ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois State Water Survey

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# ILLINOIS WATER AND CLIMATE SUMMARY
## May 2006

### May 2006 Overview (Bob Scott)

Temperatures and precipitation in Illinois during May were both slightly below average. Soil moisture within the top 40 inches of soil was below the long-term statewide average. Mean streamflows overall were near median heights. Shallow groundwater levels continued being below long-term average depths. Although rainfall in recent months largely has mitigated the water deficit conditions from last year's drought, recovery is still incomplete.

**Temperatures** across Illinois (Figure 1) for May were slightly below average (a -0.4-degree departure). Crop Reporting District (CRD) temperatures ranged from average (west) to a degree below average (east).

**Precipitation** amounts for Illinois in May were slightly below average (Figure 1). The statewide average of 3.96 inches represents a -0.30-inch departure or 93 percent of average. The recorded CRD totals varied from 2.21 inches (49 percent of average) in the west CRD to 5.36 inches (113 percent of average) in the southeast CRD.

**Soil moisture** in the 0- to 40-inch (0- to 100-centimeter) layer at the end of May ranged from below normal to slightly above normal across Illinois.

**Mean provisional streamflow** statewide was approximately at median flow in May, 98 percent of median (Figure 1). Rivers in Illinois recorded monthly mean discharges in the below normal to normal range. Peaks on major rivers did not exceed flood stage.

**Water surface levels** at the end of May were below the normal pool/target operating level at 9 of 33 reporting reservoirs. At the end of the month, Lake Shelbyville was 0.4 feet above its target level, Carlyle Lake was 1.1 feet above its target level, and Rend Lake was 3.2 feet above its target level. Lake Michigan's mean level remains below the long-term average.

Statewide, **shallow groundwater levels** averaged 2.1 feet below normal. Levels averaged 0.4 feet lower than April levels and approximately a foot below May levels last year.

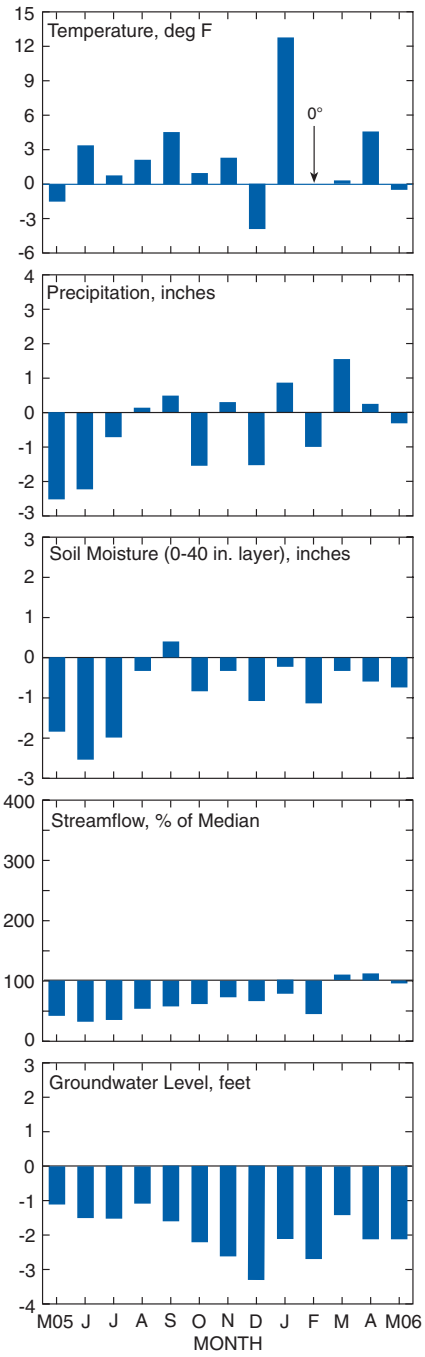


**Figure 1.**
**Statewide departures from normal**

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

**Contact**

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## Weather/Climate Information (Jim Angel and Bob Scott)

**Temperatures** across Illinois for May were near normal (Figure 2 and Table 1). Extremes ranged from 29 degrees on May 6 at Mt. Carroll to 96 degrees on May 29 at Bentley. This was the eighth warmest December–May and third warmest June–May since 1895.

**Precipitation** for May also was near normal statewide (Figure 2 and Table 1). Kankakee reported the highest one-day precipitation, 3.95 inches on May 25, and Bourbonnais reported the highest monthly total, 8.84 inches.

**Severe weather** was widespread in Illinois in May, including nine reports of tornadoes. No damage was reported in Knox County after a tornado on May 1. Wind damage and hail were reported throughout southern and central Illinois, however, including blocked streets in Edwardsville from trees and limbs. A tornado plowed a two-mile-long path through Clay County, and southern Illinois reported hail on May 3. Wind damage and hail were reported across northern Illinois on May 17. No significant damage was reported on May 24 from four tornadoes—one each in Bond, Douglas, Kankakee, and Moultrie Counties. However, significant wind damage accompanied these storms, especially in central Illinois. There were numerous reports of hail in northern Illinois and near St. Louis, including 3-inch hail in Fulton County. Severe weather also was reported in northern and central Illinois on May 27 and 29–31, including three tornadoes—one each in Champaign, Douglas, and Piatt Counties on May 31. No damage or injuries were reported.

**Illinois Climate Network (ICN) Data.** Average daily wind speeds across Illinois for May (Figure 3) ranged from 3.8 mph at Dixon Springs to 11.0 mph at Monmouth. Peoria recorded the highest gust (52 mph on May 24). The prevailing wind direction was west-southwesterly to westerly statewide. Wind speeds in excess of 8 mph varied from 70 hours at Dixon Springs to 509 hours at Monmouth. (May has 744 hours.) Average air temperatures ranged from the upper 50s in northeastern Illinois to the middle 60s in southern Illinois.

Solar radiation totals in May varied from 570 Mega-Joules per meter squared ($MJ/m^2$) at St. Charles to 680 $MJ/m^2$ at Belleville. Potential evapotranspiration observations varied from a low of 4.6 inches at St. Charles to nearly 5.8 inches at Belleville. Soil temperatures at the 4- and 8-inch levels ranged from the upper 50s in northern Illinois to the low to upper 60s in far southern Illinois.

Extended climate outlooks issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climate Prediction Center for June call for equal chances of below, above, and normal temperatures in Illinois and a slight chance of below normal precipitation in southwestern Illinois. Outlooks for climatological summer (June–August) call for equal chances of below, above, and normal temperatures and precipitation across the state.

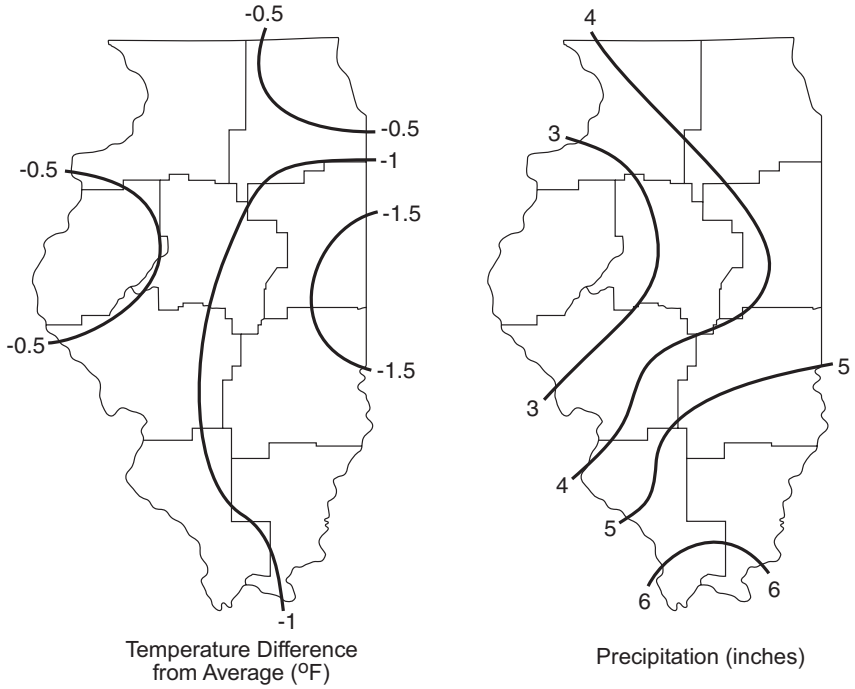


**Figure 2. Illinois temperature and precipitation during May 2006**

**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* | *May 06 Amount* | *% Avg* | *Temp Dev* | *Mar 06-May 06* | *% Avg* | *Temp Dev* | *Dec 05-May 06* | *% Avg* | *Temp Dev* | *Jun 05-May 06* | *% Avg* | *Temp Dev* |
| Northwest | 3.74 | 92 | -0.5 | 12.54 | 124 | 1.4 | 16.90 | 112 | 2.4 | 30.24 | 83 | 2.6 |
| Northeast | 4.31 | 109 | -0.2 | 11.36 | 112 | 1.5 | 16.58 | 106 | 2.4 | 29.67 | 81 | 2.6 |
| West | 2.21 | 49 | 0.0 | 10.05 | 91 | 1.7 | 13.83 | 84 | 2.6 | 28.71 | 77 | 2.5 |
| Central | 2.94 | 70 | -0.3 | 11.40 | 106 | 1.5 | 15.80 | 95 | 2.5 | 30.30 | 82 | 2.5 |
| East | 4.41 | 108 | -1.0 | 13.02 | 122 | 1.0 | 17.62 | 105 | 2.1 | 36.57 | 97 | 2.1 |
| West-southwest | 3.19 | 75 | -0.4 | 9.92 | 87 | 1.5 | 13.54 | 76 | 2.4 | 30.00 | 80 | 2.2 |
| East-southeast | 4.98 | 116 | -0.8 | 15.30 | 128 | 1.2 | 20.80 | 106 | 2.0 | 39.96 | 97 | 2.0 |
| Southwest | 4.78 | 108 | -0.2 | 14.96 | 118 | 1.9 | 20.15 | 95 | 2.4 | 42.73 | 100 | 2.1 |
| Southeast | 5.36 | 113 | -0.6 | 16.69 | 123 | 1.8 | 23.76 | 103 | 2.3 | 47.76 | 107 | 2.2 |
| **State Average** | **3.96** | **93** | **-0.4** | **12.67** | **112** | **1.5** | **17.46** | **98** | **2.3** | **34.58** | **89** | **2.3** |

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

## Soil Moisture Information (Bob Scott)

Precipitation totals in Illinois during May were below average in western, central, and southwestern Illinois, and slightly above average elsewhere. Soil moisture near the surface was below normal in these areas but above normal in northeastern Illinois (Figure 4). Values in the 0- to 6-inch layer ranged from 32 percent of normal at Rend Lake to 148 percent at DeKalb. Conditions in the 6- to 20-inch layer were similar with values ranging from 20 percent at Springfield to 140 percent at DeKalb. Deeper layers were slightly drier overall: values in the 20- to 40-inch layer varied from 31 percent at East Peoria to 115 percent at Brownstown, while soil moisture at 40 to 72 inches varied from 74 percent at Topeka to 140 percent at Rend Lake. Overall, soil moisture in Illinois at the end of May was below normal (Figure 1).

Compared to conditions at the end of April, soil moisture in May generally decreased, but a few large increases were noted across the state (Table 2). Eight sites in the 0- to 6-inch layer reported decreases in excess of 20 percent, including a decrease of 50 percent at East Peoria. Conversely, Freeport observed a 38 percent increase. Decreases dominated the 6- to 20-inch layer, and values ranged from a 41 percent decrease at East Peoria to a 17 percent increase at DeKalb. Differences from last month in the 20- to 40-inch layer were under 10 percent, except for decreases of 12–16 percent at three sites.

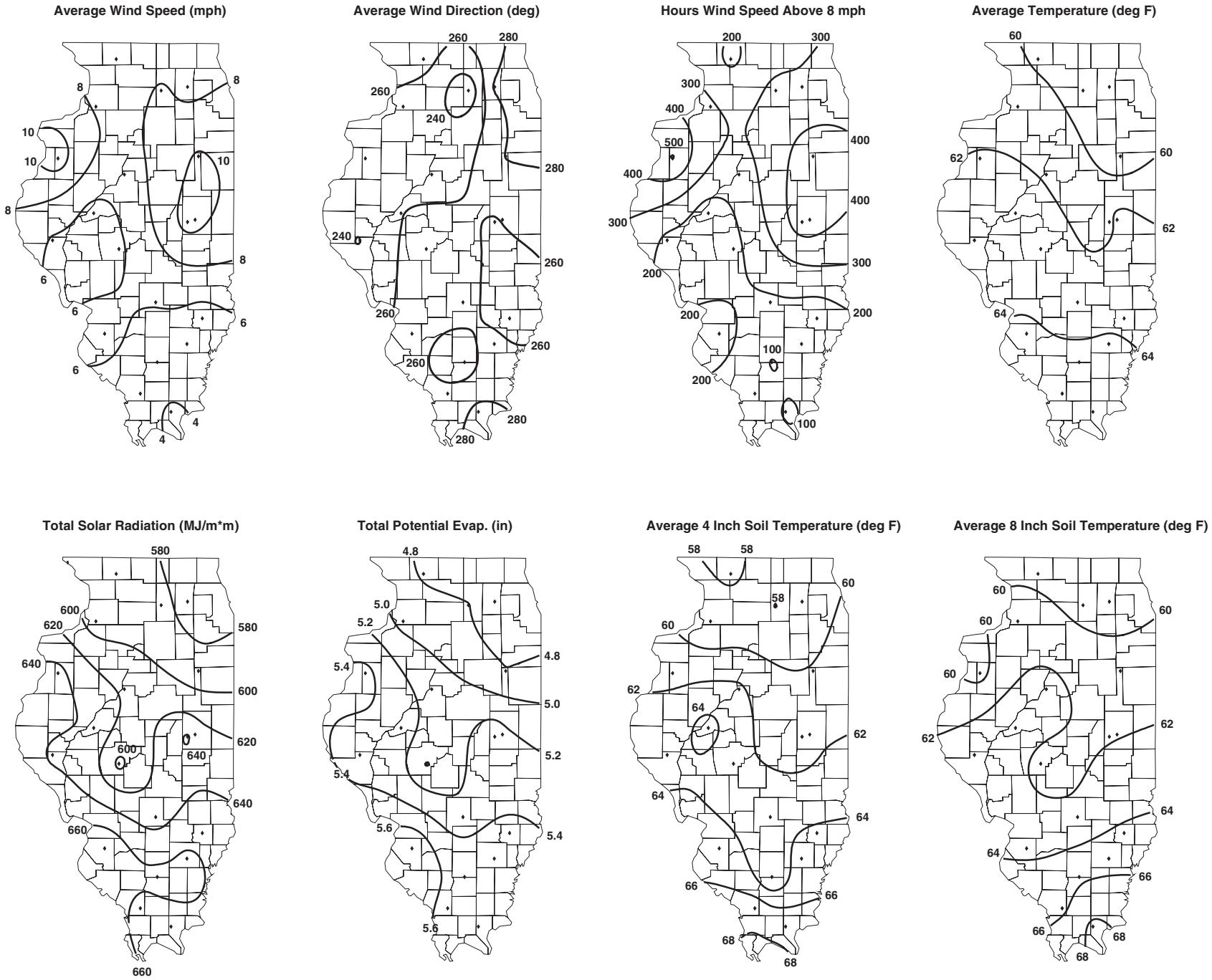


**Figure 3. May monthly averages and totals as collected by the Illinois Climate Network**

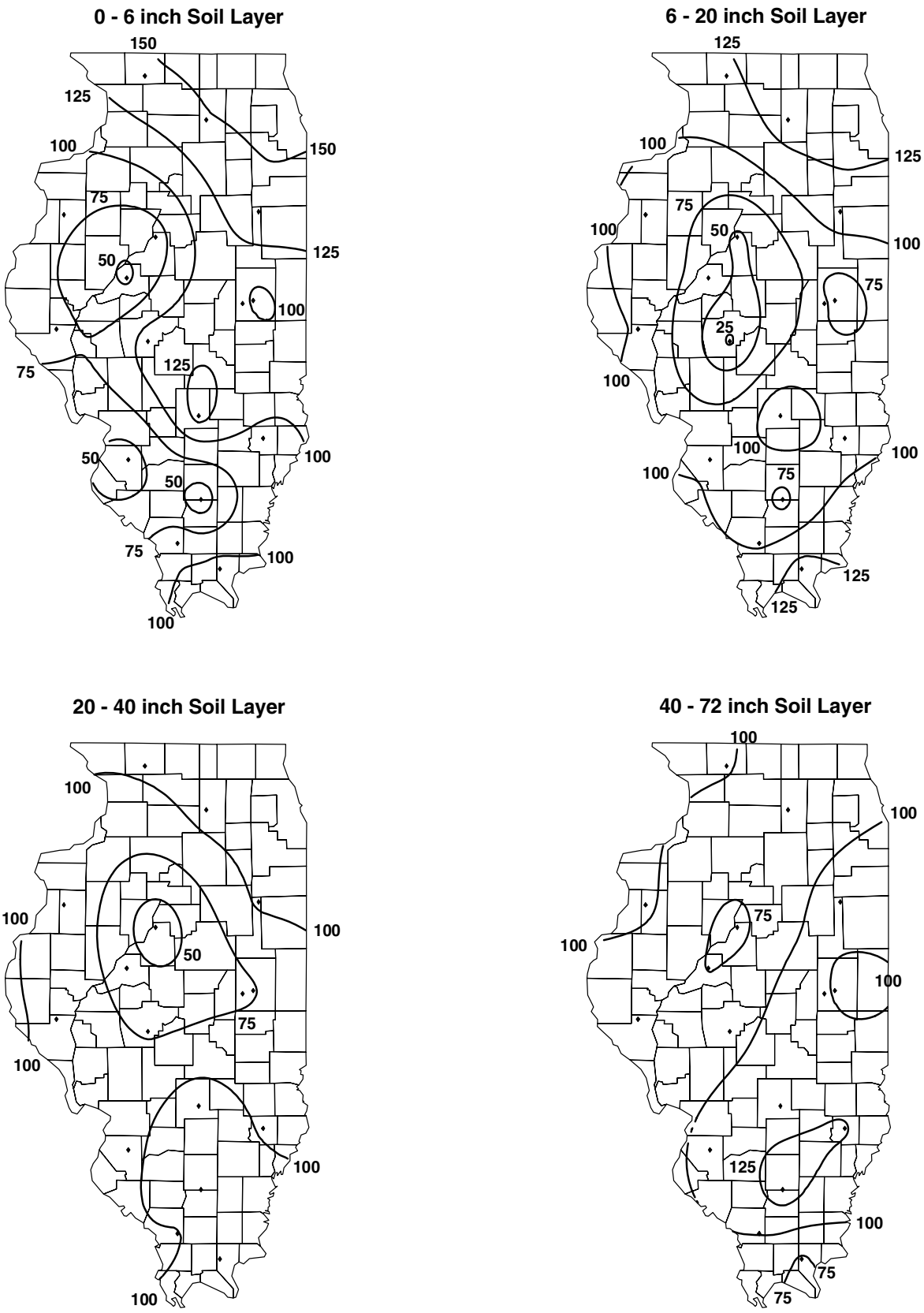


**Figure 4. June 1 observed percent-of-normal soil moisture based on 1985-1995 mean**

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

| *Location* | *Jun 1 0 - 6 (inches)* | *Change from May 1 (%)* | *Jun 1 6 - 20 (inches)* | *Change from May 1 (%)* | *Jun 1 20 - 40 (inches)* | *Change from May 1 (%)* |
|---|---|---|---|---|---|---|
| Freeport (NW) | 1.9 | 38 | 4.1 | 4 | 6.7 | -2 |
| DeKalb (NE) | 2.1 | -9 | 4.9 | 17 | 7.2 | 5 |
| Monmouth (W) | 1.4 | -35 | 3.6 | -10 | 6.2 | -8 |
| East Peoria (C) | 1.0 | -50 | 2.9 | -41 | 6.7 | -16 |
| Topeka (C) | 0.5 | -22 | 1.8 | -19 | 2.4 | -12 |
| Stelle (E) | 2.3 | 2 | 5.0 | 1 | 7.2 | 3 |
| Champaign (E) | 1.6 | -13 | 3.7 | -23 | 5.7 | -12 |
| Bondville (E) | 1.8 | -8 | 4.0 | -3 | 7.1 | 6 |
| Perry (WSW) | 1.5 | -23 | 4.4 | -5 | 7.6 | -1 |
| Springfield (WSW) | 1.7 | 21 | 3.9 | -12 | 7.3 | -7 |
| Brownstown (ESE) | 2.4 | 9 | 4.5 | 7 | 8.3 | 1 |
| Olney (ESE) | 1.8 | -13 | 4.4 | -5 | 6.9 | -4 |
| Belleville (SW) | 0.9 | -18 | 3.8 | 8 | 7.9 | 2 |
| Carbondale (SW) | 1.8 | -20 | 4.1 | -10 | 7.6 | -1 |
| Ina (SE) | 1.2 | -38 | 4.4 | 1 | 7.6 | 0 |
| Fairfield (SE) | 2.2 | 19 | 5.2 | 8 | 7.5 | 0 |
| Dixon Springs (SE) | 2.0 | -29 | 5.5 | -2 | 8.1 | 1 |

## 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 May.

**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 May 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 nearly at the median value for May (98 percent of the median) and below the long-term mean (69 percent of the mean). Mean streamflows were normal throughout most of the state, except at a few central/west-central stations, which had flows below normal.

**Table 3. Peak Stages for Major Rivers during May 2006**

| *River* | *Station* | *River mile** | *Flood stage (feet)** | *Peak stage (feet)*** | *Date* |
|---|---|---|---|---|---|
| Illinois | | | | | |
| | Morris | 263.1 | 16 | 8.3 | 31 |
| | La Salle | 224.7 | 20 | 15.7 | 31 |
| | Peoria | 164.6 | 18 | 13.4 | 17 |
| | Havana | 119.6 | 14 | 11.3 | 20 |
| | Beardstown | 88.6 | 14 | 11.2 | 18 |
| | Hardin | 21.5 | 25 | 21.0 | 22 |
| Mississippi | | | | | |
| | Dubuque | 579.9 | 17 | 12.8 | 23 |
| | Keokuk | 364.2 | 16 | 9.3 | 15 |
| | Quincy | 327.9 | 17 | 12.5 | 04 |
| | Grafton | 218.0 | 18 | 16.4 | 25 |
| | St. Louis | 180.0 | 30 | 18.8 | 06 |
| | Chester | 109.9 | 27 | 20.6 | 06 |
| | Thebes | 43.7 | 33 | 24.5 | 07 |
| Ohio | | | | | |
| | Cairo | 2.0 | 40 | 29.6 | 01 |

**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-April levels at 33 reservoirs, end-of-May levels had increased at 12 reservoirs, had decreased at 9 reservoirs, and were the same as last month at 12 reservoirs. For the 33 reservoirs with observations reported at the end of May, 14 reservoirs were above normal pool (or target operating level), 10 reservoirs were at normal pool or spillway elevation, and 9 reservoirs were below normal pool.

**Major Reservoirs.** Compared to end-of-April water levels, end-of-May levels had increased 2.1 feet at Carlyle Lake and 3.2 feet at Lake Shelbyville, but had decreased slightly at Rend Lake, which was about 3.2 feet above its target level. Lake Shelbyville was 0.4 feet above its target level, and Carlyle Lake was 1.1 feet above its target level.

**Great Lakes.** Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The May mean level for Lake Michigan was 577.7 feet, compared to a mean level of 578.1 feet in May 2005. The long-term average lake level for May is 579.1 feet, based on 1918–2005 data. Historically, the lowest mean level for Lake Michigan in May occurred in 1964 at 576.6 feet, and the highest level occurred in 1986 at 581.6 feet. The month-end level of Lake Michigan was 577.9 feet.

**Table 4. Provisional Mean Flows, May 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 | 70 | 6261 | 5426 | 4865 | normal | 32 | 31 |
| Rock River near Joslin | 9549 | 62 | 8696 | 8616 | 7748 | normal | 38 | 31 |
| Pecatonica River at Freeport | 1326 | 86 | 1132 | 1019 | 829 | normal | 40 | 31 |
| Green River near Geneseo | 1003 | 67 | 520 | 1004 | 874 | normal | 68 | 31 |
| Edwards River near New Boston | 445 | 67 | 253 | 508 | 347 | normal | 60 | 31 |
| Kankakee River at Momence | 2294 | 88 | 2396 | 2908 | 2786 | normal | 55 | 31 |
| Iroquois River near Chebanse | 2091 | 81 | 2711 | 2710 | 2133 | normal | 37 | 31 |
| Fox River at Dayton | 2642 | 86 | 2544 | 2484 | 2104 | normal | 37 | 31 |
| Vermilion River at Pontiac | 579 | 61 | 648 | 741 | 576 | normal | 39 | 31 |
| Spoon River at Seville | 1636 | 88 | 980 | 1760 | 1237 | normal | 63 | 31 |
| LaMoine River at Ripley | 1293 | 82 | 238 | 1429 | 817 | below normal | 84 | 31 |
| Bear Creek near Marceline | 349 | 61 | 24 | 416 | 200 | below normal | 89 | 31 |
| Mackinaw River near Congerville | 767 | 56 | 656 | 928 | 720 | normal | 56 | 31 |
| Salt Creek near Greenview | 1804 | 63 | 1736 | 2448 | 1775 | normal | 52 | 31 |
| Sangamon River at Monticello | 550 | 93 | 307 | 729 | 490 | below normal | 71 | 31 |
| South Fork Sangamon near Rochester | 867 | 55 | 489 | 1063 | 506 | normal | 50 | 31 |
| Illinois River at Valley City | 26,743 | 66 | 22,940 | 36,610 | 35,321 | normal | 69 | 31 |
| Macoupin Creek near Kane | 868 | 76 | 213 | 943 | 413 | normal | 66 | 31 |
| Vermilion River near Danville | 1290 | 83 | 1377 | 1684 | 1257 | normal | 43 | 31 |
| Kaskaskia River at Vandalia | 1940 | 35 | 1466 | 2108 | 1596 | normal | 53 | 31 |
| Shoal Creek near Breese | 735 | 61 | 294 | 868 | 493 | normal | 63 | 31 |
| Embarras River at Ste. Marie | 1516 | 91 | 1755 | 1958 | 1160 | normal | 36 | 31 |
| Skillet Fork at Wayne City | 464 | 85 | 368 | 649 | 248 | normal | 45 | 31 |
| Little Wabash below Clay City | 1131 | 90 | 503 | 1469 | 673 | normal | 56 | 31 |
| Big Muddy at Plumfield | 794 | 34 | 967 | 1407 | 896 | normal | 46 | 31 |
| Cache River at Forman | 244 | 81 | 368 | 432 | 312 | normal | 43 | 31 |

**Notes:**
Below normal flow = 70-90% chance of exceedence.
Normal flow = 30-70% chance of exceedence.
*As reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 2004.

**Table 5. Reservoir Levels in Illinois, May 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 16 observation wells, which are remote from pumping centers, were below average levels for the 14th consecutive month. May levels were 2.1 feet below normal and ranged from 8.8 feet below to 2.4 feet above normal (see Table 6). Two wells, Greenfield (Greene County) and Coffman (Pike County), were at record lows for May. Both wells are in the west-southwest portion of the state, which continues to report the driest conditions in the state.

**Comparison to Previous Month.** Shallow groundwater levels were below those of April. Levels averaged 0.4 feet lower and ranged from 2.4 feet below to 2.1 feet above levels last month.

**Comparison to Same Month, Previous Year.** Shallow groundwater levels in May were below levels of one year ago. Levels averaged 1.0 feet lower and ranged from 6.6 feet below to 1.5 feet above levels last May.

**Table 6. Month-End Shallow Groundwater-Level Data Sites, May 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 | 21.43 | -1.05 | -0.63 | +0.24 | +0.31 |
| 2 | Mt. Morris | Ogle | 55.00 | 24.98 | -8.82 | -7.80 | +2.07 | -1.98 |
| 3 | Crystal Lake | McHenry | 18.00 | 7.83 | -3.65 | -3.62 | -1.90 | -3.61 |
| 4 | Cambridge | Henry | 42.00 | 38.72* | N/A | N/A | N/A | N/A |
| 5 | Fermi Lab | DuPage | 17.00 | 6.50 | -0.51 | -0.79 | -0.81 | +1.48 |
| 6 | Good Hope | McDonough | 30.00 | 3.59 | +1.27 | +2.38 | +0.29 | +0.62 |
| 7 | Snicarte | Mason | 40.30 | 39.22 | -3.14 | -3.09 | +0.26 | -3.29 |
| 8 | Coffman | Pike | 28.00 | 16.10** | -7.38 | -7.06 | -1.29 | -3.64 |
| 9 | Greenfield | Greene | 20.70 | 17.21** | -8.63 | -8.82 | -0.53 | -6.58 |
| 10 | Janesville | Cumberland | 11.00 | 5.07 | +0.20 | +0.28 | -0.51 | +0.87 |
| 11 | St. Peter | Fayette | 15.00 | 2.68 | -0.52 | +0.08 | +0.26 | +0.46 |
| 12 | SWS #2 | St. Clair | 80.00 | 16.25 | -4.73 | -2.55 | -2.42 | N/A |
| 13 | Boyleston | Wayne | 23.00 | 2.49 | +0.75 | +1.32 | +0.84 | +0.80 |
| 14 | Sparta | Randolph | 27.00 | 5.60 | -1.42 | +0.04 | -0.13 | -0.04 |
| 15 | SE College | Saline | 10.19 | 4.53 | -0.55 | -0.81 | -0.06 | +0.33 |
| 16 | Dixon Springs | Pope | 8.63 | 4.40 | -1.04 | -2.00 | -0.68 | -0.83 |
| 17 | Bondville | Champaign | 21.00 | 4.13 | -0.63 | -0.84 | -2.32 | +0.17 |
| | | | | Averages | -2.49 | -2.12 | -0.42 | -1.00 |

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

## Addendum

**Imperial Valley Precipitation.** May 2006 precipitation amounts (Figure 5a) were below average. Gage totals were greatest in the western and central portion of the network, and precipitation was lightest in the northern region of the network. Individual gage amounts ranged from 3.16 inches at site #13 to 0.86 inches at site #2. The 30-year, 1971–2000, average precipitation amounts for May at Havana and Mason City are 4.43 and 4.20 inches, respectively. The May 2006 network average of 2.22 inches was about 49 percent of the 13-year (1993–2005) May network average of 4.50 inches.

**Cook County Precipitation.** May 2006 precipitation amounts (Figure 5b) were moderate. Precipitation was heaviest in the southeastern portion of the network and lightest in the west-central portion. Values ranged from 4.36 inches at site #22 (Harvey) to 1.87 inches at site #8 (Westchester). The May 2006 network average of 2.97 inches was about 73 percent of the 16-year (1990–2005) May network average of 4.06 inches.

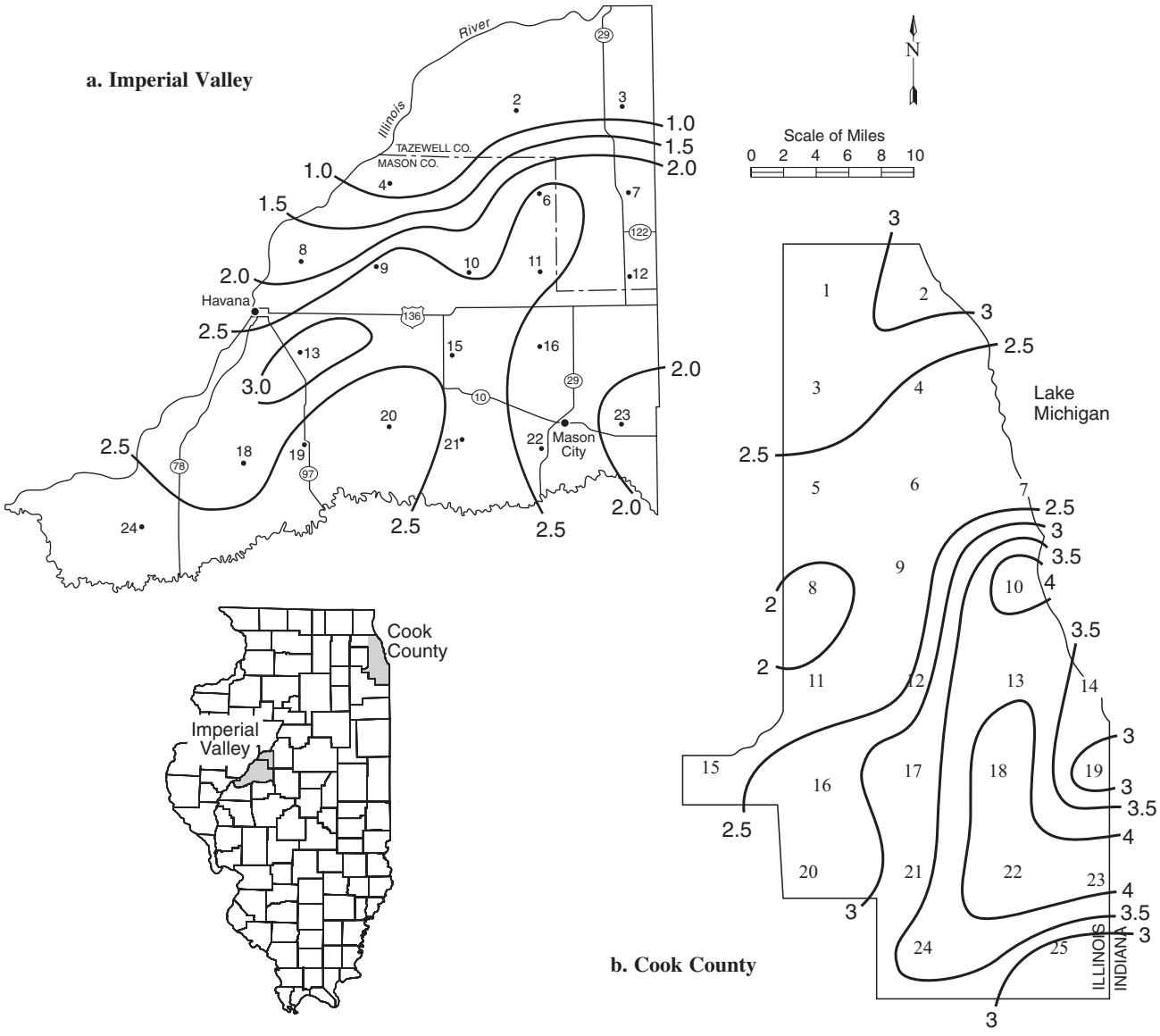


**Figure 5. Long-term raingage network precipitation totals (inches) for May2006**

*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/