

ILLINOIS WATER AND CLIMATE SUMMARY
August 1998

August 1998 Overview (Bob Scott)

Temperatures across Illinois in August were slightly above average and precipitation was near average. Soil moisture within the top 40 inches of soil 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.

Temperatures across Illinois (Figure 1) were slightly above average for August (a 1.3-degree departure). Temperatures by crop reporting districts (Table 1) ranged from 0.7 degrees above average (southeast) to 1.9 degrees above average (west and east).

Precipitation amounts (Figure 1) across the state during August were near the long-term average value although there were areas of the state that reported below average rainfall. The statewide average of 3.40 inches represents a -0.26-inch departure or 93 percent of average. District totals (Table 1) ranged from 2.39 inches (west) to 4.34 inches (northeast), 67 to 110 percent of average, respectively.

Soil moisture (Figure 1) in the 0- to 40-inch (0- to 100-cm) layer at the end of August was slightly above normal (a +0.48-inch departure). Actual soil moisture levels across most of the state continued a general decrease during the month (Table 2).

Mean provisional streamflow (Figure 1) statewide was well above the median flow (454 percent of median). Flows recorded at stations in northern and southern Illinois were in the above normal to much above normal range. Stations in central Illinois recorded flows in the normal range. Peak stages for the month at Illinois stations along the Mississippi, Illinois, and Ohio Rivers were below flood stage.

Reservoir levels (water surface levels) at 40 reporting reservoirs at the end of August were at normal pool (target operating level) at 6 reservoirs, above normal pool at 7 stations, and below the normal pool at 27 sites. Carlyle Lake, Lake Shelbyville, and Rend Lake ended August less than 2 feet above their target operating levels. Lake Michigan levels continue to exceed the long-term mean.

Statewide, **shallow ground-water levels** were approximately 1.3 feet above average levels for August. The greatest deviations above normal occurred in the western one-half of Illinois. Levels averaged about 1.1 feet below those of last month and were approximately 1.6 feet above August levels one year ago.

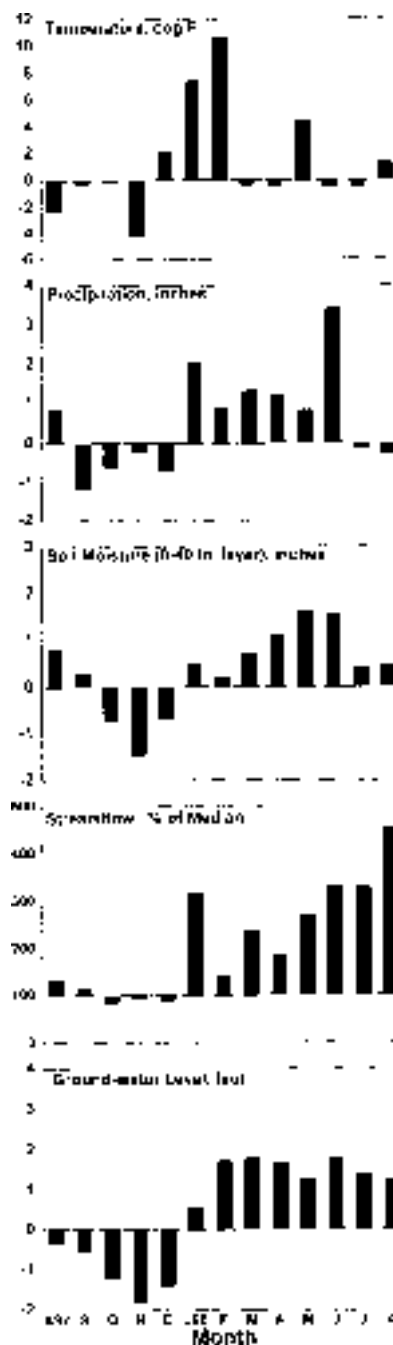


Figure 1.
Statewide departures from normal

Contact

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

Cook County precipitation amounts for July (Figure 2) were variable. Site values for the month ranged from 4.78 inches at site #24 (Matteson) to 1.43 inches at site #1 (Northbrook). The heaviest precipitation was found along the southern edge of the network with lighter precipitation throughout the central portion. July's network average of 2.21 inches was about 61 percent of the eight-year (1990-1997) July network average of 3.75 inches.

Temperatures for August (Figure 3) were slightly above the long-term average in Illinois. The warmest area of the state was in the northern half where individual site averages were as much as 2.7°F above average. Maximum temperatures occurred during the last week of the month with readings in the low 90s across much of the state. The highest temperature recorded during August was 99°F on August 26 at Iuka. The lowest temperature, 48°F, was observed at Mt. Carroll on August 1. The statewide average temperature for climatological summer (June, July, and August) was very close to the long-term average, 73.9°F, a +0.1°F departure.

Statewide average **precipitation** during August (Figure 3) was 93 percent of the long-term average, continuing the overall trend toward drier conditions first observed in July. However, rainfall varied greatly in terms of amounts, where it occurred, and when it occurred. The northern one-third of Illinois received from 4 to 5 inches of rain, while the western and eastern crop reporting districts received on average only 2 to 3 inches of rain. Within these general areas, however, there were locations that received almost twice the average rainfall for the month and others whose precipitation totals were well below average. Elizabeth in Jo Daviess County received 8.06 inches; Paris in Edgar County, 6.76 inches; and Peoria in Peoria County, 6.54 inches. Official August rainfall in Champaign was 1.94 inches, but unofficial collections within the city were as high as 4.02 inches. Furthermore, during a 2.5-day period within the first week of the month, 11.50 inches of rain was measured by a research raingage located approximately 4 miles northeast of Urbana. On the other hand, LaSalle and Beardstown received only 0.89 inches of rain during August.

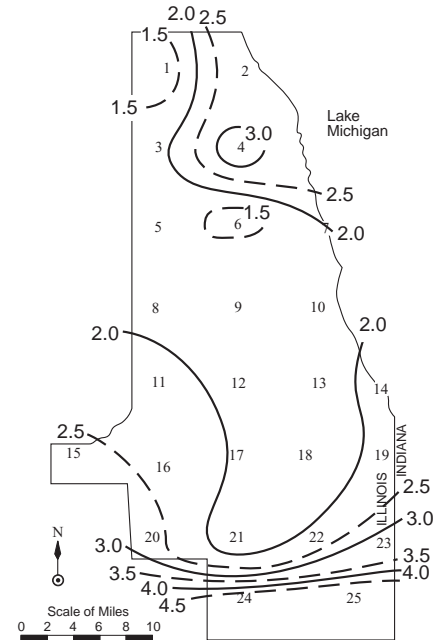


Figure 2. Cook County precipitation (inches) during July 1998

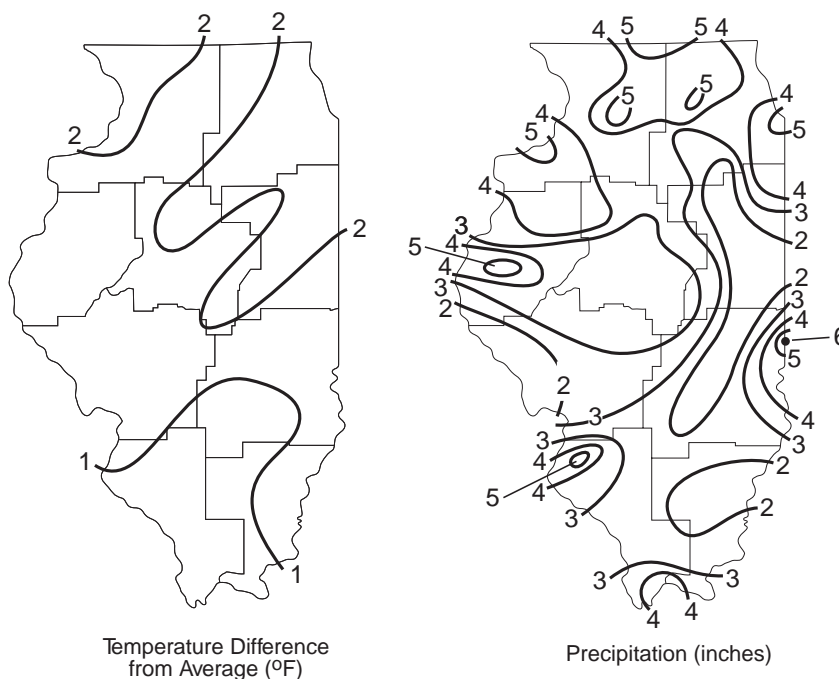


Figure 3. Illinois precipitation and temperatures during August 1998

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		
	Inch 98 Amount	% Avg	Temp Dev	Inch 98 Avg 98	% Avg	Temp Dev	Inch 98 Avg 98	% Avg	Temp Dev	Inch 97 Avg 98	% Avg	Temp Dev
Northwest	4.24	99	1.0	12.76	103	0.6	24.67	110	0.4	37.48	105	1.8
Northeast	4.74	110	1.5	12.44	106	0.1	34.52	112	1.2	37.13	107	2.1
West	2.39	67	1.4	11.84	102	0.1	26.37	117	0.5	40.95	110	1.4
Central	3.51	100	1.6	13.41	119	0.0	27.66	125	0.7	42.16	114	1.7
East	2.60	71	1.9	18.14	140	0.3	31.44	140	1.1	43.83	117	1.9
West-southwest	3.49	104	1.4	16.68	133	0.1	32.56	146	0.4	49.17	130	1.4
East-southeast	3.46	103	1.1	15.58	119	0.2	31.72	137	0.6	45.34	113	1.4
Southwest	3.21	91	0.8	16.44	151	0.5	32.74	137	0.7	48.45	115	1.2
Southeast	2.78	81	0.7	14.67	113	0.4	30.79	125	0.5	46.53	106	1.0
State Average	3.40	93	1.1	14.46	126	0.1	29.07	128	0.7	43.34	113	1.6

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

Severe weather continued its seasonal decline. Heavy thunderstorms across the northern half of the state on August 3 dropped 3 to 6 inches of rain, prompting flash flood warnings for several counties. On August 4, isolated severe storms developed in central Illinois, and a brief tornado touchdown was reported near Sinclair, northeast of Jacksonville. Concurrently, wind damage with 1-inch hail was reported near Peoria. On August 24, severe thunderstorms developed across northern Illinois and in Vermilion County as a cold front pushed through the state. Considerable wind damage was reported throughout the area, and more than 200,000 residents were left without electrical power, some for as long as two days.

Extended climate outlooks issued by the U. S. Department of Commerce, National Atmospheric and Oceanic Administration, Climate Prediction Center for September are for equal chances of below, above, and normal temperature and precipitation over all of Illinois. The outlooks for the autumn season, September through November, suggest a slight chance of below normal temperatures across northern Illinois, especially along the Iowa border, with equal chances of below, above, and normal temperatures elsewhere. Outlooks of precipitation in the fall indicate a slight chance of above normal rainfall across nearly all of Illinois, especially in the northeastern half of the state. Equal chances of below, above, and normal rainfall conditions are found only for the counties along the Missouri border.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for August (Figure 4) were typically low for the time of year and ranged from 2.2 mph at Dixon Springs to about 5.5 mph at Monmouth and Stelle. Highest wind gust for the month was recorded at Freeport, 73 mph on August 24, during the severe wind conditions reported in the prior section. The prevailing wind direction across the state was generally from the southeast to southwest. Wind speeds in excess of 8 mph occurred from less than a total of 10 hours at Dixon Springs and Rend Lake to about 125 hours at Monmouth and Stelle. (August has 744 hours.) Average temperatures were quite similar across the state, varying from the low to middle 70s from north to south. Solar radiation ranged from 583 Mega-Joules per meter squared (MJ/m²) at St. Charles to 670 MJ/m² at Dixon Springs; potential evapotranspiration varied from a low of 5.2 inches across northern Illinois to over 6.2 inches at Belleville. Soil temperatures at both the 4- and 8-inch levels were relatively cool over northern and extreme southwestern Illinois with warmest temperatures found at Rend Lake. Actual values ranged from 73°F to 80°F.

Soil Moisture Information (Bob Scott)

Soil moisture at the end of August continued to show above normal conditions across parts of southern Illinois: below normal soil moisture dominated northern Illinois (Figure 5). Lingering effects of heavy precipitation earlier in the summer over southern Illinois created above normal soil moisture in the 0- to 6-inch layer although this area is considerably smaller in breadth and magnitude than last month. Except for abnormally wet conditions in the sandy soils around Topeka, the rest of the state showed below normal soil moisture. A similar pattern was found in the 6- to 20-inch layer, but with greater extremes. Less than 50 percent of normal soil moisture was seen in northeastern and northwestern Illinois, and values in excess of 200 percent of normal were measured in the southwest. Soil moisture 20 to 40 inches down ranged from less than 75 percent of normal across northeastern and central Illinois to more than 175 percent near Belleville. Observations 40 to 72 inches deep were similar as well, but with values closer to normal. Above normal soil moisture was measured over much of southern Illinois, with a small area of below normal condi-

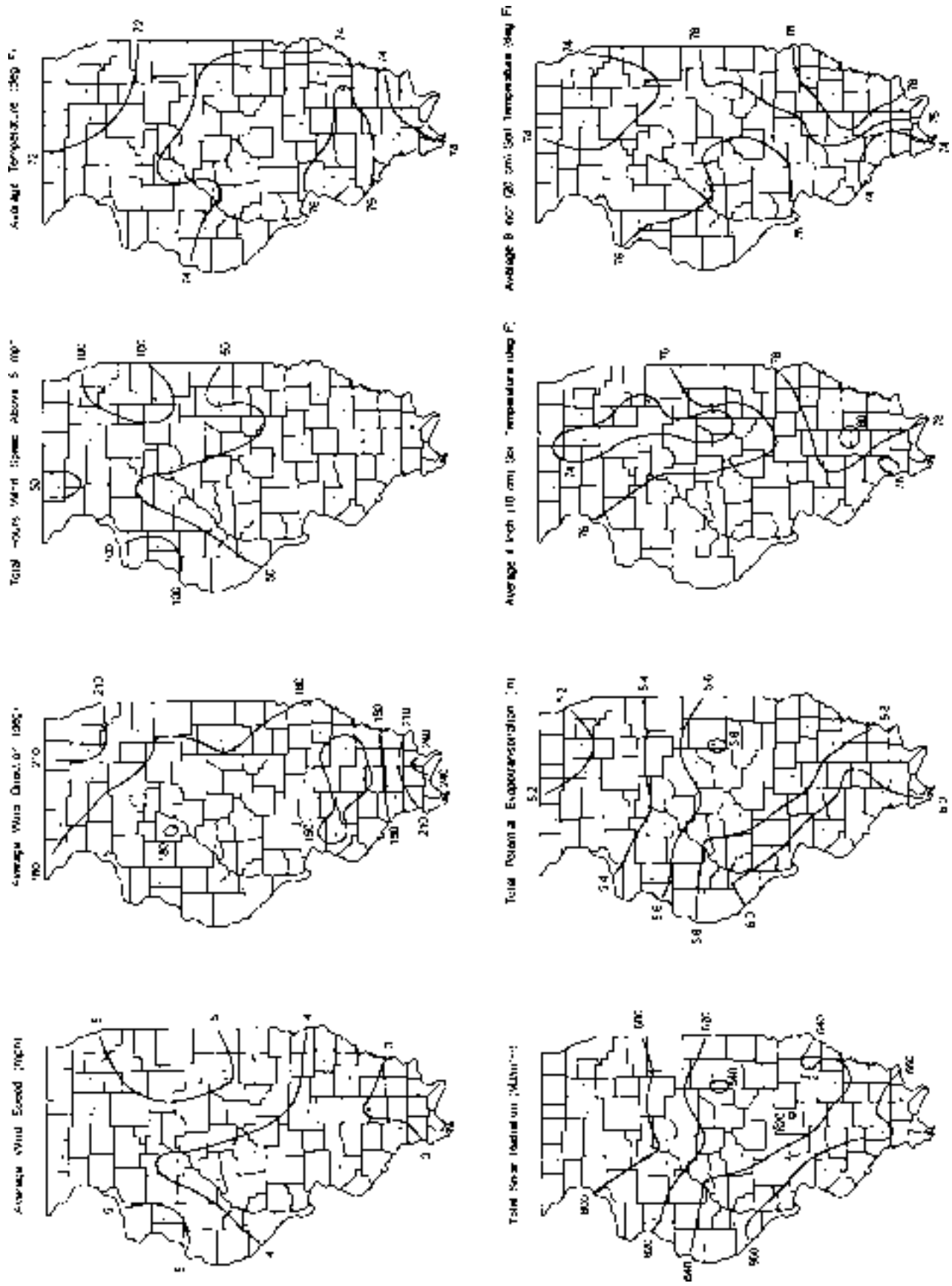


Figure 4. August monthly averages and totals as collected by the Illinois Climate Network

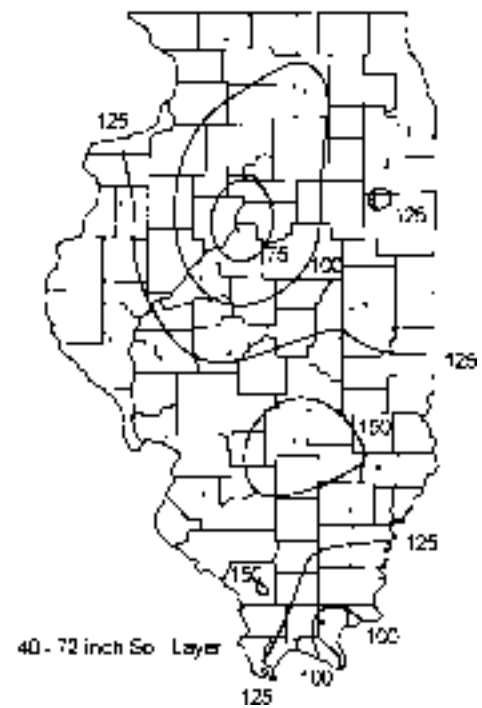
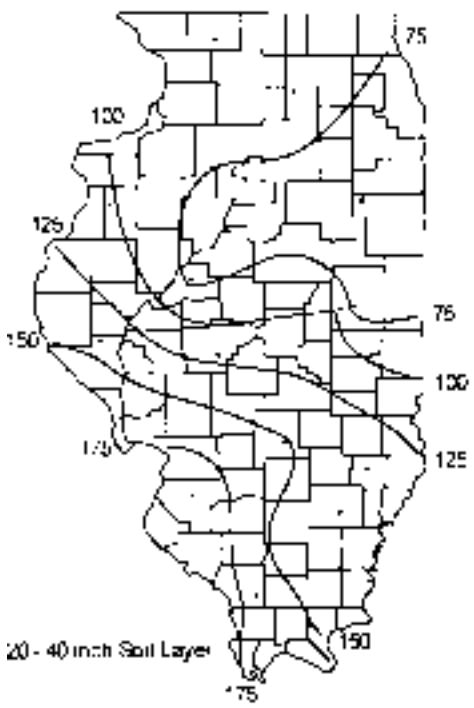
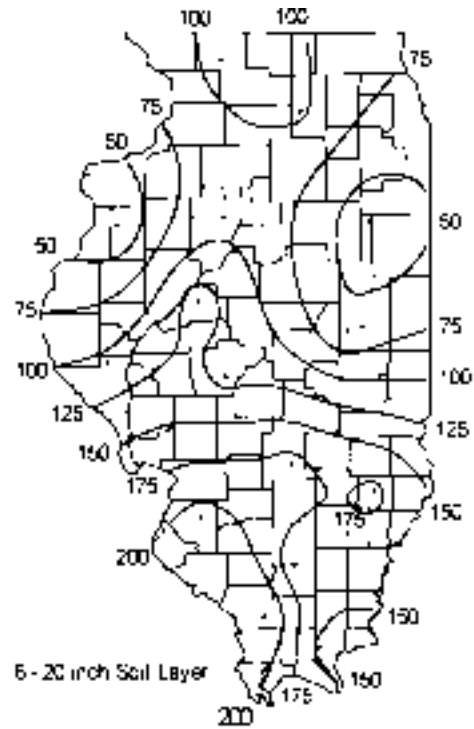
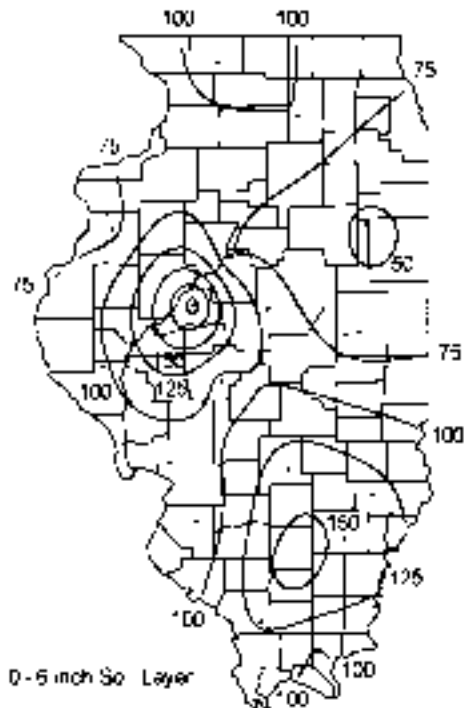


Figure 5. September 1 observed percent-of-normal soil moisture based on 1985-1992 mean

tions being observed near Peoria. Overall, throughout the first 40 inches of depth, statewide soil moisture conditions were slightly above the 1985-1995, 11-year average for September 1 (Figure 1).

Lower rainfall totals in August across much of Illinois allowed for continuation of the recent decreasing trend in actual moisture observed last month (Table 2). Decreases dominated the 0- to 6-inch layer, with several sites reporting reductions in excess of 20 percent since August 1. Increases occurred in parts of northern and central Illinois in response to a late month rain event. This was especially visible at Topeka. Similar patterns existed in the 6- to 20-inch and 20- to 40-inch layers, but with smaller extremes.

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

Location	Sept 1 0 - 6 inches	Change from Aug 1 (%)	Sept 1 6 - 20 inches	Change from Aug 1 (%)	Sept 1 20 - 40 inches	Change from Aug 1 (%)
Freeport (NW)	1.1	0	2.1	0	6.5	0
DeKalb (NE)	1.6	13	5.7	-11	5.7	-1.4
Monmouth (W)	1.3	29	2.3	-9	5.7	-2
East Peoria (C)	1.2	0	3.9	-4	6.8	2
Topeka (C)	1.0	64	2.0	8	2.2	-12
Stalle (E)	1.1	21	2.9	-21	5.1	-22
Champaign (E)	1.2	-13	3.6	12	4.9	-12
Hendeville (E)	1.5	-23	1.0	-26	6.7	-11
Peoria (W/SW)	1.4	16	3.8	-12	7.5	-6
Springfield (W/SW)	1.4	17	1.6	5	7.5	3
Brownstown (E/SE)	1.6	-17	3.4	-11	7.8	-2
Olney (E/SE)	1.4	8	4.2	2	1.0	1
Hellsville (SW)	1.1	-27	1.1	12	8.0	2
Carbondale (SW)	1.4	-19	3.8	-19	7.4	-8
Irva (SE)	1.7	-24	4.8	-11	7.7	-10
Eastfield (SE)	1.5	-3	4.2	5	7.1	-
Devon Springs (SE)	1.2	-57	1.7	-21	7.1	-

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), 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 USGS and 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. At stations along the Illinois River, the peak stage occurred during the first part of the month and was below flood stage for the first time in 6 months. The Mississippi River peaked below flood stage at stations along the Illinois border on various days during the month. At Cairo, the Ohio River recorded a peak stage, below flood stage as well, on August 4.

Table 4 lists 18 streamgaging stations located throughout Illinois. Provisional monthly mean flows posted by USGS are listed, if available; otherwise, daily discharge data posted by the USGS was 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 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.

In northern Illinois, streamflows were above normal, and in southern Illinois flows were above normal to much above normal. Rivers continued to respond to heavier precipitation across the area earlier in the summer. Throughout central Illinois, flows were in the normal range for August.

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

Table 3. Peak Stages for Major Rivers, August 1998

River	Station	River mile ^a	Flood stage (feet) ^a	Peak stage (feet) ^{**}	Date
Illinois	Mounts	263.1	12.6	10.1	08
	La Salle	224.7	29	15.6	08
	Peoria	164.6	18	13.3	08
	Havana	119.6	14	10.9	10
	Grandstowns	88.6	14	11.0	07
	Meredosia	71.3	14	8.3	11
	Hardin	21.5	25	21.0	10
Mississippi	Dubuque	579.9	17	9.1	27
	Keokuk	364.2	16	6.4	11
	Quincy	325	17	12.1	15
	Grafton	218	18	16.1	10
	St. Louis	180	30	20.8	01
	Chester	109.9	26.9	24.8	01
	Holmes	43.7	33	38.0	01
Ohio	Cairo	2.0	40	27.9	04

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 peak readings, not instantaneous peak

Table 4. Provisional Mean Flows, August 1998

Station	Drainage area (sq mi)	Years of record	1998		Long term flow		Flow condition	Days of flow this month	Percent chance of exceedance
			mean flow (cfs)	Med ^a (cfs)	Mean ^a (cfs)	Median (cfs)			
Rock River at Rockton	6,367	67	4,739	2,786	2,305	above normal	31	14	
Rock River near Juba	9,549	54	4,259	3,307	3,433	above normal	31	16	
Peotonia River at Freeport	1,136	79	1,068	699	583	above normal	31	17	
Green River near Geneseo	1,003	58	405	397	226	above normal	31	28	
Edwards River near New Boston	445	50	157	167	72	above normal	31	28	
Kankakee River at Molineuse	2,294	79	1,917	1,066	905	above normal	31	10	
Fox River at Dayton	2,642	50	950	928	596	normal	31	30	
Vermilion River at Pontiac	579	55	34.2	120	34.2	normal	31	50	
Spoon River at Seville	1,638	80	452	511	320	normal	31	37	
LaMoine River at Ripley	1,205	73	198	254	159	normal	31	52	
Mackinaw River near Cingularok	767	48	54.1	188	65	normal	31	56	
Sauganaw River at Monticello	550	84	70.1	156	54	normal	31	60	
Vernation River near Danville	1,290	53	1,430	264	112	much above normal	30	87	
Kaskaskia River at Vandula	1,940	77	1,810	914	545	above normal	30	17	
Shoal Creek near Bruce	735	53	560	170	66	much above normal	29	85	
Emmets River at St. Marie	1,516	80	652	434	180	above normal	31	24	
Skillet Fork at Wayne City	464	77	555	111	19	much above normal	31	65	
Big Muddy at Plainfield	794	82	474	199	68	above normal	31	13	

Notes:

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

Below normal flow = 70-90% chance of exceedance

Normal flow = 50-70% chance of exceedance

Above normal flow = 10-30% chance of exceedance

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

^aAs reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 1996.

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.

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 in Table 5 serve as public water supplies, with the exceptions noted in the last column.

Compared to levels at the end of July at 40 reporting reservoirs, the water surface elevation at the end of August had risen at 4 reservoirs, remained the same at 7, and decreased at 29. At the end of August for the 40 reporting reservoirs this month, 7 of the reported water surface levels were above the spillway crest or target operating level, 6 were at normal pool, and 27 were below normal pool.

Major Reservoirs. At the end of August, Carlyle Lake measured 1.6 feet above the target level, and Lake Shelbyville observed a height of 1.1 feet above the target operating level. Rend Lake was 1.6 feet above the spillway notch.

Great Lakes. Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The August mean level for Lake Michigan was 579.87 feet, compared to a mean level of 581.23 feet in August 1997. The long-term average lake level for August is 579.43 feet, based on data from 1918 through 1996. Historically, the lowest mean level for Lake Michigan in August occurred in 1964 at 576.67 feet, and the highest level occurred in 1986 at 581.99 feet. The month-end level of Lake Michigan was 579.74 feet.

Ground-Water Information (Andrew G. Buck)

Comparison to Average Levels. Shallow ground-water levels in 16 observation wells that are remote from pumping centers were near to above average for August (Table 6). Levels averaged approximately 1.3 feet above average and ranged from 0.8 feet below to 3.4 feet above average levels for the month. The greatest deviations above normal occurred in the western one-half of Illinois as illustrated by observation wells in St. Clair and Ogle Counties where water levels were 3.1 feet and 3.4 feet above average levels, respectively.

Comparison to Previous Month. Statewide, shallow ground-water levels during August were below those of July, reflecting a typical seasonal decline. Levels averaged approximately 1.1 feet lower and ranged between 2.8 feet above and 3.5 feet below last month's levels. A large positive anomaly was observed (2.8 feet above the previous month's level) at the Dixon Springs observation well in Pope County. However, the strongest trend was for shallow ground-water levels being below those of July, especially in west-central Illinois. The decline of shallow ground water from July to August levels is a normal, seasonal response to reduced ground-water recharge (rainfall).

Comparison to Same Month, Previous Year. Shallow ground-water levels in August were above those of August 1997. Levels averaged about 1.6 feet higher and ranged from near those of a year ago to 4.2 feet higher. These higher levels can be attributed largely to a trend of below average precipitation (ground-water recharge) for several months prior to August 1997 and above average precipitation during January through June of 1998.

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

Number	Well name	County	This month's reading (feet above water level)	Deviation from		
				Avg level (feet)	Previous month (feet)	Previous year (feet)
1	Garota	JoDavies	20.68	+0.60	+0.05	-0.82
2	Mt. Morris	Ogle	15.20	+3.44	-3.50	+3.40
3	Crystal Lake	McHenry	5.64	0.29	1.81	-0.05
4	Cambridge	Henry	8.50	+1.93	-3.93	+4.34
5	Ferris Lake	DuPage	8.00	0.24	0.26	-0.23
6	Conrad Hoop	McDonough	7.96	+1.59	-3.63	+1.54
7	Stearns	Mason	16.24	+0.63	0.31	-2.66
8	Coffman	Pike	12.66	+1.24	-1.35	+1.66
9	Greenfield	Greene	12.45	+1.71	1.45	+2.68
10	Janesville	Cumberland	5.95	+0.52	-0.27	+0.71
11	St. Peter	Fayette	3.32	+1.31	-0.98	+1.09
12	SWS #2	St. Clair	12.31	+3.06	+0.29	+2.16
13	Boyleston	Wayne	4.13	+3.14	+0.68	+2.15
14	Sparta	Randolph	6.64	+2.77	1.51	+1.20
15	SE College	Saline	7.09	-0.21	-0.89	+0.04
16	Dixon Springs	Pope	5.80	-0.78	+2.83	+1.86

Illinois WARM Network

▲ SOIL MOISTURE & SOIL TYPE

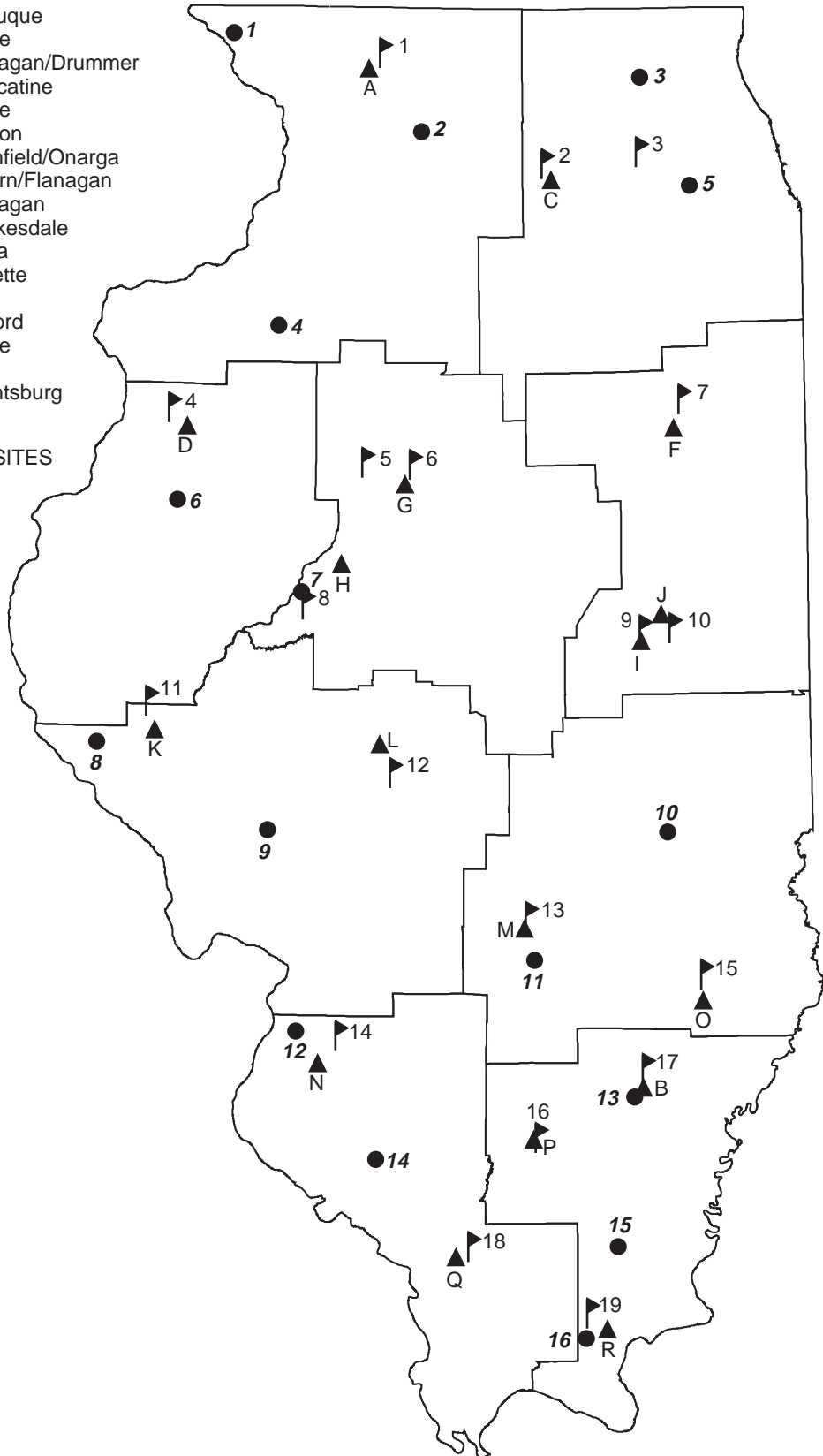
Location: City, County	Soil Type
A Freeport, Stephenson	Dubuque
B Fairfield, Wayne	Cisne
C DeKalb, DeKalb	Flanagan/Drummer
D Monmouth, Warren	Muscatine
F Stelle, Ford	Bryce
G East Peoria, Tazewell	Clinton
H Topeka, Mason	Plainfield/Onarga
I Bondville, Champaign	Elburn/Flanagan
J Champaign, Champaign	Flanagan
K Perry, Pike	Clarkesdale
L Springfield, Sangamon	Ipava
M Brownstown, Fayette	Fayette
N Belleville, St. Clair	Weir
O Olney, Richland	Bluford
P Ina, Jefferson	Cisne
Q Carbondale, Jackson	Weir
R Dixon Springs, Pope	Grantsburg

● SHALLOW GROUND WATER SITES

Well Name	County
1 Galena	JoDaviess
2 Mt. Morris	Ogle
3 Crystal Lake	McHenry
4 Cambridge	Henry
5 Fermi Lab	DuPage
6 Good Hope	McDonough
7 Snicarte	Mason
8 Coffman	Pike
9 Greenfield	Greene
10 Janesville	Cumberland
11 St. Peter	Fayette
12 SWS No. 2	St. Clair
13 Boyleston	Wayne
14 Sparta	Randolph
15 S.E. College	Saline
16 Dixon Springs	Pope

▶ CLIMATE NETWORK SITES

GIS#	Station	County
9	Bondville	Champaign
19	Dixon Springs	Pope
13	Brownstown	Fayette
11	Perry	Pike
2	DeKalb	DeKalb
4	Monmouth	Warren
8	Kilbourne	Mason
6	East Peoria	Tazewell
12	Springfield	Sangamon
14	Belleville	St. Clair
18	Carbondale	Jackson
15	Olney	Richland
1	Freeport	Stephenson
16	Ina	Jefferson
7	Stelle	Ford
5	Wildlife Park	Peoria
3	St. Charles	Kane
17	Fairfield	Wayne
10	Champaign	Champaign



Illinois WARM Network

● RESERVOIRS

Name	County
a	Altamont Effingham
b	Ashley Lake Washington
c	Bloomington McLean
d	Canton Fulton
e	Carlinville Macoupin
f	Carlyle Clinton
g	Coulterville Randolph
h	Crab Orchard Williamson
i	Decatur Macon
j	Devils Kitchen Williamson
k	Evergreen Woodford
l	Georgetown Vermilion
m	Glenn Shoals Montgomery
n	Greenfield Greene
o	Highland Madison
p	Hillsboro Montgomery
q	Jacksonville Morgan
r	Kinkaid Jackson
s	Lake of Egypt Williamson
t	Little Grassy Williamson
u	Mattoon Coles
v	Mauvaise Terre Morgan
w	Mt. Olive (old) Macoupin
x	Nashville Washington
y	Pana Christian
z	Paradise Coles
aa	Paris (east) Edgar
bb	Paris (west) Edgar
cc	Pinckneyville Perry
dd	Pittsfield Pike
ee	Raccoon Marion
ff	Rend Franklin
gg	Salem Marion
hh	Shelbyville Shelby
ii	Shipman Macoupin
jj	Sorento Bond
kk	Sparta Randolph
ll	Spring McDonough
mm	Springfield Sangamon
nn	Taylorville Christian
oo	Vermilion Vermilion
pp	Virginia Cass
qq	White Hall Greene

▲ RIVER STATIONS

Discharge	
A	Rock River at Rockton
B	Rock River near Joslin
C	Pecatonica River at Freeport
D	Green River near Geneseo
E	Edwards River near New Boston
F	Kankakee River at Momenca
G	Fox River at Dayton
H	Vermilion River at Pontiac
I	Spoon River at Seville
J	LaMoine River at Ripley
K	Mackinaw River near Congerville
L	Sangamon River at Monticello
M	Vermilion River near Danville
N	Kaskaskia River at Vandalia
O	Shoal Creek near Breese
P	Embarras River at Ste. Marie
Q	Skillet Fork at Wayne City
R	Big Muddy at Plumfield

Stage	
<i>Illinois River</i>	
AA	Morris
BB	La Salle
CC	Peoria
DD	Havana
EE	Beardstown
FF	Meredosia
GG	Hardin
<i>Mississippi River</i>	
HH	Dubuque
II	Keokuk
JJ	Quincy
KK	Grafton
LL	St. Louis
MM	Chester
NN	Thebes
<i>Ohio River</i>	
OO	Cairo

