

ILLINOIS WATER AND CLIMATE SUMMARY July 1998

July 1998 Overview (Bob Scott)

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

Mean temperatures across Illinois (Figure 1) were slightly below average for July (a -0.5-degree departure). Temperatures by crop reporting districts (Table 1) ranged from 1.2 degrees below average (northwest) to average temperatures for July (southwest and southeast).

Precipitation amounts (Figure 1) across the state during July were near the long-term mean value although there were areas of the state that reported both considerably above and below average rainfall. The statewide average of 3.77 inches represents a -0.16-inch departure or 96 percent of average. District totals (Table 1) ranged from 2.30 inches (west) to 5.30 inches (southwest), 54 to 144 percent of average, respectively.

Soil moisture (Figure 1) in the 0- to 40-inch (0- to 100-cm) layer at the end of July was slightly above normal (a +0.43-inch departure). Actual soil moisture levels across most of the state continued to decrease during the month (Table 2).

Mean provisional streamflow (Figure 1) statewide was well above the median flow (330 percent of median), and nearly all stations throughout Illinois were in the above normal to much above normal range. Peak stages along the Illinois River exceeded flood stage from Havana to Hardin for the fifth consecutive month. Likewise, flood stage was exceeded at most stations on the Mississippi River and along the Ohio River at Cairo.

Reservoir levels (water surface levels) from 42 reporting stations at the end of July were at normal pool (target operating level) at 15 reservoirs, above normal pool at nine stations, and below normal pool at 18 stations. Carlyle Lake, Lake Shelbyville, and Rend Lake ended July above their target operating levels. **Lake Michigan** levels continue to exceed the long-term average.

Statewide, **shallow ground-water levels** (Figure 1) were above average for July (a +1.42 foot departure). Greatest deviations occurred in northwestern Illinois. Levels averaged about 1.4 feet below last month's levels and were approximately 1.8 feet above July levels last year.

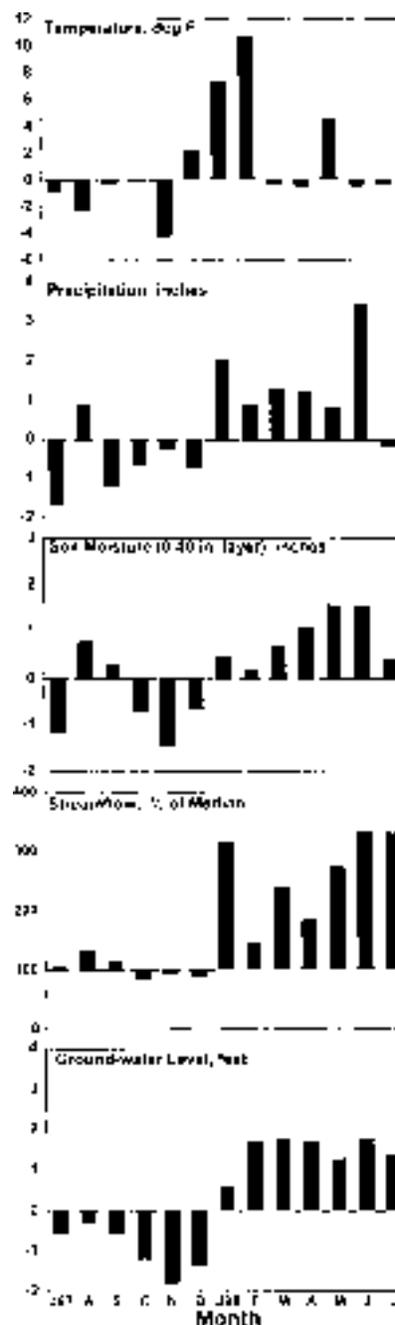


Figure 1.
Statewide departures from normal

Note: The WARM Network maps are being updated and will appear in the August issue

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

Cook County precipitation amounts for June were variable (Figure 2). Heaviest precipitation occurred in the southern half and in the northeast corner of the network. Lightest precipitation was found on the north side and along the Lake Michigan coastline. Site values for the month ranged from 6.49 inches at site #20 (Orland Park) to 2.70 inches at site #6 (north-central Chicago, near Belmont Avenue). June's network average of 4.47 inches was about 107 percent of the eight-year (1990 - 1997) June network average of 4.19 inches.

Temperatures for July (Figure 3) were slightly below the long-term average for the month throughout Illinois, except for the northeast where readings ranged from 1.0°F to 2.5°F below average. Hot weather was limited to a brief period near mid month. Temperatures reached the middle 90s over most of the state on July 19-22. Some of the higher observed temperatures were 99°F (Iuka), 98°F (Moline and Cahokia), and 97°F (Bloomington).

Statewide average **precipitation** for July (Figure 3) was about 96 percent of the long-term average, and was the first month in 1998 with below average statewide precipitation. Regionally, precipitation exhibited great variability across the state, ranging from less than 60 percent of average in western and northwestern Illinois to 144 percent in the southwest. A portion of western Illinois received an inch or less of rain during July. Other dry areas were noted in far northwestern and south-central Illinois. However, slow-moving thunderstorms dropped copious amounts of rain on other locations. Some large monthly totals include: 8.99 inches (Cahokia), 8.47 inches (Lawrenceville), 8.43 inches (Pontiac), 7.51 inches (Cairo), and 6.28 inches (Hoopeston).

Severe weather was generally limited to a hot, humid period during July 19-22. Strong storms produced wind damage at several locations over northern and east-central Illinois on July 20. Severe thunderstorms were more widespread in central and southern Illinois on July 22.

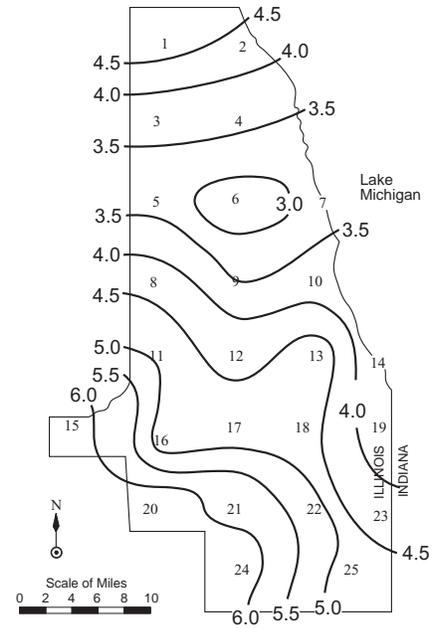


Figure 2. Cook County precipitation (inches) during June 1998

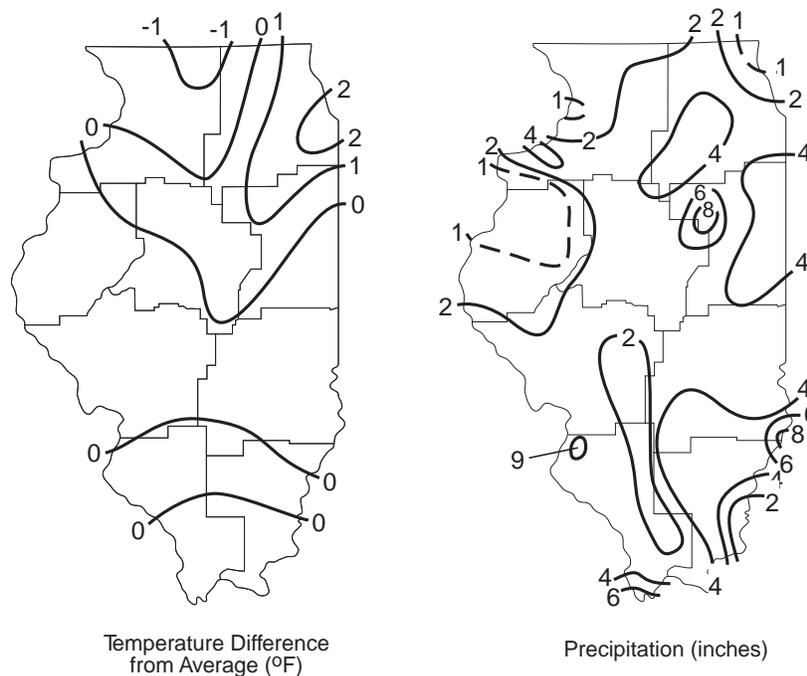


Figure 3. Illinois precipitation and temperatures during July 1998

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		
	Jan 98 Actual	% Dev	Temp (°F)	Mar 98 Actual	% Dev	Temp (°F)	Feb 98 Actual	% Dev	Temp (°F)	Aug 97 Actual	% Dev	Temp (°F)
Northwest	2.27	59	-1.2	11.72	98	0.4	33.07	119	2.2	37.77	106	1.5
Northeast	2.94	75	0.5	12.15	105	1.3	22.02	114	2.9	37.48	104	1.8
West	2.30	54	-0.3	14.58	120	0.9	37.64	136	1.8	41.13	136	1.0
Central	3.16	76	-0.4	15.57	133	1.0	26.71	132	2.2	44.40	120	1.4
East	4.89	119	-0.5	19.42	165	1.3	30.49	150	2.6	46.14	124	1.5
West-southwest	4.06	106	-0.6	18.76	161	1.2	32.38	157	1.8	49.51	131	1.2
East-southeast	4.83	123	0.6	17.73	149	1.3	30.51	140	1.9	45.52	113	1.7
Southwest	5.30	144	0.0	17.40	149	1.8	32.54	144	1.8	49.17	117	1.0
Southeast	4.62	121	0.0	16.62	136	1.5	31.22	150	1.6	47.21	108	0.8
State Average	3.77	96	-0.5	15.92	135	1.2	28.37	136	2.1	44.35	116	1.3

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

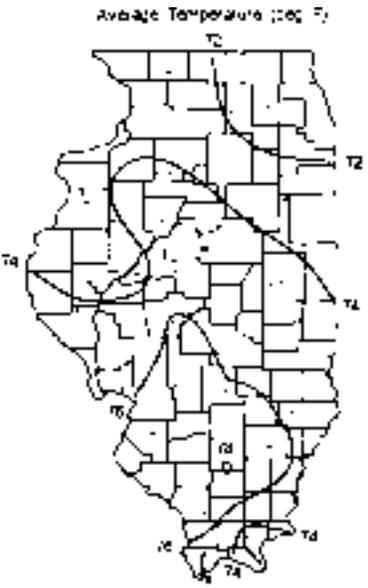
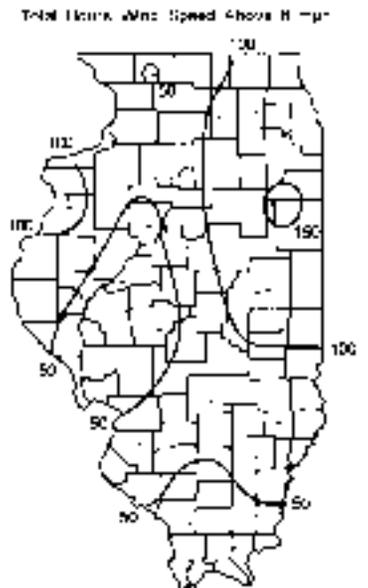
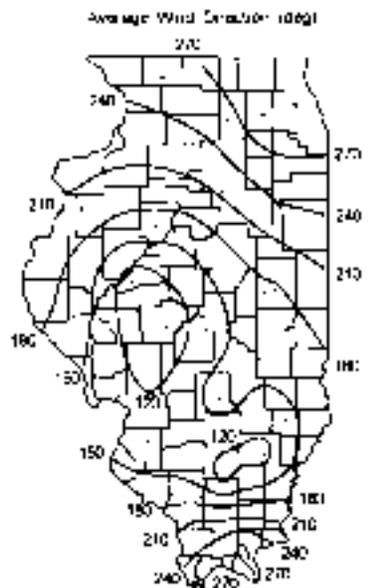
Extended climate outlooks issued by the U.S. Department of Commerce, National Atmospheric and Oceanic Administration, Climate Prediction Center for August call for equal chances of below, above, and normal temperature and precipitation over all of Illinois. August-October outlooks suggest a slight chance of below normal temperatures across all but extreme southern Illinois, with equal chances of below, above, and normal precipitation across the state.

Illinois Climate Network (ICN) Data. Average daily wind speeds for July (Figure 4) ranged from 2.8 mph at Dixon Springs to 5.9 mph at Stelle. Freeport recorded the highest wind gust for the month, 46 mph on July 19. The prevailing wind direction was from the southeast to south across much of central and southern Illinois, and from the west in far southern and northeastern Illinois. The occurrence of winds in excess of 8 mph ranged from near 20 hours at Dixon Springs, Kilbourne, and Wildlife Park to about 156 hours at Stelle. (July has 744 hours.) Average temperatures ranged from the low to upper 70s across the state from north to south. Higher precipitation totals and associated cloud cover across southern Illinois were reflected in atypical patterns of solar radiation and potential evapotranspiration: both variables reported higher values over northern Illinois with lower values to the south. Solar radiation ranged from 620 Mega-Joules per meter squared (MJ/m²) at Carbondale and Dixon Springs to 761 MJ/m² at Stelle while potential evapotranspiration ranged from a low of 5.4 inches at Dixon Springs to just over 6.7 inches over the northern quarter of the state. Soil temperatures at both the 4- and 8-inch levels reached annual highs, ranging from the middle 70s in northern Illinois to the low 80s in southeastern Illinois.

Soil Moisture Information (Bob Scott)

Soil moisture at the end of July continued to show above normal conditions across southern Illinois, while regions of below normal soil moisture began to appear for the first time this summer over northern Illinois (Figure 5). Rainfall during July remained heavy across southern Illinois where several sites reported soil moisture conditions that exceeded 200 percent of normal in the near surface layer (0 to 6 inches of depth). Concurrently, the lesser rainfall amounts across parts of northern and central Illinois resulted in soil moisture levels that reached only about 50 percent of the normal level for July. Patterns were similar in the 6- to 20-inch layer, except for values approximating normal along the southeastern border of the state and in a narrow band from far western Illinois toward the northeast. Observations in the 20- to 40-inch layer showed normal to above normal moisture levels across most of the state, but with a below normal region appearing in central Illinois. Moisture in the 40- to 72-inch layer was below normal near Peoria but above normal, in excess of 200 percent of normal, over southeastern Illinois. Overall, throughout the first 40 inches of depth, statewide soil moisture conditions were slightly above the 1985-1995, 11-year average for August 1 (Figure 1).

July's lower precipitation totals across central and northern Illinois heralded large decreases in actual moisture amounts from one month ago (Table 2). Decreases dominated in the 0- to 6-inch layer, with several sites reporting reductions of 40 to 60 percent since July 1. Small increases occurred only in parts of far southern Illinois. A similar pattern existed in the 6- to 20- and 20- to 40-inch layers, but with smaller extremes. Nevertheless, soil moisture in these layers decreased nearly universally with maximum reductions ranging from 30 to 45 and 10 to 20 percent, respectively.



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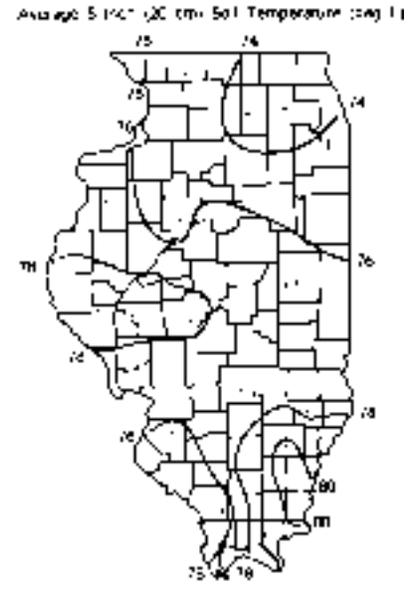
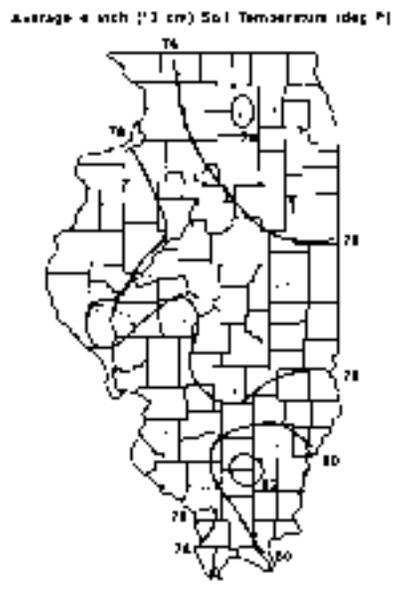
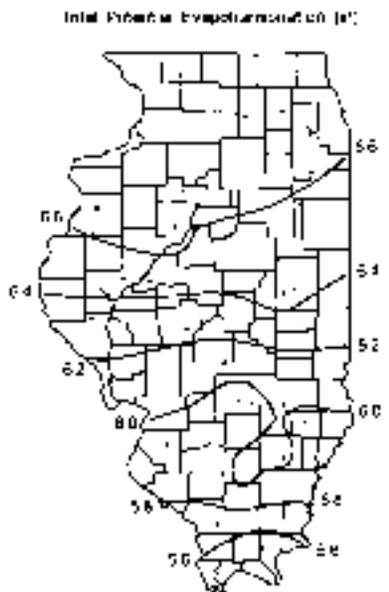
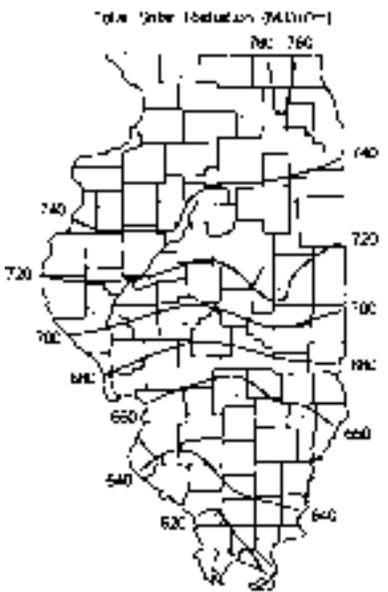


Figure 4. July monthly averages and totals as collected by the Illinois Climate Network

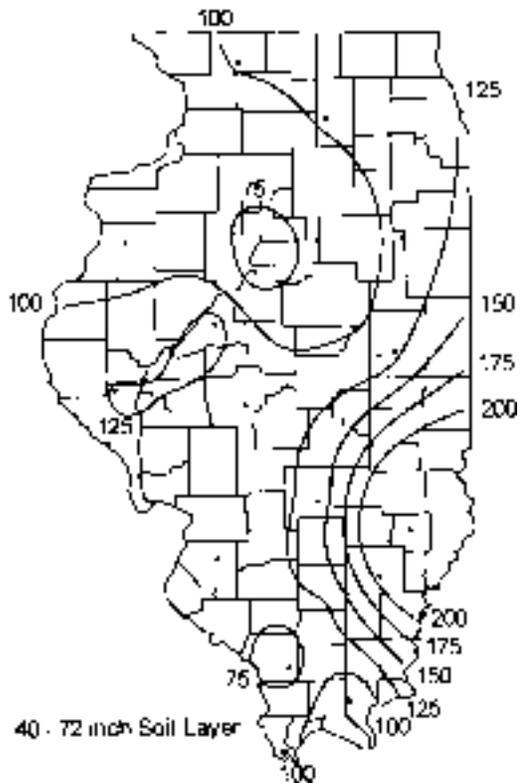
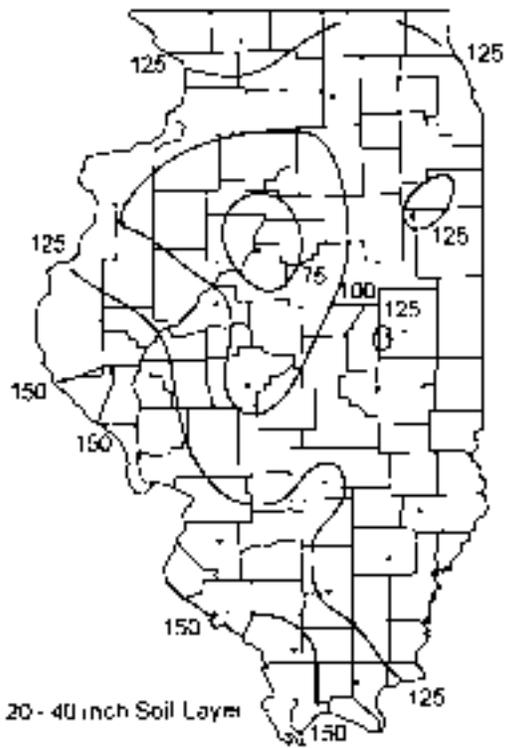
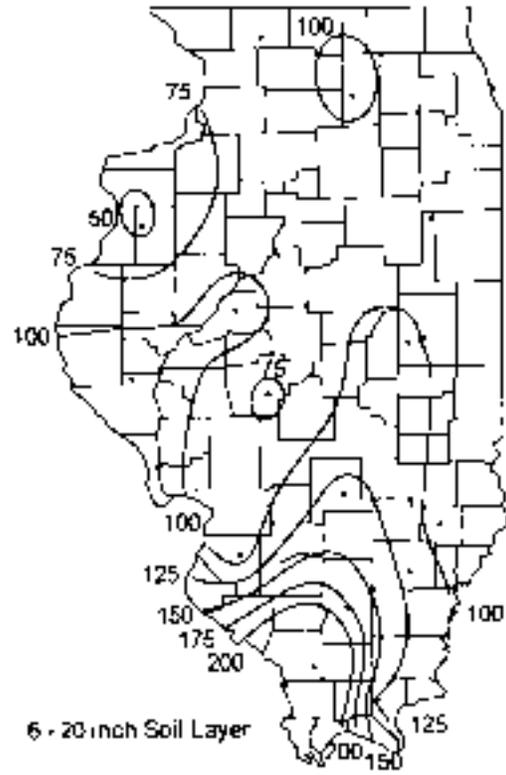
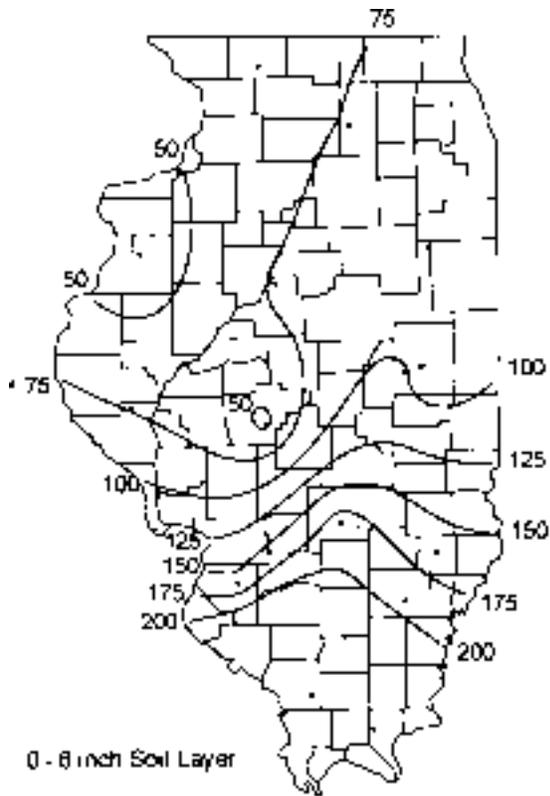


Figure 5. August 1 observed percent-of-normal soil moisture based on 1985-1992 mean

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

<i>Location</i>	<i>August 1 0 - 6 (inches)</i>	<i>Change from July 1 (%)</i>	<i>August 1 6 - 20 (inches)</i>	<i>Change from July 1 (%)</i>	<i>August 1 20 - 40 (inches)</i>	<i>Change from July 1 (%)</i>
Freeport (NW)	1.1	-19	2.9	-37	6.3	-12
DeKalb (NE)	1.4	-10	4.2	0	6.6	-6
Monmouth (W)	1.0	-46	2.5	-44	5.8	-15
East Peoria (C)	1.1	-24	3.8	-6	6.7	-5
Topeka (C)	0.6	-57	1.9	-71	2.4	-19
Stelle (E)	1.4	-5	3.6	-16	6.6	-3
Champaign (E)	1.4	-35	4.1	-12	5.7	-10
Bondville (E)	1.7	-27	4.1	-24	7.6	-10
Perry (WSW)	1.2	-50	4.4	-25	8.0	-6
Springfield (WSW)	1.2	-44	4.3	-20	7.3	-12
Brownstown (ESE)	2.0	-7	3.9	-3	8.0	-2
Olney (ESE)	1.5	-31	4.1	-11	6.9	-4
Belleville (SW)	1.5	-29	3.0	-28	7.8	-6
Carbondale (SW)	2.7	9	4.7	-10	7.8	-7
Ina (SE)	2.2	8	5.3	1	7.7	-0
Fairfield (SE)	1.6	-27	4.4	-16	7.4	-2
Dixon Springs (SE)	2.7	11	4.7	-9	7.7	-9

Surface Water Information (Sally McConkey)

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, 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 posted on the Internet.

Rivers and Streams. Data are provisional, and values reported do not reflect final or official stages or discharges. Table 3 lists streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers. The peak stage is determined from morning readings posted on the Internet by the USGS and the U.S. Army Corps of Engineers.

Peak stage at sites along the Illinois River occurred during the first part of the month and were above flood stage for the fifth consecutive month. The Mississippi River peaked above flood stage at most reporting stations in the state, also during the first two weeks of July. Similarly, the Ohio River at Cairo recorded a peak stage above flood stage on July 6.

Table 4 lists 18 streamgaging stations located throughout Illinois. Provisional mean monthly flows posted by 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 is determined by ranking the month's mean flow for each year of record and selecting the middle value. The current month's 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. Terms describing flow condition are defined in the notes following Table 4.

Again this month, streamflows ranged from above normal to much above normal throughout Illinois. The flow recorded for the Mackinaw River at Congerville was the only monthly flow in the normal range for July. Flows recorded for the Pecatonica River at Freeport, Vermilion River at Pontiac, Kaskaskia River at Vandalia, and the Big Muddy at Plumfield were much above normal.

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

Table 3. Peak Stages for Major Rivers, July 1998

River	Station	River mile ^a	Flood stage (feet) ^a	Peak stage (feet) ^{**}	Date
Illinois	Mazon	263.1	17.6	10.1	09
	La Salle	224.7	20	19.9	09
	Peoria	164.6	18	16.4	11
	Havana	119.6	14	17.9	01
	Beardstown	88.6	14	19.8	01
	Marmionia	71.3	14	19.3	01
	Hardin	21.5	25	28.2	05
Mississippi	Dubuque	579.9	17	16.2	05
	Keokuk	364.2	16	16.1	08
	Quincy	325	17	19.5	08
	Grafton	21.8	18	20.8***	13***
	St. Louis	180	20	28.1	11
	Chester	109.9	26.9	29.4	12
	Thebes	43.7	15	33.2	05
Owa	Caro	2.0	40	42.5	06

Notes:

^aRiver mile and flood stage from *River Stages in Illinois. Flood and Damage Data*, Illinois Department of Transportation, Division of Water Resources, May 1994

^{**}Peak stage based on daily 24 hr. readings, not instantaneous peak.

^{***}Data not available for 7/1 - 7/12 at Grafton

Table 4. Provisional Mean Flows, July 1998

Station	Drainage area (sq mi)	Years of record	1998 average flow (cfs)	Long-term flow		Flow condition	Days of flow this month	Percent chance of exceedence
				Mean ^a (cfs)	Median (cfs)			
Rock River at Rockton	6,261	62	6,294	2,512	2,536	above normal	31	13
Rock River near Joliet	9,349	54	13,800	5,620	4,802	above normal	17	11
Peatonica River at Freeport	1,376	79	1,701	887	663	much above normal	31	26
Lincoln River near Laneson	1,090	58	1,001	357	386	above normal	31	13
Edwards River near New Boston	445	59	379	306	165	above normal	31	18
Kaskaskia River at Altonnage	2,264	79	2,173	1,465	1,267	above normal	30	12
For River at Dayton	2,647	40	1,406	1,345	810	above normal	31	26
Vermilion River at Potosi	339	51	934	321	172	much above normal	30	27
Steen River at Seville	1,676	40	1,184	1,059	611	above normal	31	28
LaMoine River at Ripley	1,267	73	1,703	789	581	above normal	31	13
Mackinac River near Congerville	767	48	377	393	243	normal	31	36
Sangamon River at Monroville	350	84	603	292	170	above normal	31	18
Vermilion River near Danville	1,790	51	1,761	760	464	above normal	30	13
Kaskaskia River at Vandalia	1,840	27	2,008	1,319	1,141	much above normal	31	37
Small Creek near Brees	713	51	291	124	113	above normal	31	27
Lincoln River at St. Marc	1,376	87	1,642	77	477	above normal	31	16
St. Hel Fork at Wayne City	464	17	328	148	52	above normal	31	15
Big Muddy at Plumfield	394	62	990	376	136	much above normal	30	27

Notes:

^aAs reported in U. S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 1994

Much below normal flow = 50-100% chance of exceedence

Below normal flow = 70-90% chance of exceedence

Normal flow = 50-70% chance of exceedence

Above normal flow = 10-50% 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.

Compared to levels at the end of June at 37 reporting stations, the water surface elevation at the end of July had risen at two reservoirs, remained the same at four, and decreased at 31. Of the 42 stations reporting this month, nine stations were above the spillway crest or target operating level, 15 were at normal pool, and 18 were below normal pool at the end of July.

Major Reservoirs. Carlyle Lake ended July 4.2 feet above the target level and Lake Shelbyville was 7.7 feet above target. Likewise, Rend Lake was 2.7 feet above the spillway notch.

Great Lakes. Current month mean and end-of-month values are provisional and relative to IGLD 1985. The July mean level for Lake Michigan was 580.17 feet compared to a mean level of 581.33 feet in 1997. The long-term average lake level for July is 579.49 feet, based on 1918-1996 data. Historically, the lowest mean level for Lake Michigan in July occurred in 1964 at 576.71 feet, and the highest level occurred in 1986 at 581.99 feet. The month-end level of Lake Michigan was 579.97 feet.

Ground-Water Information (Bryan Coulson)

Comparison to Average Levels. Shallow ground-levels in 16 observation wells remote from pumping centers were above average for the month of July (Table 6). Levels averaged approximately 1.4 feet higher and ranged from 4.2 feet below to 5.0 feet above average levels for July. The greatest deviation occurred in the northwestern part of the state.

Comparison to Previous Month. Statewide, shallow ground-water levels during July were below those of June. July levels averaged approximately 1.4 feet lower and ranged between 9.2 feet above and 6.5 feet below June levels. A large positive anomaly was found in the northwest crop reporting district, but the strongest trend was for conditions below the average ground-water levels, especially in the western and far southern sections of the state.

Comparison to Same Month, Previous Year. Shallow ground-water levels in July were above those of July 1997. Levels averaged about 1.8 feet above normal and ranged from 2.5 feet below to 6.3 feet above those of one year ago.

Table 6. Month-End Shallow Ground-Water Level Data Sites, July 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	McDonnell	20.73	+0.18	+9.20	+0.52
2	Mt. Morris	Ogle	12.60	+4.98	-2.10	+4.40
3	Crystal Lake	McHenry	3.83	+1.23	-0.79	+1.52
4	Cambridge	Henry	5.57	+2.91	-2.82	+6.70
5	Fermi Lab	DuPage	7.74	-0.42	-0.53	+0.24
6	Good Hope	McDonough	5.33	+2.66	-1.56	+3.67
7	Snicarie	Mason	15.93	+0.46	-0.32	+2.35
8	Middletown	Logan	NA	NA	NA	NA
9	Swartz	Piatt	NA	NA	NA	NA
10	Collman	Pike	9.41	+3.28	-6.45	-4.43
11	Greenfield	Greene	9.00	+2.87	-5.63	+4.52
12	Janesville	Cumberland	5.58	+0.31	-1.08	-0.07
13	St. Peter	Fayette	2.34	+1.99	+0.08	-0.07
14	NWS #2	St. Clair	12.60	+2.21	+0.27	+0.09
15	Haystack	Wayne	4.85	+1.25	-1.05	+0.24
16	Sparta	Randolph	5.13	+3.00	-0.26	-1.11
17	SE College	Saline	6.20	+0.02	-4.14	+1.67
18	Dixon Springs	Pope	8.63	-4.18	-4.47	-2.48