ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois State Water Survey

Derek Winstanley, Chief • 2204 Griffith Dr., Champaign, IL 61820 • *Tel (217) 333-2210 • Fax (217) 333-6540*

ILLINOIS WATER AND CLIMATE SUMMARY
October 2006

October 2006 Overview (Bob Scott)

Temperatures in Illinois during October were well below average, and precipitation was above average. Soil moisture within the top 40 inches of soil was above the long-term statewide normal, reaching the highest monthly departure since November 2004. Streamflows were above median heights. Shallow groundwater levels rose in October but still were below long-term average depths for the 19th consecutive month.

Temperatures across Illinois (Figure 1) for October were well below average (a -3.8-degree departure). Crop Reporting District (CRD) temperatures ranged from 3.2 degrees below average (southeast) to 4.2 degrees below average (northeast). It was the 6th coldest September–October in Illinois since 1895.

Precipitation amounts for Illinois in October were above average (Figure 1). The statewide average of 3.97 inches represents a +1.05-inch departure or 136 percent of average for the month. Rainfall totals varied from 2.24 inches (75 percent of average) in the west CRD to 6.02 inches (198 percent of average) in the southeast CRD.

Soil moisture in the 0- to 40-inch (0- to 100-centimeter) layer in Illinois at the end of October was above normal (Figure 1). Conditions near the surface were normal to well above normal. Deeper layers continued to be dry in central Illinois, but were normal to above normal elsewhere.

Mean provisional streamflow statewide was above median flow in October, 254 percent of median (Figure 1). Rivers in Illinois recorded monthly mean discharges in the much below normal to much above normal range this month. Peaks on the major rivers did not exceed flood stage.

Water surface levels at the end of October were below the normal pool/target operating level at 22 of 31 reporting reservoirs. Rend Lake was 1.6 feet above its target level, Lake Shelbyville was 0.7 feet below its target level, and Carlyle Lake was 0.2 feet below its target level. Lake Michigan's mean level remains below the long-term average.

Statewide, **shallow groundwater levels** continue to be below normal with an average departure of -0.3 feet. Levels averaged 0.3 feet higher than September levels. Combined with a decrease in normal monthly groundwater levels between September and October of 0.6 feet, a 0.9-foot increase in departures from last month was observed (Figure 1). Levels were approximately 1.9 feet above October levels of last year. The well at Greenfield reported a record low for October.

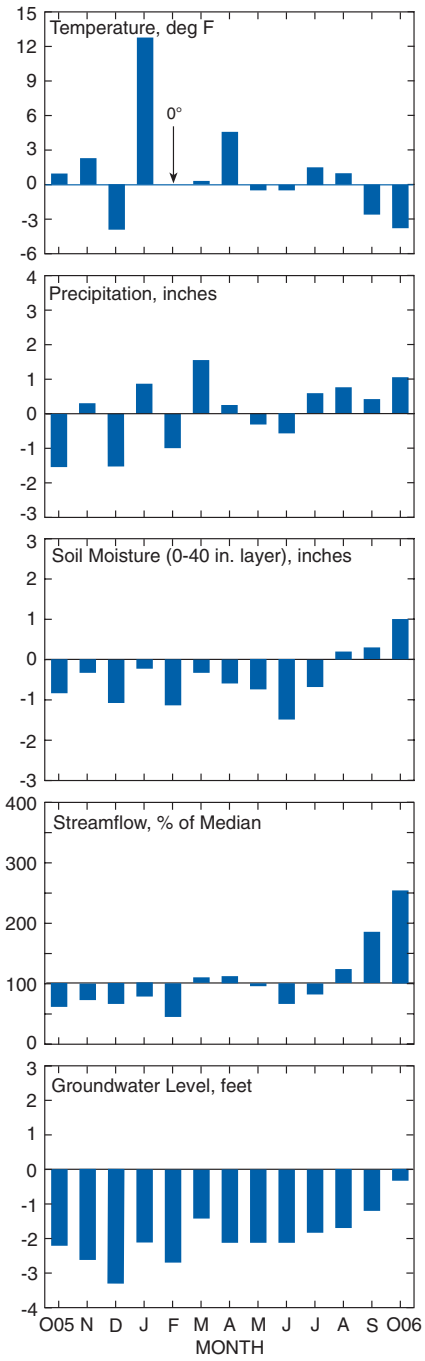

Figure 1.
Statewide departures from normal

Note: *Extended network descriptions appear in the January and July issues. Network maps are available upon request.*

Contact

Bob Scott: (217) 333-4966, email: rwscott1@uiuc.edu
For more information, see www.sws.uiuc.edu/warm

Weather/Climate Information (Jim Angel and Bob Scott)

Temperatures across Illinois for October were well below normal (Figure 2 and Table 1), the 9th coldest October since 1895. Extremes ranged from 95°F on October 4 at Havana (Mason County) to 20ºF on October 12 at Park Forest (Cook County).

Precipitation for October was above normal statewide (Figure 2 and Table 1). Midway Airport (Cook County) reported the highest one-day precipitation, 3.80 inches on October 3. Chicago Botanic Gardens (Cook County) reported the highest monthly total, 7.75 inches.

Severe weather was confined to numerous reports of hail and wind damage on October 2 in northern Illinois. Two injuries were reported in Hickory Hills (Cook County) when the high school roof blew off, hitting an occupied service van in the parking lot. No other reports were filed for Illinois in October.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for October (Figure 3) ranged from 3.8 mph at Dixon Springs to 10.9 mph at Stelle. Highest wind gusts recorded were 46 mph at Bondville (October 30) and 42 mph at Stelle (October 13). The prevailing wind direction ranged from westerly to west-southwesterly across the state. Wind speeds in excess of 8 mph varied from 85 hours at Dixon Springs to 532 hours at Monmouth. (October has 744 hours.) Average air temperatures in October ranged from 47°F at DeKalb and Freeport to 54°F across southern Illinois.

Solar radiation totals varied from 303 Mega-Joules per meter squared (MJ/m^2) at St. Charles to 389 MJ/m^2 at Belleville. Potential evapotranspiration observations ranged from 2.2 inches at St. Charles to 3.0 inches at Belleville. Soil temperatures at the 4-inch level ranged from 49°F at Big Bend to 62°F at Carbondale. Values were slightly warmer at the 8-inch level and varied from 52°F at St. Charles to 65°F at Carbondale.

Extended climate outlooks issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climate Prediction Center for November call for equal chances of above, below, and normal temperatures and precipitation in Illinois. November–January outlooks call for above normal temperatures across the state and below normal precipitation in southern Illinois.

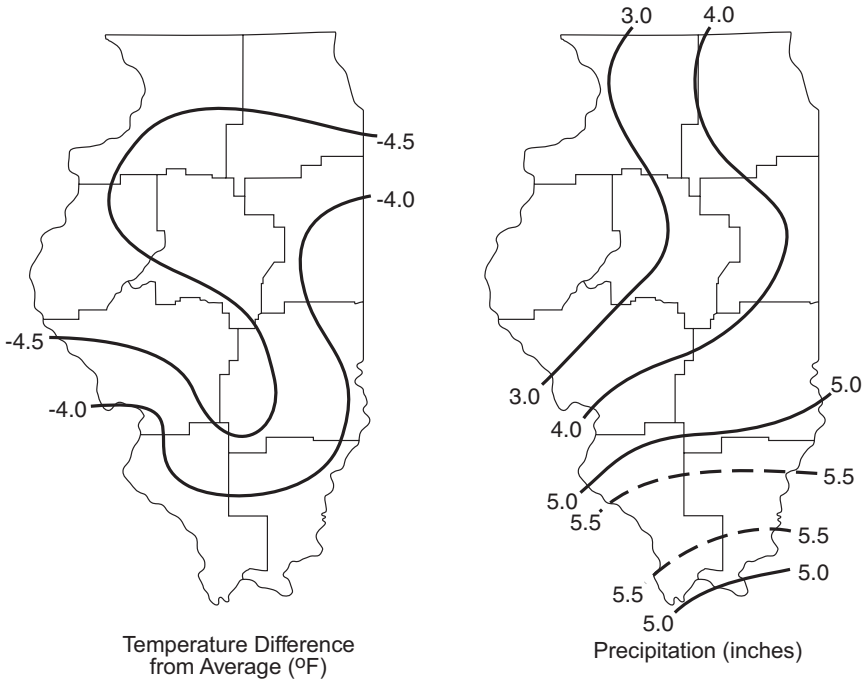

Figure 2. Illinois temperature and precipitation during October 2006

Table 1. Illinois Precipitation (inches) and Temperature (ºF) by Crop Reporting District

	Last Month			Last 3 Months			Last 6 Months			Last 12 Months		
Crop Reporting District	*Oct 06 Amount*	*% Avg*	*Temp Dev*	*Aug 06-Oct 06*	*% Avg*	*Temp Dev*	*May 06-Oct 06*	*% Avg*	*Temp Dev*	*Nov 05-Oct 06*	*% Avg*	*Temp Dev*
Northwest	3.04	106	-4.1	10.78	102	-1.9	21.71	95	-0.8	37.27	103	1.1
Northeast	4.56	164	-4.2	13.59	132	-1.9	25.18	114	-0.8	40.18	110	1.0
West	2.24	75	-4.0	8.68	86	-1.7	16.06	71	-0.5	29.67	79	1.3
Central	2.97	102	-3.6	10.34	107	-1.7	19.14	88	-0.6	34.75	94	1.1
East	3.80	132	-3.5	11.34	118	-1.9	23.41	107	-1.1	39.52	105	0.7
West-southwest	3.40	121	-4.1	11.26	124	-1.7	19.20	93	-0.6	32.69	87	1.1
East-southeast	4.47	148	-3.9	11.75	124	-1.9	22.74	104	-0.9	42.53	104	0.8
Southwest	6.02	198	-3.4	13.32	139	-1.5	25.09	116	-0.6	45.80	107	1.1
Southeast	5.88	196	-3.2	16.07	173	-1.5	30.42	140	-0.7	54.30	122	1.1
State Average	**3.97**	**136**	**-3.8**	**11.78**	**121**	**-1.8**	**22.30**	**102**	**-0.7**	**39.13**	**101**	**1.0**

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

Soil Moisture Information (Bob Scott)

Precipitation was above average across most of Illinois during October, especially in southern Illinois, but slightly below average in western counties. This pattern created normal soil moisture near the surface in central and northwestern Illinois but well above normal soil wetness in southern Illinois (Figure 4). Values in the 0- to 6-inch layer ranged from 95 percent of normal at Belleville and Champaign to 200 percent at Carbondale. Soils in all deeper layers were consistently dry in central Illinois but wet elsewhere. Values in these layers varied from less than 35 percent at Springfield to more than 200 percent at Carbondale in the 6- to 20-inch layer, from 15 percent at Springfield to 198 percent at Carbondale in the 20- to 40-inch layer, and from less than 10 percent at East Peoria to 181 percent at Carbondale in the 40- to 72-inch layer. Despite the dry deeper layers, overall soil moisture in Illinois at the end of October was above normal (Figure 1), the largest above normal departure since November 2004.

Compared to conditions at the end of September, soil moisture in Illinois during October showed nearly universal increases across the state (Table 2). Moisture near the surface increased by 77 percent at Fairfield, 66 percent at East Peoria, and 30–55 percent across most of southern Illinois. Largest increases were observed in the 6- to 20-inch layer at Belleville (87 percent), Brownstown (51 percent), and Champaign (34 percent), with 10–25 percent increases at most remaining sites. Conversely, East Peoria reported a 10-percent decrease. Changes in the 20- to 40-inch layer were small at most sites, but increases occurred at Topeka (24 percent) and at Champaign, Olney, and Carbondale (about 10 percent).

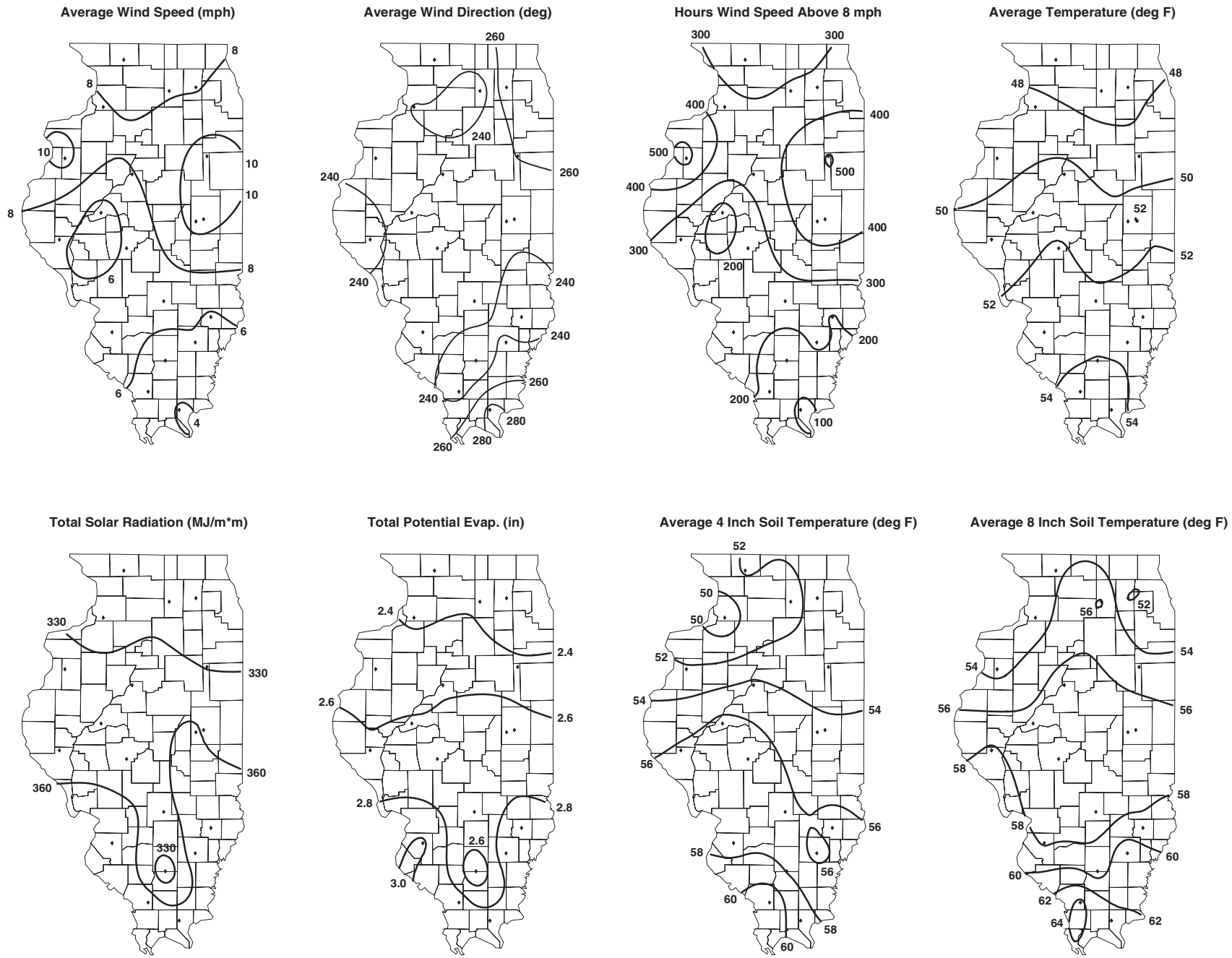

Figure 3. October monthly averages and totals as collected by the Illinois Climate Network

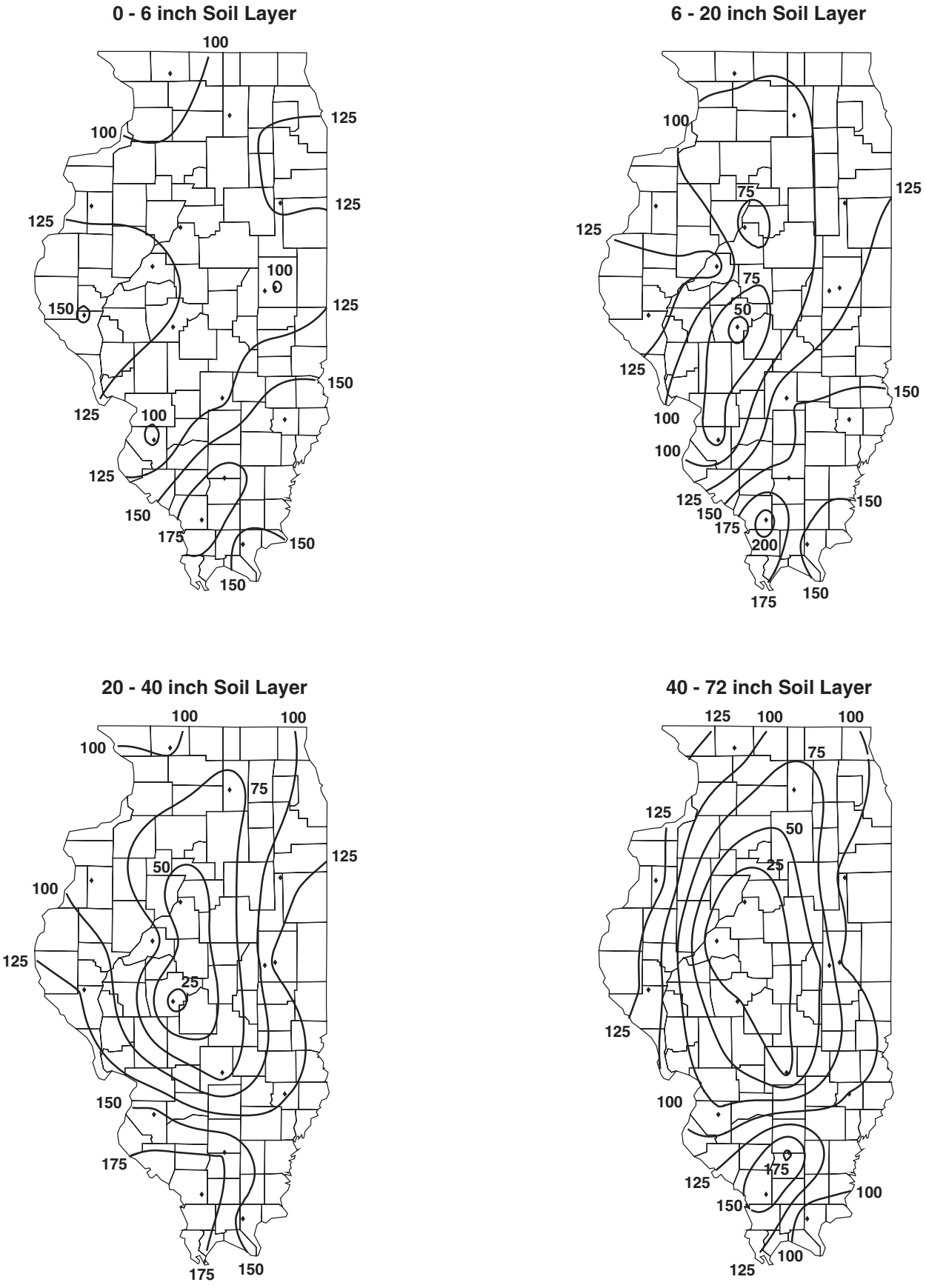

Figure 4. November 1 observed percent-of-normal soil moisture based on 1985-1995 mean

Table 2. Soil Moisture in Various Layers on November 1, 2006

Location	*Nov 1 0–6 (inches)*	*Change from Oct 1 (%)*	*Nov 1 6–20 (inches)*	*Change from Oct 1 (%)*	*Nov 1 20–40 (inches)*	*Change from Oct 1 (%)*
Freeport (NW)	1.6	11	4.5	14	7.1	3
DeKalb (NE)	2.2	9	4.5	10	6.2	5
Monmouth (W)	1.8	33	3.5	7	5.5	-1
East Peoria (C)	1.7	66	3.5	-10	6.5	-3
Topeka (C)	1.0	7	2.6	12	2.5	24
Stelle (E)	2.1	13	4.8	5	6.4	0
Champaign (E)	1.8	15	5.0	34	6.2	11
Bondville (E)	2.0	18	4.6	14	7.0	-2
Perry (WSW)	2.1	8	4.9	-1	7.3	-3
Springfield (WSW)	2.0	48	4.1	13	6.2	-1
Brownstown (ESE)	1.8	47	4.0	51	6.3	1
Olney (ESE)	2.3	56	4.6	25	6.8	12
Belleville (SW)	1.4	33	2.5	87	5.8	6
Carbondale (SW)	2.7	42	5.2	26	7.9	10
Ina (SE)	2.8	52	5.5	7	7.8	3
Fairfield (SE)	3.0	77	5.5	15	7.4	4
Dixon Springs (SE)	2.5	-4	5.5	-3	8.1	0

Surface Water Information (Bill Saylor and Vern Knapp)

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 the Illinois State Water Survey (ISWS), and the USACE. Provisional discharge data are obtained from the USGS.

Table 3 lists the provisional peak stage for the current month compared to flood stage at selected streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers. The peak stage is determined from the daily morning readings posted by the National Weather Service and/or the USACE. Peak stages at the stations listed in Table 3 were below flood stage in October.

Provisional monthly mean flows for 26 streamgaging stations located throughout Illinois are shown in Table 4. Mean values posted by the USGS are listed if available; otherwise, daily mean discharge data posted by the USGS are used to estimate the mean flow for the month. The USGS publishes long-term mean flows for each month. The month's median flow for each station listed in Table 4 was determined by ranking the October mean flow for each year of record, and selecting the middle value, 50 percent exceedence probability.

The statewide percent of historical mean flow and percent of historical median flow are calculated by dividing the sum of the average flows this month at stations in Table 4 by the sum of the historical mean and median flows calculated for the month, respectively, at the same stations. This method is intended to weight individual observations proportionately in the aggregate comparison. (The Illinois River and Rock River stations are excluded from the statewide calculation because other rivers listed in Table 4 contribute to their flow.)

Mean provisional flow statewide was above the median value for October (254 percent of the median) and above the long-term mean (117 percent of the mean). Mean streamflow conditions for the month at Table 4 stations ranged from much below normal to much above normal, except for conditions much below normal on the La Moine River at Ripley in western Illinois. Monthly mean streamflows were above normal at half of the stations listed in Table 4.

Table 3. Peak Stages for Major Rivers, October 2006

River	*Station*	*River mile**	*Flood stage (feet)**	*Peak stage (feet)***	*Date*
Illinois					
	Morris	263.1	16	10.2	04
	La Salle	224.7	20	16.2	19
	Peoria	164.6	18	13.6	07
	Havana	119.6	14	10.8	23
	Beardstown	88.6	14	10.9	22
	Hardin	21.5	25	20.9	26
Mississippi					
	Dubuque	579.9	17	7.7	25
	Keokuk	364.2	16	3.4	28
	Quincy	327.9	17	11.8	25
	Grafton	218.0	18	16.4	26
	St. Louis	180.0	30	1.7	27
	Chester	109.9	27	5.9	28
	Thebes	43.7	33	11.7	29
Ohio					
	Cairo	2.0	40	28.0	28

Notes:
*River mile and flood stage from *River Stages in Illinois: Flood and Damage Data*, Illinois Department of Natural Resources, Office of Water Resources, August 2004 (except as revised by the National Weather Service).
**Peak stage based on daily a.m. readings, not instantaneous peak.

Water-Supply Lakes and Major Reservoirs. Table 5 lists reservoirs in Illinois, their normal pool or target water surface elevation, and other data related to observed variations in water surface elevations. Reservoir levels are obtained from a network of cooperating reservoir operators who are contacted each month by ISWS staff for the current water levels. Reservoir levels are reported in terms of their difference from normal pool (or target level). The average of the month-end readings for the period of record is reported in terms of the difference from normal pool or target level (column 6 of Table 5), and the number of years of record for each reservoir also is given (column 7). Most reservoirs serve as public water supplies, with the exceptions noted in the last column.

Compared to end-of-September water levels at 31 reservoirs, end-of-October water levels had increased at 18 reservoirs, had decreased at 10 reservoirs, and were the same as last month at 3 reservoirs. For the 31 reservoirs with observations reported at the end of October, 6 reservoirs were above normal pool (or target operating level), 3 reservoirs were at normal pool or spillway elevation, and 22 reservoirs were below normal pool.

Major Reservoirs. Compared to end-of-September water levels, end-of-October water levels had increased slightly at Lake Shelbyville, Carlyle Lake, and Rend Lake. At the end of October, the water surface level was 1.6 feet above the target level at Rend Lake, 0.7 feet below the seasonal target level at Lake Shelbyville, and 0.2 feet below the seasonal target level at Carlyle Lake.

Great Lakes. Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The October mean level for Lake Michigan was 577.4 feet, compared to a mean level of 577.4 feet in October 2005. The long-term average lake level for October is 579.0 feet, based on 1918–2005 data. Historically, the lowest mean level for Lake Michigan in October, 576.4 feet, occurred in 1964, and the highest level, 582.3 feet, occurred in 1986. The month-end level of Lake Michigan was 577.3 feet.

Table 4. Provisional Mean Flows, October 2006

Station	*Drainage area (sq mi)*	*Years of record*	*2006 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	6363	71	4509	3105	2692	above normal	24	31
Rock River near Joslin	9549	63	5629	4534	3898	above normal	28	31
Pecatonica River at Freeport	1326	87	619	696	590	normal	48	31
Green River near Geneseo	1003	67	204	376	213	normal	51	31
Edwards River near New Boston	445	68	33	139	47	normal	64	31
Kankakee River at Momence	2294	88	2241	1199	914	above normal	11	31
Iroquois River near Chebanse	2091	82	1774	732	187	above normal	12	31
Fox River at Dayton	2642	86	2125	1129	807	much above normal	8	31
Vermilion River at Pontiac	579	62	272	136	19	above normal	11	31
Spoon River at Seville	1636	89	67	531	185	below normal	89	31
LaMoine River at Ripley	1293	82	14	433	118	much below normal	96	31
Bear Creek near Marceline	349	61	1.4	116	13	below normal	81	31
Mackinaw River near Congerville	767	57	125	184	30	above normal	28	31
Salt Creek near Greenview	1804	64	385	507	213	above normal	28	31
Sangamon River at Monticello	550	93	169	170	34	above normal	20	31
South Fork Sangamon near Rochester	867	56	5.9	196	26	below normal	75	31
Illinois River at Valley City	26,743	67	14,780	12,510	8,046	above normal	24	31
Macoupin Creek near Kane	868	77	37	226	52	normal	51	31
Vermilion River near Danville	1290	84	684	353	104	above normal	12	31
Kaskaskia River at Vandalia	1940	36	81	601	223	below normal	73	31
Shoal Creek near Breese	735	62	49	175	45	normal	44	31
Embarras River at Ste. Marie	1516	92	233	448	108	normal	40	31
Skillet Fork at Wayne City	464	86	115	102	11	above normal	20	31
Little Wabash below Clay City	1131	91	290	223	51	above normal	17	31
Big Muddy at Plumfield	794	35	377	110	57	much above normal	8	31
Cache River at Forman	244	82	432	54	16	much above normal	2	31

Notes:
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.
*As reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 2005.

Table 5. Reservoir Levels in Illinois, October 2006

For security considerations, statewide tabular reservoir data are not available on the Internet. Specific data requests may be made to Bill Saylor at: wsaylor@sws.uiuc.edu.

Groundwater Information (Ken Hlinka)

Comparison to Average Levels. Shallow groundwater levels in 14 observation wells, which are remote from pumping centers, were below average levels for the 19th consecutive month. October levels were 0.3 feet below normal and ranged from 4.9 feet below to 3.6 feet above normal levels (Table 6). One well, Greenfield (Greene County), was at a record low for October. The water level at Snicarte (Mason County) was again below the bottom of the well during the month.

Comparison to Previous Month. Shallow groundwater levels were above those of September. Levels averaged 0.3 feet higher and ranged from 1.5 feet below to 2.4 feet above levels last month.

Comparison to Same Month, Previous Year. Shallow groundwater levels in October were above levels measured one year ago. Levels averaged 1.9 feet higher and ranged from 1.5 feet lower to 8.9 feet higher than during October 2005.

Table 6. Month-End Shallow Groundwater-Level Data Sites, October 2006

					Deviation from			
Number	*Well name*	*County*	*Well depth (feet)*	*This month's reading (depth to water, feet)*	*15-year avg. level (feet)*	*Period of record avg. (feet)*	*Previous month (feet)*	*Previous year (feet)*
1	Galena	JoDaviess	25.00	22.00	-0.97	-0.58	-0.21	+0.38
2	Mt. Morris	Ogle	55.00	25.13	-4.64	-4.93	-0.55	+1.85
3	Crystal Lake	McHenry	18.00	6.02	-0.08	-0.19	+0.03	+1.28
4	Cambridge	Henry	42.00	N/A	N/A	N/A	N/A	N/A
5	Fermi Lab	DuPage	17.00	4.01	+3.84	+3.63	N/A	+8.89
6	Good Hope	McDonough	30.00	12.85	-3.20	-2.39	-1.49	-0.16
7	Snicarte	Mason	40.30	40.30	N/A	N/A	N/A	N/A
8	Coffman	Pike	28.00	16.89	-3.24	-2.61	-0.91	-0.20
9	Greenfield	Greene	20.70	19.28*	-4.01	-3.79	-0.24	-1.50
10	Janesville	Cumberland	11.00	6.77	-0.55	-0.43	+0.79	+0.31
11	St. Peter	Fayette	15.00	3.33	+0.99	+0.89	+1.91	+2.08
12	SWS #2	St. Clair	80.00	16.52	-2.60	-0.50	+0.26	N/A
13	Boyleston	Wayne	23.00	6.29	+0.85	+1.48	+0.28	+2.66
14	Sparta	Randolph	27.00	9.29	+0.45	+0.96	+1.61	+0.11
15	SE College	Saline	10.19	4.30	+3.39	+3.06	+2.43	+3.73
16	Dixon Springs	Pope	8.63	2.29	+4.67	+2.69	+1.03	+6.02
17	Bondville	Champaign	21.00	7.80	-1.54	-1.96	-0.82	+0.91
				Averages	-0.44	-0.31	+0.29	+1.88

Notes:
N/A = Data not available.
*Well currently at record monthly low.

Addendum (Nancy Westcott)

Imperial Valley Precipitation. October 2006 precipitation amounts (Figure 5a) were moderate. Monthly gage totals were highest in the northern and southwestern regions of the network and lowest in the central portion of the network. Individual gage amounts ranged from 3.00 inches at site #2 to 1.80 inches at site #11. The 30-year, 1971–2000, average precipitation amounts for October at Havana and Mason City are 2.86 and 2.73 inches, respectively. The October 2006 network average of 2.19 inches was about 90 percent of the 14-year (1992–2005) October network average of 2.43 inches.

Cook County Precipitation. October 2006 precipitation amounts (Figure 5b) were heavy. The greatest precipitation occurred in the central portion of the network, and the lightest precipitation occurred in the northwestern and far southern regions. Precipitation values ranged from 5.83 inches at site #7 (Broadway near Lake Michigan) to 3.73 inches at site #3 (Des Plaines). The October 2006 network average of 4.82 inches was about 161 percent of the 17-year (1989–2005) October network average of 3.00 inches.

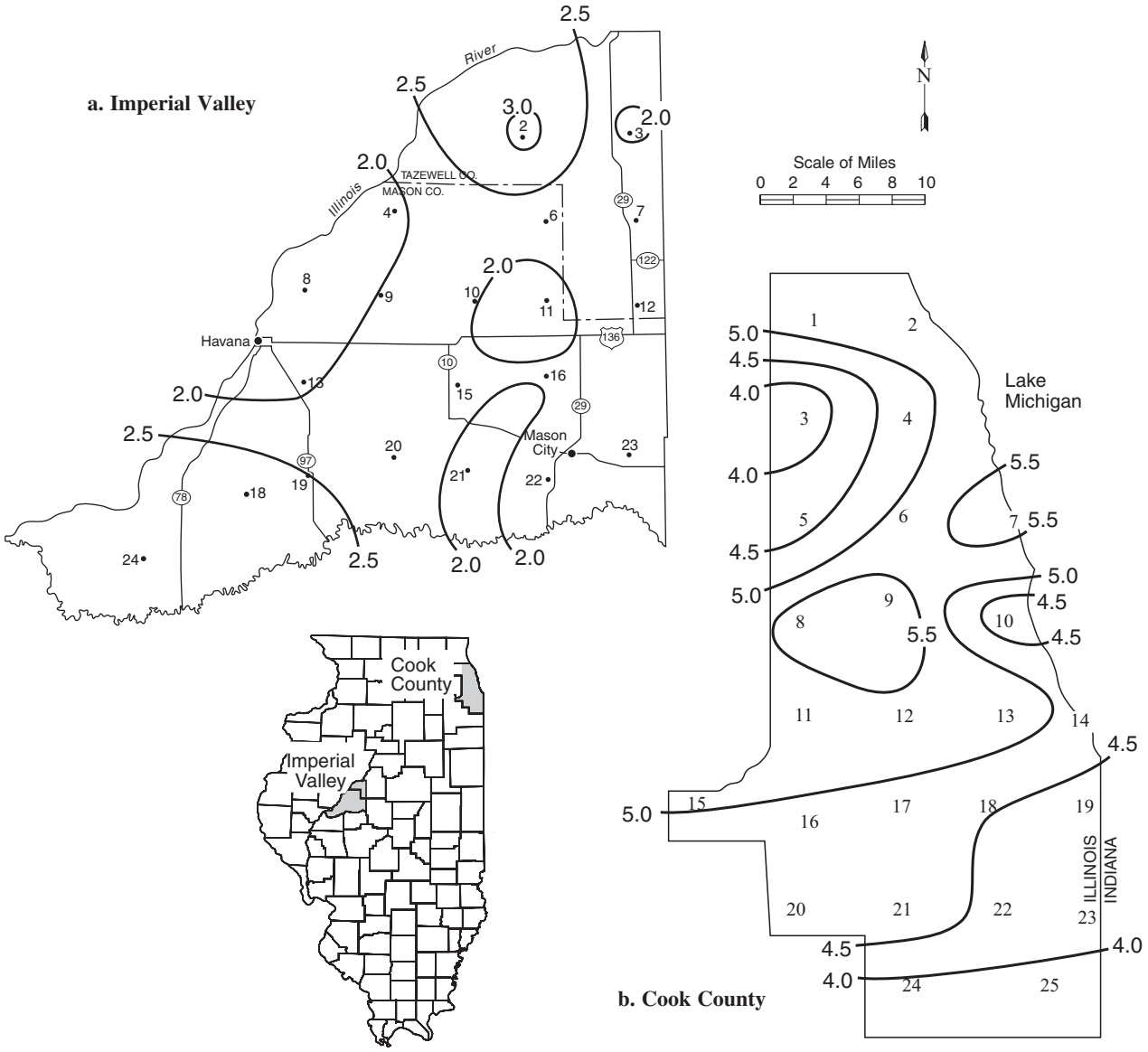

Figure 5. Long-term raingage network precipitation totals (inches) for October 2006

Data sources for information in this publication include the following:
CPC - Climate Predication Center, http://www.cpc.ncep.noaa.gov/products/predictions/
ISWS - Illinois State Water Survey, http://www.sws.uiuc.edu/
MRCC - Midwestern Regional Climate Center, http://mrcc.sws.uiuc.edu/
NCDC - National Climate Data Center, http://www.ncdc.noaa.gov/
NWS - National Weather Service, http://www.nws.noaa.gov/
USACE - U.S. Army Corps of Engineers, http://www.rivergages.com
USGS - U.S. Geological Survey, http://water.usgs.gov/
WARM - Water and Atmospheric Resources Monitoring Program, http://www.sws.uiuc.edu/warm/