ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois State Water Survey

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ILLINOIS WATER AND CLIMATE SUMMARY
January 2000

January 2000 Overview (Bob Scott)

Temperatures across Illinois in January were slightly above average, and precipitation was very near average. Soil moisture within the top 40 inches of soil continued to be below the long-term statewide average. Mean streamflows were below median heights. Shallow ground-water levels were well below the long-term average.

The state's water resources as measured by streamflows were maintained near December levels, although values fell considerably in some areas. The overall trend in soil moisture was for wetter conditions, albeit only minimally, but shallow ground-water levels continued to fall. July 1999–January 2000 ranks as the eighth driest period in Illinois since 1895, a direct result of the long-term dearth in statewide precipitation over the last seven months.

Temperatures across Illinois (Figure 1) for January were above average (a +1.6-degree departure). By crop reporting districts, temperatures ranged from 0.8 degrees above average (east and east-southeast) to 2.3 degrees above average (west).

Precipitation amounts (Figure 1) were very near the long-term average value for the month. The statewide average of 1.69 inches represents a -0.07-inch departure or 96 percent of average. District precipitation totals ranged from 1.02 inches (west) to 3.70 inches (southeast), while precipitation values varied from 63 percent (west-southwest) to 138 percent of average (southeast).

Soil moisture across Illinois in the 0- to 40-inch (0- to 100-centimeter) layer at the end of January (Figure 1) was below normal (a -2.13-inch departure). Conditions were below normal in all layers, and the lower two layers were considerably dry over central and southwestern Illinois.

Mean provisional streamflow statewide was below the median flow, 37 percent of median (Figure 1). Northern Illinois stations recorded mean flows in the normal range. Central and southern Illinois stations recorded flows in the below to much below normal range. Peak stages on the Illinois River and at Illinois stations on the Mississippi and Ohio Rivers were well below flood stage.

Water surface levels at the end of January were below the normal pool at 33 of the 40 reporting reservoirs. The end-of-month water surface level was just above the target operating level at Carlyle Lake and at the target level at Lake Shelbyville. Rend Lake was 1.6 feet below the target operating level. **Lake Michigan's** mean level remains below the long-term average.

Statewide, **shallow ground-water levels** at the end of January continue to reflect dry conditions, a -3.3-foot departure. Although levels responded slightly to recent precipitation events by averaging 0.2 feet above those of last month, levels were still far below those of last year and averaged 5.6 feet below January levels one year ago.

Note: The WARM Network maps and extended network descriptions appear in the January and July issues.

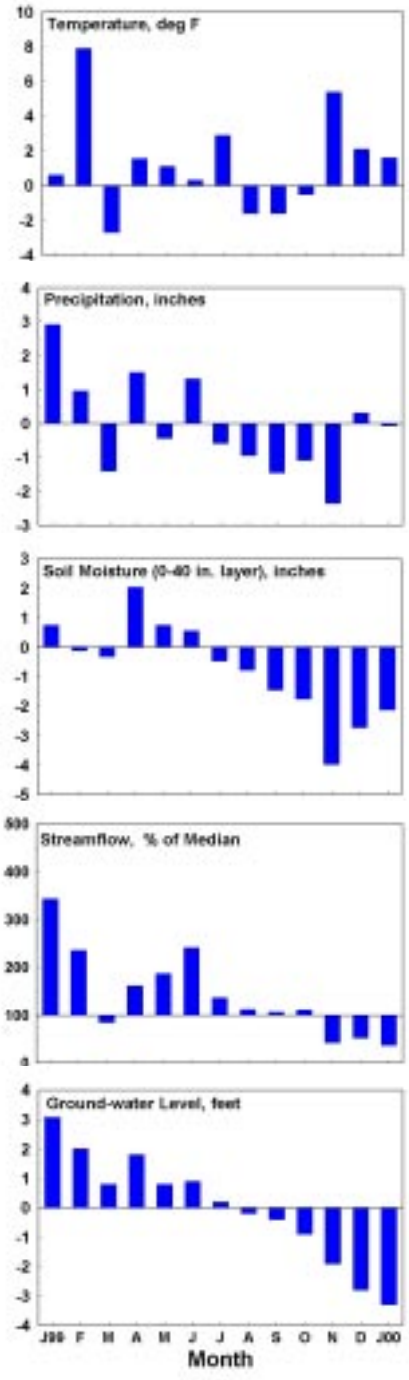

Figure 1.
Statewide departures from normal

Contact

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On the Web at www.sws.uiuc.edu/warm

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

Cook County Precipitation. December precipitation amounts (Figure 2) were relatively large for December. Site values for the month ranged from 2.38 inches at site #7 (North Broadway Avenue near the lakefront) to 4.24 inches at site #23 (Lansing). Heavier precipitation occurred in the southeastern part of the network, and the lightest precipitation occurred in northern areas. The December 1999 network average of 2.92 inches was about 180 percent of the 10-year (1989–1998) December network average of 1.62 inches.

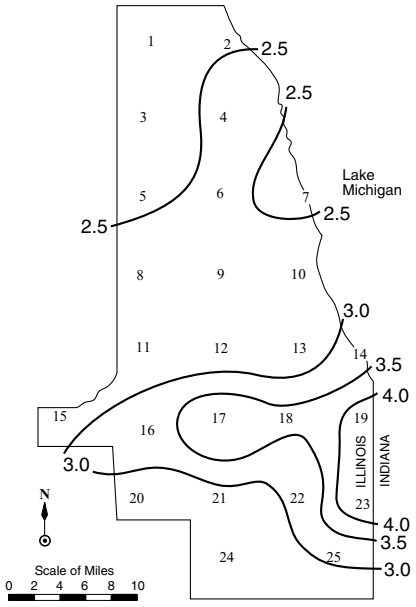

Figure 2.
Cook County precipitation (inches) during December 1999

Temperatures across Illinois for January were warmer than average statewide (Figure 3 and Table 1) with the west district reporting the warmest departure. Temperatures were generally above average for the first 18 days of January (+9.7°F), followed by below average temperatures for the remainder of the month (-9.8°F). The coolest reading for the month was -17°F on January 21 (Rochelle) and on January 24 (Watseka), and the warmest reading was 71°F on January 3 (Cairo).

Precipitation was near average statewide (Figure 3 and Table 1). Southern Illinois benefitted from above average precipitation, while once again the rest of the state was below average. The west-southwest region experienced the largest departure from average. The 3-month and 6-month precipitation amounts continued to reflect large shortfalls, leading to concerns about adequate soil moisture for the upcoming growing season. Heaviest precipitation amounts occurred in southern Illinois: 5.82 inches at Grand Chain Dam and 5.77 inches at Cairo. Snowfall was generally moderate across the state with near average amounts at most locations. Dixon reported 20 inches, the heaviest monthly snowfall total.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for January (Figure 4) ranged from 5.7 mph at Dixon Springs to 12.6 mph at Stelle. The highest wind gust for the month, near 55 mph, occurred at Carbondale and Fairfield on January 3. The prevailing wind direction was from the west-southwest statewide. Wind speeds in excess of 8 mph varied considerably from 169 hours at Dixon Springs to 584 hours at Stelle. (January has 744 hours.) Average temperatures across the state ranged from 22°F at St. Charles to the middle 30s across southern

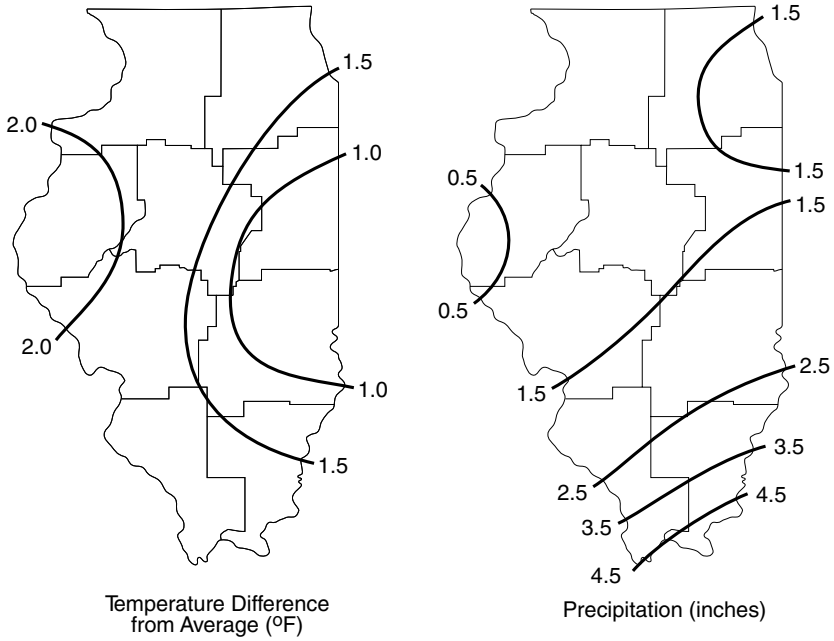

Figure 3. Illinois precipitation and temperatures during January 2000

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 00 Amount	% Avg	Temp Dev	Nov 99-Jan 00	% Avg	Temp Dev	Aug 99-Jan 00	% Avg	Temp Dev	Feb 99-Jan 00	% Avg	Temp Dev
Northwest	1.24	95	1.7	3.96	70	2.4	11.59	71	-0.2	32.22	91	0.7
Northeast	1.62	108	1.8	4.95	75	2.6	12.41	74	0.4	33.65	94	1.2
West	1.02	71	2.3	4.32	70	3.6	11.29	67	1.1	29.97	81	1.2
Central	1.29	82	1.8	4.52	66	3.1	11.65	69	0.5	32.73	89	0.8
East	1.44	86	0.8	4.93	68	2.5	11.64	69	0.3	31.24	85	0.7
West-southwest	1.06	63	1.8	4.23	56	3.1	10.58	61	0.8	28.58	76	0.8
East-southeast	1.93	93	0.8	5.97	67	2.5	11.47	62	0.7	34.19	86	0.8
Southwest	2.64	116	1.7	8.28	84	2.9	13.07	67	0.9	36.58	88	0.9
Southeast	3.70	138	1.5	9.63	92	2.5	14.27	72	0.7	37.21	86	0.6
State Average	**1.69**	**96**	**1.6**	**5.46**	**72**	**2.8**	**11.88**	**68**	**0.6**	**32.73**	**86**	**0.9**

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

Illinois. Solar radiation was fairly similar everywhere, ranging from 203 Mega-Joules per meter squared (MJ/m^2) at St. Charles to 262 MJ/m^2 at Belleville. Potential evapotranspiration also was quite constant, varying from 0.9 inches at St. Charles to 1.5 inches at Belleville. Soil temperatures at the 4- and 8-inch levels ranged from near freezing across northern Illinois to near 40°F in the far south.

Extended climate outlooks for February issued by the U.S. Department of Commerce, National Atmospheric and Oceanic Administration, Climate Prediction Center call for a slight chance of below normal temperatures over northern Illinois and a slight chance of above normal precipitation over all of Illinois. February-April outlooks call for equal chances of below, above, and normal temperatures and precipitation across the state, except for a slight chance of below normal precipitation in far western Illinois.

Note: The Cook County Precipitation Network is a 25-site weighing-bucket raingage array operated by the Illinois State Water Survey for the U.S. Army Corps of Engineers and the U.S. Geological Survey since 1989. The network is located in the Lake Michigan and Des Plaines River watersheds of Cook County to provide accurate precipitation measurements for modeling storm runoff, a crucial parameter used to compute the amount of water diverted from Lake Michigan.

Illinois temperature and precipitation data are observed at selected Cooperative Observer Network sites of the National Weather Service or NWS (www.nws.noaa.gov/index.html), an agency of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce (USDOC). The Midwestern Climate Center or MCC (mcc.sws.uiuc.edu) at the Water Survey receives near real-time data via the NWS Remote Observation Surface Automation system. These data are provisional. Complete, quality controlled data are available after about three months from the National Climatic Data Center (NCDC [www.ncdc.noaa.gov], NOAA, USDOC).

The Illinois Climate Network is a 19-station array of automated weather sites scattered across Illinois and operated by Water Survey staff. The network provides enhanced temporal weather observations on atmospheric pressure, air temperature, relative humidity, wind speed and direction, solar radiation, precipitation, and soil temperatures at several depths. Sites are located primarily at Illinois community colleges and university agricultural experimental farms. Data are polled automatically every 10 seconds, averaged by hour and day, and downloaded to a Water Survey computer once a day. The network data provide valuable information on extreme and usual weather events, as well as short- and long-term trends in climate data, which may have future impacts on other water resources of Illinois.

The Climate Prediction Center (CPC [(www.cpc.ncep.noaa.gov/], NOAA, USDOC) produces monthly and seasonal extended climate outlooks based on an extensive source of timely climate information. Because of CPC's emphasis on providing data as quickly as possible, many values are only preliminary. Final data are available from NCDC and MCC at a later date.

Soil Moisture Information (Bob Scott)

Soil moisture conditions at the end of January (Figure 5) were below normal in the 0- to 6- and 6- to 20-inch layers statewide. Values were near 75 percent of normal everywhere in both layers. Conditions on the 20- to 40-inch and 40-

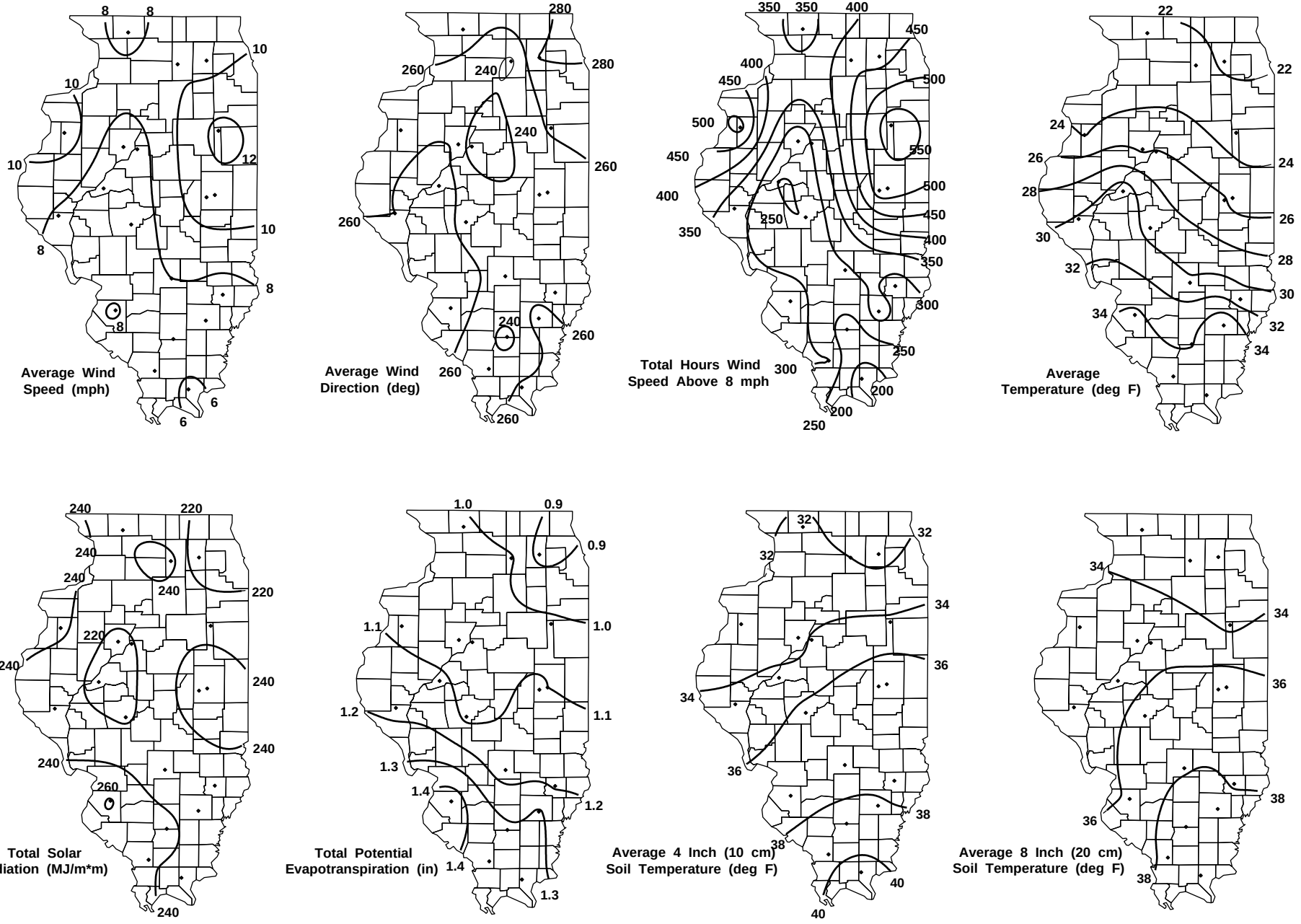

Figure 4. January monthly averages and totals as collected by the Illinois Climate Network

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

Table 2. Soil Moisture in Various Layers on February 1, 2000

Location	*Feb 1 0 - 6 (inches)*	*Change from Jan 1 (%)*	*Feb 1 6 - 20 (inches)*	*Change from Jan 1 (%)*	*Feb 1 20 - 40 (inches)*	*Change from Jan 1 (%)*
Freeport (NW)	2.2	20	4.1	6	5.6	10
DeKalb (NE)	2.2	8	4.4	2	6.5	11
Monmouth (W)	2.1	3	4.3	6	5.6	12
East Peoria (C)	1.9	-2	4.4	13	5.4	3
Topeka (C)	1.1	23	2.3	-9	2.7	25
Stelle (E)	2.0	1	4.4	17	4.7	-3
Champaign (E)	2.2	2	4.8	2	6.0	13
Bondville (E)	2.0	2	4.8	5	7.6	12
Perry (WSW)	1.8	-3	3.6	0	5.7	3
Springfield (WSW)	1.7	-15	4.6	0	6.8	4
Brownstown (ESE)	2.2	4	4.0	2	8.0	0
Olney (ESE)	2.1	30	4.2	6	6.4	3
Belleville (SW)	1.5	8	2.9	59	4.9	0
Carbondale (SW)	1.8	13	4.3	6	7.2	17
Ina (SE)	2.0	4	5.0	1	7.5	2
Fairfield (SE)	2.0	15	5.0	3	7.3	7
Dixon Springs (SE)	2.2	10	4.8	1	7.8	2

to 72-inch layers showed more spatial variability: below normal across the state, but considerably below normal in central and southwestern Illinois. Values ranged from 75 to 100 percent of normal in parts of southeastern and east-central Illinois to less than 25 percent of normal in the driest regions of central and southwestern Illinois. Overall, throughout the first 40 inches of depth, statewide soil moisture at the end of February averaged below the 1985–1995 mean for the month for the seventh straight month (Figure 1).

Compared to one month ago, soil moisture during January generally increased in all layers statewide. Although most increases were small—less than 10 percent—scattered sites showed increases of 10 to 30 percent.

Note: Soil moisture is monitored at 17 sites across the state that are primarily co-located with the Illinois Climate Network. Data are collected twice monthly during the growing season (March– October) and once a month during the remainder of the year. The information pinpoints areas and extent of unusual soil moisture and its impacts on Illinois agriculture. These data become especially important during prolonged precipitation extremes.

Surface Water Information (Sally McConkey)

River and stream discharge and stage data are obtained from gaging stations operated by the U.S. Geological Survey (USGS) or the U.S. Army Corps of Engineers (USACE). The USGS gaging station network is supported in part by the Illinois Department of Natural Resources Office of Water Resources and Illinois State Water Survey, and USACE. Provisional discharge data are obtained from direct computer access to USGS. Peak stage data are obtained from readings posted on the Internet by USGS and USACE. Values reported do not reflect final or official discharges and stages.

Table 3 lists streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers, flood stage, and the provisional peak stage for the current month. Peak stages along the Illinois River did not exceed flood stage and occurred during the second week of January at most stations. The Mississippi River peaked well below flood stage at stations along the Illinois border, as did the Ohio River at Cairo.

Table 4 lists 18 streamgaging stations located throughout Illinois. Provisional monthly mean flows posted by USGS are listed, if available; otherwise, daily mean discharge data posted by USGS were used to estimate the mean flow for the month. Long-term mean flows for each month are published by USGS. The month's median flow for each station listed in Table 4 was determined by ranking the January mean flow for each year of record and selecting the middle value, 50 percent exceedence probability.

Table 3. Peak Stages for Major Rivers, January 2000

River	*Station*	*River mile**	*Flood stage (feet)**	*Peak stage (feet)***	*Date*
Illinois					
	Morris	263.1	13	N/A	N/A
	La Salle	224.7	20	11.7	11
	Peoria	164.6	18	12.4	12
	Havana	119.6	14	6.8	13
	Beardstown	88.6	14	9.9	13
	Meredosia	71.3	14	3.2	14
	Hardin	21.5	25	19.5	02
Mississippi					
	Dubuque	579.9	17	8.3	06
	Keokuk	364.2	16	3.5	01
	Quincy	325.0	17	11.7	28
	Grafton	218.0	18	15.6	02
	St. Louis	180.0	30	3.0	04
	Chester	109.9	27	5.1	05
	Thebes	43.7	33	9.9	04
Ohio					
	Cairo	2.0	40	26.8	07

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, January 2000

Station	*Drainage area (sq mi)*	*Years of record*	*2000 mean flow (cfs)*	*Long-term flows* *Mean* (cfs)*	*Median (cfs)*	*Flow condition*	*Percent chance of exceedence*	*Days of data this month*
Rock River at Rockton	6,363	64	3,004	3,215	2,502	normal	42	29
Rock River near Joslin	9,549	56	4,277	5,267	4,201	normal	50	31
Pecatonica River at Freeport	1,326	81	572	756	622	normal	57	31
Green River near Geneseo	1,003	60	312	536	363	normal	60	31
Edwards River near New Boston	445	61	85	244	140	normal	62	24
Kankakee River at Momence	2,294	81	1,595	2,246	2,106	normal	57	31
Fox River at Dayton	2,642	80	925	1,468	1,108	normal	59	31
Vermilion River at Pontiac	579	55	5.16	376	258	much below normal	95	31
Spoon River at Seville	1,636	80	233	1,018	666	below normal	71	31
LaMoine River at Ripley	1,293	75	74.1	616	367	below normal	78	31
Mackinaw River near Congerville	767	50	8	477	302	much below normal	92	29
Sangamon River at Monticello	550	86	12.2	425	258	much below normal	90	31
Vermilion River near Danville	1,290	55	64	1,142	697	below normal	89	28
Kaskaskia River at Vandalia	1,940	29	491	2,433	2,091	below normal	84	28
Shoal Creek near Breese	735	55	26**	668	325	below normal	89	28
Embarras River at Ste. Marie	1,516	85	60	1,660	1,110	much below normal	92	30
Skillet Fork at Wayne City	464	79	7	642	355	much below normal	91	29
Big Muddy at Plumfield	794	84	84	879	610	below normal	80	29

Notes:
*As reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 1998.
**Estimated.
Much below normal flow = 90-100% chance of exceedence.
Below normal flow = 70-90% chance of exceedence.
Normal flow = 30-70% chance of exceedence.
Above normal flow = 10-30% chance of exceedence.
Much above normal flow = 0-10% chance of exceedence.

Historically, average stream flows tend to be slightly higher in January than in December. However, mean flows this January were less than those observed last month in northern and central Illinois. Mean flows in the northern third of Illinois were within the normal range. Mean flows in central and southern Illinois were in the below normal to much below normal range for January. Because the Shoal Creek gaging station near Breese (735-square-mile drainage area) has been experiencing problems, discharge at this station (see Table 4) was estimated from flow recorded for Shoal Creek near Pierron (678-square-mile drainage area). The mean provisional flow statewide was below the median this month (37 percent of median) and below the mean (28 percent of mean).

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

Compared to end-of-December levels at 40 reservoirs, the water surface elevation at the end of January had risen at 15 reservoirs and had decreased at 17 reservoirs. The reported elevation was the same as last month at eight reservoirs. Of the 40 reservoirs reporting this month, only Carlyle Lake had a water surface level above the target operating level, 6 reservoirs were at normal pool (compared to 4 reservoirs in December), and 33 reservoirs were below normal pool at the end of January. Two reservoirs, Mauvaise Terre and Paris West, have remained at normal pool for the past three months. These reservoirs have natural inflows augmented by pumpage from a second, conjunctive use reservoir. Two other reservoirs at normal pool, Crab Orchard and Devils Kitchen, are not used for public water supply. Lake Shelbyville, which was at normal pool, is regulated primarily for flood control. Twenty-eight of the 40 reservoirs reporting this month were a foot or more below normal pool, and 12 reservoirs were 3 feet or more below normal pool. Month-end average levels and current month-end levels were available for 35 reservoirs this month, of which 30 reservoirs ended January with water levels below their average month-end level for January.

Major Reservoirs. Water levels at Carlyle Lake, Lake Shelbyville, and Rend Lake have decreased since the end of December. The water surface level at the end of January was 0.1 feet above the target operating level at Carlyle Lake, at the target level at Lake Shelbyville, and 1.5 feet below the target level at Rend Lake.

Great Lakes. Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The January mean level for Lake Michigan was 577.16 feet, compared to a mean level of 578.31 feet in January 1999. The long-term average lake level for January is 578.61 feet, based on 1918–1998 data. Historically, the lowest mean level for Lake Michigan in January occurred in 1965 at 576.12 feet, and the highest level occurred in 1987 at 581.30 feet. The month-end level of Lake Michigan was 577.03 feet.

Note: River stage observations are reported in Table 3 at 15 locations along the Illinois, Mississippi, and Ohio Rivers in terms of water surface height registered in feet above the gage datum. The stage of a river is not the same as the depth of its flow. Stage may be converted to a commonly used vertical datum (e.g., National Geodetic Vertical Datum or NGVD 1929 or mean sea level) by adding the stage in feet to the gage datum elevation (reported in feet, NGVD 1929). The elevation of the gage datum varies from station to station. Flood stage is typically defined as the level at which a river goes out of its banks.

Long-term mean stream flows for each month are published by the USGS. The month's median flow for 18 stations listed in Table 4 is determined by ranking the current month's mean flow for each year of record and selecting the middle value, 50 percent exceedence probability. 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. The terms "much above normal" to "much below normal" are a relative stratification of current conditions and are defined in the notes following Table 4. Figure 1 presents the statewide average of the computed percentages of median flow for the stations. With very few exceptions, the median flow is less than the mean flow for the month at the 18 stations reported herein. The current month's flow as a percent of the median will exceed the percent of mean in nearly every case.

Current reservoir levels are obtained from a network of cooperating reservoir operators who are contacted each month by ISWS staff. The ISWS started collecting month-end water surface elevations at reservoirs more than 15 years ago. The number of reporting stations has increased over time. The current month's average month-end water surface elevation for each reservoir is posted in Table 5. This value is the arithmetic average of the month-end levels for the period of record. The number of years of data is also tabulated.

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.

Ground-Water Information (Ken Hlinka)

Comparison to Average Levels. Shallow ground-water levels in 15 observation wells, remote from pumping centers, were below average levels for January (Table 6). Levels averaged 3.3 feet below average and ranged from 0.3 to 7.6 feet below average. During this time of year, it is not uncommon for recharge from precipitation to be held at the surface as snow and ice. Levels typically increase as temperatures rise above freezing and meltwater infiltration into the water table begins.

Comparison to Previous Month. Statewide, shallow ground-water levels responded to precipitation events during January. Levels averaged 0.2 feet higher than those in December and ranged from 2.9 feet above to 0.4 feet below levels last month.

Comparison to Same Month, Previous Year. Shallow ground-water levels throughout Illinois this month were far below levels of January 1999, except at Bondville (east crop reporting district). Levels averaged 5.6 feet lower and ranged from 1.9 feet above to 11.9 feet below levels one year ago.

Note: The ISWS operates a network of 17 shallow ground-water monitoring wells sited in rural locations. Wells are remote from pumping stations to assess both short- and long-term trends in water-table levels under natural conditions. These data assist in our understanding of the effects and extent of phenomena such as droughts and floods in Illinois, and their lingering impacts on the water resources of the state.

Table 6. Month-End Shallow Ground-Water Level Data Sites, January 2000

				Deviation from		
Number	*Well name*	*County*	*This month's reading (depth to water, feet)*	*Avg. level (feet)*	*Previous month (feet)*	*Previous year (feet)*
1	Galena	JoDaviess	22.03	-0.25	-0.13	-0.65
2	Mt. Morris	Ogle	NA	NA	NA	NA
3	Crystal Lake	McHenry	NA	NA	NA	NA
4	Cambridge	Henry	11.62	-2.25	+0.56	-9.39
5	Fermi Lab	DuPage	10.78	-5.04	-0.42	-8.39
6	Good Hope	McDonough	11.01	-2.48	-0.17	-8.51
7	Snicarte	Mason	37.97	-0.93	-0.38	-1.90
8	Coffman	Pike	17.49	-4.89	-0.36	-11.91
9	Greenfield	Greene	17.11	-6.16	-0.39	-6.59
10	Janesville	Cumberland	7.29	-2.28	-0.28	-3.12
11	St. Peter	Fayette	5.26	-3.28	+0.21	-4.27
12	SWS #2	St. Clair	15.90	-0.88	-0.04	-3.95
13	Boyleston	Wayne	9.14	-6.38	+0.04	-7.94
14	Sparta	Randolph	11.07	-3.77	+0.02	-8.78
15	SE College	Saline	9.66	-7.36	+1.20	-8.19
16	Dixon Springs	Pope	3.82	-1.79	+2.99	-2.33
17	Bondville	Champaign	5.13	-1.37	+0.60	+1.88