

ILLINOIS WATER AND CLIMATE SUMMARY September 1998

September 1998 Overview (Bob Scott)

Temperatures across Illinois in September were well above average and precipitation was well below average. Soil moisture within the top 40 inches of soil was slightly below the long-term statewide average. Mean streamflows continued just slightly above the median level. Shallow ground-water levels were slightly above the long-term average.

Temperatures across Illinois (Figure 1) were well above average for September (a 4.1-degree departure). Temperatures by crop reporting districts (Table 1) ranged from 3.1 degrees above average (northwest) to 4.6 degrees above average (west and west-southwest).

Precipitation amounts (Figure 1) across the state during September were well below the long-term average value, although some areas of the state reported just slightly below average rainfall. The statewide average of 2.31 inches represents a -1.24-inch departure, or 65 percent of average. District totals (Table 1) ranged from 1.48 inches (east) to 3.38 inches (west), 44 to 79 percent of average, respectively.

Soil moisture (Figure 1) in the 0- to 40-inch (0- to 100-cm) layer at the end of September was slightly below normal (a -0.31-inch departure). However, actual soil moisture levels across much of the state showed large decreases during the month (Table 2).

Mean provisional streamflow statewide was slightly above the median flow, 132 percent of the median (Figure 1), and has finally responded to the reduction in precipitation that began in July. Mean flows recorded at stations in northern Illinois were in the normal to above normal range. Most stations in central and southern Illinois recorded flows in the normal range. Peak stages on the Illinois, Mississippi, and Ohio Rivers were well below flood stage at all reporting stations.

Water surface levels at 41 reporting reservoirs at the end of September were at normal pool (target operating level) at 2 reservoirs, above normal pool at 4 reservoirs, and below the normal pool at 35 reservoirs. Water surface levels at Carlyle Lake, Lake Shelbyville, and Rend Lake decreased from last month to end September within 1 foot of their target operating levels. Lake Michigan levels continue to exceed the long-term mean.

Statewide, **shallow ground-water levels** were slightly above average for September (a +0.5-foot departure). Greatest deviations occurred in southwestern Illinois. Levels averaged about 1.1 feet below those of last month and were approximately 1.1 feet above September levels one year ago.

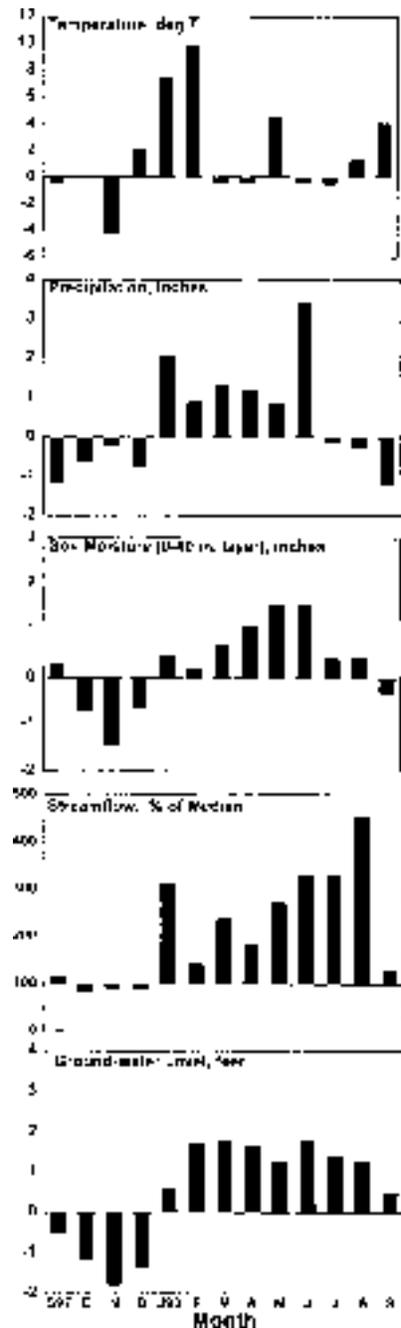


Figure 1.
Statewide departures from normal

Note: The WARM Network maps will appear only in the January and July issues.

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Weather/Climate Information (Nancy Westcott, Steve Hilberg, and Bob Scott)

Cook County precipitation amounts for August (Figure 2) were locally very heavy and quite variable. Site values for the month ranged from 7.91 inches at site #7 (Broadway near Lake Michigan) to 3.31 inches at site #14 (79th Street). Heavier precipitation occurred in the northeastern and southwestern portions of the network, and the lightest precipitation occurred in the far northwestern and southeastern regions. The August 1998 network average of 5.23 inches was about 123 percent of the eight-year (1990-1997) August network average of 4.24 inches.

Temperatures averaged well above normal in September (Figure 3 and Table 1) with positive local anomalies ranging from 3 to 6°F, making this the seventh warmest September on record statewide. Maximum temperatures reached 90°F and above several times during the month, with the warmest weather during the first week. Temperatures peaked in the mid 90s on September 5 and 6 as statewide maximums of 99°F were recorded at Minonk, Stelle, and Iuka, and 96°F at Ottawa and Champaign. Maximum temperatures also exceeded 90°F on September 12 and 13 over western and central Illinois, and across most of the state on September 26 and 27. Coolest temperatures for the month occurred across northern Illinois on September 23 with 36°F at Mt. Carroll and 37°F at Elizabethh.

September **precipitation** showed relatively low monthly totals (Figure 3) with minimum values of less than an inch in several central and far southern counties. The relatively small amounts marked September's statewide rainfall total as the largest negative monthly departure from average since September 1997, just 65 percent of average (Table 1). The driest areas of the state were the central and east crop reporting districts, both with only 44 percent of average rainfall. Heaviest precipitation fell in northwestern Illinois.

For most of the state, the dry weather began the second week in August and persisted until the third week in September. For the six-week period between August 10 and September 19, statewide precipitation was only 57 percent of average. During this period, the most extreme dryness occurred in the east and southeast crop reporting

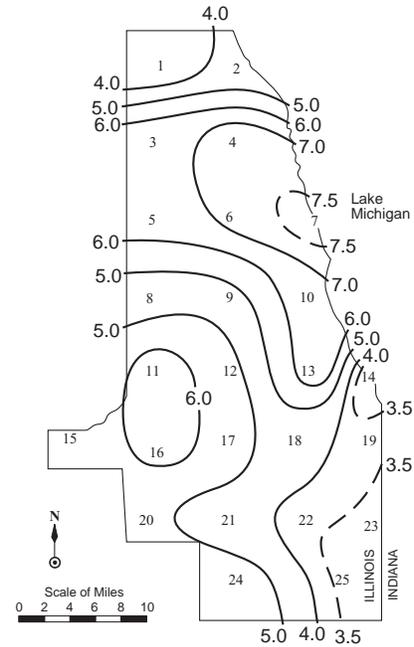


Figure 2. Cook County precipitation (inches) during August 1998

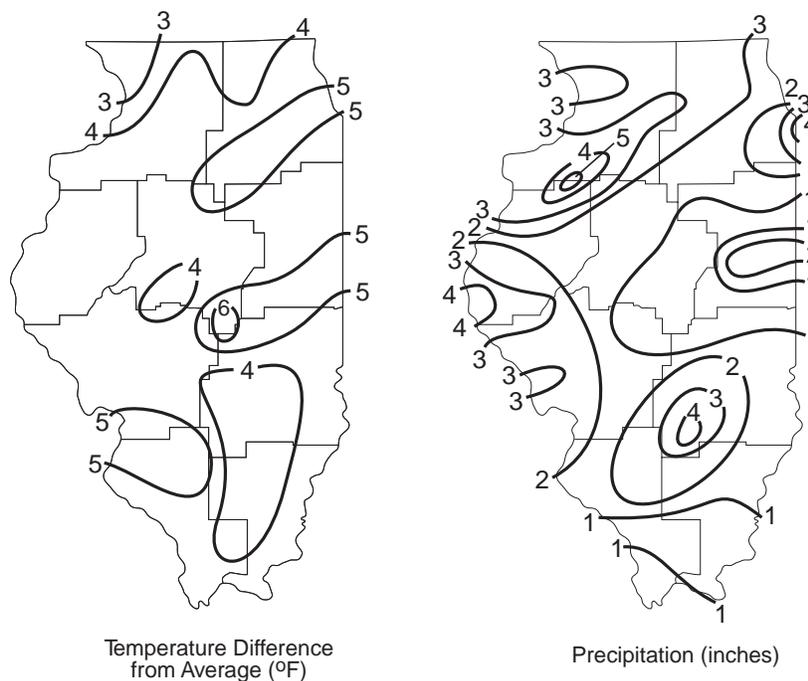


Figure 3. Illinois precipitation and temperatures during September 1998

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 97 Inches	% Avg	Temp (°F)	Aug 97 Sep 97	% Avg	Temp (°F)	Aug 97 Sep 97	% Avg	Temp (°F)	Jul 97 Sep 97	% Avg	Temp (°F)
Northwest	2.96	80	5.1	9.45	80	1.2	23.49	100	1.4	38.17	107	2.4
Northeast	2.31	62	5.6	9.34	81	1.6	22.22	97	1.9	36.29	101	2.7
West	3.18	79	4.6	7.94	66	2.0	25.70	109	1.3	43.02	115	1.7
Central	1.66	44	4.3	7.66	68	1.8	24.12	106	1.4	40.62	110	2.0
East	1.48	44	4.5	8.23	74	1.8	26.05	115	1.7	41.89	112	2.2
West-southwest	2.71	76	4.6	9.71	86	1.9	26.94	120	1.6	45.26	120	1.8
East-southeast	2.12	67	4.1	10.33	98	1.8	27.99	125	1.4	44.45	111	1.8
Southwest	2.09	63	4.3	10.33	98	1.7	27.18	120	1.7	45.81	109	1.7
Southeast	1.86	61	4.1	8.77	85	1.6	27.70	121	1.5	45.24	105	1.5
State Average	2.31	65	4.1	9.09	82	1.7	25.65	112	1.5	42.18	110	2.0

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

districts where precipitation totaled 24 and 30 percent of average, respectively. Over many parts of the state, the only significant rainfall for the month came on September 20 when a slow-moving cold front produced a line of thunderstorms that moved across Illinois. Some thunderstorms in northern Illinois were severe and produced wind damage and flooding of viaducts in Will and southern Cook Counties.

Extended climate outlooks issued by the U.S. Department of Commerce, National Atmospheric and Oceanic Administration, Climate Prediction Center for October call for equal chances of below, above, and normal temperatures over all of Illinois, and for a moderate chance of below normal precipitation across western Illinois. The October-December outlook calls for equal chances of below, above, and normal temperatures and precipitation across the state, except for a slight chance of below normal temperatures in northwestern Illinois.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for September (Figure 4) ranged from 2.5 mph at Dixon Springs to about 7.0 mph at Monmouth and Stelle. The highest wind gust for the month, 40 mph, was recorded at Stelle on September 14. The prevailing wind direction across the state ranged from the south in southwestern Illinois to the west in northeastern Illinois. Wind speeds in excess of 8 mph varied considerably from less than 20 hours at Dixon Springs and Rend Lake to about 210 hours at Monmouth and Stelle. (September has 720 hours.) Average temperatures across the state began a seasonal cool down, varying from the middle 60s over northern Illinois to the low 70s in southern Illinois. Solar radiation ranged from 482 Mega-Joules per meter squared (MJ/m²) at St. Charles to 567 MJ/m² at Dixon Springs, and potential evapotranspiration varied from a low of 4.3 inches at DeKalb and St. Charles to more than 4.9 inches at Carbondale and Dixon Springs. Soil temperatures at both the 4- and 8-inch levels were coolest over northern Illinois with warmest temperatures in southeastern Illinois. Actual values ranged from 68°F to 76°F.

Soil Moisture Information (Bob Scott)

Soil moisture across Illinois at the end of September continued a pattern of above normal conditions over most of southern Illinois. Below normal soil moisture levels dominated northern Illinois. Rainfall across Illinois during September was sparse in most areas with only a few widely scattered locations reporting average to above average precipitation. Soil moisture in the 0- to 6-inch layer (Figure 5) closely reflected these conditions. Heavy precipitation fell from Perry to Olney a few days before the end of the month and yielded soil moisture levels 150 percent of normal. Elsewhere within this layer, considerably drier conditions were present, minimizing at less than 50 percent of normal over parts of far southern and east-central Illinois. A similar pattern was found in the 6- to 20-inch layer, but with greater extremes. Less than 25 percent of normal soil moisture was measured at Stelle in northeastern Illinois, and moisture values in excess of 200 percent of normal were documented in south-central sections. This considerable variance across the state continued at 20 to 40 inches of depth where only 25 percent of normal moisture was reported in parts of central and northeastern Illinois. More than 150 percent of normal moisture was measured at southwestern sites. Observations at 40 to 72 inches of depth were similar. Soil moisture conditions around Peoria totaled just 50 percent of normal, and moisture levels up to 200 percent of normal were found in far southern Illinois.

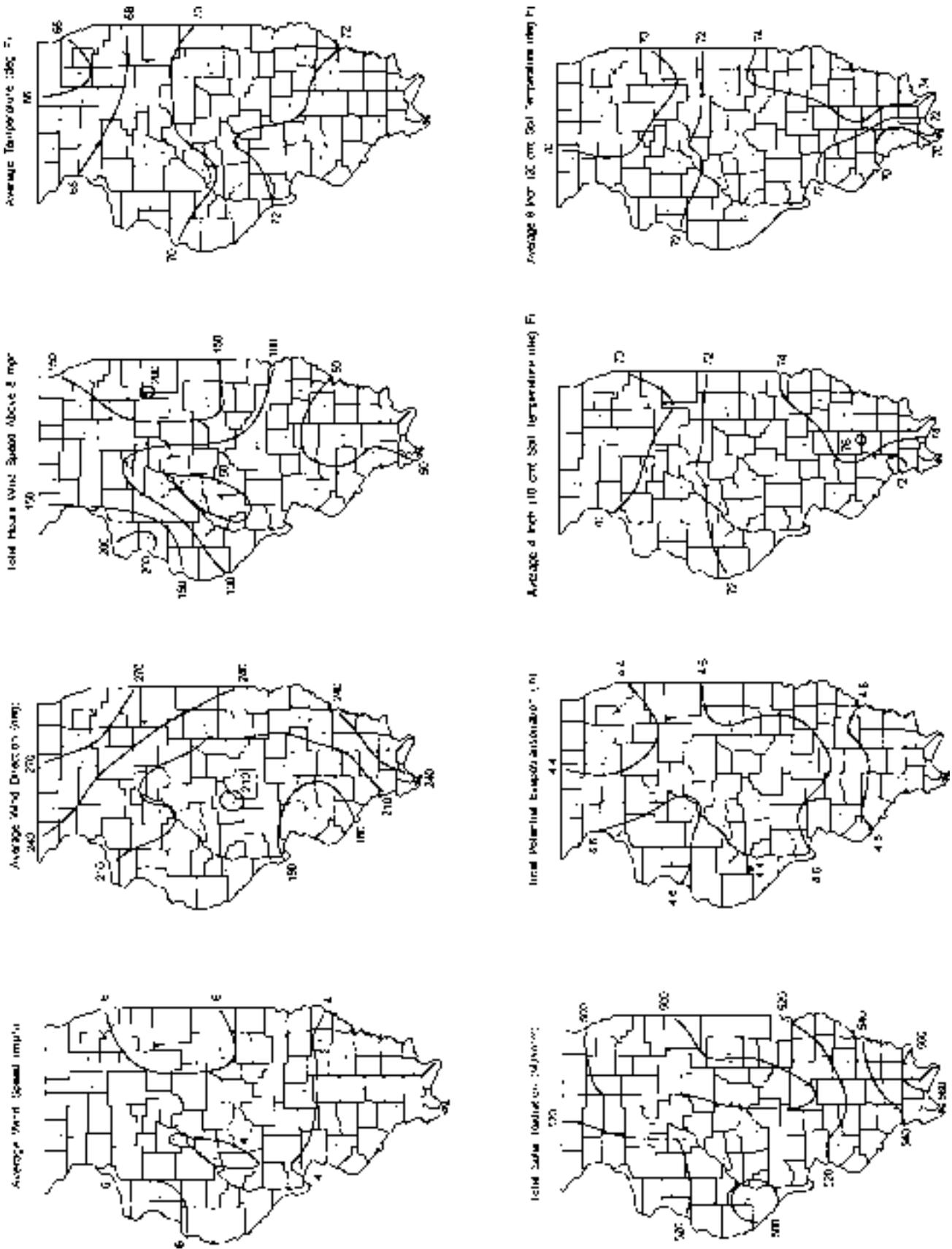


Figure 4. September monthly averages and totals as collected by the Illinois Climate Network

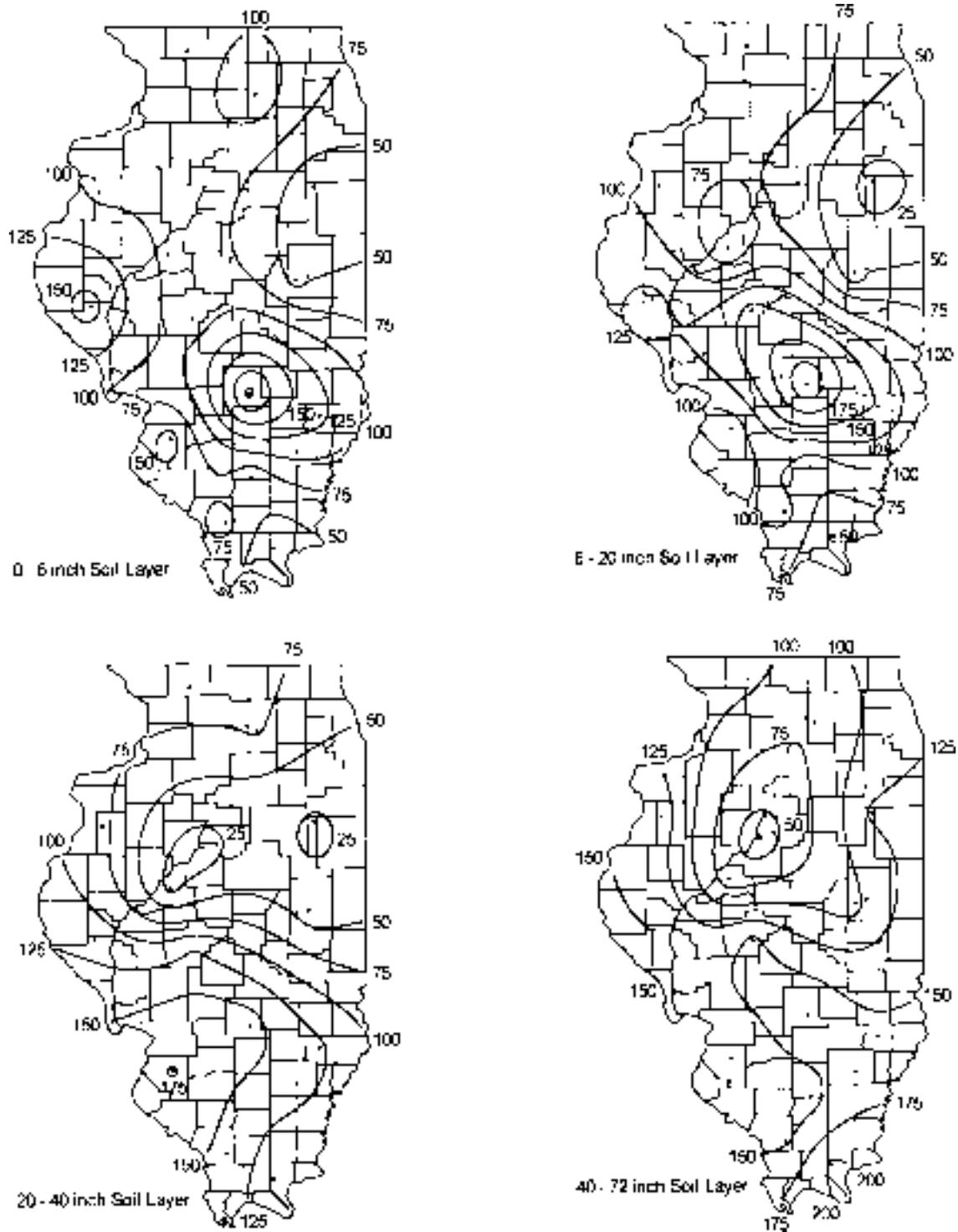


Figure 5. October 1 observed percent-of-normal soil moisture based on 1985-1992 mean

Overall, throughout the first 40 inches of depth, statewide soil moisture at the end of September averaged slightly below the 1985-1995 mean for the month, dipping below average for the first time in 1998 (Figure 1).

Low rainfall totals in September across much of Illinois resulted in large decreases in actual soil moisture levels from one month ago in the 0- to 6- and 6- to 20-inch layers (Table 2), with several sites reporting reductions in excess of 25 percent. Scattered increases occurred over parts of western and central Illinois in response to a heavy rain event late in the month. The 20- to 40-inch layer changed little from last month, except for drier conditions at some central and eastern sites.

Table 2. Soil Moisture in Various Layers on October 1, 1998

<i>Location</i>	<i>Oct 1 0 - 6 (inches)</i>	<i>Change from Sept 1 (%)</i>	<i>Oct 1 6 - 20 (inches)</i>	<i>Change from Sept 1 (%)</i>	<i>Oct 1 20 - 40 (inches)</i>	<i>Change from Sept 1 (%)</i>
Freeport (NW)	1.1	0	2.9	0	6.3	0
DeKalb (NE)	1.5	-4	3.8	2	5.8	2
Mt. Vernon (W)	1.6	20	3.3	48	5.3	-5
East Peoria (C)	1.3	15	3.5	-10	6.3	-8
Topeka (C)	0.7	-29	1.5	-24	1.8	-17
Stella (E)	1.0	-7	2.7	-8	4.6	-10
Champaign (E)	1.2	-2	3.4	-4	4.4	-13
Hamdville (E)	1.1	-18	2.7	-10	6.1	-9
Perry (WSW)	1.9	34	4.3	13	7.0	-7
Springfield (WSW)	1.4	-0	5.0	9	7.6	1
Brownstown (ESE)	2.0	21	3.9	14	7.9	1
Olney (ESE)	1.5	7	4.2	-1	6.9	-1
Belleville (SW)	0.7	-35	1.9	-43	7.5	-6
Carbondale (SW)	1.2	-12	2.8	-25	6.9	-7
Irma (SE)	1.2	-27	4.5	-6	7.6	-1
Fairfield (SE)	1.1	-30	3.5	-16	7.1	-3
Dixon Springs (SE)	0.8	-33	2.7	-27	7.0	-8

Surface Water Information (Sally McConkey)

Rivers and Streams. River and stream discharge and stage data are obtained from gaging stations equipped with telemetry. Most stations are operated and maintained by the U.S. Geological Survey (USGS) and supported in part by the U.S. Army Corps of Engineers (USACOE) and the Illinois Department of Natural Resources (Office of Water Resources and the Illinois State Water Survey). Provisional data are obtained from either direct computer access to the USGS or from readings posted on the Internet by the USGS and the USACOE. Values reported do not reflect final or official stages or discharges.

Table 3 lists streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers. Along the Illinois River, peak stages, in general, were recorded during the second week of the month and were well below flood stage. At Illinois stations along the Mississippi River and on the Ohio River at Cairo, stages also peaked below flood stage.

Table 4 lists 18 streamgaging stations located throughout Illinois. Provisional monthly mean flows posted by the USGS are listed, if available; otherwise, daily 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 is determined by ranking the month's mean flow for each year of record, and selecting the middle value. The current-month flow condition (above normal to below normal) is determined on the basis of its rank relative to the historical record for the month as defined by the exceedence probability. The terms describing flow condition are defined in the notes following Table 4.

Although considerably lower than last month, streamflows at stations throughout most of Illinois (listed in Table 4) were in the normal range. Typically streamflows in Illinois are lower in the fall months than at other times. In northern Illinois, the Pecatonica River at Freeport and the Edwards River near New Boston recorded mean flows above normal. In southern Illinois, the Big Muddy at Plumfield recorded a mean flow above normal; however, flows at this station were affected by controlled water releases from Rend Lake.

Water-Supply Lakes and Major Reservoirs. Table 5 lists reservoirs in Illinois and their month-end water surface elevation, normal pool, and other data related to observed variations in water surface elevations. Normal pool elevation is the elevation of the spillway crest unless releases are controlled and/or adjusted to meet target operating

Table 3. Peak Stages for Major Rivers, September 1998

River	Station	River mile*	Flood stage (feet)*	Peak stage (feet)**	Date
Illinois	Morris	263.1	13	6.6	08
	La Salle	224.7	20	12.2	08
	Peoria	164.6	18	12.8	09
	Havana	119.6	14	6.8	11
	Beardstown	89.6	14	9.9	10
	Meredosia	71.5	14	5.6	01
	Harden	71.5	25	19.8	01
Mississippi	Dubuque	579.9	17	8.1	02
	Kaskaskia	364.2	16	5.5	16
	Quincy	325	13	11.9	16
	Grafton	218	18	15.7	01
	St. Louis	180	30	16.8	18
	Chester	106.9	27	17.4	18
	Thebes	43.7	30	21.5	19
Ohio	Cairo	2.0	40	19.4	28

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 AMF readings, not instantaneous peak

Table 4. Provisional Mean Flows, September 1998

Station	Drainage area (sq mi)	Years of record	1998 mean flow (cfs)	Long-term flows (cfs)		Flow condition	Percent chance of exceedence	Days of data this month
				3-year*	Median			
Rock River at Keokuk	6,363	62	2,962	2,824	2,552	normal	36	30
Rock River near Joazeur	9,349	54	4,570	4,175	3,652	normal	32	30
Tecumseh River at Frogtown	1,326	79	1,000	748	681	above normal	17	30
Green River near Geneseo	1,003	58	261	154	150	normal	31	29
Edwards River near New Boston	445	59	103	130	43	above normal	28	30
Kankakee River at Mokena	2,294	74	955	986	742	normal	32	30
Fox River at Dayton	2,642	86	738	971	558	normal	41	27
Vermilion River at Pontiac	579	53	10.6	179	26	normal	60	30
Spoon River at Seville	1,636	86	142	629	193	normal	61	21
LaMoine River at Ripley	1,293	73	94.7	461	136	normal	65	30
Mackinaw River near Congerville	767	48	20	241	25	normal	56	29
Saugamon River at Monticello	550	84	16.8	121	27	normal	67	30
Vermilion River near Danville	1,290	51	109	264	112	normal	51	30
Kaskaskia River at Vandalia	1,940	27	485	605	310	normal	43	30
Shoal Creek near Haze	735	53	81	140	15	normal	33	30
Embaras River at Ste. Marie	1,516	81	72	381	115	normal	64	30
Skillet Fork at Wayne City	461	77	40	81	20	normal	37	29
Hog Muddy at Plumfield	794	82	162	134	74	above normal	25	30

Notes:

*As reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 1998

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

Below normal flow = 70-90% chance of exceedence

Normal flow = 50-70% chance of exceedence

Above normal flow = 10-30% chance of exceedence

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

Table 5. Reservoir Levels in Illinois

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.

levels. Water withdrawals from public water-supply reservoirs are reported for the previous month as available. Most of the reservoirs listed in Table 5 serve as public water supplies, with the exceptions noted in the last column.

Compared to levels at the end of August at 41 reporting reservoirs, the water surface elevation at the end of September had risen at 6 reservoirs, remained the same at 3 reservoirs, and decreased at 32 reservoirs. At the end of September for the 41 reporting reservoirs, 4 of the water surface levels were above the spillway crest or target operating level, 2 were at normal pool, and 35 were below normal pool. Lake Taylorville is drawn down several feet to facilitate construction of silt basins.

Major Reservoirs. At the end of September, water surface levels at Rend Lake, Carlyle Lake, and Lake Shelbyville all were within 1 foot of target operating levels. Water levels at all three lakes decreased since the beginning of the month toward target operating levels.

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 579.51 feet, compared to a mean level of 581.10 feet in 1997. The long-term average lake level for September is 579.27 feet, based on data from 1918-1996. Historically, the lowest mean level for Lake Michigan in September occurred in 1964 at 576.64 feet, and the highest level occurred in 1986 at 581.96 feet. The month-end level of Lake Michigan was 579.31 feet.

Ground-Water Information (Bryan Coulson)

Comparison to Average Levels. Shallow ground-water levels in 15 observation wells that are remote from pumping centers were above average for the month of September (Table 6). Levels averaged approximately 0.5 feet higher and ranged from about 3.4 feet below to about 3.6 feet above average levels for September. The greatest deviation occurred in the southwestern part of the state.

Comparison to Previous Month. Statewide, shallow ground-water levels in September were below those of August. Levels averaged approximately 1.1 feet lower and ranged from about 0.4 feet above to 3.3 feet below those of August. The greatest deviations below the average ground-water levels occurred in the northwestern crop reporting district, illustrated by the Illinois State Water Survey Observation Well at Cambridge in Henry County; it was approximately 3.3 feet below August's reported level.

Comparison to Same Month, Previous Year. Shallow ground-water levels in September were above those of September 1997. Levels averaged about 1.1 feet higher and ranged from about 0.4 feet below to 3.2 feet above those one year ago.

Table 6. Month-End Shallow Ground-Water-Level Data Sites, September 1998

Number	Well name	County	This month's reading (depth to water, feet)	Deviation from		
				Avg. level (feet)	Previous month (feet)	Previous year (feet)
1	Galena	Indiana	20.77	+0.50	-0.09	-0.53
2	Mt Morris	Ogle	16.50	+2.65	-1.40	-1.70
3	Crystal Lake	McHenry	5.84	-0.16	-0.20	+0.20
4	Cambridge	Henry	11.79	-0.51	-3.29	-1.32
5	Fossil Lab	DuPage	8.06	-0.60	-0.06	+0.76
6	Good Hope	McDonough	N/A	N/A	N/A	N/A
7	Spycarrie	Mason	36.48	+0.50	-0.24	-2.11
8	Middletown	Logan	N/A	N/A	N/A	N/A
9	Swartz	Piatt	N/A	N/A	N/A	N/A
10	Coffman	Pike	13.60	+0.81	-0.94	+2.43
11	Greenfield	Greene	15.10	+0.15	-2.65	+1.35
12	Janesville	Cumberland	6.59	-0.11	-0.64	-0.27
13	St. Peter	Fayette	2.90	+2.03	+0.42	+3.20
14	SWS #2	St. Clair	12.28	+3.56	+0.03	+0.47
15	Boyleston	Wayne	5.27	+2.86	-1.12	+1.95
16	Sparta	Randolph	8.37	+1.47	-1.73	+0.43
17	SE College	Saline	8.86	-1.69	-1.77	-0.41
18	Dixon Springs	Depe	8.42	-5.57	-2.62	+0.20

Note:
N/A = not available