

## ILLINOIS WATER AND CLIMATE SUMMARY September 2006

### September 2006 Overview (Bob Scott)

Temperatures in Illinois during September were below average, and precipitation was slightly above average. Soil moisture within the top 40 inches of soil was slightly above the long-term statewide normal. Mean streamflows were above median heights, their highest monthly departure since February 2005. Shallow groundwater levels rose in September but remained below long-term average depths for the 18th consecutive month. Water resources in Illinois are continuing a slow, but steady recovery from the 2005 drought.

**Temperatures** across Illinois (Figure 1) for September were below average (a -2.5-degree departure). Crop Reporting District (CRD) temperatures ranged from 2.0 degrees below average (central) to 3.2 degrees below average (southeast).

**Precipitation** amounts for Illinois in September were slightly above average (Figure 1). The statewide average of 3.61 inches represents a +0.43-inch departure or 113 percent of average for the month. Totals varied from 2.59 inches (73 percent of average) in the west CRD to 6.52 inches (215 percent of average) in the southeast CRD, which recorded its 4th wettest September on record.

**Soil moisture** in the 0- to 40-inch (0- to 100-centimeter) layer in Illinois at the end of September was slightly above normal (Figure 1). Conditions near the surface ranged from slightly below normal in central Illinois to well above normal elsewhere. Soils in deeper layers continued to be dry in central Illinois, but wetter elsewhere.

**Mean provisional streamflow** statewide was above the median flow in September, 186 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 the major rivers did not exceed flood stage.

**Water surface levels** at the end of September were below the normal pool/target operating level at 27 of 34 reporting reservoirs. At the end of the month, Rend Lake was 1.4 feet above its target level, Lake Shelbyville was 0.8 feet below its target level, and Carlyle Lake was 0.3 feet below its target level. Lake Michigan's mean level remains below the long-term average.

Statewide, **shallow groundwater levels** continue to be below normal with an average departure of -1.2 feet. Levels averaged 0.1 feet higher than August levels. This was concurrent with a decrease in normal monthly groundwater levels between August and September of 0.4 feet to show 0.5-foot increase in departures from last month (Figure 1). Levels were approximately 0.2 feet above September levels one year ago. The well at Greenfield reported a record low for September.

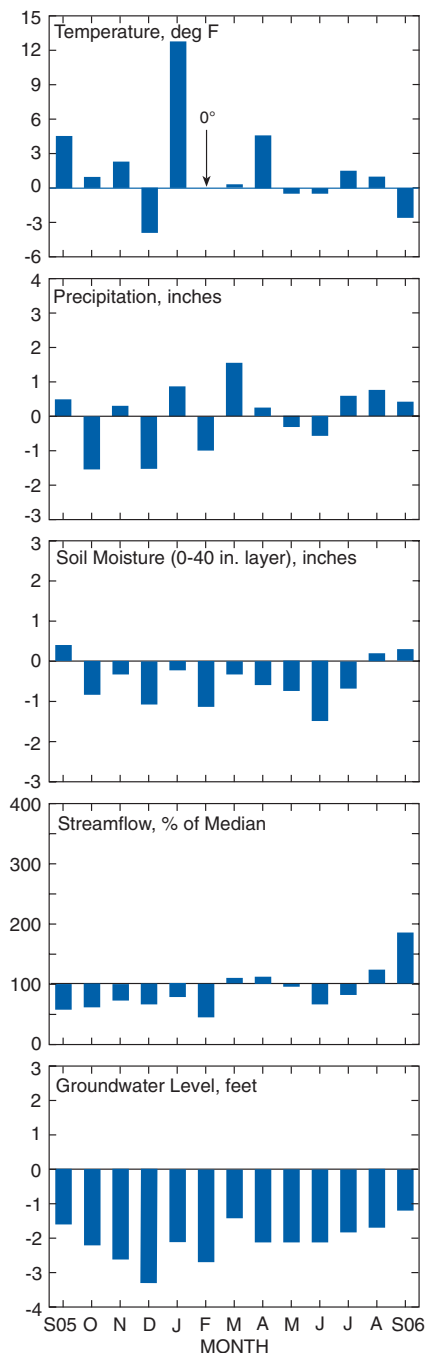


Figure 1.  
Statewide departures from normal

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

### Contact

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For more information, see [www.sws.uiuc.edu/warm](http://www.sws.uiuc.edu/warm)

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

**Temperatures** across Illinois for September were below normal (Figure 2 and Table 1). Extremes ranged from 92°F on September 17 at Belleville (St. Clair County) to 33°F on September 29 at Streamwood (Cook County). It was the 15th coolest September, 9th warmest January–September, and 11th warmest October–September since 1895.

**Precipitation** for September was above normal statewide (Figure 2 and Table 1). Morris (Grundy County) reported the highest one-day precipitation total, 4.16 inches on September 13. Smithland Lock and Dam (Pope County) reported the highest monthly total, 9.80 inches.

**Severe weather** in September included 10 reports of tornadoes in 6 counties on September 22 as severe weather swept across the state: Jackson (2), Massac (3), Pike (2), Pope (1), Randolph (1), and Washington (1). No injuries were reported, but Massac County had considerable building damage. Numerous incidences of wind damage and hail occurred across much of the state that same day. Hail and wind damage also occurred across north-central Illinois on September 4, west-central Illinois on September 11, and along the Indiana-Kentucky border of Illinois on September 27.

**Illinois Climate Network (ICN) Data.** Average daily wind speeds across Illinois for September (Figure 3) ranged from 2.6 mph at Dixon Springs to 7.7 mph at Stelle. Highest wind gusts of 33 mph were recorded at Carbondale (September 17) and at DeKalb (September 22). The prevailing wind direction ranged from westerly to southwesterly across the state. Wind speeds in excess of 8 mph varied from 25 hours at Dixon Springs to 292 hours at Stelle. (September has 720 hours.) Average air temperatures in September ranged from 60°F at DeKalb and Freeport to 65°F across southern Illinois.

Solar radiation totals continued their seasonal decline, varying from 405 Mega-Joules per meter squared (MJ/m<sup>2</sup>) at St. Charles to near 470 MJ/m<sup>2</sup> at Monmouth. Potential evapotranspiration observations varied from a low of 3.3 inches at St. Charles to 4.0 inches at Monmouth. Soil temperatures at the 4-inch level ranged from 61°F at Big Bend to 74°F at Carbondale, with similar temperatures at the 8-inch level, which ranged from 65°F at Big Bend and St. Charles to 77°F at Carbondale.

**Extended climate outlooks** issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climate Prediction Center for October call for equal chances of above, below, and normal temperatures and precipitation in Illinois. October–December outlooks call for equal chances of above, below, and normal temperatures, and below normal precipitation.

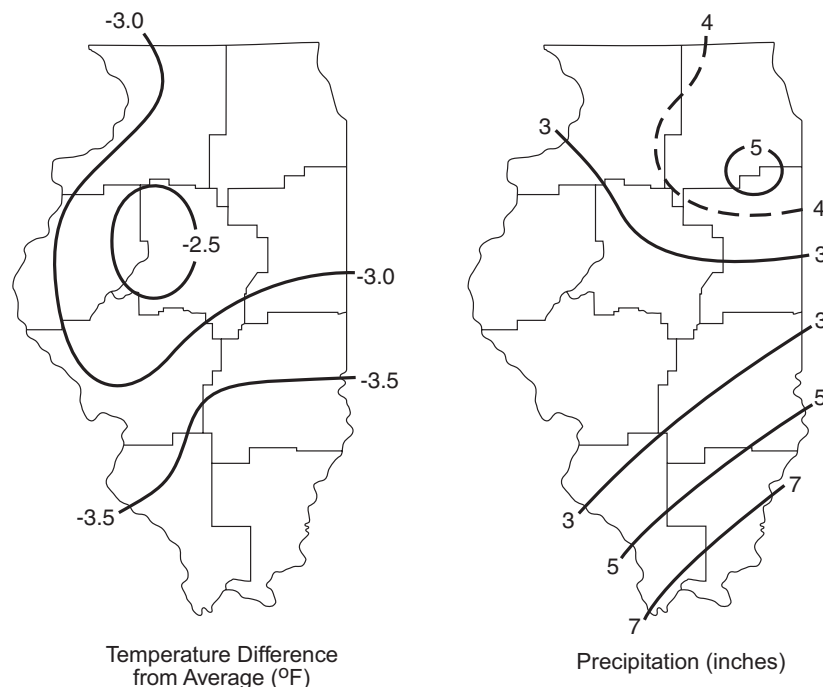


Figure 2. Illinois temperature and precipitation during September 2006

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

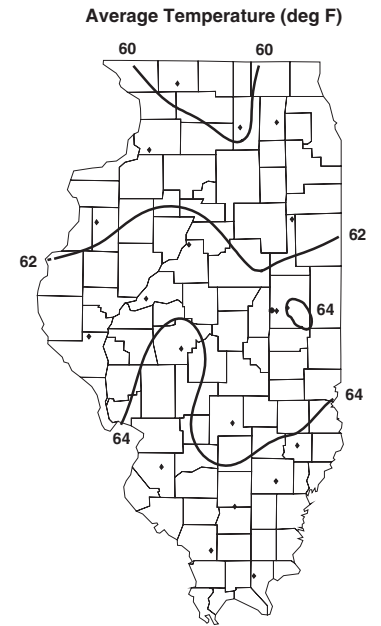
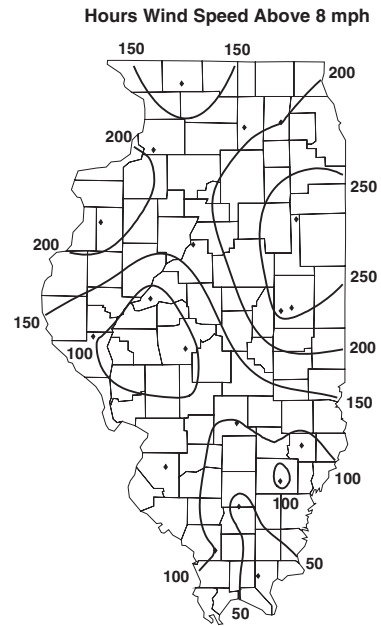
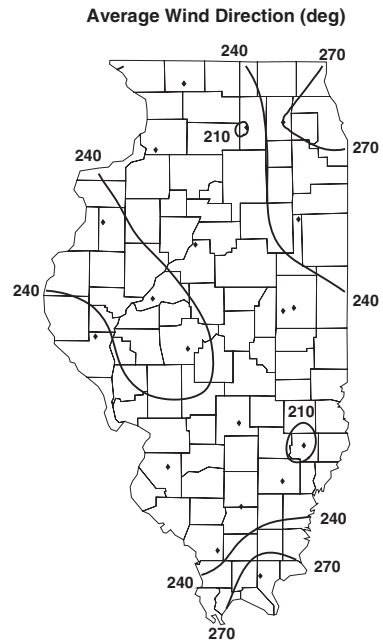
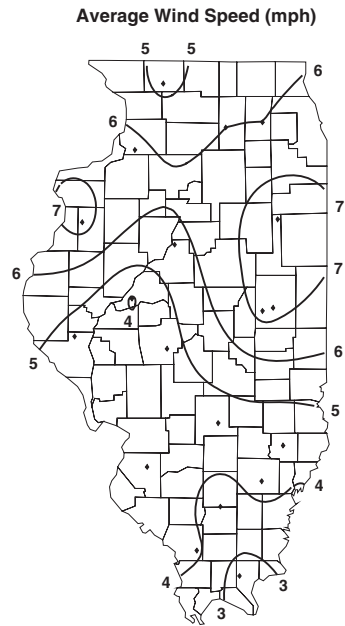
<i>Crop Reporting District</i>	<u><i>Last Month</i></u>			<u><i>Last 3 Months</i></u>			<u><i>Last 6 Months</i></u>			<u><i>Last 12 Months</i></u>		
	<i>Sep 06 Amount</i>	<i>% Avg</i>	<i>Temp Dev</i>	<i>Jul 06-Sep 06</i>	<i>% Avg</i>	<i>Temp Dev</i>	<i>Apr 06-Sep 06</i>	<i>% Avg</i>	<i>Temp Dev</i>	<i>Oct 05-Sep 06</i>	<i>% Avg</i>	<i>Temp Dev</i>
Northwest	3.40	103	-2.4	12.25	108	0.2	24.30	104	0.6	35.55	98	1.6
Northeast	4.41	132	-2.3	12.83	114	0.2	24.70	107	0.7	36.46	99	1.5
West	2.59	73	-2.2	10.30	92	0.4	19.26	82	1.0	31.01	83	1.7
Central	2.79	88	-2.0	11.40	107	0.4	21.93	98	0.8	33.67	91	1.6
East	3.51	118	-2.4	13.78	128	-0.2	25.99	115	0.2	38.53	103	1.1
West-southwest	3.02	100	-2.5	10.86	111	0.3	19.66	91	0.9	32.15	85	1.5
East-southeast	3.24	106	-3.0	10.56	100	-0.2	23.66	104	0.5	40.49	99	1.1
Southwest	3.86	121	-3.0	11.70	114	0.0	23.45	102	0.9	42.25	99	1.4
Southeast	6.52	215	-3.2	16.91	169	-0.3	28.90	124	0.7	50.89	114	1.4
<b>State Average</b>	<b>3.61</b>	<b>113</b>	<b>-2.5</b>	<b>12.11</b>	<b>114</b>	<b>0.1</b>	<b>23.35</b>	<b>102</b>	<b>0.7</b>	<b>37.42</b>	<b>96</b>	<b>1.4</b>

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

### Soil Moisture Information (Bob Scott)

Precipitation across most of Illinois during September was above average, but amounts were below average in western and central parts of the state. Combined with rainfall in prior months, this pattern led to below normal soil moisture near the surface (central and northwestern Illinois) but well above normal soil moisture elsewhere (Figure 4). Values in the 0- to 6-inch layer ranged from 57 percent of normal at East Peoria to 150 percent at Stelle, approximately 160 percent at Topeka and Perry, and 189 percent at Dixon Springs. Conditions in the 6- to 20-inch layer were more complex, with values of less than 10 percent at Springfield, 169 percent at Perry, and 200 percent at Carbondale. Values in the 20- to 40-inch layer ranged from 24 percent at Springfield to 165 percent in far southwestern Illinois. Soil moisture 40 to 72 inches deep varied from 10 percent at Topeka to 168 percent at Dixon Springs. Despite dry conditions in deeper layers, overall soil moisture at the end of September was slightly above normal statewide (Figure 1).

Compared to conditions at the end of August, changes in soil moisture during September spanned a considerable range across Illinois (Table 2). Moisture near the surface increased by 70 percent at Carbondale and by 30–45 percent at Brownstown, Perry, and Rend Lake. Conversely, decreases were significant at East Peoria (52 percent) and 27 percent at Springfield. Large increases were common in the 6- to 20-inch layer (122 percent at Belleville and 71 percent at Carbondale), except for significant decreases (roughly 15–20 percent) observed at Champaign, Bondville, and East Peoria. Changes in soil moisture in the 20- to 40-inch layer were small at most sites, maximizing with a 16-percent increase at Freeport and Topeka.



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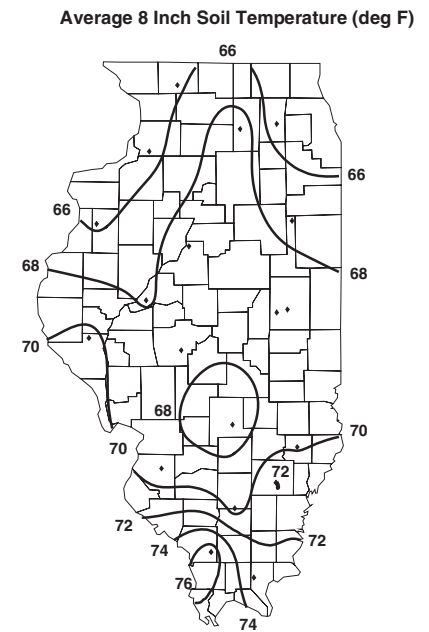
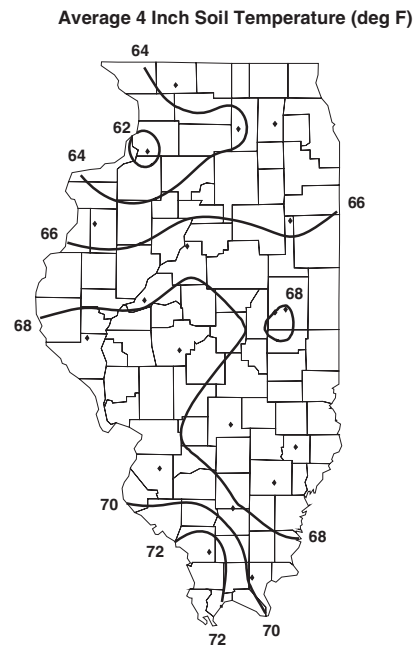
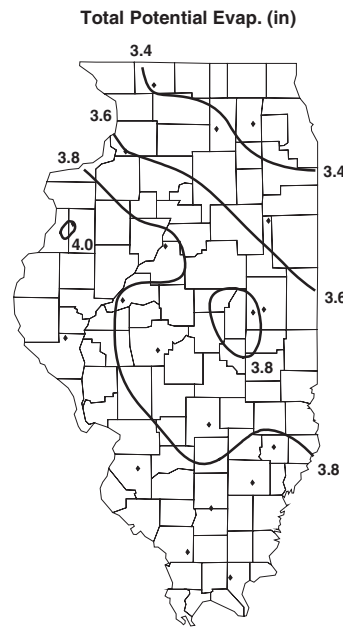
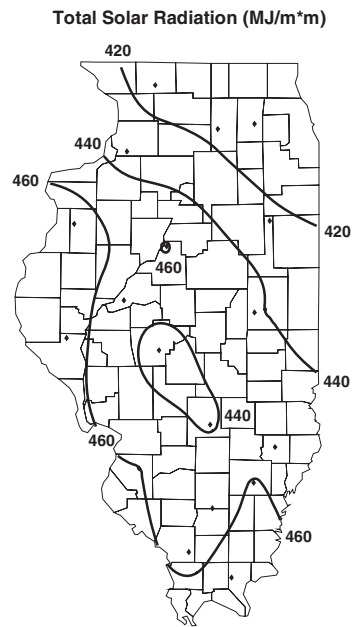


Figure 3. September monthly averages and totals as collected by the Illinois Climate Network

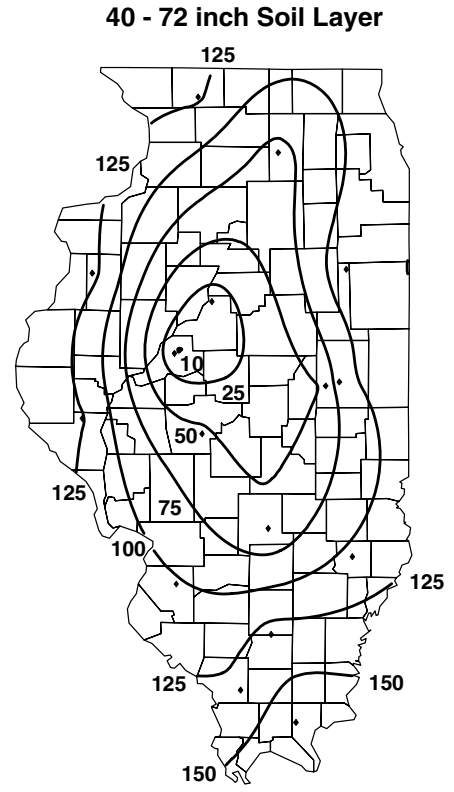
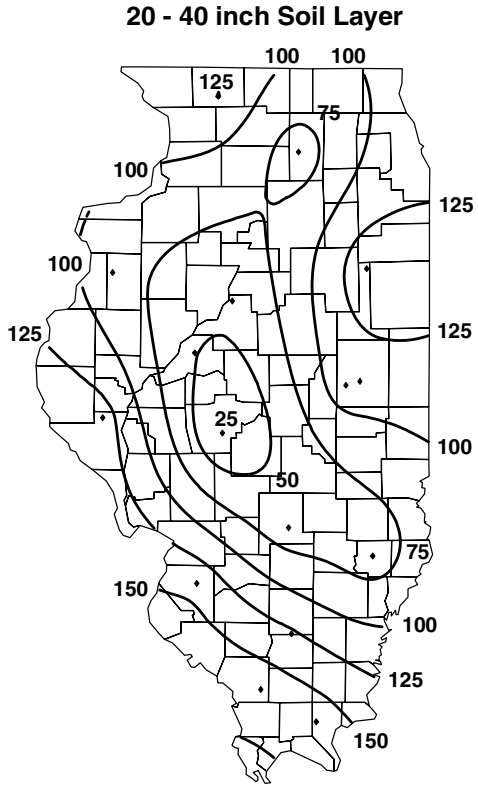
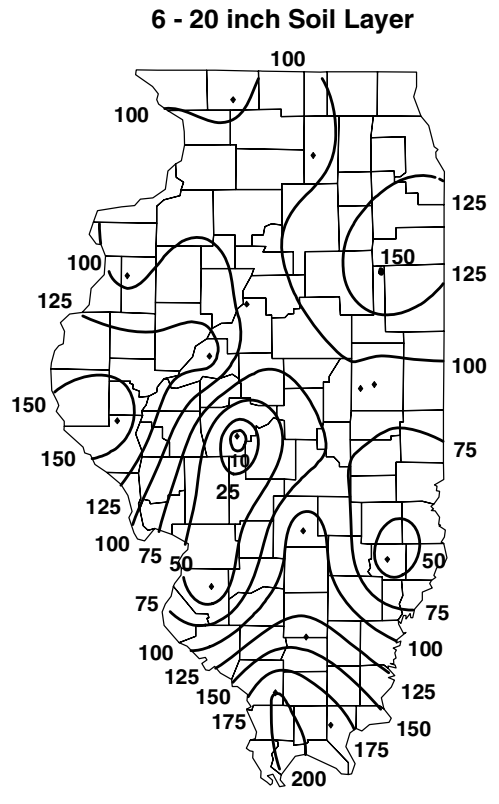
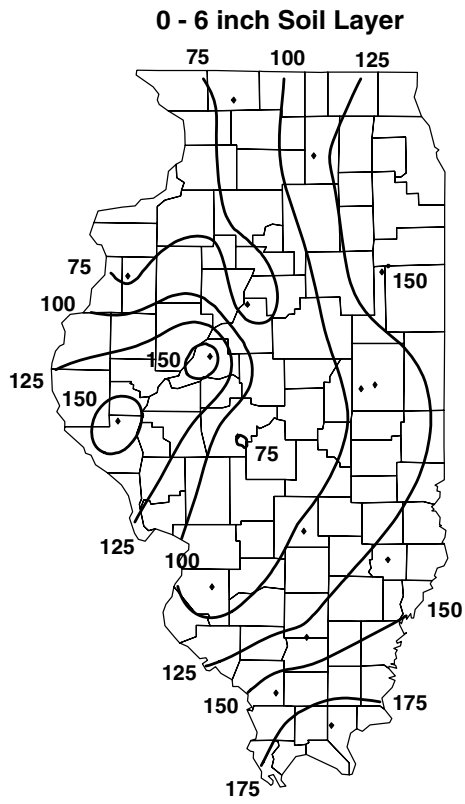


Figure 4. October 1 observed percent-of-normal soil moisture based on 1985-1995 mean

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

<i>Location</i>	<i>Oct 0 - 6 (inches)</i>	<i>Change from Sep 1 (%)</i>	<i>Oct 1 6 - 20 (inches)</i>	<i>Change from Sep 1 (%)</i>	<i>Oct 1 20 - 40 (inches)</i>	<i>Change from Sep 1 (%)</i>
Freeport (NW)	1.5	-7	3.9	47	6.9	16
DeKalb (NE)	2.0	16	4.1	19	5.9	1
Monmouth (W)	1.3	-7	3.3	-1	5.6	-1
East Peoria (C)	1.0	-52	3.9	-16	6.8	2
Topeka (C)	0.9	-7	2.3	38	2.0	16
Stelle (E)	1.9	-18	4.6	6	6.4	9
Champaign (E)	1.6	-15	3.8	-21	5.6	-9
Bondville (E)	1.7	-17	4.0	-20	7.1	-5
Perry (WSW)	2.0	37	5.0	16	7.5	-1
Springfield (WSW)	1.4	-27	3.6	-9	6.3	-1
Brownstown (ESE)	1.2	30	2.6	12	6.3	-1
Olney (ESE)	1.4	12	3.7	2	6.1	-2
Belleville (SW)	1.1	26	1.3	122	5.5	1
Carbondale (SW)	1.9	70	4.1	71	7.2	8
Ina (SE)	1.8	45	5.1	15	7.6	4
Fairfield (SE)	1.7	13	4.8	9	7.1	-1
Dixon Springs (SE)	2.6	17	5.7	1	8.1	0

**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 the stations listed in Table 3 were below flood stage in September.

**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 September 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 September (186 percent of the median) and below the long-term mean (89 percent of the mean). Mean streamflow conditions at Table 4 stations ranged from much below normal to above normal, except for conditions much above normal on the Cache River at Forman. Monthly mean streamflows were above normal at half of the stations listed in Table 4. The monthly mean streamflow for the South Fork Sangamon River near Rochester was the lowest ever observed in September for the period of record.

**Table 3. Peak Stages for Major Rivers during September 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	12.5	14
	La Salle	224.7	20	18.5	14
	Peoria	164.6	18	12.9	14
	Havana	119.6	14	10.8	17
	Beardstown	88.6	14	10.5	16
	Hardin	21.5	25	20.9	17
Mississippi	Dubuque	579.9	17	7.8	28
	Keokuk	364.2	16	3.5	22
	Quincy	327.9	17	12.0	14
	Grafton	218.0	18	16.3	17
	St. Louis	180.0	30	3.6	18
	Chester	109.9	27	6.2	19
	Thebes	43.7	33	10.8	24
Ohio	Cairo	2.0	40	30.9	27

**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-August levels at 34 reservoirs, end-of-September water levels had increased at 9 reservoirs, had decreased at 22 reservoirs, and were the same as last month at 3 reservoirs. For the 34 reservoirs with observations reported at the end of September, 3 reservoirs were above normal pool (or target operating level), 4 reservoirs were at normal pool or spillway elevation, and 27 reservoirs were below normal pool.

**Major Reservoirs.** Compared to end-of-August water levels, end-of-September water levels had decreased 0.3–0.4 feet at Lake Shelbyville, Carlyle Lake, and Rend Lake. At the end of September, the water surface level was 1.4 feet above the target level at Rend Lake, 0.8 feet below the seasonal target level at Lake Shelbyville, and 0.3 feet below the seasonal target level at Carlyle Lake.

**Great Lakes.** Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The September mean level for Lake Michigan was 577.6 feet, compared to a mean level of 577.7 feet in September 2005. The long-term average lake level for September is 579.2 feet, based on 1918–2005 data. Historically, the lowest mean level for Lake Michigan in September, 576.6 feet, occurred in 1964, and the highest level, 582.0 feet, occurred in 1986. The month-end level of Lake Michigan was 577.5 feet.

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

Station	Drainage area (sq mi)	Years of record	2006 mean flow (cfs)	<u>Long-term flows</u>		Flow condition	Percent chance of exceedence	Days of data this month
				Mean* (cfs)	Median (cfs)			
Rock River at Rockton	6363	70	4279	2878	2685	above normal	14	30
Rock River near Joslin	9549	62	4933	4196	3761	above normal	27	30
Pecatonica River at Freeport	1326	86	652	752	648	normal	48	30
Green River near Geneseo	1003	67	182	331	151	normal	43	30
Edwards River near New Boston	445	67	106	123	47	above normal	24	30
Kankakee River at Momence	2294	88	1615	992	754	above normal	11	30
Iroquois River near Chebanse	2091	81	772	571	126	above normal	12	30
Fox River at Dayton	2642	86	1456	968	608	above normal	21	30
Vermilion River at Pontiac	579	61	66	115	17	above normal	18	30
Spoon River at Seville	1636	88	123	596	194	normal	67	30
LaMoine River at Ripley	1293	82	22	431	132	much below normal	92	30
Bear Creek near Marceline	349	61	0.8	153	21	below normal	85	30
Mackinaw River near Congerville	767	56	69	212	24	above normal	25	30
Salt Creek near Greenview	1804	63	372	416	199	above normal	25	30
Sangamon River at Monticello	550	93	47	114	27	normal	38	30
South Fork Sangamon near Rochester	867	56	0.6	140	23	much below normal	**	30
Illinois River at Valley City	26,743	66	13,700	11,330	8,115	above normal	19	30
Macoupin Creek near Kane	868	76	162	175	48	above normal	23	30
Vermilion River near Danville	1290	83	275	283	105	above normal	20	30
Kaskaskia River at Vandalia	1940	35	53	551	310	below normal	86	30
Shoal Creek near Breese	735	61	20	138	37	normal	68	30
Embarras River at Ste. Marie	1516	91	162	377	110	normal	40	30
Skillet Fork at Wayne City	464	85	40	74	19	normal	34	30
Little Wabash below Clay City	1131	90	103	213	62	normal	38	30
Big Muddy at Plumfield	794	34	224	133	95	above normal	20	30
Cache River at Forman	244	81	502	57	15	much above normal	1	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 2004.

\*\* New low for September monthly mean flow for the period of record.



**Table 5. Reservoir Levels in Illinois, September 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 18th consecutive month. September levels were 1.2 feet below normal and ranged from 5.0 feet below to 1.6 feet above normal levels (Table 6). One well, Greenfield (Greene County), was at a record low for September. Water levels at Snicarte (Mason County) were again below the bottom of the well during the month.

**Comparison to Previous Month.** Shallow groundwater levels were just above those of August. Levels averaged 0.1 feet higher and ranged from 1.4 feet below to 4.9 feet above levels last month.

**Comparison to Same Month, Previous Year.** Shallow groundwater levels in September were just above levels measured one year ago. Levels averaged 0.2 feet higher and ranged from 2.2 feet lower to 2.5 feet higher than during September 2005.

**Table 6. Month-End Shallow Groundwater-Level-Data Sites, September 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	21.79	-0.88	-0.49	+0.28	+0.31
2	Mt. Morris	Ogle	55.00	24.58	-4.83	-4.99	-0.46	+1.16
3	Crystal Lake	McHenry	18.00	6.05	-0.10	-0.30	-0.01	+1.65
4	Cambridge	Henry	42.00	N/A	N/A	N/A	N/A	N/A
5	Fermi Lab	DuPage	17.00	N/A	N/A	N/A	N/A	N/A
6	Good Hope	McDonough	30.00	11.36	-2.38	-1.48	-1.36	+0.13
7	Snicarte	Mason	40.30	40.30	-4.50	-4.67	0.00	-1.92
8	Coffman	Pike	28.00	15.98	-2.43	-1.46	+0.54	+0.44
9	Greenfield	Greene	20.70	19.04*	-3.44	-3.60	-0.20	-1.74
10	Janesville	Cumberland	11.00	7.56	-1.38	-1.08	-0.68	-1.25
11	St. Peter	Fayette	15.00	5.24	-0.08	-0.35	-0.60	+0.17
12	SWS #2	St. Clair	80.00	16.78	-3.17	-0.99	-0.17	N/A
13	Boyleston	Wayne	23.00	6.57	+0.53	+1.02	-1.23	+1.73
14	Sparta	Randolph	27.00	10.90	-2.13	-1.19	-0.60	-2.21
15	SE College	Saline	10.19	6.73	+1.17	+0.92	+1.29	+0.20
16	Dixon Springs	Pope	8.63	3.32	+3.29	+1.63	+4.85	+2.54
17	Bondville	Champaign	21.00	6.98	-1.19	-1.27	-0.99	+1.27
Averages					-1.43	-1.22	+0.05	+0.18

### Notes:

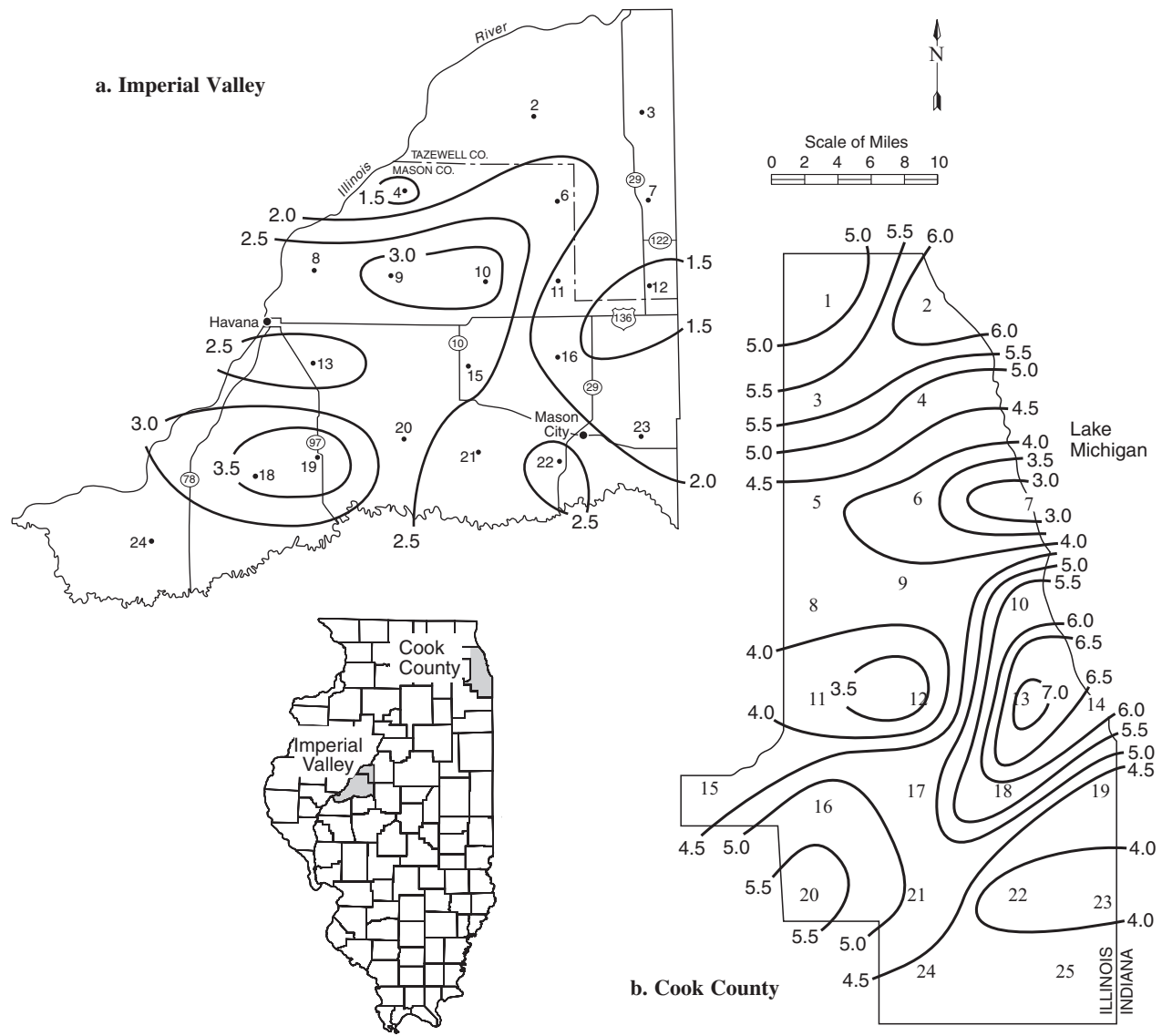
\*Well currently at record monthly low.

N/A = Data not available.

## Addendum (Nancy Westcott)

**Imperial Valley Precipitation.** September 2006 precipitation amounts (Figure 5a) were variable. Monthly gage totals were greatest in the western and central regions of the network, and precipitation was lightest in the east-central portion of the network. Individual gage amounts ranged from 3.78 inches at site #19 to 1.47 inches at site #12. The 30-year, 1971–2000, average precipitation amounts for September at Havana and Mason City are 3.21 and 3.00 inches, respectively. The September 2006 network average of 2.34 inches was about 89 percent of the 14-year (1992–2005) September network average of 2.62 inches.

**Cook County Precipitation.** September 2006 precipitation amounts (Figure 5b) were quite variable. Precipitation was heaviest in the eastern portion of the network and lightest in the central region of the network. Precipitation values ranged from 7.09 inches at site #13 (near 75<sup>th</sup> Street), to 2.86 inches at site #7 (Broadway near Lake Michigan). The September 2006 network average of 4.72 inches was about 169 percent of the 16-year (1990–2005) September network average of 2.80 inches.



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