

ILLINOIS WATER AND CLIMATE SUMMARY
December 1998

December 1998 Overview (Bob Scott)

Temperatures across Illinois in December were well above average while precipitation was well below average. Soil moisture within the top 40 inches of soil was below the long-term statewide average. Mean streamflows were 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 December (a 5.0-degree departure). By crop reporting districts (Table 1), temperatures ranged from 3.0 degrees above average (southeast) to 7.3 degrees above average (northeast).

Precipitation amounts (Figure 1) across Illinois were well below the long-term average value for the month. The statewide average of 1.76 inches represents a -1.03-inch departure, or 63 percent of average. District totals (Table 1) ranged from 1.25 inches (west-southwest) to 3.08 inches (southeast), 45 to 80 percent of average, respectively.

Soil moisture across Illinois in the 0- to 40-inch (0- to 100-cm) layer at the end of December (Figure 1) was below normal (a -1.02-inch departure). Conditions near the surface were near to slightly below normal, but soils were progressively drier with depth over much of central Illinois. Regions of above normal soil moisture were confined largely to the deepest layer at sites in southeastern and northwestern Illinois. Total soil moisture amounts across much of the state showed large increases during December near the surface, but with little change at greater depths (Table 2).

Mean provisional streamflow statewide was above the median flow, 153 percent of median (Figure 1). Stations in the northern and west-central part of the state recorded mean flows above the normal range for the month. Most stations in southern Illinois recorded flows in the below normal range. Peak stages on the Illinois, Mississippi, and Ohio River were seasonally well below flood stage at all reporting stations.

Water surface levels at 36 reporting reservoirs at the end of December were at normal pool (target operating level) at 7 reservoirs, above normal pool at 7 reservoirs, and below normal pool at 22 reservoirs. Water surface levels at Carlyle Lake, Lake Shelbyville, and Rend Lake were within one-half foot of target operating levels. Lake Michigan's December mean level was below the long-term average.

Statewide, **shallow ground-water levels** were slightly above average for December (a +0.4 foot departure). Greatest deviations occurred in the northwestern part of the state. Levels averaged about 0.4 feet above those of last month and were approximately 2.1 feet above December levels one year ago.

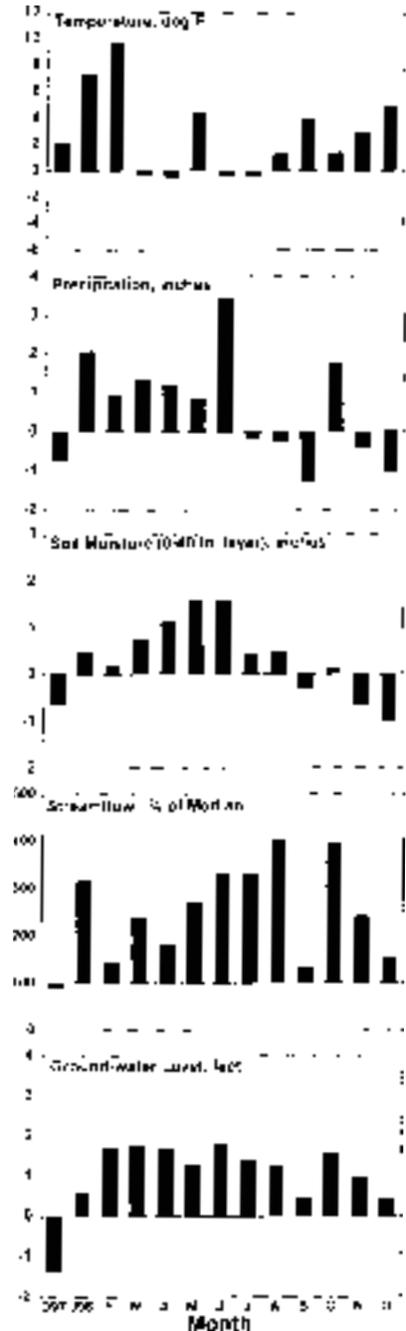


Figure 1.
Statewide departures from normal

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

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Weather/Climate Information (Nancy Westcott, Jim Angel, and Bob Scott)

Cook County precipitation amounts for November (Figure 2) were light. Site values for the month ranged from 2.24 inches at site 9 (Cicero) to 1.06 inches at site 24 (Matteson). Heaviest precipitation was found in the northern half of the network, and lightest precipitation was in the southern portion. The November 1998 network average of 1.76 inches was about 50 percent of the nine-year (1989 - 1997) November network average of 3.52 inches.

Temperatures were well above average in December (Figure 3 and Table 1). Positive anomalies ranged from 3°F in the south to greater than 6°F in the north. The state as a whole was 5°F above average, yielding the 18th warmest December on record. Highest temperatures occurred during the first six days of December. The warmest temperature for the month was 76°F reported at Belleville on December 3 and at Lebanon on December 4. Conversely, coldest temperatures for the state were reported at the end of the month. Observations from hourly stations at Monmouth, Kilbourne, and Bondville reported a -9°F reading late on December 31.

Precipitation was well below average in December (Figure 3 and Table 1). Some areas in northwestern and central Illinois received less than an inch of precipitation. Highest precipitation amounts occurred in the far south, with some stations reporting totals in excess of 3 inches. Carbondale and Cairo received 2 inches on December 21-22. Snowfall in December across most of Illinois was less than average. Many stations in the north and central portion of the state reported total accumulations of 2 to 7 inches, mostly from a December 30 storm. Sites in the southern third of the state reported less than 2 inches. Moline received the most snowfall for the month with 8.2 inches. Much of central Illinois received 3 to 7 inches from a December 30 storm. The only severe weather during the month came from an intense squall line, which developed ahead of a cold front on December 6 and produced damaging winds in Vermilion and Monroe Counties and just south of Carbondale.

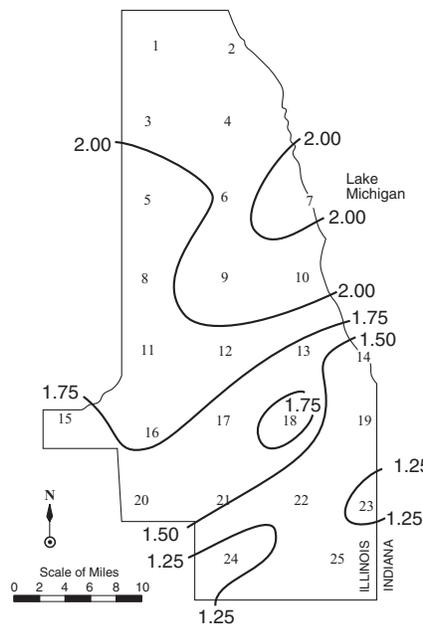


Figure 2. Cook County precipitation (inches) during November 1998

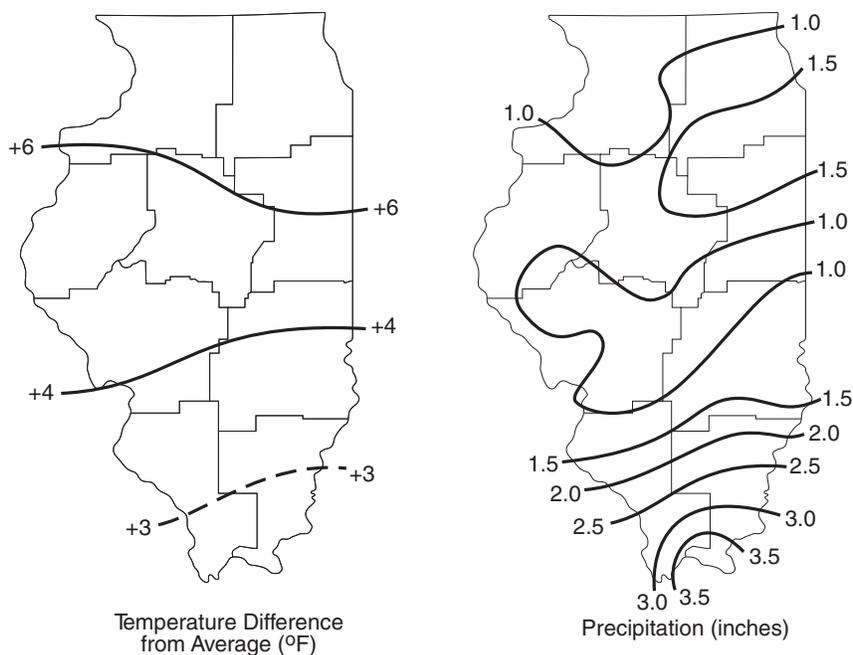


Figure 3. Illinois precipitation and temperatures during December 1998

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		
	Avg Precipitation	% Avg	Temp Dev	Avg Precipitation	% Avg	Temp Dev	Avg Precipitation	% Avg	Temp Dev	Avg Precipitation	% Avg	Temp Dev
Northwest	1.48	76	+0.6	10.07	142	+3.4	19.87	105	+2.4	41.49	122	+3.3
Northeast	1.67	72	+1.3	8.96	117	+2.1	18.76	97	+3.0	40.26	111	+3.8
West	1.74	81	+5.1	10.26	132	+3.0	18.26	91	+2.4	46.27	125	+3.6
Central	1.61	65	+5.5	7.90	98	+3.3	15.46	80	+2.5	41.95	114	+2.9
East	1.42	51	+6.0	6.88	83	+7.6	14.91	78	+2.7	42.83	115	+3.3
West-southwest	1.25	45	+3.1	8.13	95	+2.8	16.50	85	+2.4	44.80	119	+3.7
East-southeast	1.55	46	+3.9	8.48	87	+2.7	18.45	91	+2.2	46.05	114	+2.8
Southwest	2.64	71	+3.2	8.72	84	+2.9	18.19	87	+2.4	46.53	110	+2.8
Southeast	3.08	86	+3.0	9.73	91	+2.4	17.94	85	+2.0	47.02	107	+2.5
State Average	1.76	63	+5.0	8.77	102	+3.2	17.62	89	+2.5	44.27	115	+3.0

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 January call for equal chances of below, above, and normal temperatures over all of Illinois, but with a slight chance of below normal precipitation across the eastern two-thirds of the state. Outlooks for January-March call for a slight chance of above normal temperatures over southern Illinois and a slight to moderate chance of above normal precipitation in southern and eastern Illinois. Elsewhere, equal chances of below, above, and normal temperatures and precipitation exist across the state.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for December (Figure 4) ranged from 4.5 mph at Dixon Springs to 10.4 mph at Stelle. Highest wind gusts for the month were recorded on December 6 at Stelle (54 mph) and at Fairfield (50 mph). The prevailing wind direction during the month was generally westerly across the state. Wind speeds in excess of 8 mph ranged from 87 hours at Rend Lake to about 450 hours at Stelle and Monmouth. (December has 744 hours.) Average temperatures ranged from the low to upper 30s north to south across the state. Solar radiation reached a seasonal minimum, ranging from about 180 Mega-Joules per meter squared (MJ/m²) at St. Charles to 214 MJ/m² at Bondville. Potential evapotranspiration varied from a low of 1.00 inch at St. Charles to 1.25 inches at Belleville. Soil temperatures at both the 4- and 8-inch levels ranged from the upper 30s over northern Illinois to the middle 40s in the far south.

Soil Moisture Information (Bob Scott)

Soil moisture across Illinois during December (Figure 5) continued to be close to normal in the 0- to 6-inch layer, except for slightly below normal conditions over northern parts of the state. Conversely, below normal conditions were dominant in the 6- to 20-inch layer, especially to the northeast where soil moisture totaled less than 50 percent of normal. Conditions at 20 to 40 inches of depth showed a westward broadening of the dry region across much of northern Illinois, minimizing at near 25 percent of normal over northeastern counties. However, regions of normal soil moisture were observed in this layer in the northwest, and above normal conditions were measured in the southeast. In the deepest layer (40 to 72 inches), observations continued to indicate very dry conditions over central Illinois (only 25 percent of normal soil moisture at Peoria), but with wetter soils over northwestern and southeastern Illinois. Overall, throughout the first 40 inches of depth, statewide soil moisture totals at the end of December averaged below the 1985-1995 mean for the month (Figure 1).

Compared to one month ago, soil moisture during December generally increased near the surface while showing only small changes in deeper layers (Table 2). Within the first 6 inches of depth, increases in soil moisture were common across the state with a few reports from sites in eastern and southeastern areas totaling 20 to 35 percent higher. Small decreases occurred at a few stations over northern Illinois. Conversely, in the 6- to 20- and 20- to 40-inch layers, values at most sites changed little from last month with differences of less than 10 percent. One major exception was a substantial (45 percent) increase in moisture at Carbondale in the 6- to 20-inch layer.

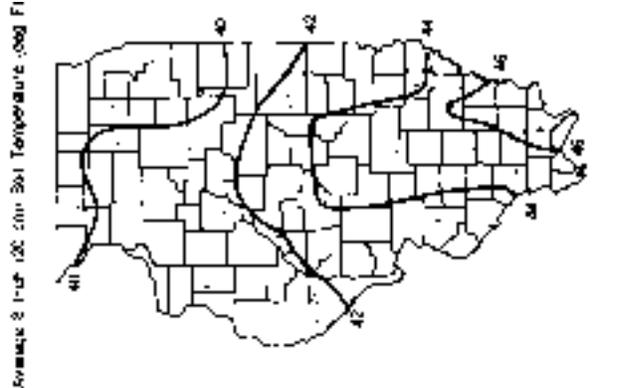
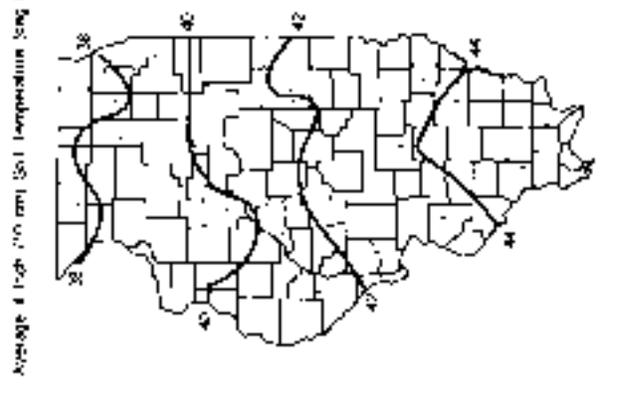
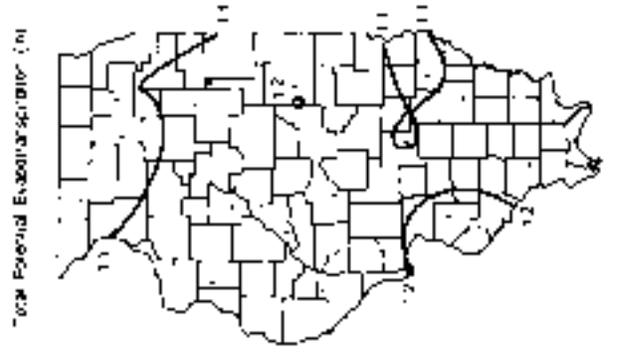
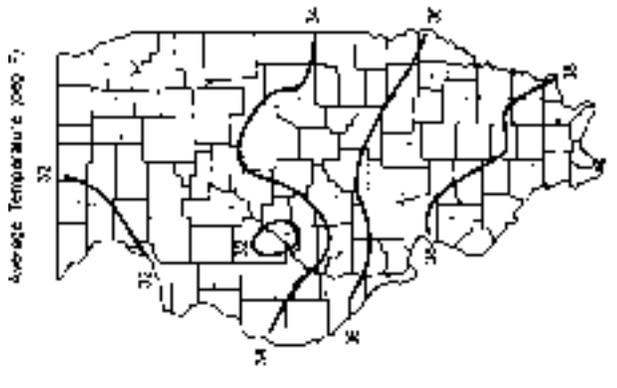
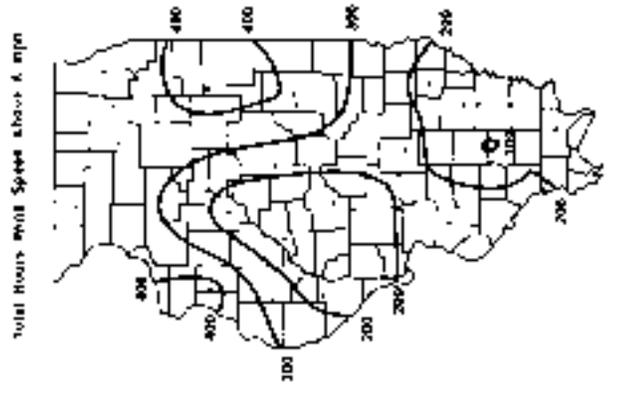
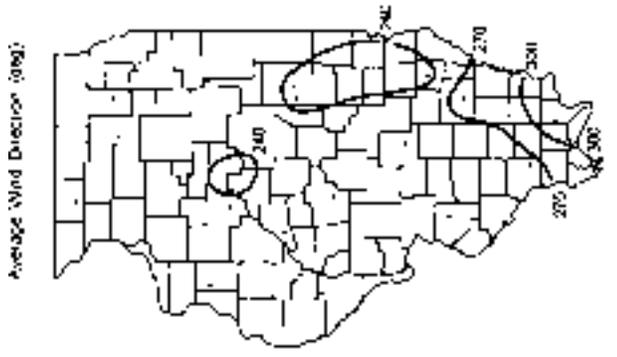
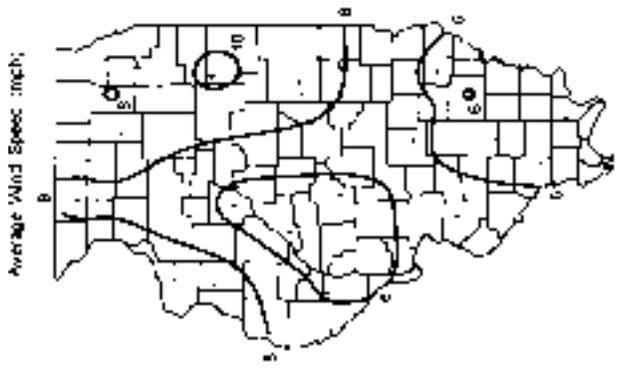


Figure 4. December monthly averages and totals as collected by the Illinois Climate Network



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

Table 2. Soil Moisture in Various Layers on January 1, 1999

<i>Location</i>	<i>Jan 1 0 - 6 inches)</i>	<i>Change from Dec 1 (%)</i>	<i>Jan 1 6 - 20 inches)</i>	<i>Change from Dec 1 (%)</i>	<i>Jan 1 20 - 40 inches)</i>	<i>Change from Dec 1 (%)</i>
Freeport (NW)	1.6	-15	3.6	-16	6.7	-2
DeKalb (NE)	1.8	-14	4.6	-5	6.9	-6
Monmouth (W)	2.0	-6	4.7	3	6.9	4
East Peoria (C)	1.9	-5	4.9	-1	6.9	1
Topeka (C)	1.1	16	2.4	-6	2.8	2
Stelle (E)	1.8	13	3.3	6	4.7	-1
Champaign (E)	2.3	21	4.9	-2	5.4	4
Bondville (E)	2.3	35	4.1	7	6.2	2
Perry (WSW)	2.3	-4	4.8	-8	7.3	-10
Springfield (WSW)	2.0	14	4.9	-5	7.4	-6
Homestead (ESE)	2.2	-0	4.2	-2	7.9	-0
Olney (ESE)	2.6	17	4.9	4	7.2	-0
Belleville (SW)	2.1	5	4.4	9	7.6	7
Carbondale (SW)	1.9	9	4.4	45	7.2	7
Ma (SE)	2.4	10	5.1	1	7.6	-1
Fairfield (SE)	2.7	24	5.5	7	7.6	2
Dixon Springs (SE)	2.3	0	5.1	-3	8.3	-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) 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 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. Along the Illinois River, the peak stage was recorded at most stations during the second week of the month and was well below flood stage. Illinois stations along the Mississippi River peaked below flood stage between December 7-11. The Ohio River at Cairo recorded a peak stage about 14 feet below flood stage on December 12.

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 also by the USGS. The month's median flow for each station listed in Table 4 is determined by ranking the monthly 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.

Flows on the Rock River in northern Illinois were in the above normal range again this month. The Green River near Geneseo and the Edwards River near New Boston in northwestern Illinois experienced flows in the much above normal range. In central Illinois, flows varied from above normal in west-central and central Illinois to below normal in east-central Illinois. This is exhibited by flows recorded for the LaMoine River at Ripley and the Spoon River at Seville in west-central Illinois, the Sangamon River in central Illinois, and the Vermilion River (Illinois River basin) at Pontiac and the Vermilion River (Wabash basin) near Danville in east-central Illinois. In southern Illinois, flows were in the below normal range, except for Shoal Creek near Breese. The statewide average is above the median reflecting the very high flows in the northern part of the state, but on average, flows are below the long-term mean for the month.

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

Table 3. Peak Stages for Major Rivers, December 1998

River	Station	River mile*	Flood stage (feet) *	Peak stage (feet)**	Date
Illinois	Morris	263.1	13	6.9	08
	La Salle	224.7	20	12.7	09
	Peoria	164.6	18	12.8	19
	Havana	119.6	14	8.5	11
	Beardstown	88.6	14	10.5	09
	Meredosia	71.3	14	6.1	09
	Hardin	21.5	25	20.5	08
Mississippi	Dubuque	579.9	17	8.9	07
	Kennick	564.2	16	6.7	07
	Quincy	525	17	12.1	07
	Grifton	218	18	16.3	08
	St. Louis	180	20	18.1	10
	Chester	139.9	27	19.5	10
	Thelus	42.7	23	23.2	1
Ohio	Cairo	2.5	40	26.5	12

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 a.m. readings, not instantaneous peak.

Table 4. Provisional Mean Flows, December 1998

Station	Drainage area (sq mi)	Feet of runoff	1998 total flow (cfs)	Long term flow		Flow condition	Percent chance of exceedence	Days of duration
				Mean (cfs)	Median (cfs)			
Rock River at Rockford	6,363	61	955	3261	2930	above normal	29	31
Rock River near Juba	9,549	53	5278	3022	4865	above normal	30	31
Equiana River at Freeport	1,326	89	724	184	572	normal	37	31
Green River near Leveson	1,033	29	1082	468	333	much above normal	09	28
Edwards River near New Boston	445	60	320	175	97	much above normal	06	26
Kankakee River at Monticello	2,254	80	1340	2009	1236	normal	61	30
Fox River at Dayton	2,642	78	1340	1492	1240	normal	47	29
Vermilion River at Pontiac	578	54	11	182	58	below normal	84	30
Spoon River at Seville	1,676	81	1260	663	395	above normal	26	30
LaMaize River at Repley	1,297	71	805	944	270	above normal	17	30
Mackinaw River near Congerville	367	49	57	415	264	normal	69	30
Sangamon River at Monticello	550	85	877	355	180	above normal	14	3
Vermilion River near Dorville	1,280	54	170	893	498	below normal	71	28
Kaskaskia River at Vandalia	1,940	28	620	2161	1567	below normal	73	30
Snow Creek near Bureau	775	54	230	585	173	normal	63	26
Embarras River at Ste. Marie	1,516	84	130	1278	805	below normal	77	30
Seillet Fork at Wayne City	464	78	50	437	255	below normal	76	29
Big Muddy at Floral Dale	794	83	80	713	96	below normal	75	30

Notes:

*As reported in U. S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 1997

Much below normal flow = 98-100% chance of exceedence

Below normal flow = 70-99% 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.

of the reservoirs listed in Table 5 serve as public water supplies with the exceptions noted in the last column. Some reservoir levels reported in Table 5 were measured at the beginning of January and reflect the winter storm that started on New Year's Day.

Compared to levels at 34 reservoirs at the end of November, the water surface elevation at the end of December had risen at 8 reservoirs, remained the same at 8 reservoirs, and had decreased at 18 reservoirs. At the end of December for the 36 reservoirs reporting this month, reported water surface levels were above the spillway crest or target operating level (7 reservoirs), at normal pool (7 reservoirs), and below normal pool (22 reservoirs).

Major Reservoirs. The water level at Carlyle Lake and Lake Shelbyville were decreased since the end of November as prescribed by target operating levels. At the end of December, water surface levels at Rend Lake, Carlyle Lake, and Lake Shelbyville were all within one half foot of 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 December mean level for Lake Michigan was 578.46 feet, compared to a mean level of 580.02 feet in 1997. The long-term average lake level for December is 578.71 feet, based on 1918-1996 data. Historically, the lowest mean level for Lake Michigan in December occurred in 1964 at 576.18 feet, and the highest level occurred in 1986 at 581.56 feet. The month-end level of Lake Michigan was 578.20 feet.

Ground-Water Information (Ken Hlinka)

Comparison to Average Levels. Shallow ground-water levels in 14 observation wells (Table 6), which are remote from pumping centers, were above average levels for December. Levels averaged 0.4 feet above, and ranged from 1.4 feet below to 7.2 feet above. The greatest deviations above normal occurred in the northwestern part of the state while the greatest deviations below normal were found in the extreme southeastern portion of Illinois.

Comparison to Previous Month. Statewide, shallow ground-water levels during December were above those of November. Levels averaged 0.4 feet higher, and ranged from 2.0 feet below to 3.0 feet above those one month ago. Levels in the southeastern portion of Illinois were well above those of last month, whereas the central portion showed slightly lower water levels than those observed during November. The northern portion showed mixed comparisons.

Comparison to Same Month, Previous Year. Shallow ground-water levels this month throughout Illinois were above levels of December 1997. Levels averaged 2.1 feet higher and ranged from 1.0 feet below to 5.4 feet above the December levels of last year.

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

Agency	Well name	County	This month's reading (depth to water, feet)	Deviation from		
				Average level (feet)	previous month (feet)	Previous year (feet)
1	Galeps	Jackson	21.36	+0.33	0.40	+0.99
2	Mt. Morris	Ogle	12.58	+7.16	+1.05	+3.02
3	Crystal Lake	McHenry	NA	NA	NA	NA
4	Cambridge	Henry	5.84	+2.30	+0.91	+3.18
5	Farm Lab	DuPage	7.80	1.13	NA	NA
6	Gard Hope	McDonough	NA	NA	NA	NA
7	Sincate	Mason	36.24	+0.79	0.24	+3.54
8	Coffman	Pike	13.57	+1.27	+1.97	+1.53
9	Greenfield	Greene	13.80	-1.37	-0.20	+0.18
10	Jonestown	Carroll	6.31	1.36	+0.17	+0.85
11	St. Peter	Fayette	2.49	+0.17	+0.05	+0.25
12	SW's #2	St. Clair	12.14	+3.28	+0.03	+0.98
13	Boydston	Wayne	6.29	+0.51	+1.15	+1.97
14	Spauld	Randolph	5.44	0.83	+0.26	+0.49
15	St. College	Saline	4.66	+0.74	+3.97	+3.17
16	Dixon Springs	Pope	4.01	1.26	+2.83	+4.61