, varying from 77 percent at Springfield to 126 percent at Carbondale. Deeper layers were considerably drier in central Illinois, but near to above normal elsewhere. Values in the 20- to 40-inch layer varied from 20 percent at Springfield to 155 percent at Carbondale and Rend Lake. Amounts in the 40- to 72-inch layer ranged from less than 10 percent at East Peoria to 144 percent at Rend Lake and 132 percent at Monmouth. Overall, soil moisture in Illinois at the end of November was slightly below normal (Figure 1).

Compared to conditions at the end of October, soil moisture during November showed scattered increases and decreases in various parts of the state (Table 2). Moisture values near the surface increased by about 28 percent at Monmouth and Freeport, but decreased by 27 percent at Rend Lake (Ina). Increases were observed in the 6- to 20-inch layer at Belleville (58 percent), East Peoria (35 percent), Springfield (17 percent), and Monmouth (15 percent). Increases also occurred in the 20- to 40-inch layer at Belleville (37 percent), Topeka (21 percent), and Brownstown (18 percent). Elsewhere, changes at most sites in all layers were small.

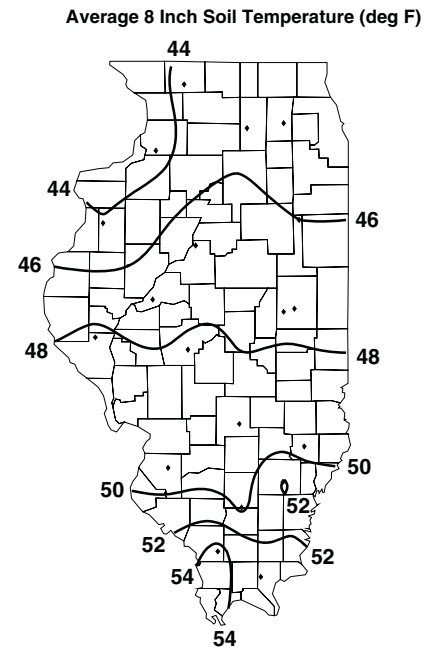
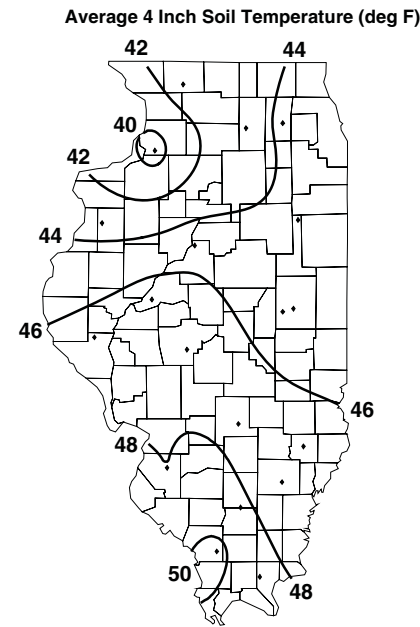
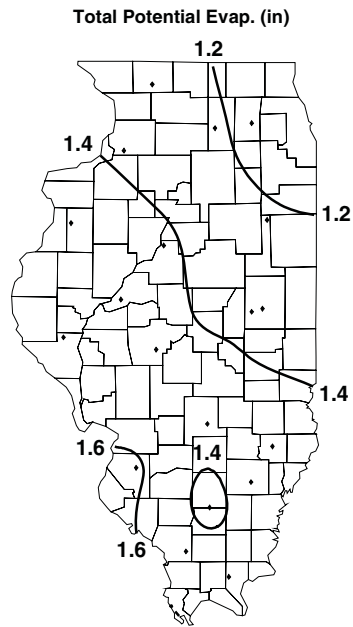
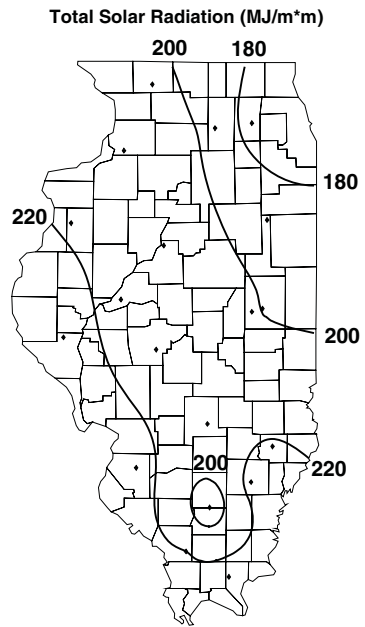
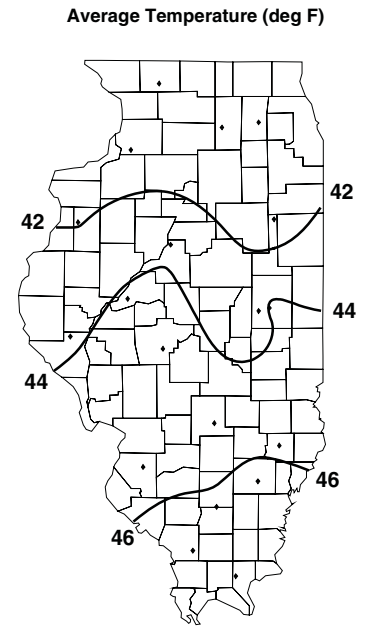
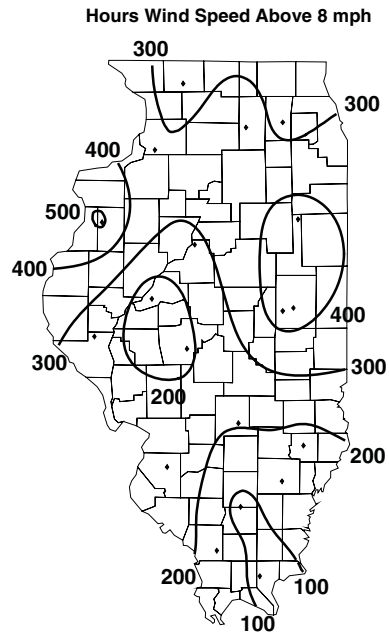
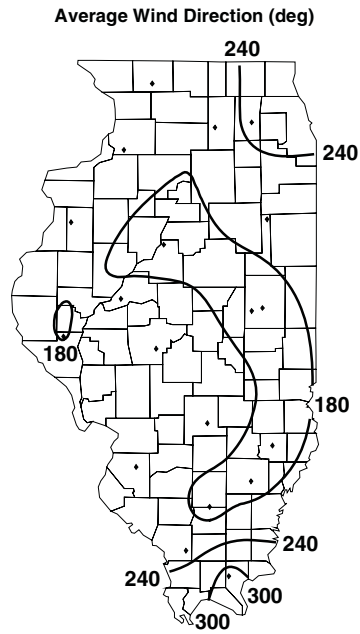
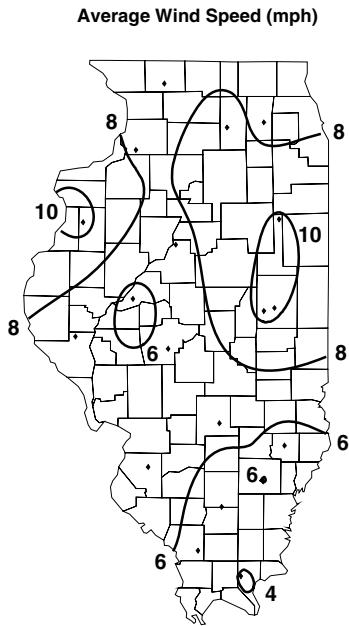


Figure 3. November monthly averages and totals as collected by the Illinois Climate Network

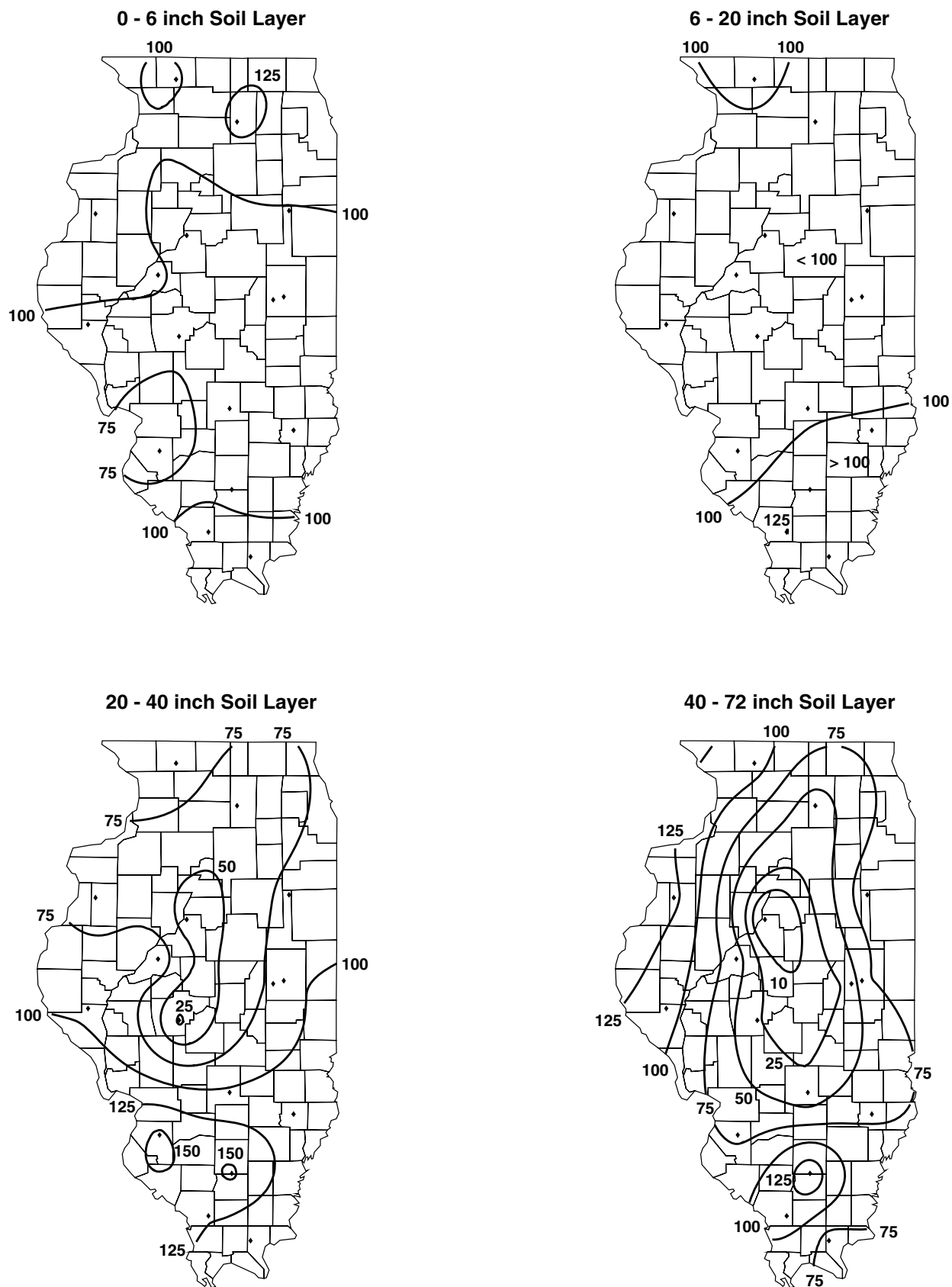


Figure 4. December 1 observed percent-of-normal soil moisture based on 1985-1995 mean

**Table 2. Soil Moisture in Various Layers on December 1, 2006**

<i>Location</i>	<i>Dec 1 0 - 6 (inches)</i>	<i>Change from Nov 1 (%)</i>	<i>Dec 1 6 - 20 (inches)</i>	<i>Change from Nov 1 (%)</i>	<i>Dec 1 20 - 40 (inches)</i>	<i>Change from Nov 1 (%)</i>
Freeport (NW)	2.1	27	4.8	7	7.1	-1
DeKalb (NE)	2.5	15	4.8	5	6.1	-1
Monmouth (W)	2.3	28	4.1	15	5.4	-2
East Peoria (C)	1.7	4	4.8	35	6.8	4
Topeka (C)	1.1	8	2.6	0	3.1	21
Stelle (E)	2.1	-1	4.8	0	6.5	0
Champaign (E)	1.9	4	5.0	-1	6.4	3
Bondville (E)	2.1	1	4.7	3	7.1	3
Perry (WSW)	2.0	-4	5.0	1	7.2	-1
Springfield (WSW)	1.8	-13	4.8	17	6.3	2
Brownstown (ESE)	1.9	7	4.2	6	7.5	18
Olney (ESE)	N/A	N/A	N/A	N/A	N/A	N/A
Belleville (SW)	1.4	-4	4.0	58	8.0	37
Carbondale (SW)	2.5	-7	5.1	-1	8.1	2
Ina (SE)	2.0	-27	5.3	-3	7.8	0
Fairfield (SE)	2.5	-17	5.4	-2	7.2	-3
Dixon Springs (SE)	2.6	4	5.5	-1	8.0	-1

**Note:**

N/A = Data not available.

**Surface Water Information (Bill Saylor and Vern Knapp)**

**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 the USGS.

Table 3 lists the provisional peak stage for the current month compared to flood stage at selected streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers. The peak stage is determined from the daily morning readings posted by the National Weather Service and/or the USACE. Peak stages at all stations listed in Table 3 were below flood stage in November.

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

The statewide percent of historical mean flow and percent of historical median flow are calculated by dividing the sum of the average flows this month at stations in Table 4 by the sum of the historical mean and median flows calculated for the month, respectively, at the same stations. This method is intended to weight individual observations proportionately in the aggregate comparison. (The Illinois River and Rock River stations are excluded from the statewide calculation because other rivers listed in Table 4 contribute to their flow.)

Mean provisional flow statewide was above the median value for November (193 percent of the median) and slightly above the long-term mean for the month (106 percent of the mean). Mean streamflow conditions in November ranged from normal to above normal at most Table 4 stations.

**Table 3. Peak Stages for Major Rivers, November 2006**

<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	16	9.6	30
	La Salle	224.7	20	15.9	30
	Peoria	164.6	18	13.2	16
	Havana	119.6	14	9.0	21
	Beardstown	88.6	14	10.4	15
	Hardin	21.5	25	20.3	27
Mississippi	Dubuque	579.9	17	7.8	28
	Keokuk	364.2	16	4.2	30
	Quincy	327.9	17	11.7	30
	Grafton	218.0	18	16.2	16
	St. Louis	180.0	30	-0.2	17
	Chester	109.9	27	3.1	17
	Thebes	43.7	33	8.8	18
Ohio	Cairo	2.0	40	30.5	21

**Notes:**

\*River mile and flood stage from *River Stages in Illinois: Flood and Damage Data*, Illinois Department of Natural Resources, Office of Water Resources, August 2004 (except as revised by the National Weather Service).

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

**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 obtained from a network of cooperating reservoir operators who are contacted each month by ISWS staff for the current water levels. Reservoir levels are reported in terms of their difference from normal pool (or target level). 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 end-of-October water levels at 32 reservoirs, end-of-November water levels increased at 18 reservoirs, decreased at 7 reservoirs, and were the same as last month at 7 reservoirs. For the 32 reservoirs with observations reported at the end of November, 13 reservoirs were above normal pool (or target operating level), 2 reservoirs were at normal pool or spillway elevation, and 17 reservoirs were below normal pool.

**Major Reservoirs.** Compared to end-of-October water levels, end-of-November water levels had increased about half a foot at Lake Shelbyville and at Rend Lake, and had decreased slightly at Carlyle Lake. At the end of November, the water surface level was 2.2 feet above the target level at Rend Lake, 1.7 feet above the seasonal target level at Carlyle Lake, and 0.4 feet below the seasonal target level at Lake Shelbyville.

**Great Lakes.** Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The November mean level for Lake Michigan was 577.2 feet, compared to a mean level of 577.2 feet in November 2005. The long-term average lake level for November is 578.8 feet, based on 1918–2005 data. Historically, the lowest mean level for Lake Michigan in November occurred in 1964 at 576.3 feet, and the highest level occurred in 1986 at 582.0 feet. The month-end level of Lake Michigan was 577.3 feet.

**Table 4. Provisional Mean Flows, November 2006**

<i>Station</i>	<i>Drainage area (sq mi)</i>	<i>Years of record</i>	<i>2006 mean flow (cfs)</i>	<i>Long-term flows</i>		<i>Flow condition</i>	<i>Percent chance of exceedence</i>	<i>Days of data this month</i>
				<i>Mean* (cfs)</i>	<i>Median (cfs)</i>			
Rock River at Rockton	6363	71	4456	3524	3199	above normal	22	30
Rock River near Joslin	9549	63	5857	5168	4712	normal	34	30
Pecatonica River at Freeport	1326	87	699	749	614	normal	44	30
Green River near Geneseo	1003	67	385	447	327	normal	40	30
Edwards River near New Boston	445	68	49	169	85	normal	64	30
Kankakee River at Momence	2294	88	2202	1564	1202	above normal	21	30
Iroquois River near Chebanse	2091	82	1685	996	428	above normal	18	30
Fox River at Dayton	2642	86	2002	1481	1311	above normal	23	30
Vermilion River at Pontiac	579	62	278	243	58	normal	41	30
Spoon River at Seville	1636	89	109	614	329	below normal	79	30
LaMoine River at Ripley	1293	82	25	527	203	much below normal	92	30
Bear Creek near Marceline	349	61	11	161	29	normal	58	30
Mackinaw River near Congerville	767	57	223	280	63	above normal	28	30
Salt Creek near Greenview	1804	64	593	808	277	above normal	29	30
Sangamon River at Monticello	550	93	229	249	85	above normal	29	30
South Fork Sangamon near Rochester	867	56	47	285	101	normal	63	30
Illinois River at Valley City	26,743	67	14,470	14,510	11,505	normal	37	30
Macoupin Creek near Kane	868	77	51	320	107	normal	63	30
Vermilion River near Danville	1290	84	987	613	231	above normal	14	30
Kaskaskia River at Vandalia	1940	36	92	1024	771	normal	59	30
Shoal Creek near Breese	735	62	57	311	139	normal	43	30
Embarras River at Ste. Marie	1516	92	853	759	332	normal	31	30
Skillet Fork at Wayne City	464	86	447	269	70	above normal	17	30
Little Wabash below Clay City	1131	91	1163	594	217	above normal	16	30
Big Muddy at Plumfield	794	35	1059	402	113	much above normal	8	30
Cache River at Forman	244	82	570	192	84	above normal	11	30

**Notes:**

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 2005.



**Table 5. Reservoir Levels in Illinois, November 2006**

**For security considerations, statewide tabular reservoir data are not available on the Internet. Specific data requests may be made to Bill Saylor at: [wsaylor@sws.uiuc.edu](mailto:wsaylor@sws.uiuc.edu).**

## Groundwater Information (Ken Hlinka)

**Comparison to Average Levels.** Shallow groundwater levels in 15 observation wells, which are remote from pumping centers, were below average levels for the 20th consecutive month. November levels were 0.4 feet below normal and ranged from 5.0 feet below to 4.5 feet above normal levels (Table 6). One well, Greenfield (Greene County), was at a record low for November. The water level at Snicarte (Mason County) was again below the bottom of the well.

**Comparison to Previous Month.** Shallow groundwater levels were above those of October. Levels averaged 0.8 feet higher and ranged from 3.2 feet below to 4.0 feet above levels last month.

**Comparison to Same Month, Previous Year.** Shallow groundwater levels in November were above levels measured one year ago. Levels averaged 2.1 feet higher and ranged from 1.8 feet lower to 6.6 feet higher than during November 2005.

**Table 6. Month-End Shallow Groundwater-Level Data Sites, November 2006**

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	21.67	-0.51	-0.12	+0.33	+0.63
2	Mt. Morris	Ogle	55.00	25.32	-4.95	-4.98	-0.19	+2.46
3	Crystal Lake	McHenry	18.00	6.05	-0.33	-0.35	-0.03	+1.65
4	Cambridge	Henry	42.00	N/A	N/A	N/A	N/A	N/A
5	Fermi Lab	DuPage	17.00	7.20	+0.83	+0.18	-3.19	+6.56
6	Good Hope	McDonough	30.00	9.65	-0.56	-0.13	+3.20	+4.10
7	Snicarte	Mason	40.30	40.30	N/A	N/A	N/A	N/A
8	Coffman	Pike	28.00	16.98	-5.28	-4.03	-0.09	-0.61
9	Greenfield	Greene	20.70	19.30*	-4.67	-4.79	-0.02	-1.23
10	Janesville	Cumberland	11.00	5.75	-0.28	-0.30	+1.02	+0.77
11	St. Peter	Fayette	15.00	3.13	-0.09	-0.28	+0.20	+0.58
12	SWS #2	St. Clair	80.00	14.80	-1.37	+0.89	+1.72	N/A
13	Boyleston	Wayne	23.00	2.28	+3.54	+3.76	+4.01	+4.58
14	Sparta	Randolph	27.00	8.44	+0.11	+0.95	+0.85	-1.78
15	SE College	Saline	10.19	0.50	+4.76	+4.52	+3.80	+5.07
16	Dixon Springs	Pope	8.63	2.24	+2.94	+1.23	+0.05	+5.24
17	Bondville	Champaign	21.00	7.95	-2.23	-2.86	-0.15	+1.19
Averages					-0.54	-0.42	+0.77	+2.09

### Notes:

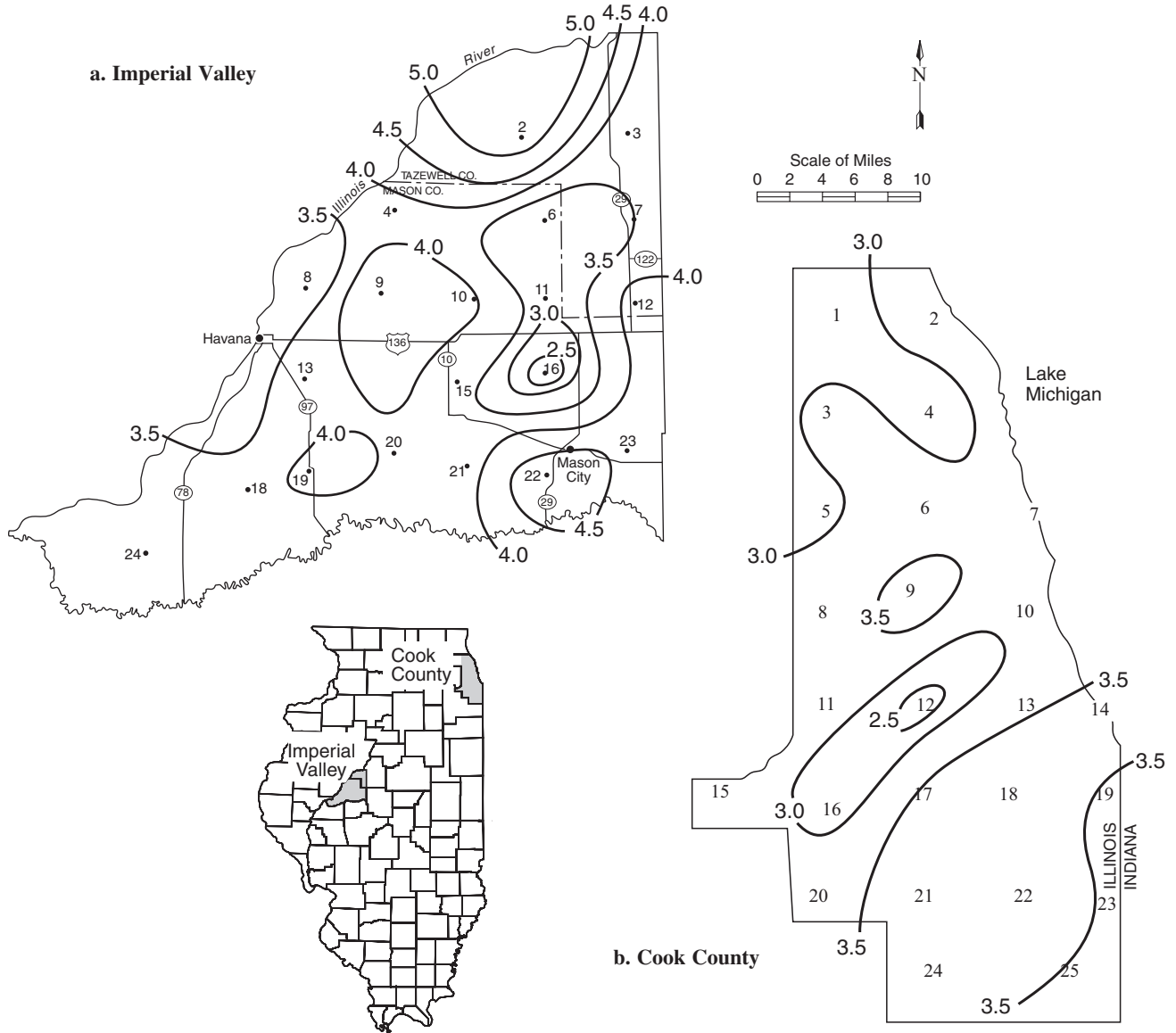
N/A = Data not available.

\*Well currently at record monthly low.

## Addendum (Nancy Westcott)

**Imperial Valley Precipitation.** November 2006 precipitation amounts (Figure 5a) were moderate. Monthly gage totals were greatest in the northern and southeastern regions of the network, and precipitation was lightest in the central portion of the network. Individual gage amounts ranged from 5.40 inches at site #2 to 2.43 inches at site #16. The 30-year, 1971–2000, average precipitation amounts for November at Havana and Mason City are 3.26 and 2.95 inches, respectively. The November 2006 network average of 3.05 inches was about 111 percent of the 14-year (1992–2005) November network average of 2.75 inches.

**Cook County Precipitation.** November 2006 precipitation amounts (Figure 5b) were moderate. The greatest precipitation was in the southern portion of the network, and the lightest precipitation was in the northwestern and far southern regions of the network. Precipitation values ranged from 3.96 inches at site #18 (West 119th Street) to 2.48 inches at site #12 (near Bedford Park). The November 2006 network average of 3.33 inches was about 110 percent of the 17-year (1989–2005) November network average of 3.02 inches.



**Figure 5. Long-term raingage network precipitation totals (inches) for November 2006**

*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 Corps of Engineers, <http://www.rivergages.com>

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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