

ILLINOIS WATER AND CLIMATE SUMMARY September 2004

2004 Overview (Bob Scott)

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

Temperatures across Illinois (Figure 1) for September were above average (a +1.3-degree departure). Crop Reporting District (CRD) temperatures ranged from 0.1 degree above average (southwest) to 2.4 degrees above average (northeast).

Precipitation amounts across Illinois were well below average (Figure 1). The statewide average of 0.86 inches represents a -2.32-inch departure or 27 percent of average. Rainfall totals were lowest in the west-southwest CRD (0.45 inches or 15 percent of average) and highest in the west CRD (1.77 inches or 50 percent of average).

Soil moisture in the 0- to 40-inch (0- to 100-centimeter) layer at the end of September was below normal overall. Regionally, dry soils dominated all layers in central Illinois, while deeper layers were moist in parts of eastern, western, and southern Illinois.

Mean provisional streamflow statewide was above the median flow in September, 240 percent of median (Figure 1). Rivers in Illinois recorded monthly mean discharges generally in the normal to above normal range this month. Peak stages on major rivers were below flood stage.

Water surface levels at the end of September were below the normal pool/target operating level at 33 of 36 reporting reservoirs. Levels at Rend Lake, Lake Shelbyville, and Carlyle Lake were within approximately a foot of their seasonal target levels. Lake Michigan's mean level remains below the long-term average.

Statewide, **shallow groundwater levels** were below normal for September. Deviations from normal averaged 0.3 feet below normal, with levels averaging a foot lower than August levels, and approximately 0.6 feet above September levels one year ago. Over the last two years, the Cambridge well (Henry County) has deviated drastically from normal levels. Data from that well were not used this month while the cause of the great departures from normal is being determined. Groundwater departures from normal levels for the past year were recalculated for this report (Figure 1).

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

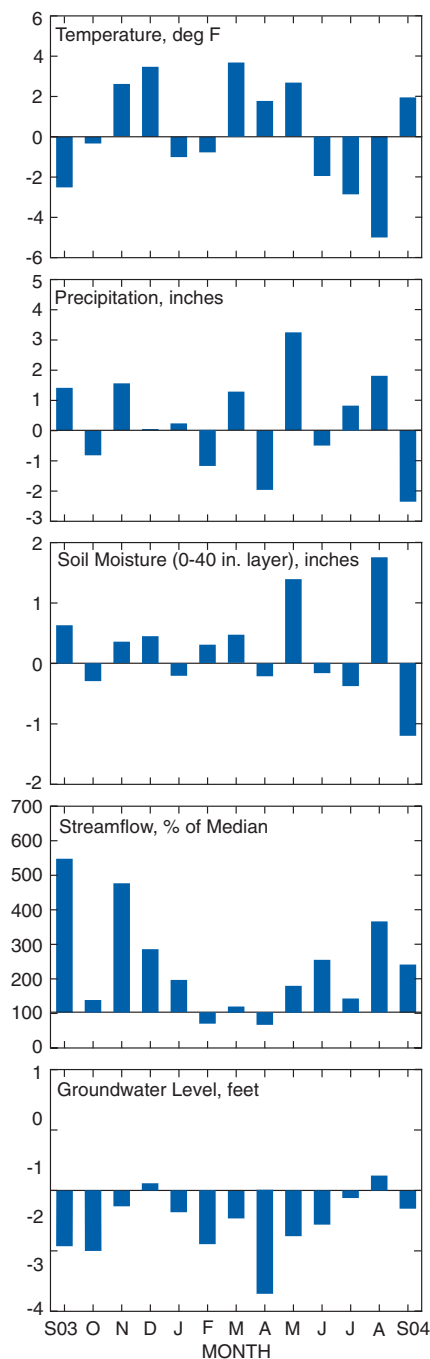


Figure 1.
Statewide departures from normal

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 September were above average (Figure 2 and Table 1). Extremes ranged from 94°F on September 5 at Grand Tower to 32°F on September 30 at Mt. Carroll. Combined with below average temperatures in July and August, the 3-month period ending in September was the 9th coolest such period since 1895.

Precipitation for September was much below average statewide (Figure 2 and Table 1), the 4th driest September since 1895. Conditions were especially dry in the southern half of Illinois. The southwest and southeast CRDs each experienced the driest September since 1895, with 0.53 and 0.46 inches of rainfall, respectively. The west-southwest and east-southeast CRDs ranked as the 4th and 2nd driest September, with 0.53 and 0.45 inches, respectively. La Harpe reported the highest one-day precipitation total (4.34 inches on September 16), and also the highest monthly precipitation total (4.42 inches).

Severe weather was not reported in Illinois in September.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for September (Figure 3) ranged from 3 mph at Dixon Springs and Rend Lake to near 7 mph at Monmouth, Bondville, and Stelle. The highest wind gusts for the month were recorded on September 15 at Stelle (38 mph). The prevailing wind direction during September varied from northeasterly in southern Illinois to southerly in northeastern Illinois. Wind speeds in excess of 8 mph ranged from 5 hours at Rend Lake to 242 hours at Monmouth. (September has 720 hours.) Average air temperatures for the month ranged from the middle to upper 60s across the state.

The lack of precipitation and cloudy days during September caused considerably higher solar radiation totals than average for the month, and were the highest totals for September at all northern Illinois sites in the roughly 15-year history of ICN records. September 2004 values varied from 558 Mega-Joules per meter squared (MJ/m^2) at Dixon Springs to 622 MJ/m^2 at Belleville. Potential evapotranspiration observations varied from 4.9 inches at Dixon Springs, DeKalb, and St. Charles to 5.4 inches at Bondville and Belleville. Soil temperatures at the 4-inch level ranged from 66°F at DeKalb to 76°F at Carbondale. Soil temperatures at the 8-level ranged from 68°F at Freeport and Stelle to 78°F at Brownstown.

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 across the state. October–December outlooks call for equal chances of above, below, and normal temperatures across Illinois and below normal precipitation in southeastern Illinois.

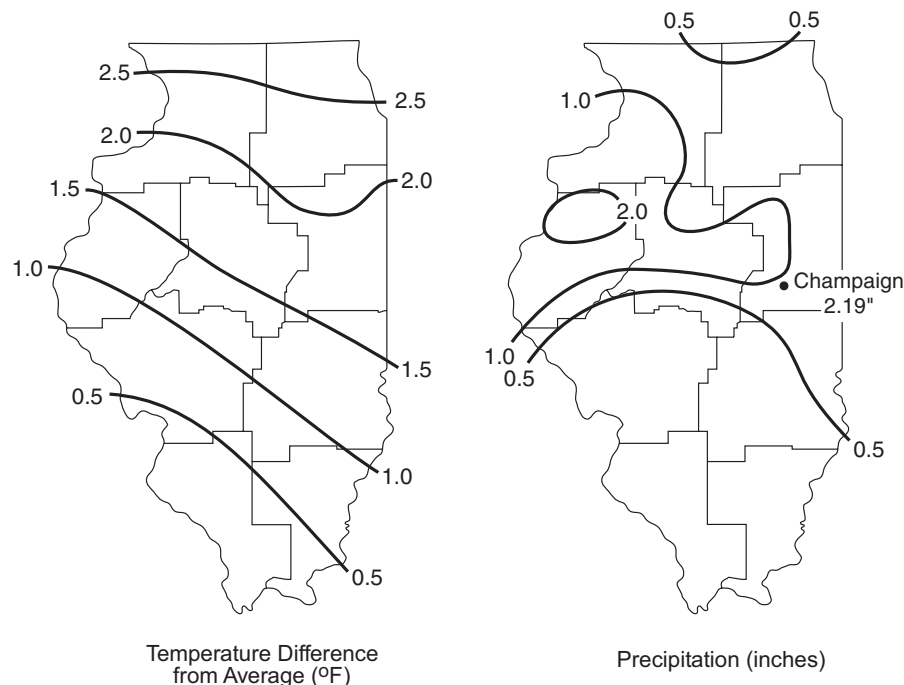


Figure 2. Illinois temperature and precipitation during September 2004

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

Crop Reporting District	Last Month			Last 3 Months			Last 6 Months			Last 12 months		
	Sep 04 Amount	% Avg	Temp Dev	Jul 04- Sep 04	% Avg	Temp Dev	Apr 04- Sep 04	% Avg	Temp Dev	Oct 03- Sep 04	% Avg	Temp Dev
Northwest	1.08	33	1.9	8.35	73	-1.8	21.86	93	-0.4	36.37	100	0.8
Northeast	0.75	23	2.4	8.99	80	-1.7	23.57	103	-0.6	38.31	104	0.4
West	1.77	50	1.2	12.25	109	-2.4	23.18	99	-0.7	36.71	98	0.4
Central	1.29	41	1.7	10.13	95	-2.1	22.27	99	-0.6	35.54	96	0.4
East	0.98	33	2.0	12.09	112	-1.7	25.77	114	-0.4	40.92	109	0.4
West-southwest	0.53	18	0.7	9.24	94	-2.5	19.62	90	-0.7	33.13	96	0.3
East-southeast	0.45	15	1.1	10.90	104	-2.0	22.21	97	-0.1	41.64	101	0.6
Southwest	0.53	17	0.1	10.75	105	-2.2	23.91	104	-0.4	41.70	98	0.5
Southeast	0.46	15	0.5	10.55	106	-1.9	23.93	103	0.0	41.06	92	0.8
State Average	0.86	27	1.3	10.25	96	-2.0	22.75	100	-0.4	38.57	99	0.5

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

Soil Moisture Information (Bob Scott)

Precipitation in Illinois during September was well below average statewide. This resulted in below normal moisture conditions near the soil surface across Illinois (Figure 4). Moisture values in the 0- to 6-inch layer ranged from just 79 percent of normal at Monmouth to less than 10 percent at Dixon Springs. Conditions in deeper layers showed greater variability. Soils were dry over most of the 6- to 20-inch layer; however, moist soils were found in east-central and west-central Illinois. Values ranged from 117 to 140 percent at Champaign, Monmouth, and Perry, but were less than 10 percent at Springfield and Dixon Springs. Soils 20 to 40 inches deep also were moist along the state's east and west boundaries, but were very dry in central Illinois. Totals at Dixon Springs were less than 10 percent and were only 15 percent at Peoria and Topeka, but levels exceeded 150 percent at Belleville and Stelle. The 40- to 72-inch layer continued to be dry in central Illinois but wet elsewhere. Values ranged from less than 10 percent at Brownstown to nearly 190 percent at Rend Lake. Overall, soil moisture in Illinois at the end of September was below normal (Figure 1).

Compared to the end of last month, soil moisture in the 0- to 6-inch layer decreased 30–60 percent at all Illinois sites (Table 1). Decreases also dominated the 6- to 20-inch layer, showing lower soil moisture by more than 40 percent at Freeport, Belleville, and Brownstown. However, soils in Champaign and Bondville indicated virtually no change in moisture. Smaller decreases were prominent in the 20- to 40-inch layer, with decreases of 12 and 19 percent at Carbondale and Dixon Springs, respectively.

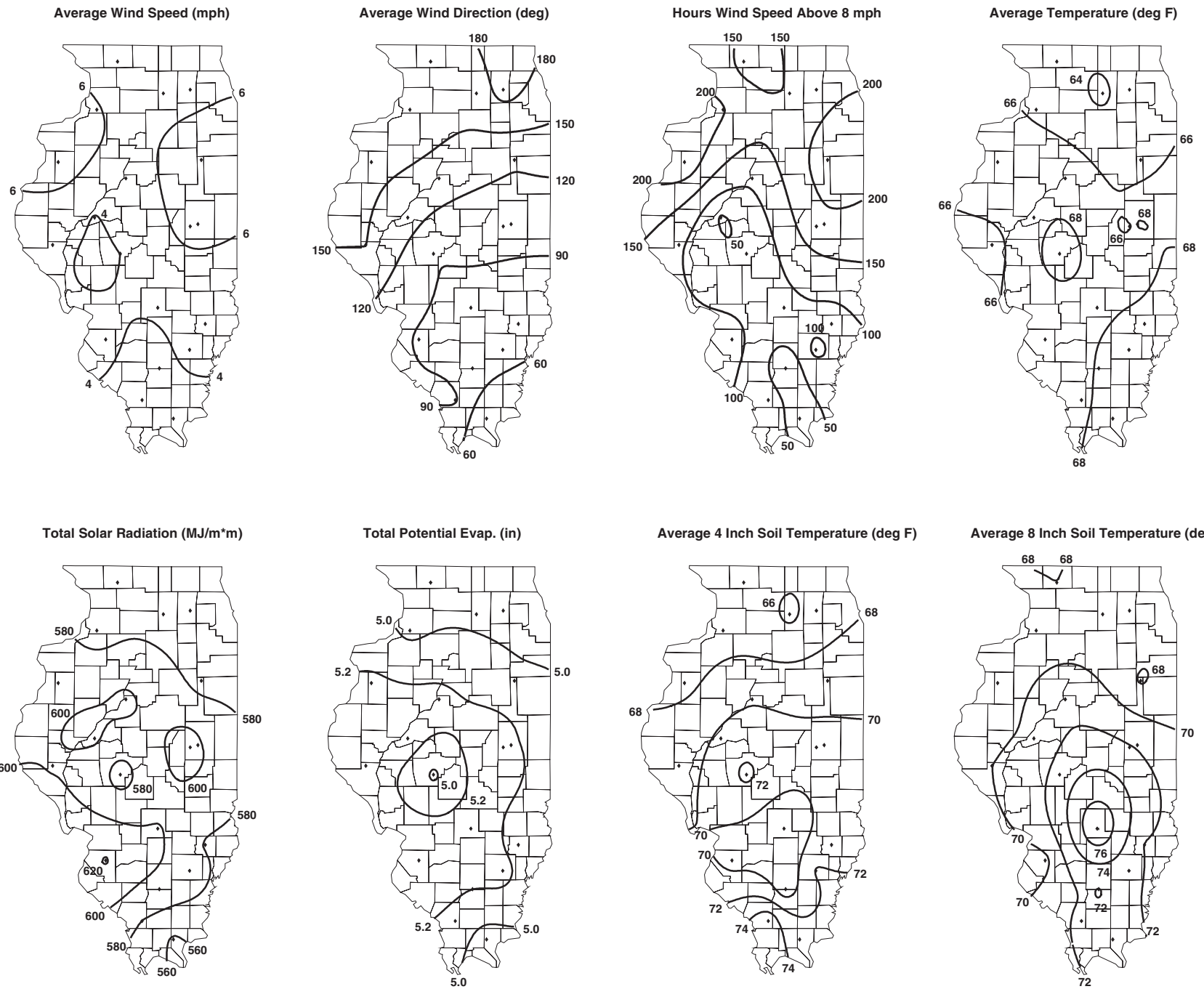


Figure 3. September monthly averages and totals as collected by the Illinois Climate Network

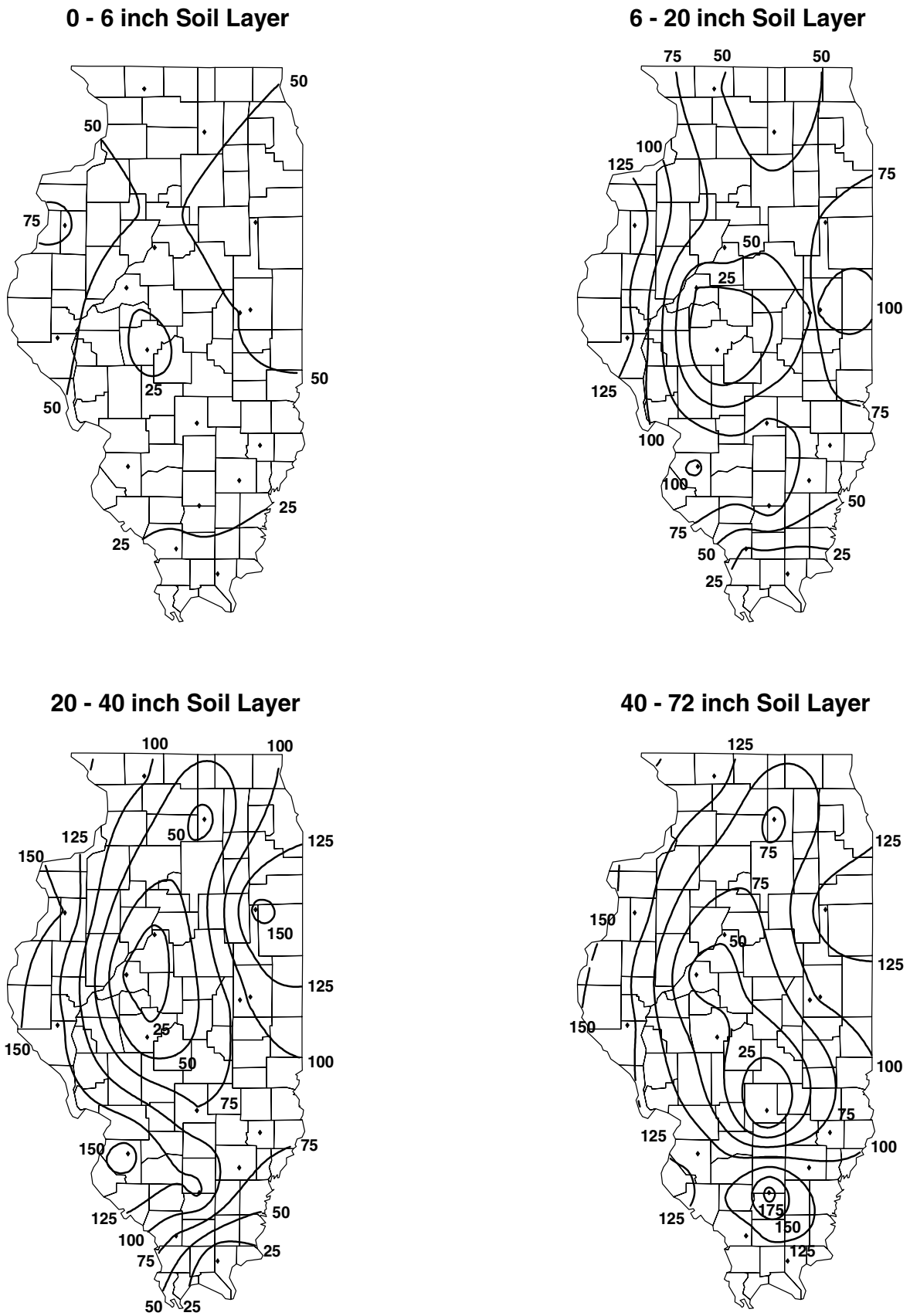


Figure 4. October 1 observed percent-of-normal soil moisture based on 1985-1995 mean

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

<i>Location</i>	<i>Oct. 1 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)	0.9	-54	2.5	-46	6.3	-9
DeKalb (NE)	1.1	-39	2.8	-27	5.6	-8
Monmouth (W)	1.4	-31	4.2	-19	6.6	-5
East Peoria (C)	0.9	-59	3.3	-25	6.3	0
Topeka (C)	0.4	-57	1.3	-26	1.8	-1
Stelle (E)	1.3	-52	3.6	-38	6.4	-9
Champaign (E)	1.4	-30	4.6	-1	5.5	0
Bondville (E)	1.2	-37	2.8	-2	6.6	-2
Perry (WSW)	1.1	-47	4.4	-17	7.4	-4
Springfield (WSW)	1.0	-49	3.4	-21	6.3	-1
Brownstown (ESE)	0.7	-67	2.1	-47	6.5	-6
Olney (ESE)	0.9	-56	3.6	-17	6.6	-2
Belleville (SW)	0.8	-66	2.3	-54	7.3	-8
Carbondale (SW)	0.6	-55	1.6	-36	5.9	-12
Ina (SE)	1.2	-49	4.6	-15	7.6	-3
Fairfield (SE)	0.9	-58	3.4	-36	7.0	-7
Dixon Springs (SE)	0.5	-36	1.6	-37	5.2	-19

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 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. September peak stages were below flood stage at all Table 3 stations.

Provisional monthly mean flows for 26 streamgaging stations located throughout Illinois are shown (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 September mean flow for each year of record, and selecting the middle value, 50 percent exceedence probability.

Mean provisional flow statewide was above the median this month (240 percent of the median) and below the long-term mean (78 percent of the mean). Mean streamflows for September were in the normal to above normal range at most Table 4 stations. Exceptions were the much above normal flow at Chebanse on the Iroquois River and below normal flows at Forman on the Cache River and near Rochester on the South Fork Sangamon.

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 reported in terms of their difference from normal pool (or target level). Reservoir levels are obtained from a network of

Table 3. Peak Stages for Major Rivers, September 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	8.9	02
	La Salle	224.7	20	16.6	01
	Peoria	164.6	18	13.2	01
	Havana	119.6	14	11.7	02
	Beardstown	88.6	14	11.2	08
	Hardin	21.5	25	20.8	01
Mississippi	Dubuque	579.9	17	9.8	20
	Keokuk	364.2	16	6.2	25
	Quincy	327.9	17	11.8	05
	Grafton	218.0	18	16.1	27
	St. Louis	180.0	30	18.9	01
	Chester	109.9	27	21.2	01
	Thebes	43.7	33	25.0	01
Ohio	Cairo	2.0	40	33.6	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.

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

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 end-of-August levels at 31 reservoirs, by the end of September the water surface elevation had decreased at 28 reservoirs, had risen at no reservoirs, and was the same as last month at 3 reservoirs. For the 36 reservoirs with observations reported at the end of September, one reservoir was above the normal pool (or target operating level), 2 reservoirs were at normal pool, and 33 reservoirs were below normal pool, including 7 reservoirs that were lower by 2 feet or more. Salem Lake inflow was supplemented by water pumped from Carlyle Lake in September.

Major Reservoirs. Water levels at the three major reservoirs decreased during September. At the end of the month, Lake Shelbyville was below its seasonal target level, Rend Lake was above its target level, and Carlyle Lake was just below its target level.

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 578.3 feet, compared to a mean level of 577.2 feet in September 2003. The long-term average lake level for September is 579.2 feet, based on 1918–2003 data. Historically, the lowest mean level for Lake Michigan in September occurred in 1964 at 576.6 feet, and the highest level occurred in 1986 at 582.0 feet. The month-end level of Lake Michigan was 578.1 feet.

Table 4. Provisional Mean Flows, September 2004

<i>Station</i>	<i>Drainage area (sq mi)</i>	<i>Years of record</i>	<i>2004 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*</i>	<i>Median</i>			
				<i>(cfs)</i>	<i>(cfs)</i>			
Rock River at Rockton	6363	68	2834	2907	2685	normal	43	30
Rock River near Joslin	9549	60	3369	4238	3761	normal	58	30
Pecatonica River at Freeport	1326	84	666	758	648	normal	49	30
Green River near Geneseo	1003	64	121	338	158	normal	63	30
Edwards River near New Boston	445	65	43.0	126	50	normal	55	23
Kankakee River at Momence	2294	85	2429	977	745	above normal	15	30
Iroquois River near Chebanse	2091	79	1754	555	125	much above normal	10	30
Fox River at Dayton	2642	83	659	979	608	normal	47	30
Vermilion River at Pontiac	579	59	41.1	117	17	above normal	25	30
Spoon River at Seville	1636	86	221	605	194	normal	43	30
LaMoine River at Ripley	1293	79	421	433	125	above normal	20	30
Bear Creek near Marceline	349	58	197	153	18	above normal	16	30
Mackinaw River near Congerville	767	54	23.1	219	23	normal	50	30
Salt Creek near Greenview	1804	61	395	415	195	above normal	22	29
Sangamon River at Monticello	550	90	52.4	114	26	normal	38	30
South Fork Sangamon near Rochester	867	53	8.05	136	23	below normal	80	30
Illinois River at Valley City	26,743	64	13,830	11,370	8115	above normal	20	30
Macoupin Creek near Kane	868	74	29.8	176	48	normal	61	30
Vermilion River near Danville	1290	81	210	252	104	above normal	27	28
Kaskaskia River at Vandalia	1940	33	118	560	310	normal	69	30
Shoal Creek near Breese	735	59	99.8	136	37	above normal	28	30
Embarras River at Ste. Marie	1516	89	171	374	110	normal	40	30
Skillet Fork at Wayne City	464	83	57.6	75	20	above normal	27	30
Little Wabash below Clay City	1131	88	53.9	211	62	normal	56	30
Big Muddy at Plumfield	794	32	239	131	89	above normal	12	30
Cache River at Forman	244	79	2.33	55	15	below normal	86	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, September 2004

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.

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 September by 0.3 feet and ranged from 3.4 feet below to 3.3 feet above average (Table 6).

Comparison to Previous Month. Shallow groundwater levels were below those in August. Levels averaged a foot lower and ranged from 3.2 feet lower to 0.2 feet higher.

Comparison to Same Month, Previous Year. Shallow groundwater levels in September were above levels of a year ago. Levels averaged 0.6 feet higher and ranged from 4.3 feet lower to 8.7 feet above levels of last year.

Table 6. Month-End Shallow Groundwater Level Data Sites, September 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	21.35	-0.30	-0.08	-0.43	+0.90
2	Mt. Morris	Ogle	55.00	22.51	-3.76	-3.18	-0.73	+8.65
3	Crystal Lake	McHenry	18.00	5.54	+0.17	+0.17	-0.80	+1.35
4	Cambridge	Henry	42.00	N/A	N/A	N/A	N/A	N/A
5	Fermi Lab	DuPage	17.00	9.16	-1.25	-1.27	-0.86	+0.58
6	Good Hope	McDonough	30.00	6.42	+2.49	+3.32	-0.56	+4.03
7	Snicarte	Mason	42.00	38.39	-1.49	-1.22	+0.19	+0.59
8	Coffman	Pike	28.00	13.47	-0.06	+0.98	-0.24	-4.30
9	Greenfield	Greene	20.70	16.19	-0.83	-0.89	-1.60	+0.76
10	Janesville	Cumberland	11.00	6.79	-0.63	-0.33	-1.23	-1.65
11	St. Peter	Fayette	15.00	4.97	+0.08	-0.10	-3.16	-1.01
12	SWS #2	St. Clair	80.00	N/A	N/A	N/A	N/A	N/A
13	Boyleston	Wayne	23.00	5.66	+1.57	+1.95	-1.65	+1.29
14	Sparta	Randolph	27.00	8.58	+0.26	+1.12	-1.92	+0.96
15	SE College	Saline	10.19	9.21	-1.14	-1.48	-1.22	-1.80
16	Dixon Springs	Pope	8.63	8.63	-1.71	-3.35	-0.01	-2.19
17	Bondville	Champaign	21.00	5.58	-0.04	-0.03	-0.28	+0.98
Averages					-0.44	-0.29	-0.97	+0.61

Notes:

N/A = Data not available.

Addendum

Long-Term Precipitation Networks (Nancy Westcott)

Imperial Valley Precipitation. September 2004 precipitation amounts (Figure 5a) were light. Gage amounts were greatest in the northeastern corner of the network, and precipitation was lightest through the central portion of the network. Individual gage totals ranged from 3.24 inches at site #3 to 0.25 inches at site #20. 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 2004 network average of 0.98 inches was about 35 percent of the 12-year (1993–2004) September network average of 2.77 inches.

Cook County Precipitation. September 2004 precipitation amounts (Figure 5b) were light. Precipitation was heaviest in the south-central portion of the network and lightest in the northern half of the network. Precipitation values ranged from 1.92 inches at site #14 (79th Street) to 0.14 inches at site #2 (Winnetka). The September 2004 network average of 0.86 inches was about 29 percent of the 14-year (1990–2003) September network average of 2.97 inches.

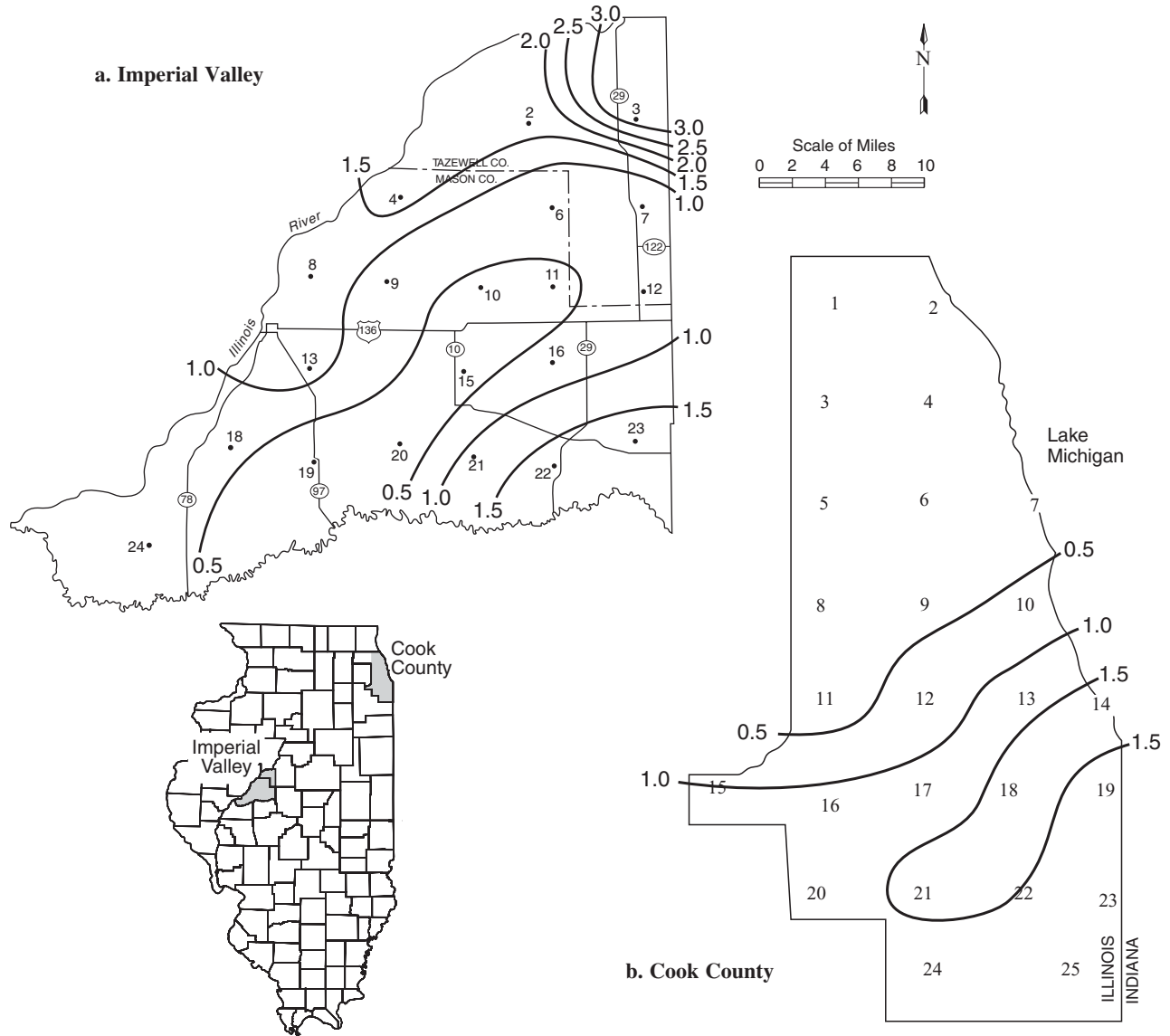


Figure 5. Long-term raingage network precipitation totals (inches) for September 2004

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 Corps of Engineers, <http://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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