INTRODUCTION

Storm Types

The type of rainstorm that most frequently produces flash floods in Illinois and the United States is very localized and produces a large amount of rainfall. According to Changnon and Vogel (1981), these storms usually last from 3 to 12 hours, significantly affect fewer than 400 square miles, and have 1- to 4-hour rainfall totals in excess of 3 inches. Changnon and Vogel's study indicates that approximately 40 of these storms will occur in an average year in Illinois, or about one for every 1,500 square miles of territory. These storms cause serious local flooding problems for farmers (crop damage) and urban areas, and interfere with small-reservoir operations.

Individually, the most damaging flood-producing storm experienced in Illinois is a larger version of the storm described above and occurs on the average of about once in two years within the state (Huff, 1986). These "blockbuster" storms generally last from 12 to 24 hours, produce extremely heavy rainfall over a 2,000- to 5,000-square-mile area, and typically create 10- to 12-inch amounts of rain at the storm center. Rainfall amounts in excess of the 100-year recurrence-interval value of point rainfall commonly encompass areas of several hundred square miles about the storm's center.

A substantial portion of the maximum point rainfalls recorded in the 83-year sample used in the present study occurred in storms of this type. Although they are rather rare occurrences, they may occur in clusters. For example, two of the three storms that occurred in 1957 took place within two weeks of each other. On the other hand, there have been times when no blockbuster storm was observed for several consecutive years.

Other flood-producing storms, affecting relatively large areas ranging from the size of a county to 20,000 or more square miles, result from a series of moderately intense showers and thunderstorms that occur intermittently for periods of 1 to 10 days. Many of these individual storms would produce little or no damage by themselves, but collectively they can cause urban drainage systems to overflow and creeks and rivers to swell beyond capacity. This can result in both localized and widespread flooding.

The frequency distributions of heavy rainfall resulting from the storm systems described above are of importance to engineers and others involved in designing and operating structures that can be affected by these events. Consequently, this Illinois study has concentrated on determining rainfall frequency relations over a wide range of storm periods or partial storm periods (5 minutes to 10 days) and recurrence intervals (2 months to 100 years). This large-scale study was considered necessary to meet the widespread needs for rainfall frequency information, both at present and in the foreseeable future.

Rationale for the Study

The present study has used a much larger and longer sample of Illinois precipitation data than was available for previous studies such as the United States studies by Yamell (1935), Hershfield (196 1), and Miller, Frederick, and Tracey (1973), and the previous Illinois study by Huff and Neil1 (1959). The present study used data for an 83-year period (1901-1983) collected at 61 Illinois precipitation-reporting stations, in addition to data from nearby stations in the surrounding states. Such a relatively large sample has permitted us to provide greater spatial detail than was possible in previous studies. Furthermore, the 83-year sample should provide more accurate estimates of the various frequency distributions, particularly for relatively long recurrence intervals of 25 years or more.

Some specific needs led to the undertaking of this study. First, Illinois frequency relations had not been updated since 1959-1961 (Huff and Neill, 1959; Hershfield, 1961). Second, further stimulation for the study resulted from recent findings (Huff and Changnon, 1987) that an apparent climatic trend operated on the frequency distributions of heavy rainstorms in Illinois from 1901-1980. Third, increased flooding in northern Illinois since the late 1970s (Changnon, 1983) has generated concern about the accuracy of existing design rainfall values. Fourth, for some hydrologic applications, a need exists for seasonal frequency relations that were not previously available but that are an integral part of the present study.

A fifth need is for definition of the natural variability in rainfall frequency relations between locations in small areas of approximately homogeneous rainfall climate. A method for quantitatively assessing this dispersion was developed as part of this study. A method for evaluating the probability of "outlier" values that tend to distort the true frequency relations has also been developed as part of the present study.

Analytical Methodology

The three paragraphs that follow the conversion table (see below) were abstracted largely from Huff and Neil1 (1959). The statements are as valid today as they were 30 years ago when the Water Survey undertook its initial study of the frequency distribution of heavy storm rainfall in Illinois. That is, a combination of statistical techniques, guided by available meteorological and climatological knowledge of atmospheric processes, provides the best approach to this area of study.

All the results in this report are expressed in the English system of units. It is anticipated that hydrologists and others who use the information will continue to use the English system in the foreseeable future. The following conversion table can be used in converting English units to metric units.

Conversion Table

Multiply	*By*	*To obtain*
Inch (in.)	***25.40***	Millimeter (mm)
Mile (mi)	1.609	Kilometer (km)
Square mile (mi^2)	2.59	Square kilometer (km^2)

If the physical laws governing the inception and distribution of precipitation were completely understood, it would be unnecessary to resort to many of the statistical approaches now used by meteorologists and hydrologists to estimate the future distribution of storm rainfall. However, even the basic physical processes involved in the production of precipitation in the atmosphere have not been adequately defined or evaluated at present, although considerable research is being directed toward defining and evaluating them. Consequently, a researcher investigating precipitation frequency relations is forced to depend primarily on application of statistical methodology to samples of observational data that are hoped to be representative of the population distribution.

The production and distribution of precipitation are obviously dependent upon complex reactions in nature. Therefore we could find no firm basis for selecting in advance any one of the several commonly used statistical distributions (e.g., log-normal, Gumbel) as best for the analysis of Illinois frequency data. It did not seem logical to pass judgment when so little is known about the basic laws and processes **governing** rainfall distribution. Rather, it appeared that the selection of a statistical technique should be determined on the basis of the goodness-of-fit of raw data to each of several statistical distributions that appeared to be promising yardsticks for estimating future events. Consequently, we followed this approach throughout the investigation to establish annual and seasonal frequency relations.

Complete objectivity in establishing frequency relations was not possible because tests of several statistical methods showed that none was distinctly superior in fitting the data samples. Thus, in the final analysis, statistical distributions selected for computing annual and seasonal relations were based to some extent upon other available meteorological and climatological information. The results represent frequency estimates based upon analysis and evaluation of all information available during the investigation.

Organization of the Report

Readers interested in the methods, analysis, and results of the study of potential climatic trends or fluctuations in the distributions of heavy rainstorms in Illinois should see Sections 1 and 2 of this report.

Those interested in how the frequency distributions of heavy rainfall events were derived and what the findings were should refer to Section 3, which provides information on the data used, the various analytical techniques and methods employed, and area1 mean frequency distributions for regions of similar precipitation climate. Section 3 also presents selected isohyetal maps that portray the statewide patterns of rainfall frequency for the recurrence intervals and rain durations most commonly used by hydrologists.

Section 4 provides information on urban effects on the frequency distributions of heavy rainstorms, with particular emphasis on the Chicago region. Section 5 describes the analytical methods used and the results obtained from an investigation of the natural variability about average frequency relations in ten sections of approximately homogeneous rainstorm climate. It also describes a study of the outlier values that are nonrepresentative of the normal frequency relations for a point or area and that tend to distort the true relationship.

For those interested in seasonal frequency distributions of heavy rain events, Section 6 provides such relations in Illinois for the four seasons and discusses the causes of substantial regional differences in the distributions. Section 7 discusses spatial and temporal characteristics of heavy storms not analyzed in the present study, which have been derived from other Illinois studies and which are important

to users of heavy rainstorm climatology in the design and operation of water control structures.

A summary and conclusions pertaining to various phases of the present study are included in Section 8. Point rainfall frequency relations for 61 locations in the state are shown in Appendices A through E.

Acknowledgments

This report was prepared under the direction of Richard G. Semonin, Chief of the Illinois State Water Survey, and with the general guidance of Peter J. Lamb, Head of the Survey's Climate and Meteorology Section. The research was partially supported by the Illinois Department of Transportation, Division of Water Resources.

The authors are indebted to Michelle Pumphry for developing much of the software used in the research, manipulating the massive data sets, and assisting in the data analyses. Phyllis Stone provided major input to the data analyses and various other tasks associated with the project. John Brother, Linda Riggin, and Lynn Weiss prepared the illustrations, and Gail Taylor edited the report.

John Vogel directed the initial research for this project. Robert Dalton of the Department of Transportation monitored the research and provided helpful suggestions. Stanley A. Changnon, Jr., principal scientist and former Survey Chief, made numerous helpful suggestions during the conduct of the research. Both he and Peter Lamb reviewed this report and provided useful comments and suggestions that improved it.

1. TEMPORAL CHANGES IN HEAVY RAINFALL FREQUENCIES IN ILLINOIS

A major use of historical precipitation data has been to develop rainfall frequency relations for partial and total storm periods of various durations ranging from a few minutes to as much as 10 days. These relations are used primarily in designing water-related structures such as urban storm sewer systems, but they also have applications in other fields in which assessment of heavy rain events is essential (e.g., agriculture, climate change, and weather modification).

Hydrometeorologists have fit various statistical distributions to historical precipitation data to derive various design values such as the 24-hour rainfall expected to occur on the average of once every 5, 10, or 100 years. Derivations of such values have traditionally been based on the assumption that the historical sampling period has year-to-year variations, but that it is essentially stationary, without major temporal fluctuations or long-term trends during the typical design period of 50 to 100 years for most water-related structures (Yevjevich, 1977). Hydrometeorologists who have developed these frequency values usually have employed all available historical data, and their results reflect the length of period sampled.

Most users desiring rainfall frequency values rely on U.S. Weather Bureau Technical Paper 40 (Hershfield, 1961), which provides average relations throughout the United States. In a few cases, more detailed data and different analytical approaches have been applied to obtain more comprehensive spatial distribution patterns on a regional or state basis, such as those derived for Illinois (Huff and Neill, 1959). Few updates of previously determined frequency relations have been performed in the last 35 years, and, in general, the earlier studies, which are in widespread use today, remain the primary sources of frequency values.

In an earlier preliminary study by Huff and Changnon (1987), 1901-1980 data for 22 Illinois precipitation-reporting stations were used to investigate the possibility of a climatic trend in the distribution of heavy rainstorms in Illinois. Huff and Changnon compared the frequency distributions of l-day and 2-day rainfall amounts, for recurrence intervals of 2 years to 25 years, for two 40-year periods, 1901-1940 and 1941-1980. They found substantial rainfall increases during the second 40-year period (1941-1980) for each recurrence interval tested in the northern part of the state, smaller increases in the west and central portions, and a slight decrease in the extreme southern and southeastern parts. Another study of Illinois climatic fluctuations by Changnon (1984a) revealed sizable shifts in precipitation and other weather conditions, including thunderstorms.

This line of inquiry was pursued further in our development of Illinois frequency relations from 1901-

1983 data, based on 61 precipitation-reporting stations having complete or nearly complete records for the entire sampling period. Another purpose of this additional study of the two 40-year periods was to ascertain the stability of the isohyetal patterns of heavy rainfall distribution in the present century.

Approach to the Problem

The 61-station sample was used to investigate the properties of the frequency distributions of maximum 24-hour and 48-hour rainfalls derived for the two 40-year periods (1901-1940 and 1941-1980) used in the earlier preliminary study. Analytical techniques developed in previous Illinois research on heavy rainstorms (Huff and Neill, 1959) were applied in the present study because they are still considered appropriate for solving the various problems involved in determining useful and reliable estimates of rainfall frequency distributions.

Frequency distributions were derived from the partial-duration series of rain events for each of the 61 stations. Frequency values were obtained from "best-fit" curves derived for each station. Although none of the several statistical distributions tested in this study and in the earlier Huff-Neil1 study provided an acceptable fit of the data at all stations, a log-log fitting provided the best fit in a majority of the cases. This method provided an excellent tit in more than 90% of the cases in the range of recurrence intervals from 2 to 25 years. A flattening of the log-log curve was typical for recurrence intervals of 50 to 100 years. A steepening of the curve was typical for recurrence intervals of less than 1 year.

Daily rainfall amounts at the 61 reporting stations were converted to maximum 24-hour and maximum 48-hour rainfall through use of transformation factors. The transformation factor for daily rainfall (1.13) was derived by Hershfield (1961), and the 2-day factor (1.02) was developed by Huff and Neil1 (1959) from Illinois recording raingage data .

Findings Relevant to Climatic Fluctuations and Related Trends

In general, the results of the expanded study support the earlier findings of Huff and Changnon (1987). This is illustrated in figure 1, which shows the distributions of the ratios of the 1941-1980 rainfall amounts to the 1901-1940 amounts for 24-hour maximum rainfall associated with an average recurrence interval of 2 years. Essentially, figure 1 indicates an increase in the intensity of P-year events in the northeastern (except for the extreme northeast), northwestern, western, and central parts of the state, and a very slight decrease in intensity over the southern, southeastern, and, to some extent, the eastern region of the state (in the Urbana-Charleston region). Within the state, 62% of the precipitation stations had ratios exceeding 1.00, and 36% had ratios exceeding 1.10.

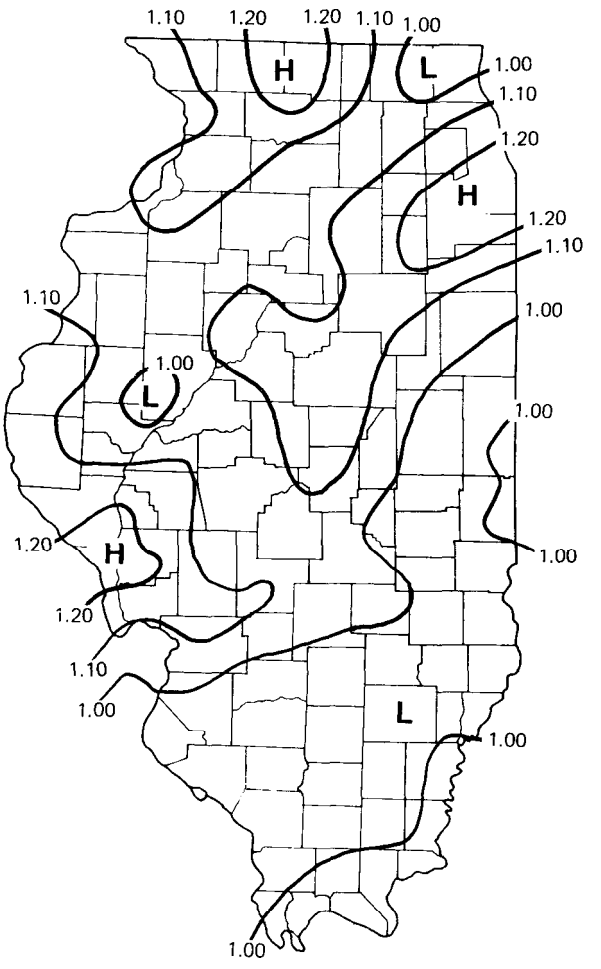


Figure 1. Ratios of 1941-1980 to 1901-1940 P-year, 24-hour rainfall amounts

The pattern in figure 1 was maintained for 24-hour maximum rainfall associated with 5-year, 10-year, and 25-year recurrence intervals. That is, highs and lows in the ratio patterns were found in approximately the same locations as for the 2-year patterns.

Figure 2 shows the distributions of ratios for 48-hour maximum rainfall associated with a recurrence interval of 2 years. The spatial pattern is very similar to the 24-hour pattern in figure 1, with highs and lows occurring in essentially the same regions of the

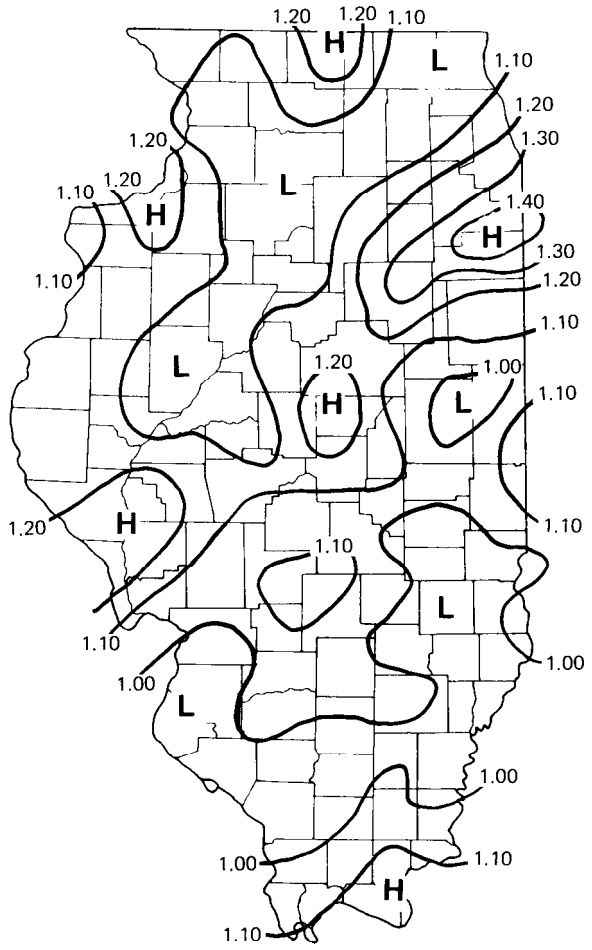


Figure 2. Ratios of 1941-1980 to 1901-1940 P-year, 48-hour rainfall amounts

state. The high in the Chicago-Kankakee-Pontiac area of northeastern Illinois is a little more pronounced for the 48-hour rainfall distributions. A weaker high in extreme southern Illinois is also more pronounced on the 48-hour map. Overall, the average ratios for the state were 1.06 for the 24-hour storm period and 1.09 for the 48-hour period. In the case of the 48-hour rainfall, approximately 68% of the precipitation stations had ratios exceeding 1.00, and 40% had ratios exceeding 1.10.

The spatial patterns exhibited in figures 1 and 2 are typical of those found for other recurrence intervals for both 24-hour and 48-hour storm rainfall. These patterns are in general agreement with and support the results of other Illinois studies of precipitation and floods in recent years. In a study of 1901-1980 data, Changnon (1985) found a gradual change to a wetter regime in Illinois during that 80-year period, and this was most pronounced in the last part (19651980) of his study period. In another study (Changnon, 1983), an increase in Illinois floods was detected in recent years, with the most pronounced change occurring in northeastern Illinois. Figure 1 shows increases of 20% or more in the 2-year, 24-hour rainfall amounts in the Chicago-Joliet region during the 1941-1980 period. This increase becomes even greater with 48-hour rainfall amounts, reaching values of 20 to 40% in the Chicago-Joliet-Kankakee region (figure 2).

Table 1 lists the average ratios of 1941-1980 to 1901-1940 24-hour rainfall amounts in each of the nine climatic sections of Illinois used by the National Weather Service (figure 3). In the northwestern and northeastern sections, in which the positive ratios are most pronounced, the ratios tend to become larger with increasing recurrence intervals. An upward trend in ratios is also indicated in the southeastern section, in which the ratio varies from 0.95 at the 2-year recurrence interval to 1.04 at the 25-year frequency. These upward trends suggest that the climatic trend or fluctuation in storm rainfall intensity has been most pronounced among the more severe of the heavy storms experienced during the two 40-year periods. However, because this effect was not indicated in the other six climatic sections, it may be possible that the northwestern, northeastern, and southeastern behavior represents a sampling vagary. The frequency values at the longer recurrence intervals are more subject to sampling error. For example, there are 20 independent 2-year events in each 40-year sample; this decreases to four in the case of lo-year events, and to two for 20-year occurrences.

Table 2 is similar to table 1 and shows average ratios of 1941-1980 to 1901-1940 48-hour rainfall amounts. Increasing ratios with increasing recurrence intervals are indicated in the northwestern, northeastern, and east southeastern sections. Slight downward trends (decreases) with increasing recurrence intervals are indicated in most other sections. In general, the 48-hour trends agree well with the 24-hour trends.

A study of thunderstorm incidences over the 1901-1980 period revealed that stations in northern Illinois experienced increases of 10 to 20% during the latter 40 years of the period. In the south, however, minor decreases (5 to 10%) were experienced in the 1941-1980 period (Changnon, 1984a). These findings support those obtained in the heavy rainstorm analyses discussed in the preceding paragraphs.

Typical differences in the frequency distributions of 24-hour maximum rainfall between the two 40-year periods are illustrated for selected precipitation

Table 1. Ratios of 1941-1980 to 1901-1940 24-Hour Maximum Rainfall Amounts for Selected Recurrence Intervals in NWS Climatic Sections of Illinois

Recurrence interval (yrs)	*Average* ratio *for* given recurrence interval								
	NW	NE	W	c	*E*	*w s w*	*ESE*	SW	*SE*
2	1.12	1.12	1.07	1.08	1.04	1.09	0.98	0.96	0.95
5	1.13	1.16	1.07	1.09	1.06	1.11	0.96	0.97	0.95
10	1.14	1.16	1.07	1.06	1.03	1.14	0.98	0.99	1.00
25	1.17	1.20	1.01	1.02	1.04	1.11	1.05	0.99	1.04
Mean	1.14	1.16	1.06	1.06	1.04	1.11	0.99	0.98	0.98

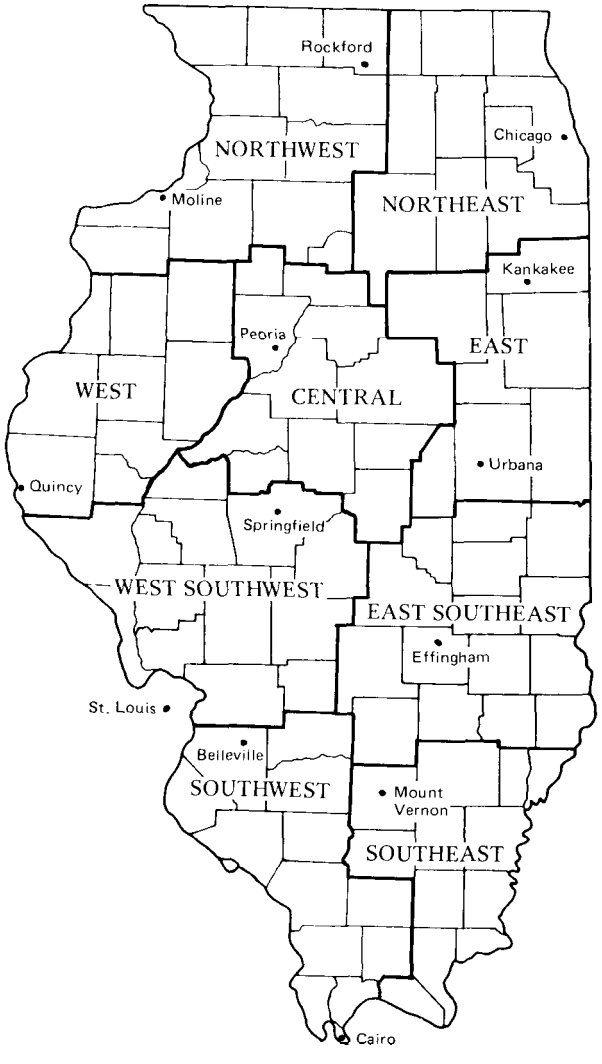


Figure 3. Illinois climatic sections adopted by the National Weather Service

stations **in figure 4.** The Rockford differences are relatively large and show the tendency among some stations for the 1941-1980 and 1901-1940 ratios to increase with increasing recurrence intervals. However, the Quincy curves do not indicate an increasing ratio with increasing recurrence interval, and the Peoria curves indicate a decreasing ratio with increasing recurrence interval.

Belleville is typical of the southern part of the state, where the 1901-1940 curves showed slightly heavier rainfall at the given recurrence intervals than indicated by the 1941-1980 curves. Thus, the differences between frequency distributions derived from the two 40-year sampling periods varied substantially within the state, as was discussed previously in conjunction with figures 1 and 2 and tables 1 and 2.

Tables 3 and 4 further illustrate the effect of climatic variations between the two 40-year periods and, consequently, their importance to hydrologists and others using frequency distributions derived from historical data. To develop table 3, 24-hour maximum rainfall was determined for 2-, 5-, and lo-year recurrence intervals from the 1941-1980 curves for the six selected stations illustrated in figure 4. For each recurrence-interval value, the corresponding recurrence interval for that rainfall was determined from the 1901-1940 curves. For example, at Rockford the 2-year rainfall value from the 1941-1980 curve corresponded to the 5-year value from the 1901-1940 curve. The 1941-1980 values for 5-year and lo-year recurrences at Rockford corresponded to 15-year and 35-year recurrence intervals, respectively, on the 1901-1940 curves. Smaller, but still relatively large, differences are indicated for Kankakee, Quincy, Peoria, and

Table 2. Ratios of 1941-1980 to 1901-1940 Maximum Rainfall Amounts for Selected Recurrence Intervals in NWS Climatic Sections of Illinois

Recurrence interval (yrs)	*Average ratio for given recurrence interval*								
	NW	*NE*	*W*	*C*	*E*	*WSW*	*ESE*	*SW*	*SE*
2	1.09	1.17	1.13	1.13	1.17	1.11	0.99	0.98	1.02
5	1.13	1.19	1.11	1.13	1.19	1.12	0.99	0.95	1.00
10	1.13	1.20	1.08	1.13	1.18	1.11	1.00	0.94	0.99
25	1.17	1.20	1.03	1.09	1.15	1.07	1.01	0.94	0.94
Mean	1.13	1.19	1.09	1.12	1.17	1.10	1.00	0.95	0.99

The relationships presented in table 3 are shown for 48-hour storm periods in table 4. The results are very similar to those for the 24-hour storm periods. Thus, at Rockford, the 2-year recurrence-interval value based on 1941-1980 data is equivalent to the 6-year recurrence interval based on 1901-1940 data. Likewise, the 5-year recurrence obtained from 1941-1980 data is equivalent to the 15-year value obtained from the 1901-1940 sample, and the lo-year recurrence from 1941-1980 data is equal to the 31-year value based on 1901-1940 data.

The results of these analyses indicate that hydrologic designs based on the 1901-1940 data for a given recurrence interval would have substantially underestimated the rainfall intensity for that recurrence interval during the 1941-1980 period over much of the state. For example, at Rockford (figure the 5-year expectancy for maximum 24-hour rainfall is 3.27 inches on the basis of 1901-1940 data. The 1941-1980 curve indicates that the average 5-year value is 4.05 inches. At Peoria, the 5-year recurrences are 3.55 and 4.05 inches, respectively, for the 1901-1940 and 1941-1980 data. At Quincy, the 5-year values are 3.73 and 4.45 inches, respectively.

In summary, this phase of the 40-year comparisons indicates a substantial change in the intensity of heavy rainstorms in the latter 40-year period. For a given recurrence interval, the 24-hour rainfall intensity was greater, on the average, over the northern and central portions of the state during 1941-1980, but was slightly less in the southern portions of Illinois.

These findings show that an adjustment should be made to incorporate this change into the derivation of heavy rainfall frequency relations from the 61-station, 83-year record for 1901-1983.

Temporal Stability of Isohyetal Patterns

An examination of isohyetal patterns for selected recurrence intervals shows that most major features were similar in the two 40-year periods (1901-1940 and 1941-1980). This is illustrated in figure 5, which displays the isohyetal patterns of 24-hour rainfall with a recurrence interval of 2 years. Both maps show 1) distinct highs in the extreme western and southern portions of the state, and 2) a low extending northeast to southwest along or in the vicinity of the Illinois River basin and northeastward into extreme northeastern Illinois. The major difference between the two maps is the presence of a 1941-1980 high extending southwestward from its most pronounced stage in the Chicago-Joliet-Kankakee area of northeastern Illinois to the vicinity of Decatur in the central part of the state and Belleville in southwestern Illinois. This high is apparent only in the Belleville area on the 1901-1940 map.

Figure 6 shows the isohyetal patterns for the two 40-year periods for rainfall with a recurrence interval of 5 years. These isohyetal patterns also show distinct highs over extreme southern and western Illinois and a low extending from the extreme northeastern part of the state southwestward along or in the vicinity of the Illinois River valley, in agreement with the 24-hour patterns shown in figure 5.

The 1941-1980 pattern, similar to that in figure 5, shows a high extending southwestward from the Kankakee area to southwestern Illinois. The 1941-1980 high in northeastern Illinois is centered near a region that has experienced increased flooding in recent years according to Changnon (1983). The isohyetal patterns in figures 5 and 6 are typical

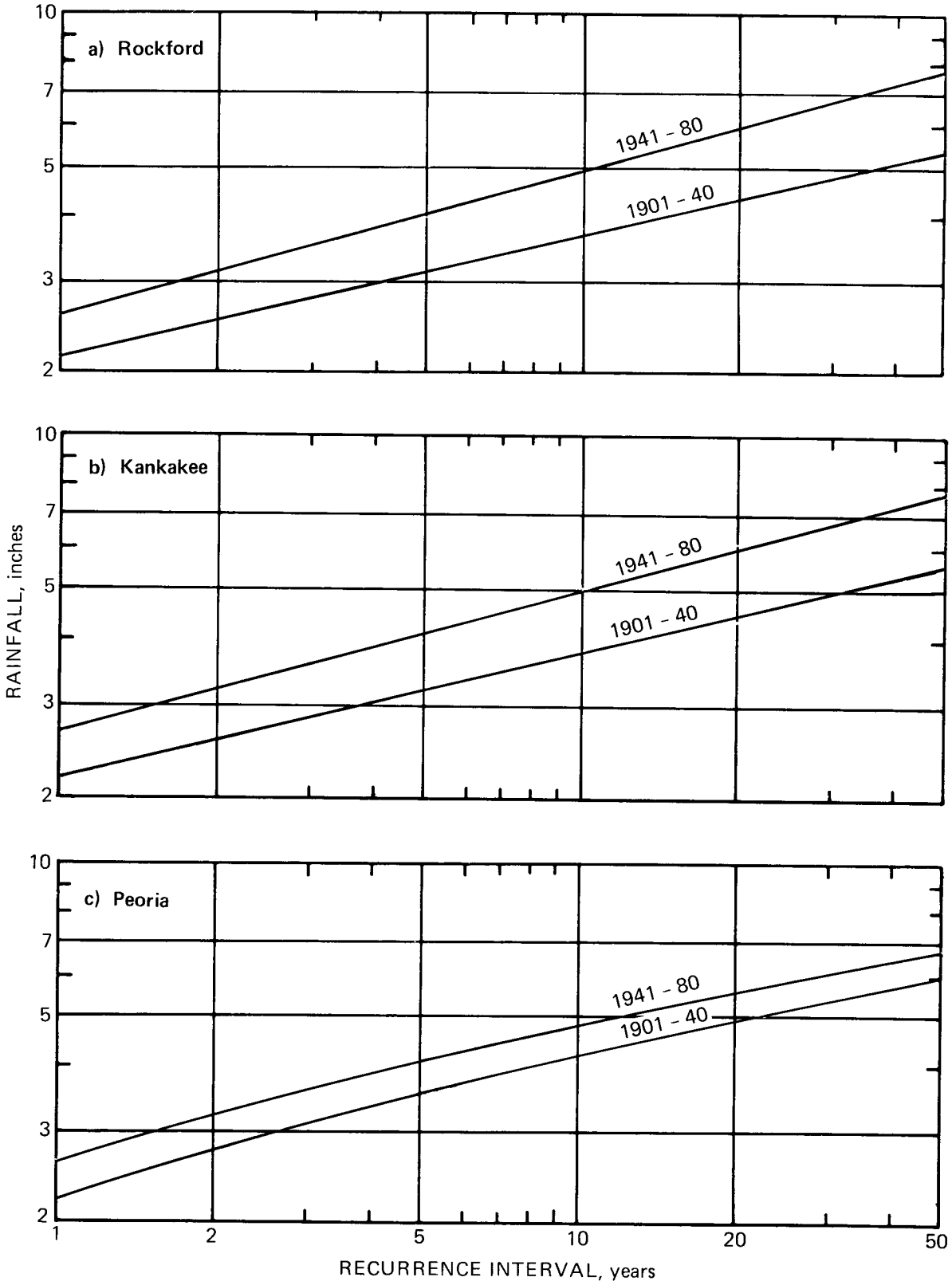


Figure 4. Frequency distributions of maximum 24-hour rainfall at selected stations in 1901-1940 and 1941-1980

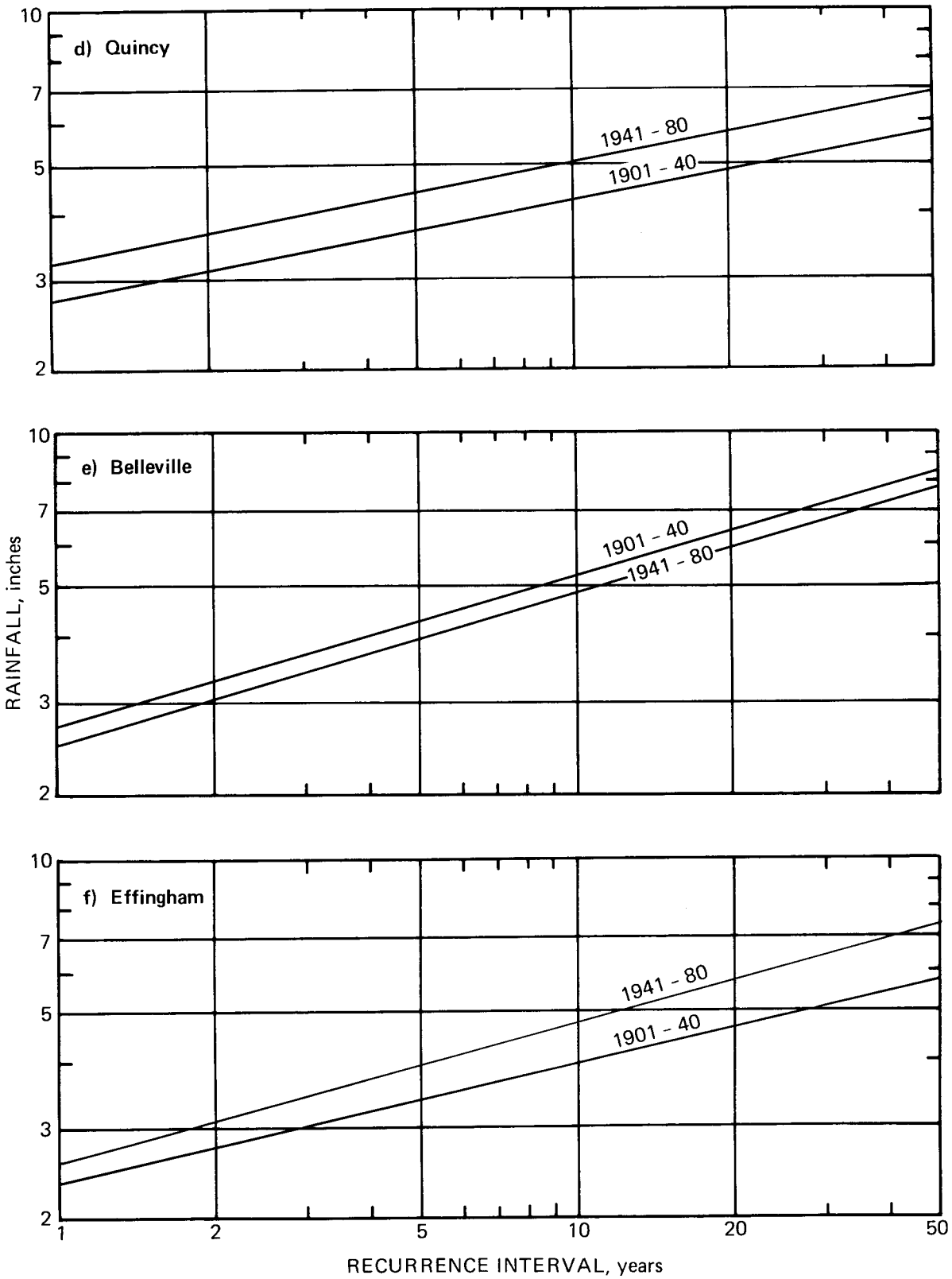


Figure 4. Concluded

Table 3. Variations in Recurrence Intervals for 24-Hour Maximum Rainfall from Frequency Curves Based on 1901-1940 and on 1941-1980 Data

Recurrence interval from 1941-1980 curves	*Equivalent recurrence interval from 1901-1940 curves for selected locations*					
	Rockford	*Kankakee*	*Peoria*	*Quincy*	*Belleville*	*Effingham*
2	*5*	*5*	*3+*	*5*	*2-*	*3+*
5	*15*	*16*	*9*	*13*	*4*	10
10	*35*	*35*	*17*	*27*	*8*	*21*

Table 4. Variations in Recurrence Intervals for 48-Hour Maximum Rainfall from Frequency Curves Based on 1901-1940 and on 1941-1980 Data

Recurrence interval from 1941-1980 curves	*Equivalent recurrence interval from 1901-1940 curves for selected locations*					
	Rockford	*Kankakee*	*Peoria*	*Quincy*	*Belleville*	*Effingham*
2	*6*	*5*	*3*	*8*	*2-*	*3+*
5	*15*	*18*	10	*17*	*4*	11
10	*31*	*49*	*22*	*32*	*8*	*25*

of those found for other recurrence intervals for 24-hour and 48-hour maximum rainfall.

The pronounced high in extreme southern Illinois is to be expected in view of its climatic and topographic properties. This region normally experiences the longest period of convective rainfall within the state, extending from early spring to late fall; even in winter, convective storms are not unusual. The region also has a relatively high frequency of thunderstorms (Changnon, 1957). Convective precipitation, dominated by thunderstorms, is most commonly associated with heavy rain events in Illinois. Furthermore, the Shawnee Hills, located in this region, have been found to intensify the natural rainfall (Huff, Changnon, and Jones, 1975).

The high in western Illinois is to be expected because this area also lies in a region of relatively high thunderstorm frequency (Changnon, 1957). Furthermore, the Ozark Mountains in Missouri southwest of this area are a source of storm development and intensification, and these hills are frequently crossed by storm systems moving into western and southwestern Illinois. For events of very short duration, primarily of three hours or less, Water Survey studies have shown an increase in the frequency and intensity of heavy rainfall amounts extending northeast, east, and southeast of St. Louis. This phenomenon is related to urban effects on the precipitation processes (Changnon et al., 1977).

The 1941-1980 high extending southwestward from the Chicago-Joliet-Kankakee area is closely aligned with a region of relatively frequent cold-front passages in summer, and these storm events frequently spawn heavy rainfalls (Chiang, 1961). The low in extreme northeastern Illinois (figures 5 and 6) may be associated with Lake Michigan's dampening effects on warm-season precipitation. The low in the vicinity of the Illinois River valley, which is quite pronounced in both 40-year periods, is likely associated with topographic factors and with the valley's normally downwind location with respect to the climatically and topographically favored regions of development and intensification of heavy rain events in western and southwestern Illinois.

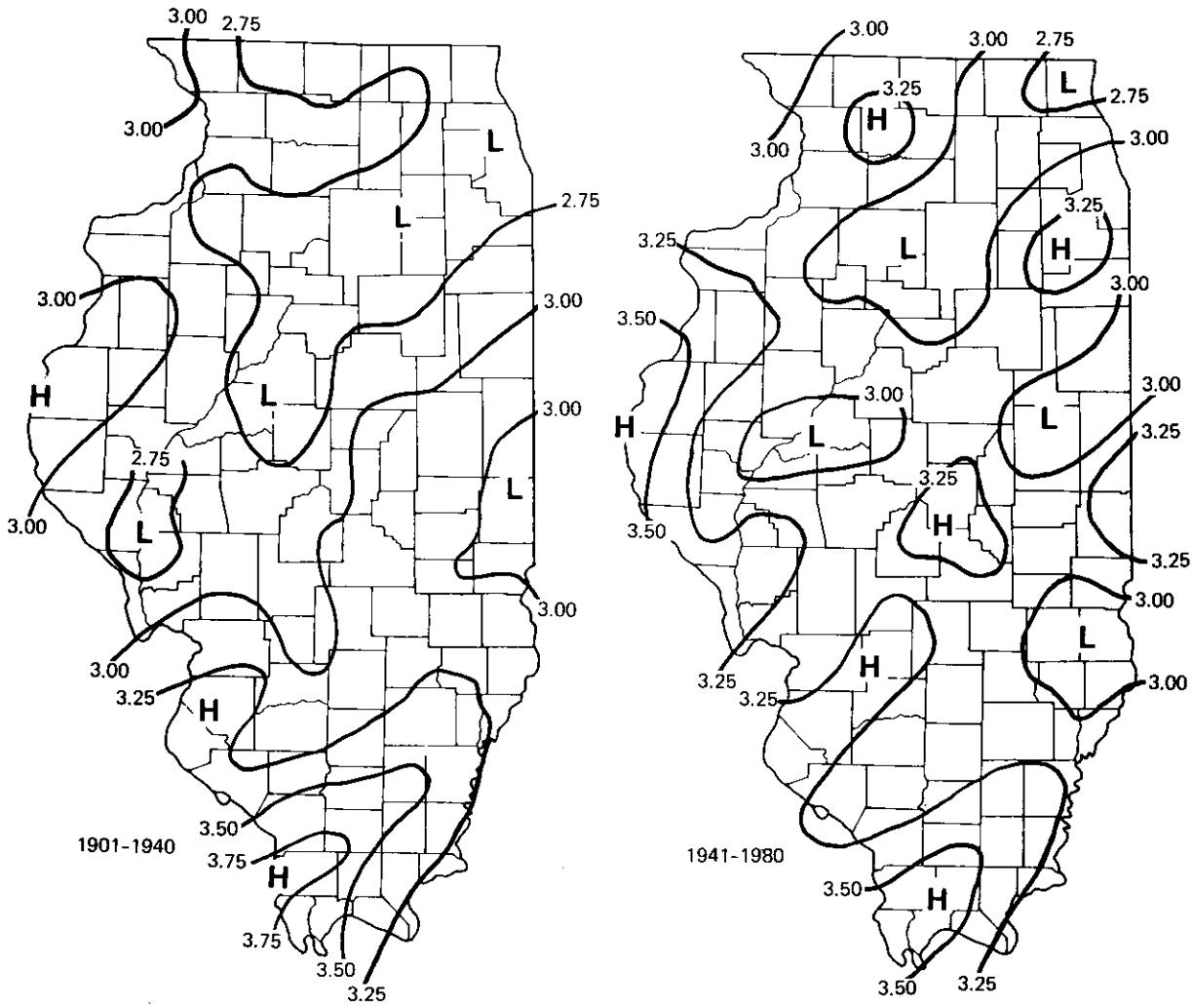


Figure 5. Isohyetal patterns of 2-year, 24-hour rainfall (inches) based on 1901-1940 and 1941-1980 data

The results of the foregoing analyses indicate that during the 1901-1980 period the spatial (isohyetal) patterns of heavy rain events remained stable with respect to the locations of highs and lows in the statewide distribution. However, the intensity of heavy rainfall events has increased over much of the state during recent years, as indicated by this study and those of Changnon (1983, 1985). As a result of overall findings from the 40-year comparisons, it was decided that the 83-year sample (1901-1983) should be used as a basis for updating the frequency distributions of heavy rain events in Illinois. However, Lamb and Changnon (1981) and others have shown that the most recent precipitation events are the best for judging the nature of events in the near future. Therefore, it was also decided to include an adjustment to the frequency distributions derived from the 1901-1983 data, based on findings from the 40-year comparison study. This adjustment is discussed further in Section 3, which is devoted to the development of frequency distributions from the 1901-1983 data.

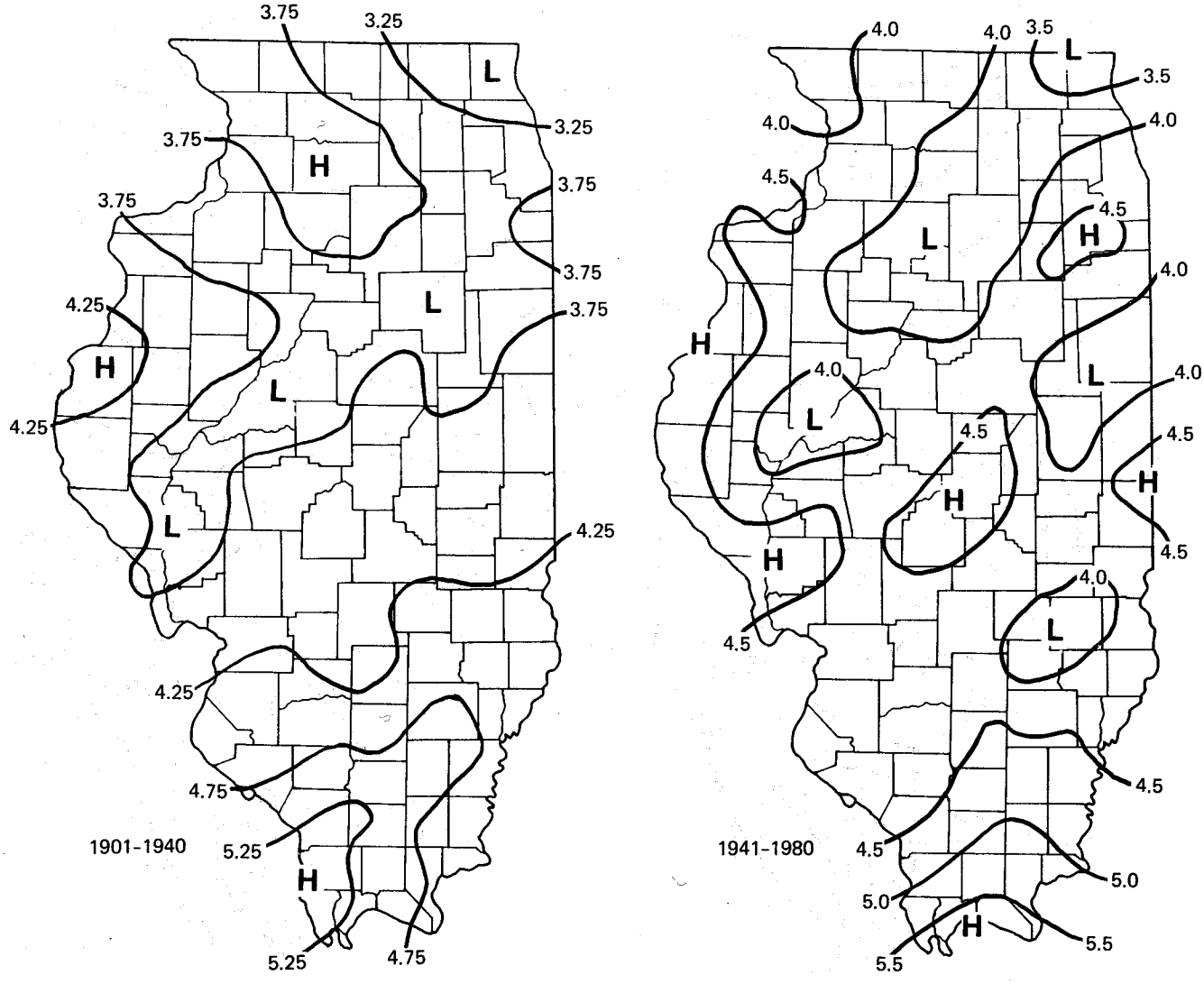


Figure 6. Isohyetal patterns of 5-year, 48-hour rainfall (inches) based on 1901-1940 and 1941-1980 data

2. COMPARISON OF INDEPENDENT 10- AND 20-YEAR PERIODS

In the previous section, results of a study of two 40-year periods (1901-1940 and 1941-1980) were presented. The results indicated that the frequency/intensity regime of heavy storms was considerably different in the two periods. For given recurrence intervals (2 years, 5 years, etc.) and rainfall durations (1 hour, 12 hours, 24 hours, etc.), the 1941-1980 data indicated heavier rainfall amounts. Thus the data indicated a climatic change or trend in the frequency distributions of heavy rainstorms. In this section, the existence of a climatic trend is explored further through comparison of data for four 20-year and eight 10-year independent periods in the 80-year sampling period at the 61 Illinois precipitation-reporting stations.

Trend Analyses of 20-Year Periods

Computations were made of the 80-year trends (1901-1980) in 1-day to 10-day rainfall amounts, based on frequency distributions derived for each of

four independent 20-year periods (1901-1920, 1921-1940, 1941-1960, 1961-1980). For determination of the frequency distributions, the state was divided into ten sections having approximately equivalent precipitation climate with respect to the temporal and spatial distributions of heavy rainstorms (see figure 7). These sections vary somewhat from the nine National Weather Service climatic sections (figure 3), which were used in the 40-year comparisons described in Section 2 (see Section 3 for further details on the selection of the ten climatic sections).

Sectional frequency distributions were obtained by combining all station data for each of the ten climatic sections. These sectional values were then used in the climatic trend evaluation. Time trends were computed for recurrence intervals of 1, 2, 3, and 5 years in each section for 1-, 2-, 3-, 5-, and 10-day storm periods. Rainfall frequency values for recurrence intervals of 10 years or longer were not used because of the relatively short sampling periods (10 to 20 years) employed in the time-trend study.

The results are briefly summarized in table 5, with 1-day rainfall used as an example. Percentage changes for the 80-year period, obtained from linear trend curves, are shown for each climatic section and for selected recurrence intervals. The linear trend for each recurrence interval was obtained by fitting a curve to the values obtained from the frequency distributions determined for each of the four 20-year periods.

In general, table 5 shows an upward trend in the intensity of rainfall from 1901 to 1980 for the given recurrence intervals in the northwestern, northeastern, western, central, eastern, and west southwestern sections (all but the four southernmost Illinois sections). The trend toward heavier rainfall with increasing time was greatest in the northeastern section and relatively small in the western section. The upward trend in heavy rainfall intensities encompasses most of the northern and central parts of the state. For southern Illinois, table 5 indicates a decreasing trend in the intensity of heavy storm events (east southeastern, southwestern, southeastern, and southern sections).

The percentage increase or decrease in rainfall becomes larger with increasing recurrence interval in the northwestern, northeastern, west southwestern, southwestern, southeastern, and southern sections. For comparative purposes, climatic fluctuations have been defined as events persisting from approximately 10 to 100 years. Based on this definition, a climatic fluctuation has been present in these six sections, and this fluctuation has been more pronounced for the more severe rainstorms; that is, the percentage change has been greater with the more extreme events (storms with longer recurrence intervals).

However, this variation with length of recurrence interval is not indicated in the other four sections (west, central, east, and east southeast). These sections are primarily in the central part of the state, and they separate the areas in northern Illinois that have relatively large upward trends in rainfall intensity from the southern Illinois regions that have downward trends.

The time-trend analysis illustrated in table 5 supports the findings from the comparison of the early and late 40-year periods (Section 1). Both the 40-year and 20-year comparison studies indicate an upward trend in the intensity of rainfall for given

Table 5. Percentage Changes in 1-Day Rainfall from 1901 to 1980, Based on Trend Analysis Applied to Frequency Distributions from Four Independent 20-Year Samples

Recurrence interval (years)	*Percentage change for given section from 1901 to 1980*									
	NW	*NE*	*W*	*C*	*E*	*WSW*	*ESE*	*SW*	*SE*	*S*
1	+12	+16	+5	+8	+10	+11	-4	-4	+5	+3
2	+9	+19	+6	+9	+13	+13	-4	-12	-10	-1
3	+11	+22	+5	+10	+11	+15	-2	-17	-13	-1
5	+16	+29	-1	+9	+10	+15	+1	-22	-14	-3
Average	+12	+21	+4	+9	+11	+13	-2	-14	-8	-1

recurrence intervals during the 80-year sampling period in the northern and central portions of the state, and decreasing intensity in the southern part.

The variance explained by the 20-year trend curves was calculated to help evaluate the strength of the trends. The results are summarized in table 6. For each climatic section, the variance explained in the frequency distributions of 2-year and 5-year rainfall amounts for 1-day storm periods is shown in the left portion of the table. The median variance explained for 1-, 2-, 3-, 5-, and 10-day amounts is shown in the right portion.

In general, table 6 indicates a relatively strong trend (high variance) in both the 1-day rainfalls and the 1- to 10-day medians in the northwestern, northeastern, central, and eastern sections for the 2-year and 5-year recurrence-interval values. Weak trends (low variance) are indicated for one or both of the recurrence intervals for the other sections. The section medians indicate relatively strong trends, in general, for the 2-year values, but somewhat weaker trends for the 5-year recurrences, particularly for 1-day rainfalls.

The natural temporal variability is very large among severe weather events such as heavy rainstorms. Therefore a relatively large number of samples is needed to establish firm long-term averages, trends, and other statistical measures of the parameter distribution (heavy rainstorms in our case). A 20-year sample includes ten independent 2-year samples, but only four independent 5-year samples. Thus it is likely that the stronger 2-year trend in table 6 is related to more adequate sampling of the natural variability.

Table 7 illustrates how the 24-hour, 5-year rainfall amounts derived from the four 20-year sampling periods varied from those obtained from the 83-year sample (1901-1983) used as a basis for developing the Illinois frequency distributions. For each 20-year sample, the differences between the 83-year and 20-year values were calculated for each of the 61 Illinois stations. The differences were then expressed as the percentage of stations falling into selected difference categories.

Thus, table 7 shows that the differences in the 24-hour, 5-year rainfall amounts for 1901-1920 from the amounts for 1901-1983 equaled or exceeded +10% at 23% of the stations, and were +1 to +9% at 23% of the observation points. There was no difference between the two frequency curves at 8% of the stations. Differences were from -1 to -9% at 19% of the stations, and they were equal to or below -10% at 27% of the stations. Thus a total of 46% of the stations showed positive differences, and another 46% fell into the negative class.

The values in table 7 indicate an increasing percentage of positive deviations with increasing time and, conversely, a decreasing percentage of negative differences with increasing time. For example, the percentage of positive deviations increased from 46%

Table 6. Variance between 1-Day to 10-Day Rainfalls Explained by Sectional Time-Trend Curves Derived from Four Frequency Distributions Based on Consecutive 20-Year Samples

	Variance explained (r^2) for given recurrence interval (yrs)			
	1-day rainfall		*Median for 1- to 10-day rainfall*	
Section	*2 yrs*	*5 yrs*	*2 yrs*	*5 yrs*
NW	0.89	0.95	0.87	0.85
NE	0.80	0.84	0.95	0.84
W	0.39	0.27	0.39	0.90
C	0.99	0.91	0.91	0.81
E	0.91	0.61	0.92	0.80
WSW	0.50	0.14	0.67	0.02
ESE	0.74	0.17	0.47	0.17
SW	0.38	0.64	0.38	0.22
SE	0.92	0.46	0.74	0.46
S	0.98	0.16	0.34	0.37
Median	0.85	0.54	0.71	0.63

Table 7. Percentages of Precipitation-Reporting Stations Showing Specified Percentage Differences in 24-Hour, 5-Year Rainfall Amounts for the 20-Year Sampling Periods from Amounts for the 83-Year Period (1901-1983)

	Percentage of stations having specified percentage difference						
20-year period	*≥+10*	*+1 to +9*	*No diff.*	*-1 to -9*	*≤-10*	*≥+1*	*≤-1*
1901-1920	23	23	8	19	27	46	46
1921-1940	13	20	8	41	18	33	59
1941-1960	31	28	10	21	10	59	31
1961-1980	24	36	11	19	10	60	29

to 60% from the 1901-1920 curves to the 1961-1980 curves. Likewise, the negative deviations decreased from 46% to 29% from 1901-1920 to 1961-1980.

The lowest percentage (33%) of positive deviations was obtained from the 1921-1940 curves, which included data from the great drought of the 1930s. During this same sampling period, the percentage of stations with negative deviations from the 1901-1983 values reached a maximum of 59%.

In general, table 7 supports the results of the areal analyses of 20-year sampling periods discussed previously and of the 40-year comparisons presented in Section 1. That is, there has been a general trend toward an increase in the intensity of heavy rainfall events over a major portion of Illinois since the beginning of this century.

Trend Analyses of 10-Year Periods

The same analysis procedures used in the 20-year trend analysis were followed for the 10-year analyses. However, results indicated that the sampling periods were too short and the natural variability too large to provide reliable information concerning possible climatic trends in the frequency distributions of heavy rainfalls.

During an average year, for example, Illinois has a total of 112 days with measurable rainfall precipitation, or 1,120 samples in a 10-year period. However, in the frequency distribution of maximum storm rainfall for 24-hour periods, the 1-year and longer recurrence-interval values are largely defined by the ten largest events in a 10-year sampling period. This is less than 1% of the samples available for studying climatic changes or trends in daily rainfall. Thus, unless a trend is very pronounced, it will not be readily discernible in the standard type of heavy rainfall frequency analysis.

Table 8 shows the variance explained by the 10-year trend curves. It is similar to table 6, which shows the variance explained by the 20-year curves. The variance explained by the trend curves derived from the eight 10-year periods during 1901-1980 was relatively small for nearly all sections, and it was much smaller than that indicated by the 20-year trends.

Summary

The analyses of the 20-year sampling periods discussed in this section helped to verify results from the 40-year comparisons. However, because of sampling inadequacies, the 10-year samples were of little assistance in evaluating the presence of long-term climatic trends in the frequency distributions of heavy rainfall.

To repeat, the presence of a climatic fluctuation, exhibiting trends upward in the north and downward in the south, was most evident in the comparison of frequency distributions derived from the 40-year samples. These findings received considerable additional support from the 20-year trend analyses. The evidence was inconclusive in the 10-year samples because of the sampling problem. Because the 40-year comparisons are the most reliable source of information on climatic trends available, the results from that portion of our study have been used in applying a climatic trend adjustment to the Illinois frequency distributions derived from 1901-1983 data (see Section 3).

Table 8. Variance between 1-Day to 10-Day Rainfalls Explained by Sectional Time Trend Curves Derived from Eight Frequency Distributions Based on Consecutive 10-Year Samples

	Variance explained (r^2) for given recurrence interval (yrs)			
	1-day rainfall		*Median for 1- to 10-day rainfall*	
Section	*2 yrs*	*5 yrs*	*2 yrs*	*5 yrs*
NW	0.30	0.65	0.46	0.55
NE	0.41	0.31	0.43	0.47
W	0.05	0.15	0.04	0.08
C	0.47	0.50	0.45	0.47
E	0.20	0.40	0.24	0.33
WSW	0.10	0.42	0.03	0.10
ESE	0.01	0.20	0.04	0.11
SW	0.22	0.19	0.14	0.25
SE	0.29	0.54	0.29	0.17
S	0.01	0.04	0.01	0.02
Median	0.21	0.35	0.19	0.21

3. FREQUENCY DISTRIBUTIONS OF HEAVY RAINFALL EVENTS

Data Used

The data used in developing the frequency relations consisted of both daily and hourly precipitation records from Illinois and from nearby stations in surrounding states. The daily data, mostly from nonrecording raingages, spanned the 83-year period from 1901 through 1983. They included data from the 61 precipitation-reporting stations discussed previously (figure 7), whose records had been carefully edited in previous Water Survey studies and were considered of acceptable accuracy for the frequency study. Records for most stations were complete for the 83-year period, but several did not begin until 1902 to 1908, one (Kankakee) did not start until 1917, and another (New Burnside) was terminated in 1957. These stations were used to ensure adequate coverage in certain areas.

The daily data were supplemented by hourly data for 34 recording-gage stations in Illinois and 21 stations in surrounding states for the 36-year period, 1948-1983 (figure 8). These data were used primarily in developing frequency distributions for rain periods of less than 24-hour durations. The recording stations are not as uniformly distributed as the daily reporting stations, and the quality of the data obtained from some of them was questionable. The 61-station, 83-year sample from the daily reporting stations was the primary database used in developing the Illinois frequency relations, because of both the length and quality of these records. The need to provide estimates of 50-year to 100-year recurrences dictated the use of records as long as possible.

Analytical Approach

Frequency relations were developed for rain periods varying from 5 minutes to 10 days and for recurrence intervals ranging from 2 months to 100 years. These durations and recurrence intervals should encompass the various needs of hydrologists and other users of rainfall frequency information for heavy storm occurrences. Initially, frequency distributions were determined for each of the 61 stations, and they are presented in the appendices of this report.

However, as pointed out by Huff and Neill (1959), the most reliable estimate of rainfall frequency relations can be obtained by combining all data within an area of relatively homogeneous precipitation climate with respect to the occurrence of heavy rainstorms. The analyses then yield areal mean relationships applicable to all locations within a specific climatic section of the state. These areal mean relationships moderate effects from the natural variability factor (random variations) somewhat and are less affected by measurement or computational errors in specific station data.

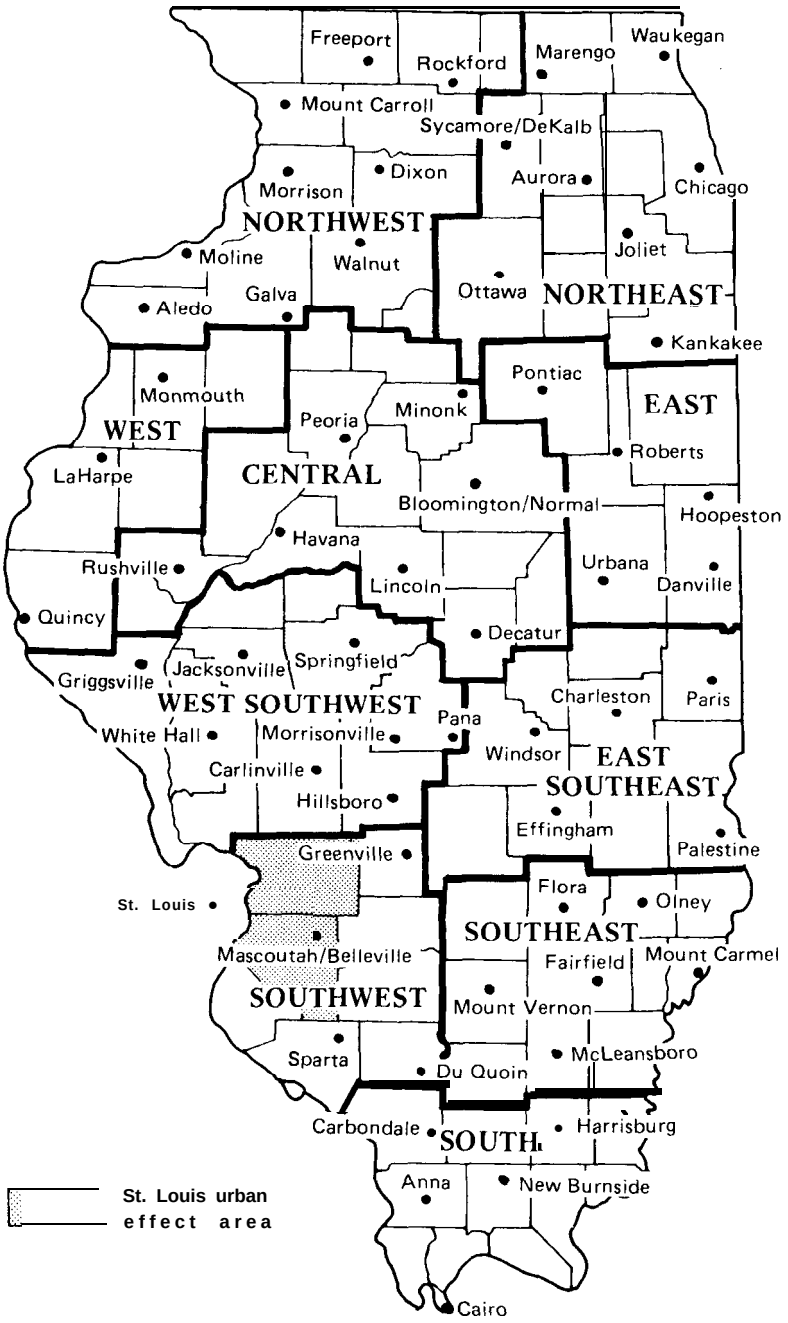


Figure 7. Precipitation-reporting stations and climatic sections used in developing Illinois frequency relations

The state was divided into ten sections of approximately homogeneous precipitation climate (figure 7). This was done through assessment of the heavy rainfall distributions for the 61 stations during the 1901-1983 sampling period, along with consideration of other pertinent meteorological and climatological information. Initially, an evaluation was made of the suitability of the nine climatic sections of the National Weather Service (NWS) (figure 3) for dividing the state into sections of approximately equivalent precipitation climate with respect to heavy rainstorms. Although the NWS sections are frequently used for climatic grouping of temperature and precipitation parameters (such as monthly or seasonal rainfall), adjustments were necessary in this grouping to adequately characterize the spatial and tem-

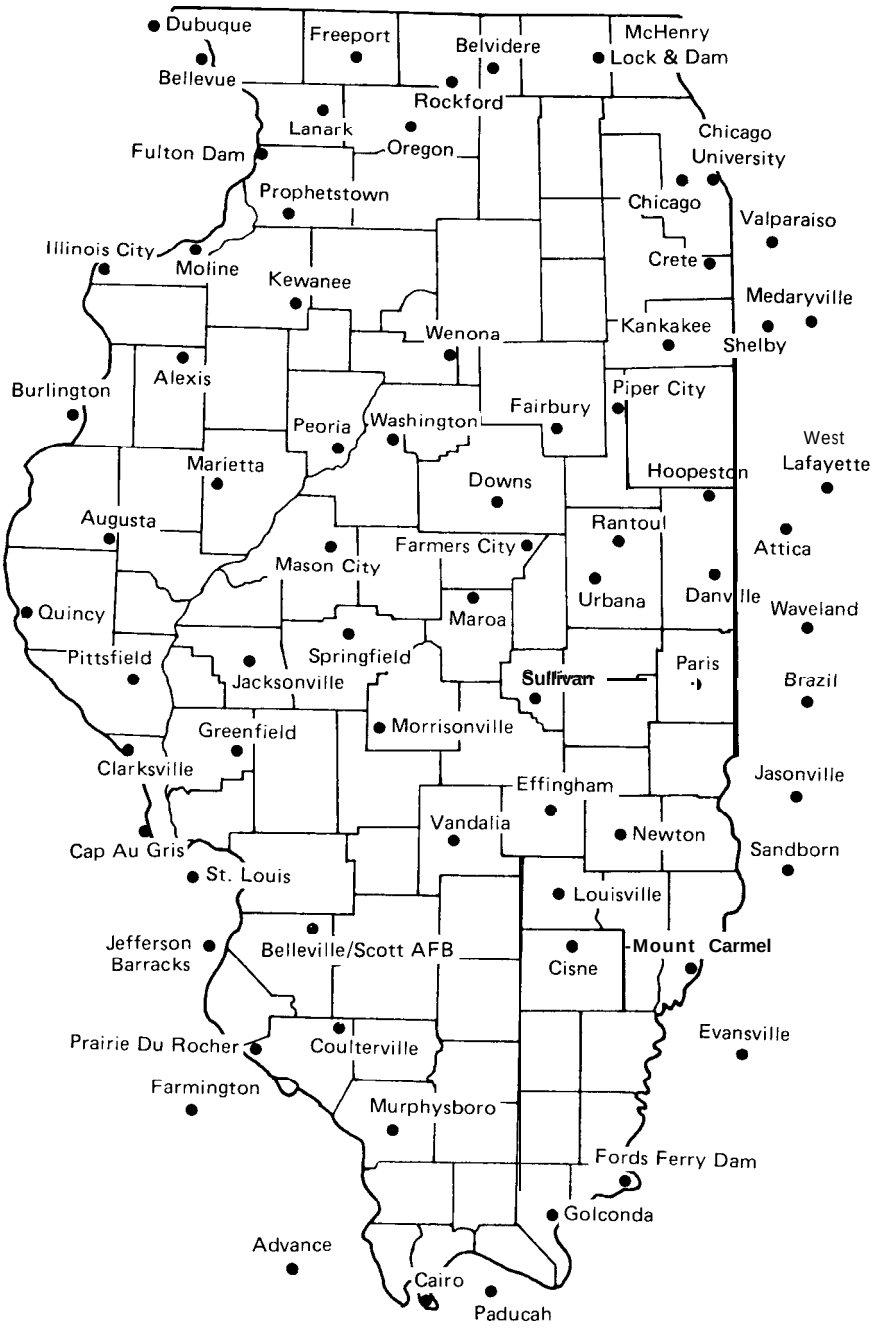


Figure 8. Locations of recording-gage stations

poral distribution characteristics of heavy rainstorms in Illinois.

In modifying the NWS grouping, major emphasis was placed on two types of information: the frequency distributions of heavy storm rainfall derived for each of the 61 stations for the 1901-1983 sampling period, and the pertinent meteorological and climatological factors influencing the frequency, intensity, and spatial distribution of extreme storm rainfall events in Illinois. Frequency distributions for rain periods of 24 hours to 10 days were used in specifying the regions (sections) having similar distribution characteristics.

Major emphasis was placed on the spatial distribution of rainfall amounts for recurrence intervals of 2 to 10 years because these values are more accurately defined than those for longer intervals. For example, for the 1901-1983 data, there are 41, 16,

and 8 independent samples available for each station for the 2-year, 5year, and lo-year recurrence intervals, respectively, whereas only three samples define the 25-year recurrence interval. Major emphasis was also placed on rain periods of 24 to 72 hours in designating the climatic sections, because these durations are of primary interest to most users of Illinois frequency relations.

Important meteorological and climatological factors were involved in the decision making. These included the length of the convective rainfall season, which increases considerably within Illinois from north to south. Extreme rainfall events, especially those having durations of 72 hours or less, are nearly always associated with thunderstorms, and these occur most frequently in the extreme southern and western parts of the state. Another pertinent factor is the spatial distribution of major synoptic weather conditions, such as fronts and low-center passages within the state (Chiang, 1961). These weather events usually generate the storms that occasionally develop into severe rain events. Inadvertent weather modification resulting from topographic and urban influences can also affect the distribution characteristics of heavy rainstorms. All of these factors have been studied in previous Water Survey research (Changnon, 1957; Huff and Changnon, 1972; Changnon et al., 1977; Chiang, 1961; Huff and Vogel, 1976; Huff and Vogel, 1978; Huff, Changnon, and Jones, 1975).

In designating the climatic sections, major emphasis was placed on minimizing the dispersion of individual (station) rainfall amounts at selected recurrence intervals about the area1 mean. Clusters of stations were selected for testing, with the NWS climatic sections used as initial guides. The initial computations were made for the stations within each of the nine NWS sections. Next, adjustments were gradually introduced that decreased the cluster variability and conformed better with known climatological factors such as thunderstorm frequency and length of the convective rainfall season (mentioned above). This involved both spatial movement and variations in the number of stations in the original NWS clusters.

This procedure was continued in a stepwise fashion until a group of sections was obtained that approached minimum possible dispersion and, at the same time, was compatible with the climatic background knowledge and information discussed earlier.

As an example, consider the relatively small section labeled "West" in figure 7, which contains only three stations (Quincy, LaHarpe, and Monmouth). Analyses indicated that these stations had very similar frequency distributions, which exhibited considerably larger rainfall values at various recurrence intervals than were found for stations located to the north, east, and south. To illustrate, the 2-year, 24-hour rainfall averaged 3.45 inches in the west compared with 3.11, 3.02, and 3.11 inches, respectively, in the northwest, central, and west southwest sections shown in figure 7.

Strictly from statistical considerations, one might conclude that the data for Quincy, LaHarpe, and Monmouth are not representative of the heavy rainfall distribution in their region because of the relatively large disagreement of these data with the data for numerous stations to the north, east, and south that incorporate a substantial portion of the state. However, Water Survey studies (Changnon, 1957) have shown that the area in question coincides closely with a region of relatively frequent thunderstorms in Illinois, and, as indicated previously, extreme rainfall events in Illinois nearly always occur in thunderstorm activity. In view of the climatic support for the statistical results, the Quincy-LaHarpe-Monmouth findings were deemed legitimate, and the west section was established to reflect the relatively heavy rainstorm climate in extreme western Illinois.

The preceding example illustrates the general procedure followed in establishing the ten sections of approximately homogeneous precipitation climate in Illinois. However, some compromise and some subjective judgment were involved in the final establishment of boundaries. This was necessary because results from efforts to minimize the dispersion of station clusters (potential climatic sections) were not always exactly the same for each of the recurrence intervals (2 to 100 years) and for each of the rainfall periods (24 hours to 10 days) used in the analyses. As indicated earlier, in these cases the shorter recurrence intervals (2 to 10 years) and rain periods of 24 to 72 hours were given the most weight in final definition of the areas because of data reliability (sample size) and the most frequent needs of Illinois users.

The ten-section grouping reflects certain spatial trends indicated in earlier national studies, such as those by Yarnell (1935) and Hershfield (1961), and in the earlier Illinois study by Huff and Neil1 (1959). Thus, a general trend is indicated for a west-to-east decrease in rainfall for a given recurrence interval and rain period. However, this trend is disrupted in northeastern Illinois by effects of the Chicago urban area and Lake Michigan, as shown by Huff and Vogel (1976). A general north-to-south increase in rainfall is indicated by the sectional grouping, except

for a reversal in central and east central Illinois (central and east sections in figure 7). This reversal was first identified by Huff and Neil1 (1959). It appears to be related to the lack of any significant topographic influences in the region, as well as to its location north and east of the regions of maximum thunderstorm activity in Illinois (Changnon, 1957) but south of the region of most active frontal activity during the warm season (Chiang, 1961).

We recommend using area1 mean frequency relationships. However, some users seek an isohyetal presentation because it facilitates use of the frequency information in certain types of hydrologic problems; for example, in calculating the frequency distribution of storm rainfall in basins, especially when a basin overlaps two or more climatic regions. We have tried to meet this need by including isohyetal maps for the storm periods and recurrence intervals most commonly used by the hydrologic community. This includes maps for storm periods ranging from 1 to 72 hours and for recurrence intervals of 2 to 100 years. (See figures 10 through 17.)

Adjustment for Climatic Trend

The relatively strong climatic trend revealed in the comparison of the two 40-year periods (1901-1940 and 1941-1980) and described in Section 1 was incorporated through use of an adjustment factor in the frequency relations derived from the 1901-1983 data. This factor was obtained by calculating the ratio of 1941-1980 rainfall to that for the entire 1901-1983 period at each of the 61 stations for the various rain periods and recurrence intervals.

Mean ratios were then calculated for each of the ten climatic sections, and these average values were used to adjust both the station and section frequency distributions derived from the 1901-1983 data. The average ratios were used in preference to station values to minimize the effects of random sampling fluctuations among the 61 individual stations. In effect, the adjustment ratios provide a weighting factor that gives more weight to the latter part of the sampling period. This was deemed appropriate in view of the findings by Lamb and Changnon (1981) and others with respect to temporal persistence in precipitation.

Table 9 shows the adjustment factors for each climatic section for storm periods of 24 hours to 10 days. No statistically significant trend was found for a change in the adjustment ratio (1941-1980/1901-1983) with increasing recurrence intervals, so the various recurrence-interval values for each storm period were averaged to obtain the average ratios in table 9. It is apparent that the most pronounced upward trend occurred in the northern part of the state, with a reversal to a slight downward trend in the southern part, as discussed in Section 1. These ratios are considerably smaller than those obtained **in** the **comparison** of the 1901-1940 and 1941-1980 periods because the 1941-1980 period is included in the denominator of the adjustment ratio. The 24-hour values were those used for the rain periods of less than 24-hour duration.

Ranking of Rainfall Data

Two methods of data ranking are commonly used in frequency analysis. In our study, the frequency relations have been developed from the partial-duration series, as opposed to the annual-maxima series. The annual series consists of only the highest values

Table 9. Adjustment Factors for Climatic Trend by Section and Storm Period

	Avemge ratio for given storm duration in each section					
Climatic section	***24 hrs***	***48 hrs***	***72 hrs***	***5 days***	***10 days***	***Combiried***
Northwest	**1.06**	**1.05**	**1.06**	**1.04**	**1.04**	**1.05**
Northeast	**1.07**	**1.04**	**1.05**	**1.03**	**1.02**	**1.04**
West	**1.05**	**1.03**	**1.05**	**1.05**	**1.05**	**1.05**
Central	**1.02**	**1.03**	**1.04**	**1.03**	**1.03**	**1.03**
East	**1.02**	**1.04**	**1.05**	**1.04**	**1.04**	**1.04**
West Southwest	**1.04**	**1.04**	**1.05**	**1.01**	**1.01**	**1.03**
East Southeast	**0.99**	**0.99**	**0.99**	**1.01**	**1.01**	**1.00**
Southwest	**0.98**	**0.98**	**0.98**	**0.99**	**0.99**	**0.98**
Southeast	**0.99**	**0.98**	**0.98**	**1.00**	**1.00**	**0.99**
South	**0.99**	**0.98**	**0.98**	**1.00**	**1.00**	**0.99**

for each year, whereas the partial-duration series incorporates all of the highest values regardless of the year in which they occur. Thus, with the partial-duration series, more than one value used in the frequency distribution can occur in a single year. The two series are equivalent for longer recurrence intervals but usually diverge for return periods of 10 years or less. For example, for 24-hour storms, the partial duration can be converted to the annual series by multiplying the a-year, &year, and lo-year partial-duration amounts by 0.88, 0.95, and 0.99, respectively (Huff and Neill, 1959).

Values in earlier major publications varied. In U.S. Weather Bureau Technical Paper 40 (Hershfield, 1961), values were expressed in partial-duration terms, but those used by Huff and Neill (1959) were derived from the annual series. The partial-duration series is used here because it appears to be the most applicable to hydrologic design problems.

Independence of Observations

As in any statistical analysis, the individual observations or data points should be independent of each other. With a partial-duration series, one must be careful that the observations used are not meteorologically dependent; that is, they must be from separate storm systems. In the present study, data for precipitation durations of 24 hours or less were obtained from individual precipitation events, defined as precipitation periods in which there was no precipitation for at least 6 hours before and 6 hours after the precipitation event (Huff, 1967); then, only the maximum value for the particular duration (6 hours, 12 hours, etc.) within such a precipitation event was used. This ensures that the precipitation values are independent of each other and are derived from individual storms. For precipitation durations of 2 to 10 days, no time separation criteria were needed.

Transformation Factors

Because the 61-station sample provided only daily rainfall totals, the calendar-day amounts had to be converted to maximum-period amounts. The transformation factors used for this purpose are shown for l-day to 10-day rainfalls in table 10. The factor for converting calendar-day rainfall to maximum 24-hour rainfall was derived by Hershfield (1961), using available recording raingage data throughout the United States. It is an average value that may vary considerably between storms, but it should result in only small errors when applied to a large sample of storms. The 1.13 transformation was verified by Huff and Neil1 (1959), using recording raingage data from Illinois stations. The transformation factors for 2- to 10-day periods were also derived by Huff and Neil1 from the Illinois data.

Table 10. Ratios of Maximum-Period to Calendar-Day Precipitation

Storm period (days)	*Ratio*
1	*1.13*
2	*1.02*
3	1.01
5	1.01
10	1.01

Computation of Short-Duration Rainfall

Recurrence-interval values for storm periods of less than 24 hours were obtained from average ratios of x-hour/24-hour rainfall. These ratios were determined primarily from the recording raingage data for 1948-1983 at 34 Illinois stations and at 21 stations in adjoining states. Results of a similar study, based on use of the Chicago urban network data for 1948-1974 (Huff and Vogel, 1976) and ratios derived by Hershfield (1961), were also taken into consideration in determining the values to be applied. All the sources of information provided ratios that were in close agreement.

In table 11, the derived ratios are shown for rain periods ranging from 5 minutes to 18 hours. Analyses indicated that the ratios do not vary significantly within Illinois or with variations in the length of recurrence intervals. Therefore, they could be used for all frequency computations involving rain periods of less than 24 hours. This permitted use of our longest and most reliable period of record (1901-1983) in the short-period frequency computations, and also helped smooth random sampling variations between points and/or areas in the state.

Recurrence Intervals of 2 to 9 Months

Frequency relations are usually developed for recurrence intervals of 1 year or longer. However, to meet some user needs in Illinois, it has been necessary to develop frequency relations for time periods shorter than 12 months. In analyzing the data, it was found that the 2-month to g-month frequency

Table 11. Average Ratios of X-Hour/ 24-Hour Rainfall for Illinois

Rain period (hours)	Ratio, x-hr /24-hr
0.08 (5 min.)	0.12
0.17 (10 min.)	0.21
0.25	0.27
0.50	0.37
1	0.47
2	0.58
3	0.64
6	0.75
12	0.87
18	0.94

values could be related to the l-year values. Further, we found that the x-month/12-month ratios are consistent throughout the state and for all recurrence intervals. These ratios are shown in table 12 for storm periods of 24 hours to 10 days. The 24-hour values are also applicable to storm periods of less than 24-hour duration.

Thus, in table 12, the 24-hour rainfall expected on the average of once in 6 months is equal to 81% (0.81) of the 24-hour rainfall expected once in 12 months at any station or in any climatic section of the state. This technique was used in extending the frequency curves below the l-year recurrence interval in the present study. Again, using the average values results in smoothing of the distributions and eliminates some of the irregularities due to random sampling variations unrelated to the long-term precipitation climate.

Areal Mean Frequency Distributions

The ten climatic sections used in computing area1 mean frequency distributions are shown in figure 7. County outlines, sampling point locations and names, and boundaries of the ten sections are indicated in this figure. The southern and western sections are subject to the greatest frequency of thunderstorm rainfall (Changnon, 1957) and, in general, have the highest rainfall amounts for given rain periods and recurrence intervals. The southern section also has the longest convective rainfall season and incorporates the Shawnee Hills, which, as previously noted, tend to increase the natural rainfall (Huff, Changnon, and Jones, 1975). The central section incorporates most of the Illinois River low discussed in Section 1.

The southwestern section has been the recipient of an unusual number of severe rainstorms in the last 40 to 45 years. This region is subject to topographic enhancement of storms by the Ozark Mountains, which lie to the west and southwest; to a relatively long convective season; and to influences of the St. Louis urban area effect under some storm conditions (Vogel and Huff, 1978). The eastern, east southeastern, and southeastern sections have no distinguishing topographic features or climatic anomalies. The same is true of the northwestern section. Variation in the length of the convective rainfall season is the major difference between these sections.

Of the ten sections, the northeastern section has the greatest diversity in the distribution of heavy storm rainfall. If more station data were available, division of this section into two or three subsections would be desirable. It incorporates effects of three

Table 12. Ratios of Illinois Rainfall Amounts for Recurrence Intervals of Less than 1 Year to Rainfall Amounts for Recurrence Intervals of 1 Year, for Various Rainstorm Periods

	Mean ratio, x-month to 12-month rainfall amount for given rainstorm period				
Storm period	2 months	3 months	4 months	6 months	9 months
<=24 hours	0.55	0.64	0.70	0.81	0.92
48 hours	0.53	0.62	0.69	0.80	0.92
72 hours	0.52	0.61	0.69	0.80	0.92
5 days	0.51	0.61	0.69	0.80	0.92
10 days	0.49	0.59	0.69	0.80	0.92

important conditions that produce in-area variations in rainfall: a frontal maximum, Lake Michigan influences, and urban effects. The southern and southeastern parts of this section lie in a climatic high that extends northeastward from southwestern Illinois and is related to frequent frontal activity. The southwestern part of this northeastern section is between the Illinois River and the Waukegan-Marengo low (Lake and McHenry Counties). The large Chicago urban area is subject to both urban and lake effects on precipitation, and the Waukegan area north of the city and near the lake is subject to the suppressing influence that Lake Michigan has on convective season rainfall (Changnon, 198413).

Graphical Values

Figure 9 shows families of frequency curves for each of the ten climatic sections. Curves are shown for recurrence intervals of 2 months to 100 years and for rain periods of 5 minutes to 10 days. The sectional curves were derived by averaging rainfall amounts from the frequency curves for each individual station in the section. These families of curves illustrate the characteristics of the frequency distributions and the interrelationship between storm (rain) periods and recurrence intervals of various lengths.

Tabular Values

The relationships shown in figure 9 are presented in tabular form in table 13. The tabular values facilitate use of the information and provide more accurate rainfall values than can be read from the logarithmic plots of figure 9. Estimates of the dispersion of point rainfall amounts that can be expected to occur about the sectional curves are discussed and presented in Section 5 of this report.

In table 13, the first column (storm code) refers to the storm (rain) period. The codes are numbered consecutively from 1 to 15, with code 1 representing 10-day storm periods and code 15 representing 5-minute periods. The second column (zone code) refers to the ten climatic sections. Thus, zone 1 is the northwestern section, zone 2 is northeastern, etc., as indicated in the code explanations included with the table.

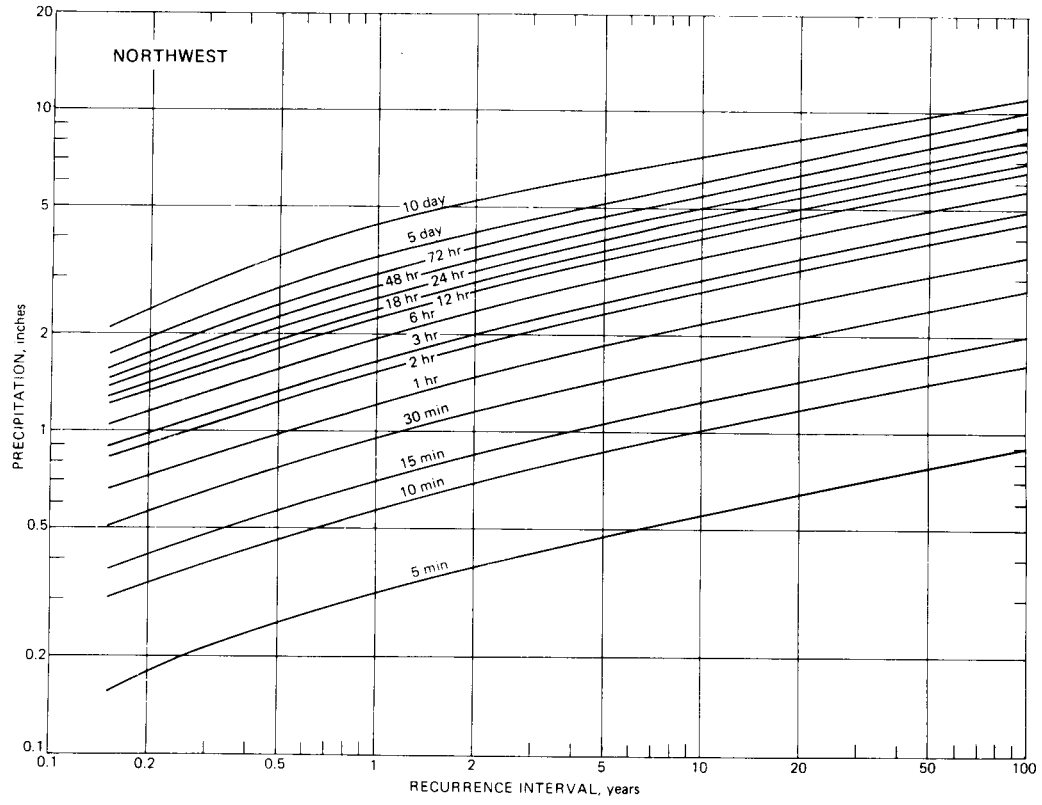
For each storm period, rainfall amounts are shown for each climatic section for recurrence intervals of 2 months to 100 years. For example, assume a user wishes to know the lo-year frequency of 24-hour rainfall in the central section. First, move to storm code 5 (24-hour rainfall). In the code 5 grouping, move to zone 4 (central section) and continue across the page to the column labeled "lo-year." At this point (storm code 5, zone 4) the rainfall amount is 4.45 inches, which is the 24-hour rainfall to be expected, on the average, once in 10 years at any given point in the central section.

Areal versus Isohyetal Presentations

The use of the areal frequency relations is favored over the use of isohyetal presentations generated from the frequency curves for individual stations in the region of interest. The areal approach lessens the effects of natural and human-induced variability between points in an area of approximately homogeneous precipitation climate with respect to heavy rainstorms. The averaging process allots equal weight to all station data in a specific climatic area (section). When data for a relatively large number of stations are available, such as the data for the 61 stations used in the present study, it is readily apparent that considerable variation in the frequency distributions of heavy rainfall may exist between nearby points (table 14), even in relatively long sampling periods such as the 83-year period used in the present study. Such variation occurs even when the sampling stations are selected after all available information pertaining to their operation is edited and reviewed.

Much of this areal variability is caused by random sampling variation. For example, the station at Urbana has been operated since 1888 in the same location, first by the University of Illinois and more recently (since 1948) by the Illinois State Water Survey. The raingage operation has been under the close supervision of University and Survey scientists throughout its history. There is probably no raingage station in the state with a more authentic record. Yet, in general, the frequency relationships for the Urbana station show smaller rain values for a given recurrence interval than do those for several surrounding stations located in the same or very similar climatic regimes.

The major cause apparently is that Urbana has not experienced the most extreme rain events that can occur in east central Illinois. A few examples resulting from extensive field surveys of heavy rains (Huff et al., 1958; Huff and Changnon, 1961) during the period since 1955 are a 10-inch rainfall in less than 24 hours about 25 miles north-northwest of Urbana (May 1956); a 12-hour storm of 13 inches about 40 miles southeast of the city (June 1957); a 6-inch storm in 4 hours 3 miles north (June 1961); a 7-



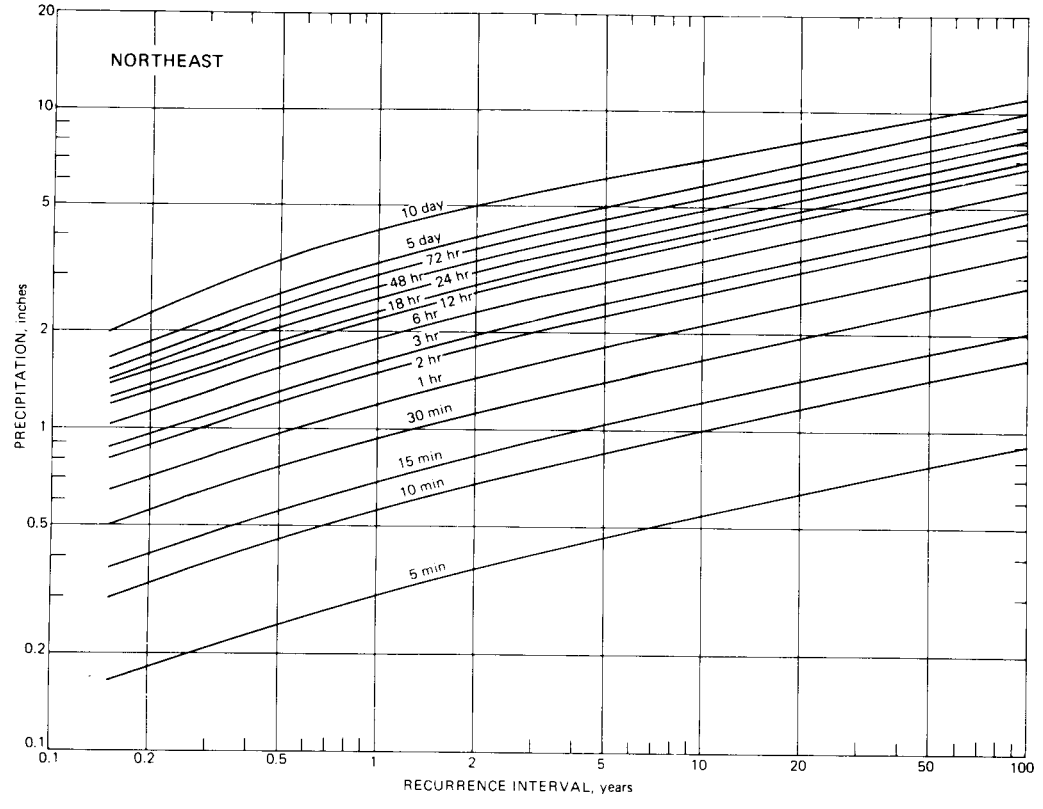
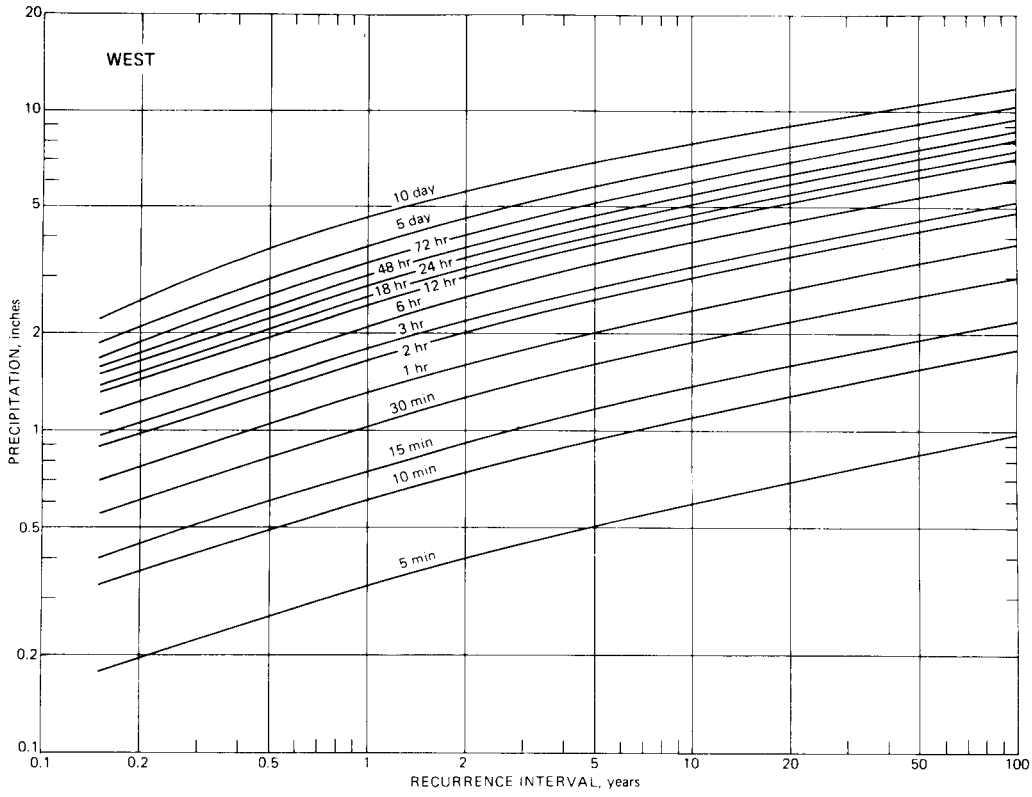


Figure 9. Frequency distributions of rainfall for ten Illinois climatic sections for storm periods of 5 minutes to 10 days and recurrence intervals of 2 months to 100 years



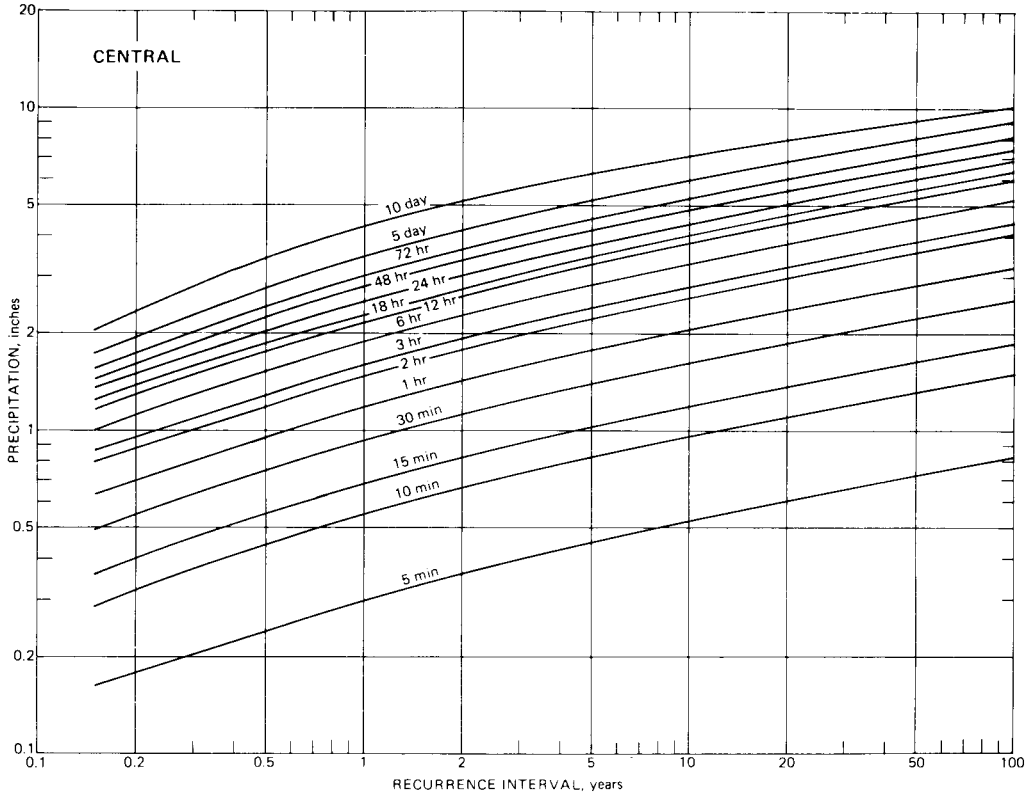
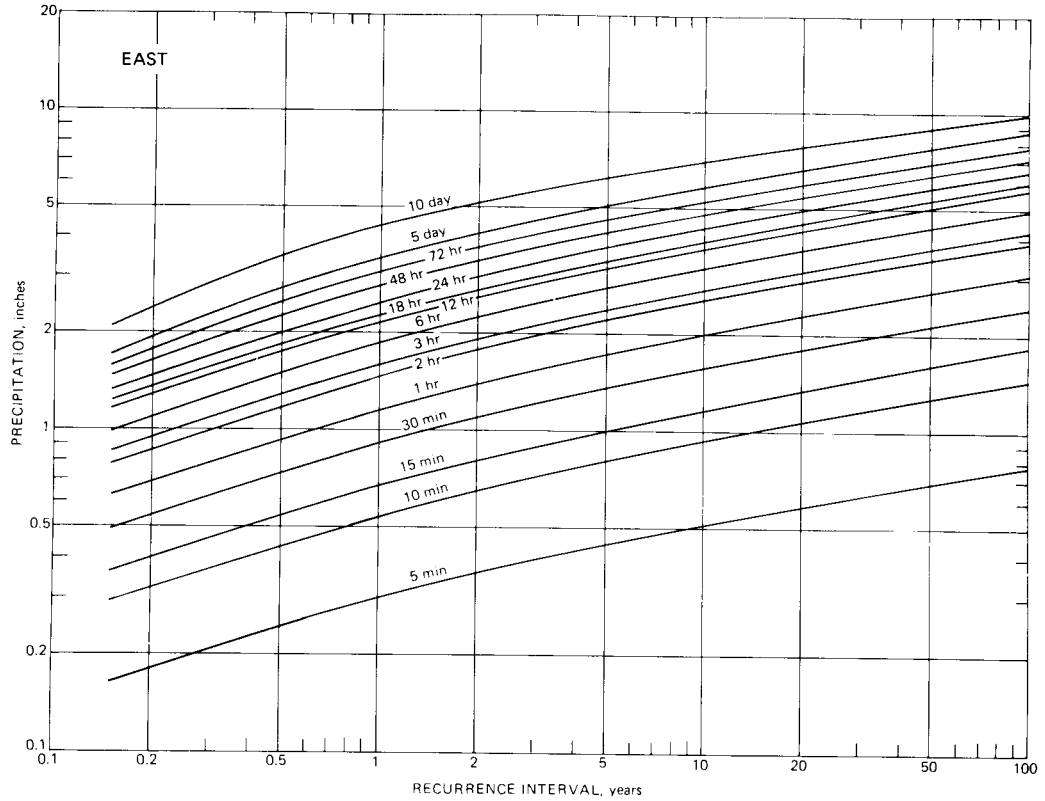


Figure 9. Continued



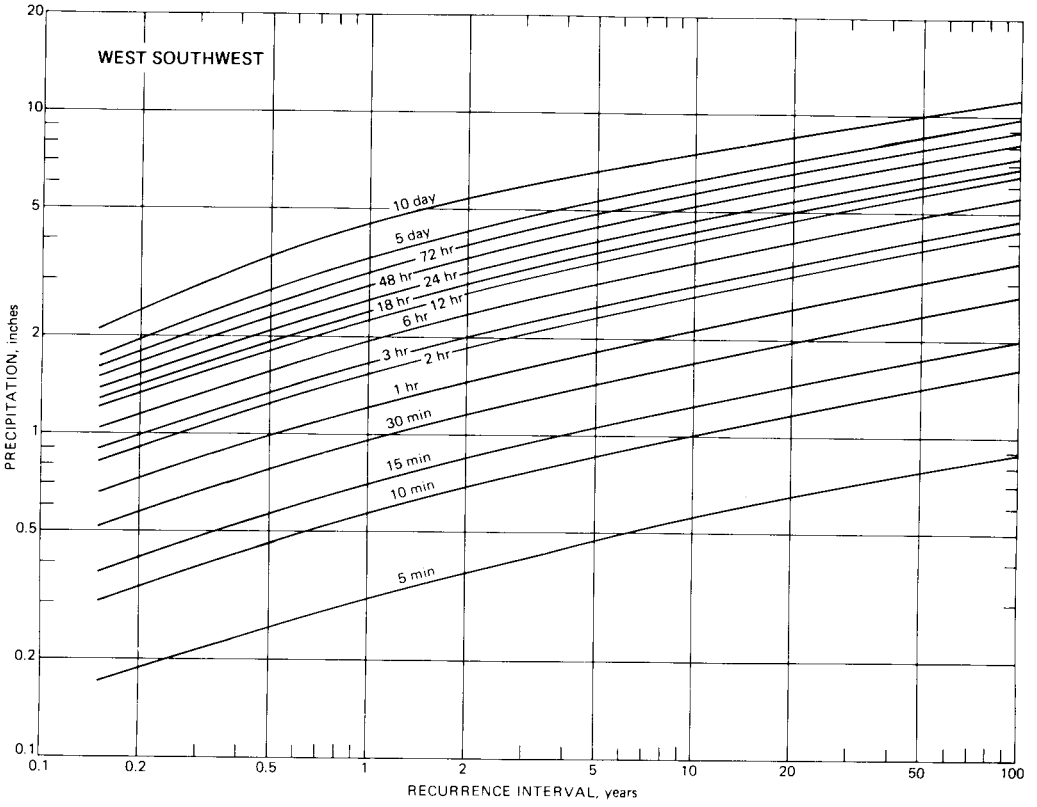
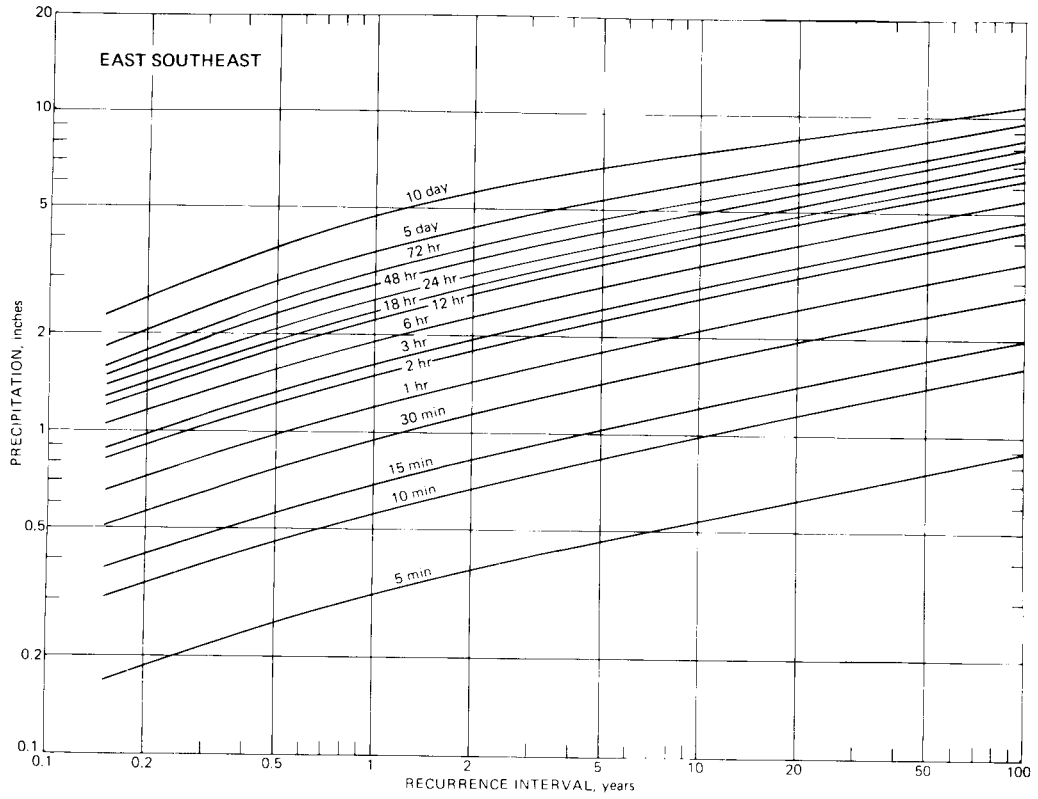


Figure 9. Continued



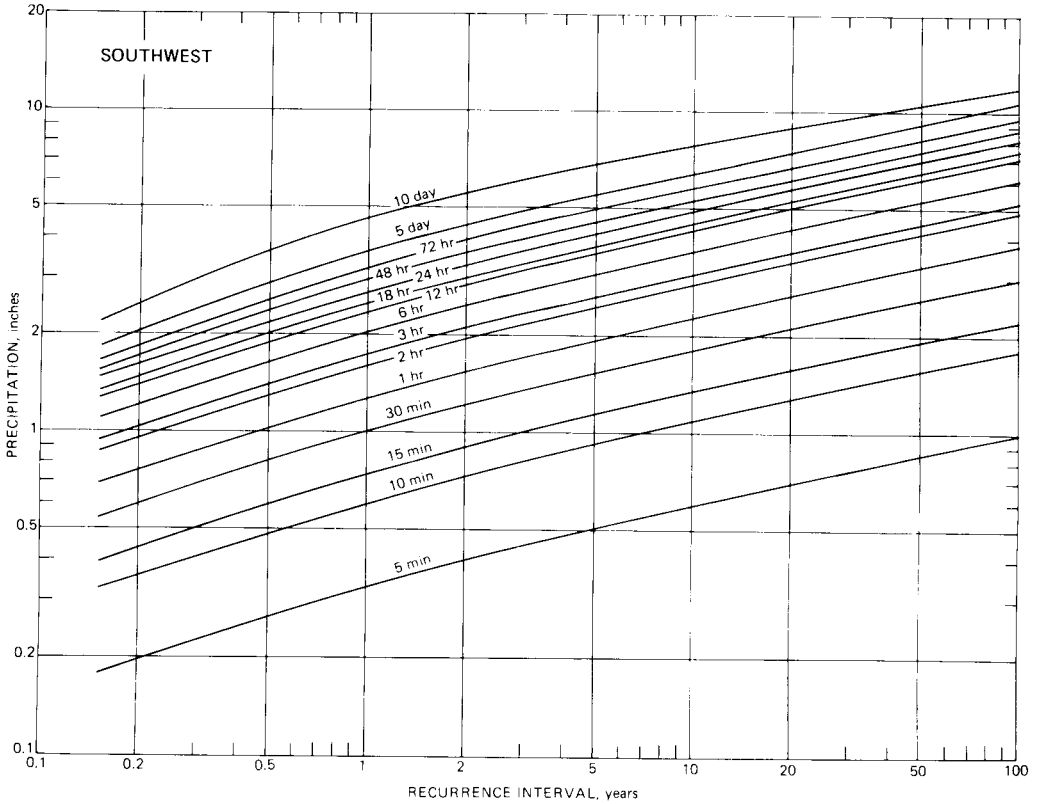
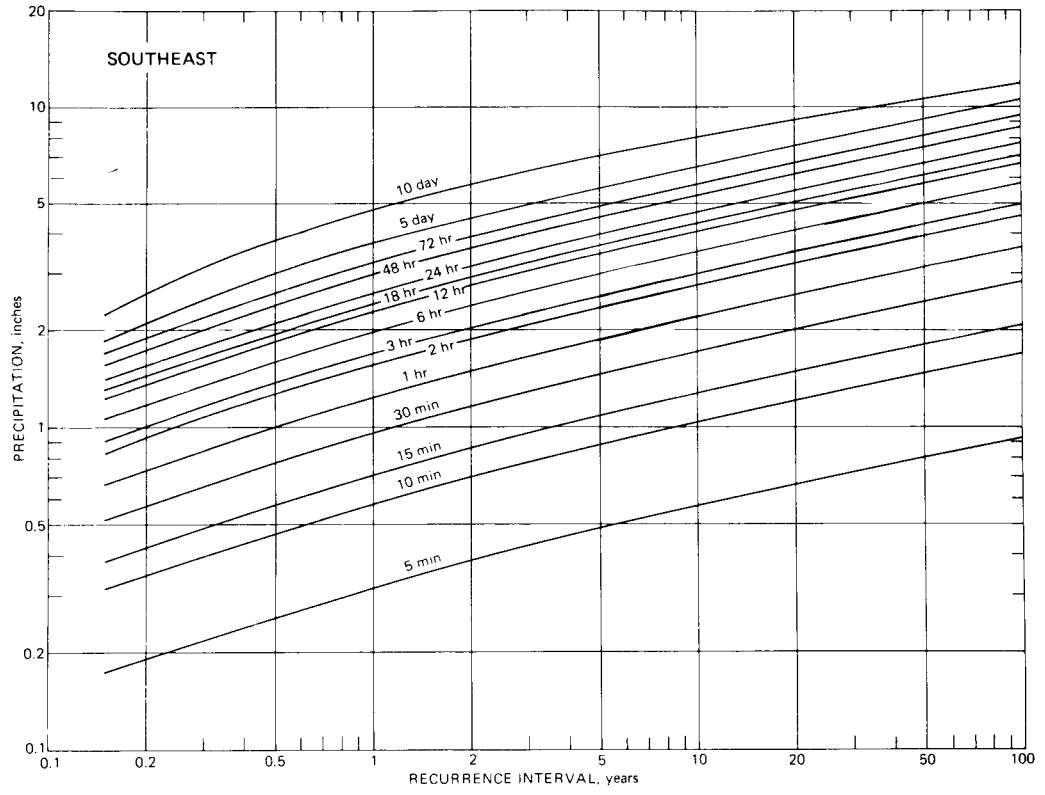


Figure 9. Continued



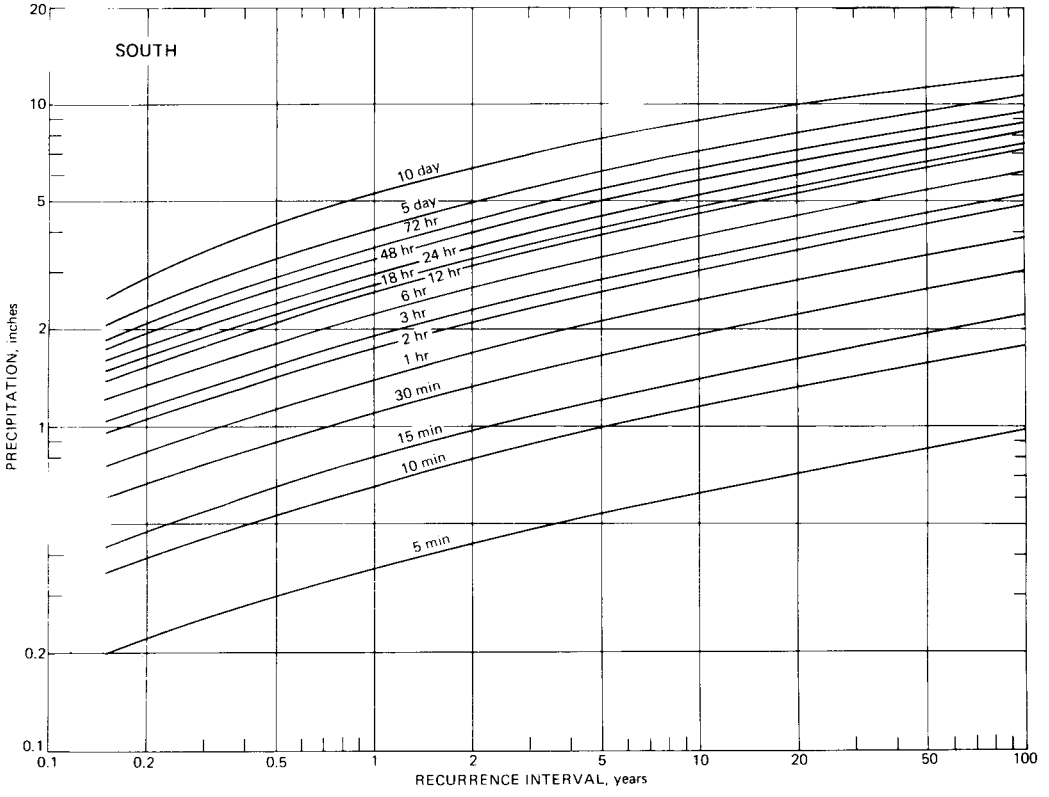


Figure 9. Concluded

Table 13. Sectional Frequency Distributions for Storm Periods of 5 Minutes to 10 Days and Recurrence Intervals of 2 Months to 100 Years

Storm codes

1 – 10 days
2 – 5 days
3 – 72 hours
4 – 48 hours
5 – 24 hours
6 – 18 hours
7 – 12 hours
8 – 6 hours
9 – 3 hours
10 – 2 hours
11 – 1 hour
12 – 30 minutes
13 – 15 minutes
14 – 10 minutes
15 – 5 minutes

Sectional (zone) codes

1 – Northwest
2 – Northeast
3 – West
4 – Central
5 – East
6 – West Southwest
7 – East Southeast
8 – Southwest
9 – Southeast
10 – South

Rainfall (inches) for given recurrence interval

Storm code	*Zone code*	*2-month*	*3-month*	*4-month*	*6-month*	*9-month*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
1	1	2.14	2.60	2.97	3.50	4.02	4.37	5.23	6.30	7.14	8.39	9.64	11.09
1	2	2.02	2.48	2.80	3.30	3.79	4.12	4.95	6.04	6.89	8.18	9.38	11.14
1	3	2.27	2.78	3.13	3.68	4.23	4.60	5.60	6.91	7.89	9.24	10.36	11.90
1	4	2.10	2.58	2.92	3.43	3.93	4.29	5.12	6.27	7.10	8.19	9.10	10.18
1	5	2.13	2.62	2.96	3.48	4.00	4.35	5.15	6.21	6.97	8.04	8.90	9.92
1	6	2.16	2.65	2.99	3.52	4.05	4.40	5.35	6.62	7.45	8.66	9.79	11.26
1	7	2.30	2.80	3.16	3.70	4.27	4.64	5.58	6.80	7.61	8.66	9.70	10.87
1	8	2.22	2.74	3.09	3.63	4.18	4.54	5.54	6.80	7.80	9.20	10.44	11.81
1	9	2.30	2.88	3.23	3.80	4.33	4.75	5.74	7.09	8.07	9.54	10.68	11.79
1	10	2.55	3.15	3.58	4.21	4.84	5.26	6.36	7.81	8.90	10.34	11.36	12.50
2	1	1.76	2.12	2.38	2.76	3.17	3.45	4.13	5.10	5.91	7.21	8.36	9.97
2	2	1.66	1.98	2.24	2.60	2.99	3.25	3.93	4.91	5.70	6.93	8.04	9.96
2	3	1.92	2.30	2.56	2.97	3.41	3.71	4.57	5.80	6.65	7.90	8.95	10.50
2	4	1.77	2.12	2.37	2.78	3.20	3.48	4.17	5.11	5.84	6.96	7.98	9.21
2	5	1.75	2.10	2.37	2.75	3.15	3.42	4.12	4.96	5.67	6.76	7.65	8.78
2	6	1.77	2.13	2.39	2.78	3.19	3.47	4.19	5.32	6.20	7.44	8.53	9.93
2	7	1.85	2.22	2.50	2.90	3.31	3.63	4.34	5.33	6.11	7.28	8.37	9.65
2	8	1.85	2.21	2.49	2.90	3.31	3.62	4.40	5.46	6.34	7.68	8.88	10.68
2	9	1.90	2.29	2.59	3.00	3.45	3.75	4.48	5.57	6.50	7.91	9.16	10.57
2	10	2.09	2.52	2.83	3.29	3.77	4.10	4.99	6.20	7.21	8.45	9.45	10.82
3	1	1.58	1.90	2.11	2.45	2.82	3.06	3.73	4.67	5.42	6.59	7.64	8.87
3	2	1.53	1.83	2.02	2.34	2.70	2.93	3.55	4.44	5.18	6.32	7.41	8.78
3	3	1.72	2.05	2.28	2.64	3.02	3.30	4.08	5.11	5.87	6.97	7.95	9.48
3	4	1.59	1.91	2.12	2.44	2.80	3.05	3.70	4.55	5.26	6.15	7.25	8.16
3	5	1.61	1.93	2.16	2.48	2.85	3.10	3.71	4.57	5.20	6.17	6.97	7.83
3	6	1.63	1.95	2.16	2.50	2.88	3.13	3.81	4.85	5.68	6.84	7.76	8.92
3	7	1.62	1.90	2.15	2.50	2.87	3.12	3.73	4.64	5.32	6.39	7.35	8.54
3	8	1.67	1.97	2.20	2.54	2.93	3.22	3.94	4.92	5.74	6.97	8.12	9.55
3	9	1.73	2.02	2.25	2.62	3.00	3.27	3.92	4.92	5.75	7.05	8.23	9.40
3	10	1.88	2.25	2.49	2.87	3.30	3.59	4.36	5.48	6.34	7.53	8.54	9.52
4	1	1.47	1.74	1.93	2.24	2.58	2.80	3.42	4.28	4.96	6.07	7.02	8.07
4	2	1.44	1.70	1.90	2.18	2.49	2.70	3.30	4.09	4.81	5.88	6.84	8.16
4	3	1.61	1.88	2.09	2.42	2.76	3.01	3.68	4.56	5.50	6.45	7.56	8.80
4	4	1.48	1.76	1.95	2.25	2.58	2.81	3.38	4.19	4.86	5.78	6.62	7.51
4	5	1.51	1.77	1.95	2.26	2.57	2.82	3.40	4.16	4.77	5.66	6.40	7.16
4	6	1.52	1.81	2.00	2.30	2.64	2.87	3.49	4.45	5.21	6.28	7.12	8.19
4	7	1.52	1.78	1.98	2.30	2.64	2.87	3.42	4.26	4.88	5.84	6.75	8.00
4	8	1.57	1.85	2.06	2.38	2.75	2.97	3.59	4.52	5.26	6.43	7.36	8.81
4	9	1.59	1.87	2.07	2.40	2.76	3.00	3.60	4.52	5.28	6.48	7.58	8.62
4	10	1.75	2.08	2.31	2.65	3.02	3.30	4.00	5.03	5.80	6.93	7.86	8.79
5	1	1.40	1.64	1.80	2.08	2.36	2.57	3.11	3.95	4.63	5.60	6.53	7.36
5	2	1.38	1.61	1.76	2.03	2.31	2.51	3.04	3.80	4.47	5.51	6.46	7.58
5	3	1.53	1.77	1.95	2.24	2.56	2.79	3.45	4.29	4.93	6.07	7.04	8.20
5	4	1.39	1.63	1.80	2.04	2.32	2.52	3.02	3.76	4.45	5.32	6.08	6.92
5	5	1.36	1.58	1.75	2.00	2.27	2.47	3.01	3.71	4.26	5.04	5.83	6.61
5	6	1.42	1.66	1.84	2.10	2.38	2.59	3.11	3.93	4.65	5.57	6.46	7.45
5	7	1.40	1.63	1.78	2.07	2.35	2.55	3.03	3.80	4.44	5.37	6.23	7.41
5	8	1.49	1.73	1.90	2.20	2.48	2.71	3.28	4.13	4.76	6.02	7.07	8.21
5	9	1.44	1.68	1.85	2.12	2.41	2.62	3.16	4.00	4.62	5.79	6.71	7.73
5	10	1.63	1.91	2.10	2.41	2.74	2.97	3.62	4.51	5.21	6.23	7.11	8.27

Continued on next page

Table 13. Continued

Rainfall (inches) for given recurrence interval

Storm code	Zone code	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
6	1	1.30	1.52	1.66	1.92	2.18	2.37	2.86	3.63	4.26	5.15	6.01	6.92
6	2	1.26	1.47	1.61	1.86	2.12	2.30	2.79	3.50	4.11	5.06	5.95	6.97
6	3	1.41	1.64	1.80	2.07	2.36	2.57	3.18	3.95	4.53	5.59	6.47	7.55
6	4	1.27	1.51	1.66	1.88	2.12	2.28	2.75	3.46	4.09	4.90	5.59	6.37
6	5	1.25	1.47	1.62	1.84	2.09	2.27	2.77	3.41	3.92	4.63	5.37	6.08
6	6	1.31	1.53	1.68	1.93	2.19	2.38	2.86	3.61	4.28	5.12	5.95	6.85
6	7	1.29	1.50	1.64	1.90	2.16	2.35	2.79	3.49	4.08	4.94	5.73	6.81
6	8	1.35	1.59	1.74	2.00	2.29	2.49	3.02	3.80	4.38	5.54	6.51	7.55
6	9	1.33	1.55	1.71	1.95	2.22	2.41	2.91	3.68	4.25	5.33	6.17	7.11
6	10	1.51	1.77	1.95	2.22	2.52	2.74	3.33	4.15	4.79	5.74	6.54	7.61
7	1	1.23	1.43	1.57	1.81	2.06	2.24	2.71	3.43	4.03	4.88	5.66	6.51
7	2	1.20	1.40	1.53	1.77	2.01	2.18	2.64	3.31	3.89	4.79	5.62	6.59
7	3	1.34	1.56	1.70	1.94	2.22	2.43	2.98	3.73	4.29	5.28	6.13	7.14
7	4	1.19	1.40	1.53	1.77	2.01	2.17	2.62	3.27	3.87	4.63	5.29	6.02
7	5	1.18	1.38	1.53	1.74	1.98	2.15	2.62	3.23	3.73	4.38	5.08	5.75
7	6	1.24	1.44	1.57	1.82	2.07	2.25	2.71	3.39	3.97	4.84	5.62	6.48
7	7	1.21	1.42	1.55	1.80	2.04	2.22	2.63	3.30	3.86	4.67	5.42	6.45
7	8	1.28	1.50	1.64	1.88	2.15	2.35	2.86	3.60	4.14	5.24	6.15	7.14
7	9	1.25	1.46	1.60	1.85	2.10	2.28	2.75	3.48	4.02	5.04	5.84	6.72
7	10	1.42	1.66	1.83	2.10	2.38	2.59	3.15	3.93	4.53	5.42	6.19	7.20
8	1	1.06	1.24	1.37	1.56	1.77	1.93	2.33	2.96	3.48	4.20	4.90	5.69
8	2	1.03	1.21	1.32	1.52	1.74	1.88	2.28	2.85	3.35	4.13	4.85	5.68
8	3	1.15	1.34	1.47	1.67	1.91	2.10	2.58	3.22	3.70	4.55	5.28	6.15
8	4	1.03	1.21	1.34	1.53	1.74	1.89	2.26	2.82	3.33	3.99	4.56	5.19
8	5	1.00	1.18	1.32	1.49	1.70	1.85	2.26	2.78	3.20	3.78	4.38	4.96
8	6	1.07	1.24	1.37	1.57	1.78	1.94	2.33	2.95	3.48	4.18	4.85	5.59
8	7	1.06	1.23	1.37	1.55	1.74	1.87	2.27	2.85	3.33	4.03	4.67	5.56
8	8	1.12	1.30	1.44	1.64	1.87	2.03	2.45	3.10	3.57	4.52	5.30	6.16
8	9	1.08	1.27	1.41	1.60	1.81	1.97	2.37	3.00	3.47	4.34	5.03	5.80
8	10	1.23	1.44	1.58	1.71	2.05	2.23	2.73	3.39	3.91	4.68	5.31	6.21
9	1	0.91	1.06	1.16	1.33	1.52	1.65	1.99	2.53	2.97	3.59	4.18	4.90
9	2	0.88	1.02	1.13	1.30	1.47	1.60	1.94	2.43	2.86	3.53	4.14	4.85
9	3	0.98	1.15	1.26	1.44	1.65	1.79	2.21	2.75	3.15	3.89	4.51	5.25
9	4	0.89	1.03	1.13	1.30	1.47	1.61	1.93	2.41	2.85	3.41	3.89	4.43
9	5	0.87	1.02	1.12	1.28	1.46	1.58	1.93	2.37	2.73	3.22	3.74	4.23
9	6	0.91	1.07	1.18	1.34	1.52	1.66	1.99	2.51	2.98	3.56	4.14	4.77
9	7	0.89	1.05	1.15	1.32	1.50	1.63	1.94	2.43	2.84	3.44	3.99	4.74
9	8	0.95	1.12	1.22	1.40	1.59	1.73	2.10	2.63	3.08	3.86	4.52	5.25
9	9	0.92	1.08	1.21	1.37	1.55	1.68	2.02	2.56	2.96	3.71	4.29	4.95
9	10	1.06	1.23	1.35	1.54	1.75	1.90	2.32	2.89	3.33	3.99	4.55	5.29
10	1	0.84	0.97	1.06	1.23	1.40	1.52	1.83	2.33	2.74	3.31	3.86	4.47
10	2	0.81	0.95	1.05	1.20	1.36	1.48	1.79	2.24	2.64	3.25	3.82	4.47
10	3	0.91	1.06	1.17	1.32	1.50	1.65	2.02	2.53	2.91	3.58	4.15	4.84
10	4	0.82	0.95	1.04	1.19	1.37	1.48	1.78	2.22	2.62	3.14	3.59	4.08
10	5	0.79	0.93	1.03	1.17	1.34	1.46	1.78	2.19	2.52	2.97	3.44	3.90
10	6	0.84	0.98	1.08	1.24	1.41	1.53	1.84	2.32	2.74	3.28	3.81	4.39
10	7	0.83	0.97	1.07	1.22	1.38	1.50	1.79	2.24	2.62	3.17	3.67	4.39
10	8	0.88	1.02	1.13	1.28	1.47	1.60	1.94	2.44	2.87	3.55	4.20	4.84
10	9	0.85	1.00	1.12	1.26	1.43	1.55	1.85	2.36	2.72	3.41	3.96	4.56
10	10	0.97	1.13	1.25	1.43	1.62	1.76	2.14	2.66	3.07	3.68	4.20	4.88
11	1	0.67	0.78	0.86	0.98	1.11	1.21	1.46	1.86	2.18	2.63	3.07	3.51
11	2	0.65	0.76	0.84	0.96	1.09	1.18	1.43	1.79	2.10	2.59	3.04	3.56
11	3	0.72	0.84	0.92	1.06	1.21	1.31	1.60	2.02	2.32	2.86	3.31	3.85
11	4	0.65	0.76	0.83	0.95	1.09	1.18	1.42	1.77	2.09	2.50	2.86	3.25
11	5	0.64	0.74	0.81	0.93	1.07	1.16	1.41	1.74	2.00	2.39	2.74	3.11
11	6	0.67	0.79	0.87	0.99	1.12	1.21	1.46	1.85	2.19	2.62	3.04	3.50
11	7	0.66	0.77	0.85	0.97	1.10	1.20	1.42	1.78	2.09	2.52	2.93	3.48
11	8	0.70	0.81	0.89	1.02	1.15	1.26	1.54	1.93	2.27	2.84	3.32	3.86
11	9	0.68	0.79	0.88	1.00	1.13	1.23	1.49	1.88	2.20	2.72	3.15	3.63
11	10	0.77	0.90	0.99	1.13	1.29	1.40	1.70	2.12	2.45	2.93	3.34	3.89
12	1	0.52	0.61	0.68	0.77	0.87	0.95	1.15	1.46	1.71	2.07	2.42	2.77
12	2	0.51	0.60	0.65	0.75	0.86	0.93	1.12	1.41	1.65	2.04	2.39	2.80
12	3	0.57	0.66	0.73	0.83	0.95	1.03	1.27	1.59	1.82	2.25	2.61	3.03
12	4	0.52	0.60	0.66	0.75	0.86	0.93	1.12	1.39	1.64	1.97	2.25	2.56
12	5	0.50	0.58	0.64	0.74	0.84	0.91	1.11	1.37	1.57	1.87	2.16	2.45
12	6	0.53	0.61	0.68	0.78	0.88	0.96	1.15	1.46	1.72	2.06	2.39	2.75
12	7	0.52	0.60	0.66	0.76	0.86	0.93	1.12	1.41	1.64	1.99	2.31	2.74
12	8	0.55	0.64	0.71	0.81	0.92	1.00	1.22	1.53	1.78	2.25	2.62	3.03
12	9	0.53	0.62	0.68	0.78	0.89	0.97	1.17	1.47	1.73	2.14	2.48	2.86
12	10	0.61	0.70	0.77	0.89	1.01	1.10	1.34	1.66	1.93	2.31	2.63	3.06

Table 13. Concluded

Storm code	Zone code	Rainfall (inches) for given recurrence interval: 2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
13	1	0.38	0.45	0.50	0.57	0.64	0.70	0.84	1.07	1.25	1.51	1.76	1.99
13	2	0.37	0.44	0.48	0.55	0.63	0.68	0.82	1.03	1.21	1.49	1.75	2.05
13	3	0.41	0.48	0.53	0.61	0.69	0.75	0.91	1.16	1.33	1.64	1.90	2.21
13	4	0.37	0.44	0.49	0.56	0.63	0.68	0.81	1.02	1.20	1.44	1.64	1.87
13	5	0.37	0.43	0.47	0.54	0.62	0.67	0.81	1.00	1.14	1.37	1.60	1.85
13	6	0.38	0.45	0.49	0.57	0.64	0.70	0.84	1.06	1.26	1.52	1.75	2.01
13	7	0.38	0.44	0.49	0.56	0.63	0.69	0.82	1.03	1.20	1.45	1.68	2.00
13	8	0.40	0.47	0.52	0.59	0.67	0.73	0.89	1.12	1.29	1.63	1.91	2.22
13	9	0.39	0.46	0.50	0.58	0.65	0.71	0.85	1.08	1.25	1.56	1.81	2.09
13	10	0.43	0.51	0.56	0.65	0.74	0.80	0.98	1.22	1.41	1.68	1.92	2.23
14	1	0.31	0.36	0.40	0.46	0.52	0.57	0.68	0.87	1.02	1.23	1.44	1.62
14	2	0.30	0.35	0.39	0.45	0.51	0.55	0.67	0.84	0.98	1.21	1.42	1.67
14	3	0.34	0.39	0.43	0.49	0.56	0.61	0.74	0.94	1.08	1.33	1.55	1.81
14	4	0.30	0.35	0.39	0.45	0.50	0.55	0.66	0.83	0.98	1.17	1.34	1.52
14	5	0.30	0.35	0.38	0.43	0.49	0.54	0.66	0.81	0.94	1.12	1.28	1.46
14	6	0.31	0.36	0.40	0.46	0.52	0.57	0.68	0.87	1.02	1.22	1.42	1.64
14	7	0.31	0.36	0.40	0.45	0.51	0.56	0.66	0.83	0.98	1.18	1.37	1.63
14	8	0.33	0.38	0.42	0.49	0.55	0.60	0.72	0.91	1.05	1.32	1.55	1.81
14	9	0.32	0.37	0.41	0.47	0.53	0.58	0.70	0.88	1.02	1.27	1.48	1.70
14	10	0.36	0.42	0.46	0.53	0.60	0.65	0.80	0.99	1.14	1.37	1.56	1.82
15	1	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.47	0.56	0.67	0.78	0.89
15	2	0.17	0.19	0.21	0.24	0.28	0.30	0.36	0.46	0.54	0.66	0.78	0.91
15	3	0.18	0.21	0.23	0.26	0.30	0.33	0.40	0.51	0.59	0.73	0.84	0.98
15	4	0.17	0.19	0.21	0.24	0.28	0.30	0.36	0.45	0.53	0.64	0.73	0.83
15	5	0.17	0.19	0.21	0.24	0.28	0.30	0.36	0.44	0.51	0.61	0.70	0.79
15	6	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.47	0.56	0.67	0.78	0.89
15	7	0.17	0.20	0.22	0.25	0.29	0.31	0.36	0.46	0.54	0.64	0.75	0.89
15	8	0.18	0.21	0.23	0.26	0.30	0.33	0.40	0.50	0.58	0.72	0.85	0.99
15	9	0.18	0.20	0.22	0.26	0.29	0.32	0.38	0.48	0.55	0.69	0.81	0.93
15	10	0.20	0.23	0.25	0.29	0.33	0.36	0.43	0.54	0.62	0.75	0.85	0.99

Note: For Madison County, increase the southwest sectional values by 15% to adjust for the St. Louis urban effect.

Table 14. Variations in the Frequency Distributions of 24-Hour Rainfall between Selected Stations

	Recurrence interval: 5 yrs	10 yrs	25 yrs	50 yrs	100 yrs
	Joliet versus Chicago, NE section, 22 mi. apart				
Joliet (in.)	4.08	4.85	6.04	7.17	8.47
Chicago Midway (in.)	3.81	4.49	5.56	6.47	7.50
Diff. (%)	7	8	9	11	13
	Danville versus Urbana, E section, 33 mi. apart				
Danville (in.)	4.01	4.61	5.40	5.95	6.75
Urbana (in.)	3.70	4.20	4.85	5.45	6.10
Diff. (%)	8	10	11	9	11
	Belleville versus Greenville, SW section, 33 mi. apart				
Belleville (in.)	4.30	5.08	6.54	7.74	9.20
Greenville (in.)	3.99	4.62	5.76	6.81	7.90
Diff. (%)	8	10	14	14	16

inch storm in 4 hours about 5 miles southeast of Urbana (July 1979); and a 5-inch storm in 3 hours just 3 miles west of Champaign (May 1959).

In contrast, the maximum daily rainfall recorded at Urbana in the 1901-1983 period was 4.50 inches in May 1921. However, Danville, located about 33 miles east of Urbana (figure 7), has experienced several more severe storms that are reflected in its higher rainfall frequency values compared with those of Urbana (table 14).

Using the averaging approach and allowing all stations equal weight in determining the sectional relationships reduces the subjectivity that usually abounds out of necessity in studies of the frequency distributions of extreme rainfall events. The area1 approach also permits computation of the dispersion (variability) to be expected among points in a particular climatic section over a given sampling period. This dispersion or variability is realistic; it occurs because of the large temporal and spatial variability in extreme rain events, which usually are of small area1 extent. This variability should be considered in applications of heavy storm events because obviously it will continue to occur in the future.

Another benefit of the area1 approach is that it tends to provide more reliable estimates of typical 5-year or longer recurrences in areas with similar precipitation climates. In the case of the 83-year record in the present Illinois study, there are 41 independent 2-year events at a precipitation station. However, this reduces to 16, 8, 4, and 2 independent samples for recurrences of 5, 10, 20, and 40 years, respectively. Thus, rainfall amounts for the longer recurrence intervals are subject to more sampling error, and beyond 20- to 25-year frequencies they become quite questionable. However, when several stations are combined to obtain the longer recurrence-interval values, rainfall amounts are established more reliably. For example, the nine stations in the northwestern climatic section provided 36 independent measurements for the 20-year event and 18 values for the 40-year event.

As has been discussed in the Urbana example, relatively large differences can occur between the frequency distributions of stations located a few miles apart in a relatively homogeneous region of precipitation climate. As indicated earlier, these differences occur even with records of relatively long length, such as the 83 years used in the present study. However, unless a significant climatic trend is in operation, area1 average relations are more likely to remain nearly constant with time if enough stations are included to obtain a reliable measure of the mean and the dispersion about the mean. We believe this has been accomplished in the present study and that the area1 method of establishing frequency relations is preferable to fitting isohyets to point data.

Point Frequency Distributions

Appendix A provides frequency distributions for each of the 61 stations used in the present Illinois study. As with the area1 distributions, they include rain periods ranging from 5 minutes to 10 days and recurrence intervals of 2 months to 100 years. These are provided for the benefit of the user who may need specific information for a particular location, or who wishes to construct a detailed isohyetal pattern for a specific region that is not covered adequately by the sectional curves or selected isohyetal maps presented in this report. It is stressed, however, that the point frequency distributions should be used with caution and should be compared with other nearby point relationships before the results are considered authentic. The reasons for this caution were discussed in the presentation of the area1 relationships.

Selected Iso hyetal Maps

As mentioned previously, certain isohyetal maps are included in this report to satisfy hydrologic needs for some applications in which isohyetal presentations are considered preferable to our recommended use of sectional frequency curves. These maps are shown in figures 10 through 17, and show spatial distributions for rain periods ranging from 1 to 72 hours. For each rain period, which may include a total or partial storm, maps for recurrence intervals of 2 to 100 years are presented.

The isohyetal maps do not extend into northeastern Illinois. This is because the six-county area in the cutoff region has been the subject of a special study (Huff and Vogel, 1976) that employed additional data from a raingage network in the Chicago urban area, plus data from other stations not used in the present 61-station study because of their record lengths. An updating of this six-county study is discussed in Section 4 of this report.

Pattern Features

As noted in the comparison of two 40-year periods (Section 1), the isohyetal patterns show certain characteristics that are generally consistent for various rain periods and recurrence intervals. These include a major high in extreme southern Illinois, which lies in a region of maximum thunderstorm frequency in the state (Changnon, 1957). Topographic influences from the Shawnee Hills may also affect the rainfall distribution (Huff, Changnon, and Jones, 1975).

A second major high in the heavy rainfall distributions occurs in the extreme western part of the state, which also lies in a region of relatively frequent thunderstorm occurrences in which most of the severe rain events breed. A low in the rainfall pattern extends along or in the vicinity of the Illinois River valley from northeastern to southwestern Illinois. A high extends northeastward from the vicinity of St. Louis to the Joliet-Kankakee region in northeastern Illinois and is nearly parallel to the Illinois River low. A low is also present in the extreme northeastern part of the state in the Waukegan-Marengo area. Another weak low is evident in east central Illinois and in some cases extends into southeastern Illinois.

The details of the statewide frequency distributions listed above are apparent only because of the existence and judicious use of the 83-year record from the many cooperative weather stations operated largely by the National Weather Service.

The Waukegan low may be related to the influence of Lake Michigan in dissipating or reducing the intensity of warm-season storms moving into the lake. However, Marengo, which is also in the northeastern low, is too far west of Lake Michigan to be significantly affected by it. This low is apparently related to climatic variations, possibly intensified by lake effects in the Waukegan area.

*Map **Analysis***

The maps in figures 10 through 17 were constructed by plotting rainfall amounts from each of the station frequency curves for the storm period and recurrence interval being analyzed. A total of 48 maps are included to cover the various storm periods and recurrence intervals. As discussed previously, sampling variability between nearby stations can cause substantial differences in frequency values. As a result, a considerable amount of subjectivity was involved in preparing the isohyetal patterns. Efforts were made to obtain a realistic, relatively smooth, isohyetal pattern from consideration of both plotted data and meteorological-climatological factors. In doing so, values at some stations were arbitrarily lowered and others increased to avoid sharp, unrealistic rainfall gradients between nearby stations.

The resulting maps in figures 10 through 17 reflect findings from the 1901-1983 data sample adjusted for climatic trend. Variations from these distribution patterns may occur in the future. However, in general, the comparison of the two 40-year periods, 1901-1940 and 1941-1980 (Section 1) indicates that most features of the patterns have persisted throughout the 83-year period.

Comparison between Values in Table 13 and Those in Technical Paper 40

The mean sectional frequency distributions summarized in table 13 were compared with those in U.S. Weather Bureau Technical Paper 40 (Hershfield, 1961), which has had widespread use throughout the United States. In general, the values in table 13 are very similar to those in Technical Paper 40 for recurrence intervals of 10 years and less. For longer recurrence intervals, table 13 shows larger values than Technical Paper 40, and the differences become larger with increasing recurrence interval.

Table 15 (see page 50) illustrates the differences between the two sets of frequency values for 24-hour maximum rainfall amounts at selected observational stations in Illinois. The Water Survey values are those for the climatic sections in which the stations are located. The values for Technical Paper 40 were interpolated from isohyetal maps for 24-hour rainfall.

The differences are most pronounced in the northeastern section (figure 7), where the climatic trend study (Section 1 of this report) showed the maximum increase in the frequency distributions of heavy rainstorms in the 1941-1980 period. Technical Paper 40, published in 1961, did not include some of the extremely heavy rain events that occurred in recent years, several of which affected the Chicago-Aurora-Joliet-Kankakee area. Note the Chicago values in table 15 that reflect these occurrences.

We believe that our method of fully using data from the cooperative observer network and employing the area1 analysis technique (sectional mean frequency distributions) provides a better estimate of the more extreme rainfall events (25-year to 100-year recurrences) than the technique used in Technical Paper 40, which placed major emphasis on first-order station data and isohyetal analysis of these data.

Six-County Frequency Relations

As mentioned previously, data from a 1976 study of the frequency distribution of heavy rainfall in the Chicago urban area and in the surrounding six-county area (**Huff and** Vogel, 1976) were updated. Basically, this was done by relating frequency relations derived from 1901-1983 data (present study) and from 1949-1974 data used in the 1976 study. This was done for five long-term stations, including the official first-order stations of the National Weather Service. The specific methodology used and the updated relations are presented for the urban area and the six-county area in Section 4.

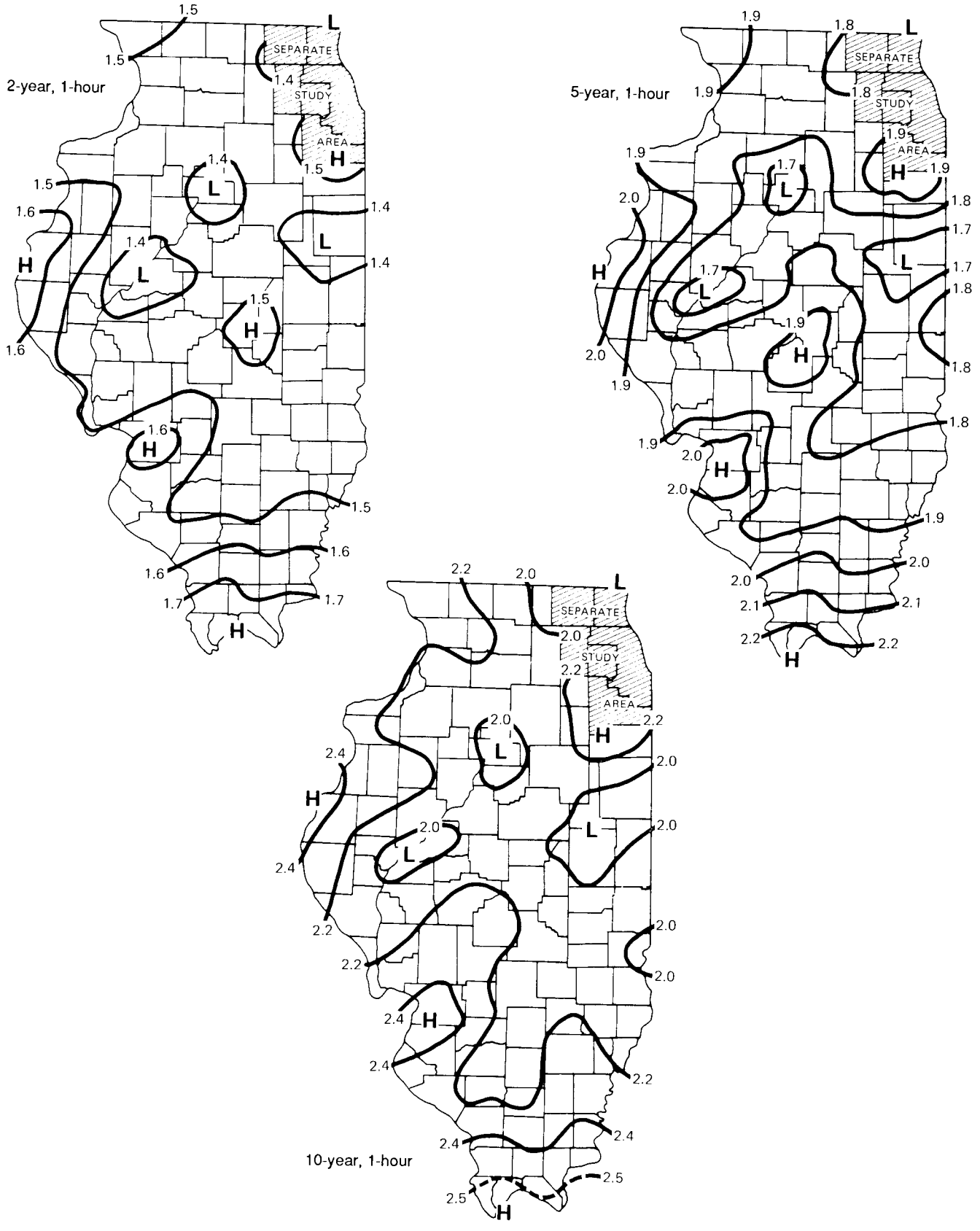


Figure 10. Spatial distributions of 1-hour rainfall (inches)

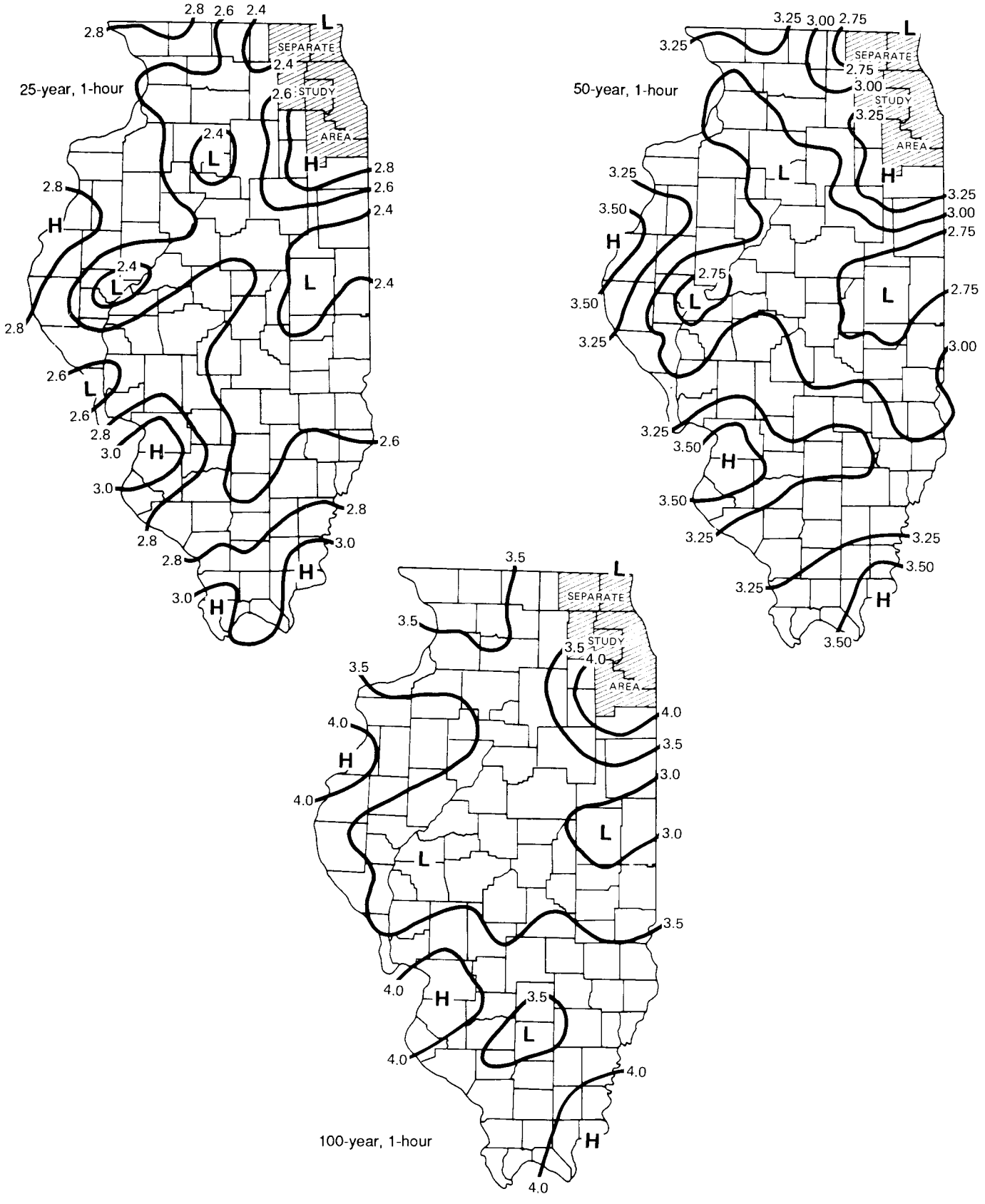


Figure 10. Concluded

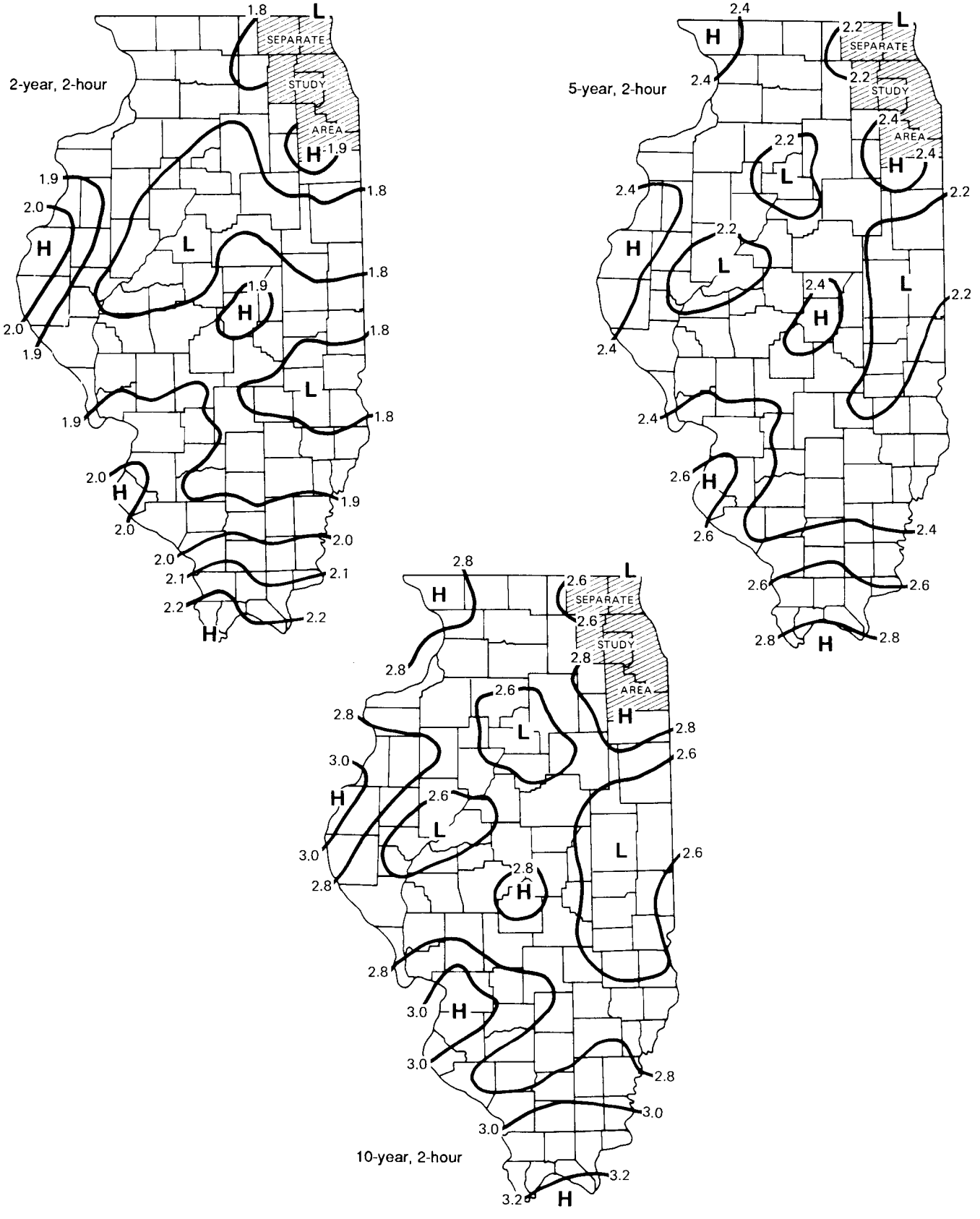


Figure 11. Spatial distributions of 2-hour rainfall (inches)

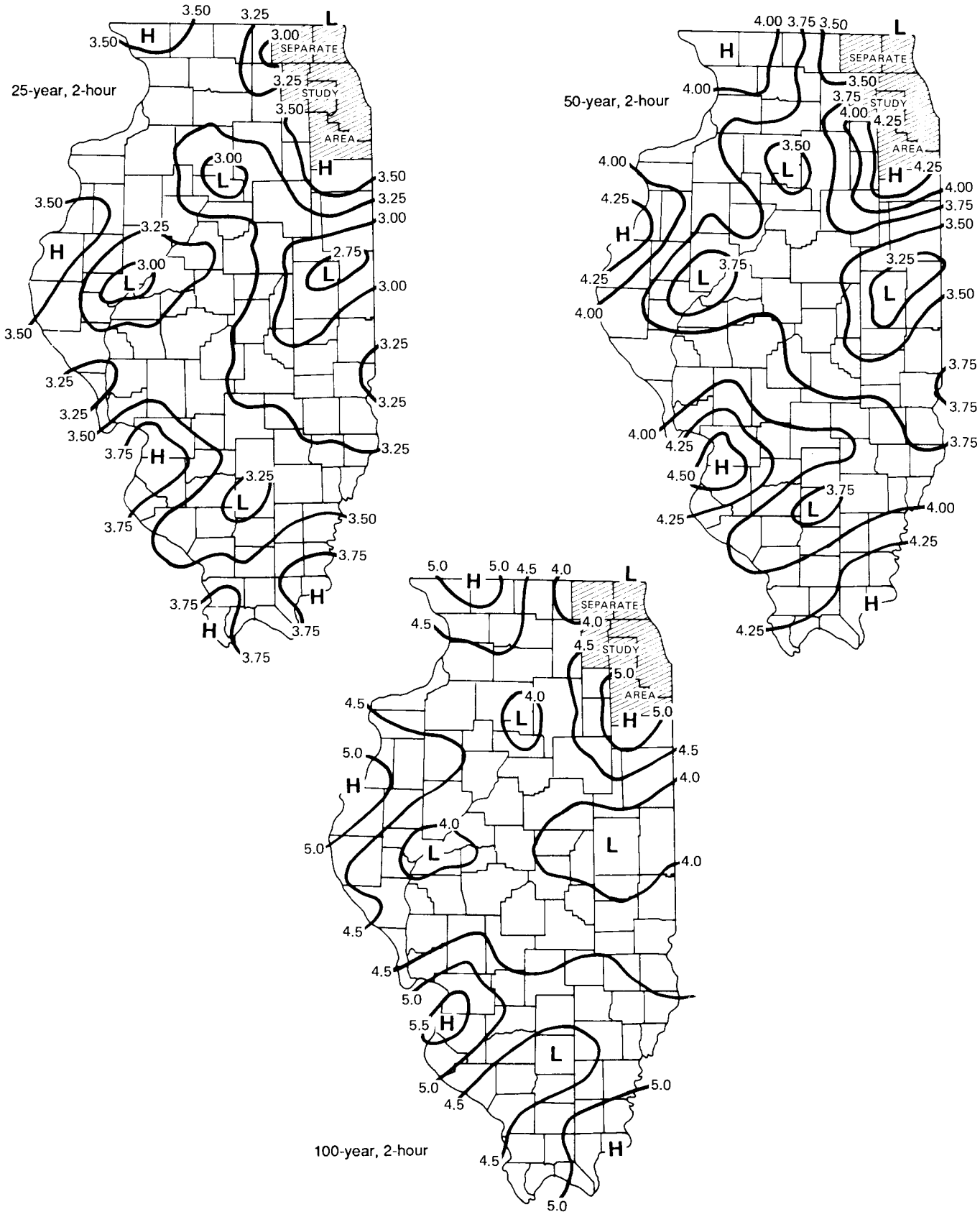


Figure 11. Concluded

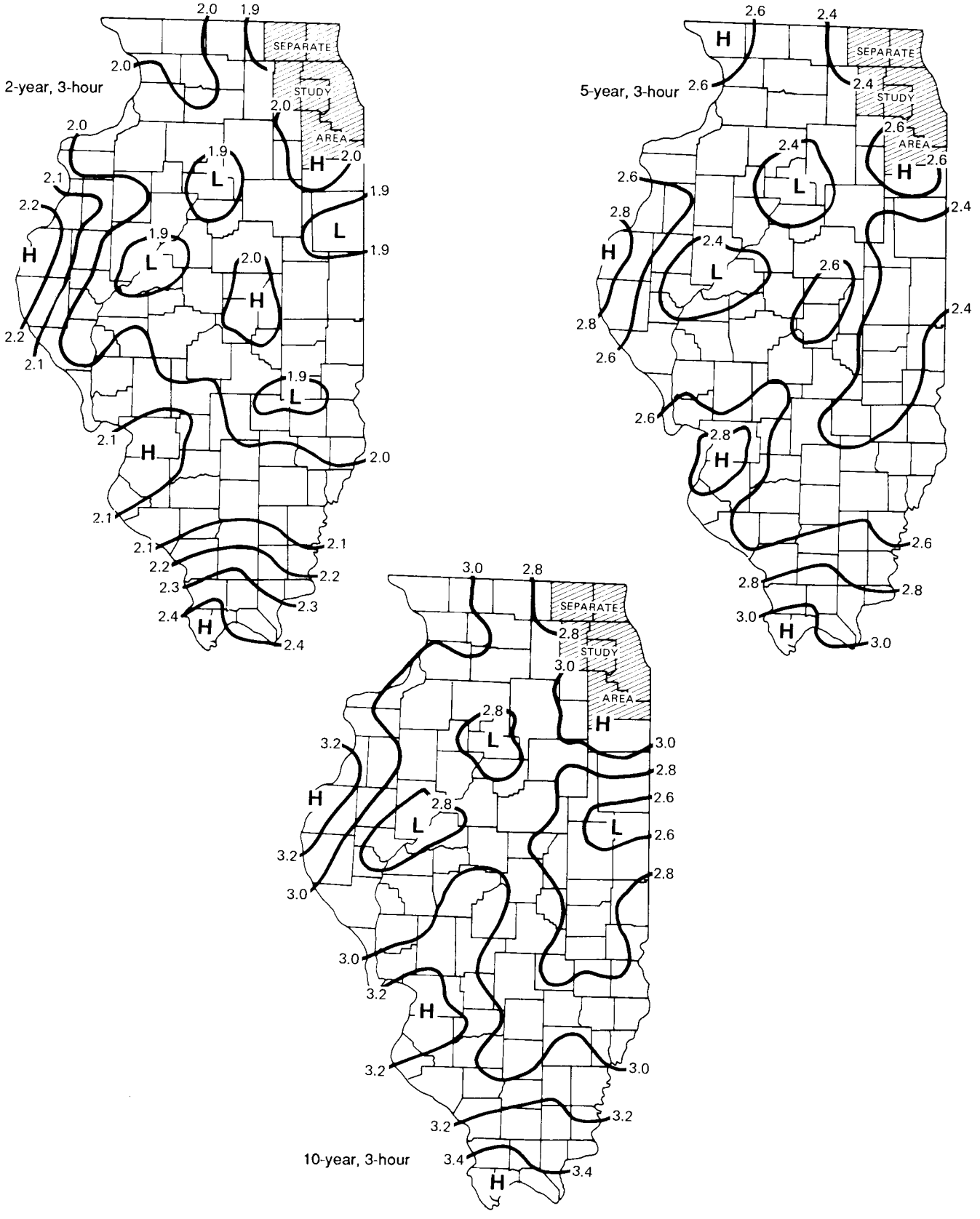


Figure 12. Spatial distributions of 3-hour rainfall (inches)

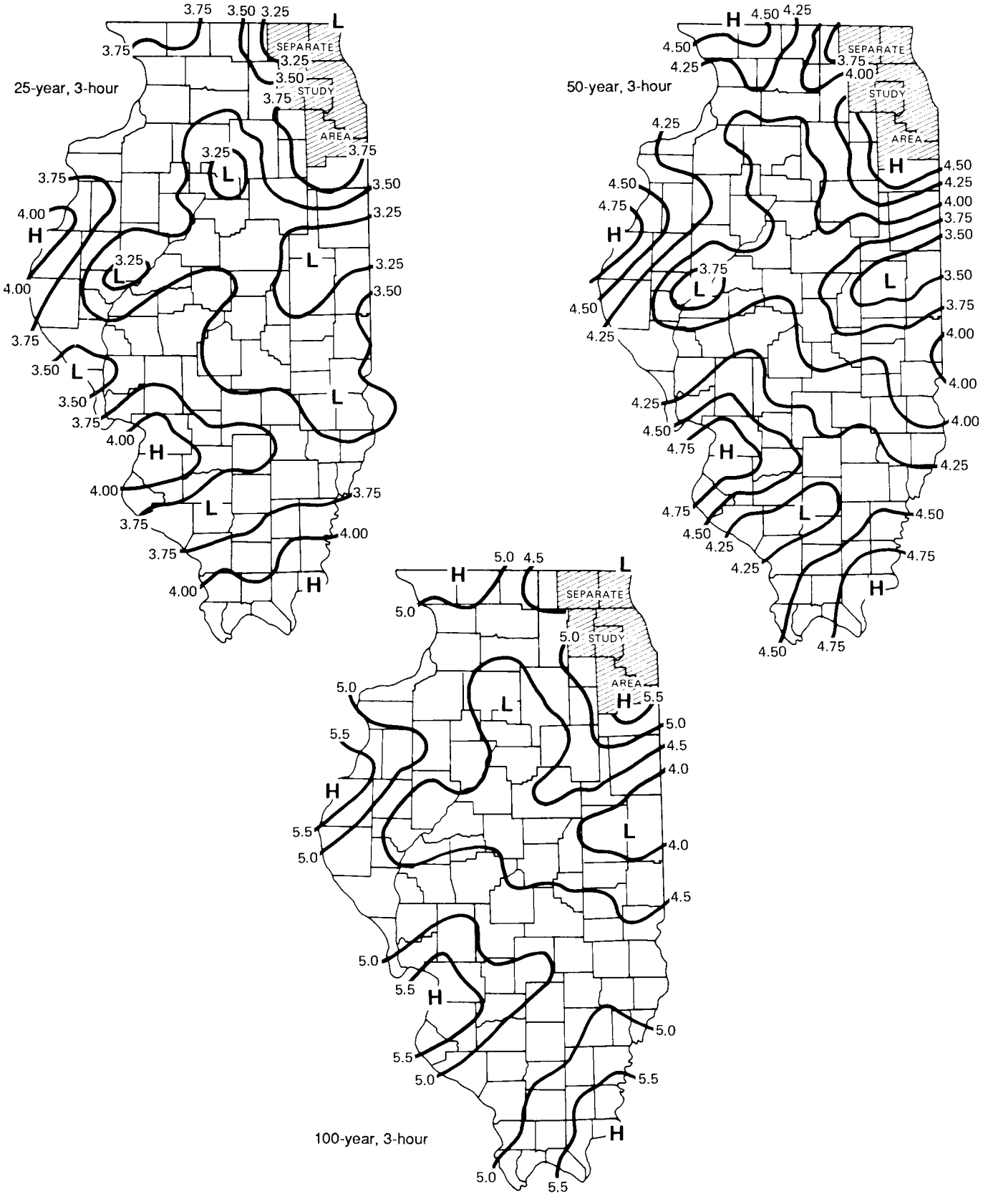


Figure 12. Concluded

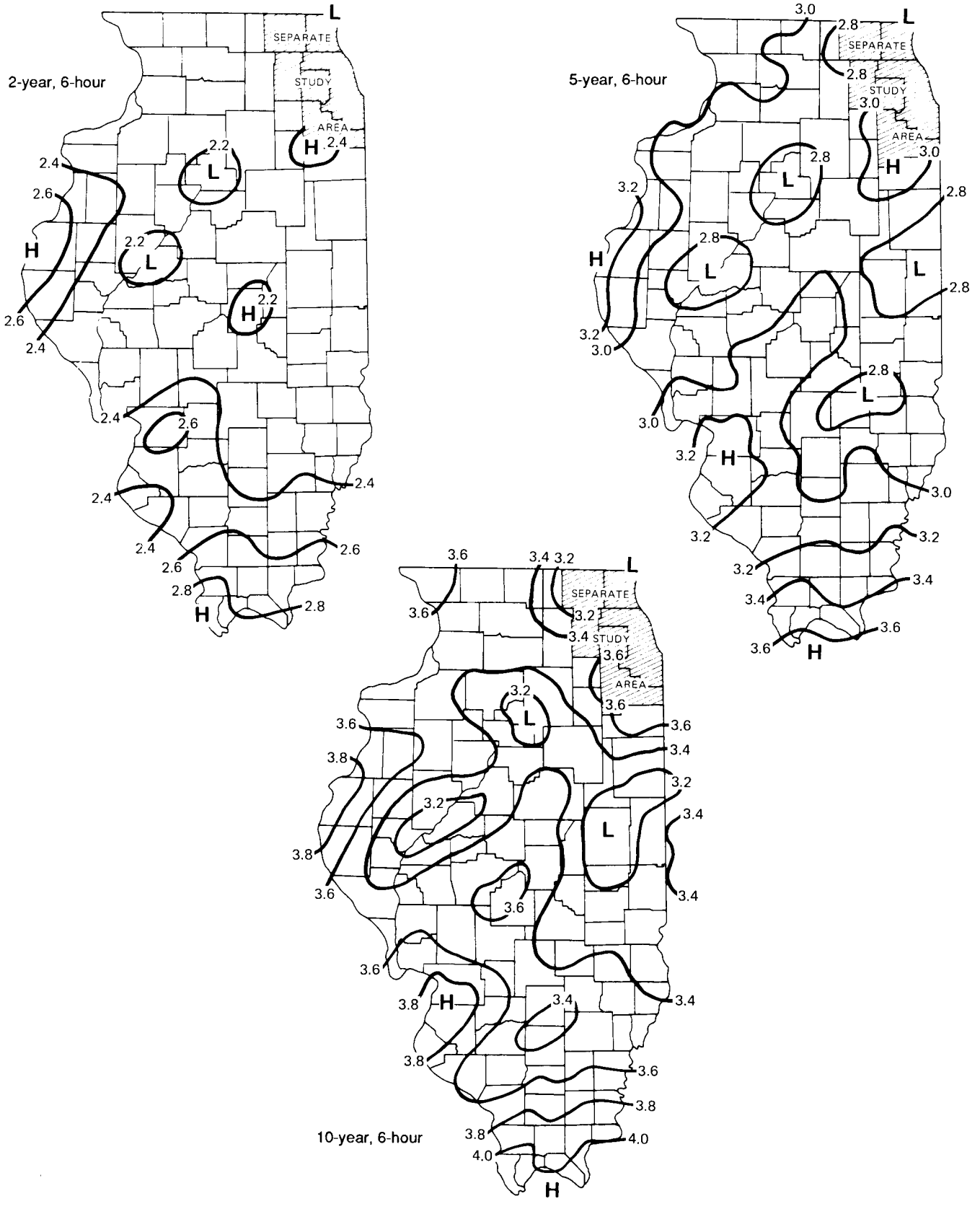


Figure 13. Spatial distributions of 6-hour rainfall (inches)

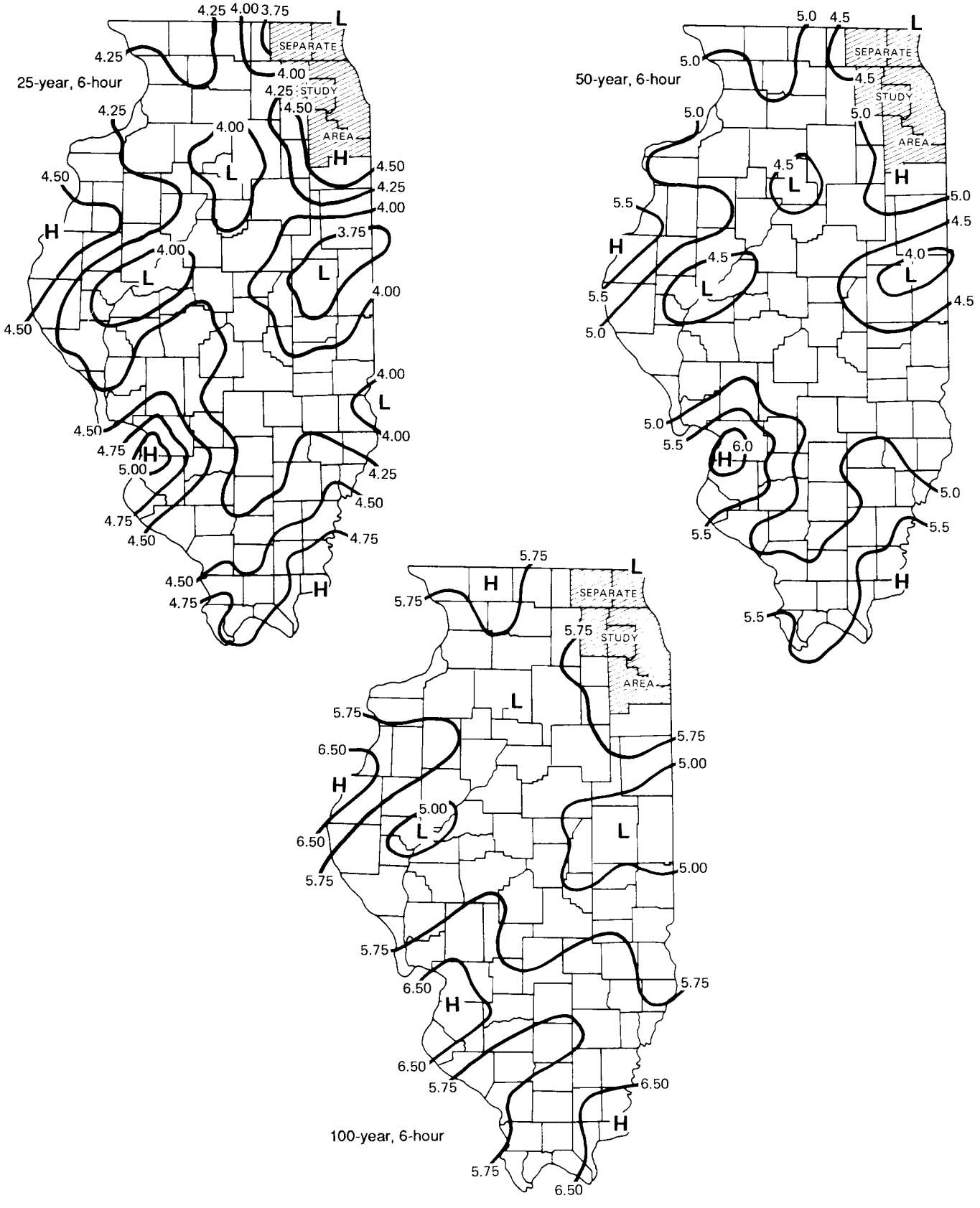


Figure 13. Concluded

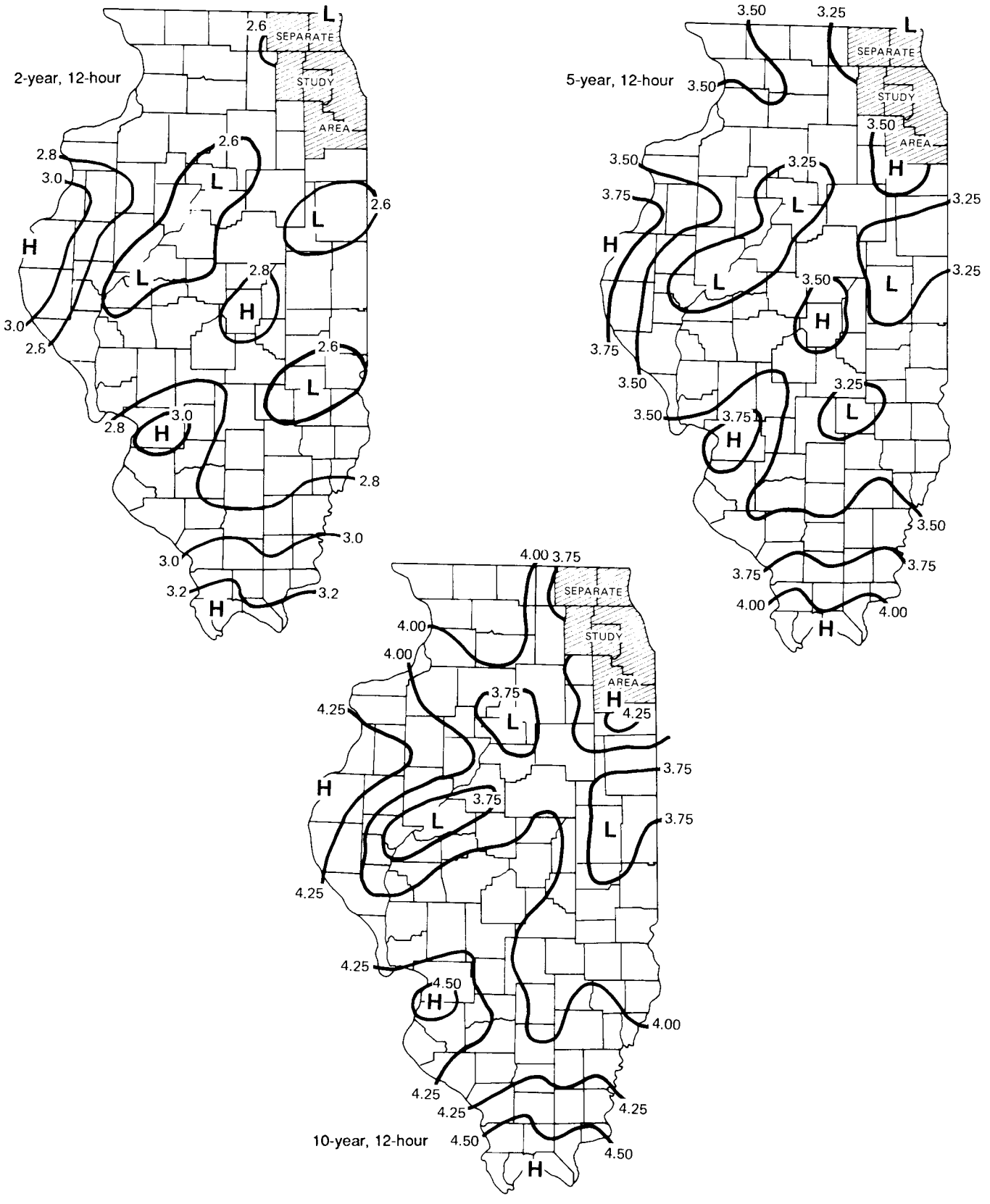


Figure 14. Spatial distributions of 12-hour rainfall (inches)

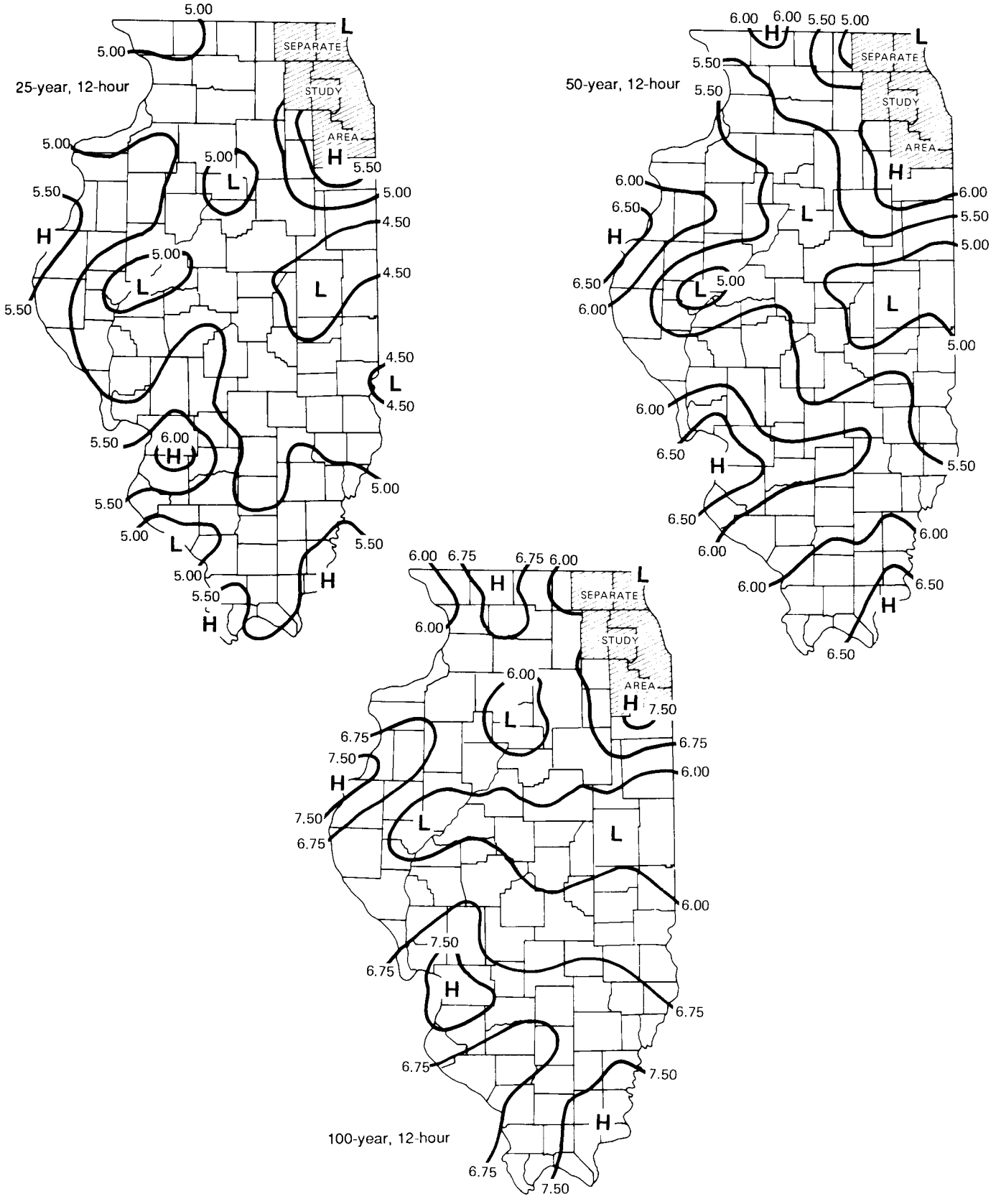


Figure 14. Concluded

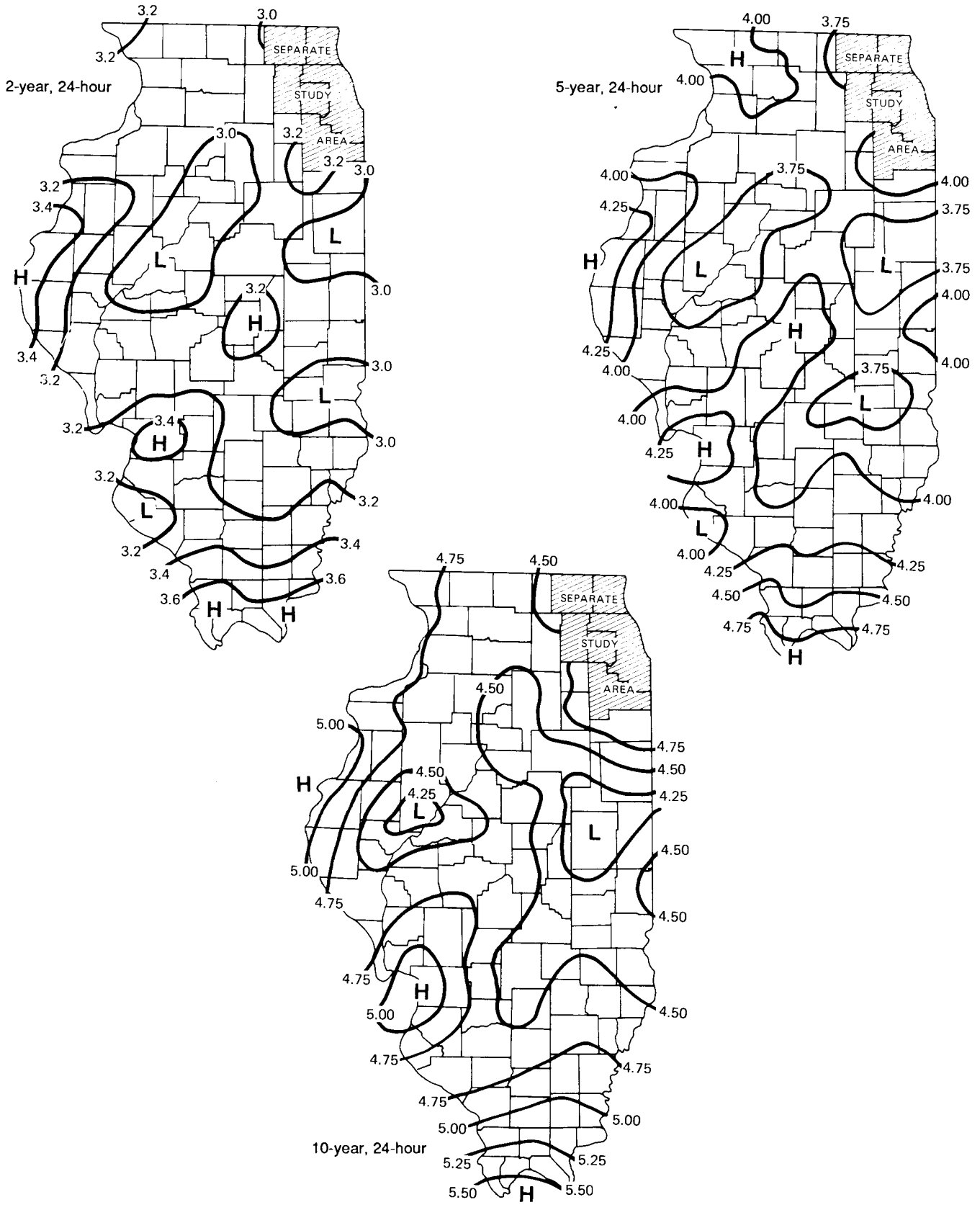


Figure 15. Spatial distributions of 24-hour rainfall (inches)

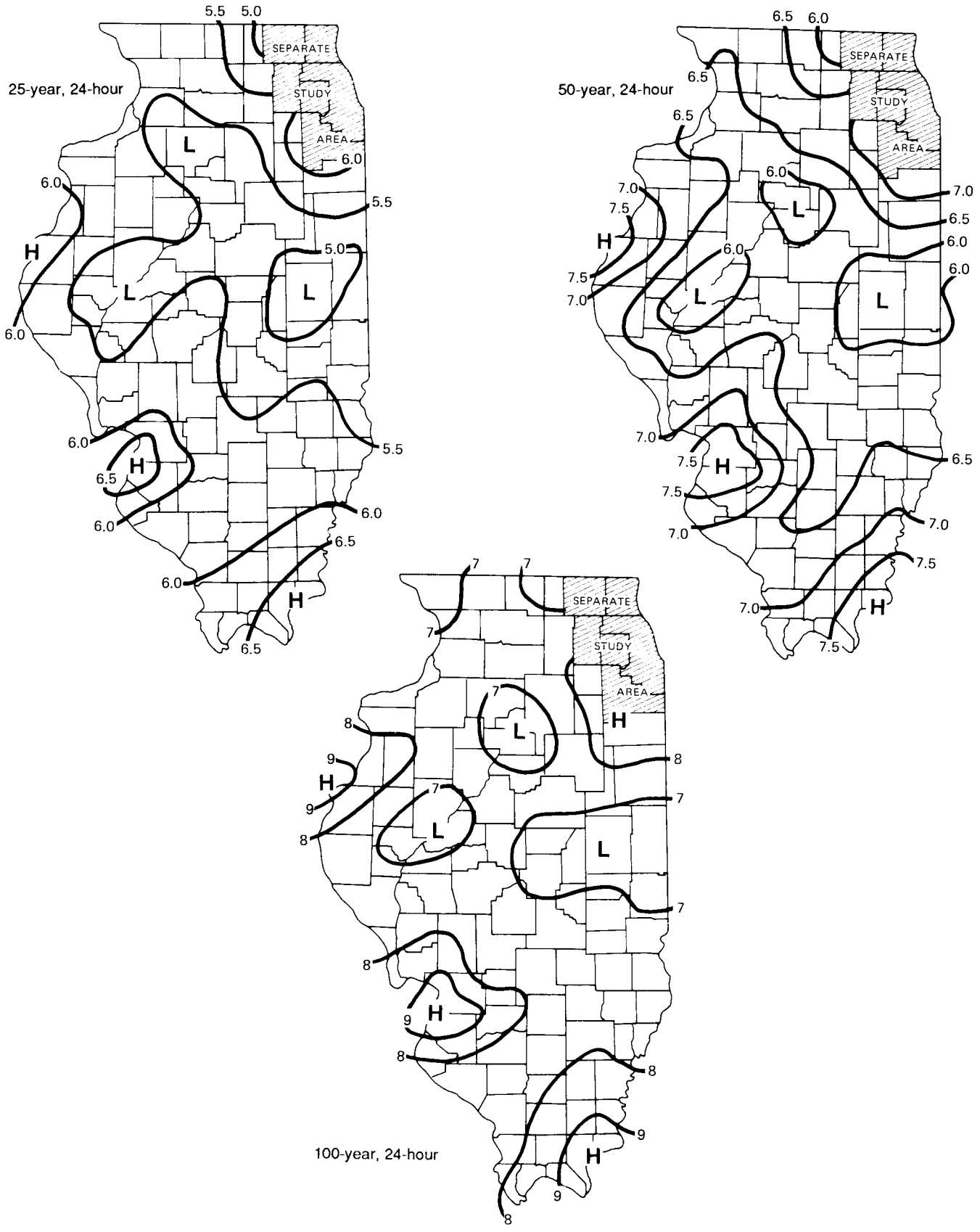


Figure 15. Concluded

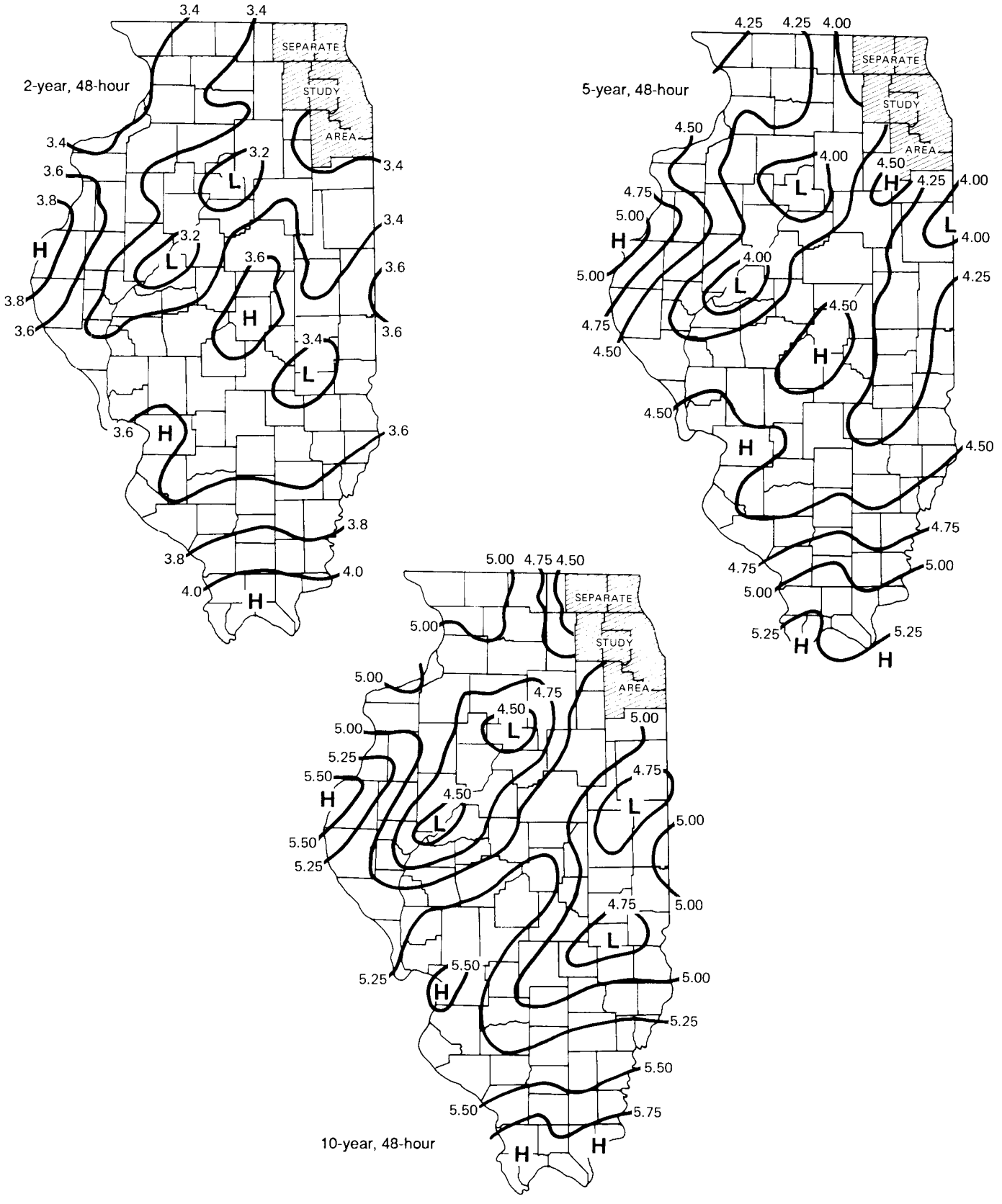


Figure 16. Spatial distributions of 48-hour rainfall (inches)

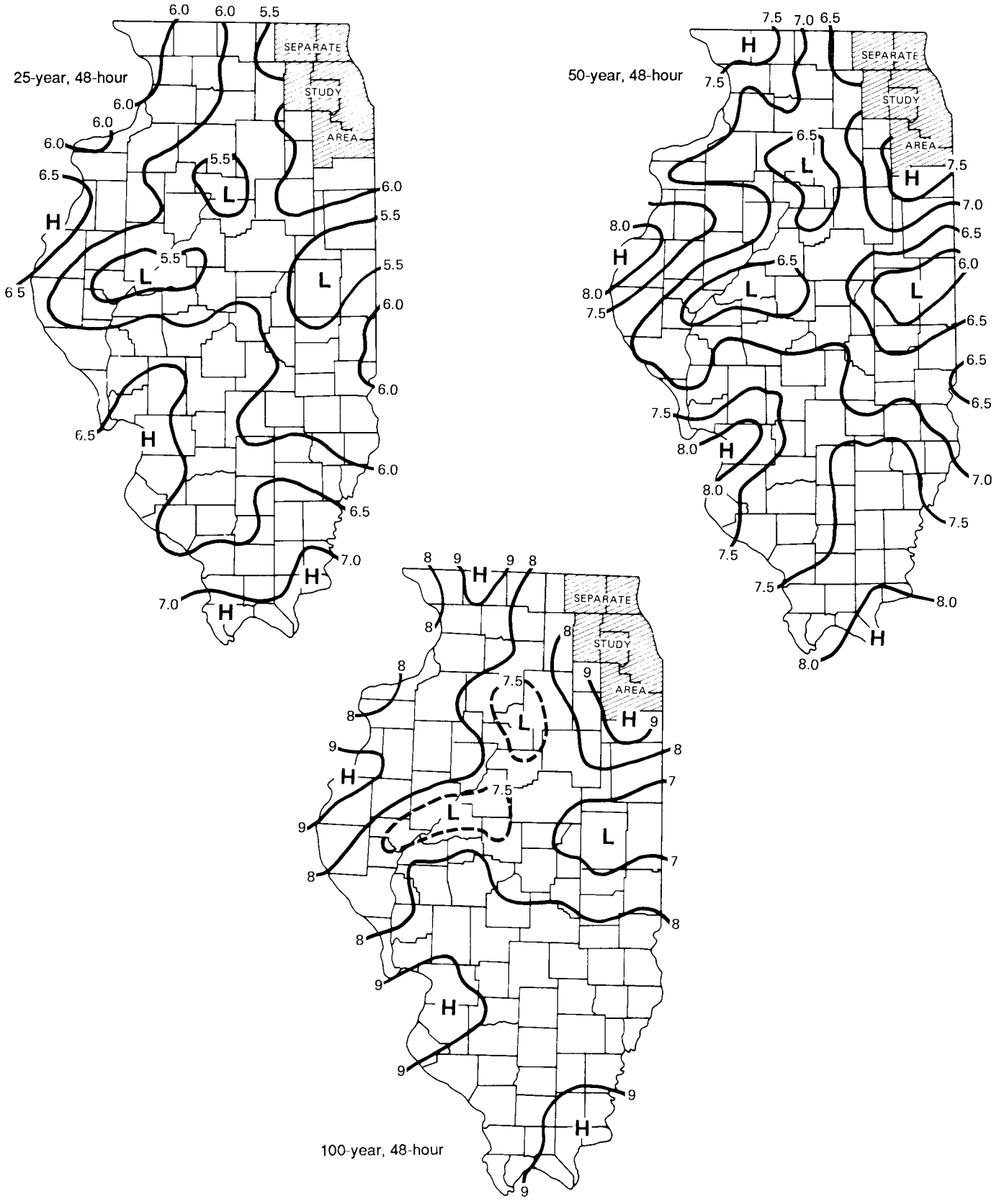


Figure 16. Concluded

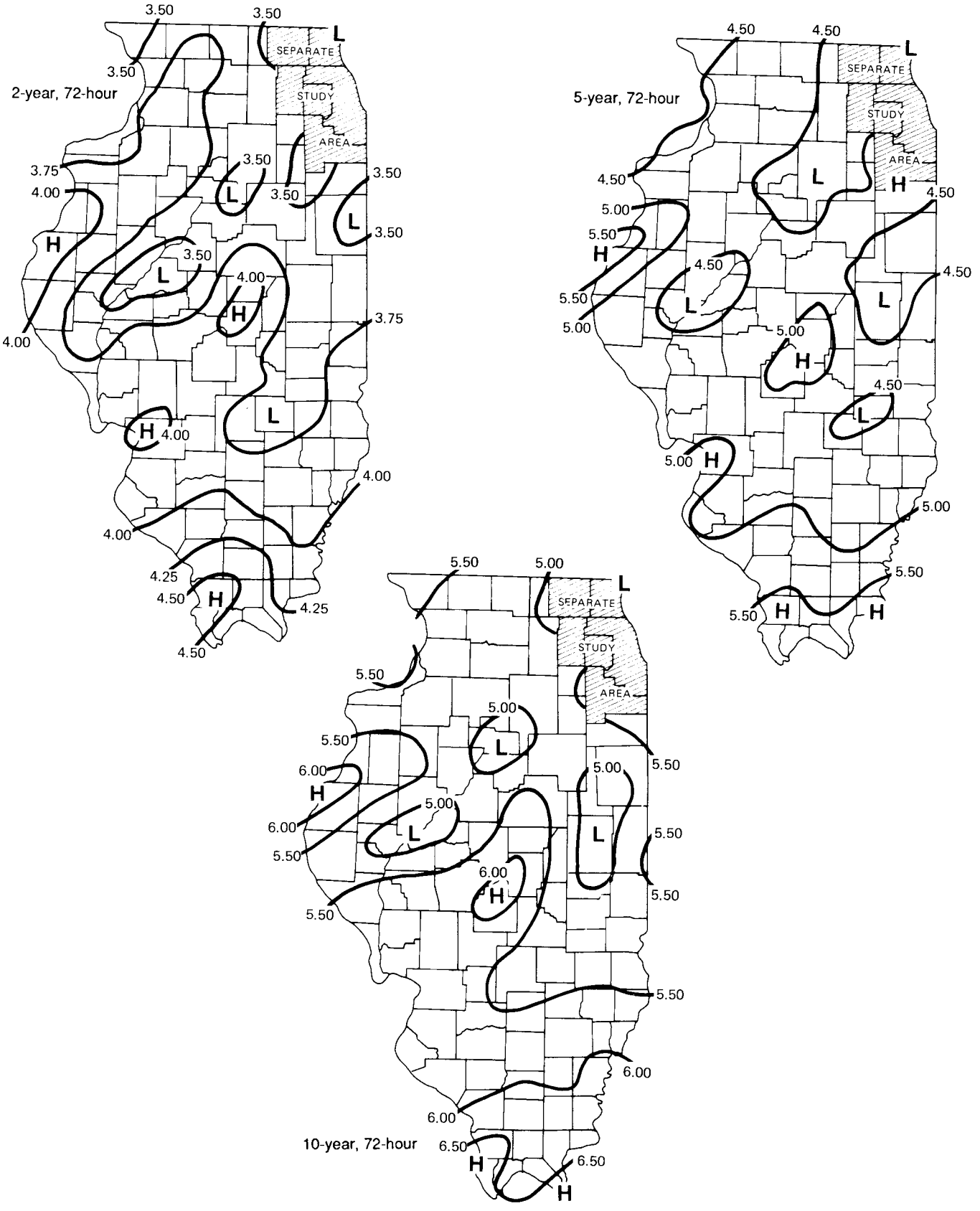


Figure 17. Spatial distributions of 72-hour rainfall (inches)

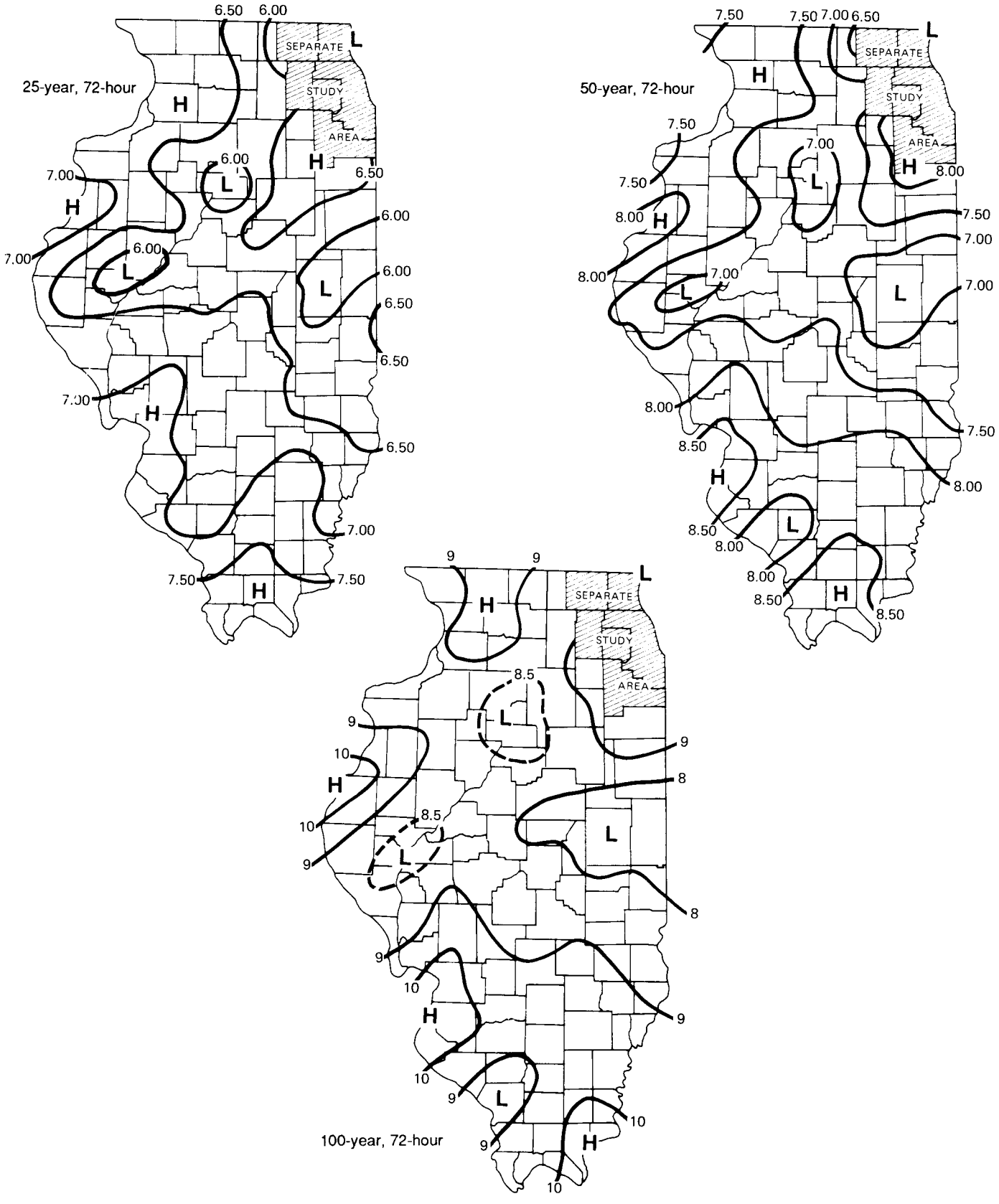


Figure 17. Concluded

Table 15. Increases/Decreases in New 24-Hour Maximum Rainfall Values in Illinois from Those in U.S. Weather Bureau Technical Paper 40 (Hershfield, 1961)

	Differences (in inches and percentages) for given recurrence intervals											
	2 yrs		5 *yrs*		*10 yrs*		25 *yrs*		50 *yrs*		100 *yrs*	
	in.	*%*	*in.*	*%*	*in.*	*%*	*in.*	*%*	*in.*	*%*	*in.*	*%*
Chicago	0.1	3	0.3	8	*0.5*	11	*0.9*	*16*	*1.3*	*20*	1.9	*25*
Moline	0.0	0	0.0	0	0.1	0	*0.4*	*7*	*0.7*	11	1.1	15
Peoria	-0.1	3	-0.2	6	0.0	0	0.1	2	0.3	5	0.5	7
Springfield	0.1	3	-0.2	6	0.1	2	0.3	5	0.6	9	0.9	12
Quincy	0.2	6	0.1	2	0.2	4	0.6	10	0.8	11	1.3	16
Urbana	0.0	0	-0.2	7	-0.1	2	-0.1	2	0.2	3	0.4	6
St. Louis	0.3	9	-0.3	8	-0.1	2	0.4	7	0.8	11	1.3	16
Cairo	0.0	Q	0.1	2	0.1	2	0.4	6	0.6	11	1.3	16
Mean		3		5		3		7		10		14
Median		*3*		*6*		*2*		*6*		11		15

4. URBAN EFFECTS ON FREQUENCY DISTRIBUTIONS

In view of the results of the substantial past Water Survey research on the effects of urban environments on the incidence and magnitudes of heavy rainstorms, it was considered necessary to assess and incorporate (if feasible) urban effects on the frequency distributions of heavy rainfall in Illinois. Two major urban areas are of sufficient size to cause local effects: the Chicago urban area, and a region lying east and northeast of the St. Louis metropolitan area. Other urban areas within or adjacent to the state are not considered large enough to affect the heavy rainfall distributions significantly.

Several earlier studies revealed evidence of local shifts of heavy rain events in the Chicago area. Detweiller and Changnon (1976) found an upward trend in the Chicago (and St. Louis) maximum annual daily rain values; Changnon (1980a) found that increased urban flooding in Chicago was related to local increases in heavy rain events; and Changnon (1980b) showed how storms were enhanced in urban areas. Huff and Changnon (1973) demonstrated that both Chicago and St. Louis have experienced sizable local increases in summer thunderstorms and rain days.

Huff and Changnon (1987) revealed that urban-related increases in heavy rains occurred in the St. Louis area during 1971-1975, when intensive field studies (METROMEX Project, Changnon et al., 1977) were carried out in that region. Thus, considerable evidence exists, in both cities and their environs, of localized increases in heavy rain events on the order of 10 to 25% in both incidence and magnitude.

The Chicago Effect

Huff and Vogel (1976) made a detailed study of the heavy rainfall distribution within the Chicago urban area and the surrounding six-county area, using an urban network of *16* recording raingages on an area of approximately 430 square miles during the 1949-1974 period (figure 18). These gages were operated by the Metropolitan Sanitary District of Greater Chicago, the city of Chicago, and the National Weather Service. Frequency distributions of point rainfall were derived for storm rainfall periods of 5 minutes to 72 hours and for recurrence intervals of 6 months to 50 years.

Results of this study indicated a central urban high in the isohyetal patterns for a given storm duration and recurrence interval. This high appeared to consist of two centers, one over the north central portion of the urban area and the other over the extreme southern part. The pattern is illustrated in figure 19 for 12-hour to 72-hour storm periods and a recurrence interval of 5 years.

However, even more pronounced highs in the heavy rainfall distributions were indicated 1) in the Aurora region, about 23 miles west of the western boundary of the urban area; and 2) at Joliet, about 13 miles

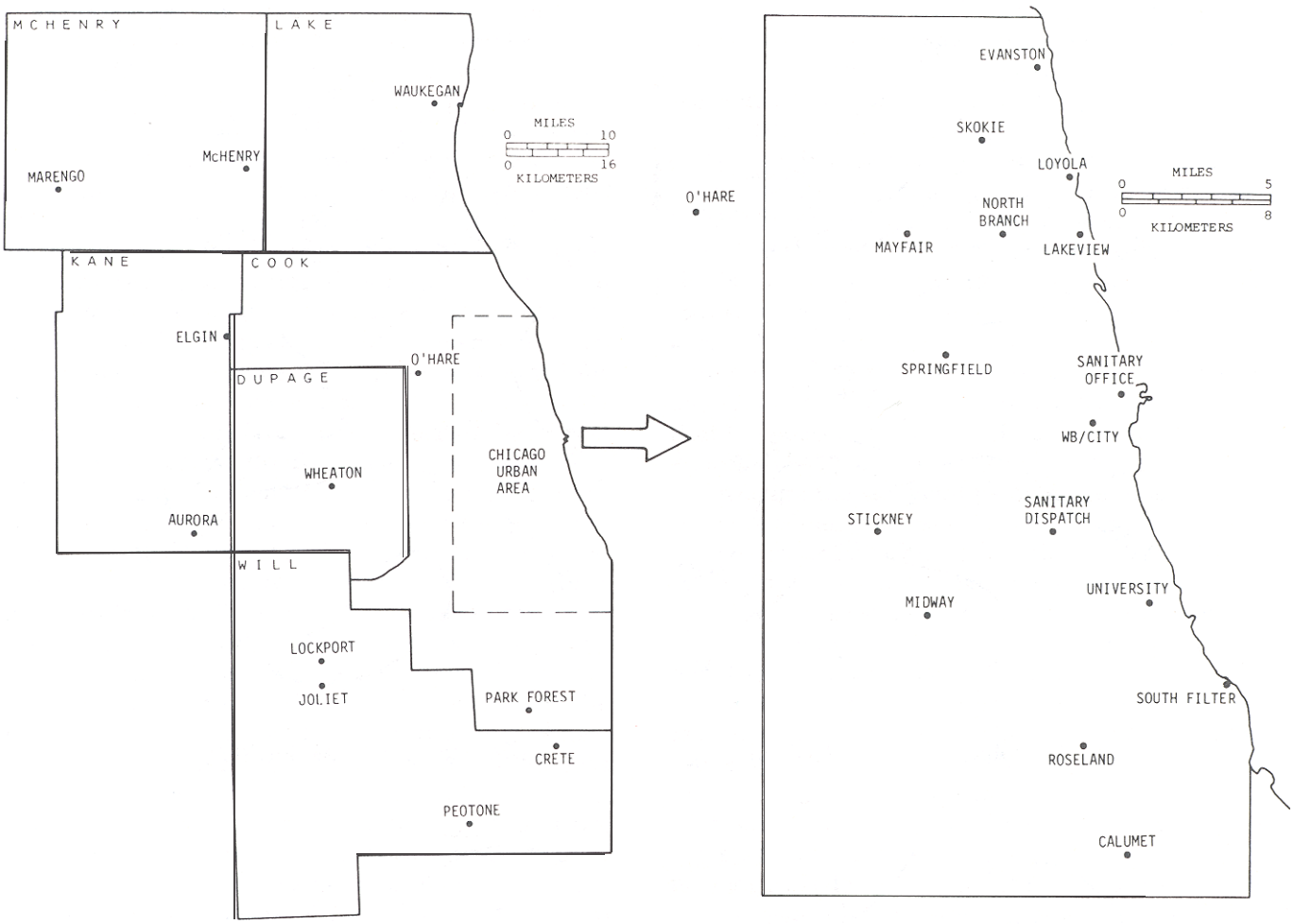


Figure 18. Location maps for northeast Illinois study

southwest of the central city. These areas are usually upwind of the city in heavy rainstorms, and therefore are not usually influenced significantly by the urban environment. The 1949.1974 data indicated a low in the climatic pattern of heavy rainstorms in the Waukegan area north of the city.

Results of the 1949.1974 and the present 1901. 1983 study suggest that the south urban high is quite likely related to a natural local climatic feature that produces an area of increased rainfall extending from Aurora to Joliet and south-southeast to Kankakee. The north central high (figure 19) appears to be urban-related; that is, produced by rainfall enhancement by the urban environment (Changnon, 1980b). The Waukegan low in the extreme northeast part of the urban area may be related to the stabilizing influence of Lake Michigan on convective rainfall, which results in fewer raincells and lower rain rates than experienced over the adjacent rural areas (Changnon, 1984b).

The results of the Huff-Vogel study and the present Illinois frequency study were evaluated to determine whether there is a need to adjust the 1949. 1974 findings to conform with the 1901-1983 results. The Chicago raingage network data have apparently deteriorated substantially in quality since 1974, according to recent data analyses and inspection of existing raingage sites by Water Survey scientists. Consequently, the urban network data since 1974 could not be used in assessing the adjustment needs.

An adjustment was achieved by comparing frequency relations obtained from the 1949.1974 data with those obtained from the 1901-1983 data for the long-term stations at Waukegan, Marengo, Aurora, Joliet, and the main urban station of the National Weather Service. This station has been located at Midway Airport since 1943, but previously was at the NWS downtown office (1901-1926) and at the University of Chicago (1927-1942) (at the locations and "University" in figure 18).

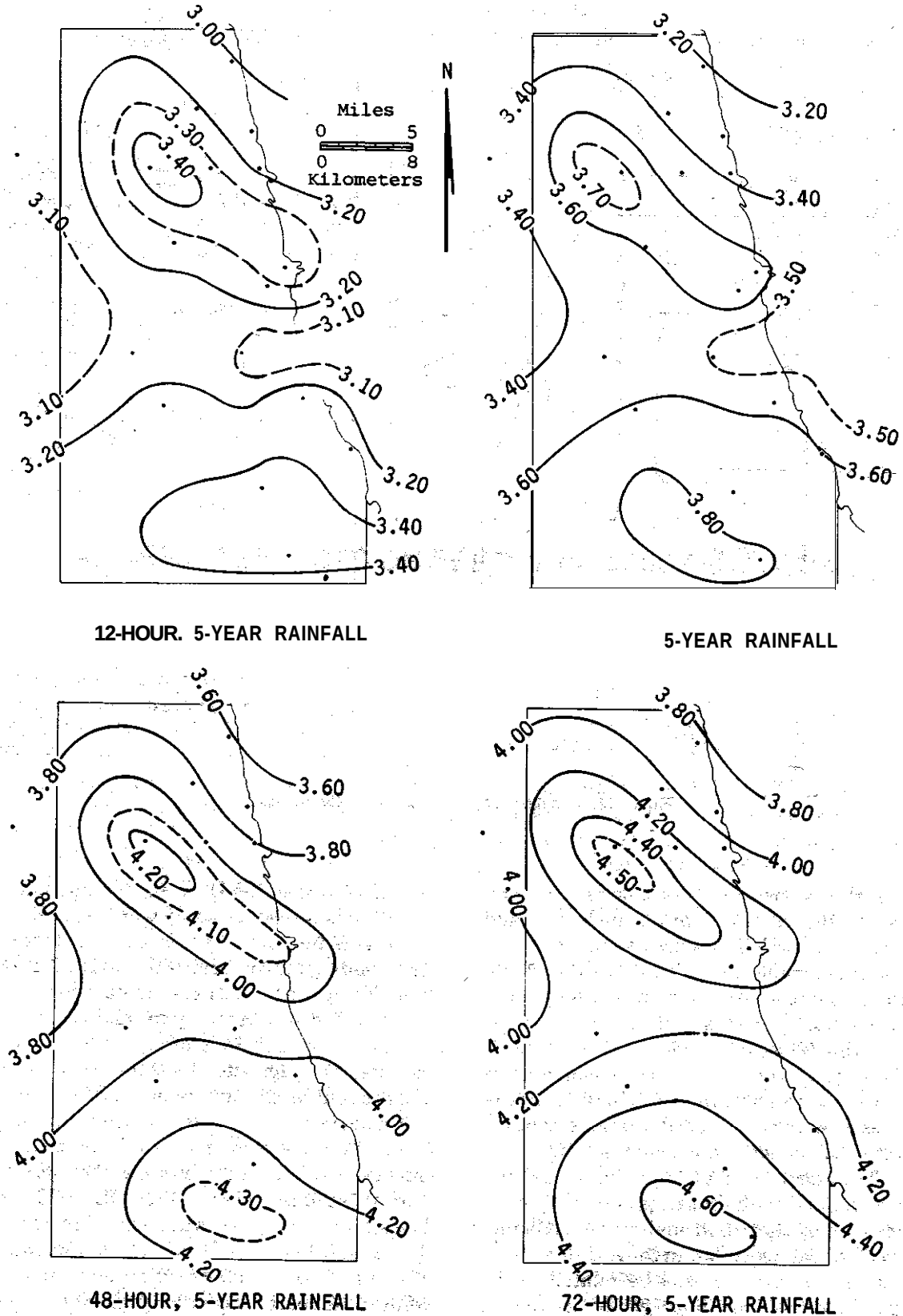


Figure 19. Isohyetal patterns (inches) in the Chicago urban area (from Huff and Vogel, 1976)

In assessing the need to adjust the 1949-1974 results, ratios of 1901-1983/1949-1974 rainfall were calculated for selected recurrence intervals and rain periods. The results for 24-hour rain periods are illustrated in table 16, in which the 1901-1983/1949-1974 rainfall ratios are shown for various recurrence intervals for the five stations used in the assessment analysis. Relatively small differences are indicated, on the average, for Chicago, Waukegan, and Marengo. However, the ratios for Aurora and Joliet (to the west and southwest) indicate a substantial increase in the intensity of rainfall for the given recurrence intervals. Similar findings were obtained for the other storm periods tested.

The magnitudes of the ratios indicated that it was necessary to adjust the frequency relations for the Chicago urban area and the six surrounding counties to reflect findings from the longer sampling period (1901-1983), and to include the climatic fluctuation adjustment incorporated into the 1901-1983 analyses (Section 3). The first step was to construct ratio maps for the urban and six-county areas, using the five-station analytical results. This allowed adjustment of the 1949-1974 rainfall amounts at the various urban stations and other stations (e.g., Wheaton and Elgin) not included in the 1901-1983 data sample. This was initially done for a 24-hour storm period and recurrence intervals of 1 to 100 years. Isohyetal maps were then drawn for the urban area and for the surrounding six-county area.

The maps for the urban area for 24-hour rain periods are shown in figure 20. The spatial patterns shown by these maps and those constructed from the 1949-1974 data are essentially the same. For example, in both these maps and those in figure 19, two urban highs are shown, one over the north central and the other over the southern part of the city. Both figures show a low in the northeastern part of the city that apparently continues southward offshore east of the urban area. Both figures show a secondary low extending west of the city.

Figure 21 shows the adjusted isohyetal patterns of 24-hour rainfall for the six-county area outside of the urban area. Reference to the results of Huff and Vogel (1976) showed that the six-county maps derived from the two sampling periods were also very similar with respect to isohyetal patterns. The six-county maps show a pronounced low in the Waukegan area and a strong high in the southwestern and southern part of the region from Aurora to Joliet and eastward. From figures 20 and 21, it is apparent that the southern urban high is an extension of the Aurora-Joliet-Kankakee high discussed previously.

Although the isohyetal patterns derived from the two sets of data are very similar, the rainfall values derived from the 1901-1983 data are substantially larger in some regions for given recurrence intervals. This is illustrated in table 17, which was constructed from rainfall values interpolated from isohyetal maps for the two sampling periods. The smallest differences occurred at Waukegan and Marengo. Differences at the two urban stations (Midway and Mayfair) were larger, but not nearly as large as those for Aurora and Joliet.

It has been established from various Water Survey studies, including the 1949-1974 study and the present 1901-1983 study, that isohyetal patterns remain essentially the same for various storm periods and recurrence intervals. For example, note in figure 19 that the patterns are essentially the same for the 12-hour, 24-hour, 48-hour, and 72-hour isohyetal maps of 5-year rainfall. In view of this finding, it was decided to greatly reduce the work load (and, consequently, costs) by using the 24-hour isohyetal pat-

Table 16. 1901-1983/1949-1974 **Rainfall Ratios for Storm Periods of 24 Hours and Selected Recurrence Intervals**

Recurrence interval (years)	*Rainfall ratio for given station*				
	Chicago	*Waukegan*	*Marengo*	*Aurora*	*Joliet*
1	1.04	1.09	1.07	1.08	1.18
2	1.04	1.09	1.08	1.11	1.16
5	1.06	1.06	1.02	1.15	1.22
10	1.07	1.02	0.99	1.17	1.26
25	1.06	1.01	0.96	1.19	1.28
50	1.05	1.01	0.96	1.19	1.28
Average	1.05	1.05	1.02	1.15	1.23

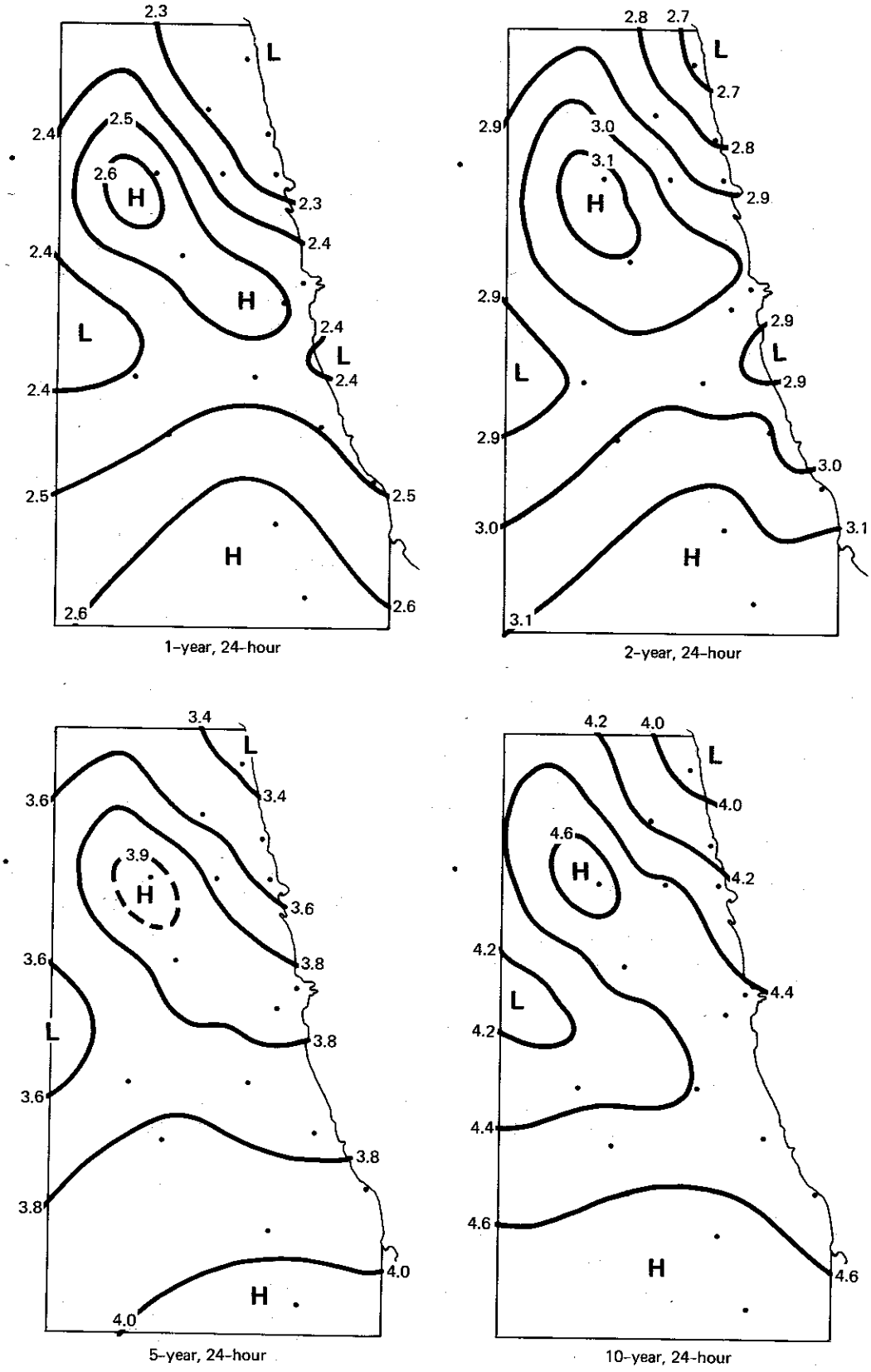


Figure 20. Frequency distribution of 24-hour maximum rainfall (inches), Chicago urban area (adjusted)

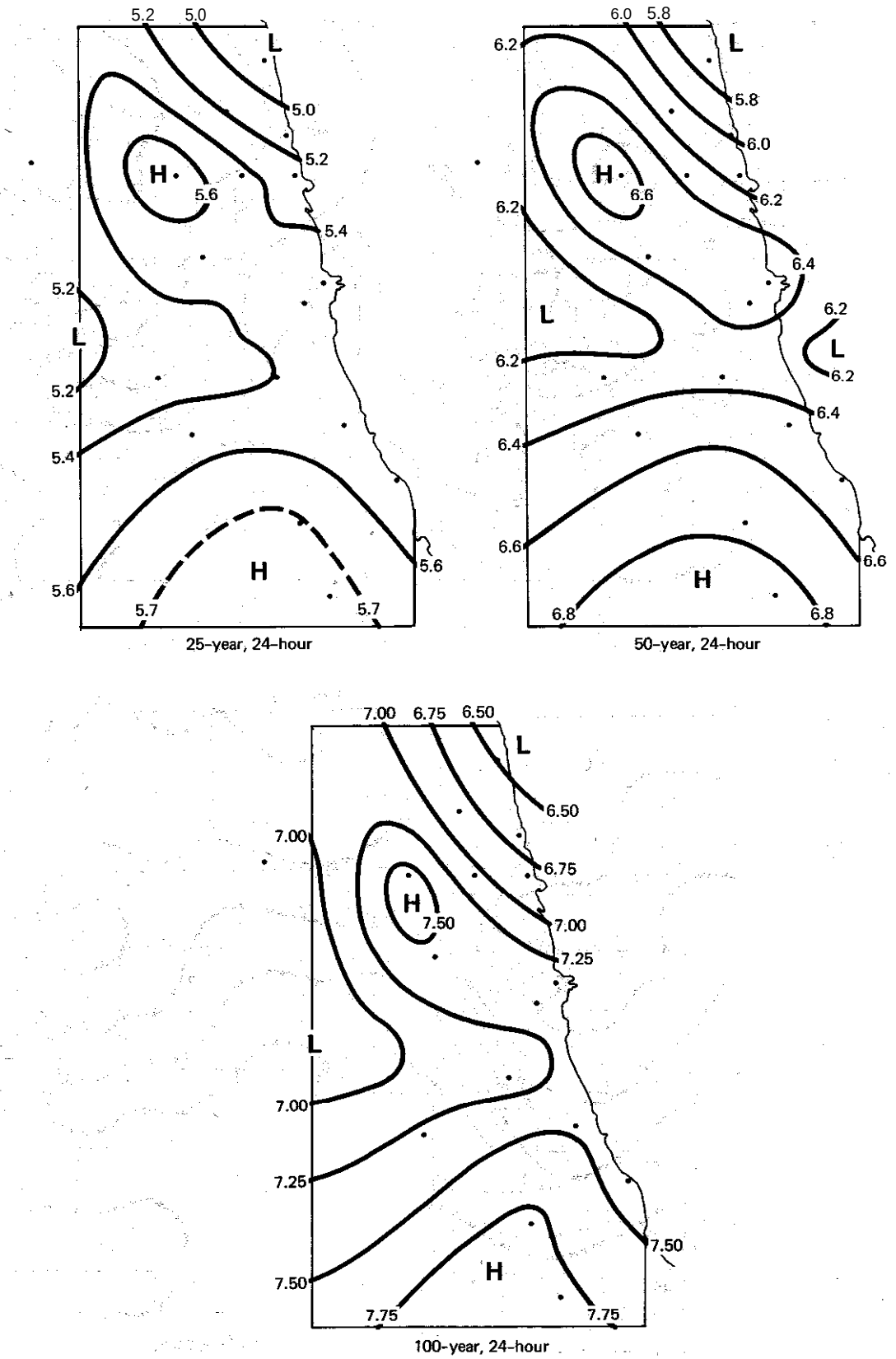


Figure 20. Concluded

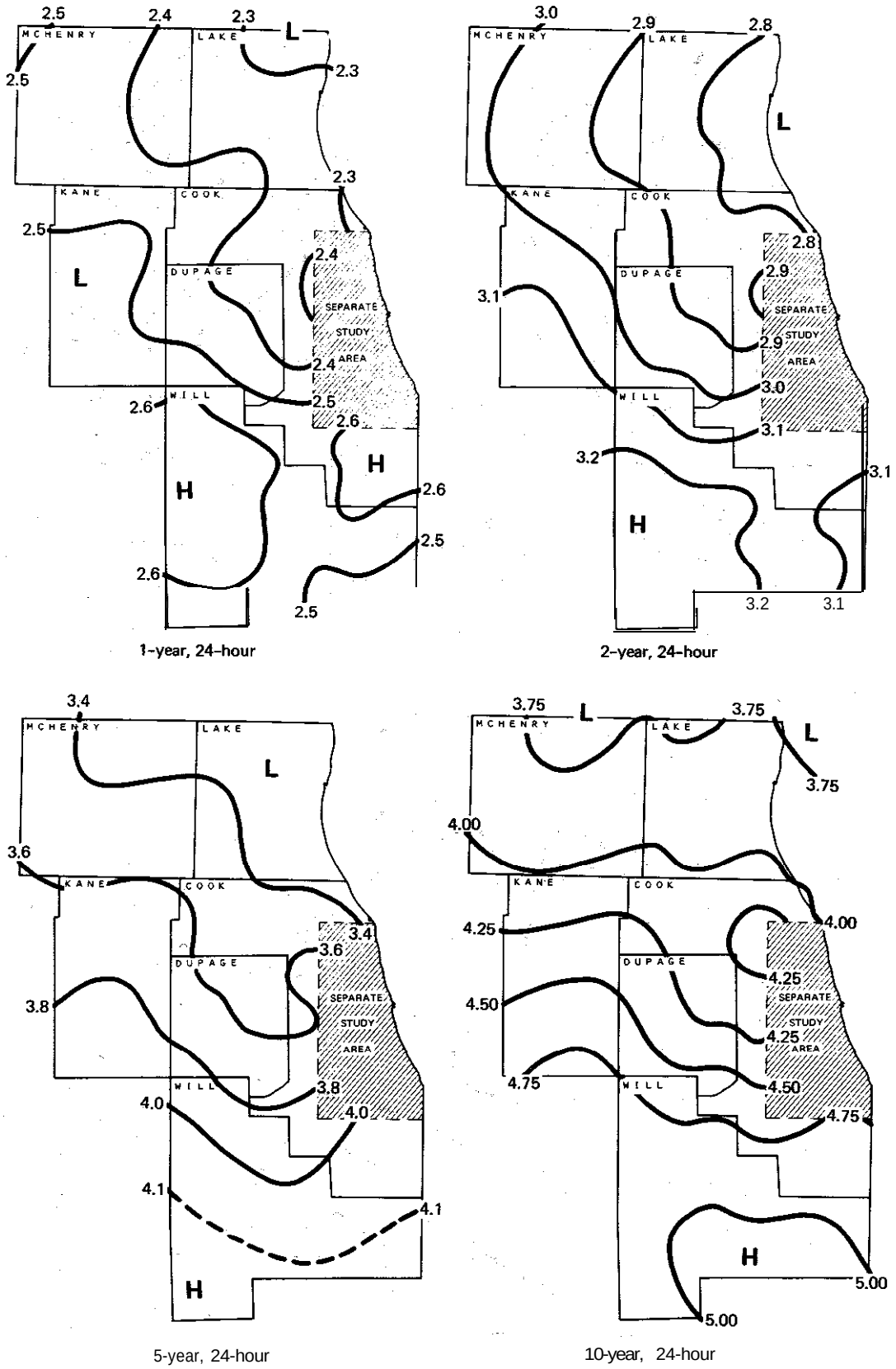
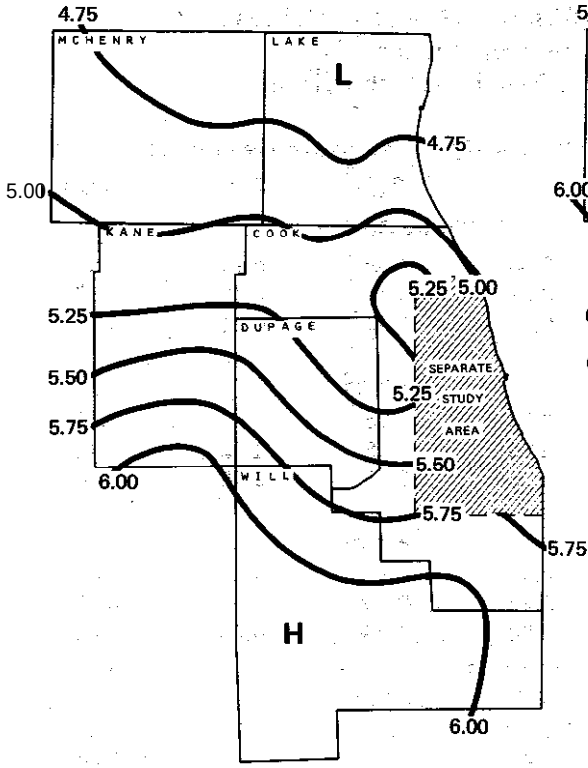
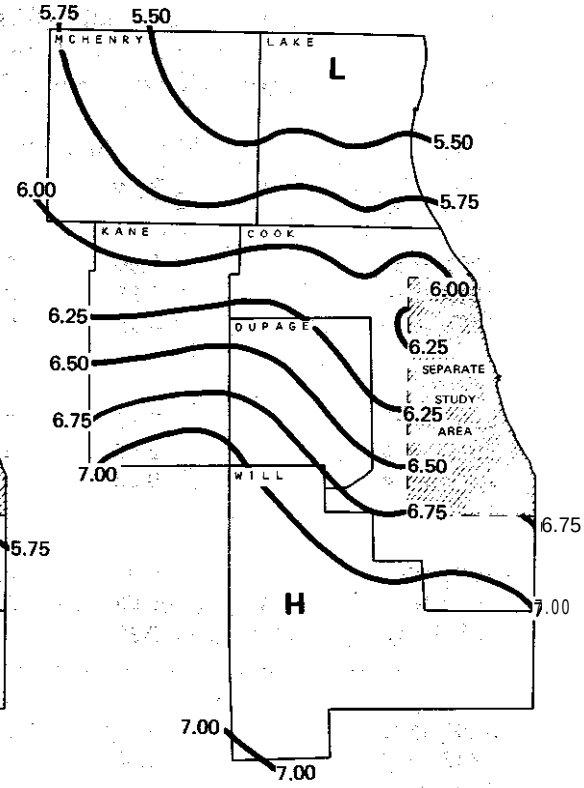


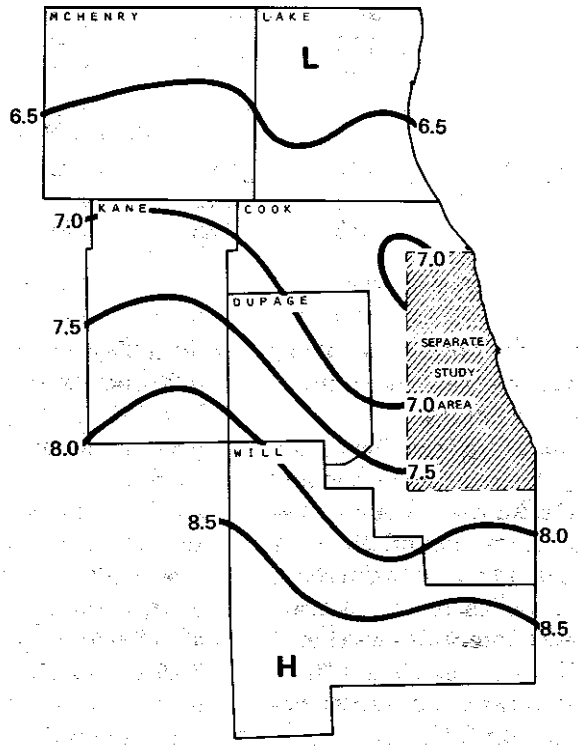
Figure 21. Frequency distribution of 24-hour maximum rainfall (inches), six-county (adjusted)



25-year, 24-hour



50-year, 24-hour



100-year, 24-hour

Figure 21. Concluded

Table 17. Differences between 24-Hour Storm Rainfall Amounts Derived from 1901-1983 and 1949-1974 Values for Selected Recurrence Intervals in Six-County Area of Northeastern Illinois

	Rainfall (inches) for given recurrence interval				
	2 yrs	5 yrs	*10 yrs*	25yrs	50yrs
			Chicago Midway		
1901-1983	3.00	3.83	4.49	5.46,	6.47
1949-1974	2.88	3.62	4.18	5.15	6.17
Difference	0.12	0.21	0.31	0.31	0.30
			Waukegan		
1901-1983	2.82	3.38	3.75	4.60	5.45
1949.1974	2.60	3.20	3.65	4.55	5.41
Difference	0.22	0.18	0.10	0.05	0.04
			Marengo		
1901-1983	2.98	3.48	3.87	4.90	5.80
1949-1974	2.79	3.42	3.90	4.90	5.83
Difference	0.19	0.06	-0.03	0.00	-0.03
			Aurora		
1901-1983	3.10	3.90	4.76	6.00	7.10
1949-1974	2.80	3.45	3.96	4.92	5.85
Difference	0.30	0.45	0.80	1.08	1.25
			Joliet		
1901-1983	3.17	4.02	4.85	6.02	7.10
1949.1974	2.75	3.30	3.90	4.78	5.70
Difference	0.42	0.72	0.95	1.24	1.40
			Chicago Mayfair		
1901-1983	3.14	3.94	4.71	5.72~	6.72
1949-1974	3.02	3.72	4.40	5.40	6.40
Difference	.12	0.22	0.31	0.32	0.32

terns as a base, and to express all other frequency relations for other storm periods and recurrence intervals as a function of the 24-hour values.

Tables 18 and 19 accomplish the transformation from figures 20 and **21** to any desired rain period and recurrence interval. Table 18 shows x-hour to 24-hour ratios for rain periods from 5 minutes to 72 hours. The ratios are applicable to all recurrence intervals. Table 19 provides ratios for calculating frequency values for recurrence intervals less than 1 year, which are not provided in figures 20 and **21.**

The following example illustrates the use of figures 20 and 21 in conjunction with tables 18 and 19. Assume a user wishes to calculate the maximum 6-hour rainfall expected to occur, on the average, once in 25 years at Aurora (figure 18). The 24-hour map for a 25-year recurrence (figure 21) shows a value of 6.00 inches at Aurora. Table 18 shows that the 6-hour/24-hour ratio is 0.75. Multiplying 6.00 by 0.75 gives a value of 4.50 inches for the 6-hour, 25-year storm.

Now, assume further that the user wishes to determine the 6-hour rainfall to be expected once in 6 months, on the average. Figure 21 shows that the 1-year, 24-hour storm value at Aurora is 2.55 inches. The 1-year value is obtained by multiplying 2.55 by 0.75, which gives 1.91 inches. Table 19 indicates that the 6-month value is 81% (0.81) of the 1-year amount. Then 1.91 multiplied by 0.81 yields 1.55 inches for the 6-hour, amount.

Next, assume that a user wishes to analyze an area for a rain period other than 24 hours. This can

Table 18. Average Ratios of X-Hour/24-HourRainfall for Illinois
(See table 11)

Rain period (hours)	*Ratio, x-hr/24hr*
0.08 (5 min.)	0.12
0.17 (10 min.)	0.21
0.25	0.27
0.50	0.37
1	0.47
2	0.58
3	0.64
6	0.75
12	0.87
18	0.94
24	1.00
48	1.08
72	1.16

Table 19. Ratios of Illinois Rainfall Amounts for Recurrence Intervals of Less than 1 Year to Rainfall Amounts for Recurrence Intervals of 1 Year, for Various Rainstorm Periods
(See table 12)

	Mean ratio, x-month to 12-month rainfall amount for given rainstorm period				
Storm period	2 *months*	3 *months*	4 *months*	6 *months*	9 *months*
<=24 hours	0.55	0.64	0.70	0.81	0.92
48 hours	0.53	0.62	0.69	0.80	0.92
72 hours	0.52	0.61	0.69	0.80	0.92

be done quite readily by replacing the 24-hour values for each isohyet with the computed value for any rain period of interest. For example, assume it is desired to determine the spatial amounts for the frequency distribution of 12-hour rainfall having a 5-year recurrence in DuPageCounty. Turning to the 5-year, 24-hour map in figure 21, multiply each isohyetal value by 0.87, the 12-hr/24-hr ratio in table 18. Then the 3.4-inch isohyet of figure 21 becomes 2.96 inches, and the 3.6-, 3.8-, and 4.0-inch isohyets convert to 3.13,3.31, and 3.48 inches, respectively.

Thus, figures 20 and 21 can be used in conjunction with tables 18 and 19 to calculate frequency distributions of storm rainfall for rain periods of 5 minutes to 72 hours and recurrence intervals ranging from 2 months to 100 years. This can be done for both the Chicago urban area and the six-county area of major interest in northeastern Illinois. The use of the ratio technique provides a consistent, accurate distribution, of, rainfall between storm periods and recurrence intervals.

The St. Louis Anomaly

Previous Water Survey studies (Huff and Changnon, 1972; Changnon et al., 1977; Changnon et al., 1985) have shown that inadvertent weather modification by the St. Louis urban environment substantially increases rainfall ,downwind of the city into Illinois, and that the urban enhancement tends to be largest in relatively heavy rainstorms. The anomaly is largely contained within a 25-mile radius, extending northeast, east, and southeast of central St. Louis into Illinois, and no significant effect has been identified beyond 50 miles. The effect is most pronounced

in spring and summer, when the majority of the excessive rainstorms occur, particularly those producing 25-year to 100-year events.

Results of the St. Louis studies show that in Illinois, only St. Clair and Madison Counties (shaded area, figure 7) are significantly affected by the urban anomaly. The effect should be most pronounced in Madison County northeast and east of the city. of the stations used in this study of Illinois frequency distributions, only Mascoutah-Belleville would incorporate any significant urban effect on the natural rainfall distribution. St. Louis (Lambert Field) in figure 7 is usually upwind of the major urban area. It would rarely, if ever, be affected by heavy rainstorms, which almost always move across the area from the southwest or northwest quadrants (from south-southwest through west to north-northwest).

Evidence of the presence of urban rain modification was indicated in some of the isohyetal patterns derived in conjunction with the present study (figures 10 through 17). Except during the 1971-1975 field research in the St. Louis area, there has been no raingage network of sufficient density, such as the Chicago network, to identify and define the intensity and areal extent of the St. Louis anomaly.

However, the results of the METROMEX project at St. Louis (Changnon et al., 1977) and other Water Survey studies of heavy rainstorm climatology (Huff and Changnon, 1972; Huff and Vogel, 1976) suggest that the frequency values for Madison County should be increased by 15% over the southwest section values in table 13 to adjust for the St. Louis urban effect. The values will then be in agreement with the findings in the earlier studies of inadvertent weather modification in the St. Louis region. No adjustment is needed for St. Clair County because the Mascoutah-Belleville data appear to have adequately accounted for the urban anomaly in that region.

5. VARIABILITY WITHIN CLIMATIC SECTIONS

Variation between Point and Section Frequency Distributions

Frequency relations for climatic sections and individual stations within each section are presented in Section 3. The sectional relations provide estimates of the mean rainfall to be expected for various recurrence intervals and rain periods in areas that have similar precipitation climate with respect to heavy rainfall occurrences. However, natural variability will produce variations for any given recurrence interval and storm period. This variability will be substantial even when long periods of record, such as the 83 years used in the present Illinois study, are integrated into the development of frequency relations. Therefore, a measure of this variability is presented in this section for those who have need for such information.

The method employed involved comparing the variations in rainfall amounts between the frequency distributions derived for individual stations within a given climatic section and those indicated by the sectional mean distributions. The variability obtained by this method results primarily from random Sampling variations due to the spatial distribution of heavy rainstorms in a particular climatic section during the sampling period. Variability due to other causes, such as observational and processing errors, has been minimized by using the individual frequency distributions to measure the dispersion about the sectional mean frequency distributions, rather than the raw data observations.

The effects of "outliers" and "inliers," which are nonrepresentative of the expected rainfall for a given recurrence interval and storm duration, are also minimized but not completely eliminated by the method employed. "Outliers" and "inliers" are rainfall amounts that either exceed or are less, respectively, than any value expected to occur normally within the length of record undergoing analysis, such as the 83 years used in the present study. For example, the 200-year storm event must occur in some year, and at some of the observational points this could have been within the 83-year sample. These abnormal values are important in some hydrologic design considerations, and results of their analysis are discussed later in this section.

The analytical approach employed by Huff and Neil1 (1959) was used. This method consists of cornputing the standard deviations about the sectional curves at selected recurrence intervals for the storm period undergoing analysis. From these computations, confidence bands be drawn to provide an estimate of the variability likely to occur between the mean distributions and points selected at random within the given climatic section. Station (point) deviations about each sectional curve were expressed as a percent of the sectional mean in assessing the

dispersion. The dispersion calculations were made for recurrence intervals of 1, 2, 5, 10, 25, 50, and 100 years for storm periods of 1 to 10 days.

Initial analyses of the percentage deviations of station frequency values about the mean curves for each of the ten climatic sections indicated that several sections could be combined to obtain a more reliable measure of the intrasectional variability. That is, the magnitudes of the percentage deviations were quite similar. The number of stations (and thus the number of point frequency curves) varied from three to nine among the ten climatic sections. This is an insufficient number to obtain either a reliable estimate of the standard deviation or a coefficient of variation on a sectional basis.

Further study led to the conclusion that the state could be divided into two regions of comparable relative variability: the northern region, consisting of the northwest, northeast, west, central, and east climatic sections; and the southern region, consisting of the west southwest, east southeast, southwest, southeast, and south sections (figure 7). The northern half of Illinois has a shorter convective season and fewer heavy storms than the southern half, and hence greater variability would be expected in the north.

Assessment of the distribution of percentage deviations also indicated that rain periods could be readily combined into two groups to increase the sample size in the dispersion calculations. Storm periods of 24, 48, and 72 hours were placed in one group. The dispersion characteristics of this group also serve as an approximation of rain periods of 1 to 24 hours because the shorter durations are strongly related to the 24-hour rainfall values. The second storm group includes intermittent rain periods of 5 to 10 days, which produce some of the serious flooding problems in Illinois, as discussed in the introduction to this report.

Results of the dispersion study are shown in table 20. The coefficient of variation (%) is shown for each data grouping. As expected, the variability about the sectional mean curve increases with increasing recurrence interval. The relative variability at the 100-year frequency for storms ≤72 hours is approximately twice that at the 2-year recurrence interval. The variability in the southern part of the state tends to be less than in the northern part. This is believed to be related to the longer convective rainfall season in the south. There is not much difference between the variability in the two groups of rain periods. In the north, slightly smaller percentages

Table 20. Dispersion of Point Rainfall Frequency Distributions about Sectional Mean Distributions for Various Recurrence Intervals and Rain Periods

Recurrence interval (years)	*Coefficient of variation (%) for given recurrence*	
	*North**	*South**
	Storm periods of 1 - 72 hours	
1	3.3	2.0
2	3.8	2.2
5	4.5	2.4
10	5.1	2.7
25	5.8	3.1
50	6.5	3.6
100	7.4	4.7
	Storm periods of 5 - 10 days	
1	3.4	2.8
2	3.8	2.8
5	4.4	3.0
10	4.8	3.2
25	5.3	3.4
50	5.7	3.9
100	6.2	4.8

**North = NW, NE, W, C, and E sections; South = WSW, ESE, SW, SE, and S sections*

are indicated for the 5- to 10-day rain periods. In the south, percentages are somewhat higher for the 5- to 10-day storms for the shorter recurrence intervals but merge for the 25-year and longer recurrences.

Use of the percentages in table 20 to compute the dispersion of point rainfall values about any sectional mean frequency distribution is illustrated in the following example. Assume one wishes to determine the maximum positive and negative departures that will include 95% of the occurrences for a 24-hour storm having a recurrence interval of 50 years in the northwest section. Reference to the mean frequency distribution for 24-hour storms in the northwest (table 13) shows a value of 6.53 inches.

Table 20 shows a coefficient of variation of 6.5% in the northern region of the state for a storm period of 24 hours and a recurrence interval of 50 years. Multiply 6.5% by 2 to obtain the value encompassing 95% of the dispersion about the 50-year recurrence value. Then multiply this value (13%) by 6.53 inches to obtain the rainfall amount to be added to and subtracted from the 6.53 inches to obtain the rainfall values that should incorporate 95% of the future point rainfall frequency distributions within the northwestern section for 24-hour storm periods.

Table 21 provides a measure of maximum and minimum rainfall values for recurrence intervals of 1 to 100 years for 24-hour storm periods within the northwest section at the 95% and 99% probability levels (two and three standard deviations about the sectional mean curve). This table was derived from the sectional relationships (table 13) and table 20, by following the procedure described above. Curves for the northwest sectional mean and for two standard deviations about the mean are shown in figure 22 through use of the information provided in table 21. A similar set of curves for the southern climatic section is also shown in figure 22 to illustrate differences between northern and southern Illinois. As indicated earlier, the intrasectional variability is less in the southern part of the state, and this is evident from the dispersion curves for the northwestern and southern sections. The sectional frequency distributions and table 20 can be used to derive tables and curves, such as those presented here, for any climatic section and any storm period of use in analyzing the intrasectional variability resulting from temporal variability in the natural precipitation distribution.

Nonrepresentative Extreme Rainfalls

As indicated earlier, during a given sampling period involving a large number of observation stations, a few stations will experience extreme rainfall amounts that are not representative either of average conditions for the points at which they occurred, or of average frequency relations in the climatic section in which they are recorded. These extremes are labeled "outliers," the amounts that greatly exceed the amounts expected to occur at a given location for a given rain duration and recurrence interval. Likewise, "inliers" are maximum amounts well below the normal expectancy for the given point or climatic section during the sampling period (83 years in the present Illinois study). The Urbana example discussed in Section 3 illustrates this.

The probability of outlier storms is of interest to the hydrologic community because they are likely to produce runoff conditions that exceed the flood control capabilities of hydrologic systems designed on the basis of a normal time distribution of heavy rainstorms. Such storms can result in severe overflows and, in extreme cases, can damage or destroy containment structures. From the standpoint of floodwater control, inliers are of little concern to the design hydrologist.

Table 21. Variability about the Sectional Mean Curve for 24-Hour Storm Periods in the Northwest Section

Recurrence interval (years)	*Sectional mean (in.)*	*Rainfall (in.) for given standard deviation*			
		+2	*+3*	*-2*	*-3*
1	2.57	2.74	2.82	2.40	2.32
2	3.11	3.35	3.47	2.87	2.75
5	3.95	4.31	4.48	3.59	3.42
10	4.63	5.10	5.34	4.16	3.92
25	5.60	6.25	6.57	4.95	4.63
50	6.53	7.38	7.80	5.68	5.26
100	7.36	8.45	8.99	6.27	5.73

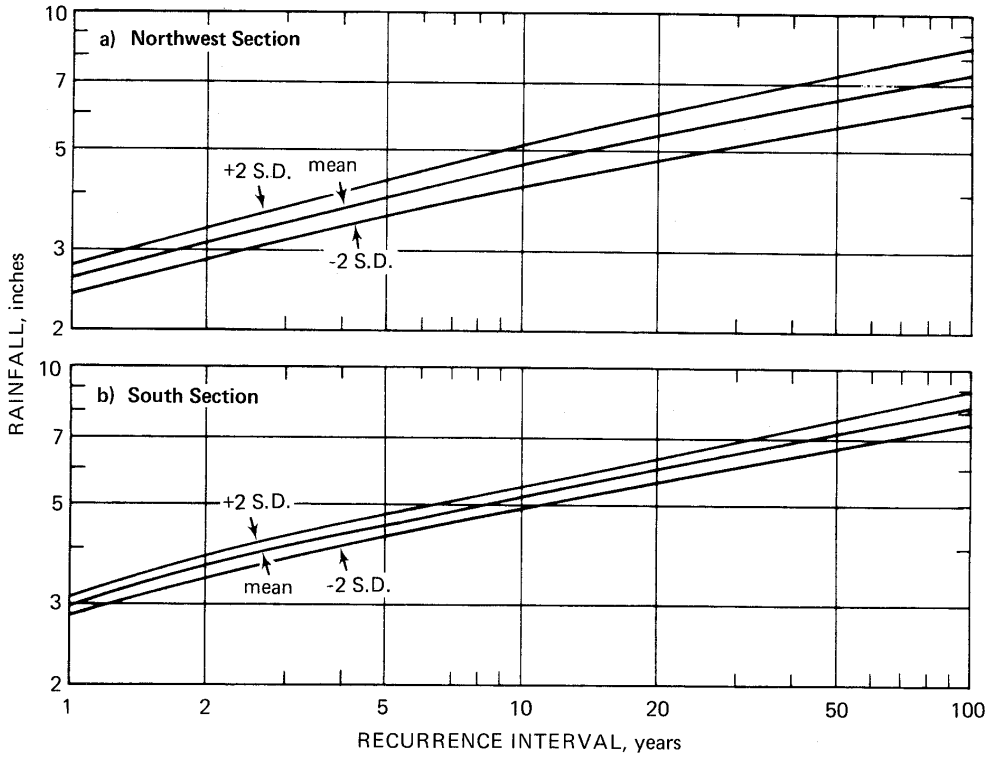


Figure 22. Examples of dispersion about sectional mean curves

In the present study, investigations of extreme rainfall events were confined to outlier storms. However, there is no standard definition of what constitutes an outlier storm. Our approach was to include those rainfall amounts that exceeded three standard deviations about the 100-year frequency value for each climatic section. The standard deviation was calculated in the same manner described earlier in evaluating the dispersion of point frequency relations about sectional mean curves. Analyses were performed for rain periods ranging from 24 hours to 10 days. Results for the 24-hour analysis may be used as a first approximation for rain periods that have durations less than 24 hours. Ranked rainfall amounts for each sampling station were compared with the three-standard-deviation rainfall at the 100-year frequency level for the appropriate climatic section.

The results are summarized briefly in tables 22 through 26. In these tables, the stations at which outlier storms were recorded are shown for each rainfall period. For each station, information is provided regarding the climatic section in which each qualifying rainfall occurred, the station rainfall amount, the difference between this amount and the value of +3 standard deviations in the given section, and the starting date of the storm.

Table 22 shows that most of the nine extreme values for 24-hour rain periods occurred in the northern half of the state. Of the nine qualifiers, seven were summer storms. Other analyses performed in the present study show that the heaviest storms tend to occur in summer, and that they occur most frequently in northern and central Illinois in June-August. In the lower part of table 22, information is provided for nine severe rainstorms during 1951-1961 for which detailed field surveys and analyses were carried out by the Water Survey, or which were centered on dense raingage networks of the Survey. These storms are generally larger with respect to maximum rainfall than those observed at the fixed sampling points of the National Weather Service climatic network. The climatic network is not sufficiently dense to detect the maximum point rainfall

Table 22. Observed Occurrences of 24-Hour Rainfall Amounts Exceeding Three Standard Deviations at the 100-Year Recurrence Interval during 1901-1983

Climatic analysis of daily data, 1901-1983

NWS stations	*Climatic section*	*Maximum rainfall (inches)*	*Difference from +3 standard deviations (in.)*	*Starting date*
Aurora	NE	10.56	1.30	10/10/54
Ottawa	NE	9.90	0.64	7/14/58
Galva	NW	9.50	0.51	8/20/24
Rockford	NW	9.50	0.51	7/19/52
La Harpe	W	10.25	0.23	6/10/05
Paris	ESE	10.20	1.41	6/27/57
Flora	SE	11.20	2.03	3/7/31
Mascoutah	SW	10.61	1.25	8/16/46
Belleville	SW	11.30	1.95	6/14/57

Network and field-surveyed storms, 1951-1961

Approximate location	*Climatic section*	*Maximum rainfall (inches)*	*Starting date*
Near Pontiac	C	13.0	7/9/51
NE of Rockford	NW	12.5	7/19/52
Near Waterman	NE	11.7	10/10/54
W of Rantoul	C	10.9	5/26/56
Near E. St. Louis	SW	16.5	6/14/57
SW of Paris	ESE	12.4	6/27/57
Near Kankakee	NE	11.3	7/12/57
Near Marion	S	10.7	8/16/59
Near Clinton	C	11.0	5/7/61

in most severe storms. For example, in table 22, the Aurora storm that began on October 10, 1954, and the field-surveyed storm labeled "near Waterman" occurred in the same storm system. At Waterman, the 24-hour total was 11.7 inches, compared with 10.56 inches at Aurora. Likewise, the storm northeast of Rockford on July 19, 1952 (lower part of table 22) had a maximum of 12.5 inches at its center compared to 9.5 inches at the Rockford NWS station (upper part of table 22). The median rainfall for the nine field-surveyed storms in the 11-year period 1951-1961 was 11.7 inches, compared with 10.2 inches for the nine heaviest storms recorded in the 61-station NWS network.

Obviously, there had to be many more storms of the field-surveyed type in the 83-year sample, but there is no way of accurately determining their number or locations. The 1951-1960 decade was one in which an abnormal number of heavy storms occurred, based on the 61-station sample. For example, five of the nine heaviest 24-hour storms observed in the 61-station NWS network occurred in this decade (table 22). Thus, the 1951-1961 group of network or field-surveyed storms yielding 10 inches or more of rainfall at their center probably is not typical of the frequency of such storms over an extended period of time, such as 50 or 75 years.

Other Water Survey studies indicate that 10-inch storms have an average recurrence interval of 1.5 to 2.0 years in Illinois (Huff, 1978); that is, one will occur somewhere in the state on the average of once every 18 to 24 months. However, they tend to occur in clusters rather than in any systematic fashion. This is illustrated in figure 23, which shows that four of the outlier type of storms (maximum amount $\geq$ 10 inches) occurred in 1956-1957. A fifth storm (May 1957) had more than 9 inches at the center. Two of these storms (those of June 14-15, 1957, and July 12-13, 1957) lasted less than 12 hours. All were field-surveyed by the Water Survey.

Table 23 provides information on 48-hour storm periods. There were ten qualifying 48-hour storms,

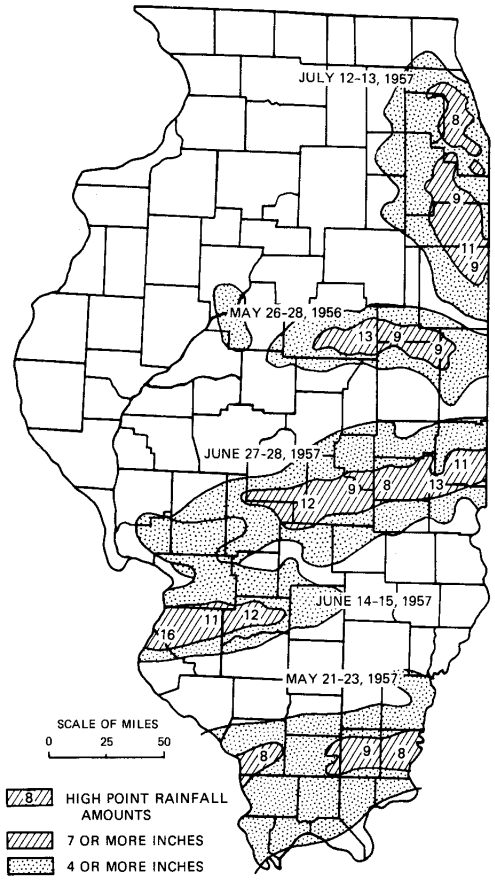


Figure 23. Major rainstorms in Illinois during 1956-1957

with amounts ranging from 10.92 inches to 13.68 inches. These storms were dispersed more evenly throughout the state than the 24-hour storms. The median departure from three standard deviations was 1.36 inches, compared with 1.25 inches for the 24-hour storms. Thus, the 48-hour extremes tended to have greater deviations from the sectional mean than those for 24-hour rainfall. Their occurrence was most frequent in summer.

The number of extreme events for 72-hour storms (table 24) was 11, and they occurred most frequently in the southern part of the state (the opposite of the situation for 24-hour storms). Storms of this length usually occur in conjunction with major storm systems involving passage of low centers and/or warm and cold fronts, especially in the transition seasons. In contrast, the 24-hour storms are most commonly associated with one or more squall lines or areas, last only a few hours, and in the case of the more extreme weather events, such as those discussed here, occur most commonly at night.

Table 25 shows the statistics for 5-day extreme events. There were only seven qualifying rainfalls in this category, and three of these occurrred during one of the greatest storms in Illinois history, which occurred on August 16-18, 1946, in southwest Illinois and eastern Missouri. Only four extreme events occurred in the 10-day category (table 26), and two of these were also part of the August 1946 storm.

Independence of Extreme Rain Events

Tables 22 through 26 illustrate how extreme rain events for different rain periods are likely to occur

Table 23. Observed Occurrences of 48-Hour Rainfall Amounts Exceeding Three Standard Deviations at the 100-Year Recurrence Interval during 1901-1983

NWS stations	*Climatic section*	*Maximum rainfall (inches)*	*Difference from +3 standard deviations (in.)*	*Starting date*
Aurora	NE	11.34	1.37	10/10/54
Belleville	SW	12.06	2.01	6/14/57
Flora	SE	12.14	2.30	3/7/31
Harrisburg	S	10.92	0.79	10/10/05
Mascoutah	SW	13.68	3.65	8/16/46
Mt. Vernon	SE	10.64	0.70	8/16/46
New Burnside	S	10.93	0.90	10/6/10
Paris	ESE	11.04	1.27	6/27/57
Rockford	NW	11.33	1.36	7/19/52
St. Louis	SW	11.94	1.89	8/16/46

Table 24. Observed Occurrences of 72-Hour Rainfall Amounts Exceeding Three Standard Deviations at the 100-Year Recurrence Interval during 1901-1983

NWS stations	*Climatic section*	*Maximum rainfall (inches)*	*Difference from +3 standard deviations (in.)*	*Starting date*
Anna	S	10.91	0.05	10/6/10
Aurora	NE	11.34	0.61	10/10/54
Belleville	SW	12.20	1.30	6/14/57
Flora	SE	12.20	1.47	3/7/31
Harrisburg	S	12.88	2.02	10/6/10
Mascoutah	SW	15.24	4.34	8/16/46
Mt. Vernon	SE	11.83	1.10	8/16/46
New Burnside	S	12.21	1.35	10/6/10
Paris	ESE	11.04	1.30	6/27/57
Rockford	NW	11.33	0.60	7/19/52
St. Louis	SW	14.63	3.73	8/16/46

Table 25. Observed Occurrences of 5-Day Rainfall Amounts Exceeding Three Standard Deviations at the 100-Year Recurrence Interval during 1901-1983

NWS stations	*Climatic section*	*Maximum rainfall (inches)*	*Difference from +3 standard deviations (in.)*	*Starting date*
Aurora	NE	11.62	0.19	10/10/54
Belleville	SW	12.81	0.59	7/14/57
Flora	SE	12.87	0.76	5/9/61
Harrisburg	S	12.88	0.50	10/6/10
Mascoutah	SW	15.30	3.08	8/16/46
Mt. Vernon	SE	12.56	0.50	8/16/46
St. Louis	SW	14.97	2.25	8/16/46

Table 26. Observed Occurrences of 10-Day Rainfall Amounts Exceeding Three Standard Deviations at the 100-Year Recurrence Interval during 1901-1983

NWS stations	*Climatic section*	*Maximum rainfall (inches)*	*Difference from +3 standard deviations (in.)*	*Starting date*
Aurora	NE	14.20	2.17	10/10/54
Belleville	SW	14.68	1.17	6/14/57
Mascoutah	SW	15.68	2.17	8/16/46
St. Louis	SW	15.39	1.88	8/16/46

within a single storm system. This is very evident for the storm of August 16-18, 1946, which accounted for the largest outliers for rain periods of 48 hours to 10 days. Outliers for rain periods of 24 to 72 hours occurred in the storm systems of October 10-11, 1954, at Aurora and June 27-28, 1957, at Paris. However, the 72-hour amounts in these two storms occurred within less than 48 hours and generally in less than 24 hours. The 48-hour amounts were so large that they also qualified as 72-hour totals. Of the nine field-surveyed storms listed in table 22, five had durations of less than 12 hours.

This presents a problem that warrants consideration. Statistically, when a single storm event is included in the sample for several storm durations, the samples are not independent. Furthermore, it is questionable whether a storm event lasting a certain number of hours should be included in the sample for longer durations, such as the Aurora and Paris examples mentioned above. A study of this factor and how it affects heavy rainfall frequency distributions is feasible and should be considered.

The results in tables 22 through 26 indicate that approximately 15% of the state (9 of 61 stations) received 24-hour rainfalls that meet our definition of an outlier or extreme rain event. This increased to 16% with 48-hour storms (10 of 61 stations) and to 18% (11 of 61 stations) for 72-hour storm periods. Extreme events appear to be less likely for 5- to 10-day periods, as indicated by the occurrence frequencies of 11% (7 of 61 stations) for 5-day periods and 7% (4 of 61 stations) for 10-day storm periods.

6. SEASONAL DISTRIBUTIONS OF HEAVY RAINFALL EVENTS

In the design of some hydrologic systems or structures, it is pertinent to know not only the frequency distributions of maximum storm rainfall amounts for various storm durations, but also the seasonal distribution characteristics of the heavy rainstorms. For example, a storm of intensity equivalent to a 5-year recurrence interval occurring in spring when the soil is near saturation may have different consequences than the same 5-year storm occurring in a drier summer month. Winter storms, generally producing less precipitation than summer storms, can be devastating if they occur over frozen ground. With or without snow cover, they can cause rapid flooding.

Consequently, it was decided to investigate the seasonal frequency distributions of heavy rainfall events, in addition to the standard type of frequency distribution derived from combining all storm data without regard to month or season. For this investigation, it was decided to study the four traditional seasons: winter (December-February), spring (March-May), summer (June-August), and fall (September-November).

Method of Analysis

In developing the frequency distributions of heavy rainfall events by season from the 1901-1983 sample, relations were determined for rain periods varying from 30 minutes to 10 days and for recurrence intervals of 1 year to 100 years. Frequency relations were computed for individual stations and for each of the ten climatic sections (figure 7), as was done for the total sample analysis in Section 3.

One problem faced in the seasonal analyses was the likelihood of substantially larger sampling errors (sampling variability) because of the division of the annual (total) sample into four seasons. Another concern was the derivation of accurate climatic trend factors for the smaller, more variable seasonal samples. An effort was made to minimize these problems by relating the seasonal frequency relations to those derived from the annual data in Section 3.

In doing this, seasonal frequency relations were developed from the raw data for each of the ten climatic sections. For each recurrence interval and rain period, the ratio of the seasonal to the annual rainfall value was calculated. These seasonal ratios were then used in conjunction with the annual frequency curves to obtain adjusted seasonal curves. The sectional ratios were also applied to the annual curves for each station within each section to obtain station (point) seasonal curves for the 61 Illinois stations. Spot-checking of the adjusted (annual-related) curves with those obtained directly from the seasonal data showed relatively small differences overall, but the adjusted curves provided a more logical and consistent pattern between the various recurrence intervals, rain periods, and climatic sections.

Table 27 illustrates the relations between summer and annual frequency distributions for 24-hour storm periods and recurrence intervals of 1 to 100 years in each of the ten climatic sections. The ratio

Table 27. Relations between Summer and Annual Frequency Distributions for 24-Hour Storm Periods and 1- to 100-Year Recurrence Intervals

Ratio, summer/annual for given recurrence interval

Section	*1 yr*	*2 yrs*	*5 yrs*	*10 yrs*	*25 yrs*	*50 yrs*	*100 yrs*
NW	.79	.83	.86	.88	.90	.91	.92
NE	.83	.86	.88	.91	.94	.96	.98
W	.80	.84	.88	.91	.94	.96	.98
C	.81	.82	.84	.85	.87	.88	.90
E	.82	.84	.87	.89	.92	.94	.96
WSW	.82	.83	.84	.85	.86	.87	.88
ESE	.79	.82	.85	.88	.91	.94	.96
SW	.69	.75	.82	.87	.91	.94	.96
SE	.72	.74	.77	.79	.81	.82	.84
S	.66	.69	.73	.77	.82	.86	.88

becomes progressively larger with increasing recurrence interval in each section. For example, in the northwestern section the summer 2-year frequency is 83% of the annual frequency. This increases gradually to 92% for the 100-year frequency. Thus the intensity of the seasonally derived storms approaches that of the annually derived storms as the recurrence interval lengthens.

Table 27 also shows a decrease in the ratio from north to south in the state. This decrease results from the seasonal variation in precipitation climate within Illinois. As discussed previously, in the extreme north, heavy rainfall events occur largely in the summer and seldom occur from mid-fall to mid-spring. In the extreme south, heavy rainfall events are more evenly distributed among the seasons than in central and northern Illinois. The ratios shown in table 27 are typical of the trends found for other storm periods in summer.

However, the north-south trend is reversed in the other seasons; that is, the ratios tend to increase from northern to southern Illinois in spring, fall, and winter with thunderstorms of increasing magnitude. The probability of a heavy rain event occurring in each of these seasons gradually increases southward. For example, in the winter, a heavy rainstorm with a 2-year or longer recurrence-interval value is very unlikely to occur at Chicago, but is not a rare event at Cairo. This is in close agreement with the average pattern of thunderstorms in winter in the state.

Spring Frequency Relations

Table 28 summarizes spring frequency relations for each of the ten climatic sections (zones) for storm periods of 30 minutes to 10 days and recurrence intervals ranging from 1 to 100 years. Appendix B provides similar information for each of the precipitation stations used in the present study. Figure 24 illustrates the spatial distribution characteristics of the spring frequency relations. These isohyetal maps for 24-hour storm periods having recurrence intervals of 2 to 100 years are typical of the isohyetal patterns associated with the various storm periods analyzed in the present study. They were derived from the station data in Appendix B. Isohyetal maps for other storm periods of interest to the user may readily be derived from this appendix. However, as pointed out in Section 3, the authors recommend the use of sectional relations rather than individual station values.

Most of the distribution characteristics of the 24-hour spring storms are similar to those shown in figure 15 (see pages 44-45) for 24-hour storms for all seasons combined. Both map sets show highs in southern and western Illinois and in the southwestern part of the state east of St. Louis. Lows are indicated on both map sets in northeastern Illinois (Waukegan region) and southwestward along or in the vicinity of the Illinois River valley.

Summer Frequency Relations

Sectional and individual station relations are shown for summer in table 29 and Appendix C, respectively. Illustrative isohyetal patterns similar to those for spring are shown in figure 25. The summer isohyetal patterns are even more similar to those derived from the total data sample in figure 15 than are the spring patterns. Summer storm events predominate in frequency and intensity, and therefore they exert a strong influence on the annual patterns.

Fall Frequency Relations

Sectional and station frequency distributions for fall, similar to those for spring and summer, are provided in table 30 and Appendix D, respectively. The fall isohyetal patterns are illustrated in figure 26, and again are very similar to the annual patterns (figure 15) with respect to major features.

Winter Frequency Relations

Sectional and station frequency relations for winter are given in table 31 and Appendix E, respectively. Figure 27 shows the typical isohyetal patterns of the winter frequency distributions based on 24-hour storms and recurrence intervals of 2 to 100 years. The winter patterns are characterized by relatively heavy amounts over extreme southern and southwestern Illinois and a general decrease from south to north in the state. The relatively pronounced low extending from Waukegan southwestward along or near the Illinois River valley on the annual, spring, summer, and fall maps is not apparent. Rather, that low appears to have been displaced farther to the north and northwest in winter. For a given recurrence interval, the amounts in extreme southern Illinois are nearly double those in the extreme northern part of the state in winter.

Seasonal Variations in Frequency Distributions

Major differences in the frequency distributions of heavy storm rainfall occur between seasons in each climatic section. Within seasons, large regional differences exist. The magnitude of the differences is illustrated in table 32 (page 94), which shows seasonal comparisons of 24-hour rainfall amounts for a 5-year recurrence interval in the ten climatic sections. In all but the south section, the most intense storms (heavier rainfall for a given recurrence interval) occur in summer. In the south, spring storms tend to be more intense than summer storms. As expected, winter storms are least intense for a given frequency in all sections. Spring and fall storms are nearly equivalent except in the northwest, west, and south sections.

The difference between summer and winter values generally decreases from north to south and from west to east. In the northwest section, the summer/ winter ratio is 2.44, compared with 1.54 in the southwest section. It is 2.38 in the west, compared with 2.02 in the east section. The differences between sections (statewide variation) are least in fall and greatest in winter. The ratios of maximum/ minimum amount are 1.91, 1.49, 1.23, and 1.18, respectively, for winter, spring, summer, and fall. The maximum difference in inches among the ten sections is 1.27 in winter (northwest, south), 1.17 in spring (northeast, south), 0.70 in summer (southeast, west), and 0.47 in fall (northeast, south). The foregoing statistics correspond strongly with the mean thunderstorm distribution.

Further investigation was made of the seasonal distribution characteristics by determining when those storms with recurrence intervals of 2 years or longer are most likely to occur. In doing this, counts were made of the qualifying storms in each season for storm periods of 24 hours to 10 days and recurrence intervals of 2, 10, and 40 years. The data were divided in this fashion to determine if the distribution changes as the recurrence interval increases.

Results for each of the ten climatic sections are summarized in table 33 (page 94). This table shows the percentage contribution of qualifying storms by season for the selected recurrence intervals. For example, for all storms having rainfall amounts equaling or exceeding a 2-year frequency value, table 33 shows winter contributing only 1% of the northwestern qualifying storms, whereas winter produced 21% of the total number in the southern section. Likewise, summer contributed 54% of all qualifying storms in the northwest and 25% of storms in the southern section. From the three analyses (2, 10, and 40 years), it was found that the ten climatic regions could be consolidated into four areas of similar seasonal response. These four areas were then used for further evaluation of seasonal distribution characteristics.

Table 34 (page 95) shows the criteria used to define four categories of seasonal contribution to heavy rainfall events. Figure 28 (page 95) shows the four regional divisions of the state and the ratings of the seasonal contributions to the total number of storms in the 1901-1983 data sample that have recurrence intervals of 2 years or longer.

Of the storms with recurrence intervals of 2 years or more, the storms in the northernmost area (northwest, northeast, and west sections) occurred predominantly in the summer. Fall made a moderate contribution to the number of storms, whereas spring and winter contributions were of little consequence. The central area (central, east, and west southwest sections) had a strong contribution from summer storms. Spring and fall made moderate contributions, whereas the winter contribution was still of little consequence. The south central area (east southeast, southwest, and southeast sections) had moder-

ate contributions of approximately equal amounts from spring, summer, and fall. Again, the winter contribution was small. The most southern area (south section) had a strong spring contribution and moderate contributions from the other seasons.

For very heavy storms, defined here as those with recurrence intervals of 40 years or longer, the northern area showed a very strong contribution from summer storms, followed by a moderate contribution from fall storms. Spring and winter had little effect. The central area had a very strong contribution from summer activity, along with a moderate contribution from fall storms, similar to the northern area. However, the influences of spring and winter storms were a little stronger than in the northern area.

The south central area lacked coherence, so the seasonal distribution can be described best by climatic section. The east southeast section showed a strong contribution from summer storms, a moderate contribution from spring and fall storms, and an insignificant winter contribution. The southwest section showed a very strong (81%) contribution from summer storms, with little contribution from storms in other seasons. The southeast section showed a very strong contribution from spring storms (62%) and moderate contributions from summer and fall storms.

The extreme southern area, represented by the south section, showed the strongest contribution from spring and fall storms.

In general, when moving from north to south, the season with the heaviest storms changes from summer in the north, to the warm spring through fall period across the large central portion of the state; in the extreme south, significant contributions are made by storms in all seasons. A primary force behind the intrastate storm distributions is the duration of the convection season, which is relatively short in northern Illinois but essentially present in all months in the extreme southern part of the state. Again, the seasonal distributions are strongly related to the pattern of thunderstorm occurrences in the state.

Table 28. Sectional Frequency Distributions for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Spring

Storm codes

1 – 10 days
2 – 5 days
3 – 72 hours
4 – 48 hours
5 – 24 hours
6 – 18 hours
7 – 12 hours
8 – 6 hours
9 – 3 hours
10 – 2 hours
11 – 1 hour
12 – 30 minutes

Sectional (zone) codes

1 – Northwest
2 – Northeast
3 – West
4 – Central
5 – East
6 – West Southwest
7 – East Southeast
8 – Southwest
9 – Southeast
10 – South

		Spring rainfall (inches) for given recurrence interval						
Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
1	1	3.02	3.50	4.22	4.93	5.96	7.13	8.54
1	2	2.93	3.42	4.11	4.69	5.56	6.43	7.52
1	3	3.17	3.75	4.56	5.21	6.10	6.84	7.85
1	4	3.17	3.79	4.64	5.32	6.31	7.19	8.14
1	5	3.44	4.12	5.03	5.72	6.67	7.39	8.33
1	6	3.21	3.85	4.77	5.51	6.58	7.64	9.02
1	7	3.29	4.13	5.30	6.16	7.36	8.63	10.00
1	8	3.31	4.01	5.03	5.77	6.90	7.83	9.09
1	9	3.42	4.36	5.74	6.78	8.49	9.93	11.32
1	10	3.79	4.77	6.09	7.21	8.79	9.88	11.25

Table 28. Continued

Spring rainfall (inches) for given recurrence interval

Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
2	1	2.31	2.81	3.52	4.20	5.31	6.33	7.58
2	2	2.20	2.59	3.19	3.70	4.57	5.34	6.47
2	3	2.45	2.92	3.54	4.12	4.96	5.80	7.04
2	4	2.64	3.09	3.83	4.42	5.44	6.40	7.45
2	5	2.53	3.05	3.77	4.37	5.34	6.15	7.15
2	6	2.53	2.97	3.78	4.46	5.51	6.48	7.74
2	7	2.61	3.21	4.10	4.83	5.97	7.03	8.30
2	8	2.61	3.21	4.04	4.82	5.99	7.10	8.41
2	9	2.59	3.27	4.29	5.33	6.88	8.43	10.15
2	10	2.91	3.64	4.77	5.77	7.10	8.22	9.64
3	1	2.03	2.47	3.09	3.69	4.67	5.56	6.66
3	2	1.99	2.34	2.93	3.42	4.23	4.96	5.87
3	3	2.08	2.53	3.17	3.76	4.64	5.44	6.51
3	4	2.24	2.68	3.33	3.94	4.87	5.73	6.69
3	5	2.14	2.60	3.29	3.85	4.75	5.51	6.34
3	6	2.25	2.67	3.39	4.03	4.99	5.74	6.78
3	7	2.25	2.72	3.48	4.04	4.98	5.81	6.83
3	8	2.29	2.80	3.54	4.19	5.23	6.25	7.41
3	9	2.26	2.80	3.69	4.60	6.06	7.57	9.12
3	10	2.58	3.31	4.32	5.27	6.56	7.73	8.87
4	1	1.80	2.19	2.74	3.27	4.13	4.93	5.90
4	2	1.84	2.18	2.70	3.17	3.94	4.65	5.53
4	3	1.87	2.31	2.87	3.42	4.22	5.02	5.94
4	4	1.98	2.37	3.02	3.60	4.39	5.16	6.01
4	5	1.89	2.35	3.00	3.53	4.36	5.06	5.80
4	6	1.99	2.41	3.11	3.70	4.58	5.27	6.14
4	7	2.02	2.45	3.15	3.71	4.56	5.33	6.30
4	8	2.08	2.55	3.25	3.84	4.76	5.52	6.45
4	9	1.95	2.45	3.36	4.20	5.54	6.80	8.09
4	10	2.34	3.00	3.97	4.81	6.10	7.23	8.35

Table 28. Continued

Storm code	Zone code	Spring rainfall (inches) for given recurrence interval						
		1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	1.63	1.98	2.48	2.96	3.74	4.46	5.34
5	2	1.58	1.92	2.39	2.82	3.53	4.13	4.85
5	3	1.67	2.10	2.66	3.11	3.82	4.44	5.25
5	4	1.66	2.02	2.59	3.16	3.88	4.56	5.26
5	5	1.61	2.02	2.60	3.11	3.83	4.55	5.29
5	6	1.76	2.11	2.67	3.16	3.79	4.39	5.07
5	7	1.81	2.15	2.74	3.20	3.92	4.55	5.38
5	8	1.90	2.30	2.85	3.38	4.09	4.81	5.60
5	9	1.73	2.18	2.96	3.60	4.81	5.84	7.03
5	10	2.11	2.68	3.56	4.32	5.42	6.47	7.77
6	1	1.50	1.83	2.29	2.73	3.45	4.11	4.93
6	2	1.45	1.76	2.20	2.59	3.24	3.81	4.46
6	3	1.54	1.94	2.45	2.86	3.52	4.08	4.83
6	4	1.54	1.88	2.39	2.90	3.58	4.19	4.84
6	5	1.48	1.86	2.39	2.86	3.52	4.19	4.86
6	6	1.62	1.94	2.45	2.91	3.48	4.05	4.66
6	7	1.67	1.98	2.51	2.94	3.61	4.18	4.94
6	8	1.74	2.11	2.62	3.12	3.77	4.43	5.16
6	9	1.59	2.01	2.72	3.31	4.42	5.37	6.47
6	10	1.95	2.46	3.28	3.98	4.99	5.95	7.15
7	1	1.42	1.73	2.16	2.58	3.26	3.89	4.66
7	2	1.37	1.66	2.09	2.45	3.07	3.60	4.22
7	3	1.46	1.82	2.31	2.71	3.33	3.86	4.57
7	4	1.43	1.76	2.26	2.75	3.38	3.97	4.58
7	5	1.40	1.76	2.26	2.71	3.33	3.96	4.60
7	6	1.53	1.84	2.31	2.70	3.29	3.82	4.41
7	7	1.58	1.87	2.38	2.78	3.41	3.96	4.67
7	8	1.64	2.00	2.48	2.96	3.56	4.18	4.88
7	9	1.50	1.90	2.58	3.14	4.18	5.08	6.12
7	10	1.84	2.33	3.10	3.76	4.72	5.63	6.77
8	1	1.23	1.49	1.87	2.23	2.82	3.36	4.02
8	2	1.18	1.44	1.80	2.11	2.64	3.10	3.64
8	3	1.26	1.57	2.00	2.34	2.87	3.33	3.94
8	4	1.25	1.51	1.95	2.36	2.91	3.42	3.94
8	5	1.20	1.51	1.95	2.34	2.87	3.42	3.97
8	6	1.32	1.58	2.01	2.37	2.84	3.30	3.80
8	7	1.33	1.61	2.05	2.40	2.94	3.41	4.04
8	8	1.42	1.72	2.14	2.56	3.07	3.60	4.23
8	9	1.30	1.64	2.22	2.71	3.60	4.38	5.28
8	10	1.58	2.02	2.68	3.25	4.07	4.83	5.84

Table 28. Concluded

Storm code	Zone code	Spring rainfall (inches) for given recurrence interval						
		1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	1.05	1.27	1.59	1.90	2.40	2.86	3.43
9	2	1.01	1.22	1.53	1.80	2.26	2.65	3.10
9	3	1.07	1.35	1.71	1.99	2.45	2.84	3.36
9	4	1.06	1.29	1.66	2.02	2.49	2.92	3.37
9	5	1.03	1.29	1.66	1.99	2.45	2.92	3.38
9	6	1.13	1.35	1.71	2.03	2.42	2.82	3.24
9	7	1.16	1.38	1.75	2.04	2.51	2.91	3.45
9	8	1.21	1.47	1.86	2.21	2.62	3.07	3.62
9	9	1.11	1.39	1.89	2.31	3.08	3.73	4.50
9	10	1.35	1.72	2.28	2.76	3.47	4.14	4.97
10	1	0.96	1.17	1.47	1.75	2.21	2.64	3.16
10	2	0.93	1.13	1.41	1.66	2.08	2.44	2.86
10	3	0.99	1.23	1.57	1.83	2.26	2.61	3.10
10	4	0.98	1.19	1.53	1.86	2.29	2.69	3.10
10	5	0.95	1.19	1.53	1.84	2.26	2.68	3.12
10	6	1.04	1.25	1.58	1.86	2.23	2.59	2.99
10	7	1.06	1.27	1.61	1.89	2.31	2.68	3.20
10	8	1.12	1.36	1.72	2.03	2.41	2.86	3.36
10	9	1.02	1.28	1.75	2.12	2.83	3.45	4.15
10	10	1.25	1.58	2.10	2.55	3.20	3.82	4.59
11	1	0.77	0.94	1.17	1.40	1.77	2.11	2.53
11	2	0.74	0.90	1.13	1.32	1.66	1.95	2.28
11	3	0.79	0.98	1.25	1.46	1.80	2.09	2.46
11	4	0.78	0.95	1.22	1.48	1.83	2.14	2.47
11	5	0.75	0.94	1.22	1.46	1.82	2.14	2.49
11	6	0.82	0.99	1.26	1.49	1.78	2.07	2.38
11	7	0.85	1.01	1.28	1.50	1.84	2.14	2.54
11	8	0.88	1.08	1.36	1.62	1.93	2.26	2.64
11	9	0.81	1.03	1.39	1.72	2.26	2.74	3.30
11	10	0.99	1.26	1.67	2.03	2.55	3.04	3.66
12	1	0.60	0.73	0.91	1.09	1.38	1.64	1.97
12	2	0.59	0.71	0.89	1.04	1.31	1.53	1.79
12	3	0.62	0.77	0.99	1.14	1.42	1.64	1.94
12	4	0.61	0.75	0.96	1.16	1.44	1.69	1.95
12	5	0.59	0.74	0.96	1.15	1.42	1.68	1.96
12	6	0.65	0.78	0.99	1.17	1.40	1.63	1.87
12	7	0.66	0.80	1.02	1.18	1.45	1.69	2.03
12	8	0.70	0.85	1.06	1.26	1.53	1.78	2.07
12	9	0.64	0.81	1.09	1.35	1.78	2.16	2.60
12	10	0.78	0.99	1.31	1.60	2.01	2.39	2.88

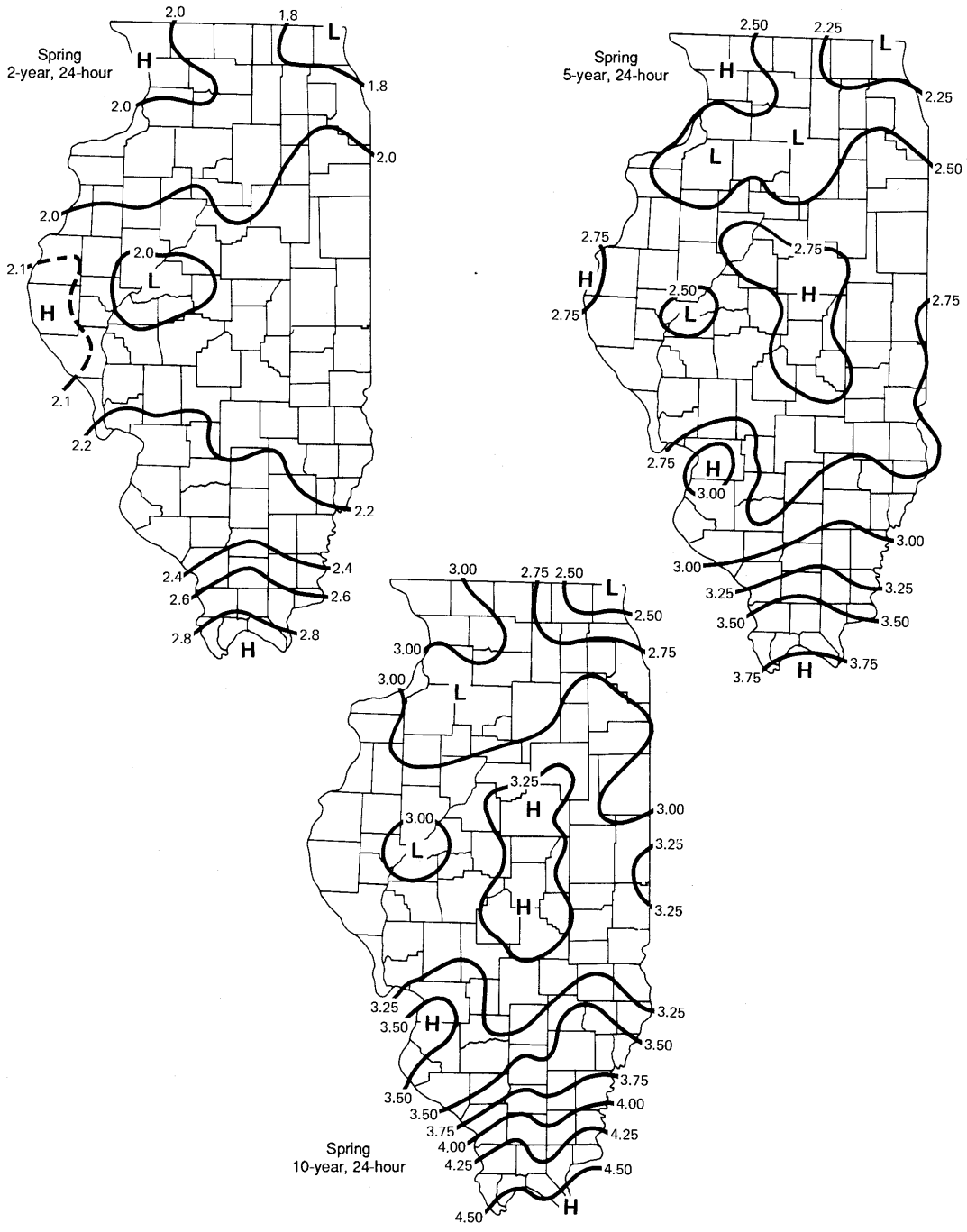


Figure 24. Isohyetal patterns (inches) of 24-hour rain periods in spring

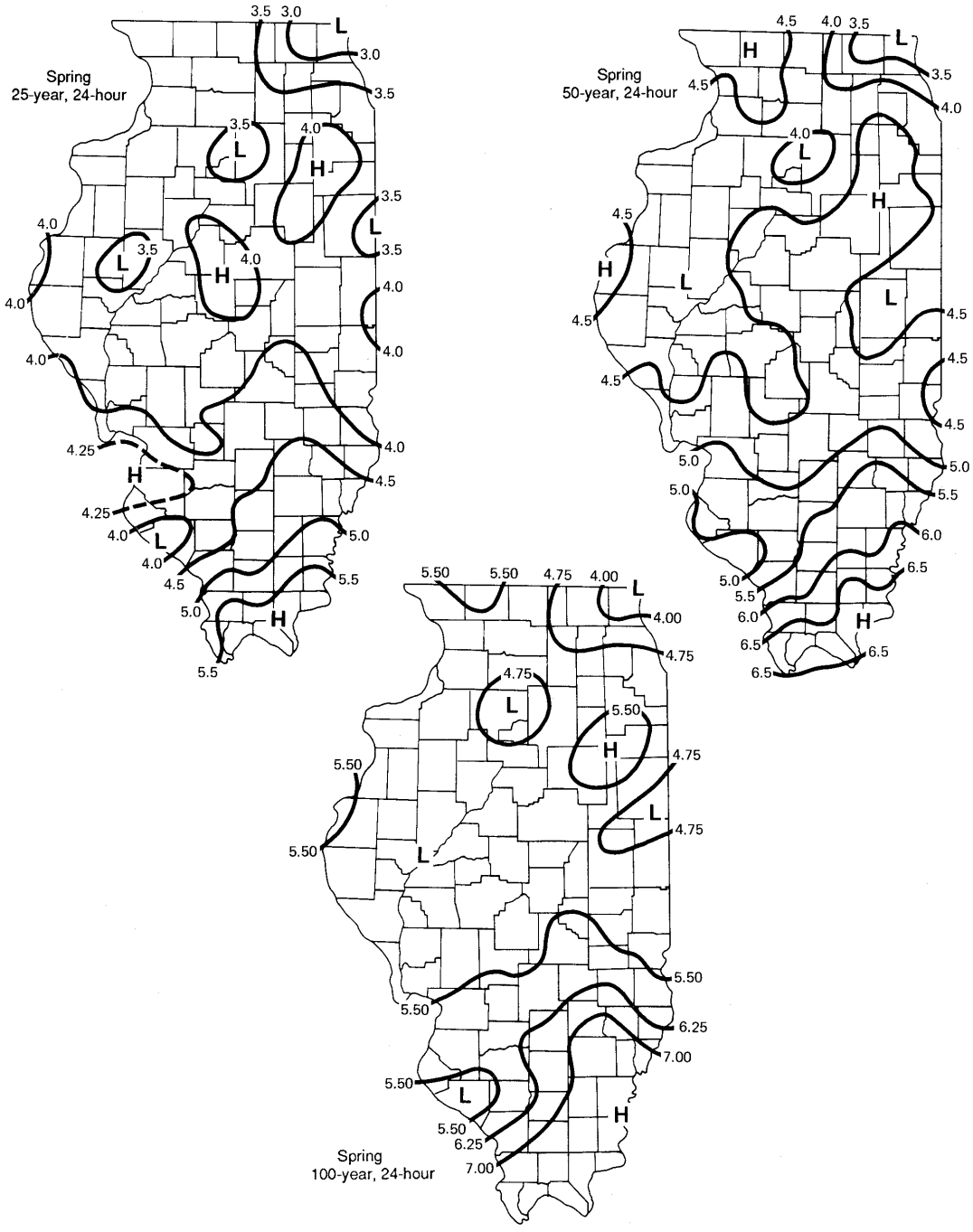


Figure 24. Concluded

Table 29. Sectional Frequency Distributions for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Summer

Storm codes

1 – 10 days
2 – 5 days
3 – 72 hours
4 – 48 hours
5 – 24 hours
6 – 18 hours
7 – 12 hours
8 – 6 hours
9 – 3 hours
10 – 2 hours
11 – 1 hour
12 – 30 minutes

Sectional (zone) codes

1 – Northwest
2 – Northeast
3 – West
4 – Central
5 – East
6 – West Southwest
7 – East Southeast
8 – Southwest
9 – Southeast
10 – South

		Summer rainfall (inches) for given recurrence interval						
Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
1	1	3.71	4.50	5.48	6.35	7.63	8.97	10.54
1	2	3.30	4.11	5.25	6.20	7.53	8.72	10.48
1	3	3.86	4.82	6.15	7.26	8.69	9.84	11.42
1	4	3.32	4.10	5.27	6.11	7.21	8.19	9.37
1	5	3.48	4.27	5.28	6.06	7.24	8.19	9.32
1	6	3.39	4.23	5.49	6.41	7.71	9.01	10.70
1	7	3.48	4.35	5.51	6.47	7.79	8.92	10.22
1	8	3.22	4.16	5.44	6.63	8.28	9.81	11.57
1	9	3.14	3.96	5.18	6.13	7.44	8.54	9.67
1	10	3.26	4.20	5.47	6.59	7.96	9.09	10.25

Table 29. Continued

Storm code	Zone code	Summer rainfall (inches) for given recurrence interval: 1-year	2-year	5-year	10-year	25-year	50-year	100-year
2	1	2.86	3.47	4.44	5.26	6.56	7.77	9.17
2	2	2.60	3.22	4.17	5.02	6.38	7.56	9.36
2	3	2.86	3.70	4.93	5.85	7.35	8.59	10.29
2	4	2.70	3.33	4.24	4.96	5.99	6.94	8.10
2	5	2.80	3.38	4.22	4.93	6.02	6.96	8.08
2	6	2.72	3.32	4.30	5.15	6.47	7.68	9.14
2	7	2.72	3.39	4.32	5.13	6.43	7.63	8.98
2	8	2.53	3.26	4.31	5.26	6.84	8.31	10.26
2	9	2.59	3.18	4.07	4.88	6.09	7.24	8.56
2	10	2.54	3.29	4.34	5.19	6.25	7.09	8.22
3	1	2.56	3.17	4.02	4.77	6.06	7.11	8.25
3	2	2.41	2.98	3.82	4.61	5.88	7.11	8.60
3	3	2.57	3.35	4.45	5.22	6.59	7.74	9.21
3	4	2.44	3.00	3.83	4.53	5.51	6.45	7.43
3	5	2.60	3.15	3.98	4.58	5.55	6.48	7.52
3	6	2.50	3.02	3.98	4.77	6.02	7.06	8.30
3	7	2.33	2.87	3.71	4.52	5.81	6.98	8.37
3	8	2.32	2.92	3.89	4.76	6.27	7.75	9.36
3	9	2.22	2.74	3.49	4.20	5.34	6.34	7.43
3	10	2.31	2.96	3.84	4.65	5.50	6.58	7.62
4	1	2.32	2.87	3.72	4.41	5.54	6.48	7.40
4	2	2.24	2.77	3.52	4.28	5.48	6.56	7.87
4	3	2.38	3.09	4.13	4.91	6.10	7.21	8.46
4	4	2.19	2.67	3.44	4.13	5.14	5.96	6.83
4	5	2.35	2.86	3.62	4.25	5.09	5.97	6.88
4	6	2.31	2.82	3.62	4.32	5.53	6.41	7.45
4	7	2.15	2.67	3.41	4.15	5.31	6.41	7.76
4	8	2.07	2.66	3.53	4.37	5.87	7.07	8.63
4	9	2.03	2.53	3.30	3.91	4.94	5.91	6.91
4	10	2.14	2.66	3.55	4.33	5.30	6.28	7.32

Table 29. Continued

Summer rainfall (inches) for given recurrence interval

Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
5	1	2.03	2.58	3.40	4.07	5.04	5.94	6.77
5	2	2.08	2.61	3.34	4.07	5.18	6.20	7.43
5	3	2.23	2.90	3.78	4.49	5.71	6.76	8.04
5	4	2.04	2.48	3.16	3.78	4.63	5.35	6.23
5	5	2.03	2.53	3.23	3.79	4.64	5.48	6.35
5	6	2.12	2.58	3.30	3.95	4.89	5.72	6.66
5	7	2.01	2.48	3.23	3.91	4.89	5.86	7.11
5	8	1.87	2.46	3.34	4.14	5.48	6.65	7.88
5	9	1.89	2.34	3.08	3.65	4.64	5.50	6.49
5	10	1.96	2.50	3.29	4.01	5.01	5.98	7.02
6	1	1.87	2.37	3.12	3.75	4.63	5.47	6.37
6	2	1.91	2.40	3.08	3.74	4.76	5.71	6.83
6	3	2.06	2.67	3.48	4.12	5.25	6.21	7.40
6	4	1.90	2.30	2.96	3.48	4.26	4.92	5.73
6	5	1.86	2.33	2.97	3.49	4.26	5.05	5.84
6	6	1.95	2.37	3.03	3.64	4.50	5.28	6.13
6	7	1.86	2.29	2.97	3.59	4.50	5.39	6.54
6	8	1.72	2.27	3.12	3.81	5.04	6.12	7.25
6	9	1.74	2.15	2.83	3.36	4.28	5.06	5.97
6	10	1.81	2.30	3.03	3.69	4.71	5.62	6.70
7	1	1.77	2.25	2.95	3.55	4.39	5.15	5.99
7	2	1.81	2.27	2.91	3.54	4.50	5.40	6.46
7	3	1.94	2.50	3.28	3.90	4.96	5.88	7.00
7	4	1.76	2.15	2.75	3.29	4.03	4.66	5.42
7	5	1.76	2.20	2.81	3.30	4.03	4.78	5.52
7	6	1.85	2.25	2.85	3.37	4.26	4.99	5.80
7	7	1.75	2.16	2.81	3.40	4.25	5.09	6.19
7	8	1.62	2.14	2.95	3.60	4.77	5.78	6.85
7	9	1.64	2.04	2.68	3.18	4.04	4.79	5.64
7	10	1.71	2.17	2.87	3.49	4.44	5.32	6.34
8	1	1.52	1.93	2.55	3.06	3.78	4.46	5.23
8	2	1.56	1.96	2.51	3.05	3.88	4.66	5.57
8	3	1.68	2.14	2.83	3.37	4.28	5.07	6.03
8	4	1.53	1.85	2.37	2.83	3.47	4.01	4.67
8	5	1.52	1.90	2.42	2.85	3.48	4.12	4.76
8	6	1.59	1.93	2.48	2.96	3.69	4.32	5.02
8	7	1.48	1.86	2.42	2.93	3.67	4.39	5.34
8	8	1.40	1.84	2.54	3.11	4.11	4.98	5.91
8	9	1.42	1.75	2.29	2.74	3.47	4.12	4.87
8	10	1.47	1.88	2.47	3.01	3.84	4.57	5.46

Table 29. Concluded

Summer rainfall (inches) for given recurrence interval

Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
9	1	1.30	1.65	2.18	2.61	3.23	3.80	4.51
9	2	1.33	1.67	2.14	2.60	3.32	3.97	4.75
9	3	1.43	1.86	2.42	2.87	3.66	4.33	5.14
9	4	1.30	1.58	2.02	2.42	2.97	3.42	3.99
9	5	1.30	1.62	2.06	2.43	2.96	3.52	4.06
9	6	1.36	1.65	2.11	2.53	3.16	3.70	4.30
9	7	1.29	1.59	2.07	2.50	3.13	3.75	4.55
9	8	1.19	1.57	2.16	2.68	3.51	4.25	5.04
9	9	1.21	1.49	1.97	2.34	2.98	3.52	4.16
9	10	1.25	1.60	2.11	2.56	3.27	3.91	4.66
10	1	1.20	1.52	2.00	2.41	2.98	3.51	4.11
10	2	1.23	1.54	1.97	2.40	3.06	3.67	4.38
10	3	1.32	1.70	2.23	2.65	3.37	3.98	4.74
10	4	1.20	1.46	1.86	2.23	2.73	3.16	3.67
10	5	1.20	1.50	1.91	2.24	2.73	3.23	3.74
10	6	1.25	1.53	1.95	2.33	2.92	3.41	3.96
10	7	1.19	1.47	1.90	2.31	2.88	3.45	4.21
10	8	1.10	1.46	2.00	2.50	3.23	3.95	4.65
10	9	1.10	1.37	1.82	2.15	2.73	3.25	3.83
10	10	1.16	1.48	1.94	2.36	3.02	3.61	4.29
11	1	0.96	1.21	1.60	1.92	2.37	2.79	3.23
11	2	0.98	1.23	1.58	1.91	2.43	2.92	3.49
11	3	1.05	1.34	1.78	2.11	2.69	3.18	3.77
11	4	0.96	1.16	1.49	1.78	2.17	2.52	2.92
11	5	0.95	1.18	1.51	1.78	2.20	2.58	2.99
11	6	0.99	1.21	1.55	1.86	2.35	2.74	3.18
11	7	0.95	1.16	1.51	1.84	2.29	2.75	3.34
11	8	0.87	1.15	1.58	1.97	2.58	3.12	3.71
11	9	0.89	1.10	1.45	1.74	2.18	2.58	3.05
11	10	0.92	1.17	1.55	1.89	2.40	2.87	3.42
12	1	0.75	0.95	1.26	1.50	1.86	2.20	2.55
12	2	0.77	0.96	1.24	1.50	1.92	2.29	2.74
12	3	0.84	1.07	1.40	1.66	2.12	2.51	2.97
12	4	0.75	0.92	1.17	1.39	1.71	1.98	2.30
12	5	0.75	0.93	1.19	1.40	1.72	2.03	2.35
12	6	0.79	0.95	1.23	1.46	1.87	2.18	2.52
12	7	0.75	0.92	1.20	1.44	1.81	2.17	2.63
12	8	0.69	0.92	1.25	1.55	2.05	2.46	2.91
12	9	0.70	0.87	1.13	1.37	1.73	2.03	2.40
12	10	0.73	0.92	1.21	1.49	1.89	2.26	2.69

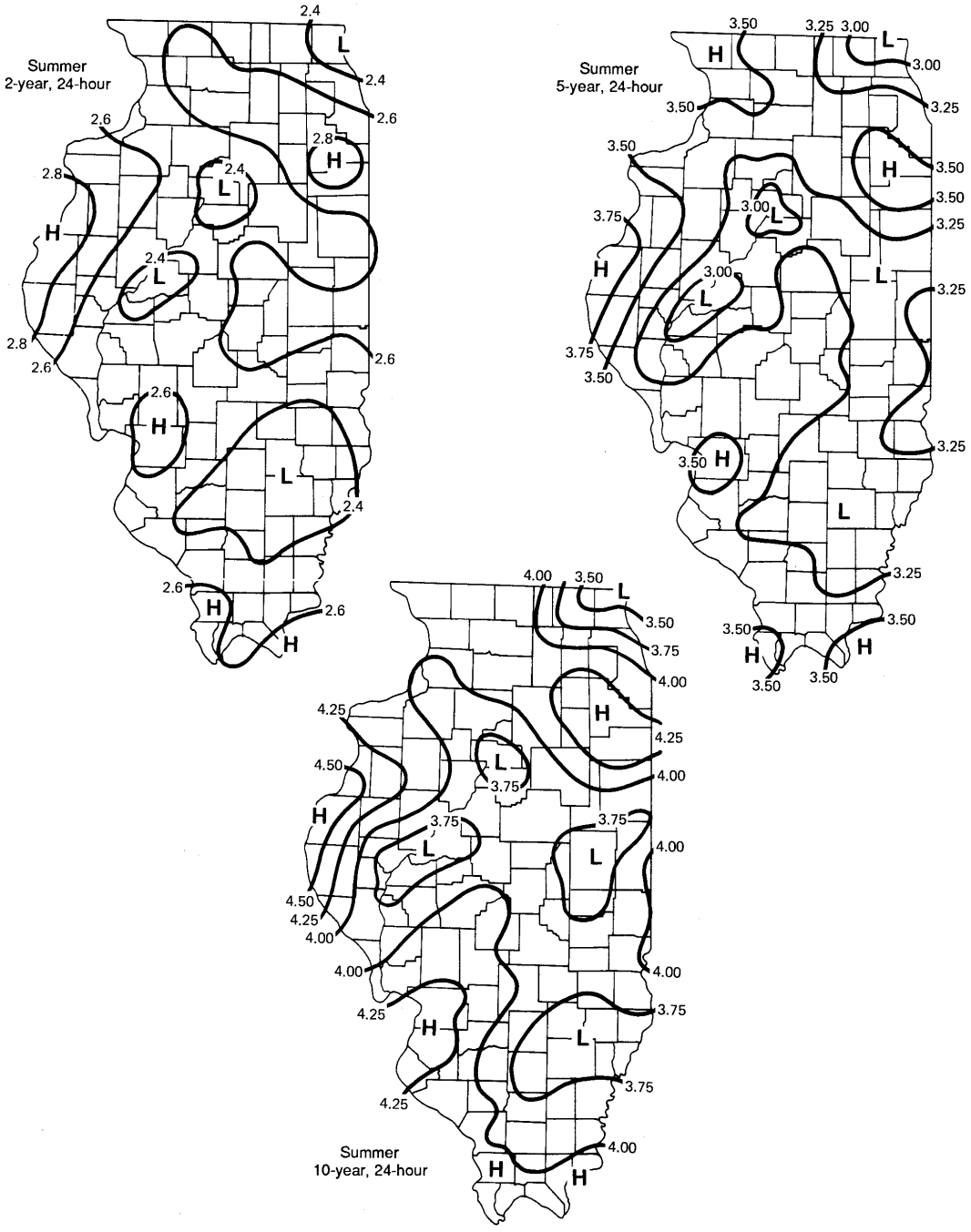


Figure 25. Isohyetal patterns (inches) of 24-hour rain periods in summer

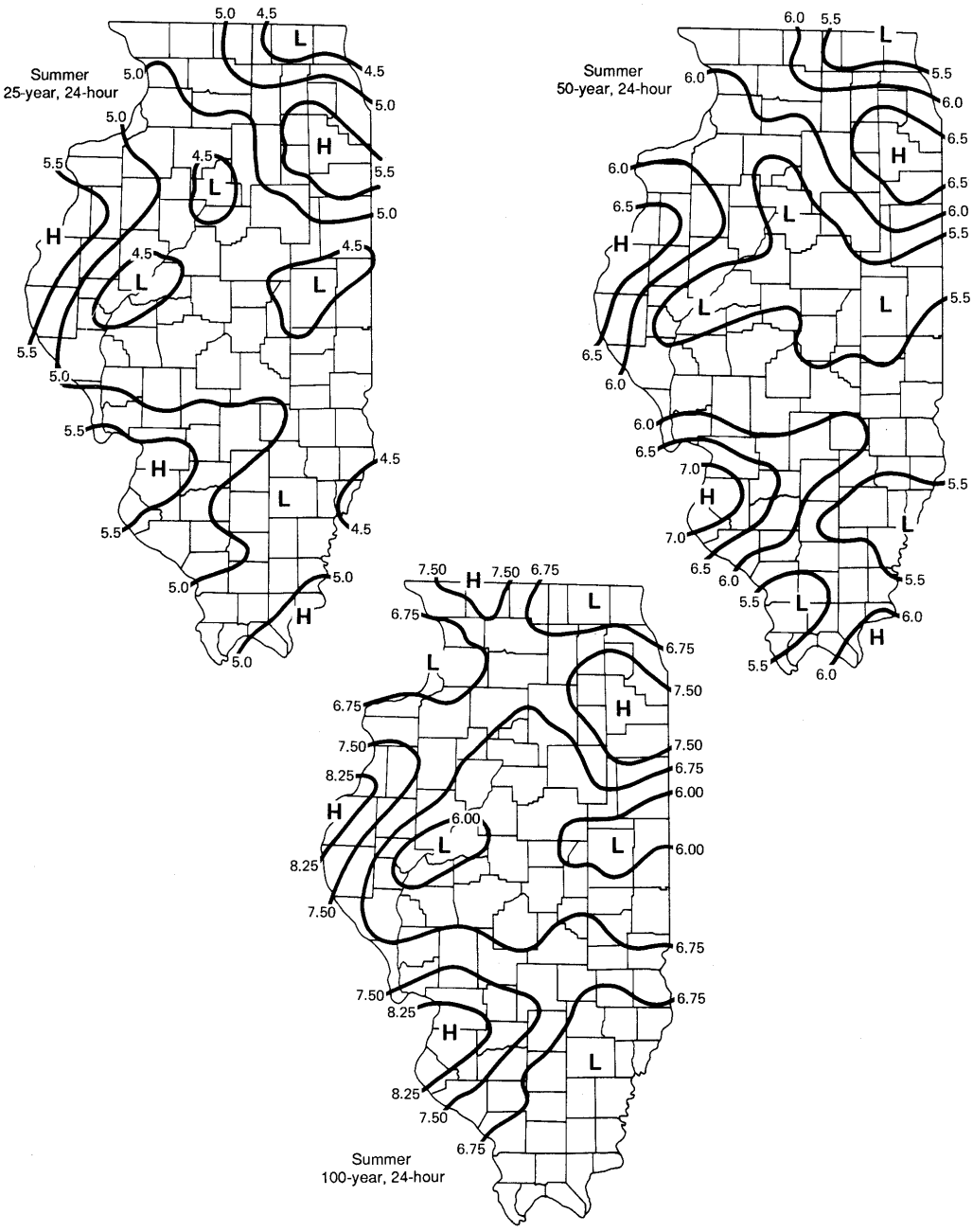


Figure 25. Concluded

Table 30. Sectional Frequency Distributions for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Fall

Storm codes

1 – 10 days
2 – 5 days
3 – 72 hours
4 – 48 hours
5 – 24 hours
6 – 18 hours
7 – 12 hours
8 – 6 hours
9 – 3 hours
10 – 2 hours
11 – 1 hour
12 – 30 minutes

Sectional (zone) codes

1 – Northwest
2 – Northeast
3 – West
4 – Central
5 – East
6 – West Southwest
7 – East Southeast
8 – Southwest
9 – Southeast
10 – South

		Fall rainfall (inches) for given recurrence interval						
Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
1	1	2.75	3.45	4.46	5.44	6.80	7.91	9.20
1	2	2.47	3.17	4.29	5.24	6.54	7.69	9.02
1	3	2.81	3.58	4.84	6.08	7.85	9.32	10.95
1	4	2.66	3.38	4.58	5.58	7.04	8.19	9.57
1	5	2.61	3.24	4.37	5.31	6.75	7.83	9.13
1	6	2.86	3.53	4.73	5.81	7.36	8.62	9.91
1	7	2.95	3.57	4.62	5.58	7.00	8.05	9.24
1	8	3.01	3.69	4.69	5.54	6.82	8.04	9.45
1	9	2.99	3.67	4.82	5.81	7.25	8.54	10.02
1	10	3.10	3.94	5.15	6.14	7.86	9.32	10.88

Table 30. Continued

Fall rainfall (inches) for given recurrence interval

Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
2	1	2.28	2.81	3.61	4.43	5.62	6.77	8.18
2	2	2.11	2.66	3.54	4.33	5.61	6.67	7.97
2	3	2.33	2.94	3.94	4.85	6.38	7.53	9.03
2	4	2.26	2.84	3.68	4.44	5.64	6.63	7.85
2	5	2.19	2.72	3.52	4.20	5.31	6.27	7.44
2	6	2.23	2.81	3.72	4.61	5.95	7.08	8.44
2	7	2.42	2.90	3.69	4.47	5.68	6.77	8.08
2	8	2.38	2.90	3.71	4.44	5.68	6.74	8.07
2	9	2.38	2.99	3.95	4.81	6.17	7.51	9.09
2	10	2.54	3.14	4.09	4.97	6.52	7.89	9.53
3	1	1.99	2.46	3.22	3.91	5.07	6.11	7.36
3	2	1.80	2.27	3.02	3.69	4.79	5.69	6.80
3	3	2.09	2.63	3.53	4.35	5.72	6.75	8.09
3	4	1.98	2.49	3.23	3.90	4.95	5.82	6.89
3	5	1.93	2.40	3.11	3.71	4.69	5.54	6.57
3	6	2.01	2.53	3.35	4.15	5.36	6.38	7.60
3	7	2.22	2.66	3.39	4.11	5.22	6.22	7.42
3	8	2.17	2.65	3.39	4.06	5.19	6.16	7.37
3	9	2.19	2.74	3.59	4.43	5.66	6.95	8.41
3	10	2.28	2.82	3.67	4.46	5.85	7.08	8.55
4	1	1.76	2.22	2.95	3.62	4.67	5.62	6.78
4	2	1.66	2.09	2.78	3.40	4.41	5.24	6.26
4	3	1.89	2.38	3.19	3.93	5.17	6.10	7.31
4	4	1.82	2.29	2.97	3.58	4.55	5.35	6.34
4	5	1.79	2.22	2.87	3.42	4.33	5.11	6.07
4	6	1.84	2.32	3.07	3.80	4.91	5.84	6.97
4	7	1.98	2.37	3.02	3.66	4.65	5.54	6.61
4	8	2.00	2.44	3.12	3.73	4.78	5.67	6.79
4	9	2.01	2.48	3.30	4.02	5.10	6.14	7.47
4	10	2.09	2.59	3.37	4.10	5.37	6.50	7.85

Table 30. Continued

Storm code	Zone code	Fall rainfall (inches) for given recurrence interval						
		1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	1.57	2.05	2.73	3.38	4.31	5.19	6.24
5	2	1.52	1.92	2.55	3.12	4.04	4.80	5.74
5	3	1.77	2.24	3.00	3.69	4.86	5.73	6.88
5	4	1.62	2.03	2.63	3.17	4.03	4.74	5.61
5	5	1.59	1.98	2.56	3.05	3.86	4.56	5.41
5	6	1.65	2.08	2.75	3.41	4.40	5.23	6.24
5	7	1.82	2.18	2.77	3.36	4.26	5.08	6.07
5	8	1.80	2.20	2.81	3.36	4.30	5.10	6.11
5	9	1.83	2.24	2.92	3.56	4.57	5.50	6.65
5	10	1.88	2.32	3.02	3.67	4.81	5.83	7.04
6	1	1.45	1.89	2.50	3.11	3.97	4.79	5.77
6	2	1.40	1.77	2.35	2.87	3.72	4.43	5.29
6	3	1.64	2.07	2.77	3.41	4.49	5.29	6.35
6	4	1.49	1.87	2.42	2.92	3.71	4.36	5.16
6	5	1.46	1.82	2.35	2.80	3.55	4.19	4.97
6	6	1.52	1.91	2.53	3.14	4.05	4.82	5.74
6	7	1.67	2.00	2.55	3.09	3.93	4.68	5.58
6	8	1.66	2.02	2.58	3.09	3.95	4.69	5.61
6	9	1.69	2.07	2.69	3.27	4.21	5.06	6.11
6	10	1.73	2.13	2.78	3.38	4.43	5.36	6.48
7	1	1.37	1.79	2.37	2.94	3.76	4.49	5.44
7	2	1.32	1.67	2.22	2.72	3.52	4.18	5.00
7	3	1.54	1.95	2.61	3.21	4.23	4.99	5.98
7	4	1.41	1.77	2.29	2.76	3.51	4.13	4.88
7	5	1.39	1.72	2.23	2.66	3.36	3.97	4.71
7	6	1.42	1.79	2.37	2.94	3.79	4.51	5.38
7	7	1.58	1.89	2.41	2.92	3.71	4.42	5.28
7	8	1.57	1.92	2.45	2.93	3.75	4.45	5.33
7	9	1.60	1.95	2.54	3.10	3.98	4.79	5.78
7	10	1.63	2.02	2.63	3.20	4.19	5.07	6.13
8	1	1.18	1.55	2.04	2.54	3.23	3.89	4.77
8	2	1.14	1.44	1.91	2.34	3.03	3.60	4.30
8	3	1.33	1.68	2.25	2.77	3.64	4.30	5.16
8	4	1.21	1.52	1.97	2.38	3.02	3.55	4.20
8	5	1.19	1.48	1.92	2.29	2.90	3.42	4.06
8	6	1.24	1.56	2.07	2.57	3.31	3.94	4.70
8	7	1.36	1.63	2.08	2.52	3.20	3.82	4.55
8	8	1.35	1.65	2.11	2.53	3.23	3.83	4.59
8	9	1.38	1.68	2.19	2.67	3.43	4.12	4.99
8	10	1.41	1.74	2.27	2.76	3.62	4.38	5.29

Table 30. Concluded

Storm code	Zone code	Fall rainfall (inches) for given recurrence interval						
		1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	1.01	1.32	1.75	2.17	2.76	3.33	4.12
9	2	0.97	1.22	1.63	1.99	2.58	3.07	3.67
9	3	1.14	1.43	1.92	2.36	3.11	3.67	4.40
9	4	1.04	1.30	1.69	2.04	2.59	3.04	3.61
9	5	1.02	1.27	1.64	1.96	2.47	2.92	3.47
9	6	1.06	1.33	1.76	2.18	2.82	3.35	3.99
9	7	1.16	1.39	1.77	2.14	2.72	3.25	3.88
9	8	1.15	1.40	1.79	2.14	2.74	3.25	3.89
9	9	1.18	1.43	1.87	2.28	2.93	3.52	4.26
9	10	1.20	1.49	1.94	2.36	3.09	3.74	4.52
10	1	0.93	1.21	1.61	2.00	2.55	3.06	3.74
10	2	0.89	1.13	1.50	1.83	2.38	2.83	3.38
10	3	1.05	1.32	1.77	2.18	2.87	3.38	4.06
10	4	0.95	1.20	1.55	1.87	2.38	2.79	3.31
10	5	0.94	1.17	1.51	1.80	2.28	2.69	3.19
10	6	0.97	1.22	1.62	2.01	2.59	3.08	3.68
10	7	1.08	1.29	1.64	1.99	2.52	3.01	3.59
10	8	1.06	1.30	1.66	1.99	2.54	3.02	3.61
10	9	1.08	1.31	1.72	2.09	2.69	3.25	3.92
10	10	1.11	1.37	1.78	2.16	2.84	3.43	4.15
11	1	0.74	0.97	1.28	1.59	2.03	2.44	2.93
11	2	0.72	0.90	1.20	1.47	1.90	2.26	2.70
11	3	0.83	1.05	1.41	1.74	2.28	2.69	3.23
11	4	0.76	0.96	1.24	1.50	1.90	2.23	2.65
11	5	0.75	0.93	1.20	1.43	1.81	2.14	2.54
11	6	0.77	0.97	1.29	1.60	2.06	2.46	2.93
11	7	0.85	1.02	1.30	1.57	2.00	2.39	2.85
11	8	0.84	1.02	1.31	1.57	2.01	2.38	2.85
11	9	0.86	1.06	1.37	1.69	2.15	2.58	3.12
11	10	0.88	1.09	1.42	1.73	2.26	2.74	3.31
12	1	0.58	0.75	1.01	1.25	1.59	1.94	2.29
12	2	0.56	0.71	0.94	1.15	1.49	1.77	2.12
12	3	0.66	0.83	1.11	1.37	1.80	2.12	2.54
12	4	0.60	0.75	0.97	1.17	1.49	1.75	2.07
12	5	0.59	0.73	0.95	1.13	1.43	1.69	2.01
12	6	0.61	0.77	1.02	1.26	1.63	1.94	2.31
12	7	0.68	0.81	1.03	1.25	1.59	1.89	2.26
12	8	0.67	0.81	1.04	1.24	1.59	1.89	2.26
12	9	0.68	0.83	1.07	1.33	1.69	2.03	2.46
12	10	0.69	0.85	1.11	1.35	1.77	2.14	2.59

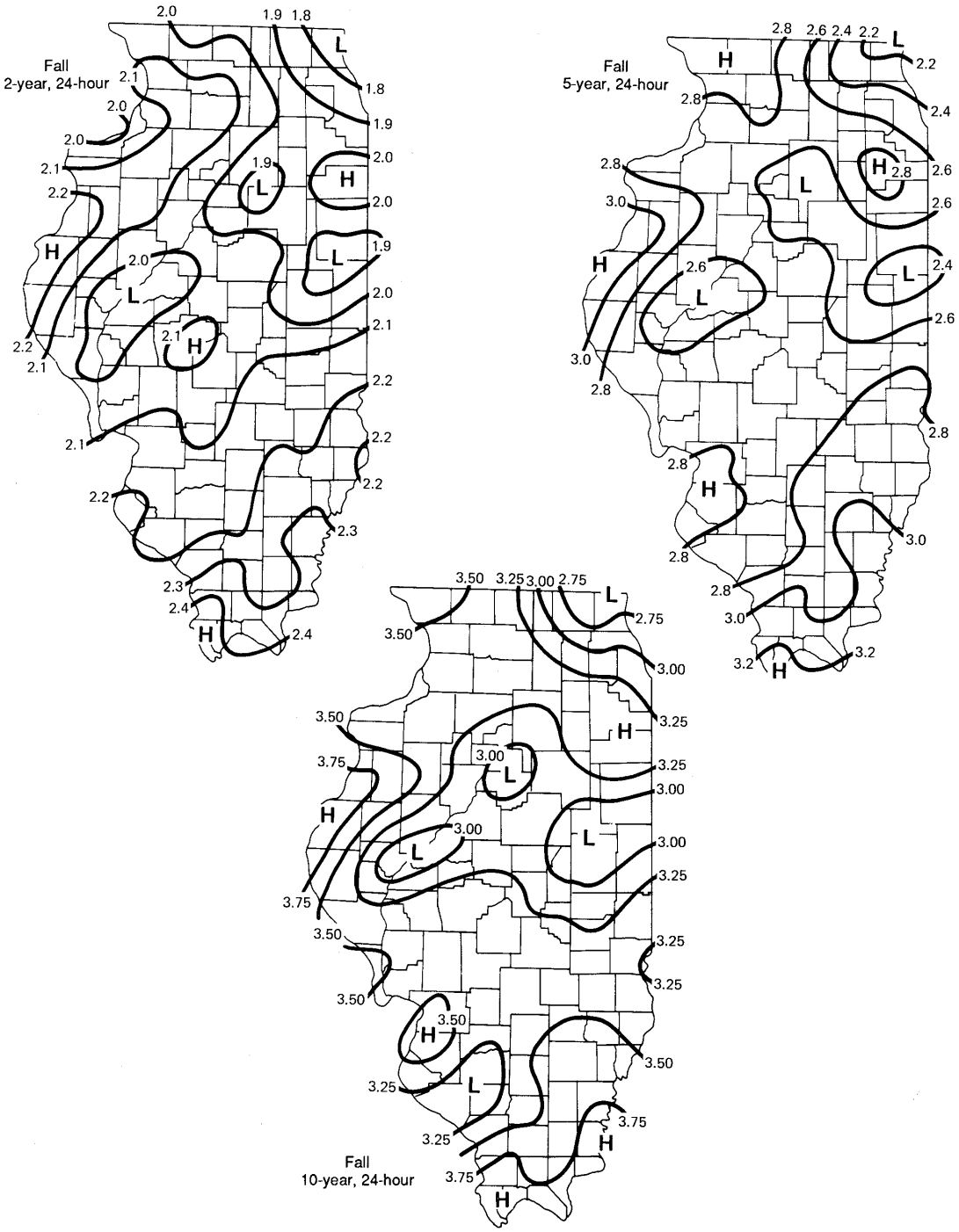


Figure 26. Isohyetal patterns (inches) of 24-hour rain periods in fall

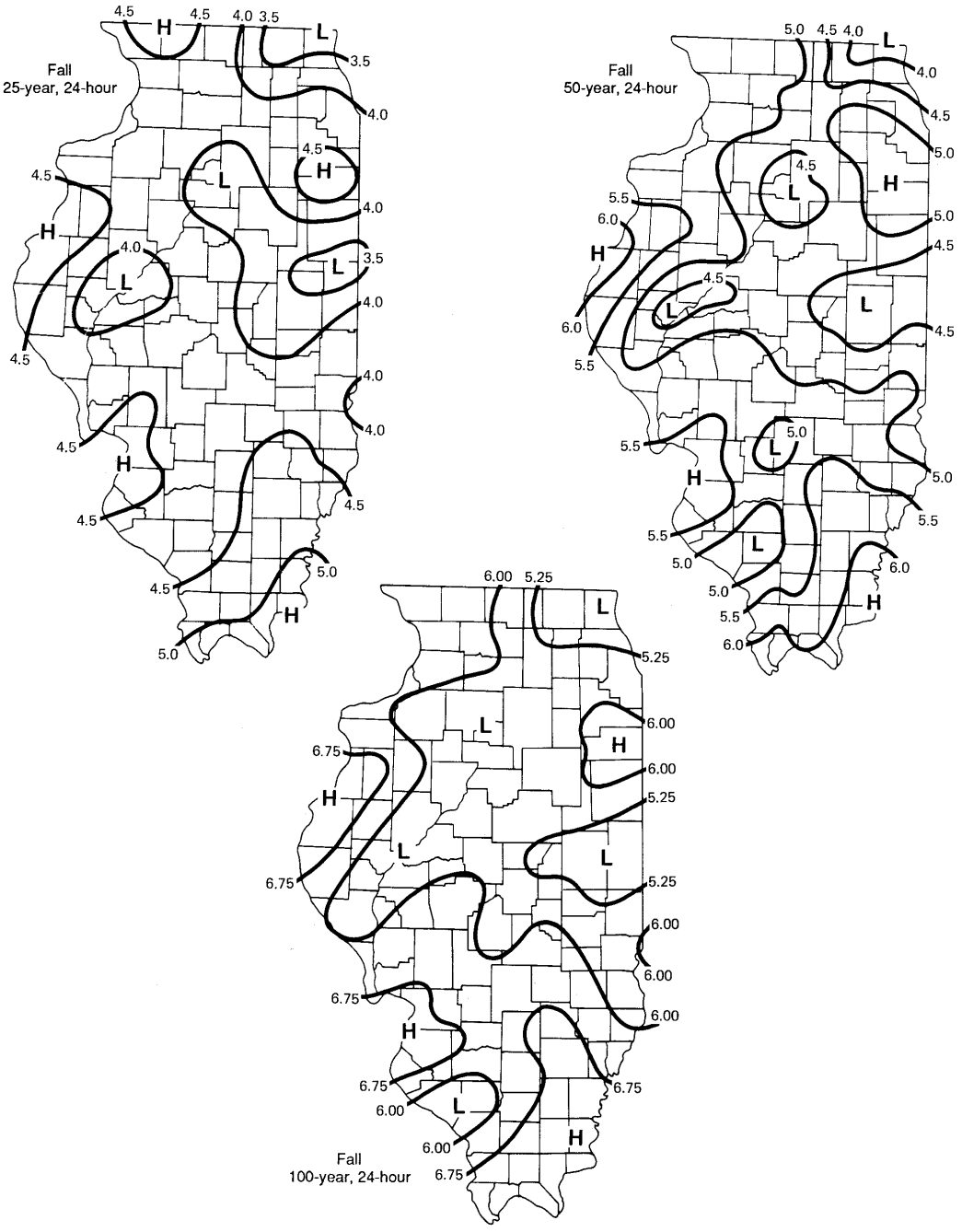


Figure 26. Concluded

Table 31. Sectional Frequency Distributions for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Winter

Storm codes

1 – 10 days
2 – 5 days
3 – 72 hours
4 – 48 hours
5 – 24 hours
6 – 18 hours
7 – 12 hours
8 – 6 hours
9 – 3 hours
10 – 2 hours
11 – 1 hour
12 – 30 minutes

Sectional (zone) codes

1 – Northwest
2 – Northeast
3 – West
4 – Central
5 – East
6 – West Southwest
7 – East Southeast
8 – Southwest
9 – Southeast
10 – South

Winter rainfall (inches) for given recurrence interval

Storm code	*Zone code*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
1	1	1.53	1.83	2.33	2.78	3.44	4.15	4.88
1	2	1.57	1.92	2.48	3.03	3.84	4.60	5.34
1	3	1.70	2.07	2.69	3.23	4.07	4.97	6.07
1	4	1.72	2.10	2.82	3.48	4.59	5.55	6.72
1	5	1.91	2.32	3.04	3.69	4.58	5.34	6.25
1	6	1.94	2.35	3.05	3.65	4.68	5.58	6.64
1	7	2.32	2.90	3.74	4.52	5.54	6.40	7.39
1	8	2.27	2.83	3.74	4.60	5.80	6.99	8.27
1	9	2.80	3.48	4.40	5.36	6.49	7.26	8.25
1	10	3.21	4.01	5.23	6.41	8.07	9.32	10.75

Table 31. Continued

Storm code	Zone code	Winter rainfall (inches) for given recurrence interval						
		1-year	2-year	5-year	10-year	25-year	50-year	100-year
2	1	1.21	1.47	1.89	2.25	2.81	3.28	3.95
2	2	1.33	1.62	2.05	2.50	3.17	3.83	4.61
2	3	1.37	1.69	2.19	2.69	3.52	4.29	5.31
2	4	1.43	1.75	2.30	2.86	3.76	4.61	5.70
2	5	1.54	1.88	2.38	2.89	3.65	4.37	5.27
2	6	1.60	1.93	2.45	2.98	3.79	4.57	5.51
2	7	1.92	2.34	2.98	3.60	4.47	5.23	6.14
2	8	1.86	2.33	3.06	3.80	4.90	5.79	6.96
2	9	2.25	2.73	3.56	4.19	5.12	5.64	6.24
2	10	2.71	3.34	4.28	5.19	6.51	7.47	8.33
3	1	1.11	1.35	1.73	2.06	2.57	3.00	3.62
3	2	1.19	1.44	1.89	2.28	2.95	3.56	4.24
3	3	1.23	1.52	2.00	2.47	3.21	3.91	4.78
3	4	1.28	1.56	2.09	2.61	3.44	4.13	4.98
3	5	1.38	1.68	2.13	2.59	3.27	3.91	4.72
3	6	1.38	1.68	2.18	2.61	3.35	3.96	4.64
3	7	1.71	2.08	2.65	3.20	3.97	4.65	5.46
3	8	1.70	2.13	2.80	3.48	4.48	5.30	6.37
3	9	1.99	2.43	3.15	3.76	4.43	4.88	5.45
3	10	2.48	2.96	3.78	4.50	5.57	6.49	7.62
4	1	0.98	1.19	1.53	1.82	2.27	2.66	3.20
4	2	1.05	1.32	1.72	2.12	2.70	3.21	3.79
4	3	1.11	1.40	1.87	2.31	3.00	3.65	4.41
4	4	1.08	1.35	1.86	2.28	3.04	3.69	4.41
4	5	1.20	1.47	1.86	2.26	2.85	3.42	4.12
4	6	1.24	1.52	1.95	2.35	2.97	3.47	4.18
4	7	1.51	1.84	2.34	2.83	3.51	4.11	4.82
4	8	1.54	1.93	2.54	3.15	4.07	4.81	5.78
4	9	1.77	2.12	2.74	3.28	4.00	4.40	4.83
4	10	2.18	2.64	3.42	4.06	4.99	5.74	6.77

Table 31. Continued

Storm code	Zone code	Winter rainfall (inches) for given recurrence interval						
		1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	0.89	1.08	1.39	1.65	2.07	2.41	2.91
5	2	0.86	1.09	1.44	1.79	2.26	2.65	3.18
5	3	0.88	1.14	1.59	2.00	2.52	2.95	3.45
5	4	0.93	1.18	1.58	1.96	2.55	3.04	3.74
5	5	1.04	1.26	1.60	1.94	2.45	2.94	3.54
5	6	1.09	1.31	1.61	1.91	2.34	2.78	3.20
5	7	1.26	1.53	1.95	2.36	2.92	3.42	4.02
5	8	1.32	1.65	2.17	2.69	3.47	4.11	4.94
5	9	1.44	1.74	2.20	2.59	3.13	3.49	3.87
5	10	1.72	2.06	2.66	3.18	3.92	4.62	5.29
6	1	0.81	0.98	1.26	1.50	1.87	2.19	2.63
6	2	0.78	1.00	1.33	1.64	2.07	2.44	2.93
6	3	0.82	1.05	1.46	1.83	2.32	2.71	3.19
6	4	0.84	1.07	1.45	1.80	2.35	2.80	3.44
6	5	0.95	1.16	1.47	1.78	2.25	2.70	3.25
6	6	1.00	1.20	1.48	1.75	2.15	2.56	2.95
6	7	1.11	1.36	1.73	2.09	2.59	3.04	3.56
6	8	1.21	1.52	1.99	2.47	3.19	3.77	4.53
6	9	1.33	1.60	2.02	2.38	2.88	3.21	3.56
6	10	1.59	1.90	2.45	2.92	3.62	4.25	4.87
7	1	0.75	0.91	1.17	1.39	1.74	2.03	2.45
7	2	0.74	0.95	1.26	1.56	1.96	2.30	2.77
7	3	0.77	0.98	1.38	1.74	2.19	2.56	3.01
7	4	0.80	1.02	1.37	1.70	2.22	2.64	3.25
7	5	0.90	1.10	1.39	1.69	2.13	2.55	3.08
7	6	0.94	1.14	1.39	1.63	2.03	2.42	2.79
7	7	1.04	1.26	1.61	1.94	2.41	2.83	3.32
7	8	1.14	1.42	1.87	2.32	2.99	3.54	4.25
7	9	1.25	1.51	1.91	2.25	2.72	3.04	3.36
7	10	1.50	1.80	2.32	2.76	3.41	4.02	4.61
8	1	0.65	0.79	1.01	1.20	1.50	1.75	2.11
8	2	0.64	0.82	1.08	1.34	1.69	1.99	2.39
8	3	0.66	0.85	1.19	1.50	1.90	2.21	2.60
8	4	0.70	0.88	1.18	1.47	1.92	2.28	2.80
8	5	0.78	0.95	1.20	1.46	1.84	2.20	2.66
8	6	0.81	0.98	1.21	1.43	1.76	2.09	2.40
8	7	0.91	1.12	1.42	1.72	2.13	2.49	2.93
8	8	0.98	1.23	1.61	2.00	2.58	3.05	3.66
8	9	1.08	1.30	1.65	1.94	2.34	2.62	2.90
8	10	1.29	1.56	2.00	2.39	2.95	3.45	3.97

Table 31. Concluded

Storm code	Zone code	Winter rainfall (inches) for given recurrence interval: 1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	0.55	0.67	0.86	1.02	1.28	1.49	1.80
9	2	0.54	0.70	0.92	1.14	1.45	1.70	2.04
9	3	0.56	0.73	1.02	1.27	1.62	1.89	2.22
9	4	0.60	0.75	1.01	1.25	1.64	1.95	2.39
9	5	0.66	0.81	1.02	1.24	1.56	1.87	2.26
9	6	0.70	0.84	1.03	1.22	1.50	1.78	2.05
9	7	0.79	0.96	1.22	1.47	1.83	2.14	2.51
9	8	0.83	1.04	1.37	1.70	2.19	2.59	3.12
9	9	0.92	1.11	1.41	1.66	2.00	2.23	2.47
9	10	1.10	1.32	1.71	2.03	2.51	2.96	3.39
10	1	0.51	0.61	0.79	0.94	1.17	1.37	1.65
10	2	0.50	0.64	0.85	1.06	1.33	1.57	1.88
10	3	0.51	0.67	0.94	1.18	1.49	1.74	2.04
10	4	0.55	0.69	0.93	1.15	1.51	1.79	2.20
10	5	0.61	0.74	0.94	1.14	1.44	1.73	2.08
10	6	0.64	0.77	0.95	1.12	1.38	1.64	1.89
10	7	0.72	0.88	1.12	1.35	1.68	1.97	2.31
10	8	0.77	0.97	1.27	1.58	2.03	2.40	2.89
10	9	0.85	1.02	1.30	1.52	1.84	2.06	2.28
10	10	1.02	1.22	1.57	1.87	2.32	2.73	3.12
11	1	0.40	0.49	0.63	0.75	0.94	1.09	1.32
11	2	0.40	0.51	0.68	0.84	1.06	1.25	1.50
11	3	0.41	0.53	0.75	0.93	1.19	1.39	1.63
11	4	0.44	0.55	0.74	0.92	1.20	1.43	1.76
11	5	0.49	0.59	0.75	0.91	1.15	1.38	1.66
11	6	0.51	0.61	0.76	0.90	1.10	1.31	1.50
11	7	0.57	0.70	0.89	1.08	1.33	1.56	1.83
11	8	0.61	0.76	1.00	1.24	1.60	1.89	2.27
11	9	0.68	0.82	1.03	1.23	1.47	1.64	1.82
11	10	0.81	0.97	1.25	1.49	1.85	2.17	2.49
12	1	0.32	0.39	0.50	0.60	0.74	0.87	1.04
12	2	0.31	0.40	0.54	0.66	0.84	0.98	1.18
12	3	0.32	0.42	0.59	0.73	0.93	1.10	1.28
12	4	0.34	0.44	0.58	0.72	0.95	1.13	1.38
12	5	0.38	0.47	0.59	0.72	0.90	1.08	1.31
12	6	0.40	0.48	0.60	0.71	0.87	1.03	1.18
12	7	0.45	0.55	0.70	0.85	1.05	1.23	1.44
12	8	0.49	0.61	0.80	0.99	1.28	1.51	1.82
12	9	0.53	0.64	0.81	0.97	1.16	1.29	1.43
12	10	0.64	0.76	0.98	1.18	1.46	1.71	1.96

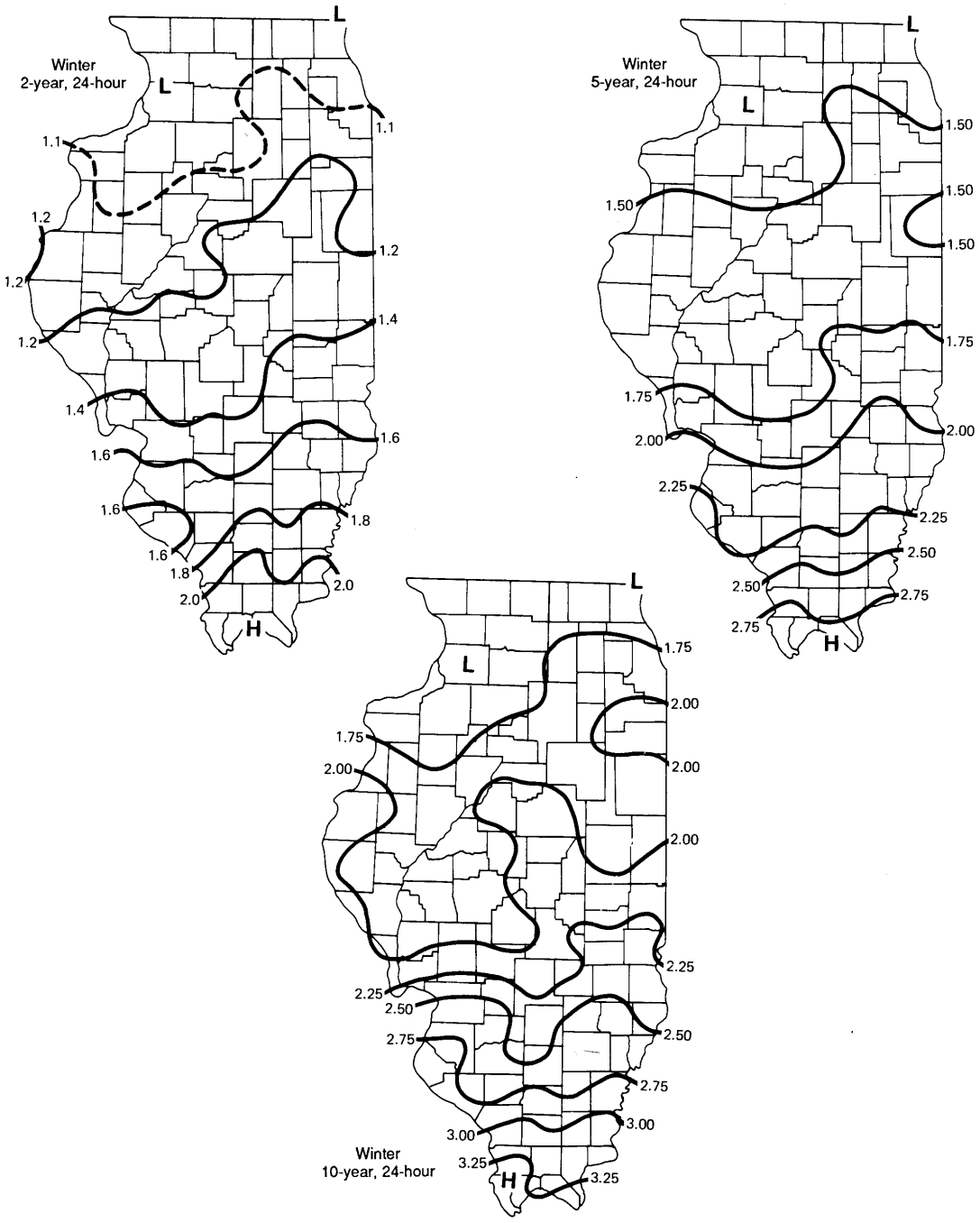


Figure 27. Isohyetal patterns (inches) of 24-hour rain periods in winter

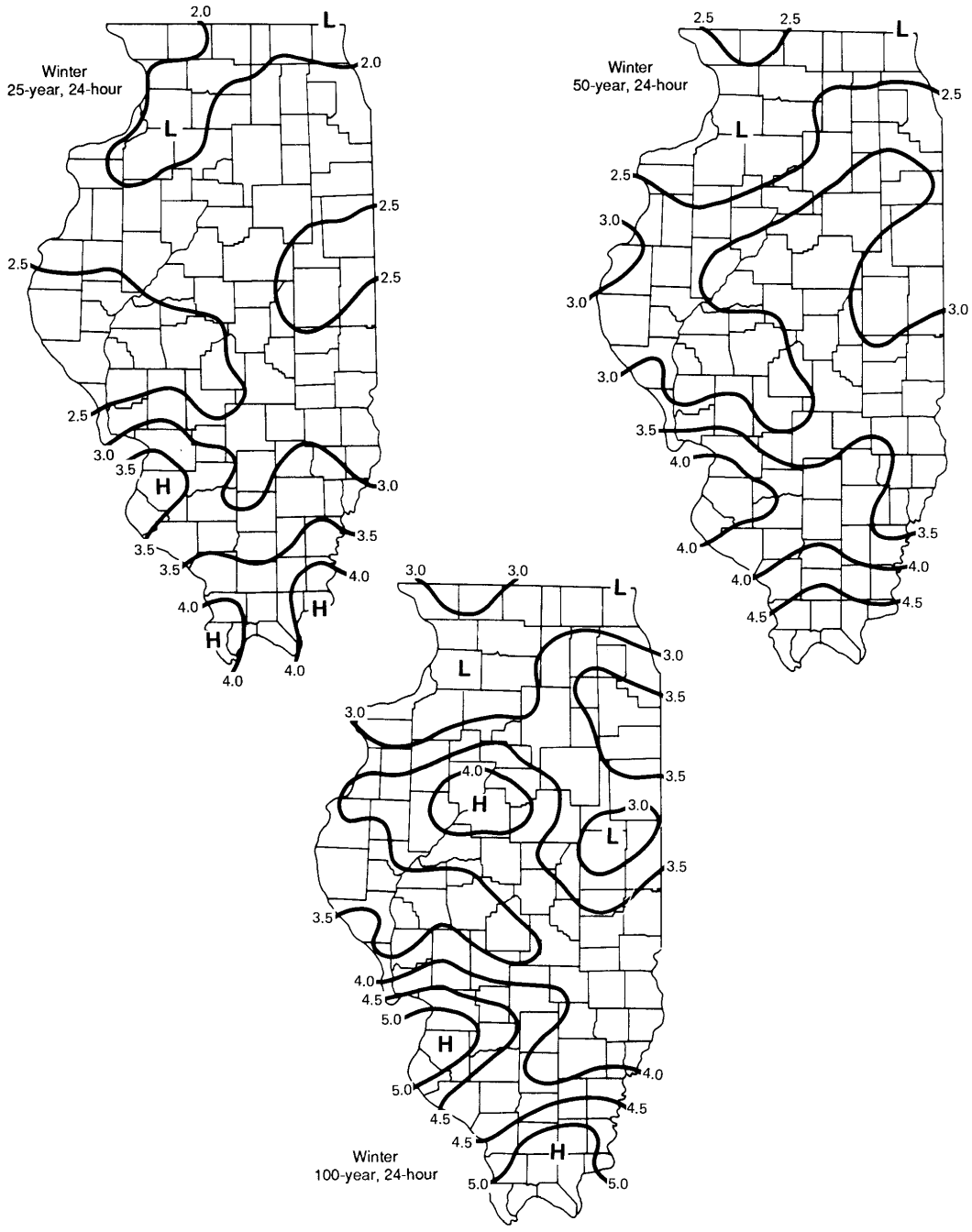


Figure 27. Concluded

Table 32. 24-Hour, 5-Year Rainfall Amounts in the Ten Climatic Sections during the Four Seasons of the Year

Climatic section	*Rainfall (inches) for given season*				*Ratio*
	Winter	*Spring*	*Summer*	*Fall*	*Summer / Winter*
NW	1.39	2.48	3.40	2.73	2.44
NE	1.44	2.39	3.34	2.55	2.32
W	1.59	2.66	3.78	3.00	2.38
C	1.58	2.59	3.16	2.63	2.00
E	1.60	2.60	3.23	2.56	2.02
WSW	1.61	2.67	3.30	2.75	2.05
ESE	1.95	2.74	3.23	2.77	1.66
SW	2.17	2.85	3.34	2.81	1.54
SE	2.20	2.96	3.08	2.92	1.40
S	2.66	3.56	3.29	3.02	1.24

Table 33. Average Percentage Contribution by Season of Combined Storms of 24-Hour, 48-Hour, 72-Hour, 5-Day, and 10-Day Durations

Recurrence intervals greater than or equal to 2 years

	NW	*NE*	*W*	*C*	*E*	*WSW*	*ESE*	*SW*	*SE*	*S*
Winter	1	3	3	6	4	5	9	12	15	21
Spring	14	14	13	23	24	25	27	27	30	36
Summer	54	53	54	43	48	41	38	37	27	25
Fall	31	30	30	28	24	29	26	24	28	20

Recurrence intervals greater than or equal to 10 years

	NW	*NE*	*W*	*C*	*E*	*WSW*	*ESE*	*SW*	*SE*	*S*
Winter	0	0	2	6	3	5	6	8	1	19
Spring	14	7	5	17	19	13	24	20	46	43
Summer	53	61	58	42	51	50	44	53	23	19
Fall	33	32	35	35	27	32	26	19	30	19

Recurrence intervals greater than or equal to 40 years

	NW	*NE*	*W*	*C*	*E*	*WSW*	*ESE*	*SW*	*SE*	*S*
Winter	0	0	0	9	4	7	0	3	0	5
Spring	16	0	3	9	11	7	18	4	62	43
Summer	56	76	60	46	56	56	50	84	15	8
Fall	28	24	37	36	29	30	32	12	23	44

Table 34. Criteria Used in Developing Four Categories of Seasonal Contribution to Heavy Rainfall Events

Percent contribution	*Category*
0 - 5	Insignificant
6 - 15	Weak
16 - 35	Moderate
36 - 100	Strong

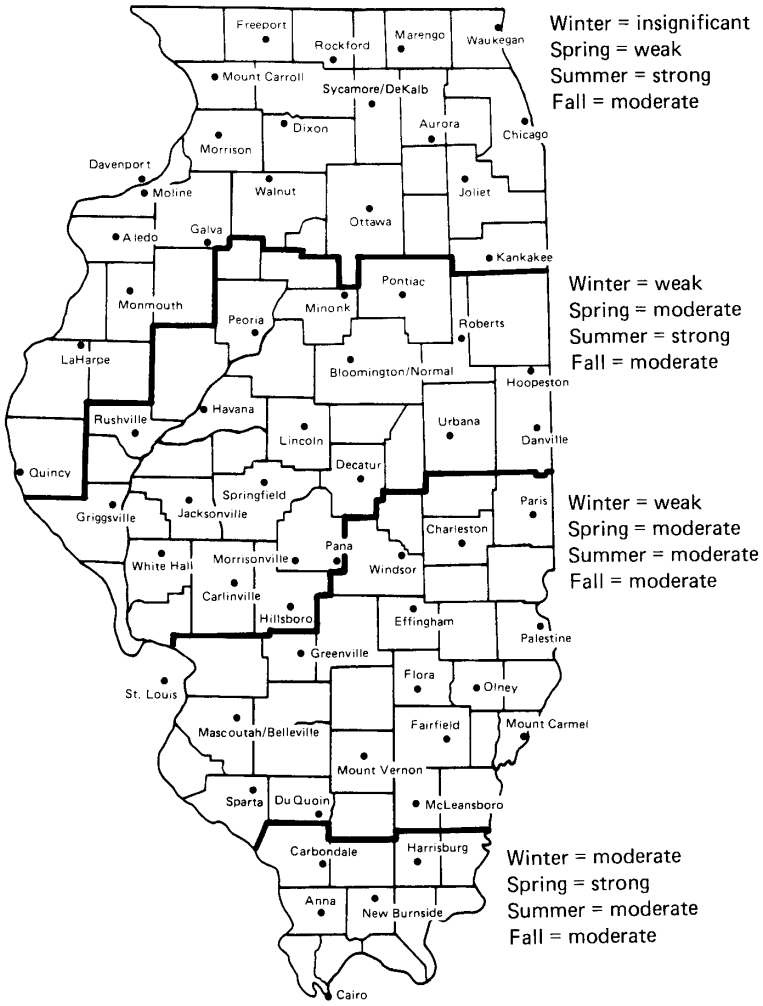


Figure 28. Categories (insignificant, weak, moderate, and strong) defining seasonal contributions to total number of rainfall events with recurrence intervals of 2 years or longer in four areas of Illinois

7. SPATIAL AND TEMPORAL CHARACTERISTICS OF HEAVY RAINSTORMS IN ILLINOIS

Data from dense raingage networks operated by the Illinois State Water Survey have supported numerous studies of the spatial and temporal distribution of heavy rainstorms of the type discussed in this report. Key results from several of these studies have been abstracted from published reports and technical papers and included here for the convenience of the user. They provide pertinent information for both the hydrologic designer and the hydrologic systems operator.

Relations between Point and Areal Mean Rainfall Frequencies

Knowledge of the frequency distributions of areal mean rainfall is pertinent to the efficient design of hydraulic structures such as dams, urban storm sewers, highway culverts, and water-supply facilities. In the United States, a relatively large amount of data is available on the frequency distributions of point rainfall, but there is little information on the frequency distributions of areal mean rainfall. Consequently, there was a need for determining how the mean rainfall frequency distributions for small areas about a point are related to the point frequency distributions.

Data from two dense raingage networks in east central Illinois (Huff, 1970) were used to determine the relationships between the frequency distributions of point and areal mean rainfall in areas ranging from 10 to 400 square miles and for storm periods of 30 minutes to 48 hours. A 10-year sample (1950-1959) from an urban network of 11 recording raingages in Champaign-Urbana provided data for 10 square miles. A network of 49 recording raingages on 400 square miles in east central Illinois provided a 12-year sample (1955-1966) for determination of relationships in areas of 50, 100, 200, and 400 square miles.

Point rainfall at the central gage in each area was used in developing the point-areal relationship. Areal mean rainfall was obtained from the arithmetic average of all gages in each of the sampling areas. For each storm period (30 minutes to 48 hours), the study was restricted to storms in which the central gage recorded rainfall that equaled or exceeded the amount expected to occur on the average of once in 2 years.

Table 35 was constructed to show the average ratios of areal mean to point rainfall for selected storm periods. These ratios can be used with available frequency distributions of point rainfall to estimate the frequency distributions of areal mean rainfall for small areas. The ratios are considered to be applicable throughout Illinois and most of the Midwest (see Huff and Vogel [1976] and Huff [1980] for a more detailed discussion of the point-areal relations).

Time Distributions of Rainfall (Storm Profiles)

The advent of urban runoff models in the late 1960s and early 1970s brought new demands on hydroclimatologists. These models required definition of the time-distribution characteristics of rainfall in the design type of storms; that is, the time profile of storm rainfall as developed from "mass" curves of storm rainfall. Because the previous demand for this information had not been strong, it was not readily available. Some limited work on storm "profiles" was done by the Corps of Engineers (1952) and by Tholin and Keifer (1960), who developed storm profiles for use with frequency data such as provided by U.S. Weather Bureau Technical Paper 40 (Hershfield, 1961).

In 1967, the Water Survey published results of a more detailed time-distribution study based on data from heavy storms sampled in an 11-year operation of a dense raingage network in central Illinois (Huff, 1967). The present study was undertaken primarily to provide information applicable to the existing urban design problems (Huff, 1986).

In the present study, 260 storms were used in which mean rainfall on a 49-gage, 400-square-mile network exceeded 0.50 inch. Appraisal of this sample led to development of four basic types of curves, showing time distributions of rainfall in storms categorized as first-, second-, third-, or fourth-quartile storms depending on whether the maximum rainfall occurred in the first, second, third, or fourth quarter of the storm (Huff, 1967). Families of curves were then computed for each storm type to provide the user with a measure of variability that would occur about any average curve derived from the data. Curves were determined for point rainfall and areas up to 400 square miles.

Table 35. Relations between Areal Mean and Point Rainfall Frequency Distributions

Storm period (hours)	*Ratio of areal to point rainfall for given area*					
	10 sq mi	*25 sq mi*	*50 sq mi*	*100 sq mi*	*200 sq mi*	*400 sq mi*
0.5	0.88	0.80	0.74	0.68	0.62	0.56
1.0	0.92	0.87	0.83	0.78	0.74	0.70
2.0	0.95	0.91	0.88	0.84	0.81	0.78
3.0	0.96	0.93	0.90	0.87	0.84	0.81
6.0	0.97	0.94	0.92	0.89	0.87	0.84
12.0	0.98	0.96	0.94	0.92	0.90	0.88
24.0	0.99	0.97	0.95	0.94	0.93	0.91
48.0	0.99	0.98	0.97	0.96	0.95	0.94

Other analyses indicated that areas from 50 to 400 square miles, durations of up to 24 hours, and mean rainfall of more than 0.50 inch could be combined into a single family when the model was derived in terms of cumulative percent of storm time versus cumulative percent of rainfall.

Tables 36 and 37, abstracted from Huff (1980), show average areal and point rainfall distributions derived from the original Huff curves (Huff, 1967; Huff, 1980). The reader is referred to the foregoing publications and to that of Huff and Vogel (1976) for more details on time-distribution characteristics of heavy rainstorms in Illinois.

Storm Shape

Runoff characteristics in heavy storms are influenced by the shape and movement of the storms. Two studies have been made to determine the shape characteristics of heavy rainstorms in Illinois. In one study, data from 260 storms on a dense raingage network in east central Illinois were used to investigate shapes on areas of 50 to 400 square miles (Huff, 1967). Storms were used in which areal mean rainfall exceeded 0.50 inch. In the other study, historical data for 350 heavy storms in Illinois having durations of up to 72 hours were used in a shape study of large-scale, flood-producing rain events. These were storms in which maximum 1-day amounts exceeded 4 inches or in which 2-day and 3-day amounts exceeded 5 inches (Stout and Huff, 1962). The storms encompassed areas ranging from a few hundred to 10,000 square miles.

The study of historical storms indicated that the rain intensity centers most frequently had an elliptical shape. The ratio of major to minor axis tended to increase with increasing area enclosed within a given isohyet; that is, the ellipse became more elongated. Within the limits employed in the study, no significant difference in the shape factor occurred with increasing storm magnitude or with durations ranging from a few hours to 72 hours.

In the network study, elliptical patterns also were found to be the most prevalent type, but the heaviest storms tended to be made up of a series of rainfall bands. However, intensity centers within these bands were most frequently elliptical. From these two studies, a mean shape factor has been determined that can be used as guidance in hydrologic problems in which storm shape is a significant design factor. The shape curve is shown in figure 29 for areas of 20 to 1,000 square miles. For those interested, the curve can be continued to 10,000 square miles because storms up to this size were included in the historical storm study.

The foregoing discussion of shape factor was abstracted from Huff and Vogel (1976).

Storm Orientation

An important consideration in any region is the orientation of the major axis of heavy rainstorms. For example, if the axes of heavy rainstorms tend to be parallel to a river basin or other area of concern, then the total runoff in this region will be greater, on the average, than in a region perpendicular to most storm axes.

The orientation of the storm axis also provides an indication of the movement of the major precipitation-producing entities embedded in any large-scale weather system. Because most individual storm elements have a component of motion from the west, an azimuth angle ranging from 180 to 360° was ascribed to each storm. Thus, if a storm had an orienta-

Table 36. Average Time Distributions of Heavy Storm Rainfalls on Areas of 50 to 400 Square Miles

	*Cumulative percent of storm rainfall for given storm type**			
Cumulative percent of storm time	*First-quartile*	*Second-quartile*	*Third-quartile*	*Fourth-quartile*
5	9	3	2	2
10	20	6	4	3
15	35	9	7	5
20	51	13	10	7
25	63	21	12	9
30	70	31	14	10
35	75	42	16	12
40	80	55	19	14
45	83	65	23	16
50	86	73	30	19
55	88	80	39	21
60	90	85	53	25
65	92	89	68	29
70	93	92	79	35
75	95	95	87	43
80	96	96	92	54
85	97	97	95	75
90	98	98	97	92
95	99	99	99	97

**Storms were categorized as first-, second-, third-, or fourth-quartile storms depending on whether the maximum rainfall occurred in the first, second, third, or fourth quarter of the storm.*

Table 37. Average Time Distributions of Heavy Rainfall at a Point

	*Cumulative percent of storm rainfall for given storm type**			
Cumulative percent of storm time	*First-quartile*	*Second-quartile*	*Third-quartile*	*Fourth-quartile*
5	12	4	3	2
10	26	9	6	5
15	40	14	10	8
20	51	19	13	10
25	59	25	16	13
30	65	32	20	16
35	71	40	23	18
40	75	52	27	21
45	78	61	33	24
50	82	68	39	28
55	84	73	46	32
60	87	78	56	35
65	89	82	68	40
70	91	86	79	44
75	93	89	85	50
80	95	92	89	58
85	96	94	92	68
90	97	96	95	83
95	99	98	98	93

**Storms were categorized as first-, second-, third-, or fourth-quartile storms depending on whether the maximum rainfall occurred in the first, second, third, or fourth quarter of the storm.*

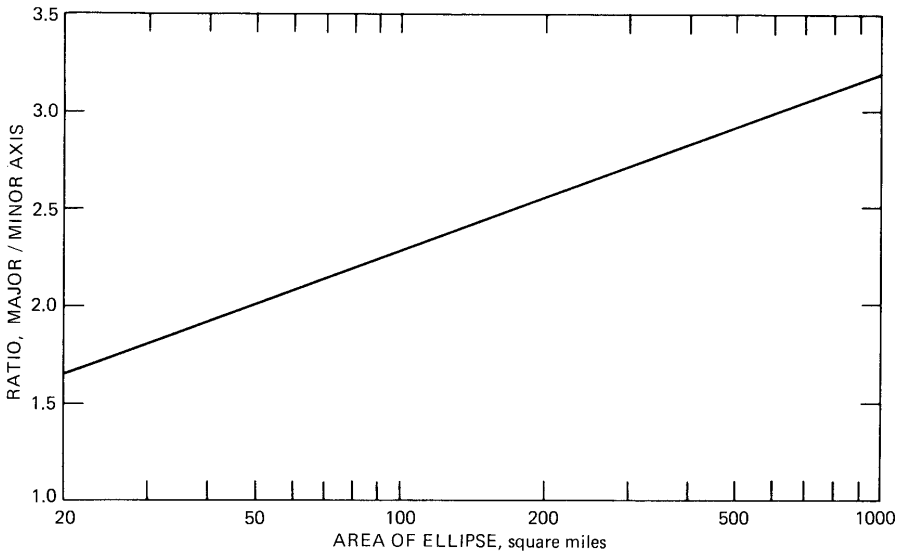


Figure 29. Mean shape factor for heavy storms

tion of 230°, the orientation was along a line from 230 to 050° (southwest to northeast). Network studies show it is very likely that the major rain-producing cells within a storm with this orientation moved from the southwest to the northeast.

No significant difference was found between the orientation of storms when they were stratified according to mean rainfall and areal extent. Table 38 shows the distribution in heavy storms having mean rainfall exceeding 1 inch over a contiguous area of 10,000 square miles (Huff and Semonin, 1960). This distribution is considered typical for heavy storms in Illinois. Other studies have supported the results shown in table 38 (Huff and Vogel, 1976; Vogel and Huff, 1978).

Table 38. Orientations of Heavy Rainstorms in Illinois

Azimuth (degrees)	*Percent of storms*	*Azimuth (degrees)*	*Percent of storms*
180-215	4	276-295	20
216-235	6	296-315	12
236-255	30	316-335	6
256-275	21	336-360	1

Heavy rainstorms in Illinois are most frequently oriented from west-southwest to east-northeast, west to east, or west-northwest to east-southeast (236-295° in table 38). The median orientation of the storms used in deriving table 38 was 265° (nearly west to east). In general, it has been found that the very heavy storms tend to have nearly west-to-east orientations. Heavy but less severe storms are usually oriented west-southwest to east-northeast or west-northwest to east-southeast. Moderately heavy storms, especially those of short duration (1 to 3 hours) are frequently oriented west-southwest to east-northeast or southwest to northeast. It is quite fortunate that the orientations of the major drainage basins in Illinois are closer to a north-south than to a west-east orientation.

Storm Movement

In Illinois, heavy rainstorms are usually produced by one or more squall lines or squall areas traversing a basin or other area of interest. Each system (squall line or squall area) consists of a number of individual convective entities, usually thunderstorms, and these entities have a motion that is strongly related to the wind field in which they are imbedded. These entities are often referred to as raincells. Network studies of the motion of heavy raincells (Huff, 1975) have provided the frequency distribution of cell move-

Table 39. Frequency Distribution of Heavy Raincell Movements

Azimuth (degrees)	*Percent of storms*	*Azimuth (degrees)*	*Percent of storms*
180-209	6	0- 29	4
210-239	16	30- 59	2
240-269	22	60- 89	2
270-299	20	90-119	2
300-329	13	120-149	2
330-359	7	150-179	4

ments shown in table 39. The most frequent raincell movements are from west-southwest through west to west-northwest (240-299°), which accounted for 42% of the total number analyzed in Huff's 1975 study. Of the total, 84% exhibited motion with a westerly component.

The foregoing information on storm orientation and movement in Illinois was abstracted from Huff (1979). Other information for the Chicago urban area and the six-county region surrounding Chicago is presented by Huff and Vogel (1976).

Extreme Rainstorm Events (Outliers)

During the 1951-1960 period, an unusual number of severe rainstorms occurred in Illinois. Ten storms substantially exceeded the 100-year recurrence interval of storm rainfall for total or partial storm periods. All except the storm of May 21-23, 1957, produced amounts of nine inches or more at the storm core within periods of 24 hours or less and qualified as outliers by the Section 5 definition. The Water Survey carried out extensive field surveys and analyses of these major storm events in Illinois. Through this program, information was generated for each of the ten storms, the depth-duration-area relations for which are shown in table 40. Results were published in a number of technical reports (Huff, 1979; Huff and Changnon, 1961; Huff, Hiser, and Stout, 1955; Huff et al., 1958; Illinois State Water Survey, 1952; Larson, Hiser, and Daniels, 1955).

These reports contain detailed information on the characteristics of these outlier storms, including isohyetal patterns, characteristics of the rainfall distribution, depth-area-duration relations, antecedent rainfall, synoptic weather conditions associated with the storms, and both partial and total storm isohyetal patterns. When possible, radar analyses were also made to help define the spatial-temporal characteristics of the storms and the triggering mechanisms for these rare events.

These individual storm studies should be helpful to hydrologists involved in the design and operation of hydraulic structures in areas where the risk to life and property from severe flash floods is a major concern. Large metropolitan areas, such as Chicago, are especially subject to massive property damage, interruption of normal activities, and, sometimes, creation of health hazards from severe rainstorms of the type discussed above.

Additional Information

Reports and papers that deal with various aspects of the temporal and spatial characteristics of heavy rainstorms in Illinois are identified in the reference list by asterisks. These publications provide much more detailed information than is presented in the brief summaries in this section. For example, additional information on the time distribution of heavy storm rainfall is provided in references 15, 20, 30, and 33.

Detailed information on the temporal-spatial characteristics of rare storm events that substantially exceed the 100-year recurrence-interval values is presented in references 19, 21, 23, 28, 32, 35, and 37. All of the references identified by asterisks contain important information on one or more of the various spatial-temporal characteristics of severe rainstorms in Illinois discussed in this section.

Table 40. Depth-Duration-Area Relations for Selected Storms

	Depth (inches) for given area (sq mi) and duration (hours)								
	25	*50*	*100*	*200*	*500*	*1000*	*2000*	*5000*	*Section*
24 hours									
8/16-17/59*	10.3	10.1	9.8	9.5	8.8	8.2	7.3	5.9	S
6/14-15/57*	16.5	16.0	15.1	14.2	12.5	11.0	9.3	6.7	SW
6/27-28/57*	12.4	12.0	11.5	11.1	10.2	9.4	8.5	7.1	ESE
7/12-13/57*	11.3	11.0	10.7	10.3	9.5	8.7	7.6	5.9	NE
5/21-23/57	7.9	7.8	7.6	7.3	6.8	6.3	5.7	4.8	S
5/26-28/56	10.9	10.1	9.3	8.2	6.2	4.7			C
10/9-10/54	11.7	11.6	11.3	10.9	10.3	9.5	8.6	7.0	NE
12 hours									
8/16-17/59†	9.3	9.1	8.8	8.4	7.8	7.0	6.2	4.8	S
7/14/58*	8.7	8.5	8.2	7.4	7.0	6.2	5.2	3.9	NE
6/14-15/57*	16.3	15.7	14.7	13.8	12.0	10.4	8.6	6.1	SW
6/27-28/57*	12.0	11.5	10.9	10.3	9.3	8.4	7.4	5.9	ESE
7/12-13/57*	9.8	9.6	9.3	8.9	8.2	7.3	6.5	4.9	NE
5/21-22/57**	7.3	7.1	6.8	6.5	5.9	5.3	4.6	3.6	S
5/26-28/56	9.2	8.5	7.6	6.5	4.8	3.5			C
10/9-10/54	7.3	7.2	7.0	6.8	6.3	5.9	5.3	4.2	NE
7/8-9/51	12.0	11.3	10.6	9.8	8.8	7.8	6.7	5.6	C
6 hours									
8/16-17/59†	5.1	5.0	4.8	4.7	4.3	4.0	3.6	2.9	S
6/14-15/57*	12.6	11.8	10.9	9.8	8.1	6.6	5.0	3.1	SW
6/27-28/57*	8.7	8.3	8.0	7.6	6.8	6.2	5.5	4.4	ESE
7/12-13/57*	6.9	6.8	6.6	6.2	5.8	5.1	4.4	3.2	NE
5/21-22/57**	7.0	6.7	6.4	6.1	5.5	4.8	4.2	3.2	S
5/26-28/56	8.5	7.9	7.0	6.0	4.4	3.1			C
10/9-10/54	5.3	5.2	5.0	4.8	4.4	4.0	3.6	2.8	NE
7/18-19/52	9.5	8.7	7.8	6.8	5.3				NW
7/8-9/51	11.9	11.0	10.3	9.5	8.5	7.5	6.5	5.3	C
3 hours									
8/16-17/59†	4.0	3.8	3.7	3.5	3.1	2.7	2.3	1.6	S
6/14-15/57*	8.7	8.2	7.5	6.7	5.5	4.4	3.4	2.0	SW
6/27-28/57*	4.5	4.3	4.2	4.0	3.7	3.4	3.1	2.6	ESE
7/12-13/57*	5.1	5.0	4.8	4.5	4.0	3.6	3.0	2.1	NE
7/8-9/51†	7.6	7.2	6.8	6.3	5.3	4.5	3.7	2.5	C

**Field survey was primary data source*

***Network supplied most of isohyetal information*

†Both field surveys and SWS networks provided key information

8. GENERAL SUMMARY AND CONCLUSIONS

Major Climatic Fluctuations

The frequency distributions of heavy storm rainfall derived from two 40-year periods (1901-1940 and 1941-1980) were examined for climatic fluctuations. The results indicated a substantial change in the intensity of these storms between the two periods. In general, the 1941-1980 rainfall for given recurrence intervals was greater than the 1901-1940 rainfall over the northern and central portions of the state. However, it was slightly less in the southeastern and extreme southern parts of the state. The change was most pronounced in the northwest, northeast, and west southwest climatic sections (figure 7).

Furthermore, results suggest that hydrologic designs based on the 1901-1940 data for a given recurrence interval would have underestimated the rainfall intensity distribution during 1941-1980 over much of the state, particularly in northeastern Illinois.

Further investigation of the existence of a climatic trend was pursued through analyses of four independent 20-year periods during 1901-1980. Frequency distributions derived from the 20-year samples provided support for the results obtained from comparison of the two 40-year periods. That is, a general trend was indicated for an increase in the intensity of heavy rainfall events over a major portion of Illinois since the beginning of this century.

Although the intensity of heavy rainfall events increased substantially over much of the state during 1901-1980, the spatial (isohyetal) patterns remained stable with respect to the locations of major highs and lows found in the statewide distribution. This indicates that the observed changes were not associated with changes in macroscale storm tracks or other large-scale features of the precipitation climate. Rather, the frequency and intensity of heavy rain events appear to have been in an upward trend since the start of the twentieth century. These findings agree well with fluctuations in other relevant conditions, including thunderstorms, total seasonal precipitation, and cloud cover.

As a result of the foregoing analyses, it was concluded that an adjustment should be made to incorporate the observed trends in our updating of Illinois rainfall frequency relations. Several investigators have shown that climatic conditions in the near future are most highly related to what has happened in the immediate past. Findings also lead to the conclusion that rainfall frequency relations should be updated more frequently than has been done in the past. An updating every 10 years (decade) would be desirable, but updates should certainly be made at intervals of no greater than 20 years.

Frequency of Heavy Rainfall Events

Statewide Patterns

Frequency distributions were determined for rain periods ranging from 5 minutes to 10 days and for recurrence intervals varying from 2 months to 100 years. Analyses were based on carefully edited daily data for 61 Illinois stations in operation during the 1901-1983 period and on hourly data for 34 stations during 1948-1983. The state was divided into ten sections of approximately homogeneous precipitation climate with respect to the distribution of heavy rainstorm events. This division was based on assessment of the 83-year sample of heavy rainstorms and on consideration of pertinent meteorological and climatological factors.

The resulting statewide pattern shows differences in rainfall frequencies that agree well with physical causative factors, including the distribution of 1) weather fronts and low-pressure centers, 2) thunderstorms, and 3) topographic, lake (Lake Michigan), and urban influences.

Both sectional mean and point rainfall frequency distributions were derived after adjusting for the climatic trend found in the 83-year sample. *The sectional mean relationships are recommended for use.* This approach lessens the effects of natural and human-induced variability (undetected measurement and computational errors) between points in an area of approximately homogeneous precipitation climate. However, some users still prefer to work with point relationships, so these relationships have been included, along with selected isohyetal patterns derived from them.

The sectional relationships have been presented in two forms: in families of curves and in a table. The tabular values provide the best means of interpolating between storm periods or recurrence intervals not included in the presentation, and they can be read more accurately than the curves, which were produced from the table. Point rainfall frequency distributions have been presented in tabular form. Because some users prefer the findings to be presented in map form, isohyetal patterns for the state

have been presented for the most critical storm periods and recurrence intervals used by the hydrologic community. Caution in their use is urged.

Urban Effects

Past research has indicated increases in rainfall frequencies in Illinois in two major urban areas. Hence a special study was made of frequency distributions for the Chicago urban area and the surrounding six counties to update a 1976 Water Survey study. This area has experienced numerous problems related to flash floods in recent years.

More detailed rainfall analyses were possible than for the remainder of the state because of the existence of an urban network of 16 recording gages covering 430 square miles that provided useful data in the 1949-1974 period. These data were used in conjunction with the 1901-1983 record from NWS stations in the six-county area in the present study. Only slight adjustment of the 1976 findings was found necessary for the urban area, but substantial changes were required for the region west, southwest, and south of the city. Adjustments to the 1976 findings are presented in this report.

An urban-induced rainfall anomaly produced by the St. Louis urban environment extends northeast, east, and southeast of the city into Illinois. This rain enhancement is confined largely to St. Clair and Madison Counties in southwestern Illinois. An adjustment to the regional rainfall frequency distributions was derived for use in Madison County; no adjustment was found necessary for St. Clair County.

Variability within Climatic Sections

Within any particular climatic section, natural variability will produce variations between sampling points for any given recurrence interval and storm period. This variability will be substantial and will occur even when long periods of record are used in developing heavy rainfall frequency distributions. Two methods of assessing this variability were used in the present study.

The first method involved comparing the variation in rainfall amounts between the frequency distributions derived for individual stations within a climatic section and the sectional mean distribution. The variability measured by this method results primarily from sampling variations due to the random distribution of heavy storms in the climatic section within the sampling period. The effects resulting from undetected measurement and computational errors and from rare events nonrepresentative of the sampling period expectancies were minimized but not completely eliminated by this approach.

The second method involved a study of outlier storms, which are those storms producing amounts that greatly exceed the amounts expected to occur at a given location for a given rain duration within the sampling period used in developing frequency distributions of heavy rainstorms. They are often considered to be storms that might occur in sampling periods exceeding 100 years; that is, they are very unusual storms.

We defined outlier storms as those that exceeded three standard deviations about the sectional mean distribution at the 100-year recurrence interval, based on the dispersion calculations in the first method described above. We then identified outlier storms for rain periods of 24 hours to 10 days in each of the ten climatic sections.

On the basis of our definition, we identified nine, ten, eleven, seven, and four outlier storms for 1901-1983 for rain periods of 24 hours, 48 hours, 72 hours, 5 days, and 10 days, respectively. The maximum rainfall amounts in these storms ranged from 9.5 to 11.3 inches for 24-hour rain periods, 10.6 to 13.7 inches for 48-hour periods, 11.0 to 15.2 inches for 72-hour rain periods, 11.6 to 15.3 inches for 5-day rains, and 14.2 to 15.7 inches for 10-day rains. The foregoing occurrences comprise less than 0.25% of the approximately 5,000 station years of data in the Illinois sample (61 stations, 83 years of record at most stations).

These storms tend to occur most frequently in summer (June-August). The 24-hour outliers occurred most frequently in north and central Illinois, but the longer storms (48 hours to 10 days) were most common in the southern part of the state. In most of the longer storms, the major portion of the rainfall occurred within a period of 24 hours or less. These storms tended to occur in clusters rather than in any orderly fashion. Combining all occurrences for 24-hour to 10-day rain periods, 41% occurred in the 1951-1960 decade.

Seasonal Relations

Separation of frequency distributions according to season provides information useful to the design of some hydraulic systems and structures. Runoff characteristics vary between seasons as a result of a variety of factors such as vegetative cover, plant foliage, frozen soils, snow cover, soil saturation, and transpiration. In this Illinois study, seasonal fre-

quency distributions were derived for the four traditional climatic seasons: winter (December-February), spring (March-May), summer (June-August), and fall (September-November). Relations were developed for precipitation periods of 30 minutes to 10 days and recurrence intervals of 1 to 100 years. Both sectional and point rainfall distributions were derived from the 61-station sample for 1901-1983.

With respect to spatial distribution characteristics, the spring, summer, and fall isohyetal patterns are very similar to those derived from the total data sample (all seasons combined). During winter, a relatively strong precipitation gradient exists from southern to northern Illinois and eliminates some of the features common to the distributions for the other seasons.

The seasonal frequency distributions for the ten climatic sections were compared for storms having intensities equaling or exceeding the 2-year recurrence-interval value. In the northernmost areas (northwest, northeast, and west sections), these storms occurred predominantly in summer. The central area (central, eastern, and west southwestern sections) also had a strong contribution from summer storms.

The south-central area (east southeast, southwest, and southeast sections) had their heavy storms quite equally divided between spring, summer, and fall. Extreme southern Illinois (southern section) showed a maximum frequency in spring and moderate occurrences during spring, fall, and winter. The winter contribution was insignificant in northern Illinois and small in the central and south central parts of the state.

In general, the season having the most heavy storms changes from summer in the north to the transition seasons (spring and fall) across the central part of the state; in the extreme south, significant contributions are made by storms in all seasons. A primary force behind this distribution is the duration of the convective rainfall season, which is relatively short in extreme northern Illinois but nearly year-round in the extreme southern part of the state. Consequently, thunderstorms, which breed most of the heavy rainstorm events, are much more frequent in the south.

Appendix A. Point Frequency Distributions at 61 Stations for Storm Periods of 5 Minutes to 2 Days and Recurrence Intervals of 2 Months to 100 Years for All Seasons Combined

Storm codes

1 – 10 days
2 – 5 days
3 – 72 hours
4 – 48 hours
5 – 24 hours
6 – 18 hours
7 – 12 hours
8 – 6 hours
9 – 3 hours
10 – 2 hours
11 – 1 hour
12 – 30 minutes
13 – 15 minutes
14 – 10 minutes
15 – 5 minutes

Sectional (zone) codes

1 – Northwest
2 – Northeast
3 – West
4 – Central
5 – East
6 – West Southwest
7 – East Southeast
8 – Southwest
9 – Southeast
10 – South

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1	1	Aledo	2.19	2.63	3.01	3.54	4.07	4.42	5.43	6.56	7.35	8.35	9.30	10.88
1	1	Dixon	2.04	2.45	2.80	3.30	3.79	4.12	5.02	5.95	6.85	8.40	9.70	11.60
1	1	Freeport	2.15	2.59	2.96	3.48	4.00	4.35	5.25	6.30	7.02	8.65	10.40	12.38
1	1	Galva	2.13	2.56	2.93	3.45	3.97	4.31	5.15	6.30	7.14	8.40	9.45	10.60
1	1	Moline	2.21	2.65	3.03	3.57	4.10	4.46	5.41	6.51	7.33	8.45	9.80	11.04
1	1	Morrison	2.14	2.57	2.96	3.49	4.01	4.36	5.15	6.20	7.09	8.40	9.80	11.66
1	1	Mt Carroll	2.19	2.63	3.03	3.57	4.10	4.46	5.25	6.25	7.09	8.35	9.40	10.60
1	1	Rockford	2.16	2.60	3.00	3.53	4.06	4.41	5.25	6.35	7.23	8.40	9.40	10.45
1	1	Walnut	2.16	2.60	3.00	3.53	4.06	4.41	5.19	6.30	7.20	8.45	9.50	10.61
1	2	Aurora	2.08	2.54	2.86	3.36	3.86	4.20	5.06	6.40	7.56	9.33	10.90	12.60
1	2	Chicago	1.93	2.33	2.65	3.11	3.58	3.89	4.78	5.70	6.41	7.70	9.16	11.07
1	2	DeKalb	2.11	2.54	2.92	3.44	3.96	4.30	5.14	6.30	7.05	8.19	9.19	10.78
1	2	Joliet	2.11	2.54	2.92	3.44	3.96	4.30	5.14	6.35	7.30	8.82	10.08	11.55
1	2	Kankakee	2.02	2.43	2.80	3.30	3.79	4.12	4.89	6.04	6.90	8.24	9.70	12.35
1	2	Marengo	1.98	2.38	2.75	3.23	3.72	4.04	4.78	5.70	6.41	7.40	8.29	10.03
1	2	Ottawa	2.06	2.48	2.86	3.36	3.86	4.20	4.99	5.99	6.83	8.19	9.45	10.92
1	2	Waukegan	1.93	2.32	2.68	3.15	3.62	3.94	4.78	5.81	6.67	7.77	8.71	9.56
1	3	La Harpe	2.34	2.82	3.25	3.82	4.40	4.78	5.83	7.20	8.19	9.50	10.75	12.98
1	3	Mormouth	2.16	2.62	3.00	3.53	4.06	4.41	5.41	6.70	7.72	9.24	10.50	11.76
1	3	Quincy	2.26	2.73	3.14	3.70	4.25	4.62	5.56	6.83	7.77	8.98	10.03	11.24
1	4	Bloomington	2.20	2.69	3.02	3.55	4.08	4.44	5.35	6.51	7.37	8.48	9.39	10.21
1	4	Decatur	2.22	2.67	3.05	3.59	4.13	4.49	5.50	6.97	7.93	8.99	9.70	10.60
1	4	Havana	2.03	2.44	2.82	3.31	3.81	4.14	4.90	5.96	6.82	7.95	8.90	10.00
1	4	Lincoln	2.08	2.54	2.88	3.39	3.90	4.24	5.05	6.21	7.02	8.08	8.84	10.01
1	4	Minonk	2.00	2.41	2.78	3.27	3.76	4.09	4.85	6.01	6.62	7.56	8.70	10.28
1	4	Peoria	2.03	2.44	2.82	3.31	3.81	4.14	4.90	5.96	6.82	8.24	9.14	10.31
1	4	Rushville	2.21	2.67	3.07	3.62	4.16	4.52	5.30	6.30	7.09	8.14	9.03	9.87
1	5	Danville	2.26	2.72	3.11	3.66	4.21	4.58	5.46	6.66	7.41	8.44	9.17	9.71
1	5	Hoopeston	2.17	2.63	3.01	3.54	4.08	4.43	5.15	6.18	7.06	8.29	9.27	10.30
1	5	Pontiac	2.02	2.44	2.81	3.30	3.80	4.13	4.99	6.13	7.01	8.20	9.17	10.20
1	5	Roberts	2.04	2.46	2.84	3.34	3.84	4.17	4.94	5.94	6.64	7.72	8.75	10.61
1	5	Urbana	2.19	2.63	3.03	3.57	4.10	4.46	5.20	6.13	6.75	7.57	8.14	8.76
1	6	Carlinville	2.25	2.71	3.09	3.63	4.18	4.54	5.45	6.62	7.57	8.89	10.25	12.24
1	6	Griggsville	2.14	2.58	2.95	3.47	3.99	4.34	5.35	6.72	7.72	8.94	9.85	11.37
1	6	Hillsboro	2.22	2.68	3.09	3.63	4.18	4.54	5.40	6.57	7.47	8.64	9.70	11.49
1	6	Jacksonville	2.17	2.64	3.01	3.54	4.07	4.42	5.25	6.60	7.52	8.69	10.10	11.38
1	6	Morrisonville	2.13	2.56	2.95	3.47	3.99	4.34	5.30	6.42	7.22	8.43	9.49	10.61
1	6	Pana	2.22	2.68	3.07	3.63	4.18	4.54	5.65	6.77	7.52	8.58	9.60	11.19
1	6	Springfield	2.00	2.41	2.77	3.26	3.75	4.08	4.95	6.21	7.12	8.59	9.80	11.11
1	6	White Hall	2.15	2.59	2.99	3.51	4.04	4.39	5.35	6.62	7.57	8.72	9.65	10.65
1	7	Charleston	2.30	2.77	3.16	3.71	4.27	4.64	5.51	6.63	7.39	8.36	9.18	10.10
1	7	Effingham	2.26	2.72	3.11	3.66	4.20	4.57	5.61	6.94	7.80	8.72	9.90	11.27
1	7	Palestine	2.37	2.86	3.29	3.87	4.45	4.84	5.66	6.58	7.24	8.06	9.10	10.38
1	7	Paris	2.20	2.65	3.05	3.59	4.13	4.49	5.51	6.84	7.80	9.03	10.00	11.02
1	7	Windsor	2.27	2.74	3.16	3.71	4.27	4.64	5.61	6.89	7.90	9.23	10.30	11.58
1	8	Belleville	2.20	2.64	3.02	3.55	4.08	4.44	5.30	6.60	7.70	9.25	10.70	13.25
1	8	DuQuoin	2.35	2.82	3.23	3.80	4.37	4.75	5.90	7.20	8.10	9.35	10.15	10.90
1	8	Greenville	2.18	2.62	3.02	3.55	4.08	4.44	5.45	6.67	7.47	8.69	9.85	11.11
1	8	Sparta	2.34	2.81	3.20	3.76	4.32	4.70	5.70	6.95	7.90	9.35	10.60	11.85
1	8	St Louis	2.15	2.59	2.99	3.51	4.04	4.39	5.35	6.72	7.83	9.29	11.00	12.93
1	9	Fairfield	2.32	2.79	3.19	3.75	4.31	4.69	5.71	7.09	8.16	9.64	10.81	12.04
1	9	Flora	2.29	2.76	3.16	3.71	4.27	4.64	5.61	6.89	7.80	9.33	10.60	11.83
1	9	McLeansboro	2.36	2.87	3.28	3.86	4.43	4.82	5.81	7.14	8.16	9.54	10.71	11.83
1	9	Mt Carmel	2.32	2.80	3.22	3.79	4.36	4.74	5.81	7.39	8.40	10.15	11.07	11.94
1	9	Mt Vernon	2.35	2.83	3.25	3.83	4.41	4.79	5.81	7.17	8.16	9.58	10.76	11.83
1	9	Olney	2.35	2.83	3.26	3.83	4.41	4.79	5.71	6.89	7.75	8.98	10.10	11.27
1	10	Anna	2.74	3.30	3.81	4.48	5.15	5.60	6.65	7.95	8.90	10.10	11.00	12.00
1	10	Cairo	2.57	3.10	3.54	4.16	4.78	5.20	6.25	7.75	8.75	10.20	11.50	12.50
1	10	Carbondale	2.50	3.01	3.43	4.04	4.65	5.05	6.35	7.80	8.75	9.80	10.60	11.30
1	10	Harrisburg	2.47	2.98	3.43	4.04	4.65	5.05	6.02	7.60	9.08	11.22	12.40	14.07
1	10	New Burnside	2.65	3.19	3.67	4.32	4.97	5.40	6.52	7.95	9.02	10.40	11.50	12.65

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
2	1	Aledo	1.83	2.18	2.44	2.83	3.26	3.54	4.26	5.25	5.98	7.20	8.40	9.70
2	1	Dixon	1.77	2.11	2.37	2.74	3.16	3.43	4.16	5.15	5.94	7.35	8.80	10.45
2	1	Freeport	1.77	2.11	2.37	2.74	3.16	3.43	4.06	5.10	6.00	7.55	9.00	11.15
2	1	Galva	1.77	2.11	2.37	2.74	3.16	3.43	4.06	4.99	5.83	7.10	8.32	9.74
2	1	Moline	1.80	2.14	2.41	2.79	3.21	3.49	4.26	5.15	6.00	7.40	8.50	9.95
2	1	Morrison	1.78	2.11	2.39	2.77	3.18	3.46	4.08	5.00	5.81	7.20	8.60	10.50
2	1	Mt Carroll	1.76	2.10	2.38	2.76	3.17	3.45	4.16	5.10	5.82	7.05	8.30	9.90
2	1	Rockford	1.71	2.04	2.31	2.68	3.08	3.35	4.06	5.10	5.93	7.22	8.30	9.40
2	1	Walnut	1.76	2.10	2.38	2.76	3.17	3.45	4.11	5.10	5.93	7.20	8.32	9.67
2	2	Aurora	1.69	2.02	2.26	2.62	3.02	3.28	3.91	4.84	5.67	7.40	8.90	11.05
2	2	Chicago	1.62	1.95	2.17	2.51	2.89	3.14	3.81	4.79	5.60	6.80	8.20	9.97
2	2	DeKalb	1.76	2.10	2.38	2.76	3.17	3.45	4.12	4.95	5.61	6.64	7.89	9.50
2	2	Joliet	1.72	2.05	2.31	2.68	3.08	3.35	4.16	5.46	6.54	7.83	8.95	10.26
2	2	KankaKee	1.70	2.04	2.30	2.66	3.06	3.33	4.10	5.15	5.93	7.35	8.50	10.00
2	2	Marengo	1.61	1.92	2.13	2.46	2.83	3.08	3.71	4.64	5.31	6.23	7.35	9.05
2	2	Ottawa	1.71	2.04	2.31	2.68	3.08	3.35	4.02	4.99	5.82	7.00	8.03	9.69
2	2	Waukegan	1.56	1.86	2.10	2.44	2.81	3.05	3.61	4.48	5.15	6.28	7.21	8.50
2	3	La Harpe	1.93	2.31	2.61	3.02	3.48	3.88	4.68	6.09	7.04	8.24	9.50	11.70
2	3	Monmouth	1.85	2.21	2.50	2.90	3.33	3.62	4.52	5.84	6.67	7.92	9.20	10.76
2	3	Quincy	1.90	2.28	2.57	2.98	3.43	3.73	4.52	5.46	6.25	7.35	8.42	9.90
2	4	Bloomington	1.89	2.25	2.53	2.93	3.37	3.66	4.43	5.35	6.02	7.11	7.98	9.19
2	4	Decatur	1.91	2.28	2.56	2.97	3.41	3.71	4.58	5.66	6.54	7.56	8.60	9.62
2	4	Havana	1.71	2.04	2.28	2.64	3.04	3.30	3.89	4.79	5.61	6.80	7.83	9.25
2	4	Lincoln	1.76	2.10	2.38	2.76	3.17	3.45	4.07	4.98	5.71	6.84	7.61	8.70
2	4	Minonk	1.69	2.02	2.28	2.64	3.04	3.30	4.00	4.84	5.42	6.40	7.60	9.26
2	4	Peoria	1.73	2.07	2.35	2.72	3.13	3.40	4.00	5.09	5.82	7.20	8.40	9.65
2	4	Rushville	1.83	2.19	2.45	2.84	3.27	3.55	4.20	5.04	5.78	6.93	7.93	8.65
2	5	Danville	1.88	2.24	2.51	2.91	3.35	3.64	4.31	5.25	6.07	7.07	7.85	8.87
2	5	Hoopeston	1.76	2.10	2.35	2.72	3.13	3.40	4.16	4.95	5.62	6.55	7.21	8.05
2	5	Pontiac	1.73	2.07	2.32	2.69	3.09	3.36	4.16	5.20	6.02	7.17	8.20	9.40
2	5	Roberts	1.74	2.08	2.35	2.73	3.14	3.41	3.93	4.67	5.38	6.70	8.00	9.56
2	5	Urbana	1.74	2.08	2.35	2.73	3.14	3.41	4.05	4.74	5.36	6.30	7.00	7.90
2	6	Carlinville	1.83	2.18	2.43	2.82	3.24	3.52	4.30	5.35	6.20	7.80	9.20	11.03
2	6	Griggsville	1.76	2.11	2.36	2.74	3.15	3.42	4.15	5.20	6.05	7.10	8.20	9.25
2	6	Hillsboro	1.84	2.20	2.48	2.88	3.31	3.60	4.25	5.30	6.30	7.60	8.60	10.10
2	6	Jacksonville	1.73	2.07	2.35	2.72	3.13	3.40	4.20	5.30	6.20	7.39	8.70	10.00
2	6	Morrisonville	1.75	2.11	2.33	2.70	3.10	3.37	4.24	5.40	6.40	7.60	8.30	9.40
2	6	Pana	1.83	2.18	2.47	2.86	3.29	3.58	4.39	5.45	6.16	7.60	8.70	10.14
2	6	Springfield	1.72	2.06	2.33	2.70	3.11	3.38	4.04	5.10	5.90	7.00	8.03	9.60
2	6	White Hall	1.79	2.13	2.38	2.76	3.17	3.45	4.15	5.45	6.35	7.50	8.50	9.80
2	7	Charleston	1.91	2.28	2.55	2.95	3.39	3.69	4.30	5.25	5.91	6.92	8.10	9.30
2	7	Effingham	1.83	2.18	2.44	2.83	3.26	3.54	4.20	5.10	5.90	7.30	8.50	10.15
2	7	Palestine	1.88	2.25	2.55	2.95	3.39	3.69	4.44	5.40	6.16	7.02	8.00	9.35
2	7	Paris	1.83	2.19	2.48	2.87	3.30	3.59	4.39	5.45	6.40	7.68	8.53	9.23
2	7	Windsor	1.87	2.23	2.53	2.93	3.37	3.66	4.39	5.45	6.16	7.47	8.70	10.12
2	8	Belleville	1.81	2.16	2.42	2.81	3.23	3.51	4.26	5.35	6.34	7.92	9.31	11.50
2	8	DuQuoin	1.96	2.34	2.63	3.05	3.51	3.81	4.70	5.70	6.54	7.47	8.55	9.90
2	8	Greenville	1.79	2.14	2.40	2.78	3.20	3.48	4.20	5.20	6.05	7.40	8.55	10.15
2	8	Sparta	1.92	2.29	2.59	3.01	3.46	3.76	4.60	5.69	6.54	7.72	8.66	9.90
2	8	St Louis	1.80	2.15	2.44	2.82	3.25	3.53	4.25	5.35	6.25	7.90	9.40	11.55
2	9	Fairfield	1.90	2.26	2.54	2.94	3.39	3.68	4.40	5.60	6.50	7.90	9.10	10.83
2	9	Flora	1.89	2.25	2.53	2.93	3.37	3.66	4.34	5.35	6.31	7.73	9.09	10.18
2	9	McLeansboro	1.91	2.29	2.59	3.00	3.45	3.75	4.55	5.70	6.65	8.15	9.50	10.90
2	9	Mt Carmel	1.94	2.32	2.62	3.04	3.50	3.80	4.55	5.60	6.50	7.75	8.85	10.30
2	9	Mt Vernon	1.95	2.33	2.64	3.06	3.51	3.82	4.65	5.70	6.80	8.20	9.50	10.68
2	9	Olney	1.92	2.29	2.59	3.01	3.46	3.76	4.40	5.45	6.21	7.70	9.00	10.40
2	10	Anna	2.20	2.63	2.97	3.45	3.97	4.31	5.25	6.39	7.28	8.32	9.26	10.30
2	10	Cairo	2.12	2.53	2.84	3.29	3.78	4.11	5.05	6.14	7.18	8.41	9.41	10.75
2	10	Carbondale	2.08	2.48	2.77	3.21	3.69	4.01	5.00	6.24	7.18	8.46	9.50	10.26
2	10	Harrisburg	1.99	2.38	2.69	3.12	3.59	3.90	4.75	5.95	7.10	8.55	9.80	11.63
2	10	New Burnside	2.12	2.53	2.86	3.32	3.82	4.15	5.00	6.30	7.20	8.50	9.60	11.00

Storm code	Zone code	Station	Annual rainfall (inches) for given recurrence interval											
			2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
3	1	Aledo	1.62	1.92	2.13	2.46	2.83	3.08	3.74	4.65	5.40	6.54	7.54	8.60
3	1	Dixon	1.59	1.90	2.08	2.41	2.77	3.01	3.69	4.66	5.47	6.77	7.89	9.17
3	1	Freeport	1.60	1.87	2.09	2.42	2.79	3.03	3.74	4.71	5.42	6.80	8.20	9.88
3	1	Galva	1.62	1.90	2.13	2.46	2.83	3.08	3.69	4.60	5.30	6.44	7.42	8.63
3	1	Moline	1.58	1.86	2.07	2.40	2.76	3.00	3.71	4.83	5.55	6.71	7.67	8.73
3	1	Morrison	1.62	1.92	2.15	2.50	2.87	3.12	3.76	4.60	5.40	6.60	7.80	9.31
3	1	Mt Carroll	1.59	1.88	2.10	2.43	2.80	3.04	3.71	4.65	5.42	6.58	7.66	8.74
3	1	Rockford	1.61	1.89	2.11	2.45	2.82	3.06	3.74	4.60	5.36	6.38	7.29	8.25
3	1	Walnut	1.60	1.90	2.13	2.46	2.83	3.08	3.76	4.71	5.43	6.52	7.29	8.48
3	2	Aurora	1.56	1.83	2.05	2.38	2.73	2.97	3.61	4.46	5.27	6.80	8.20	9.80
3	2	Chicago	1.49	1.76	1.95	2.26	2.59	2.82	3.51	4.37	5.10	6.20	7.40	8.75
3	2	DeKalb	1.59	1.89	2.11	2.45	2.82	3.06	3.63	4.43	5.10	6.07	7.20	8.61
3	2	Joliet	1.61	1.89	2.09	2.42	2.79	3.03	3.82	5.01	5.83	7.12	8.16	9.78
3	2	Kankakee	1.55	1.81	2.03	2.35	2.70	2.94	3.61	4.63	5.45	6.87	7.98	9.40
3	2	Marengo	1.50	1.76	1.97	2.28	2.62	2.85	3.39	4.10	4.66	5.70	6.50	7.80
3	2	Ottawa	1.56	1.83	2.07	2.40	2.76	3.00	3.55	4.43	5.22	6.42	7.44	8.50
3	3	Waukegan	1.46	1.70	1.90	2.20	2.53	2.75	3.30	4.08	4.79	5.60	6.42	7.45
3	3	La Harpe	1.76	2.06	2.33	2.70	3.11	3.38	4.18	5.33	6.13	7.41	8.68	10.38
3	3	Monmouth	1.69	2.00	2.21	2.56	2.94	3.20	4.02	5.00	5.80	7.10	8.10	9.44
3	3	Quincy	1.75	2.05	2.29	2.66	3.05	3.32	4.05	4.96	5.67	6.60	7.54	8.97
3	4	Bloomington	1.66	1.97	2.18	2.53	2.91	3.16	3.88	4.81	5.57	6.58	7.34	8.24
3	4	Decatur	1.75	2.05	2.30	2.66	3.06	3.33	4.13	5.17	5.95	6.88	7.60	8.44
3	4	Havana	1.53	1.79	2.00	2.32	2.67	2.90	3.40	4.20	4.91	6.06	7.20	8.35
3	4	Lincoln	1.55	1.83	2.04	2.36	2.71	2.95	3.66	4.60	5.35	6.38	7.09	7.99
3	4	Minonk	1.50	1.77	1.99	2.30	2.65	2.88	3.42	4.12	4.80	5.84	6.90	8.12
3	4	Peoria	1.60	1.88	2.10	2.43	2.80	3.04	3.67	4.57	5.38	6.52	7.63	8.65
3	4	Rushville	1.66	1.96	2.18	2.53	2.91	3.16	3.69	4.39	4.97	5.99	6.92	7.73
3	5	Danville	1.68	1.97	2.21	2.56	2.94	3.20	3.90	4.79	5.54	6.42	7.12	7.87
3	5	Hoopeston	1.65	1.95	2.17	2.52	2.90	3.15	3.74	4.48	5.06	5.83	6.45	7.06
3	5	Pontiac	1.58	1.86	2.09	2.42	2.79	3.03	3.72	4.85	5.50	6.58	7.52	8.27
3	5	Roberts	1.57	1.86	2.08	2.41	2.77	3.01	3.51	4.25	4.95	6.20	7.40	8.80
3	5	Urbana	1.63	1.91	2.13	2.50	2.88	3.13	3.66	4.43	5.01	5.80	6.35	7.18
3	6	Carlinville	1.64	1.94	2.14	2.48	2.85	3.10	3.79	4.86	5.75	7.10	8.29	9.68
3	6	Griggsville	1.59	1.88	2.08	2.42	2.78	3.02	3.70	4.70	5.51	6.71	7.53	8.49
3	6	Hillsboro	1.71	2.03	2.27	2.63	3.03	3.29	3.90	4.86	5.60	6.70	7.61	9.10
3	6	Jacksonville	1.61	1.89	2.14	2.48	2.85	3.10	3.79	4.79	5.67	6.93	7.94	9.00
3	6	Morrisonville	1.62	1.92	2.15	2.50	2.87	3.12	3.85	5.05	5.99	7.05	7.94	8.75
3	6	Pana	1.68	1.97	2.23	2.58	2.97	3.23	3.92	4.86	5.62	6.81	7.75	8.90
3	6	Springfield	1.59	1.87	2.11	2.45	2.82	3.06	3.75	4.79	5.54	6.58	7.42	8.69
3	6	White Hall	1.63	1.92	2.14	2.48	2.85	3.10	3.76	4.88	5.77	6.81	7.64	8.60
3	7	Charleston	1.65	1.93	2.15	2.49	2.86	3.11	3.66	4.51	5.18	6.24	7.16	8.49
3	7	Effingham	1.59	1.88	2.08	2.42	2.78	3.02	3.63	4.46	5.17	6.50	7.62	8.98
3	7	Palestine	1.66	1.95	2.21	2.56	2.94	3.20	3.82	4.81	5.40	6.24	7.28	8.35
3	7	Paris	1.64	1.93	2.16	2.50	2.88	3.13	3.79	4.70	5.40	6.38	7.20	8.10
3	7	Windsor	1.66	1.95	2.18	2.53	2.91	3.16	3.75	4.72	5.44	6.57	7.60	8.89
3	8	Belleville	1.62	1.91	2.12	2.46	2.82	3.07	3.78	4.83	5.77	7.17	8.70	10.64
3	8	DuQuoin	1.76	2.06	2.30	2.67	3.07	3.34	4.08	5.02	5.77	6.74	7.59	8.80
3	8	Greenville	1.68	1.97	2.21	2.56	2.94	3.20	3.91	4.79	5.49	6.80	7.94	9.20
3	8	Sparta	1.72	2.04	2.28	2.65	3.05	3.31	4.00	5.00	5.80	6.95	7.83	8.81
3	8	St Louis	1.67	1.98	2.21	2.56	2.94	3.20	3.92	4.96	5.87	7.18	8.70	10.32
3	9	Fairfield	1.68	1.97	2.21	2.56	2.94	3.20	3.95	4.95	5.88	7.16	8.28	9.67
3	9	Flora	1.64	1.94	2.15	2.50	2.87	3.12	3.79	4.78	5.61	7.00	8.40	9.40
3	9	McLeansboro	1.68	1.99	2.22	2.58	2.96	3.22	3.95	4.95	5.79	7.16	8.30	9.57
3	9	Mt Carmel	1.76	2.07	2.32	2.72	3.11	3.38	4.01	5.01	5.76	6.81	8.02	9.12
3	9	Mt Vernon	1.73	2.02	2.26	2.62	3.02	3.28	3.98	4.99	5.85	7.15	8.21	9.45
3	9	Olney	1.71	2.02	2.26	2.62	3.02	3.28	3.91	4.86	5.61	7.00	8.17	9.20
3	10	Anna	1.92	2.25	2.55	2.95	3.39	3.69	4.41	5.70	6.53	7.63	8.57	9.18
3	10	Cairo	1.92	2.25	2.52	2.92	3.36	3.65	4.39	5.58	6.44	7.73	8.70	9.56
3	10	Carbondale	1.83	2.15	2.39	2.78	3.19	3.52	4.30	5.41	6.29	7.40	8.39	9.00
3	10	Harrisburg	1.83	2.14	2.42	2.81	3.23	3.51	4.30	5.37	6.24	7.47	8.56	10.20
3	10	New Burnside	1.89	2.22	2.51	2.91	3.35	3.65	4.40	5.35	6.20	7.40	8.48	9.65

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
4	1	Aledo	1.50	1.75	1.95	2.26	2.60	2.83	3.43	4.27	4.95	6.00	6.91	7.89
4	1	Dixon	1.49	1.74	1.91	2.22	2.55	2.77	3.38	4.28	5.01	6.21	7.24	8.42
4	1	Freeport	1.48	1.73	1.92	2.22	2.56	2.78	3.43	4.31	4.97	6.35	7.60	9.07
4	1	Galva	1.50	1.75	1.95	2.26	2.60	2.83	3.38	4.22	4.87	5.92	7.00	8.00
4	1	Moline	1.46	1.71	1.90	2.21	2.54	2.76	3.40	4.43	5.10	6.16	7.04	8.01
4	1	Morrison	1.52	1.77	1.97	2.29	2.63	2.86	3.46	4.22	4.90	6.05	7.00	8.10
4	1	Mt Carroll	1.48	1.73	1.93	2.23	2.57	2.79	3.40	4.27	4.97	6.05	7.03	8.02
4	1	Rockford	1.51	1.76	1.93	2.23	2.57	2.79	3.43	4.22	4.92	5.85	6.69	7.50
4	1	Walnut	1.50	1.75	1.95	2.26	2.60	2.83	3.46	4.31	4.98	6.00	6.69	7.60
4	2	Aurora	1.46	1.70	1.88	2.18	2.51	2.73	3.31	4.10	5.00	6.44	7.65	9.07
4	2	Chicago	1.39	1.63	1.79	2.07	2.38	2.59	3.21	4.01	4.73	5.87	6.88	8.10
4	2	DeKalb	1.48	1.74	1.93	2.24	2.58	2.80	3.33	4.06	4.80	5.80	6.80	7.97
4	2	Joliet	1.51	1.78	1.96	2.26	2.60	2.80	3.54	4.60	5.34	6.53	7.70	9.15
4	2	Kankakee	1.44	1.68	1.86	2.16	2.48	2.70	3.38	4.40	5.20	6.50	7.60	9.05
4	2	Marengo	1.38	1.62	1.80	2.09	2.40	2.61	3.11	3.76	4.27	5.17	5.90	7.10
4	2	Ottawa	1.46	1.71	1.90	2.20	2.53	2.75	3.26	4.06	4.79	5.89	6.83	7.83
4	2	Waukegan	1.37	1.59	1.74	2.02	2.32	2.52	3.02	3.75	4.29	5.13	5.89	6.70
4	3	La Harpe	1.64	1.92	2.14	2.48	2.85	3.10	3.80	4.74	5.62	6.90	8.10	9.61
4	3	Monmouth	1.56	1.82	2.03	2.35	2.70	2.94	3.58	4.55	5.35	6.40	7.50	8.74
4	3	Quincy	1.62	1.89	2.10	2.44	2.81	3.05	3.71	4.56	5.20	6.30	7.07	8.23
4	4	Bloomington	1.54	1.80	2.00	2.32	2.67	2.90	3.56	4.41	5.11	5.95	6.74	7.56
4	4	Decatur	1.62	1.89	2.10	2.44	2.81	3.05	3.79	4.75	5.46	6.31	6.97	7.60
4	4	Havana	1.42	1.66	1.84	2.14	2.46	2.67	3.12	3.85	4.51	5.55	6.41	7.46
4	4	Lincoln	1.42	1.66	1.85	2.14	2.47	2.68	3.30	4.20	4.90	5.85	6.50	7.32
4	4	Minonk	1.40	1.64	1.83	2.12	2.44	2.65	3.14	3.88	4.50	5.40	6.40	7.45
4	4	Peoria	1.48	1.73	1.93	2.23	2.57	2.79	3.37	4.19	4.93	5.98	7.00	7.99
4	4	Rushville	1.54	1.80	2.00	2.32	2.67	2.90	3.39	4.02	4.60	5.50	6.30	7.20
4	5	Danville	1.56	1.82	2.05	2.37	2.72	2.96	3.59	4.39	5.08	5.89	6.53	7.23
4	5	Hoopeston	1.53	1.79	1.99	2.31	2.66	2.89	3.43	4.12	4.64	5.34	5.91	6.48
4	5	Pontiac	1.40	1.64	1.83	2.12	2.44	2.66	3.36	4.26	5.05	6.04	6.90	7.58
4	5	Roberts	1.46	1.71	1.90	2.21	2.54	2.76	3.21	3.91	4.55	5.70	6.83	7.90
4	5	Urbana	1.52	1.78	1.98	2.30	2.64	2.87	3.36	4.06	4.60	5.31	5.83	6.59
4	6	Carlinville	1.53	1.79	1.96	2.27	2.61	2.84	3.47	4.45	5.27	6.52	7.60	8.90
4	6	Griggsville	1.47	1.72	1.91	2.22	2.55	2.77	3.40	4.32	5.05	6.16	6.91	7.95
4	6	Hillsboro	1.62	1.89	2.08	2.42	2.78	3.02	3.55	4.45	5.14	6.16	6.99	8.30
4	6	Jacksonville	1.51	1.76	1.96	2.27	2.61	2.84	3.47	4.40	5.20	6.35	7.28	8.25
4	6	Morrisonville	1.52	1.77	1.97	2.29	2.63	2.86	3.53	4.64	5.49	6.47	7.28	8.10
4	6	Pana	1.57	1.84	2.04	2.37	2.72	2.96	3.61	4.45	5.15	6.25	7.10	8.16
4	6	Springfield	1.49	1.74	1.94	2.25	2.59	2.81	3.44	4.40	5.09	6.04	6.85	8.00
4	6	White Hall	1.51	1.76	1.96	2.27	2.61	2.84	3.46	4.47	5.29	6.25	7.01	7.89
4	7	Charleston	1.51	1.77	1.97	2.28	2.62	2.85	3.35	4.14	4.75	5.72	6.70	7.86
4	7	Effingham	1.47	1.72	1.91	2.22	2.55	2.77	3.34	4.09	4.74	5.90	6.98	8.32
4	7	Palestine	1.57	1.84	2.04	2.37	2.72	2.96	3.50	4.42	4.95	5.72	6.63	8.05
4	7	Paris	1.52	1.78	1.98	2.30	2.64	2.87	3.47	4.32	4.95	5.85	6.60	7.50
4	7	Windsor	1.54	1.80	2.00	2.32	2.67	2.90	3.45	4.34	4.99	6.03	7.00	8.23
4	8	Belleville	1.50	1.75	1.94	2.25	2.59	2.81	3.54	4.50	5.36	6.79	8.20	9.85
4	8	DuQuoin	1.63	1.90	2.12	2.46	2.82	3.07	3.74	4.61	5.29	6.18	7.10	8.15
4	8	Greenville	1.58	1.84	2.03	2.35	2.70	2.94	3.49	4.40	5.03	6.20	7.28	8.40
4	8	Sparta	1.61	1.88	2.09	2.43	2.80	3.04	3.67	4.59	5.32	6.37	7.18	8.10
4	8	St Louis	1.58	1.85	2.06	2.38	2.74	2.98	3.60	4.56	5.38	6.80	8.05	9.56
4	9	Fairfield	1.55	1.82	2.02	2.34	2.70	2.93	3.62	4.54	5.40	6.57	7.59	8.78
4	9	Flora	1.52	1.77	1.97	2.29	2.63	2.86	3.47	4.39	5.15	6.50	7.85	8.60
4	9	McLeansboro	1.56	1.83	2.04	2.36	2.71	2.95	3.62	4.54	5.32	6.57	7.61	8.78
4	9	Mt Carmel	1.61	1.90	2.13	2.48	2.85	3.10	3.64	4.59	5.29	6.25	7.33	8.43
4	9	Mt Vernon	1.60	1.87	2.08	2.41	2.77	3.01	3.65	4.57	5.37	6.56	7.53	8.67
4	9	Olney	1.60	1.87	2.08	2.41	2.77	3.01	3.58	4.46	5.15	6.40	7.52	8.47
4	10	Anna	1.80	2.10	2.34	2.71	3.12	3.39	4.05	5.20	5.99	7.01	7.96	8.42
4	10	Cairo	1.77	2.07	2.30	2.67	3.07	3.34	4.03	5.12	5.91	7.10	7.99	8.86
4	10	Carbondale	1.69	1.98	2.20	2.55	2.93	3.19	3.95	4.96	5.77	6.79	7.69	8.32
4	10	Harrisburg	1.71	2.00	2.23	2.58	2.97	3.23	3.94	4.92	5.72	6.87	7.86	9.45
4	10	New Burnside	1.79	2.09	2.33	2.70	3.10	3.37	4.03	4.91	5.69	6.86	7.78	8.90

Storm code	Zone code	Station	Annual rainfall (inches) for given recurrence interval											
			2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	Aledo	1.40	1.63	1.79	2.06	2.35	2.55	3.11	3.95	4.68	5.69	6.58	7.56
5	1	Dixon	1.41	1.64	1.82	2.11	2.39	2.60	3.14	4.02	4.68	5.63	6.74	7.70
5	1	Freeport	1.42	1.65	1.81	2.09	2.37	2.58	3.14	3.95	4.67	5.87	7.07	8.40
5	1	Galva	1.41	1.64	1.80	2.08	2.36	2.57	3.09	3.89	4.57	5.63	6.52	7.56
5	1	Moline	1.38	1.61	1.78	2.06	2.34	2.54	3.11	3.95	4.68	5.69	6.58	7.32
5	1	Morrison	1.40	1.63	1.78	2.06	2.34	2.54	3.09	3.84	4.52	5.46	6.35	7.32
5	1	Mt Carroll	1.40	1.63	1.78	2.06	2.34	2.54	3.11	4.07	4.73	5.51	6.23	6.96
5	1	Rockford	1.42	1.65	1.81	2.09	2.37	2.58	3.07	3.95	4.61	5.51	6.30	6.96
5	1	Walnut	1.42	1.66	1.82	2.12	2.42	2.63	3.11	3.89	4.57	5.45	6.23	7.00
5	2	Aurora	1.37	1.60	1.78	2.06	2.34	2.54	3.12	3.93	4.74	6.04	7.22	8.40
5	2	Chicago	1.33	1.55	1.72	1.98	2.25	2.45	3.00	3.81	4.49	5.56	6.47	7.50
5	2	DeKalb	1.39	1.62	1.80	2.08	2.36	2.57	3.02	3.82	4.54	5.45	6.35	7.38
5	2	Joliet	1.44	1.68	1.86	2.15	2.45	2.66	3.20	4.08	4.85	6.04	7.17	8.47
5	2	Kankakee	1.38	1.61	1.78	2.06	2.34	2.54	3.14	4.10	5.02	6.20	7.30	8.65
5	2	Marengo	1.31	1.52	1.70	1.97	2.24	2.44	2.95	3.48	3.87	4.70	5.40	6.50
5	2	Ottawa	1.38	1.60	1.75	2.03	2.30	2.50	3.00	3.81	4.49	5.45	6.35	7.25
5	2	Waukegan	1.29	1.50	1.64	1.90	2.15	2.34	2.80	3.38	3.85	4.60	5.45	6.40
5	3	La Harpe	1.54	1.80	2.00	2.32	2.63	2.86	3.50	4.29	5.03	6.29	7.48	8.90
5	3	Monmouth	1.47	1.71	1.89	2.19	2.48	2.70	3.30	4.15	4.88	5.93	6.94	8.09
5	3	Quincy	1.55	1.80	1.97	2.28	2.59	2.82	3.53	4.40	4.94	5.99	6.70	7.62
5	4	Bloomington	1.41	1.64	1.79	2.07	2.36	2.56	3.11	3.98	4.63	5.45	6.22	7.05
5	4	Decatur	1.47	1.71	1.87	2.16	2.46	2.67	3.26	4.06	4.63	5.40	6.05	6.80
5	4	Havana	1.35	1.57	1.72	1.98	2.25	2.45	2.90	3.62	4.18	5.17	5.94	6.90
5	4	Lincoln	1.33	1.55	1.72	1.98	2.25	2.45	2.98	3.79	4.51	5.59	6.22	6.90
5	4	Minonk	1.32	1.54	1.68	1.94	2.21	2.40	2.91	3.63	4.29	5.15	6.00	6.90
5	4	Peoria	1.38	1.60	1.75	2.03	2.30	2.50	2.99	3.78	4.60	5.65	6.42	7.40
5	4	Rushville	1.42	1.64	1.81	2.10	2.38	2.59	3.00	3.63	4.20	5.00	5.70	6.50
5	5	Danville	1.40	1.63	1.78	2.06	2.34	2.54	3.09	4.01	4.61	5.40	5.95	6.75
5	5	Hoopeston	1.38	1.61	1.76	2.03	2.31	2.51	2.97	3.52	3.94	4.69	5.25	6.00
5	5	Pontiac	1.32	1.54	1.68	1.94	2.21	2.40	3.03	3.80	4.40	5.48	6.40	7.02
5	5	Roberts	1.28	1.49	1.63	1.89	2.14	2.33	2.84	3.52	4.22	5.07	6.12	7.13
5	5	Urbana	1.41	1.64	1.80	2.08	2.36	2.57	3.10	3.70	4.20	4.85	5.45	6.10
5	6	Carlinville	1.42	1.65	1.83	2.11	2.40	2.61	3.15	3.94	4.71	5.77	6.81	8.02
5	6	Griggsville	1.39	1.62	1.79	2.07	2.36	2.56	3.09	3.88	4.54	5.57	6.47	7.55
5	6	Hillsboro	1.54	1.79	1.96	2.27	2.58	2.80	3.25	4.10	4.71	5.56	6.47	7.55
5	6	Jacksonville	1.42	1.66	1.81	2.10	2.38	2.59	3.15	3.99	4.60	5.59	6.46	7.20
5	6	Morrisonville	1.39	1.62	1.77	2.05	2.33	2.53	3.06	4.06	4.77	5.70	6.50	7.20
5	6	Pana	1.38	1.60	1.75	2.03	2.30	2.50	3.10	3.80	4.47	5.37	6.20	7.20
5	6	Springfield	1.39	1.62	1.77	2.05	2.33	2.53	3.06	3.94	4.72	5.76	6.49	7.40
5	6	White Hall	1.40	1.64	1.81	2.10	2.38	2.59	3.12	3.90	4.70	5.51	6.34	7.32
5	7	Charleston	1.40	1.63	1.78	2.07	2.35	2.55	3.00	3.75	4.38	5.38	6.32	7.28
5	7	Effingham	1.34	1.56	1.71	1.98	2.24	2.44	2.92	3.69	4.42	5.49	6.43	7.70
5	7	Palestine	1.40	1.63	1.78	2.07	2.35	2.55	3.02	3.86	4.40	5.25	6.16	7.50
5	7	Paris	1.41	1.64	1.80	2.08	2.36	2.57	3.06	3.80	4.47	5.37	6.16	6.94
5	7	Windsor	1.44	1.68	1.86	2.15	2.45	2.66	3.14	3.88	4.48	5.37	6.24	7.54
5	8	Belleville	1.43	1.67	1.86	2.15	2.45	2.66	3.31	4.30	5.08	6.54	7.74	9.20
5	8	DuQuoin	1.51	1.75	1.92	2.22	2.52	2.74	3.32	4.12	4.72	5.76	6.64	7.55
5	8	Greenville	1.50	1.75	1.91	2.21	2.51	2.73	3.26	3.99	4.62	5.76	6.81	7.90
5	8	Sparta	1.46	1.70	1.87	2.15	2.45	2.66	3.22	4.01	4.70	5.70	6.64	7.55
5	8	St Louis	1.48	1.73	1.92	2.23	2.53	2.75	3.29	4.23	4.99	6.34	7.52	8.85
5	9	Fairfield	1.46	1.70	1.86	2.15	2.44	2.65	3.21	4.02	4.70	5.82	6.71	7.84
5	9	Flora	1.41	1.64	1.79	2.07	2.36	2.56	3.15	4.05	4.75	6.09	7.25	7.90
5	9	McLeansboro	1.45	1.70	1.88	2.17	2.47	2.68	3.25	4.08	4.80	5.93	6.81	8.06
5	9	Mt Carmel	1.45	1.68	1.84	2.13	2.42	2.63	3.17	3.97	4.60	5.76	6.71	7.80
5	9	Mt Vernon	1.45	1.68	1.84	2.13	2.42	2.63	3.14	3.97	4.48	5.43	6.16	6.95
5	9	Olney	1.42	1.65	1.81	2.09	2.37	2.58	3.12	3.91	4.60	5.70	6.60	7.80
5	10	Anna	1.69	1.97	2.16	2.49	2.83	3.08	3.75	4.66	5.32	6.40	7.10	7.80
5	10	Cairo	1.66	1.93	2.11	2.44	2.77	3.05	3.75	4.80	5.43	6.31	7.20	8.20
5	10	Carbondale	1.61	1.87	2.04	2.37	2.69	2.92	3.57	4.37	5.10	5.98	6.84	7.77
5	10	Harrisburg	1.56	1.82	1.99	2.30	2.61	2.84	3.45	4.32	5.10	6.38	7.42	8.75
5	10	New Burnside	1.66	1.93	2.11	2.45	2.78	3.02	3.58	4.40	5.10	6.10	7.00	8.36

Storm code	Zone code	Station	Annual rainfall (inches) for given recurrence interval											
			2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
6	1	Aledo	1.29	1.50	1.64	1.90	2.16	2.35	2.86	3.63	4.31	5.23	6.05	6.96
6	1	Dixon	1.29	1.51	1.67	1.94	2.20	2.39	2.89	3.70	4.31	5.18	6.18	7.12
6	1	Freeport	1.30	1.52	1.66	1.92	2.18	2.37	2.89	3.63	4.30	5.40	6.50	7.73
6	1	Galva	1.30	1.51	1.65	1.91	2.17	2.36	2.84	3.58	4.20	5.18	6.00	6.96
6	1	Moline	1.29	1.50	1.64	1.90	2.15	2.34	2.86	3.63	4.31	5.23	6.05	6.73
6	1	Morrison	1.29	1.50	1.64	1.90	2.15	2.34	2.84	3.53	4.16	5.02	5.84	6.73
6	1	Mt Carroll	1.29	1.50	1.64	1.90	2.15	2.34	2.86	3.74	4.35	5.07	5.73	6.40
6	1	Rockford	1.30	1.52	1.66	1.92	2.18	2.37	2.82	3.63	4.24	5.07	5.80	6.40
6	1	Walnut	1.35	1.57	1.72	1.98	2.25	2.45	2.86	3.58	4.20	5.01	5.73	6.44
6	2	Aurora	1.29	1.50	1.64	1.90	2.15	2.34	2.87	3.62	4.36	5.56	6.64	7.73
6	2	Chicago	1.22	1.42	1.57	1.82	2.07	2.25	2.76	3.51	4.13	5.12	5.95	6.90
6	2	DeKalb	1.30	1.52	1.66	1.91	2.17	2.36	2.78	3.51	4.18	5.01	5.84	6.79
6	2	Joliet	1.35	1.57	1.72	1.98	2.25	2.45	2.94	3.75	4.46	5.56	6.60	7.79
6	2	Kankakee	1.29	1.50	1.64	1.90	2.15	2.34	2.89	3.77	4.62	5.70	6.72	7.96
6	2	Marengo	1.23	1.43	1.57	1.81	2.06	2.24	2.71	3.20	3.56	4.32	4.97	5.98
6	2	Ottawa	1.26	1.47	1.61	1.86	2.12	2.30	2.76	3.51	4.13	5.01	5.84	6.67
6	2	Waukegan	1.18	1.38	1.50	1.74	1.98	2.15	2.58	3.11	3.55	4.23	5.01	5.88
6	3	La Harpe	1.45	1.68	1.87	2.13	2.42	2.63	3.22	3.95	4.64	5.79	6.88	8.19
6	3	Monmouth	1.36	1.58	1.74	2.01	2.28	2.48	3.04	3.82	4.49	5.46	6.38	7.44
6	3	Quincy	1.42	1.66	1.81	2.10	2.38	2.59	3.25	4.05	4.56	5.51	6.16	7.01
6	4	Bloomington	1.30	1.51	1.65	1.91	2.17	2.36	2.86	3.66	4.26	5.02	5.72	6.49
6	4	Decatur	1.35	1.57	1.72	1.99	2.26	2.46	3.00	3.74	4.26	4.97	5.57	6.26
6	4	Havana	1.24	1.44	1.57	1.82	2.07	2.25	2.67	3.33	3.85	4.75	5.46	6.35
6	4	Lincoln	1.24	1.44	1.58	1.82	2.07	2.25	2.74	3.49	4.15	5.12	5.72	6.35
6	4	Minonk	1.22	1.41	1.55	1.79	2.03	2.21	2.68	3.34	3.94	4.74	5.52	6.35
6	4	Peoria	1.26	1.47	1.61	1.86	2.12	2.30	2.75	3.48	4.23	5.20	5.91	6.81
6	4	Rushville	1.31	1.52	1.67	1.93	2.19	2.38	2.76	3.32	3.86	4.60	5.24	5.98
6	5	Danville	1.29	1.50	1.64	1.90	2.15	2.34	2.84	3.69	4.24	4.97	5.47	6.21
6	5	Hoopeston	1.27	1.48	1.62	1.87	2.13	2.31	2.73	3.24	3.62	4.34	4.83	5.52
6	5	Pontiac	1.22	1.41	1.55	1.79	2.03	2.21	2.80	3.50	4.05	5.04	5.89	6.46
6	5	Roberts	1.18	1.37	1.50	1.73	1.97	2.14	2.61	3.24	3.90	4.66	5.63	6.56
6	5	Urbana	1.30	1.51	1.65	1.91	2.17	2.36	2.85	3.40	3.86	4.46	5.01	5.61
6	6	Carlinville	1.32	1.54	1.70	1.94	2.21	2.40	2.90	3.62	4.33	5.31	6.27	7.38
6	6	Griggsville	1.30	1.51	1.65	1.91	2.17	2.36	2.84	3.57	4.18	5.12	5.95	6.95
6	6	Hillsboro	1.42	1.65	1.81	2.09	2.37	2.58	2.99	3.77	4.33	5.12	5.95	6.95
6	6	Jacksonville	1.31	1.52	1.67	1.93	2.19	2.38	2.90	3.70	4.23	5.17	5.94	6.62
6	6	Morrisonville	1.28	1.49	1.63	1.89	2.14	2.33	2.82	3.74	4.39	5.24	5.98	6.62
6	6	Pana	1.26	1.47	1.61	1.86	2.12	2.30	2.85	3.50	4.11	4.94	5.70	6.62
6	6	Springfield	1.28	1.49	1.63	1.89	2.14	2.33	2.82	3.62	4.34	5.30	5.97	6.80
6	6	White Hall	1.31	1.52	1.67	1.93	2.19	2.38	2.87	3.59	4.28	5.07	5.83	6.73
6	7	Charleston	1.29	1.50	1.64	1.90	2.16	2.35	2.76	3.45	4.03	4.95	5.81	6.70
6	7	Effingham	1.23	1.43	1.57	1.81	2.06	2.24	2.69	3.39	4.06	5.05	5.92	7.08
6	7	Palestine	1.29	1.50	1.64	1.90	2.16	2.35	2.78	3.55	4.05	4.83	5.67	6.90
6	7	Paris	1.30	1.51	1.65	1.91	2.17	2.36	2.82	3.50	4.11	4.94	5.67	6.38
6	7	Windsor	1.33	1.55	1.72	1.98	2.25	2.45	2.89	3.57	4.12	4.94	5.74	6.93
6	8	Belleville	1.33	1.55	1.72	1.98	2.25	2.45	3.06	3.97	4.69	6.02	7.12	8.46
6	8	DuQuoin	1.39	1.61	1.76	2.04	2.32	2.52	3.05	3.79	4.35	5.30	6.11	6.95
6	8	Greenville	1.38	1.61	1.76	2.03	2.31	2.51	3.00	3.67	4.29	5.30	6.27	7.27
6	8	Sparta	1.35	1.57	1.72	1.98	2.25	2.45	2.96	3.69	4.30	5.24	6.11	6.95
6	8	St Louis	1.39	1.62	1.77	2.05	2.33	2.53	3.03	3.89	4.60	5.83	6.92	8.14
6	9	Fairfield	1.34	1.56	1.71	1.98	2.24	2.44	2.95	3.70	4.33	5.35	6.17	7.21
6	9	Flora	1.30	1.51	1.65	1.91	2.17	2.36	2.90	3.73	4.38	5.60	6.67	7.27
6	9	McLeansboro	1.36	1.58	1.73	2.00	2.27	2.47	2.99	3.75	4.42	5.46	6.27	7.42
6	9	Mt Carmel	1.33	1.55	1.69	1.96	2.23	2.42	2.92	3.65	4.23	5.30	6.17	7.18
6	9	Mt Vernon	1.33	1.55	1.69	1.96	2.23	2.42	2.89	3.65	4.12	5.00	5.67	6.39
6	9	Olney	1.30	1.52	1.66	1.92	2.18	2.37	2.87	3.60	4.23	5.24	6.07	7.18
6	10	Anna	1.56	1.81	1.99	2.29	2.60	2.83	3.45	4.29	4.89	5.89	6.53	7.18
6	10	Cairo	1.52	1.77	1.94	2.24	2.55	2.79	3.45	4.41	5.00	5.81	6.62	7.54
6	10	Carbondale	1.48	1.72	1.90	2.18	2.47	2.69	3.28	4.02	4.69	5.50	6.29	7.15
6	10	Harrisburg	1.44	1.67	1.83	2.11	2.40	2.61	3.17	3.97	4.69	5.87	6.83	8.05
6	10	New Burnside	1.53	1.78	1.95	2.25	2.56	2.78	3.29	4.05	4.69	5.61	6.44	7.66

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
7	1	Aledo	1.22	1.42	1.55	1.80	2.04	2.22	2.71	3.44	4.07	4.95	5.72	6.58
7	1	Dixon	1.22	1.43	1.58	1.83	2.08	2.26	2.73	3.50	4.07	4.90	5.84	6.76
7	1	Freeport	1.23	1.43	1.57	1.81	2.06	2.24	2.73	3.44	4.06	5.11	6.15	7.31
7	1	Galva	1.23	1.43	1.57	1.81	2.06	2.24	2.69	3.38	3.98	4.90	5.67	6.58
7	1	Moline	1.22	1.41	1.55	1.79	2.03	2.21	2.71	3.44	4.07	4.95	5.72	6.37
7	1	Morrison	1.22	1.41	1.55	1.79	2.03	2.21	2.69	3.34	3.93	4.75	5.52	6.37
7	1	Mt Carroll	1.22	1.41	1.55	1.79	2.03	2.21	2.71	3.54	4.12	4.79	5.42	6.06
7	1	Rockford	1.23	1.43	1.57	1.81	2.06	2.24	2.67	3.44	4.01	4.79	5.48	6.06
7	1	Walnut	1.27	1.48	1.62	1.87	2.13	2.31	2.71	3.38	3.98	4.74	5.42	6.09
7	2	Aurora	1.22	1.41	1.55	1.79	2.03	2.21	2.71	3.42	4.12	5.25	6.28	7.31
7	2	Chicago	1.15	1.34	1.49	1.73	1.96	2.13	2.61	3.31	3.91	4.84	5.63	6.53
7	2	DeKalb	1.23	1.43	1.57	1.81	2.06	2.24	2.63	3.32	3.95	4.74	5.52	6.42
7	2	Joliet	1.27	1.48	1.62	1.87	2.13	2.31	2.78	3.55	4.22	5.25	6.24	7.37
7	2	Kankakee	1.22	1.41	1.55	1.79	2.03	2.21	2.73	3.57	4.37	5.39	6.35	7.53
7	2	Marengo	1.17	1.36	1.48	1.72	1.95	2.12	2.56	3.03	3.37	4.09	4.70	5.66
7	2	Ottawa	1.19	1.39	1.52	1.76	2.00	2.17	2.61	3.31	3.91	4.74	5.52	6.31
7	2	Waukegan	1.12	1.31	1.43	1.65	1.88	2.04	2.44	2.94	3.36	4.00	4.74	5.56
7	3	La Harpe	1.37	1.59	1.77	2.02	2.29	2.49	3.05	3.73	4.39	5.47	6.51	7.74
7	3	Monmouth	1.29	1.49	1.64	1.90	2.16	2.35	2.87	3.61	4.25	5.16	6.04	7.04
7	3	Quincy	1.35	1.57	1.72	1.98	2.25	2.45	3.07	3.82	4.30	5.21	5.83	6.63
7	4	Bloomington	1.21	1.41	1.56	1.81	2.05	2.23	2.71	3.46	4.03	4.75	5.41	6.13
7	4	Decatur	1.28	1.48	1.62	1.88	2.13	2.32	2.84	3.53	4.03	4.70	5.26	5.92
7	4	Havana	1.17	1.36	1.49	1.73	1.96	2.13	2.52	3.15	3.64	4.49	5.17	6.00
7	4	Lincoln	1.17	1.36	1.49	1.73	1.96	2.13	2.60	3.30	3.92	4.84	5.41	6.00
7	4	Minonk	1.15	1.34	1.46	1.69	1.92	2.09	2.53	3.16	3.72	4.48	5.22	6.00
7	4	Peoria	1.19	1.39	1.52	1.76	2.00	2.17	2.60	3.28	4.00	4.92	5.59	6.44
7	4	Rushville	1.24	1.44	1.57	1.82	2.07	2.25	2.61	3.14	3.65	4.35	4.96	5.66
7	5	Danville	1.22	1.41	1.55	1.79	2.03	2.21	2.69	3.49	4.01	4.70	5.18	5.87
7	5	Hoopeston	1.20	1.40	1.53	1.77	2.01	2.18	2.58	3.06	3.43	4.05	4.57	5.22
7	5	Pontiac	1.15	1.34	1.46	1.69	1.92	2.09	2.64	3.31	3.83	4.77	5.57	6.11
7	5	Roberts	1.12	1.30	1.42	1.64	1.87	2.03	2.47	3.06	3.67	4.41	5.32	6.20
7	5	Urbana	1.23	1.43	1.57	1.81	2.06	2.24	2.70	3.22	3.65	4.22	4.74	5.31
7	6	Carlinville	1.23	1.43	1.59	1.84	2.09	2.27	2.74	3.43	4.10	5.02	5.92	6.98
7	6	Griggsville	1.23	1.43	1.56	1.81	2.05	2.23	2.69	3.38	3.95	4.85	5.63	6.57
7	6	Hillsboro	1.34	1.56	1.71	1.98	2.24	2.44	2.84	3.57	4.10	4.84	5.63	6.57
7	6	Jacksonville	1.24	1.44	1.57	1.82	2.07	2.25	2.74	3.51	4.00	4.90	5.62	6.26
7	6	Morrisonville	1.21	1.41	1.54	1.78	2.02	2.20	2.66	3.53	4.15	4.96	5.66	6.26
7	6	Pana	1.19	1.39	1.52	1.76	2.00	2.17	2.69	3.31	3.89	4.67	5.39	6.26
7	6	Springfield	1.21	1.41	1.54	1.78	2.02	2.20	2.66	3.43	4.11	5.01	5.65	6.42
7	6	White Hall	1.24	1.44	1.57	1.82	2.07	2.25	2.71	3.39	4.05	4.79	5.52	6.37
7	7	Charleston	1.22	1.42	1.55	1.80	2.04	2.22	2.61	3.26	3.81	4.68	5.50	6.33
7	7	Effingham	1.15	1.34	1.48	1.72	1.95	2.12	2.54	3.21	3.84	4.78	5.59	6.70
7	7	Palestine	1.22	1.42	1.55	1.80	2.04	2.22	2.63	3.36	3.83	4.57	5.36	6.53
7	7	Paris	1.23	1.43	1.57	1.81	2.06	2.24	2.66	3.31	3.89	4.67	5.36	6.04
7	7	Windsor	1.23	1.44	1.62	1.87	2.13	2.31	2.73	3.38	3.90	4.67	5.44	6.55
7	8	Belleville	1.27	1.48	1.62	1.87	2.13	2.31	2.90	3.76	4.44	5.69	6.73	8.00
7	8	DuQuoin	1.31	1.52	1.67	1.93	2.19	2.38	2.89	3.58	4.11	5.01	5.78	6.57
7	8	Greenville	1.31	1.52	1.67	1.93	2.19	2.38	2.84	3.47	4.07	5.01	5.92	6.87
7	8	Sparta	1.27	1.48	1.62	1.87	2.13	2.31	2.80	3.49	4.08	4.96	5.78	6.57
7	8	St Louis	1.31	1.53	1.67	1.94	2.20	2.39	2.86	3.68	4.35	5.52	6.54	7.70
7	9	Fairfield	1.25	1.46	1.62	1.87	2.13	2.31	2.79	3.50	4.10	5.06	5.84	6.82
7	9	Flora	1.22	1.42	1.56	1.81	2.05	2.23	2.74	3.52	4.15	5.30	6.30	6.87
7	9	McLeansboro	1.28	1.49	1.63	1.89	2.14	2.33	2.83	3.55	4.18	5.16	5.92	7.01
7	9	Mt Carmel	1.26	1.47	1.60	1.85	2.11	2.29	2.76	3.45	4.00	5.01	5.84	6.79
7	9	Mt Vernon	1.26	1.47	1.60	1.85	2.11	2.29	2.73	3.45	3.90	4.72	5.36	6.05
7	9	Olney	1.23	1.43	1.57	1.81	2.06	2.24	2.71	3.40	4.00	4.96	5.74	6.79
7	10	Anna	1.47	1.72	1.88	2.17	2.47	2.68	3.26	4.05	4.63	5.57	6.18	6.79
7	10	Cairo	1.42	1.66	1.83	2.12	2.41	2.62	3.26	4.17	4.72	5.49	6.26	7.13
7	10	Carbondale	1.40	1.63	1.80	2.06	2.34	2.54	3.11	3.80	4.44	5.20	5.95	6.76
7	10	Harrisburg	1.36	1.58	1.73	2.00	2.27	2.47	3.00	3.76	4.44	5.55	6.46	7.61
7	10	New Burnside	1.45	1.68	1.84	2.13	2.42	2.63	3.11	3.83	4.44	5.31	6.09	7.25

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
8	1	Aledo	1.05	1.22	1.34	1.55	1.76	1.91	2.33	2.96	3.51	4.27	4.93	5.67
8	1	Dixon	1.07	1.25	1.37	1.58	1.79	1.95	2.36	3.02	3.51	4.22	5.00	5.80
8	1	Freeport	1.06	1.24	1.35	1.56	1.78	1.93	2.36	2.96	3.50	4.40	5.30	6.30
8	1	Galva	1.06	1.24	1.35	1.56	1.78	1.93	2.32	2.92	3.43	4.22	4.89	5.67
8	1	Moline	1.04	1.22	1.33	1.54	1.75	1.90	2.33	2.96	3.51	4.27	4.93	5.49
8	1	Morrison	1.04	1.22	1.33	1.54	1.75	1.90	2.32	2.88	3.39	4.10	4.76	5.49
8	1	Mt Carroll	1.04	1.22	1.33	1.54	1.75	1.90	2.33	3.05	3.55	4.13	4.67	5.22
8	1	Rockford	1.06	1.24	1.35	1.56	1.78	1.93	2.30	2.96	3.46	4.13	4.73	5.22
8	1	Walnut	1.10	1.28	1.40	1.62	1.84	2.00	2.33	2.92	3.43	4.09	4.67	5.25
8	2	Aurora	1.04	1.22	1.33	1.54	1.75	1.90	2.34	2.95	3.55	4.53	5.41	6.30
8	2	Chicago	0.99	1.16	1.29	1.49	1.69	1.84	2.25	2.86	3.37	4.17	4.85	5.63
8	2	DeKalb	1.06	1.24	1.35	1.56	1.78	1.93	2.27	2.87	3.40	4.09	4.76	5.54
8	2	Joliet	1.10	1.28	1.40	1.62	1.84	2.00	2.40	3.06	3.64	4.53	5.38	6.35
8	2	Kankakee	1.04	1.22	1.33	1.54	1.75	1.90	2.36	3.08	3.77	4.65	5.48	6.49
8	2	Marengo	1.01	1.17	1.28	1.48	1.68	1.83	2.20	2.61	2.90	3.52	4.05	4.88
8	2	Ottawa	1.03	1.20	1.32	1.52	1.73	1.88	2.25	2.86	3.37	4.09	4.76	5.44
8	2	Waukegan	0.96	1.12	1.23	1.42	1.61	1.75	2.10	2.54	2.91	3.45	4.09	4.79
8	3	La Harpe	1.18	1.37	1.50	1.73	1.97	2.14	2.63	3.22	3.80	4.72	5.61	6.67
8	3	Monmouth	1.12	1.29	1.42	1.64	1.87	2.03	2.47	3.11	3.66	4.45	5.20	6.07
8	3	Quincy	1.17	1.36	1.48	1.72	1.95	2.12	2.64	3.30	3.71	4.49	5.03	5.72
8	4	Bloomington	1.04	1.21	1.34	1.56	1.77	1.92	2.33	2.99	3.47	4.11	4.66	5.29
8	4	Decatur	1.10	1.28	1.40	1.62	1.84	2.00	2.44	3.05	3.47	4.05	4.54	5.10
8	4	Havana	1.01	1.18	1.29	1.49	1.69	1.84	2.18	2.71	3.13	3.86	4.45	5.18
8	4	Lincoln	1.01	1.18	1.29	1.49	1.69	1.87	2.25	2.85	3.38	4.17	4.66	5.18
8	4	Minonk	0.99	1.15	1.26	1.46	1.66	1.80	2.18	2.72	3.19	3.87	4.50	5.18
8	4	Peoria	1.03	1.20	1.32	1.52	1.73	1.88	2.24	2.84	3.45	4.24	4.82	5.55
8	4	Rushville	1.07	1.24	1.36	1.57	1.78	1.94	2.25	2.71	3.15	3.75	4.28	4.88
8	5	Danville	1.04	1.22	1.33	1.54	1.75	1.90	2.32	3.01	3.46	4.05	4.46	5.05
8	5	Hoopeston	1.03	1.20	1.32	1.52	1.73	1.88	2.23	2.64	2.96	3.49	3.94	4.50
8	5	Pontiac	0.99	1.15	1.26	1.46	1.66	1.82	2.27	2.85	3.30	4.11	4.80	5.26
8	5	Roberts	0.96	1.12	1.23	1.42	1.61	1.75	2.13	2.64	3.19	3.80	4.59	5.35
8	5	Urbana	1.06	1.24	1.35	1.56	1.78	1.93	2.33	2.78	3.15	3.64	4.09	4.57
8	6	Carlinville	1.05	1.24	1.37	1.59	1.80	1.96	2.36	2.96	3.53	4.33	5.11	6.02
8	6	Griggsville	1.06	1.23	1.34	1.56	1.77	1.92	2.32	2.91	3.40	4.18	4.85	5.66
8	6	Hillsboro	1.15	1.34	1.47	1.70	1.93	2.10	2.46	3.08	3.53	4.17	4.85	5.66
8	6	Jacksonville	1.07	1.24	1.36	1.57	1.78	1.94	2.36	2.95	3.45	4.26	4.85	5.40
8	6	Morrisonville	1.04	1.22	1.33	1.54	1.75	1.90	2.30	3.05	3.58	4.28	4.88	5.40
8	6	Pana	1.03	1.20	1.32	1.52	1.73	1.88	2.31	2.85	3.35	4.03	4.65	5.40
8	6	Springfield	1.04	1.22	1.33	1.54	1.75	1.90	2.30	2.96	3.54	4.32	4.88	5.56
8	6	White Hall	1.07	1.24	1.36	1.57	1.78	1.94	2.34	2.93	3.48	4.13	4.76	5.49
8	7	Charleston	1.05	1.22	1.34	1.55	1.76	1.91	2.25	2.81	3.29	4.04	4.74	5.46
8	7	Effingham	1.01	1.17	1.28	1.48	1.68	1.83	2.19	2.77	3.30	4.12	4.82	5.78
8	7	Palestine	1.05	1.22	1.34	1.55	1.76	1.91	2.27	2.89	3.30	3.94	4.62	5.63
8	7	Paris	1.06	1.24	1.35	1.56	1.78	1.93	2.30	2.85	3.35	4.03	4.62	5.20
8	7	Windsor	1.10	1.28	1.40	1.62	1.84	2.00	2.36	2.91	3.36	4.03	4.70	5.64
8	8	Belleville	1.10	1.28	1.40	1.62	1.84	2.00	2.50	3.24	3.83	4.91	5.80	6.90
8	8	DuQuoin	1.13	1.32	1.44	1.67	1.90	2.06	2.49	3.09	3.55	4.32	4.98	5.66
8	8	Greenville	1.13	1.31	1.43	1.66	1.89	2.05	2.44	2.99	3.49	4.32	5.11	5.93
8	8	Sparta	1.10	1.28	1.40	1.62	1.84	2.00	2.41	3.01	3.49	4.28	4.98	5.66
8	8	St Louis	1.13	1.32	1.44	1.67	1.90	2.06	2.47	3.17	3.77	4.76	5.64	6.64
8	9	Fairfield	1.09	1.27	1.39	1.61	1.83	1.99	2.41	3.02	3.55	4.37	5.03	5.88
8	9	Flora	1.04	1.21	1.34	1.56	1.77	1.92	2.36	3.04	3.59	4.57	5.43	5.93
8	9	McLeansboro	1.11	1.29	1.41	1.63	1.85	2.01	2.44	3.06	3.60	4.45	5.11	6.05
8	9	Mt Carmel	1.08	1.26	1.38	1.60	1.81	1.97	2.38	2.98	3.45	4.32	5.03	5.85
8	9	Mt Vernon	1.08	1.26	1.38	1.60	1.81	1.97	2.36	2.98	3.36	4.07	4.62	5.21
8	9	Olney	1.06	1.24	1.35	1.56	1.78	1.93	2.34	2.93	3.45	4.28	4.95	5.85
8	10	Anna	1.27	1.48	1.62	1.87	2.13	2.31	2.81	3.49	3.99	4.80	5.32	5.85
8	10	Cairo	1.23	1.44	1.58	1.83	2.08	2.26	2.81	3.60	4.07	4.73	5.40	6.15
8	10	Carbondale	1.20	1.40	1.53	1.77	2.01	2.19	2.68	3.28	3.83	4.49	5.13	5.83
8	10	Harrisburg	1.17	1.36	1.49	1.73	1.96	2.13	2.59	3.24	3.83	4.79	5.57	6.56
8	10	New Burnside	1.25	1.45	1.59	1.84	2.09	2.27	2.68	3.30	3.83	4.57	5.25	6.15

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	Aledo	0.90	1.04	1.14	1.32	1.50	1.63	1.99	2.53	3.00	3.64	4.21	4.84
9	1	Dixon	0.91	1.06	1.16	1.34	1.53	1.66	2.01	2.57	3.00	3.60	4.24	4.91
9	1	Freeport	0.91	1.06	1.15	1.34	1.52	1.65	2.01	2.53	2.99	3.76	4.52	5.38
9	1	Galva	0.90	1.05	1.15	1.33	1.51	1.64	1.98	2.49	2.92	3.60	4.17	4.84
9	1	Moline	0.90	1.04	1.14	1.32	1.50	1.63	1.99	2.53	3.00	3.64	4.21	4.68
9	1	Morrison	0.90	1.04	1.14	1.32	1.50	1.63	1.98	2.46	2.89	3.49	4.06	4.68
9	1	Mt Carroll	0.90	1.04	1.14	1.32	1.50	1.63	1.99	2.60	3.03	3.53	3.99	4.45
9	1	Rockford	0.91	1.06	1.15	1.34	1.52	1.65	1.96	2.53	2.95	3.53	4.03	4.45
9	1	Walnut	0.94	1.09	1.19	1.38	1.56	1.70	1.99	2.49	2.92	3.49	3.99	4.48
9	2	Aurora	0.90	1.04	1.14	1.32	1.50	1.63	2.00	2.52	3.03	3.87	4.62	5.38
9	2	Chicago	0.86	1.00	1.10	1.27	1.44	1.57	1.92	2.44	2.87	3.56	4.14	4.80
9	2	DeKalb	0.90	1.05	1.15	1.33	1.51	1.64	1.93	2.44	2.91	3.49	4.06	4.72
9	2	Joliet	0.94	1.09	1.19	1.38	1.56	1.70	2.05	2.61	3.10	3.87	4.59	5.42
9	2	Kankakee	0.90	1.04	1.14	1.32	1.50	1.63	2.01	2.62	3.21	3.97	4.67	5.54
9	2	Marengo	0.86	1.00	1.09	1.26	1.44	1.56	1.87	2.23	2.48	3.01	3.46	4.16
9	2	Ottawa	0.88	1.02	1.12	1.30	1.47	1.60	1.92	2.44	2.87	3.49	4.06	4.64
9	2	Waukegan	0.83	0.96	1.05	1.22	1.38	1.50	1.79	2.16	2.47	2.94	3.49	4.10
9	3	La Harpe	1.01	1.17	1.28	1.48	1.68	1.83	2.24	2.75	3.26	4.03	4.79	5.70
9	3	Monmouth	0.95	1.10	1.21	1.40	1.59	1.73	2.11	2.66	3.12	3.80	4.44	5.18
9	3	Quincy	0.99	1.15	1.26	1.46	1.66	1.80	2.24	2.82	3.15	3.83	4.29	4.88
9	4	Bloomington	0.90	1.05	1.15	1.33	1.51	1.64	1.99	2.55	2.96	3.52	3.98	4.51
9	4	Decatur	0.94	1.09	1.20	1.39	1.57	1.71	2.09	2.60	2.96	3.46	3.87	4.35
9	4	Havana	0.86	1.00	1.10	1.27	1.44	1.57	1.86	2.32	2.68	3.30	3.80	4.42
9	4	Lincoln	0.86	1.00	1.10	1.27	1.44	1.57	1.92	2.44	2.89	3.56	3.98	4.42
9	4	Minonk	0.85	0.99	1.08	1.25	1.42	1.54	1.86	2.32	2.71	3.29	3.84	4.42
9	4	Peoria	0.88	1.02	1.12	1.30	1.47	1.60	1.91	2.43	2.94	3.62	4.11	4.74
9	4	Rushville	0.91	1.06	1.16	1.34	1.53	1.66	1.96	2.31	2.69	3.20	3.65	4.16
9	5	Danville	0.90	1.04	1.14	1.32	1.50	1.63	1.98	2.57	2.95	3.46	3.81	4.30
9	5	Hoopeston	0.89	1.03	1.13	1.30	1.48	1.61	1.90	2.25	2.52	3.01	3.36	3.84
9	5	Pontiac	0.85	0.99	1.08	1.25	1.42	1.54	1.94	2.43	2.82	3.51	4.10	4.49
9	5	Roberts	0.82	0.95	1.04	1.21	1.37	1.49	1.82	2.25	2.71	3.24	3.92	4.56
9	5	Urbana	0.90	1.05	1.15	1.33	1.51	1.64	1.98	2.37	2.69	3.10	3.49	3.90
9	6	Carlinville	0.92	1.07	1.17	1.35	1.54	1.67	2.02	2.52	3.01	3.69	4.36	5.13
9	6	Griggsville	0.90	1.05	1.15	1.33	1.51	1.64	1.98	2.48	2.91	3.56	4.14	4.83
9	6	Hillsboro	0.98	1.15	1.25	1.45	1.65	1.79	2.10	2.62	3.01	3.56	4.14	4.83
9	6	Jacksonville	0.91	1.06	1.16	1.34	1.53	1.66	2.02	2.53	2.94	3.63	4.13	4.61
9	6	Morrisonville	0.89	1.04	1.13	1.31	1.49	1.62	1.96	2.60	3.05	3.65	4.16	4.61
9	6	Pana	0.88	1.02	1.12	1.30	1.47	1.60	1.97	2.43	2.86	3.44	3.97	4.61
9	6	Springfield	0.89	1.04	1.13	1.31	1.49	1.62	1.96	2.52	3.02	3.69	4.16	4.73
9	6	White Hall	0.91	1.06	1.16	1.34	1.53	1.66	2.00	2.50	2.97	3.53	4.06	4.68
9	7	Charleston	0.90	1.04	1.14	1.32	1.50	1.63	1.92	2.40	2.80	3.44	4.04	4.66
9	7	Effingham	0.86	1.00	1.09	1.26	1.44	1.56	1.87	2.36	2.81	3.51	4.12	4.93
9	7	Palestine	0.90	1.04	1.14	1.32	1.50	1.63	1.93	2.47	2.82	3.36	3.94	4.80
9	7	Paris	0.91	1.05	1.15	1.33	1.51	1.64	1.96	2.43	2.86	3.44	3.94	4.44
9	7	Windsor	0.94	1.09	1.19	1.38	1.56	1.70	2.01	2.48	2.87	3.44	4.04	4.80
9	8	Belleville	0.94	1.09	1.19	1.38	1.56	1.70	2.13	2.76	3.26	4.19	4.95	5.89
9	8	DuQuoin	0.96	1.12	1.23	1.42	1.61	1.75	2.12	2.64	3.09	3.69	4.25	4.83
9	8	Greenville	0.96	1.12	1.23	1.42	1.61	1.75	2.09	2.55	2.99	3.69	4.36	5.06
9	8	Sparta	0.94	1.09	1.19	1.38	1.56	1.70	2.06	2.57	2.99	3.65	4.25	4.83
9	8	St Louis	0.97	1.13	1.23	1.43	1.62	1.76	2.11	2.71	3.23	4.06	4.81	5.66
9	9	Fairfield	0.94	1.09	1.19	1.38	1.56	1.70	2.05	2.57	3.04	3.72	4.29	5.02
9	9	Flora	0.90	1.05	1.15	1.33	1.51	1.64	2.02	2.59	3.08	3.90	4.63	5.06
9	9	McLeansboro	0.95	1.10	1.20	1.39	1.58	1.72	2.09	2.61	3.07	3.80	4.36	5.16
9	9	Mt Carmel	0.92	1.08	1.18	1.36	1.55	1.68	2.03	2.54	2.94	3.69	4.29	4.99
9	9	Mt Vernon	0.92	1.08	1.18	1.36	1.55	1.68	2.01	2.54	2.87	3.48	3.94	4.45
9	9	Olney	0.91	1.06	1.16	1.34	1.52	1.65	2.00	2.50	2.94	3.65	4.22	4.99
9	10	Anna	1.08	1.26	1.38	1.60	1.81	1.97	2.40	2.98	3.40	4.10	4.54	4.99
9	10	Cairo	1.06	1.24	1.35	1.56	1.78	1.93	2.40	3.06	3.48	4.04	4.61	5.25
9	10	Carbondale	1.03	1.20	1.31	1.51	1.72	1.87	2.28	2.80	3.26	3.83	4.38	4.97
9	10	Harrisburg	1.00	1.16	1.27	1.47	1.67	1.82	2.21	2.76	3.26	4.08	4.75	5.60
9	10	New Burnside	1.06	1.24	1.35	1.56	1.78	1.93	2.29	2.82	3.26	3.90	4.48	5.18

Storm code	Zone code	Station	Annual rainfall (inches) for given recurrence interval											
			2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
10	1	Aledo	0.83	0.96	1.05	1.22	1.38	1.50	1.83	2.33	2.76	3.36	3.88	4.46
10	1	Dixon	0.84	0.98	1.07	1.24	1.41	1.53	1.85	2.37	2.76	3.32	3.90	4.55
10	1	Freeport	0.84	0.97	1.06	1.23	1.40	1.52	1.85	2.33	2.76	3.46	4.17	4.96
10	1	Galva	0.84	0.97	1.06	1.23	1.40	1.52	1.82	2.30	2.70	3.32	3.85	4.46
10	1	Moline	0.83	0.96	1.05	1.22	1.38	1.50	1.83	2.33	2.76	3.36	3.88	4.32
10	1	Morrison	0.83	0.96	1.05	1.22	1.38	1.50	1.82	2.27	2.67	3.22	3.75	4.32
10	1	Mt Carroll	0.83	0.96	1.05	1.22	1.38	1.50	1.83	2.40	2.79	3.25	3.68	4.11
10	1	Rockford	0.84	0.97	1.06	1.23	1.40	1.52	1.81	2.33	2.72	3.25	3.72	4.11
10	1	Walnut	0.86	1.00	1.10	1.27	1.44	1.57	1.83	2.30	2.70	3.22	3.68	4.13
10	2	Aurora	0.83	0.96	1.05	1.22	1.38	1.50	1.84	2.32	2.80	3.56	4.26	4.96
10	2	Chicago	0.80	0.93	1.01	1.17	1.33	1.45	1.77	2.25	2.65	3.28	3.82	4.42
10	2	DeKalb	0.84	0.97	1.06	1.23	1.40	1.52	1.78	2.25	2.68	3.22	3.75	4.35
10	2	Joliet	0.86	1.00	1.10	1.27	1.44	1.57	1.89	2.41	2.86	3.56	4.23	5.00
10	2	Kankakee	0.83	0.96	1.05	1.22	1.38	1.50	1.85	2.42	2.96	3.66	4.31	5.10
10	2	Marengo	0.79	0.92	1.01	1.17	1.32	1.44	1.72	2.05	2.28	2.77	3.19	3.83
10	2	Ottawa	0.81	0.94	1.03	1.19	1.35	1.47	1.77	2.25	2.65	3.22	3.75	4.28
10	2	Waukegan	0.76	0.88	0.97	1.12	1.27	1.38	1.65	1.99	2.27	2.71	3.22	3.78
10	3	La Harpe	0.93	1.08	1.18	1.37	1.55	1.69	2.06	2.53	2.99	3.71	4.41	5.25
10	3	Monmouth	0.87	1.01	1.11	1.29	1.46	1.59	1.95	2.45	2.88	3.50	4.09	4.77
10	3	Quincy	0.91	1.06	1.16	1.34	1.53	1.66	2.08	2.59	2.91	3.53	3.95	4.50
10	4	Bloomington	0.83	0.97	1.06	1.22	1.39	1.51	1.83	2.35	2.73	3.26	3.67	4.16
10	4	Decatur	0.87	1.01	1.11	1.28	1.45	1.58	1.92	2.40	2.73	3.19	3.57	4.01
10	4	Havana	0.80	0.93	1.01	1.17	1.33	1.45	1.71	2.14	2.47	3.04	3.50	4.07
10	4	Lincoln	0.80	0.93	1.01	1.17	1.33	1.45	1.77	2.25	2.66	3.28	3.67	4.07
10	4	Minonk	0.78	0.91	0.99	1.15	1.31	1.42	1.72	2.14	2.49	3.06	3.54	4.07
10	4	Peoria	0.81	0.94	1.03	1.19	1.35	1.47	1.76	2.24	2.71	3.33	3.79	4.37
10	4	Rushville	0.84	0.98	1.07	1.24	1.41	1.53	1.81	2.14	2.48	2.95	3.36	3.83
10	5	Danville	0.83	0.96	1.05	1.22	1.38	1.50	1.82	2.37	2.72	3.19	3.51	3.96
10	5	Hoopeston	0.81	0.95	1.04	1.20	1.36	1.48	1.75	2.08	2.32	2.75	3.10	3.54
10	5	Pontiac	0.78	0.91	0.99	1.15	1.31	1.42	1.80	2.24	2.60	3.23	3.78	4.14
10	5	Roberts	0.75	0.88	0.96	1.11	1.26	1.37	1.68	2.08	2.49	2.99	3.61	4.21
10	5	Urbana	0.84	0.97	1.06	1.23	1.40	1.52	1.83	2.18	2.48	2.86	3.22	3.60
10	6	Carlinville	0.85	0.99	1.08	1.25	1.42	1.54	1.86	2.32	2.78	3.40	4.02	4.73
10	6	Griggsville	0.83	0.97	1.06	1.22	1.39	1.51	1.82	2.29	2.68	3.29	3.82	4.45
10	6	Hillsboro	0.91	1.06	1.15	1.34	1.52	1.65	1.94	2.42	2.78	3.28	3.82	4.45
10	6	Jacksonville	0.84	0.98	1.07	1.24	1.41	1.53	1.86	2.34	2.71	3.33	3.81	4.25
10	6	Morrisonville	0.82	0.95	1.04	1.21	1.37	1.49	1.81	2.40	2.81	3.36	3.83	4.25
10	6	Pana	0.81	0.94	1.03	1.19	1.35	1.47	1.82	2.24	2.64	3.17	3.66	4.25
10	6	Springfield	0.82	0.95	1.04	1.21	1.37	1.49	1.81	2.32	2.78	3.40	3.84	4.35
10	6	White Hall	0.84	0.98	1.07	1.24	1.41	1.53	1.84	2.30	2.73	3.25	3.74	4.32
10	7	Charleston	0.83	0.96	1.05	1.22	1.38	1.50	1.77	2.21	2.58	3.17	3.73	4.30
10	7	Effingham	0.79	0.92	1.01	1.17	1.32	1.44	1.72	2.18	2.60	3.24	3.79	4.54
10	7	Palestine	0.83	0.96	1.05	1.22	1.38	1.50	1.78	2.28	2.60	3.10	3.63	4.42
10	7	Paris	0.84	0.97	1.06	1.23	1.40	1.52	1.81	2.24	2.64	3.17	3.63	4.09
10	7	Windsor	0.86	1.00	1.10	1.27	1.44	1.57	1.85	2.29	2.64	3.17	3.73	4.42
10	8	Belleville	0.86	1.00	1.10	1.27	1.44	1.57	1.96	2.55	3.01	3.86	4.57	5.43
10	8	DuQuoin	0.89	1.04	1.13	1.31	1.49	1.62	1.96	2.43	2.76	3.40	3.92	4.45
10	8	Greenville	0.89	1.03	1.13	1.30	1.48	1.61	1.92	2.35	2.75	3.40	4.02	4.66
10	8	Sparta	0.86	1.00	1.10	1.27	1.44	1.57	1.90	2.37	2.74	3.36	3.92	4.45
10	8	St Louis	0.89	1.04	1.13	1.31	1.49	1.62	1.94	2.50	2.99	3.74	4.44	5.22
10	9	Fairfield	0.86	1.00	1.09	1.26	1.44	1.56	1.89	2.37	2.81	3.43	3.96	4.63
10	9	Flora	0.83	0.97	1.06	1.22	1.39	1.51	1.86	2.39	2.84	3.59	4.27	4.66
10	9	McLeansboro	0.87	1.01	1.11	1.28	1.45	1.58	1.94	2.41	2.83	3.50	4.02	4.76
10	9	Mt Carmel	0.85	0.99	1.08	1.26	1.43	1.55	1.87	2.34	2.71	3.40	3.96	4.60
10	9	Mt Vernon	0.85	0.99	1.08	1.26	1.43	1.55	1.85	2.34	2.64	3.20	3.63	4.10
10	9	Olney	0.84	0.97	1.06	1.23	1.40	1.52	1.84	2.31	2.71	3.36	3.89	4.60
10	10	Anna	1.00	1.16	1.27	1.47	1.67	1.82	2.21	2.75	3.14	3.78	4.19	4.60
10	10	Cairo	0.98	1.14	1.25	1.44	1.64	1.78	2.21	2.82	3.20	3.72	4.25	4.84
10	10	Carbondale	0.95	1.10	1.20	1.39	1.58	1.72	2.11	2.58	3.01	3.53	4.04	4.58
10	10	Harrisburg	0.92	1.06	1.18	1.36	1.55	1.68	2.04	2.55	3.01	3.76	4.38	5.16
10	10	New Burnside	0.98	1.14	1.25	1.44	1.64	1.78	2.11	2.60	3.01	3.60	4.13	4.89

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
11	1	Aledo	0.66	0.77	0.84	0.97	1.10	1.20	1.46	1.86	2.20	2.67	3.09	3.55
11	1	Dixon	0.67	0.78	0.85	0.99	1.12	1.22	1.48	1.89	2.20	2.65	3.08	3.58
11	1	Freeport	0.67	0.77	0.85	0.98	1.11	1.21	1.48	1.86	2.19	2.76	3.32	3.95
11	1	Galva	0.67	0.77	0.85	0.98	1.11	1.21	1.45	1.83	2.15	2.65	3.06	3.55
11	1	Moline	0.65	0.76	0.83	0.96	1.09	1.19	1.46	1.86	2.20	2.67	3.09	3.44
11	1	Morrison	0.65	0.76	0.83	0.96	1.09	1.19	1.45	1.80	2.12	2.57	2.98	3.44
11	1	Mt Carroll	0.65	0.76	0.83	0.96	1.09	1.19	1.46	1.91	2.22	2.59	2.93	3.27
11	1	Rockford	0.67	0.77	0.85	0.98	1.11	1.21	1.44	1.86	2.17	2.59	2.96	3.27
11	1	Walnut	0.69	0.80	0.88	1.01	1.15	1.25	1.46	1.83	2.15	2.56	2.93	3.29
11	2	Aurora	0.65	0.76	0.83	0.96	1.09	1.19	1.47	1.85	2.23	2.84	3.39	3.95
11	2	Chicago	0.63	0.74	0.80	0.93	1.06	1.15	1.41	1.79	2.11	2.61	3.04	3.53
11	2	DeKalb	0.67	0.77	0.85	0.98	1.11	1.21	1.42	1.80	2.13	2.56	2.98	3.47
11	2	Joliet	0.69	0.80	0.88	1.01	1.15	1.25	1.50	1.92	2.28	2.84	3.37	3.98
11	2	Kankakee	0.65	0.76	0.83	0.96	1.09	1.19	1.48	1.93	2.36	2.91	3.43	4.07
11	2	Marengo	0.63	0.74	0.80	0.93	1.06	1.15	1.37	1.64	1.82	2.21	2.54	3.06
11	2	Ottawa	0.64	0.75	0.82	0.95	1.08	1.17	1.41	1.79	2.11	2.56	2.98	3.41
11	2	Waukegan	0.61	0.70	0.77	0.89	1.01	1.10	1.32	1.59	1.82	2.16	2.56	3.00
11	3	La Harpe	0.74	0.86	0.94	1.09	1.23	1.36	1.64	2.02	2.39	2.96	3.52	4.18
11	3	Monmouth	0.70	0.80	0.89	1.03	1.17	1.27	1.55	1.95	2.29	2.79	3.26	3.80
11	3	Quincy	0.73	0.85	0.93	1.08	1.22	1.33	1.65	2.06	2.32	2.82	3.15	3.58
11	4	Bloomington	0.66	0.77	0.84	0.97	1.10	1.20	1.46	1.87	2.18	2.60	2.92	3.31
11	4	Decatur	0.69	0.80	0.88	1.01	1.15	1.25	1.53	1.91	2.18	2.54	2.84	3.20
11	4	Havana	0.63	0.74	0.80	0.93	1.06	1.15	1.36	1.70	1.96	2.42	2.79	3.24
11	4	Lincoln	0.63	0.74	0.80	0.93	1.06	1.17	1.42	1.80	2.12	2.61	2.92	3.24
11	4	Minonk	0.62	0.72	0.79	0.92	1.04	1.13	1.37	1.71	2.00	2.43	2.82	3.24
11	4	Peoria	0.64	0.75	0.82	0.95	1.08	1.17	1.41	1.79	2.16	2.66	3.02	3.48
11	4	Rushville	0.67	0.78	0.85	0.99	1.12	1.22	1.41	1.69	1.97	2.35	2.68	3.06
11	5	Danville	0.65	0.76	0.83	0.96	1.09	1.19	1.45	1.88	2.17	2.54	2.80	3.15
11	5	Hoopeston	0.65	0.76	0.83	0.96	1.09	1.18	1.40	1.65	1.85	2.24	2.47	2.82
11	5	Pontiac	0.62	0.72	0.79	0.92	1.04	1.13	1.42	1.79	2.07	2.58	3.01	3.30
11	5	Roberts	0.61	0.70	0.77	0.89	1.01	1.10	1.33	1.65	1.96	2.38	2.88	3.35
11	5	Urbana	0.67	0.77	0.85	0.98	1.11	1.21	1.46	1.74	1.97	2.28	2.56	2.87
11	6	Carlinville	0.68	0.79	0.86	1.00	1.13	1.23	1.48	1.85	2.21	2.71	3.20	3.77
11	6	Griggsville	0.66	0.77	0.84	0.97	1.10	1.20	1.45	1.82	2.13	2.62	3.04	3.55
11	6	Hillsboro	0.73	0.84	0.92	1.07	1.21	1.32	1.56	1.93	2.21	2.61	3.04	3.55
11	6	Jacksonville	0.67	0.78	0.85	0.99	1.12	1.22	1.48	1.86	2.16	2.64	3.04	3.38
11	6	Morrisonville	0.65	0.76	0.83	0.96	1.09	1.19	1.44	1.91	2.24	2.68	3.06	3.38
11	6	Pana	0.64	0.75	0.82	0.95	1.08	1.17	1.46	1.79	2.10	2.52	2.91	3.38
11	6	Springfield	0.65	0.76	0.83	0.96	1.09	1.19	1.44	1.85	2.22	2.71	3.06	3.45
11	6	White Hall	0.67	0.78	0.85	0.99	1.12	1.22	1.47	1.83	2.17	2.59	2.98	3.44
11	7	Charleston	0.66	0.77	0.84	0.97	1.10	1.20	1.41	1.76	2.06	2.53	2.97	3.42
11	7	Effingham	0.63	0.73	0.80	0.93	1.06	1.15	1.37	1.73	2.06	2.58	3.02	3.62
11	7	Palestine	0.66	0.77	0.84	0.97	1.10	1.20	1.42	1.81	2.07	2.47	2.90	3.53
11	7	Paris	0.67	0.77	0.85	0.98	1.11	1.21	1.44	1.79	2.10	2.52	2.90	3.26
11	7	Windsor	0.69	0.80	0.88	1.01	1.15	1.25	1.48	1.82	2.11	2.52	2.96	3.58
11	8	Belleville	0.69	0.80	0.88	1.01	1.15	1.25	1.57	2.03	2.40	3.07	3.64	4.32
11	8	DuQuoin	0.71	0.83	0.90	1.04	1.19	1.29	1.56	1.94	2.20	2.71	3.12	3.55
11	8	Greenville	0.70	0.82	0.90	1.04	1.18	1.28	1.53	1.88	2.20	2.71	3.20	3.71
11	8	Sparta	0.69	0.80	0.88	1.01	1.15	1.25	1.51	1.88	2.18	2.68	3.12	3.55
11	8	St Louis	0.71	0.83	0.90	1.04	1.19	1.29	1.55	1.99	2.40	2.98	3.53	4.16
11	9	Fairfield	0.69	0.80	0.88	1.01	1.15	1.25	1.51	1.89	2.26	2.74	3.15	3.68
11	9	Flora	0.66	0.77	0.84	0.97	1.10	1.20	1.48	1.90	2.29	2.86	3.40	3.71
11	9	McLeansboro	0.69	0.81	0.88	1.02	1.16	1.26	1.55	1.92	2.26	2.79	3.20	3.79
11	9	Mt Carmel	0.68	0.79	0.87	1.00	1.14	1.24	1.49	1.87	2.16	2.71	3.15	3.67
11	9	Mt Vernon	0.68	0.79	0.87	1.00	1.14	1.24	1.48	1.87	2.11	2.55	2.90	3.27
11	9	Olney	0.67	0.77	0.85	0.98	1.11	1.21	1.47	1.84	2.16	2.68	3.10	3.67
11	10	Anna	0.80	0.93	1.01	1.17	1.33	1.45	1.76	2.19	2.50	3.01	3.34	3.67
11	10	Cairo	0.78	0.90	0.99	1.14	1.30	1.41	1.76	2.25	2.55	2.97	3.38	3.85
11	10	Carbondale	0.75	0.88	0.96	1.11	1.26	1.37	1.68	2.05	2.40	2.81	3.21	3.65
11	10	Harrisburg	0.73	0.85	0.93	1.08	1.22	1.33	1.62	2.03	2.40	3.00	3.49	4.11
11	10	New Burnside	0.78	0.91	0.99	1.15	1.31	1.42	1.68	2.07	2.40	2.87	3.29	3.88

Storm code	Zone code	Station	Annual rainfall (inches) for given recurrence interval											
			2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
12	1	Aledo	0.52	0.60	0.66	0.76	0.86	0.94	1.15	1.46	1.73	2.11	2.43	2.80
12	1	Dixon	0.53	0.61	0.67	0.78	0.88	0.96	1.16	1.49	1.73	2.08	2.50	2.86
12	1	Freeport	0.52	0.61	0.66	0.77	0.87	0.95	1.16	1.46	1.73	2.17	2.62	3.11
12	1	Galva	0.52	0.61	0.66	0.77	0.87	0.95	1.14	1.44	1.69	2.08	2.41	2.80
12	1	Moline	0.52	0.60	0.66	0.76	0.86	0.94	1.15	1.46	1.73	2.11	2.43	2.71
12	1	Morrison	0.52	0.60	0.66	0.76	0.86	0.94	1.14	1.42	1.67	2.02	2.35	2.71
12	1	Mt Carroll	0.52	0.60	0.66	0.76	0.86	0.94	1.15	1.51	1.75	2.04	2.31	2.58
12	1	Rockford	0.52	0.61	0.68	0.77	0.87	0.95	1.14	1.46	1.71	2.04	2.33	2.58
12	1	Walnut	0.54	0.63	0.69	0.79	0.90	0.98	1.15	1.44	1.69	2.02	2.31	2.59
12	2	Aurora	0.52	0.60	0.66	0.76	0.86	0.94	1.15	1.45	1.75	2.23	2.67	3.11
12	2	Chicago	0.50	0.58	0.64	0.74	0.84	0.91	1.11	1.41	1.66	2.06	2.39	2.78
12	2	DeKalb	0.52	0.61	0.66	0.77	0.87	0.95	1.12	1.41	1.68	2.02	2.35	2.73
12	2	Joliet	0.54	0.63	0.69	0.79	0.90	0.98	1.18	1.51	1.79	2.23	2.65	3.13
12	2	Kankakee	0.52	0.60	0.66	0.76	0.86	0.94	1.16	1.52	1.86	2.29	2.70	3.20
12	2	Marengo	0.50	0.58	0.63	0.73	0.83	0.90	1.07	1.29	1.43	1.74	2.00	2.40
12	2	Ottawa	0.51	0.60	0.65	0.75	0.86	0.93	1.11	1.41	1.66	2.02	2.35	2.68
12	2	Waukegan	0.48	0.56	0.61	0.70	0.80	0.87	1.04	1.25	1.45	1.70	2.02	2.36
12	3	La Harpe	0.58	0.68	0.74	0.86	0.98	1.08	1.30	1.59	1.88	2.33	2.77	3.29
12	3	Monmouth	0.55	0.63	0.70	0.81	0.92	1.00	1.22	1.54	1.81	2.19	2.57	2.99
12	3	Quincy	0.57	0.67	0.73	0.84	0.96	1.04	1.30	1.62	1.85	2.22	2.48	2.82
12	4	Bloomington	0.52	0.61	0.66	0.77	0.87	0.95	1.15	1.47	1.71	2.06	2.30	2.61
12	4	Decatur	0.54	0.63	0.69	0.80	0.91	0.99	1.21	1.50	1.71	2.00	2.24	2.52
12	4	Havana	0.50	0.58	0.64	0.74	0.84	0.91	1.07	1.34	1.55	1.90	2.20	2.55
12	4	Lincoln	0.50	0.58	0.64	0.74	0.84	0.94	1.13	1.42	1.67	2.05	2.30	2.55
12	4	Minonk	0.49	0.57	0.62	0.72	0.82	0.89	1.08	1.34	1.58	1.92	2.22	2.55
12	4	Peoria	0.51	0.60	0.65	0.75	0.86	0.93	1.11	1.40	1.70	2.09	2.38	2.74
12	4	Rushville	0.53	0.61	0.67	0.78	0.88	0.96	1.11	1.34	1.55	1.85	2.11	2.40
12	5	Danville	0.52	0.60	0.66	0.76	0.86	0.94	1.14	1.48	1.71	2.00	2.20	2.47
12	5	Hoopeston	0.51	0.60	0.65	0.75	0.86	0.93	1.10	1.30	1.46	1.75	1.94	2.22
12	5	Pontiac	0.49	0.57	0.62	0.72	0.82	0.89	1.10	1.41	1.63	2.03	2.37	2.60
12	5	Roberts	0.47	0.55	0.60	0.70	0.79	0.86	1.05	1.30	1.54	1.88	2.26	2.64
12	5	Urbana	0.52	0.61	0.67	0.77	0.87	0.95	1.15	1.37	1.55	1.79	2.02	2.26
12	6	Carlinville	0.53	0.62	0.68	0.79	0.89	0.97	1.17	1.46	1.74	2.13	2.52	2.97
12	6	Griggsville	0.52	0.60	0.66	0.77	0.87	0.95	1.14	1.44	1.68	2.06	2.39	2.79
12	6	Hillsboro	0.57	0.67	0.73	0.84	0.96	1.04	1.23	1.52	1.74	2.06	2.39	2.79
12	6	Jacksonville	0.53	0.61	0.67	0.78	0.88	0.96	1.17	1.46	1.70	2.06	2.39	2.66
12	6	Morrisonville	0.52	0.60	0.66	0.76	0.86	0.94	1.13	1.50	1.76	2.11	2.40	2.66
12	6	Pana	0.51	0.60	0.65	0.75	0.86	0.93	1.15	1.41	1.65	1.99	2.29	2.66
12	6	Springfield	0.52	0.60	0.66	0.76	0.86	0.94	1.13	1.46	1.75	2.13	2.40	2.69
12	6	White Hall	0.53	0.61	0.67	0.78	0.88	0.96	1.15	1.44	1.70	2.04	2.35	2.71
12	7	Charleston	0.52	0.60	0.66	0.76	0.86	0.94	1.11	1.39	1.62	1.99	2.34	2.69
12	7	Effingham	0.50	0.57	0.63	0.73	0.83	0.90	1.08	1.37	1.61	2.03	2.38	2.85
12	7	Palestine	0.52	0.60	0.66	0.76	0.86	0.94	1.12	1.43	1.63	1.94	2.28	2.78
12	7	Paris	0.52	0.61	0.67	0.77	0.87	0.95	1.13	1.41	1.65	1.99	2.28	2.57
12	7	Windsor	0.54	0.63	0.69	0.79	0.90	0.98	1.16	1.44	1.66	1.99	2.35	2.80
12	8	Belleville	0.54	0.63	0.69	0.79	0.90	0.98	1.23	1.60	1.89	2.42	2.86	3.40
12	8	DuQuoin	0.56	0.65	0.71	0.82	0.93	1.01	1.23	1.52	1.74	2.13	2.46	2.79
12	8	Greenville	0.56	0.65	0.71	0.82	0.93	1.01	1.21	1.48	1.74	2.13	2.52	2.92
12	8	Sparta	0.54	0.63	0.69	0.79	0.90	0.98	1.19	1.48	1.73	2.11	2.46	2.79
12	8	St Louis	0.56	0.65	0.71	0.83	0.94	1.02	1.22	1.57	1.91	2.35	2.78	3.27
12	9	Fairfield	0.54	0.63	0.69	0.79	0.90	0.98	1.19	1.49	1.80	2.15	2.48	2.90
12	9	Flora	0.52	0.61	0.66	0.77	0.87	0.95	1.17	1.50	1.79	2.25	2.67	2.92
12	9	McLeansboro	0.54	0.63	0.69	0.80	0.91	0.99	1.23	1.51	1.78	2.19	2.52	2.98
12	9	Mt Carmel	0.53	0.62	0.68	0.79	0.89	0.97	1.17	1.47	1.70	2.13	2.48	2.89
12	9	Mt Vernon	0.53	0.62	0.68	0.79	0.89	0.97	1.16	1.47	1.66	2.01	2.28	2.57
12	9	Olney	0.52	0.61	0.66	0.77	0.87	0.95	1.15	1.45	1.70	2.11	2.44	2.89
12	10	Anna	0.63	0.73	0.80	0.92	1.05	1.14	1.39	1.72	1.97	2.37	2.63	2.89
12	10	Cairo	0.61	0.71	0.78	0.90	1.02	1.11	1.39	1.76	2.01	2.33	2.66	3.03
12	10	Carbondale	0.59	0.69	0.76	0.87	0.99	1.08	1.32	1.62	1.89	2.21	2.53	2.87
12	10	Harrisburg	0.58	0.67	0.73	0.85	0.97	1.05	1.28	1.60	1.89	2.36	2.75	3.24
12	10	New Burnside	0.62	0.72	0.78	0.91	1.03	1.12	1.32	1.63	1.89	2.26	2.59	3.00

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
13	1	Aledo	0.38	0.44	0.49	0.56	0.63	0.69	0.84	1.07	1.26	1.54	1.78	2.04
13	1	Dixon	0.38	0.44	0.49	0.57	0.64	0.70	0.85	1.09	1.26	1.52	1.81	2.09
13	1	Freeport	0.38	0.44	0.49	0.57	0.64	0.70	0.85	1.07	1.26	1.58	1.91	2.27
13	1	Galva	0.38	0.44	0.48	0.56	0.63	0.69	0.83	1.05	1.23	1.52	1.76	2.04
13	1	Moline	0.38	0.44	0.50	0.56	0.63	0.69	0.84	1.07	1.26	1.54	1.78	1.98
13	1	Morrison	0.38	0.44	0.48	0.56	0.63	0.69	0.83	1.04	1.22	1.47	1.71	1.98
13	1	Mt Carroll	0.38	0.44	0.48	0.56	0.63	0.69	0.84	1.10	1.28	1.49	1.68	1.88
13	1	Rockford	0.37	0.44	0.49	0.57	0.64	0.70	0.83	1.07	1.24	1.49	1.70	1.88
13	1	Walnut	0.40	0.46	0.50	0.58	0.66	0.72	0.84	1.05	1.23	1.47	1.68	1.89
13	2	Aurora	0.38	0.44	0.49	0.56	0.63	0.69	0.84	1.06	1.28	1.63	1.95	2.27
13	2	Chicago	0.36	0.42	0.46	0.53	0.61	0.66	0.81	1.03	1.21	1.50	1.75	2.03
13	2	DeKalb	0.38	0.44	0.48	0.56	0.63	0.69	0.82	1.03	1.23	1.47	1.71	1.99
13	2	Joliet	0.40	0.46	0.50	0.58	0.66	0.72	0.86	1.10	1.31	1.63	1.94	2.29
13	2	Kankakee	0.38	0.44	0.48	0.56	0.63	0.69	0.85	1.11	1.36	1.67	1.97	2.34
13	2	Marengo	0.36	0.42	0.46	0.53	0.61	0.66	0.78	0.94	1.04	1.27	1.46	1.76
13	2	Ottawa	0.37	0.44	0.48	0.55	0.63	0.68	0.81	1.03	1.21	1.47	1.71	1.96
13	2	Waukegan	0.35	0.40	0.44	0.51	0.58	0.63	0.76	0.91	1.01	1.24	1.47	1.71
13	3	La Harpe	0.42	0.49	0.54	0.62	0.71	0.77	0.95	1.16	1.37	1.70	2.02	2.40
13	3	Monmouth	0.40	0.46	0.51	0.59	0.67	0.73	0.89	1.12	1.32	1.60	1.87	2.18
13	3	Quincy	0.42	0.49	0.53	0.62	0.70	0.76	0.94	1.18	1.35	1.62	1.81	2.06
13	4	Bloomington	0.38	0.45	0.50	0.56	0.63	0.69	0.84	1.07	1.25	1.52	1.68	1.90
13	4	Decatur	0.40	0.46	0.50	0.58	0.66	0.72	0.88	1.10	1.25	1.46	1.63	1.84
13	4	Havana	0.36	0.42	0.46	0.53	0.61	0.66	0.78	0.98	1.13	1.38	1.60	1.86
13	4	Lincoln	0.36	0.42	0.46	0.53	0.61	0.68	0.81	1.04	1.22	1.50	1.68	1.86
13	4	Minonk	0.36	0.41	0.46	0.53	0.60	0.65	0.79	0.98	1.16	1.40	1.62	1.86
13	4	Peoria	0.37	0.43	0.48	0.55	0.63	0.68	0.81	1.03	1.24	1.53	1.73	2.00
13	4	Rushville	0.38	0.45	0.49	0.57	0.64	0.70	0.81	0.97	1.13	1.35	1.54	1.76
13	5	Danville	0.38	0.44	0.48	0.56	0.63	0.69	0.83	1.08	1.24	1.46	1.61	1.80
13	5	Hoopeston	0.37	0.44	0.50	0.55	0.63	0.68	0.80	0.95	1.06	1.29	1.42	1.62
13	5	Pontiac	0.36	0.42	0.46	0.53	0.60	0.65	0.81	1.03	1.19	1.48	1.73	1.90
13	5	Roberts	0.35	0.40	0.44	0.51	0.58	0.63	0.77	0.95	1.13	1.37	1.65	1.93
13	5	Urbana	0.38	0.44	0.48	0.56	0.63	0.69	0.84	1.00	1.13	1.31	1.47	1.65
13	6	Carlinville	0.38	0.44	0.49	0.57	0.64	0.70	0.85	1.06	1.27	1.56	1.84	2.17
13	6	Griggsville	0.38	0.44	0.48	0.56	0.63	0.69	0.83	1.05	1.23	1.50	1.75	2.04
13	6	Hillsboro	0.42	0.49	0.53	0.62	0.70	0.76	0.91	1.11	1.27	1.50	1.75	2.04
13	6	Jacksonville	0.38	0.45	0.49	0.57	0.64	0.70	0.85	1.08	1.24	1.50	1.74	1.94
13	6	Morrisonville	0.37	0.44	0.48	0.55	0.63	0.68	0.83	1.10	1.29	1.54	1.76	1.94
13	6	Pana	0.37	0.43	0.48	0.55	0.63	0.68	0.84	1.03	1.21	1.45	1.67	1.94
13	6	Springfield	0.37	0.43	0.48	0.55	0.63	0.68	0.83	1.06	1.27	1.56	1.75	1.95
13	6	White Hall	0.38	0.45	0.49	0.57	0.64	0.70	0.84	1.05	1.24	1.49	1.71	1.98
13	7	Charleston	0.38	0.44	0.50	0.56	0.63	0.69	0.81	1.01	1.18	1.45	1.71	1.97
13	7	Effingham	0.36	0.42	0.46	0.53	0.61	0.66	0.79	1.00	1.17	1.48	1.74	2.08
13	7	Palestine	0.38	0.44	0.48	0.56	0.63	0.69	0.82	1.04	1.19	1.42	1.66	2.03
13	7	Paris	0.38	0.44	0.49	0.56	0.63	0.69	0.83	1.03	1.21	1.45	1.66	1.87
13	7	Windsor	0.40	0.46	0.50	0.58	0.66	0.72	0.85	1.05	1.21	1.45	1.70	2.01
13	8	Belleville	0.40	0.46	0.50	0.58	0.66	0.72	0.90	1.17	1.38	1.77	2.09	2.48
13	8	DuQuoin	0.41	0.47	0.52	0.60	0.68	0.74	0.90	1.11	1.26	1.56	1.79	2.04
13	8	Greenville	0.41	0.47	0.52	0.60	0.68	0.74	0.88	1.08	1.27	1.56	1.84	2.13
13	8	Sparta	0.40	0.46	0.50	0.58	0.66	0.72	0.87	1.08	1.26	1.54	1.79	2.04
13	8	St Louis	0.41	0.47	0.52	0.60	0.68	0.74	0.89	1.14	1.38	1.71	2.03	2.39
13	9	Fairfield	0.40	0.46	0.50	0.58	0.66	0.72	0.87	1.09	1.32	1.57	1.81	2.12
13	9	Flora	0.38	0.44	0.49	0.56	0.63	0.69	0.85	1.09	1.33	1.64	1.94	2.13
13	9	McLeansboro	0.40	0.46	0.50	0.58	0.66	0.72	0.89	1.10	1.30	1.60	1.84	2.18
13	9	Mt Carmel	0.39	0.45	0.50	0.58	0.65	0.71	0.86	1.07	1.24	1.56	1.81	2.11
13	9	Mt Vernon	0.39	0.45	0.50	0.58	0.65	0.71	0.85	1.07	1.21	1.47	1.66	1.88
13	9	Olney	0.38	0.45	0.49	0.57	0.64	0.70	0.84	1.06	1.24	1.54	1.78	2.11
13	10	Anna	0.46	0.53	0.58	0.67	0.76	0.83	1.01	1.26	1.44	1.73	1.92	2.11
13	10	Cairo	0.45	0.52	0.57	0.66	0.75	0.81	1.01	1.29	1.47	1.70	1.94	2.21
13	10	Carbondale	0.43	0.51	0.55	0.64	0.73	0.79	0.96	1.18	1.38	1.61	1.85	2.10
13	10	Harrisburg	0.42	0.49	0.54	0.62	0.71	0.77	0.93	1.17	1.38	1.72	2.00	2.36
13	10	New Burnside	0.45	0.52	0.57	0.66	0.75	0.82	0.97	1.19	1.38	1.65	1.89	2.19

Annual rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
14	1	Aledo	0.31	0.36	0.40	0.45	0.52	0.56	0.68	0.87	1.03	1.25	1.45	1.66
14	1	Dixon	0.31	0.36	0.40	0.46	0.52	0.57	0.69	0.88	1.03	1.24	1.44	1.68
14	1	Freeport	0.31	0.36	0.40	0.46	0.52	0.57	0.69	0.87	1.03	1.29	1.56	1.85
14	1	Galva	0.31	0.36	0.40	0.46	0.52	0.57	0.68	0.86	1.01	1.24	1.43	1.66
14	1	Moline	0.31	0.36	0.40	0.45	0.52	0.56	0.68	0.87	1.03	1.25	1.45	1.61
14	1	Morrison	0.31	0.36	0.39	0.45	0.52	0.56	0.68	0.84	0.99	1.20	1.40	1.61
14	1	Mt Carroll	0.31	0.36	0.39	0.45	0.52	0.56	0.68	0.90	1.04	1.21	1.37	1.53
14	1	Rockford	0.31	0.36	0.40	0.46	0.52	0.57	0.68	0.87	1.01	1.21	1.39	1.53
14	1	Walnut	0.32	0.38	0.41	0.48	0.54	0.59	0.68	0.86	1.01	1.20	1.37	1.54
14	2	Aurora	0.31	0.36	0.40	0.45	0.52	0.56	0.69	0.86	1.04	1.33	1.59	1.85
14	2	Chicago	0.29	0.34	0.38	0.44	0.50	0.54	0.66	0.84	0.99	1.22	1.42	1.65
14	2	DeKalb	0.31	0.36	0.40	0.46	0.52	0.57	0.66	0.84	1.00	1.20	1.40	1.62
14	2	Joliet	0.32	0.38	0.41	0.48	0.54	0.59	0.70	0.90	1.07	1.33	1.58	1.86
14	2	Kankakee	0.31	0.36	0.39	0.45	0.52	0.56	0.69	0.90	1.10	1.36	1.61	1.90
14	2	Marengo	0.30	0.35	0.38	0.44	0.50	0.54	0.64	0.77	0.85	1.03	1.19	1.43
14	2	Ottawa	0.30	0.35	0.38	0.45	0.51	0.55	0.66	0.84	0.99	1.20	1.40	1.60
14	2	Waukegan	0.28	0.33	0.36	0.41	0.47	0.51	0.62	0.74	0.84	1.01	1.20	1.40
14	3	La Harpe	0.35	0.40	0.44	0.51	0.58	0.63	0.77	0.94	1.09	1.38	1.65	1.96
14	3	Monmouth	0.32	0.37	0.41	0.48	0.54	0.59	0.73	0.91	1.07	1.30	1.53	1.78
14	3	Quincy	0.34	0.40	0.43	0.50	0.57	0.62	0.77	0.96	1.11	1.32	1.47	1.68
14	4	Bloomington	0.31	0.37	0.41	0.46	0.52	0.56	0.68	0.88	1.02	1.23	1.37	1.55
14	4	Decatur	0.32	0.37	0.41	0.48	0.54	0.59	0.72	0.89	1.02	1.19	1.33	1.50
14	4	Havana	0.30	0.35	0.38	0.44	0.50	0.54	0.64	0.80	0.92	1.13	1.31	1.52
14	4	Lincoln	0.30	0.34	0.38	0.44	0.50	0.55	0.67	0.84	0.99	1.22	1.37	1.52
14	4	Minonk	0.29	0.33	0.37	0.43	0.49	0.53	0.64	0.80	0.95	1.15	1.32	1.52
14	4	Peoria	0.30	0.34	0.38	0.45	0.51	0.55	0.66	0.84	1.01	1.24	1.41	1.63
14	4	Rushville	0.31	0.36	0.40	0.46	0.52	0.57	0.66	0.79	0.92	1.10	1.25	1.43
14	5	Danville	0.31	0.35	0.39	0.45	0.52	0.56	0.68	0.88	1.01	1.19	1.31	1.46
14	5	Hoopeston	0.30	0.36	0.40	0.45	0.51	0.55	0.65	0.77	0.87	1.02	1.15	1.32
14	5	Pontiac	0.29	0.34	0.38	0.43	0.49	0.53	0.66	0.84	0.97	1.21	1.41	1.54
14	5	Roberts	0.28	0.33	0.36	0.41	0.47	0.51	0.62	0.77	0.92	1.12	1.35	1.57
14	5	Urbana	0.31	0.36	0.40	0.46	0.52	0.57	0.68	0.81	0.92	1.07	1.20	1.34
14	6	Carlinville	0.31	0.36	0.40	0.46	0.52	0.57	0.69	0.87	1.04	1.27	1.50	1.76
14	6	Griggsville	0.31	0.36	0.39	0.45	0.51	0.56	0.68	0.85	1.00	1.23	1.42	1.66
14	6	Hillsboro	0.34	0.40	0.43	0.50	0.57	0.62	0.73	0.90	1.04	1.22	1.42	1.66
14	6	Jacksonville	0.31	0.36	0.40	0.46	0.52	0.57	0.69	0.88	1.01	1.21	1.42	1.58
14	6	Morrisonville	0.31	0.36	0.39	0.45	0.52	0.56	0.67	0.89	1.05	1.25	1.43	1.58
14	6	Pana	0.30	0.35	0.39	0.45	0.51	0.55	0.68	0.84	0.98	1.18	1.36	1.58
14	6	Springfield	0.31	0.36	0.39	0.45	0.52	0.56	0.67	0.87	1.04	1.27	1.42	1.62
14	6	White Hall	0.31	0.36	0.40	0.46	0.52	0.57	0.69	0.86	1.00	1.21	1.39	1.61
14	7	Charleston	0.29	0.34	0.38	0.43	0.50	0.55	0.66	0.82	0.96	1.18	1.39	1.60
14	7	Effingham	0.29	0.34	0.38	0.44	0.50	0.54	0.64	0.81	0.95	1.21	1.41	1.69
14	7	Palestine	0.31	0.36	0.39	0.45	0.52	0.56	0.66	0.85	0.97	1.15	1.36	1.65
14	7	Paris	0.31	0.36	0.40	0.46	0.52	0.57	0.67	0.84	0.98	1.18	1.36	1.53
14	7	Windsor	0.32	0.38	0.41	0.48	0.54	0.59	0.69	0.85	0.99	1.18	1.38	1.64
14	8	Belleville	0.32	0.38	0.41	0.48	0.54	0.59	0.73	0.95	1.12	1.44	1.70	2.02
14	8	DuQuoin	0.33	0.38	0.42	0.49	0.55	0.60	0.73	0.91	1.03	1.27	1.46	1.66
14	8	Greenville	0.33	0.38	0.42	0.49	0.55	0.60	0.72	0.88	1.03	1.27	1.50	1.74
14	8	Sparta	0.32	0.37	0.41	0.48	0.54	0.59	0.71	0.88	1.03	1.25	1.46	1.66
14	8	St Louis	0.34	0.39	0.43	0.49	0.56	0.61	0.72	0.93	1.12	1.39	1.65	1.95
14	9	Fairfield	0.32	0.37	0.41	0.47	0.53	0.58	0.71	0.88	1.06	1.28	1.48	1.72
14	9	Flora	0.30	0.35	0.39	0.45	0.51	0.56	0.69	0.89	1.07	1.34	1.58	1.74
14	9	McLeansboro	0.32	0.38	0.41	0.48	0.54	0.59	0.73	0.90	1.06	1.30	1.50	1.77
14	9	Mt Carmel	0.32	0.37	0.41	0.47	0.53	0.58	0.70	0.87	1.01	1.27	1.48	1.72
14	9	Mt Vernon	0.32	0.37	0.41	0.47	0.53	0.58	0.69	0.87	0.99	1.19	1.36	1.53
14	9	Olney	0.31	0.36	0.40	0.46	0.52	0.57	0.69	0.86	1.01	1.25	1.45	1.72
14	10	Anna	0.37	0.43	0.48	0.55	0.63	0.68	0.82	1.03	1.17	1.41	1.56	1.72
14	10	Cairo	0.36	0.42	0.46	0.53	0.61	0.66	0.82	1.05	1.19	1.39	1.58	1.80
14	10	Carbondale	0.35	0.41	0.45	0.52	0.59	0.64	0.79	0.96	1.12	1.32	1.50	1.71
14	10	Harrisburg	0.34	0.40	0.43	0.50	0.57	0.62	0.76	0.95	1.12	1.40	1.63	1.92
14	10	New Burnside	0.36	0.42	0.46	0.53	0.61	0.66	0.79	0.97	1.12	1.34	1.54	1.82

Storm code	Zone code	Station	Annual rainfall (inches) for given recurrence interval											
			2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
15	1	Aledo	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.47	0.56	0.68	0.79	0.91
15	1	Dixon	0.17	0.20	0.22	0.25	0.29	0.31	0.38	0.48	0.56	0.68	0.80	0.96
15	1	Freeport	0.17	0.20	0.22	0.25	0.29	0.31	0.38	0.47	0.56	0.70	0.85	1.01
15	1	Galva	0.17	0.20	0.22	0.25	0.28	0.31	0.37	0.47	0.55	0.68	0.78	0.91
15	1	Moline	0.17	0.19	0.21	0.24	0.27	0.30	0.37	0.47	0.56	0.68	0.79	0.88
15	1	Morrison	0.17	0.19	0.21	0.24	0.28	0.30	0.37	0.46	0.54	0.66	0.76	0.88
15	1	Mt Carroll	0.17	0.19	0.21	0.24	0.28	0.30	0.37	0.49	0.57	0.66	0.75	0.84
15	1	Rockford	0.17	0.20	0.22	0.25	0.28	0.31	0.37	0.47	0.55	0.66	0.76	0.84
15	1	Walnut	0.18	0.20	0.22	0.25	0.29	0.31	0.37	0.47	0.55	0.65	0.75	0.84
15	2	Aurora	0.16	0.19	0.21	0.24	0.27	0.30	0.37	0.47	0.57	0.72	0.87	1.01
15	2	Chicago	0.15	0.18	0.20	0.23	0.26	0.29	0.36	0.46	0.54	0.67	0.78	0.90
15	2	DeKalb	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.46	0.54	0.65	0.76	0.89
15	2	Joliet	0.18	0.20	0.22	0.25	0.29	0.31	0.38	0.49	0.58	0.72	0.86	1.02
15	2	Kankakee	0.16	0.19	0.21	0.24	0.27	0.30	0.38	0.49	0.60	0.74	0.88	1.04
15	2	Marengo	0.16	0.18	0.20	0.23	0.26	0.29	0.35	0.42	0.46	0.56	0.65	0.78
15	2	Ottawa	0.17	0.19	0.21	0.24	0.28	0.30	0.36	0.46	0.54	0.65	0.76	0.87
15	2	Waukegan	0.15	0.18	0.20	0.23	0.26	0.28	0.34	0.41	0.47	0.55	0.65	0.76
15	3	La Harpe	0.19	0.22	0.24	0.28	0.31	0.34	0.41	0.51	0.60	0.75	0.90	1.07
15	3	Monmouth	0.18	0.20	0.22	0.25	0.29	0.32	0.40	0.50	0.59	0.71	0.83	0.97
15	3	Quincy	0.19	0.22	0.24	0.28	0.31	0.34	0.42	0.52	0.61	0.72	0.80	0.91
15	4	Bloomington	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.48	0.56	0.66	0.75	0.85
15	4	Decatur	0.17	0.20	0.22	0.25	0.29	0.32	0.39	0.49	0.56	0.65	0.73	0.82
15	4	Havana	0.16	0.18	0.20	0.23	0.26	0.29	0.35	0.43	0.50	0.62	0.71	0.83
15	4	Lincoln	0.16	0.18	0.20	0.23	0.26	0.29	0.36	0.46	0.54	0.67	0.75	0.83
15	4	Minonk	0.16	0.18	0.20	0.23	0.26	0.29	0.35	0.44	0.52	0.63	0.72	0.83
15	4	Peoria	0.17	0.19	0.21	0.24	0.27	0.30	0.36	0.46	0.55	0.68	0.77	0.89
15	4	Rushville	0.17	0.20	0.22	0.25	0.28	0.30	0.36	0.43	0.50	0.60	0.68	0.78
15	5	Danville	0.17	0.20	0.21	0.24	0.27	0.30	0.37	0.48	0.55	0.65	0.71	0.80
15	5	Hoopeston	0.17	0.20	0.21	0.24	0.28	0.30	0.36	0.42	0.47	0.55	0.63	0.72
15	5	Pontiac	0.16	0.18	0.20	0.23	0.26	0.29	0.36	0.46	0.53	0.66	0.77	0.84
15	5	Roberts	0.15	0.18	0.20	0.23	0.26	0.28	0.34	0.42	0.50	0.61	0.73	0.86
15	5	Urbana	0.17	0.20	0.22	0.25	0.28	0.31	0.37	0.44	0.50	0.58	0.65	0.73
15	6	Carlinville	0.17	0.20	0.22	0.25	0.29	0.31	0.38	0.47	0.57	0.69	0.82	0.96
15	6	Griggsville	0.17	0.20	0.22	0.25	0.28	0.31	0.37	0.47	0.54	0.67	0.78	0.91
15	6	Hillsboro	0.19	0.22	0.24	0.28	0.31	0.34	0.40	0.49	0.57	0.67	0.78	0.91
15	6	Jacksonville	0.17	0.20	0.22	0.25	0.29	0.31	0.38	0.47	0.55	0.66	0.78	0.86
15	6	Morrisonville	0.17	0.19	0.21	0.24	0.28	0.30	0.37	0.49	0.57	0.68	0.78	0.86
15	6	Pana	0.17	0.19	0.21	0.24	0.27	0.30	0.37	0.46	0.54	0.64	0.74	0.86
15	6	Springfield	0.17	0.19	0.21	0.24	0.28	0.30	0.37	0.47	0.57	0.69	0.78	0.89
15	6	White Hall	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.47	0.55	0.66	0.76	0.88
15	7	Charleston	0.17	0.20	0.22	0.25	0.28	0.31	0.36	0.45	0.53	0.65	0.76	0.87
15	7	Effingham	0.15	0.18	0.20	0.23	0.26	0.29	0.35	0.44	0.52	0.66	0.77	0.92
15	7	Palestine	0.17	0.20	0.22	0.25	0.29	0.31	0.36	0.46	0.53	0.63	0.74	0.90
15	7	Paris	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.46	0.54	0.64	0.74	0.83
15	7	Windsor	0.18	0.20	0.22	0.26	0.29	0.32	0.38	0.47	0.54	0.64	0.73	0.88
15	8	Belleville	0.18	0.20	0.22	0.25	0.29	0.32	0.40	0.52	0.61	0.78	0.93	1.10
15	8	DuQuoin	0.18	0.21	0.23	0.26	0.30	0.33	0.40	0.49	0.56	0.69	0.80	0.91
15	8	Greenville	0.18	0.21	0.23	0.26	0.30	0.33	0.39	0.48	0.57	0.69	0.82	0.95
15	8	Sparta	0.18	0.20	0.22	0.25	0.29	0.32	0.39	0.48	0.57	0.68	0.80	0.91
15	8	St Louis	0.18	0.21	0.23	0.26	0.30	0.32	0.39	0.51	0.61	0.76	0.90	1.06
15	9	Fairfield	0.17	0.20	0.22	0.25	0.29	0.32	0.39	0.48	0.57	0.70	0.81	0.94
15	9	Flora	0.17	0.20	0.22	0.25	0.29	0.31	0.38	0.49	0.58	0.73	0.86	0.95
15	9	McLeansboro	0.18	0.20	0.22	0.26	0.30	0.32	0.40	0.49	0.58	0.71	0.82	0.97
15	9	Mt Carmel	0.18	0.20	0.22	0.25	0.29	0.32	0.38	0.48	0.55	0.69	0.81	0.94
15	9	Mt Vernon	0.17	0.20	0.22	0.25	0.30	0.32	0.38	0.48	0.54	0.65	0.74	0.83
15	9	Olney	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.47	0.55	0.68	0.79	0.94
15	10	Anna	0.20	0.23	0.26	0.30	0.34	0.37	0.45	0.56	0.64	0.77	0.85	0.94
15	10	Cairo	0.20	0.23	0.25	0.29	0.33	0.36	0.45	0.57	0.65	0.76	0.86	0.98
15	10	Carbondale	0.19	0.22	0.24	0.28	0.32	0.35	0.43	0.52	0.61	0.72	0.82	0.93
15	10	Harrisburg	0.19	0.22	0.24	0.27	0.31	0.34	0.41	0.52	0.61	0.77	0.89	1.05
15	10	New Burnside	0.20	0.23	0.25	0.29	0.33	0.36	0.43	0.53	0.61	0.73	0.84	1.00

Appendix B. Point Frequency Distributions at 61 Stations for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Spring

Storm codes

1 – 10 days	7 – 12 hours
2 – 5 days	8 – 6 hours
3 – 72 hours	9 – 3 hours
4 – 48 hours	10 – 2 hours
5 – 24 hours	11 – 1 hour
6 – 18 hours	12 – 30 minutes

		Spring rainfall (inches) for given recurrence interval						
Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1	1	Aledo	3.05	3.64	4.40	5.07	5.93	6.88	8.38
1	1	Dixon	2.84	3.36	3.99	4.73	5.96	7.18	8.93
1	1	Freeport	2.80	3.32	4.12	4.89	6.14	7.70	9.53
1	1	Galva	2.97	3.45	4.22	4.93	5.96	6.99	8.16
1	1	Moline	3.08	3.62	4.36	5.06	6.10	7.25	8.50
1	1	Morrison	3.01	3.45	4.15	4.89	5.96	7.25	8.98
1	1	Mt Carroll	3.08	3.52	4.19	4.89	5.93	6.96	8.16
1	1	Rockford	3.04	3.52	4.25	4.99	5.96	6.96	8.05
1	1	Walnut	3.04	3.48	4.22	4.97	6.00	7.03	8.17
1	2	Aurora	2.98	3.49	4.35	5.14	6.34	7.41	8.69
1	2	Chicago	2.76	3.30	3.88	4.36	5.24	6.23	7.64
1	2	DeKalb	3.05	3.55	4.28	4.79	5.57	6.35	7.44
1	2	Joliet	3.05	3.55	4.32	4.96	6.00	6.85	7.97
1	2	Kankakee	2.93	3.37	4.11	4.79	5.74	6.77	8.02
1	2	Marengo	2.87	3.30	3.88	4.36	5.03	5.79	6.82
1	2	Ottawa	2.98	3.44	4.07	4.64	5.57	6.43	7.53
1	2	Waukegan	2.80	3.30	3.95	4.54	5.28	5.92	6.60
1	3	La Harpe	3.30	3.91	4.75	5.41	6.27	7.20	8.57
1	3	Monmouth	3.04	3.62	4.42	5.10	6.10	6.93	7.76
1	3	Quincy	3.19	3.73	4.51	5.13	5.93	6.62	7.42
1	4	Bloomington	3.29	3.96	4.82	5.53	6.53	7.42	8.17
1	4	Decatur	3.32	4.07	5.16	5.95	6.92	7.66	8.48
1	4	Havana	3.06	3.63	4.41	5.12	6.12	7.03	8.00
1	4	Lincoln	3.14	3.74	4.60	5.26	6.22	6.98	8.01
1	4	Minonk	3.03	3.59	4.32	4.97	5.96	6.77	8.12
1	4	Peoria	3.06	3.63	4.41	5.12	6.34	7.22	8.25
1	4	Rushville	3.34	3.92	4.66	5.32	6.27	7.13	7.90
1	5	Danville	3.62	4.37	5.39	6.08	7.01	7.61	8.16
1	5	Hoopeston	3.50	4.12	5.01	5.79	6.88	7.69	8.65
1	5	Pontiac	3.26	3.99	4.97	5.75	6.81	7.61	8.57
1	5	Roberts	3.29	3.95	4.81	5.44	6.41	7.26	8.91
1	5	Urbana	3.52	4.16	4.97	5.53	6.28	6.76	7.36
1	6	Carlinville	3.31	3.92	4.77	5.60	6.76	8.05	9.91
1	6	Griggsville	3.17	3.85	4.84	5.61	6.79	7.78	9.21
1	6	Hillsboro	3.31	3.89	4.73	5.53	6.57	7.57	9.31
1	6	Jacksonville	3.13	3.78	4.75	5.56	6.70	7.88	9.22
1	6	Morrisonville	3.17	3.82	4.62	5.34	6.41	7.40	8.59
1	6	Pana	3.27	4.02	4.87	5.56	6.52	7.59	9.02
1	6	Springfield	2.98	3.56	4.47	5.27	6.53	7.64	9.00
1	6	White Hall	3.20	3.85	4.77	5.60	6.63	7.53	8.63
1	7	Charleston	3.29	4.08	5.17	5.99	7.11	8.17	9.29
1	7	Effingham	3.24	4.15	5.41	6.32	7.51	8.81	10.37
1	7	Palestine	3.44	4.19	5.13	5.86	6.85	8.10	9.55
1	7	Paris	3.24	4.08	5.34	6.32	7.68	8.90	10.14
1	7	Windsor	3.29	4.15	5.37	6.40	7.85	9.17	10.65
1	8	Belleville	3.06	3.83	4.78	5.70	6.94	8.25	10.20
1	8	DuQuoin	3.57	4.38	5.33	5.99	7.01	7.61	8.39
1	8	Greenville	3.04	3.84	4.84	5.59	6.59	7.49	8.65
1	8	Sparta	3.33	4.13	5.14	5.85	7.01	7.95	9.12
1	8	St Louis	3.10	3.97	4.94	5.79	6.99	8.32	9.96
1	9	Fairfield	3.38	4.34	5.74	6.85	8.58	10.05	11.56
1	9	Flora	3.34	4.26	5.58	6.55	8.30	9.86	11.36
1	9	McLeansboro	3.47	4.42	5.78	6.85	8.49	9.96	11.36
1	9	Mt Carmel	3.41	4.42	5.99	7.06	9.03	10.30	11.46
1	9	Mt Vernon	3.45	4.42	5.81	6.85	8.53	10.01	11.36
1	9	Olney	3.45	4.34	5.58	6.51	7.99	9.39	10.82
1	10	Anna	4.03	4.99	6.20	7.21	8.59	9.57	10.80
1	10	Cairo	3.74	4.69	6.04	7.09	8.67	10.01	11.25
1	10	Carbondale	3.74	4.76	6.08	7.09	8.33	9.22	10.17
1	10	Harrisburg	3.64	4.51	5.93	7.35	9.34	10.79	12.66
1	10	New Burnside	3.89	4.89	6.20	7.31	8.84	10.01	11.38

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
2	1	Aledo	2.41	2.90	3.62	4.25	5.20	6.01	7.25
2	1	Dixon	2.33	2.83	3.55	4.22	5.31	6.43	7.66
2	1	Freeport	2.27	2.76	3.52	4.21	5.46	6.72	8.34
2	1	Galva	2.27	2.76	3.44	4.04	5.16	6.09	7.37
2	1	Moline	2.27	2.80	3.59	4.26	5.35	6.36	7.66
2	1	Morrison	2.28	2.77	3.47	4.07	5.17	6.19	7.56
2	1	Mt Carroll	2.35	2.83	3.52	4.13	5.09	5.92	7.02
2	1	Rockford	2.28	2.74	3.49	4.16	5.21	6.01	7.02
2	1	Walnut	2.35	2.79	3.52	4.21	5.25	6.19	7.33
2	2	Aurora	2.26	2.64	3.25	3.84	4.98	6.06	7.16
2	2	Chicago	2.17	2.61	3.21	3.69	4.49	5.34	6.58
2	2	DeKalb	2.33	2.67	3.22	3.70	4.41	5.09	6.10
2	2	Joliet	2.31	2.82	3.55	4.20	5.17	6.00	6.98
2	2	Kankakee	2.16	2.57	3.25	3.85	4.85	5.67	6.76
2	2	Marengo	2.09	2.45	2.98	3.45	4.11	4.82	5.75
2	2	Ottawa	2.26	2.65	3.24	3.78	4.62	5.38	6.39
2	2	Waukegan	2.05	2.43	2.99	3.45	4.14	4.75	5.48
2	3	La Harpe	2.40	2.90	3.65	4.36	5.32	6.27	7.61
2	3	Monmouth	2.39	2.89	3.56	4.14	5.09	5.91	6.91
2	3	Quincy	2.26	2.70	3.38	3.93	4.80	5.49	6.32
2	4	Bloomington	2.68	3.18	3.90	4.53	5.50	6.40	7.51
2	4	Decatur	2.72	3.29	4.13	4.84	5.85	6.69	7.74
2	4	Havana	2.41	2.88	3.53	4.18	5.12	6.03	7.24
2	4	Lincoln	2.52	3.01	3.69	4.28	5.25	6.01	7.03
2	4	Minonk	2.41	2.86	3.53	4.11	5.04	5.90	7.24
2	4	Peoria	2.48	2.96	3.72	4.41	5.47	6.44	7.61
2	4	Rushville	2.70	3.11	3.74	4.32	5.27	6.16	7.09
2	5	Danville	2.62	3.19	3.99	4.67	5.59	6.36	7.27
2	5	Hoopeston	2.57	3.08	3.76	4.33	5.17	5.84	6.60
2	5	Pontiac	2.42	3.08	3.95	4.64	5.66	6.64	7.56
2	5	Roberts	2.31	2.76	3.49	4.14	5.29	6.38	7.71
2	5	Urbana	2.46	2.95	3.60	4.13	4.98	5.67	6.48
2	6	Carlinville	2.57	3.05	3.80	4.54	5.67	6.84	8.41
2	6	Griggsville	2.45	2.95	3.69	4.36	5.38	6.23	7.31
2	6	Hillsboro	2.51	3.02	3.76	4.50	5.57	6.49	7.75
2	6	Jacksonville	2.48	2.98	3.76	4.46	5.57	6.48	7.60
2	6	Morrisonville	2.46	3.01	3.83	4.61	5.62	6.36	7.38
2	6	Pana	2.61	3.12	3.87	4.49	5.57	6.51	7.81
2	6	Springfield	2.42	2.87	3.62	4.25	5.18	6.00	7.23
2	6	White Hall	2.47	2.98	3.87	4.57	5.55	6.46	7.54
2	7	Charleston	2.66	3.18	4.00	4.67	5.72	6.80	8.00
2	7	Effingham	2.55	3.11	3.93	4.66	5.99	7.04	8.63
2	7	Palestine	2.66	3.29	4.16	4.87	5.76	6.72	8.04
2	7	Paris	2.63	3.25	4.20	5.06	6.30	7.17	7.94
2	7	Windsor	2.61	3.21	4.09	4.96	6.13	7.31	8.70
2	8	Belleville	2.53	3.11	3.96	4.82	6.13	7.30	9.01
2	8	DuQuoin	2.79	3.43	4.22	4.94	5.83	6.71	7.62
2	8	Greenville	2.51	3.07	3.85	4.50	5.47	6.43	7.72
2	8	Sparta	2.76	3.36	4.21	4.97	6.02	6.93	8.02
2	8	St Louis	2.54	3.10	3.96	4.70	6.03	7.27	8.94
2	9	Fairfield	2.51	3.21	4.31	5.33	6.87	8.37	10.25
2	9	Flora	2.43	3.07	4.12	5.17	6.73	8.36	9.87
2	9	McLeansboro	2.59	3.32	4.39	5.45	7.09	8.74	10.46
2	9	Mt Carmel	2.62	3.27	4.31	5.33	6.74	8.14	9.89
2	9	Mt Vernon	2.64	3.34	4.44	5.58	7.08	8.64	10.10
2	9	Olney	2.59	3.21	4.20	5.09	6.70	8.23	9.98
2	10	Anna	3.06	3.83	4.92	5.82	6.99	8.06	9.27
2	10	Cairo	2.92	3.69	4.73	5.74	7.06	8.19	9.58
2	10	Carbondale	2.85	3.65	4.80	5.74	7.11	8.27	9.23
2	10	Harrisburg	2.77	3.47	4.58	5.68	7.18	8.53	10.47
2	10	New Burnside	2.95	3.65	4.85	5.76	7.14	8.35	9.80

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
3	1	Aledo	2.00	2.43	3.12	3.67	4.54	5.33	6.24
3	1	Dixon	2.05	2.49	3.13	3.72	4.68	5.67	6.75
3	1	Freeport	1.97	2.37	3.06	3.69	4.73	5.83	7.20
3	1	Galva	2.00	2.40	2.99	3.60	4.57	5.49	6.56
3	1	Moline	1.95	2.41	3.14	3.77	4.76	5.68	6.58
3	1	Morrison	2.06	2.50	3.13	3.67	4.66	5.58	6.82
3	1	Mt Carroll	2.10	2.53	3.14	3.69	4.55	5.29	6.27
3	1	Rockford	2.00	2.40	3.05	3.64	4.56	5.26	6.14
3	1	Walnut	2.04	2.44	3.06	3.69	4.63	5.39	6.24
3	2	Aurora	2.02	2.38	2.94	3.48	4.56	5.39	6.51
3	2	Chicago	1.92	2.32	2.88	3.37	4.15	4.96	5.95
3	2	DeKalb	2.03	2.35	2.92	3.37	4.15	4.77	5.55
3	2	Joliet	2.11	2.52	3.25	3.85	4.77	5.55	6.55
3	2	Kankakee	2.02	2.40	3.04	3.60	4.54	5.30	6.32
3	2	Marengo	1.87	2.19	2.66	3.08	3.67	4.30	5.13
3	2	Ottawa	2.06	2.42	2.96	3.45	4.22	4.91	5.83
3	2	Waukegan	1.85	2.19	2.70	3.11	3.73	4.28	4.94
3	3	La Harpe	2.18	2.63	3.32	3.96	4.83	5.69	6.91
3	3	Monmouth	2.02	2.49	3.17	3.73	4.63	5.40	6.35
3	3	Quincy	2.09	2.49	3.12	3.63	4.43	5.07	5.84
3	4	Bloomington	2.28	2.75	3.42	4.07	5.00	5.80	6.76
3	4	Decatur	2.40	2.93	3.67	4.34	5.23	6.00	6.92
3	4	Havana	2.03	2.45	3.05	3.68	4.61	5.54	6.61
3	4	Lincoln	2.12	2.60	3.27	3.91	4.85	5.60	6.45
3	4	Minonk	2.01	2.42	3.01	3.60	4.44	5.35	6.36
3	4	Peoria	2.21	2.64	3.32	3.93	4.87	5.74	6.78
3	4	Rushville	2.24	2.63	3.22	3.73	4.65	5.47	6.34
3	5	Danville	2.21	2.73	3.45	4.10	4.94	5.62	6.37
3	5	Hoopeston	2.22	2.66	3.25	3.74	4.47	5.04	5.70
3	5	Pontiac	2.04	2.67	3.46	4.14	5.15	5.94	6.77
3	5	Roberts	2.04	2.44	3.09	3.66	4.68	5.64	6.82
3	5	Urbana	2.11	2.56	3.19	3.71	4.47	5.07	5.82
3	6	Carlinville	2.23	2.71	3.40	4.08	5.18	6.13	7.36
3	6	Griggsville	2.17	2.59	3.29	3.91	4.85	5.67	6.55
3	6	Hillsboro	2.22	2.67	3.33	3.98	4.93	5.74	6.85
3	6	Jacksonville	2.24	2.69	3.40	4.03	5.03	5.86	6.87
3	6	Morrisonville	2.20	2.69	3.54	4.25	5.19	5.85	6.65
3	6	Pana	2.28	2.74	3.40	3.99	4.97	5.74	6.76
3	6	Springfield	2.16	2.63	3.35	3.93	4.80	5.49	6.50
3	6	White Hall	2.18	2.63	3.42	4.04	4.90	5.71	6.66
3	7	Charleston	2.25	2.67	3.38	3.94	4.87	5.72	6.79
3	7	Effingham	2.14	2.65	3.35	3.93	5.07	6.02	7.18
3	7	Palestine	2.24	2.77	3.50	4.10	4.85	5.66	6.77
3	7	Paris	2.22	2.77	3.52	4.10	4.98	5.69	6.48
3	7	Windsor	2.26	2.78	3.54	4.29	5.31	6.33	7.53
3	8	Belleville	2.18	2.68	3.48	4.21	5.33	6.50	7.96
3	8	DuQuoin	2.37	2.90	3.61	4.21	5.05	5.79	6.70
3	8	Greenville	2.24	2.74	3.43	4.01	4.87	5.73	6.88
3	8	Sparta	2.35	2.84	3.60	4.23	5.21	6.03	6.96
3	8	St Louis	2.27	2.78	3.57	4.24	5.38	6.55	7.95
3	9	Fairfield	2.16	2.76	3.71	4.59	5.91	7.20	8.82
3	9	Flora	2.11	2.67	3.58	4.49	5.84	7.26	8.57
3	9	McLeansboro	2.13	2.73	3.71	4.63	6.16	7.64	9.28
3	9	Mt Carmel	2.23	2.77	3.76	4.66	5.99	7.33	8.85
3	9	Mt Vernon	2.22	2.81	3.74	4.70	5.96	7.28	8.51
3	9	Olney	2.16	2.70	3.65	4.49	6.02	7.47	8.92
3	10	Anna	2.62	3.26	4.39	5.22	6.41	7.58	8.77
3	10	Cairo	2.62	3.31	4.24	5.15	6.33	7.35	8.60
3	10	Carbondale	2.50	3.18	4.17	5.03	6.22	7.40	8.41
3	10	Harrisburg	2.49	3.18	4.13	5.12	6.55	7.79	9.68
3	10	New Burnside	2.59	3.21	4.26	5.06	6.27	7.34	8.61

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
4	1	Aledo	1.78	2.10	2.74	3.27	4.04	4.73	5.57
4	1	Dixon	1.83	2.22	2.78	3.31	4.16	5.04	6.01
4	1	Freeport	1.75	2.10	2.70	3.28	4.28	5.25	6.50
4	1	Galva	1.78	2.11	2.69	3.21	4.01	4.84	5.70
4	1	Moline	1.74	2.18	2.85	3.37	4.25	5.07	5.94
4	1	Morrison	1.81	2.20	2.75	3.23	4.10	4.91	6.00
4	1	Mt Carroll	1.91	2.30	2.86	3.36	4.14	4.82	5.71
4	1	Rockford	1.78	2.14	2.73	3.25	4.07	4.70	5.48
4	1	Walnut	1.80	2.13	2.75	3.29	4.09	4.82	5.60
4	2	Aurora	1.77	2.13	2.71	3.20	4.21	5.00	6.01
4	2	Chicago	1.74	2.10	2.65	3.12	3.86	4.55	5.45
4	2	DeKalb	1.85	2.15	2.68	3.12	3.84	4.44	5.20
4	2	Joliet	1.88	2.27	2.94	3.52	4.38	5.14	6.05
4	2	Kankakee	1.90	2.26	2.85	3.38	4.26	4.98	5.93
4	2	Marengo	1.71	2.00	2.44	2.82	3.36	3.94	4.70
4	2	Ottawa	1.89	2.22	2.71	3.16	3.86	4.50	5.34
4	2	Waukegan	1.68	1.99	2.45	2.83	3.40	3.90	4.50
4	3	La Harpe	1.93	2.33	2.94	3.51	4.28	5.05	6.13
4	3	Monmouth	1.86	2.26	2.87	3.38	4.19	4.93	5.82
4	3	Quincy	1.93	2.31	2.89	3.36	4.10	4.69	5.40
4	4	Bloomington	1.97	2.39	3.03	3.63	4.45	5.26	6.05
4	4	Decatur	2.07	2.57	3.27	3.90	4.70	5.34	6.08
4	4	Havana	1.82	2.18	2.77	3.34	4.22	5.00	5.97
4	4	Lincoln	1.86	2.29	2.92	3.53	4.45	5.07	5.86
4	4	Minonk	1.80	2.15	2.74	3.28	4.10	4.94	5.78
4	4	Peoria	2.05	2.45	3.08	3.65	4.53	5.33	6.30
4	4	Rushville	2.01	2.35	2.89	3.40	4.18	4.91	5.76
4	5	Danville	1.98	2.48	3.16	3.76	4.54	5.16	5.86
4	5	Hoopeston	1.98	2.37	2.89	3.33	3.98	4.49	5.08
4	5	Pontiac	1.82	2.32	3.07	3.74	4.65	5.45	6.20
4	5	Roberts	1.88	2.25	2.84	3.37	4.31	5.19	6.28
4	5	Urbana	1.92	2.32	2.92	3.40	4.09	4.66	5.34
4	6	Carlinville	1.98	2.42	3.11	3.74	4.76	5.62	6.67
4	6	Griggsville	1.95	2.31	2.94	3.49	4.30	5.01	5.86
4	6	Hillsboro	2.04	2.45	3.05	3.65	4.52	5.26	6.29
4	6	Jacksonville	2.05	2.47	3.11	3.69	4.61	5.36	6.29
4	6	Morrisonville	1.99	2.44	3.22	3.87	4.68	5.34	6.02
4	6	Pana	2.01	2.49	3.11	3.66	4.56	5.25	6.12
4	6	Springfield	1.94	2.35	3.02	3.59	4.41	5.07	5.92
4	6	White Hall	1.98	2.39	3.11	3.67	4.46	5.19	6.06
4	7	Charleston	2.05	2.45	3.06	3.61	4.46	5.29	6.29
4	7	Effingham	1.92	2.38	3.03	3.60	4.60	5.51	6.66
4	7	Palestine	2.00	2.47	3.13	3.66	4.33	5.05	6.04
4	7	Paris	2.07	2.53	3.20	3.76	4.56	5.21	6.00
4	7	Windsor	2.05	2.52	3.21	3.89	4.81	5.74	6.83
4	8	Belleville	1.99	2.46	3.24	3.91	4.93	5.95	7.04
4	8	DuQuoin	2.15	2.66	3.32	3.86	4.57	5.27	5.99
4	8	Greenville	2.05	2.50	3.14	3.67	4.46	5.24	6.30
4	8	Sparta	2.13	2.61	3.30	3.88	4.71	5.38	6.16
4	8	St Louis	2.09	2.56	3.28	3.87	4.93	5.89	7.07
4	9	Fairfield	1.93	2.47	3.32	4.11	5.29	6.45	7.90
4	9	Flora	1.91	2.42	3.24	4.07	5.30	6.58	7.77
4	9	McLeansboro	1.92	2.46	3.36	4.16	5.59	6.93	8.34
4	9	Mt Carmel	1.95	2.48	3.29	4.11	5.44	6.67	8.01
4	9	Mt Vernon	1.99	2.51	3.34	4.20	5.33	6.50	7.60
4	9	Olney	1.86	2.35	3.17	4.04	5.42	6.64	8.00
4	10	Anna	2.41	3.04	4.01	4.87	6.07	7.12	8.10
4	10	Cairo	2.50	3.16	4.05	4.91	6.04	7.01	8.19
4	10	Carbondale	2.26	2.86	3.80	4.61	5.75	6.90	7.90
4	10	Harrisburg	2.23	2.89	3.81	4.69	6.05	7.23	8.98
4	10	New Burnside	2.42	2.99	3.97	4.72	5.85	6.84	8.03

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	Aledo	1.56	1.93	2.49	3.00	3.70	4.34	5.07
5	1	Dixon	1.66	2.01	2.52	3.00	3.77	4.57	5.45
5	1	Freeport	1.62	1.95	2.49	2.99	3.82	4.67	5.63
5	1	Galva	1.57	1.92	2.45	2.92	3.66	4.30	5.07
5	1	Moline	1.55	1.93	2.49	3.00	3.70	4.34	4.95
5	1	Morrison	1.62	1.97	2.46	2.89	3.67	4.40	5.37
5	1	Mt Carroll	1.72	2.08	2.58	3.03	3.73	4.34	5.15
5	1	Rockford	1.62	1.94	2.47	2.95	3.69	4.26	4.98
5	1	Walnut	1.60	1.93	2.45	2.92	3.54	4.11	4.69
5	2	Aurora	1.60	1.97	2.48	2.99	3.87	4.62	5.38
5	2	Chicago	1.54	1.89	2.40	2.83	3.56	4.14	4.80
5	2	DeKalb	1.64	1.94	2.41	2.86	3.49	4.06	4.72
5	2	Joliet	1.68	2.02	2.57	3.06	3.87	4.59	5.42
5	2	Kankakee	1.77	2.11	2.67	3.16	3.98	4.65	5.55
5	2	Marengo	1.54	1.80	2.19	2.54	3.03	3.55	4.23
5	2	Ottawa	1.69	1.98	2.43	2.83	3.46	4.03	4.78
5	2	Waukegan	1.46	1.73	2.13	2.46	2.95	3.39	3.91
5	3	La Harpe	1.72	2.08	2.61	3.12	3.81	4.49	5.45
5	3	Monmouth	1.62	2.01	2.57	3.03	3.74	4.37	5.18
5	3	Quincy	1.79	2.14	2.68	3.12	3.81	4.36	5.02
5	4	Bloomington	1.69	2.08	2.75	3.29	3.98	4.66	5.36
5	4	Decatur	1.76	2.18	2.80	3.29	3.94	4.54	5.17
5	4	Havana	1.62	1.94	2.50	2.97	3.77	4.45	5.24
5	4	Lincoln	1.62	2.00	2.62	3.20	4.04	4.66	5.24
5	4	Minonk	1.58	1.95	2.50	3.05	3.76	4.50	5.24
5	4	Peoria	1.84	2.19	2.76	3.27	4.06	4.78	5.64
5	4	Rushville	1.71	2.01	2.50	2.98	3.65	4.28	4.94
5	5	Danville	1.75	2.16	2.81	3.37	4.10	4.69	5.36
5	5	Hoopeston	1.74	2.08	2.54	2.93	3.50	3.95	4.47
5	5	Pontiac	1.56	2.03	2.66	3.24	4.16	4.99	5.67
5	5	Roberts	1.72	2.05	2.60	3.08	3.94	4.75	5.74
5	5	Urbana	1.67	2.08	2.59	3.07	3.69	4.25	4.88
5	6	Carlinville	1.77	2.14	2.68	3.20	3.92	4.63	5.45
5	6	Griggsville	1.74	2.10	2.64	3.09	3.79	4.40	5.13
5	6	Hillsboro	1.83	2.20	2.74	3.28	4.06	4.73	5.65
5	6	Jacksonville	1.74	2.09	2.64	3.13	3.91	4.55	5.33
5	6	Morrisonville	1.72	2.08	2.71	3.24	3.88	4.42	4.90
5	6	Pana	1.70	2.11	2.58	3.04	3.65	4.22	4.90
5	6	Springfield	1.72	2.08	2.68	3.21	3.92	4.41	5.03
5	6	White Hall	1.69	2.04	2.65	3.13	3.80	4.42	5.16
5	7	Charleston	1.81	2.13	2.70	3.15	3.93	4.61	5.39
5	7	Effingham	1.73	2.07	2.66	3.18	4.01	4.69	5.70
5	7	Palestine	1.73	2.14	2.71	3.17	3.75	4.37	5.23
5	7	Paris	1.82	2.17	2.74	3.22	3.92	4.50	5.14
5	7	Windsor	1.78	2.19	2.79	3.38	4.18	4.99	5.93
5	8	Belleville	1.86	2.32	2.97	3.51	4.45	5.26	6.16
5	8	DuQuoin	1.92	2.32	2.84	3.26	3.92	4.52	5.06
5	8	Greenville	1.78	2.18	2.73	3.19	3.88	4.56	5.47
5	8	Sparta	1.86	2.25	2.77	3.24	3.88	4.52	5.16
5	8	St Louis	1.92	2.30	2.92	3.44	4.31	5.11	5.93
5	9	Fairfield	1.73	2.21	2.97	3.67	4.73	5.77	7.06
5	9	Flora	1.74	2.20	2.95	3.70	4.82	5.98	7.06
5	9	McLeansboro	1.77	2.24	3.02	3.74	4.92	5.92	7.33
5	9	Mt Carmel	1.74	2.19	2.94	3.59	4.78	5.84	7.10
5	9	Mt Vernon	1.75	2.21	2.94	3.69	4.69	5.72	6.69
5	9	Olney	1.70	2.15	2.89	3.59	4.73	5.74	7.10
5	10	Anna	2.19	2.78	3.68	4.42	5.57	6.46	7.33
5	10	Cairo	2.29	2.90	3.72	4.51	5.55	6.44	7.53
5	10	Carbondale	2.07	2.64	3.45	4.23	5.20	6.22	7.30
5	10	Harrisburg	2.02	2.55	3.41	4.23	5.55	6.75	8.23
5	10	New Burnside	2.17	2.68	3.56	4.23	5.24	6.13	7.20

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
6	1	Aledo	1.43	1.77	2.29	2.76	3.40	3.99	4.66
6	1	Dixon	1.52	1.85	2.32	2.76	3.47	4.21	5.01
6	1	Freeport	1.45	1.79	2.29	2.75	3.51	4.29	5.18
6	1	Galva	1.44	1.76	2.26	2.69	3.37	3.96	4.66
6	1	Moline	1.43	1.77	2.29	2.76	3.40	3.99	4.56
6	1	Morrison	1.49	1.81	2.27	2.66	3.38	4.05	4.94
6	1	Mt Carroll	1.58	1.90	2.37	2.78	3.43	3.98	4.73
6	1	Rockford	1.49	1.78	2.27	2.71	3.39	3.92	4.57
6	1	Walnut	1.49	1.77	2.26	2.69	3.26	3.78	4.31
6	2	Aurora	1.47	1.81	2.28	2.75	3.56	4.25	4.95
6	2	Chicago	1.42	1.74	2.21	2.60	3.28	3.81	4.42
6	2	DeKalb	1.49	1.75	2.21	2.63	3.21	3.74	4.35
6	2	Joliet	1.54	1.85	2.36	2.81	3.56	4.22	4.99
6	2	Kankakee	1.63	1.94	2.46	2.91	3.67	4.29	5.11
6	2	Marengo	1.42	1.66	2.02	2.34	2.79	3.27	3.90
6	2	Ottawa	1.55	1.82	2.23	2.60	3.18	3.70	4.40
6	2	Waukegan	1.33	1.58	1.94	2.24	2.69	3.08	3.56
6	3	La Harpe	1.59	1.92	2.41	2.88	3.51	4.14	5.03
6	3	Monmouth	1.49	1.85	2.37	2.78	3.44	4.02	4.76
6	3	Quincy	1.63	1.94	2.43	2.83	3.46	3.95	4.55
6	4	Bloomington	1.56	1.92	2.53	3.02	3.66	4.29	4.93
6	4	Decatur	1.62	2.01	2.58	3.02	3.63	4.18	4.76
6	4	Havana	1.49	1.79	2.30	2.73	3.47	4.10	4.83
6	4	Lincoln	1.49	1.84	2.41	2.95	3.74	4.29	4.83
6	4	Minonk	1.46	1.80	2.30	2.80	3.46	4.14	4.83
6	4	Peoria	1.69	2.01	2.53	3.00	3.72	4.38	5.18
6	4	Rushville	1.57	1.85	2.29	2.74	3.36	3.93	4.54
6	5	Danville	1.52	1.90	2.58	3.10	3.78	4.27	4.97
6	5	Hoopeston	1.57	1.88	2.29	2.64	3.15	3.56	4.02
6	5	Pontiac	1.44	1.88	2.45	2.98	3.83	4.59	5.22
6	5	Roberts	1.59	1.90	2.40	2.85	3.64	4.39	5.31
6	5	Urbana	1.53	1.91	2.38	2.82	3.39	3.91	4.49
6	6	Carlinville	1.63	1.97	2.46	2.94	3.61	4.26	5.02
6	6	Griggsville	1.60	1.93	2.43	2.84	3.48	4.05	4.73
6	6	Hillsboro	1.64	1.97	2.46	2.94	3.64	4.24	5.06
6	6	Jacksonville	1.60	1.92	2.43	2.88	3.60	4.18	4.91
6	6	Morrisonville	1.58	1.92	2.50	2.99	3.56	4.07	4.50
6	6	Pana	1.56	1.94	2.38	2.79	3.36	3.88	4.50
6	6	Springfield	1.58	1.92	2.46	2.95	3.60	4.06	4.62
6	6	White Hall	1.56	1.88	2.44	2.88	3.50	4.07	4.75
6	7	Charleston	1.63	1.96	2.45	2.90	3.61	4.24	4.96
6	7	Effingham	1.59	1.91	2.44	2.92	3.69	4.32	5.24
6	7	Palestine	1.59	1.97	2.49	2.92	3.45	4.03	4.82
6	7	Paris	1.68	2.00	2.52	2.96	3.61	4.14	4.72
6	7	Windsor	1.64	2.02	2.57	3.12	3.85	4.59	5.47
6	8	Belleville	1.72	2.14	2.74	3.24	4.09	4.84	5.67
6	8	DuQuoin	1.76	2.13	2.62	3.00	3.60	4.15	4.66
6	8	Greenville	1.65	2.02	2.53	2.96	3.60	4.23	5.08
6	8	Sparta	1.72	2.07	2.55	2.97	3.56	4.15	4.75
6	8	St Louis	1.77	2.12	2.68	3.17	3.96	4.71	5.45
6	9	Fairfield	1.60	2.04	2.74	3.39	4.37	5.32	6.52
6	9	Flora	1.61	2.03	2.73	3.42	4.45	5.53	6.53
6	9	McLeansboro	1.63	2.06	2.78	3.45	4.53	5.45	6.75
6	9	Mt Carmel	1.60	2.01	2.70	3.30	4.40	5.37	6.53
6	9	Mt Vernon	1.61	2.03	2.70	3.39	4.31	5.25	6.14
6	9	Olney	1.56	1.98	2.66	3.30	4.35	5.28	6.53
6	10	Anna	2.01	2.55	3.39	4.06	5.12	5.94	6.75
6	10	Cairo	2.11	2.67	3.42	4.15	5.10	5.92	6.93
6	10	Carbondale	1.91	2.43	3.18	3.89	4.78	5.72	6.72
6	10	Harrisburg	1.85	2.35	3.14	3.89	5.11	6.22	7.57
6	10	New Burnside	1.99	2.47	3.28	3.89	4.82	5.64	6.62

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
7	1	Aledo	1.35	1.68	2.17	2.60	3.22	3.78	4.41
7	1	Dixon	1.44	1.74	2.19	2.60	3.27	3.96	4.72
7	1	Freeport	1.37	1.69	2.17	2.60	3.32	4.06	4.90
7	1	Galva	1.37	1.67	2.13	2.55	3.18	3.74	4.41
7	1	Moline	1.35	1.68	2.17	2.60	3.22	3.78	4.31
7	1	Morrison	1.41	1.72	2.15	2.52	3.20	3.83	4.68
7	1	Mt Carroll	1.50	1.81	2.25	2.64	3.25	3.78	4.49
7	1	Rockford	1.41	1.69	2.16	2.57	3.22	3.71	4.34
7	1	Walnut	1.41	1.68	2.13	2.55	3.08	3.58	4.08
7	2	Aurora	1.39	1.71	2.15	2.60	3.36	4.02	4.68
7	2	Chicago	1.34	1.64	2.09	2.46	3.10	3.60	4.18
7	2	DeKalb	1.41	1.66	2.09	2.49	3.03	3.53	4.11
7	2	Joliet	1.46	1.75	2.24	2.66	3.36	3.99	4.72
7	2	Kankakee	1.54	1.84	2.32	2.75	3.46	4.05	4.83
7	2	Marengo	1.34	1.57	1.91	2.21	2.63	3.09	3.68
7	2	Ottawa	1.47	1.72	2.11	2.46	3.01	3.50	4.16
7	2	Waukegan	1.26	1.49	1.84	2.12	2.54	2.92	3.37
7	3	La Harpe	1.50	1.81	2.28	2.72	3.32	3.91	4.75
7	3	Monmouth	1.41	1.75	2.24	2.63	3.25	3.81	4.51
7	3	Quincy	1.54	1.83	2.30	2.67	3.26	3.73	4.29
7	4	Bloomington	1.47	1.82	2.39	2.86	3.47	4.06	4.66
7	4	Decatur	1.53	1.90	2.44	2.86	3.43	3.95	4.50
7	4	Havana	1.41	1.69	2.17	2.58	3.28	3.88	4.56
7	4	Lincoln	1.41	1.74	2.28	2.78	3.53	4.06	4.56
7	4	Minonk	1.38	1.70	2.18	2.64	3.27	3.91	4.56
7	4	Peoria	1.60	1.91	2.40	2.84	3.52	4.15	4.90
7	4	Rushville	1.49	1.75	2.17	2.59	3.18	3.72	4.30
7	5	Danville	1.44	1.80	2.44	2.93	3.57	4.04	4.70
7	5	Hoopeston	1.48	1.78	2.17	2.50	2.98	3.37	3.81
7	5	Pontiac	1.36	1.77	2.32	2.82	3.63	4.34	4.93
7	5	Roberts	1.50	1.79	2.26	2.68	3.42	4.13	4.99
7	5	Urbana	1.46	1.81	2.25	2.66	3.21	3.70	4.25
7	6	Carlinville	1.54	1.86	2.33	2.79	3.41	4.03	4.75
7	6	Griggsville	1.52	1.83	2.30	2.69	3.30	3.83	4.47
7	6	Hillsboro	1.56	1.87	2.33	2.79	3.45	4.02	4.80
7	6	Jacksonville	1.51	1.82	2.29	2.72	3.40	3.95	4.63
7	6	Morrisonville	1.50	1.81	2.36	2.82	3.37	3.85	4.26
7	6	Pana	1.48	1.83	2.25	2.65	3.18	3.67	4.26
7	6	Springfield	1.50	1.81	2.33	2.79	3.41	3.84	4.37
7	6	White Hall	1.47	1.78	2.31	2.73	3.31	3.86	4.50
7	7	Charleston	1.54	1.85	2.32	2.74	3.42	4.02	4.68
7	7	Effingham	1.51	1.80	2.31	2.76	3.49	4.08	4.96
7	7	Palestine	1.51	1.86	2.36	2.76	3.26	3.81	4.56
7	7	Paris	1.59	1.89	2.38	2.80	3.41	3.91	4.47
7	7	Windsor	1.55	1.91	2.43	2.95	3.64	4.34	5.17
7	8	Belleville	1.62	2.03	2.59	3.06	3.87	4.58	5.36
7	8	DuQuoin	1.67	2.02	2.47	2.84	3.41	3.93	4.40
7	8	Greenville	1.57	1.92	2.40	2.81	3.42	4.02	4.82
7	8	Sparta	1.62	1.96	2.41	2.82	3.37	3.93	4.48
7	8	St Louis	1.67	2.00	2.54	3.00	3.75	4.45	5.16
7	9	Fairfield	1.51	1.93	2.59	3.20	4.13	5.03	6.16
7	9	Flora	1.52	1.92	2.58	3.24	4.22	5.24	6.19
7	9	McLeansboro	1.54	1.95	2.63	3.26	4.28	5.15	6.38
7	9	Mt Carmel	1.51	1.90	2.55	3.12	4.16	5.08	6.18
7	9	Mt Vernon	1.52	1.92	2.55	3.20	4.07	4.96	5.80
7	9	Olney	1.48	1.87	2.52	3.12	4.12	4.99	6.18
7	10	Anna	1.90	2.41	3.20	3.84	4.85	5.62	6.38
7	10	Cairo	1.99	2.52	3.23	3.92	4.82	5.59	6.54
7	10	Carbondale	1.80	2.30	3.00	3.69	4.52	5.41	6.35
7	10	Harrisburg	1.75	2.22	2.97	3.69	4.83	5.88	7.15
7	10	New Burnside	1.89	2.34	3.11	3.69	4.57	5.35	6.28

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
8	1	Aledo	1.17	1.44	1.86	2.25	2.78	3.25	3.80
8	1	Dixon	1.24	1.51	1.89	2.25	2.83	3.43	4.08
8	1	Freeport	1.18	1.46	1.86	2.24	2.86	3.50	4.22
8	1	Galva	1.18	1.44	1.84	2.20	2.74	3.23	3.80
8	1	Moline	1.16	1.44	1.86	2.25	2.78	3.25	3.74
8	1	Morrison	1.22	1.48	1.85	2.17	2.76	3.30	4.03
8	1	Mt Carroll	1.29	1.56	1.93	2.27	2.80	3.25	3.86
8	1	Rockford	1.21	1.46	1.85	2.21	2.77	3.19	3.73
8	1	Walnut	1.22	1.44	1.84	2.20	2.66	3.08	3.52
8	2	Aurora	1.20	1.47	1.86	2.24	2.90	3.46	4.03
8	2	Chicago	1.16	1.42	1.80	2.12	2.67	3.10	3.60
8	2	DeKalb	1.22	1.43	1.81	2.14	2.62	3.05	3.55
8	2	Joliet	1.26	1.51	1.93	2.29	2.90	3.44	4.06
8	2	Kankakee	1.34	1.59	2.01	2.38	3.00	3.51	4.18
8	2	Marengo	1.16	1.36	1.65	1.91	2.28	2.67	3.18
8	2	Ottawa	1.27	1.49	1.82	2.12	2.59	3.02	3.58
8	2	Waukegan	1.09	1.29	1.59	1.83	2.20	2.52	2.91
8	3	La Harpe	1.30	1.57	1.98	2.36	2.88	3.39	4.12
8	3	Monmouth	1.22	1.51	1.93	2.27	2.80	3.28	3.88
8	3	Quincy	1.32	1.58	1.98	2.30	2.81	3.21	3.70
8	4	Blocmington	1.27	1.56	2.06	2.46	3.00	3.49	4.02
8	4	Decatur	1.32	1.63	2.10	2.46	2.96	3.40	3.88
8	4	Havana	1.21	1.46	1.87	2.22	2.82	3.34	3.94
8	4	Lincoln	1.23	1.51	1.97	2.40	3.04	3.49	3.94
8	4	Minonk	1.19	1.46	1.88	2.26	2.83	3.38	3.94
8	4	Peoria	1.38	1.64	2.07	2.45	3.04	3.58	4.23
8	4	Rushville	1.28	1.51	1.87	2.24	2.74	3.21	3.71
8	5	Danville	1.23	1.55	2.11	2.53	3.08	3.48	4.04
8	5	Hoopeston	1.28	1.54	1.88	2.16	2.58	2.91	3.29
8	5	Pontiac	1.18	1.52	1.99	2.43	3.12	3.74	4.24
8	5	Roberts	1.30	1.55	1.96	2.33	2.98	3.59	4.34
8	5	Urbana	1.25	1.56	1.95	2.30	2.77	3.19	3.66
8	6	Carlinville	1.33	1.60	2.01	2.40	2.94	3.47	4.09
8	6	Griggsville	1.31	1.58	1.98	2.31	2.84	3.30	3.85
8	6	Hillsboro	1.34	1.61	2.01	2.40	2.97	3.46	4.13
8	6	Jacksonville	1.31	1.57	1.98	2.35	2.93	3.41	4.00
8	6	Morrisonville	1.29	1.56	2.03	2.43	2.91	3.32	3.67
8	6	Pana	1.28	1.57	1.94	2.28	2.74	3.16	3.67
8	6	Springfield	1.29	1.56	2.01	2.41	2.94	3.32	3.78
8	6	White Hall	1.27	1.53	1.99	2.35	2.85	3.32	3.88
8	7	Charleston	1.36	1.60	2.02	2.37	2.95	3.46	4.04
8	7	Effingham	1.30	1.55	1.99	2.38	3.01	3.52	4.28
8	7	Palestine	1.30	1.61	2.03	2.38	2.81	3.28	3.93
8	7	Paris	1.37	1.63	2.05	2.41	2.94	3.37	3.85
8	7	Windsor	1.34	1.65	2.10	2.55	3.15	3.75	4.47
8	8	Belleville	1.40	1.75	2.24	2.64	3.34	3.94	4.62
8	8	DuQuoin	1.44	1.74	2.13	2.45	2.94	3.39	3.79
8	8	Greenville	1.34	1.64	2.06	2.41	2.93	3.44	4.13
8	8	Sparta	1.40	1.69	2.08	2.41	2.91	3.39	3.85
8	8	St Louis	1.44	1.73	2.19	2.60	3.24	3.84	4.45
8	9	Fairfield	1.30	1.66	2.23	2.76	3.55	4.33	5.30
8	9	Flora	1.32	1.66	2.23	2.80	3.64	4.53	5.35
8	9	McLeansboro	1.33	1.68	2.26	2.81	3.69	4.45	5.51
8	9	Mt Carmel	1.30	1.64	2.21	2.69	3.59	4.38	5.32
8	9	Mt Vernon	1.31	1.66	2.21	2.78	3.52	4.30	5.03
8	9	Olney	1.27	1.61	2.17	2.69	3.55	4.31	5.32
8	10	Anna	1.64	2.08	2.76	3.31	4.18	4.84	5.50
8	10	Cairo	1.72	2.17	2.79	3.38	4.16	4.82	5.64
8	10	Carbondale	1.55	1.98	2.59	3.18	3.91	4.67	5.48
8	10	Harrisburg	1.51	1.92	2.56	3.18	4.17	5.07	6.17
8	10	New Burnside	1.63	2.02	2.68	3.18	3.94	4.61	5.41

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	Aledo	0.99	1.23	1.59	1.92	2.37	2.78	3.24
9	1	Dixon	1.06	1.29	1.62	1.92	2.42	2.93	3.49
9	1	Freeport	1.01	1.25	1.59	1.91	2.44	2.98	3.60
9	1	Galva	1.00	1.23	1.57	1.87	2.34	2.75	3.24
9	1	Moline	0.99	1.23	1.59	1.92	2.37	2.78	3.17
9	1	Morrison	1.04	1.26	1.58	1.85	2.35	2.81	3.44
9	1	Mt Carroll	1.10	1.33	1.65	1.94	2.39	2.78	3.30
9	1	Rockford	1.04	1.24	1.59	1.89	2.37	2.73	3.19
9	1	Walnut	1.04	1.23	1.57	1.87	2.27	2.63	3.00
9	2	Aurora	1.03	1.26	1.59	1.91	2.48	2.96	3.44
9	2	Chicago	0.99	1.21	1.54	1.81	2.28	2.65	3.07
9	2	DeKalb	1.03	1.22	1.54	1.83	2.23	2.60	3.02
9	2	Joliet	1.07	1.29	1.64	1.95	2.48	2.94	3.47
9	2	Kankakee	1.13	1.35	1.71	2.02	2.54	2.97	3.55
9	2	Marengo	0.99	1.16	1.41	1.63	1.94	2.28	2.72
9	2	Ottawa	1.08	1.27	1.55	1.81	2.21	2.58	3.06
9	2	Waukegan	0.93	1.10	1.35	1.56	1.87	2.15	2.48
9	3	La Harpe	1.11	1.34	1.69	2.02	2.46	2.90	3.53
9	3	Monmouth	1.04	1.29	1.65	1.93	2.39	2.80	3.32
9	3	Quincy	1.12	1.34	1.68	1.95	2.38	2.72	3.14
9	4	Bloomington	1.08	1.33	1.76	2.10	2.57	2.99	3.43
9	4	Decatur	1.13	1.40	1.79	2.10	2.53	2.90	3.31
9	4	Havana	1.04	1.25	1.60	1.90	2.41	2.85	3.36
9	4	Lincoln	1.04	1.29	1.68	2.05	2.60	2.99	3.36
9	4	Minonk	1.02	1.25	1.60	1.92	2.40	2.88	3.36
9	4	Peoria	1.18	1.40	1.76	2.09	2.59	3.05	3.61
9	4	Rushville	1.10	1.31	1.59	1.91	2.34	2.74	3.16
9	5	Danville	1.06	1.33	1.80	2.15	2.63	2.97	3.44
9	5	Hoopeston	1.09	1.31	1.60	1.84	2.20	2.48	2.80
9	5	Pontiac	1.00	1.30	1.70	2.08	2.67	3.20	3.62
9	5	Roberts	1.10	1.32	1.67	1.98	2.53	3.05	3.69
9	5	Urbana	1.07	1.33	1.66	1.96	2.36	2.72	3.12
9	6	Carlinville	1.14	1.37	1.71	2.05	2.51	2.96	3.49
9	6	Griggsville	1.12	1.35	1.69	1.98	2.42	2.82	3.28
9	6	Hillsboro	1.14	1.38	1.71	2.05	2.54	2.96	3.53
9	6	Jacksonville	1.11	1.34	1.69	2.00	2.50	2.91	3.41
9	6	Morrisonville	1.10	1.33	1.74	2.07	2.48	2.83	3.13
9	6	Pana	1.09	1.34	1.65	1.94	2.34	2.70	3.13
9	6	Springfield	1.10	1.33	1.71	2.05	2.51	2.83	3.22
9	6	White Hall	1.09	1.31	1.70	2.01	2.44	2.84	3.31
9	7	Charleston	1.16	1.36	1.73	2.02	2.51	2.95	3.45
9	7	Effingham	1.11	1.33	1.70	2.02	2.56	3.01	3.65
9	7	Palestine	1.11	1.37	1.73	2.03	2.40	2.80	3.35
9	7	Paris	1.16	1.39	1.75	2.06	2.51	2.88	3.29
9	7	Windsor	1.14	1.40	1.79	2.17	2.68	3.20	3.81
9	8	Belleville	1.19	1.49	1.90	2.25	2.85	3.37	3.95
9	8	DuQuoin	1.23	1.48	1.82	2.10	2.51	2.89	3.24
9	8	Greenville	1.15	1.41	1.76	2.06	2.50	2.94	3.53
9	8	Sparta	1.19	1.44	1.77	2.06	2.48	2.89	3.30
9	8	St Louis	1.23	1.48	1.87	2.23	2.76	3.27	3.79
9	9	Fairfield	1.11	1.42	1.90	2.35	3.03	3.69	4.52
9	9	Flora	1.13	1.43	1.91	2.40	3.12	3.88	4.58
9	9	McLeansboro	1.14	1.44	1.93	2.39	3.15	3.79	4.70
9	9	Mt Carmel	1.11	1.40	1.88	2.29	3.06	3.73	4.54
9	9	Mt Vernon	1.12	1.41	1.88	2.36	3.00	3.66	4.28
9	9	Olney	1.09	1.38	1.85	2.29	3.03	3.67	4.54
9	10	Anna	1.40	1.78	2.35	2.82	3.57	4.13	4.69
9	10	Cairo	1.47	1.86	2.38	2.89	3.55	4.12	4.82
9	10	Carbondale	1.33	1.69	2.21	2.71	3.33	3.99	4.67
9	10	Harrisburg	1.29	1.64	2.18	2.71	3.55	4.32	5.26
9	10	New Burnside	1.39	1.72	2.28	2.71	3.36	3.93	4.61

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
10	1	Aledo	0.92	1.13	1.47	1.77	2.18	2.56	2.99
10	1	Dixon	0.98	1.19	1.49	1.77	2.23	2.70	3.21
10	1	Freeport	0.93	1.15	1.47	1.77	2.25	2.75	3.32
10	1	Galva	0.93	1.13	1.45	1.73	2.16	2.54	2.99
10	1	Moline	0.92	1.13	1.47	1.77	2.18	2.56	2.92
10	1	Morrison	0.96	1.16	1.46	1.71	2.17	2.60	3.18
10	1	Mt Carroll	1.02	1.23	1.53	1.79	2.21	2.57	3.04
10	1	Rockford	0.95	1.15	1.46	1.74	2.18	2.51	2.94
10	1	Walnut	0.96	1.13	1.45	1.73	2.09	2.43	2.77
10	2	Aurora	0.94	1.16	1.46	1.76	2.28	2.73	3.17
10	2	Chicago	0.91	1.12	1.42	1.67	2.10	2.44	2.83
10	2	DeKalb	0.96	1.12	1.42	1.69	2.06	2.40	2.78
10	2	Joliet	0.99	1.19	1.52	1.80	2.28	2.71	3.20
10	2	Kankakee	1.04	1.24	1.57	1.86	2.34	2.74	3.27
10	2	Marengo	0.91	1.07	1.30	1.50	1.79	2.10	2.50
10	2	Ottawa	1.00	1.17	1.43	1.67	2.04	2.38	2.82
10	2	Waukegan	0.85	1.01	1.24	1.43	1.72	1.97	2.27
10	3	La Harpe	1.02	1.23	1.55	1.85	2.26	2.66	3.23
10	3	Monmouth	0.95	1.19	1.52	1.79	2.20	2.58	3.05
10	3	Quincy	1.04	1.24	1.55	1.80	2.20	2.51	2.89
10	4	Bloomington	1.00	1.23	1.62	1.94	2.38	2.75	3.16
10	4	Decatur	1.04	1.29	1.66	1.94	2.33	2.68	3.05
10	4	Havana	0.96	1.15	1.48	1.75	2.22	2.63	3.09
10	4	Lincoln	0.96	1.19	1.55	1.89	2.39	2.75	3.09
10	4	Minonk	0.94	1.15	1.48	1.77	2.23	2.65	3.09
10	4	Peoria	1.08	1.29	1.62	1.92	2.38	2.80	3.31
10	4	Rushville	1.01	1.21	1.48	1.76	2.15	2.52	2.91
10	5	Danville	0.97	1.22	1.66	1.99	2.42	2.74	3.17
10	5	Hoopeston	1.00	1.20	1.47	1.69	2.02	2.28	2.58
10	5	Pontiac	0.92	1.21	1.57	1.91	2.45	2.95	3.34
10	5	Roberts	1.02	1.21	1.53	1.82	2.33	2.80	3.39
10	5	Urbana	0.99	1.23	1.53	1.81	2.17	2.51	2.88
10	6	Carlinville	1.05	1.26	1.58	1.89	2.31	2.73	3.22
10	6	Griggsville	1.03	1.24	1.56	1.82	2.24	2.60	3.03
10	6	Hillsboro	1.05	1.27	1.58	1.89	2.34	2.73	3.26
10	6	Jacksonville	1.02	1.23	1.55	1.84	2.30	2.67	3.14
10	6	Morrisonville	1.01	1.23	1.62	1.91	2.28	2.60	2.89
10	6	Pana	1.00	1.24	1.52	1.80	2.16	2.49	2.89
10	6	Springfield	1.01	1.23	1.58	1.89	2.31	2.61	2.96
10	6	White Hall	1.00	1.20	1.56	1.84	2.24	2.60	3.04
10	7	Charleston	1.06	1.26	1.59	1.86	2.31	2.72	3.18
10	7	Effingham	1.02	1.22	1.57	1.87	2.37	2.77	3.36
10	7	Palestine	1.02	1.26	1.60	1.87	2.21	2.58	3.09
10	7	Paris	1.08	1.29	1.61	1.90	2.31	2.65	3.03
10	7	Windsor	1.05	1.29	1.65	2.00	2.47	2.95	3.51
10	8	Belleville	1.10	1.37	1.76	2.08	2.62	3.11	3.64
10	8	DuQuoin	1.13	1.37	1.68	1.95	2.31	2.67	2.98
10	8	Greenville	1.06	1.30	1.63	1.90	2.31	2.71	3.26
10	8	Sparta	1.10	1.33	1.64	1.89	2.28	2.67	3.00
10	8	St Louis	1.13	1.36	1.73	2.06	2.54	3.02	3.50
10	9	Fairfield	1.02	1.30	1.75	2.16	2.79	3.40	4.16
10	9	Flora	1.04	1.32	1.77	2.22	2.89	3.59	4.24
10	9	McLeansboro	1.04	1.34	1.78	2.21	2.90	3.50	4.33
10	9	Mt Carmel	1.02	1.29	1.73	2.11	2.82	3.45	4.19
10	9	Mt Vernon	1.03	1.30	1.73	2.17	2.76	3.37	3.94
10	9	Olney	1.00	1.27	1.71	2.11	2.79	3.38	4.19
10	10	Anna	1.29	1.64	2.17	2.61	3.29	3.81	4.32
10	10	Cairo	1.35	1.71	2.19	2.66	3.27	3.80	4.44
10	10	Carbondale	1.22	1.56	2.04	2.50	3.07	3.68	4.31
10	10	Harrisburg	1.19	1.51	2.01	2.50	3.27	3.99	4.85
10	10	New Burnside	1.28	1.58	2.11	2.50	3.10	3.62	4.25

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
11	1	Aledo	0.73	0.91	1.17	1.41	1.74	2.04	2.38
11	1	Dixon	0.78	0.95	1.19	1.41	1.77	2.15	2.56
11	1	Freeport	0.74	0.92	1.17	1.40	1.79	2.19	2.65
11	1	Galva	0.74	0.90	1.15	1.38	1.72	2.02	2.38
11	1	Moline	0.73	0.91	1.17	1.41	1.74	2.04	2.32
11	1	Morrison	0.76	0.93	1.16	1.36	1.73	2.07	2.53
11	1	Mt Carroll	0.81	0.97	1.21	1.42	1.75	2.04	2.41
11	1	Rockford	0.76	0.92	1.17	1.39	1.74	2.01	2.35
11	1	Walnut	0.76	0.91	1.15	1.38	1.66	1.93	2.20
11	2	Aurora	0.75	0.93	1.17	1.40	1.82	2.17	2.53
11	2	Chicago	0.72	0.89	1.13	1.33	1.67	1.95	2.26
11	2	DeKalb	0.76	0.89	1.13	1.34	1.64	1.91	2.22
11	2	Joliet	0.79	0.94	1.21	1.44	1.82	2.16	2.55
11	2	Kankakee	0.84	0.99	1.26	1.49	1.88	2.19	2.62
11	2	Marengo	0.73	0.85	1.04	1.20	1.43	1.68	2.00
11	2	Ottawa	0.80	0.93	1.14	1.33	1.63	1.89	2.25
11	2	Waukegan	0.68	0.81	1.00	1.15	1.38	1.58	1.83
11	3	La Harpe	0.81	0.98	1.24	1.48	1.81	2.13	2.58
11	3	Monmouth	0.76	0.95	1.21	1.42	1.76	2.05	2.43
11	3	Quincy	0.83	0.99	1.24	1.44	1.76	2.01	2.32
11	4	Bloomington	0.79	0.98	1.29	1.55	1.90	2.19	2.52
11	4	Decatur	0.83	1.03	1.32	1.55	1.85	2.13	2.43
11	4	Havana	0.76	0.91	1.17	1.39	1.77	2.09	2.46
11	4	Lincoln	0.77	0.95	1.24	1.51	1.91	2.19	2.46
11	4	Minonk	0.75	0.92	1.18	1.42	1.77	2.12	2.46
11	4	Peoria	0.86	1.03	1.29	1.53	1.90	2.23	2.64
11	4	Rushville	0.81	0.94	1.17	1.40	1.72	2.01	2.33
11	5	Danville	0.77	0.97	1.32	1.58	1.93	2.18	2.52
11	5	Hoopeston	0.80	0.96	1.17	1.35	1.61	1.82	2.06
11	5	Pontiac	0.73	0.95	1.25	1.52	1.96	2.35	2.66
11	5	Roberts	0.80	0.95	1.21	1.43	1.83	2.20	2.66
11	5	Urbana	0.79	0.98	1.22	1.44	1.73	2.00	2.30
11	6	Carlinville	0.84	1.01	1.26	1.50	1.84	2.18	2.56
11	6	Griggsville	0.82	0.99	1.24	1.45	1.78	2.07	2.41
11	6	Hillsboro	0.84	1.01	1.25	1.50	1.86	2.16	2.58
11	6	Jacksonville	0.82	0.98	1.24	1.47	1.84	2.14	2.50
11	6	Morrisonville	0.81	0.98	1.29	1.52	1.82	2.08	2.30
11	6	Pana	0.80	0.99	1.22	1.43	1.71	1.98	2.30
11	6	Springfield	0.81	0.98	1.26	1.51	1.84	2.08	2.35
11	6	White Hall	0.79	0.95	1.24	1.46	1.78	2.07	2.42
11	7	Charleston	0.85	1.00	1.27	1.48	1.85	2.17	2.53
11	7	Effingham	0.82	0.97	1.25	1.48	1.88	2.20	2.68
11	7	Palestine	0.81	1.01	1.27	1.49	1.76	2.06	2.46
11	7	Paris	0.86	1.02	1.29	1.51	1.84	2.12	2.41
11	7	Windsor	0.84	1.03	1.31	1.59	1.96	2.34	2.79
11	8	Belleville	0.88	1.10	1.40	1.66	2.09	2.48	2.89
11	8	DuQuoin	0.90	1.09	1.34	1.52	1.84	2.12	2.38
11	8	Greenville	0.85	1.04	1.30	1.52	1.85	2.17	2.61
11	8	Sparta	0.88	1.06	1.30	1.50	1.82	2.12	2.40
11	8	St Louis	0.90	1.08	1.37	1.66	2.03	2.40	2.79
11	9	Fairfield	0.82	1.04	1.40	1.73	2.23	2.72	3.33
11	9	Flora	0.84	1.06	1.43	1.79	2.33	2.89	3.42
11	9	McLeansboro	0.83	1.07	1.42	1.76	2.32	2.78	3.45
11	9	Mt Carmel	0.82	1.03	1.38	1.68	2.25	2.74	3.34
11	9	Mt Vernon	0.82	1.04	1.38	1.73	2.20	2.69	3.14
11	9	Olney	0.80	1.01	1.36	1.68	2.22	2.70	3.34
11	10	Anna	1.03	1.30	1.73	2.08	2.62	3.04	3.45
11	10	Cairo	1.08	1.36	1.75	2.12	2.61	3.02	3.54
11	10	Carbondale	0.97	1.24	1.62	1.99	2.44	2.92	3.43
11	10	Harrisburg	0.94	1.20	1.60	1.99	2.61	3.18	3.86
11	10	New Burnside	1.02	1.26	1.68	1.99	2.47	2.88	3.39

Spring rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
12	1	Aledo	0.57	0.71	0.92	1.11	1.37	1.60	1.88
12	1	Dixon	0.61	0.74	0.93	1.11	1.40	1.69	2.01
12	1	Freeport	0.58	0.72	0.92	1.11	1.41	1.73	2.08
12	1	Galva	0.58	0.71	0.91	1.08	1.35	1.59	1.88
12	1	Moline	0.57	0.71	0.92	1.11	1.37	1.60	1.84
12	1	Morrison	0.60	0.73	0.91	1.07	1.36	1.63	1.99
12	1	Mt Carroll	0.64	0.77	0.95	1.12	1.38	1.61	1.90
12	1	Rockford	0.60	0.72	0.91	1.09	1.37	1.57	1.84
12	1	Walnut	0.60	0.71	0.91	1.08	1.31	1.52	1.74
12	2	Aurora	0.59	0.72	0.91	1.10	1.43	1.71	1.99
12	2	Chicago	0.57	0.70	0.89	1.05	1.32	1.53	1.78
12	2	DeKalb	0.60	0.71	0.89	1.06	1.29	1.50	1.75
12	2	Joliet	0.62	0.74	0.95	1.13	1.43	1.70	2.00
12	2	Kankakee	0.66	0.78	0.99	1.17	1.47	1.72	2.05
12	2	Marengo	0.56	0.66	0.80	0.93	1.11	1.30	1.55
12	2	Ottawa	0.63	0.74	0.90	1.05	1.28	1.49	1.77
12	2	Waukegan	0.54	0.64	0.79	0.91	1.09	1.25	1.45
12	3	La Harpe	0.64	0.78	0.98	1.17	1.43	1.68	2.04
12	3	Monmouth	0.60	0.74	0.95	1.12	1.38	1.62	1.91
12	3	Quincy	0.66	0.79	0.99	1.15	1.40	1.61	1.85
12	4	Bloomington	0.63	0.77	1.01	1.21	1.50	1.73	1.98
12	4	Decatur	0.65	0.81	1.03	1.21	1.46	1.68	1.92
12	4	Havana	0.60	0.72	0.92	1.10	1.39	1.65	1.94
12	4	Lincoln	0.62	0.76	0.98	1.19	1.50	1.73	1.94
12	4	Minonk	0.59	0.72	0.92	1.12	1.40	1.67	1.94
12	4	Peoria	0.68	0.81	1.02	1.21	1.50	1.77	2.09
12	4	Rushville	0.63	0.74	0.92	1.10	1.35	1.58	1.82
12	5	Danville	0.61	0.76	1.04	1.25	1.52	1.72	1.98
12	5	Hoopeston	0.64	0.76	0.93	1.07	1.28	1.44	1.63
12	5	Pontiac	0.58	0.74	0.99	1.20	1.54	1.85	2.10
12	5	Roberts	0.62	0.75	0.94	1.12	1.43	1.73	2.09
12	5	Urbana	0.62	0.77	0.96	1.13	1.36	1.58	1.81
12	6	Carlinville	0.66	0.80	0.99	1.18	1.45	1.71	2.02
12	6	Griggsville	0.65	0.78	0.98	1.14	1.40	1.63	1.90
12	6	Hillsboro	0.66	0.79	0.99	1.18	1.46	1.70	2.03
12	6	Jacksonville	0.65	0.78	0.98	1.16	1.45	1.69	1.98
12	6	Morrisonville	0.64	0.77	1.01	1.20	1.43	1.63	1.81
12	6	Pana	0.63	0.78	0.96	1.12	1.35	1.56	1.81
12	6	Springfield	0.64	0.77	0.99	1.19	1.45	1.63	1.83
12	6	White Hall	0.63	0.75	0.98	1.16	1.41	1.64	1.91
12	7	Charleston	0.67	0.79	1.00	1.17	1.45	1.71	1.99
12	7	Effingham	0.64	0.77	0.99	1.16	1.48	1.74	2.11
12	7	Palestine	0.64	0.79	1.00	1.17	1.38	1.61	1.93
12	7	Paris	0.67	0.80	1.02	1.19	1.45	1.66	1.90
12	7	Windsor	0.66	0.82	1.04	1.26	1.56	1.86	2.21
12	8	Belleville	0.69	0.86	1.10	1.30	1.65	1.94	2.28
12	8	DuQuoin	0.71	0.86	1.05	1.20	1.45	1.67	1.87
12	8	Greenville	0.67	0.82	1.03	1.20	1.46	1.71	2.06
12	8	Sparta	0.69	0.83	1.02	1.19	1.43	1.67	1.88
12	8	St Louis	0.71	0.85	1.08	1.32	1.60	1.89	2.19
12	9	Fairfield	0.64	0.82	1.10	1.36	1.75	2.14	2.62
12	9	Flora	0.66	0.83	1.12	1.40	1.82	2.26	2.67
12	9	McLeansboro	0.65	0.85	1.12	1.39	1.82	2.19	2.71
12	9	Mt Carmel	0.64	0.81	1.09	1.33	1.77	2.16	2.63
12	9	Mt Vernon	0.65	0.82	1.09	1.37	1.74	2.12	2.48
12	9	Olney	0.63	0.79	1.07	1.33	1.75	2.12	2.63
12	10	Anna	0.81	1.03	1.36	1.64	2.06	2.39	2.72
12	10	Cairo	0.85	1.07	1.38	1.67	2.05	2.38	2.79
12	10	Carbondale	0.77	0.98	1.28	1.57	1.92	2.30	2.70
12	10	Harrisburg	0.75	0.95	1.26	1.57	2.05	2.50	3.05
12	10	New Burnside	0.80	0.99	1.32	1.57	1.95	2.28	2.67

Appendix C. Point Frequency Distributions at 61 Stations for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Summer

Storm codes

1 – 10 days	7 – 12 hours
2 – 5 days	8 – 6 hours
3 – 72 hours	9 – 3 hours
4 – 48 hours	10 – 2 hours
5 – 24 hours	11 – 1 hour
6 – 18 hours	12 – 30 minutes

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1	1	Aledo	3.76	4.67	5.71	6.54	7.60	8.75	10.34
1	1	Dixon	3.40	4.22	5.18	6.10	7.64	9.02	11.02
1	1	Freeport	3.70	4.51	5.48	6.25	7.87	9.67	11.76
1	1	Galva	3.66	4.43	5.48	6.35	7.64	8.79	10.07
1	1	Moline	3.79	4.65	5.66	6.52	7.69	9.11	10.49
1	1	Morrison	3.71	4.43	5.39	6.31	7.64	9.11	11.08
1	1	Mt Carroll	3.79	4.51	5.44	6.31	7.60	8.74	10.07
1	1	Rockford	3.75	4.51	5.52	6.43	7.64	8.74	9.93
1	1	Walnut	3.75	4.46	5.48	6.41	7.69	8.84	10.08
1	2	Aurora	3.36	4.20	5.57	6.80	8.58	10.14	11.97
1	2	Chicago	3.11	3.97	4.96	5.77	7.08	8.52	10.52
1	2	DeKalb	3.44	4.27	5.48	6.34	7.53	8.55	10.24
1	2	Joliet	3.44	4.27	5.52	6.57	8.11	9.37	10.97
1	2	Kankakee	3.30	4.06	5.25	6.21	7.58	9.02	11.43
1	2	Marengo	3.23	3.97	4.96	5.77	6.81	7.81	9.53
1	2	Ottawa	3.36	4.14	5.21	6.15	7.53	8.79	10.37
1	2	Waukegan	3.15	3.97	5.05	6.00	7.15	8.10	9.08
1	3	La Harpe	4.02	5.01	6.41	7.53	8.93	10.21	12.36
1	3	Monmouth	3.70	4.65	5.96	7.10	8.69	9.97	11.29
1	3	Quincy	3.88	4.78	6.08	7.15	8.44	9.53	10.79
1	4	Bloomington	3.33	4.28	5.47	6.34	7.46	8.45	9.39
1	4	Decatur	3.37	4.40	5.85	6.82	7.91	8.73	9.75
1	4	Havana	3.11	3.92	5.01	5.87	7.00	8.01	9.20
1	4	Lincoln	3.18	4.04	5.22	6.04	7.11	7.96	9.21
1	4	Minonk	3.07	3.88	5.00	5.69	6.65	7.83	9.46
1	4	Peoria	3.21	3.92	5.01	5.87	7.25	8.23	9.49
1	4	Rushville	3.49	4.24	5.29	6.10	7.16	8.13	9.08
1	5	Danville	3.66	4.53	5.66	6.45	7.60	8.44	9.13
1	5	Hoopeston	3.54	4.27	5.25	6.14	7.46	8.53	9.68
1	5	Pontiac	3.30	4.14	5.21	6.10	7.38	8.44	9.59
1	5	Roberts	3.34	4.10	5.05	5.78	6.95	8.05	9.97
1	5	Urbana	3.57	4.32	5.21	5.87	6.81	7.49	8.23
1	6	Carlinville	3.50	4.31	5.49	6.51	7.91	9.43	11.63
1	6	Griggsville	3.34	4.23	5.58	6.64	7.96	9.06	10.80
1	6	Hillsboro	3.50	4.27	5.45	6.42	7.69	8.92	10.92
1	6	Jacksonville	3.40	4.15	5.48	6.47	7.73	9.29	10.81
1	6	Morrisonville	3.34	4.19	5.33	6.21	7.50	8.73	10.08
1	6	Pana	3.50	4.46	5.62	6.47	7.64	8.83	10.63
1	6	Springfield	3.14	3.91	5.15	6.12	7.65	9.02	10.55
1	6	White Hall	3.38	4.23	5.49	6.51	7.76	8.88	10.12
1	7	Charleston	3.48	4.30	5.37	6.28	7.52	8.45	9.49
1	7	Effingham	3.43	4.38	5.62	6.63	7.85	9.11	10.59
1	7	Palestine	3.63	4.41	5.33	6.15	7.25	8.37	9.76
1	7	Paris	3.37	4.30	5.54	6.63	8.13	9.20	10.36
1	7	Windsor	3.48	4.38	5.58	6.72	8.31	9.48	10.89
1	8	Belleville	3.15	3.98	5.28	6.55	8.32	10.06	12.99
1	8	DuQuoin	3.37	4.43	5.76	6.89	8.41	9.54	10.68
1	8	Greenville	3.15	4.09	5.34	6.35	7.82	9.26	10.89
1	8	Sparta	3.34	4.28	5.56	6.72	8.41	9.96	11.61
1	8	St Louis	3.12	4.01	5.38	6.66	8.36	10.34	12.67
1	9	Fairfield	3.10	3.94	5.18	6.20	7.52	8.65	9.87
1	9	Flora	3.06	3.87	5.03	5.93	7.28	8.48	9.70
1	9	McLeansboro	3.18	4.01	5.21	6.20	7.44	8.57	9.70
1	9	Mt Carmel	3.13	4.01	5.39	6.38	7.92	8.86	9.79
1	9	Mt Vernon	3.16	4.01	5.23	6.20	7.47	8.61	9.70
1	9	Olney	3.16	3.94	5.03	5.89	7.00	8.08	9.24
1	10	Anna	3.48	4.39	5.56	6.59	7.78	8.80	9.84
1	10	Cairo	3.22	4.13	5.42	6.47	7.85	9.20	10.25
1	10	Carbondale	3.13	4.19	5.46	6.47	7.55	8.48	9.27
1	10	Harrisburg	3.13	3.97	5.32	6.72	8.64	9.92	11.54
1	10	New Burnside	3.35	4.30	5.56	6.67	8.01	9.20	10.37

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
2	1	Aledo	2.90	3.58	4.57	5.32	6.59	7.81	9.12
2	1	Dixon	2.85	3.49	4.48	5.29	6.69	8.08	9.62
2	1	Freeport	2.82	3.43	4.44	5.34	6.87	8.37	10.18
2	1	Galva	2.81	3.41	4.34	5.19	6.46	7.66	9.01
2	1	Moline	2.90	3.58	4.48	5.34	6.73	7.91	9.15
2	1	Morrison	2.87	3.43	4.35	5.17	6.55	7.90	9.72
2	1	Mt Carroll	2.76	3.49	4.44	5.18	6.42	7.72	9.11
2	1	Rockford	2.78	3.41	4.44	5.28	6.57	7.72	8.84
2	1	Walnut	2.86	3.45	4.44	5.28	6.55	7.74	9.09
2	2	Aurora	2.62	3.21	4.11	4.99	6.81	8.37	10.50
2	2	Chicago	2.51	3.12	4.07	4.93	6.26	7.65	9.37
2	2	DeKalb	2.81	3.38	4.21	4.94	6.11	7.37	8.82
2	2	Joliet	2.68	3.41	4.64	5.76	7.20	8.41	9.89
2	2	Kankakee	2.66	3.36	4.38	5.32	6.76	7.99	9.50
2	2	Marengo	2.46	3.04	3.94	4.67	5.73	6.91	8.60
2	2	Ottawa	2.68	3.30	4.24	5.12	6.44	7.55	9.11
2	2	Waukegan	2.44	2.96	3.81	4.57	5.78	6.78	8.07
2	3	La Harpe	3.09	3.89	5.18	6.20	7.66	9.12	11.17
2	3	Monmouth	2.84	3.66	4.96	5.87	7.37	8.73	10.34
2	3	Quincy	2.80	3.66	4.64	5.50	6.84	8.03	9.40
2	4	Bloomington	2.79	3.49	4.39	5.15	6.11	6.94	8.09
2	4	Decatur	2.93	3.71	4.75	5.56	6.50	7.48	8.47
2	4	Havana	2.61	3.15	4.01	4.77	5.85	6.81	8.01
2	4	Lincoln	2.68	3.25	4.18	4.85	5.88	6.62	7.66
2	4	Minonk	2.61	3.14	3.97	4.61	5.57	6.61	8.15
2	4	Peoria	2.69	3.24	4.18	4.95	6.19	7.31	8.49
2	4	Rushville	2.90	3.40	4.23	4.91	5.96	6.85	7.81
2	5	Danville	2.88	3.53	4.46	5.20	6.29	7.14	8.16
2	5	Hoopeston	2.82	3.41	4.21	4.89	5.83	6.62	7.49
2	5	Pontiac	2.75	3.41	4.42	5.24	6.38	7.46	8.55
2	5	Roberts	2.69	3.22	3.97	4.68	5.96	7.28	8.80
2	5	Urbana	2.79	3.32	4.03	4.66	5.61	6.37	7.27
2	6	Carlinville	2.71	3.35	4.33	5.25	6.79	8.28	10.15
2	6	Griggsville	2.63	3.24	4.17	5.02	6.24	7.38	8.51
2	6	Hillsboro	2.77	3.36	4.29	5.23	6.61	7.74	9.21
2	6	Jacksonville	2.62	3.28	4.29	5.18	6.56	7.73	9.10
2	6	Morrisonville	2.59	3.31	4.27	5.31	6.61	7.57	8.65
2	6	Pana	2.76	3.42	4.41	5.21	6.61	7.83	9.33
2	6	Springfield	2.60	3.15	4.03	4.90	6.09	7.23	8.83
2	6	White Hall	2.66	3.24	4.31	5.27	6.53	7.61	8.92
2	7	Charleston	2.67	3.25	4.15	4.96	6.12	7.29	8.66
2	7	Effingham	2.65	3.28	4.13	4.96	6.35	7.65	9.34
2	7	Palestine	2.77	3.46	4.37	5.17	6.11	7.20	8.60
2	7	Paris	2.69	3.42	4.41	5.38	6.68	7.68	8.69
2	7	Windsor	2.75	3.42	4.41	5.17	6.50	7.83	9.31
2	8	Belleville	2.41	3.15	4.23	5.26	7.05	8.66	11.06
2	8	DuQuoin	2.77	3.48	4.50	5.43	6.65	8.05	9.55
2	8	Greenville	2.44	3.11	4.11	5.02	6.59	7.99	9.71
2	8	Sparta	2.63	3.40	4.50	5.43	6.87	8.05	9.60
2	8	St Louis	2.47	3.14	4.18	5.19	7.03	8.74	11.02
2	9	Fairfield	2.54	3.12	4.05	4.88	6.08	7.19	8.62
2	9	Flora	2.51	3.07	3.91	4.71	5.98	7.13	8.25
2	9	McLeansboro	2.59	3.23	4.16	4.99	6.28	7.51	8.83
2	9	Mt Carmel	2.62	3.20	4.09	4.88	5.97	7.05	8.34
2	9	Mt Vernon	2.64	3.30	4.16	5.10	6.31	7.51	8.65
2	9	Olney	2.59	3.12	3.98	4.76	5.93	7.11	8.42
2	10	Anna	2.77	3.49	4.42	5.24	6.19	7.00	7.82
2	10	Cairo	2.57	3.30	4.33	5.17	6.27	7.35	8.19
2	10	Carbondale	2.64	3.30	4.37	5.17	6.26	7.13	7.95
2	10	Harrisburg	2.53	3.14	4.16	5.06	6.33	7.53	9.04
2	10	New Burnside	2.69	3.30	4.41	5.18	6.34	7.25	8.41

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
3	1	Aledo	2.59	3.20	4.08	4.75	5.88	6.97	8.14
3	1	Dixon	2.59	3.17	4.07	4.81	6.08	7.35	8.75
3	1	Freeport	2.52	3.06	3.97	4.77	6.14	7.48	9.09
3	1	Galva	2.58	3.13	3.98	4.76	5.92	7.03	8.26
3	1	Moline	2.56	3.15	4.05	4.88	6.17	7.13	8.12
3	1	Morrison	2.61	3.20	3.96	4.75	6.07	7.15	8.51
3	1	Mt Carroll	2.54	3.15	4.00	4.77	5.91	7.02	7.97
3	1	Rockford	2.47	3.06	3.96	4.72	5.87	6.78	7.67
3	1	Walnut	2.60	3.15	4.05	4.78	5.90	6.78	7.89
3	2	Aurora	2.49	3.07	3.84	4.69	6.32	7.87	9.60
3	2	Chicago	2.32	2.93	3.76	4.54	5.77	7.04	8.47
3	2	DeKalb	2.57	3.09	3.89	4.64	5.65	6.81	8.14
3	2	Joliet	2.45	3.15	4.31	5.19	6.62	7.83	9.38
3	2	Kankakee	2.42	3.06	3.99	4.85	6.16	7.28	8.66
3	2	Marengo	2.30	2.82	3.53	4.15	5.30	6.24	7.64
3	2	Ottawa	2.47	3.02	3.81	4.65	5.97	7.14	8.33
3	2	Waukegan	2.22	2.69	3.47	4.16	5.26	6.17	7.35
3	3	La Harpe	2.72	3.43	4.56	5.46	6.75	8.03	9.84
3	3	Monmouth	2.55	3.30	4.35	5.16	6.46	7.53	8.97
3	3	Quincy	2.57	3.36	4.26	5.05	6.28	7.37	8.63
3	4	Bloomington	2.56	3.21	4.03	4.73	5.61	6.37	7.43
3	4	Decatur	2.66	3.35	4.24	5.06	5.99	6.76	7.68
3	4	Havana	2.28	2.75	3.51	4.17	5.11	5.95	7.00
3	4	Lincoln	2.26	2.86	3.77	4.55	5.55	6.31	7.27
3	4	Minonk	2.25	2.77	3.48	4.08	5.08	6.14	7.39
3	4	Peoria	2.38	2.92	3.75	4.57	5.67	6.79	7.87
3	4	Rushville	2.43	2.89	3.60	4.22	5.21	6.07	7.03
3	5	Danville	2.70	3.31	4.19	4.88	5.90	6.70	7.66
3	5	Hoopeston	2.59	3.13	3.87	4.49	5.35	6.08	6.88
3	5	Pontiac	2.54	3.15	4.08	4.84	5.89	6.89	7.90
3	5	Roberts	2.43	2.98	3.70	4.36	5.58	6.73	8.25
3	5	Urbana	2.56	3.06	3.75	4.36	5.22	5.91	6.74
3	6	Carlinville	2.48	3.06	3.99	4.83	6.25	7.54	9.00
3	6	Griggsville	2.43	2.99	3.85	4.63	5.76	6.81	7.85
3	6	Hillsboro	2.49	3.02	3.86	4.70	5.94	6.96	8.28
3	6	Jacksonville	2.41	3.01	3.94	4.76	6.03	7.10	8.36
3	6	Morrisonville	2.42	3.00	4.04	4.93	6.20	7.18	8.14
3	6	Pana	2.51	3.06	3.99	4.72	5.99	7.05	8.28
3	6	Springfield	2.35	2.87	3.73	4.55	5.72	6.75	8.08
3	6	White Hall	2.45	2.98	3.97	4.85	6.01	7.00	8.21
3	7	Charleston	2.37	2.88	3.68	4.40	5.43	6.47	7.68
3	7	Effingham	2.25	2.80	3.67	4.49	5.91	7.24	8.80
3	7	Palestine	2.34	2.94	3.85	4.59	5.68	6.73	8.18
3	7	Paris	2.28	2.92	3.76	4.59	5.81	6.84	7.94
3	7	Windsor	2.51	3.10	3.94	4.65	5.98	7.22	8.71
3	8	Belleville	2.23	2.91	3.91	4.86	6.51	8.00	10.22
3	8	DuQuoin	2.35	3.02	3.95	4.79	6.07	7.29	8.62
3	8	Greenville	2.22	2.83	3.73	4.56	5.99	7.26	8.82
3	8	Sparta	2.27	2.96	3.89	4.81	6.25	7.52	8.69
3	8	St Louis	2.25	2.90	3.92	4.87	6.51	8.25	10.11
3	9	Fairfield	2.23	2.74	3.56	4.29	5.34	6.32	7.58
3	9	Flora	2.21	2.70	3.45	4.15	5.27	6.28	7.27
3	9	McLeansboro	2.25	2.77	3.56	4.23	5.37	6.39	7.56
3	9	Mt Carmel	2.25	2.75	3.52	4.20	5.14	6.07	7.18
3	9	Mt Vernon	2.30	2.79	3.54	4.27	5.36	6.32	7.47
3	9	Olney	2.20	2.74	3.45	4.10	5.25	6.29	7.37
3	10	Anna	2.48	3.12	3.96	4.69	5.54	6.26	7.00
3	10	Cairo	2.32	2.98	3.91	4.67	5.67	6.64	7.40
3	10	Carbondale	2.28	2.85	3.78	4.47	5.41	6.16	6.87
3	10	Harrisburg	2.24	2.78	3.68	4.48	5.60	6.67	8.00
3	10	New Burnside	2.36	2.90	3.87	4.55	5.57	6.37	7.39

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
4	1	Aledo	2.43	3.00	3.83	4.46	5.52	6.55	7.65
4	1	Dixon	2.38	2.91	3.73	4.41	5.58	6.74	8.02
4	1	Freeport	2.36	2.87	3.72	4.47	5.75	7.01	8.52
4	1	Galva	2.34	2.84	3.62	4.33	5.39	6.39	7.52
4	1	Moline	2.25	2.86	3.75	4.49	5.62	6.60	7.35
4	1	Morrison	2.37	2.91	3.67	4.31	5.32	6.16	7.13
4	1	Mt Carroll	2.22	2.86	3.71	4.37	5.32	6.19	7.06
4	1	Rockford	2.22	2.78	3.67	4.33	5.40	6.19	7.10
4	1	Walnut	2.35	2.91	3.75	4.38	5.37	6.19	7.11
4	2	Aurora	2.27	2.78	3.53	4.45	5.92	7.11	8.53
4	2	Chicago	2.15	2.70	3.55	4.31	5.50	6.60	7.81
4	2	DeKalb	2.32	2.80	3.59	4.37	5.34	6.45	7.59
4	2	Joliet	2.35	2.97	3.96	4.75	6.01	7.16	8.60
4	2	Kankakee	2.32	2.92	3.81	4.63	5.88	6.95	8.27
4	2	Marengo	2.15	2.61	3.23	3.80	4.86	5.69	6.97
4	2	Ottawa	2.23	2.74	3.49	4.26	5.42	6.35	7.36
4	2	Waukegan	2.04	2.47	3.18	3.82	4.83	5.67	6.75
4	3	La Harpe	2.50	3.14	4.19	5.01	6.19	7.37	9.03
4	3	Monmouth	2.34	3.01	3.96	4.81	5.95	7.05	8.30
4	3	Quincy	2.43	3.18	4.03	4.78	5.94	6.98	8.17
4	4	Bloomington	2.35	2.94	3.70	4.34	5.15	5.85	6.82
4	4	Decatur	2.38	2.99	3.80	4.49	5.40	6.07	6.92
4	4	Havana	2.10	2.53	3.22	3.83	4.70	5.47	6.43
4	4	Lincoln	2.14	2.61	3.44	4.16	5.16	5.85	6.66
4	4	Minonk	2.07	2.48	3.18	3.83	4.81	5.76	6.78
4	4	Peoria	2.18	2.66	3.44	4.19	5.32	6.25	7.27
4	4	Rushville	2.26	2.68	3.30	3.91	4.89	5.67	6.55
4	5	Danville	2.50	3.07	3.88	4.52	5.47	6.21	7.09
4	5	Hoopeston	2.32	2.81	3.47	4.03	4.80	5.46	6.17
4	5	Pontiac	2.30	2.86	3.70	4.39	5.35	6.25	7.16
4	5	Roberts	2.14	2.70	3.40	4.05	5.13	6.22	7.43
4	5	Urbana	2.32	2.82	3.49	4.05	4.78	5.51	6.29
4	6	Carlinville	2.29	2.76	3.62	4.37	5.64	6.84	8.10
4	6	Griggsville	2.20	2.70	3.48	4.19	5.21	6.16	7.10
4	6	Hillsboro	2.30	2.79	3.56	4.34	5.49	6.42	7.64
4	6	Jacksonville	2.19	2.74	3.58	4.32	5.47	6.45	7.59
4	6	Morrisonville	2.23	2.75	3.67	4.50	5.64	6.45	7.27
4	6	Pana	2.26	2.82	3.57	4.27	5.30	6.21	7.33
4	6	Springfield	2.19	2.68	3.48	4.22	5.32	6.16	7.28
4	6	White Hall	2.22	2.70	3.59	4.39	5.44	6.34	7.43
4	7	Charleston	2.17	2.65	3.38	4.04	4.98	5.94	7.05
4	7	Effingham	2.08	2.56	3.37	4.15	5.37	6.63	8.07
4	7	Palestine	2.16	2.73	3.54	4.21	5.21	6.30	7.81
4	7	Paris	2.15	2.71	3.46	4.21	5.32	6.27	7.28
4	7	Windsor	2.28	2.79	3.57	4.24	5.49	6.65	7.98
4	8	Belleville	2.08	2.72	3.66	4.55	6.10	7.49	9.57
4	8	DuQuoin	2.11	2.72	3.60	4.39	5.69	6.82	7.99
4	8	Greenville	2.08	2.65	3.50	4.27	5.61	6.80	8.26
4	8	Sparta	2.07	2.72	3.63	4.42	5.81	6.89	7.94
4	8	St Louis	2.08	2.66	3.66	4.57	6.21	7.71	9.37
4	9	Fairfield	2.08	2.56	3.32	4.00	4.98	5.89	7.07
4	9	Flora	2.08	2.55	3.25	3.91	4.96	5.92	6.85
4	9	McLeansboro	2.09	2.57	3.31	3.97	5.06	5.94	6.97
4	9	Mt Carmel	2.10	2.56	3.28	3.91	4.78	5.65	6.68
4	9	Mt Vernon	2.17	2.63	3.34	3.97	5.05	5.87	6.85
4	9	Olney	2.02	2.49	3.23	3.87	4.93	5.87	6.84
4	10	Anna	2.30	2.90	3.68	4.36	5.15	5.82	6.51
4	10	Cairo	2.17	2.78	3.65	4.36	5.29	6.20	6.91
4	10	Carbondale	2.12	2.65	3.51	4.15	5.02	5.72	6.38
4	10	Harrisburg	2.08	2.58	3.41	4.15	5.19	6.18	7.41
4	10	New Burnside	2.18	2.68	3.58	4.20	5.14	5.88	6.82

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	Aledo	2.25	2.77	3.54	4.12	5.10	6.05	7.06
5	1	Dixon	2.21	2.70	3.47	4.10	5.19	6.26	7.46
5	1	Freeport	2.17	2.64	3.42	4.11	5.29	6.44	7.84
5	1	Galva	2.18	2.64	3.36	4.02	5.00	5.93	6.98
5	1	Moline	2.06	2.58	3.40	4.12	5.12	5.99	6.73
5	1	Morrison	2.01	2.56	3.30	3.98	4.91	5.78	6.73
5	1	Mt Carroll	2.01	2.58	3.50	4.16	4.96	5.67	6.40
5	1	Rockford	2.04	2.55	3.40	4.06	4.96	5.73	6.40
5	1	Walnut	2.08	2.58	3.35	4.02	4.90	5.67	6.44
5	2	Aurora	2.11	2.68	3.46	4.31	5.68	6.93	8.23
5	2	Chicago	2.03	2.58	3.35	4.09	5.23	6.21	7.35
5	2	DeKalb	2.13	2.60	3.36	4.13	5.12	6.10	7.23
5	2	Joliet	2.21	2.75	3.59	4.41	5.68	6.88	8.10
5	2	Kankakee	2.20	2.79	3.63	4.41	5.60	6.62	7.88
5	2	Marengo	2.03	2.46	3.06	3.52	4.42	5.18	6.37
5	2	Ottawa	2.08	2.58	3.35	4.09	5.12	6.10	7.11
5	2	Waukegan	1.87	2.27	2.92	3.50	4.43	5.19	6.18
5	3	La Harpe	2.28	2.87	3.83	4.58	5.66	6.74	8.25
5	3	Monmouth	2.16	2.77	3.65	4.44	5.57	6.66	7.93
5	3	Quincy	2.29	2.99	3.80	4.50	5.60	6.57	7.69
5	4	Bloomington	2.13	2.67	3.36	3.94	4.67	5.31	6.19
5	4	Decatur	2.16	2.67	3.41	3.94	4.70	5.32	6.12
5	4	Havana	1.94	2.34	2.98	3.55	4.35	5.07	5.96
5	4	Lincoln	1.98	2.44	3.18	3.83	4.81	5.47	6.21
5	4	Minonk	1.94	2.34	3.01	3.60	4.48	5.28	6.21
5	4	Peoria	2.03	2.45	3.18	3.91	4.87	5.70	6.66
5	4	Rushville	2.10	2.46	3.05	3.57	4.35	5.02	5.85
5	5	Danville	2.27	2.78	3.52	4.10	4.96	5.63	6.43
5	5	Hoopeston	2.02	2.45	3.02	3.51	4.18	4.75	5.38
5	5	Pontiac	2.07	2.57	3.33	3.95	4.81	5.62	6.45
5	5	Roberts	1.91	2.39	3.06	3.76	4.71	5.75	6.84
5	5	Urbana	2.11	2.60	3.22	3.74	4.46	5.12	5.86
5	6	Carlinville	2.14	2.61	3.31	4.00	4.96	5.92	7.06
5	6	Griggsville	2.02	2.49	3.21	3.86	4.80	5.67	6.54
5	6	Hillsboro	2.12	2.57	3.28	4.00	5.06	5.92	7.04
5	6	Jacksonville	1.98	2.48	3.24	3.91	4.95	5.83	6.87
5	6	Morrisonville	2.07	2.54	3.41	4.05	4.90	5.66	6.34
5	6	Pana	2.03	2.57	3.19	3.80	4.62	5.39	6.34
5	6	Springfield	2.07	2.54	3.31	4.01	4.95	5.65	6.51
5	6	White Hall	2.01	2.45	3.26	3.99	4.94	5.76	6.75
5	7	Charleston	2.07	2.52	3.22	3.85	4.75	5.66	6.72
5	7	Effingham	1.93	2.39	3.14	3.89	5.00	6.04	7.39
5	7	Palestine	2.01	2.48	3.28	3.87	4.78	5.79	7.20
5	7	Paris	2.03	2.51	3.23	3.93	4.89	5.79	6.66
5	7	Windsor	2.10	2.57	3.30	3.94	4.89	5.87	7.24
5	8	Belleville	1.98	2.59	3.47	4.32	5.79	7.11	9.08
5	8	DuQuoin	1.89	2.49	3.38	4.11	5.24	6.24	7.25
5	8	Greenville	1.95	2.49	3.29	4.02	5.28	6.40	7.78
5	8	Sparta	1.84	2.41	3.29	4.09	5.19	6.24	7.25
5	8	St Louis	1.90	2.47	3.47	4.34	5.77	7.07	8.50
5	9	Fairfield	1.93	2.37	3.08	3.71	4.62	5.47	6.55
5	9	Flora	2.00	2.44	3.11	3.75	4.76	5.68	6.57
5	9	McLeansboro	1.93	2.40	3.14	3.79	4.80	5.58	6.64
5	9	Mt Carmel	1.95	2.38	3.04	3.63	4.44	5.24	6.20
5	9	Mt Vernon	1.89	2.32	3.01	3.54	4.40	5.05	5.84
5	9	Olney	1.86	2.31	3.01	3.63	4.62	5.41	6.45
5	10	Anna	2.17	2.73	3.46	4.10	4.84	5.47	6.12
5	10	Cairo	2.05	2.62	3.44	4.11	4.99	5.84	6.51
5	10	Carbondale	2.01	2.51	3.32	3.93	4.76	5.42	6.04
5	10	Harrisburg	1.97	2.44	3.23	3.93	4.92	5.85	7.02
5	10	New Burnside	2.04	2.50	3.35	3.93	4.81	5.50	6.38

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
6	1	Aledo	2.07	2.55	3.26	3.79	4.69	5.56	6.50
6	1	Dixon	2.04	2.50	3.21	3.79	4.79	5.79	6.89
6	1	Freeport	2.00	2.43	3.14	3.78	4.86	5.92	7.21
6	1	Galva	2.00	2.43	3.09	3.70	4.61	5.46	6.42
6	1	Moline	1.85	2.37	3.12	3.79	4.71	5.51	6.19
6	1	Morrison	1.85	2.36	3.04	3.66	4.52	5.31	6.19
6	1	Mt Carroll	1.85	2.37	3.22	3.83	4.56	5.21	5.89
6	1	Rockford	1.87	2.34	3.12	3.73	4.56	5.28	5.89
6	1	Walnut	1.94	2.37	3.08	3.70	4.51	5.21	5.92
6	2	Aurora	1.94	2.47	3.19	3.97	5.23	6.37	7.58
6	2	Chicago	1.87	2.37	3.09	3.76	4.81	5.71	6.76
6	2	DeKalb	1.96	2.39	3.09	3.80	4.71	5.61	6.65
6	2	Joliet	2.03	2.53	3.30	4.06	5.23	6.34	7.63
6	2	Kankakee	2.05	2.59	3.38	4.10	5.21	6.16	7.32
6	2	Marengo	1.86	2.30	2.82	3.24	4.06	4.77	5.86
6	2	Ottawa	1.91	2.37	3.09	3.76	4.71	5.61	6.54
6	2	Waukegan	1.72	2.09	2.69	3.23	4.09	4.79	5.70
6	3	La Harpe	2.10	2.65	3.53	4.22	5.21	6.21	7.60
6	3	Monmouth	1.98	2.55	3.36	4.09	5.13	6.12	7.29
6	3	Quincy	2.11	2.76	3.50	4.15	5.16	6.06	7.09
6	4	Bloomington	1.96	2.45	3.09	3.62	4.29	4.88	5.69
6	4	Decatur	1.99	2.46	3.14	3.62	4.32	4.90	5.63
6	4	Havana	1.79	2.16	2.75	3.27	4.01	4.67	5.49
6	4	Lincoln	1.82	2.25	2.93	3.53	4.41	5.03	5.71
6	4	Minonk	1.79	2.20	2.81	3.35	4.12	4.86	5.71
6	4	Peoria	1.86	2.25	2.92	3.60	4.52	5.25	6.13
6	4	Rushville	1.93	2.26	2.79	3.28	4.00	4.61	5.38
6	5	Danville	2.09	2.56	3.23	3.77	4.56	5.18	5.92
6	5	Hoopeston	1.86	2.25	2.77	3.22	3.84	4.36	4.93
6	5	Pontiac	1.91	2.37	3.07	3.64	4.43	5.18	5.94
6	5	Roberts	1.75	2.19	2.82	3.47	4.34	5.29	6.30
6	5	Urbana	1.94	2.39	2.96	3.44	4.10	4.71	5.39
6	6	Carlinville	1.97	2.41	3.04	3.68	4.57	5.45	6.49
6	6	Griggsville	1.86	2.29	2.95	3.55	4.41	5.22	6.02
6	6	Hillsboro	1.95	2.36	3.02	3.68	4.65	5.45	6.48
6	6	Jacksonville	1.82	2.28	2.98	3.60	4.56	5.37	6.32
6	6	Morrisonville	1.91	2.34	3.14	3.73	4.51	5.20	5.83
6	6	Pana	1.92	2.37	2.94	3.49	4.25	4.96	5.83
6	6	Springfield	1.91	2.34	3.04	3.69	4.56	5.19	5.98
6	6	White Hall	1.84	2.24	2.98	3.64	4.51	5.26	6.16
6	7	Charleston	1.91	2.33	2.97	3.55	4.38	5.22	6.20
6	7	Effingham	1.77	2.21	2.88	3.57	4.60	5.56	6.80
6	7	Palestine	1.86	2.28	3.02	3.56	4.40	5.33	6.62
6	7	Paris	1.86	2.31	2.98	3.62	4.50	5.33	6.12
6	7	Windsor	1.94	2.37	3.03	3.63	4.50	5.40	6.65
6	8	Belleville	1.86	2.43	3.26	4.06	5.44	6.68	8.54
6	8	DuQuoin	1.74	2.29	3.11	3.78	4.82	5.74	6.67
6	8	Greenville	1.81	2.31	3.05	3.73	4.90	5.94	7.21
6	8	Sparta	1.69	2.22	3.03	3.74	4.77	5.74	6.67
6	8	St Louis	1.75	2.27	3.19	4.00	5.31	6.50	7.81
6	9	Fairfield	1.78	2.19	2.84	3.42	4.26	5.04	6.04
6	9	Flora	1.84	2.26	2.87	3.46	4.39	5.24	6.06
6	9	McLeansboro	1.78	2.21	2.89	3.49	4.42	5.14	6.23
6	9	Mt Carmel	1.79	2.19	2.80	3.34	4.09	4.83	5.71
6	9	Mt Vernon	1.74	2.14	2.76	3.25	4.05	4.65	5.37
6	9	Olney	1.71	2.12	2.77	3.34	4.24	4.98	6.03
6	10	Anna	1.99	2.51	3.18	3.77	4.45	5.03	5.63
6	10	Cairo	1.92	2.46	3.23	3.85	4.67	5.47	6.10
6	10	Carbondale	1.84	2.30	3.05	3.61	4.37	4.98	5.55
6	10	Harrisburg	1.80	2.24	2.97	3.61	4.52	5.37	6.45
6	10	New Burnside	1.87	2.30	3.07	3.61	4.42	5.05	5.86

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
7	1	Aledo	1.95	2.41	3.08	3.58	4.43	5.26	6.14
7	1	Dixon	1.93	2.36	3.03	3.58	4.53	5.47	6.51
7	1	Freeport	1.89	2.29	2.97	3.57	4.59	5.60	6.81
7	1	Galva	1.89	2.30	2.93	3.50	4.36	5.17	6.08
7	1	Moline	1.75	2.25	2.96	3.58	4.45	5.21	5.86
7	1	Morrison	1.75	2.23	2.87	3.46	4.28	5.02	5.86
7	1	Mt Carroll	1.75	2.25	3.04	3.63	4.31	4.93	5.58
7	1	Rockford	1.77	2.22	2.96	3.53	4.31	4.99	5.58
7	1	Walnut	1.82	2.25	2.91	3.50	4.27	4.93	5.60
7	2	Aurora	1.83	2.33	3.01	3.75	4.93	6.03	7.16
7	2	Chicago	1.77	2.24	2.91	3.56	4.55	5.40	6.40
7	2	DeKalb	1.86	2.26	2.92	3.59	4.46	5.30	6.29
7	2	Joliet	1.92	2.39	3.12	3.84	4.93	5.99	7.22
7	2	Kankakee	1.89	2.39	3.11	3.78	4.80	5.68	6.75
7	2	Marengo	1.76	2.17	2.67	3.07	3.84	4.51	5.55
7	2	Ottawa	1.80	2.24	2.91	3.56	4.46	5.30	6.18
7	2	Waukegan	1.63	1.98	2.55	3.06	3.87	4.54	5.40
7	3	La Harpe	1.94	2.44	3.25	3.89	4.81	5.72	7.01
7	3	Monmouth	1.88	2.41	3.18	3.87	4.85	5.80	6.90
7	3	Quincy	1.99	2.60	3.30	3.91	4.86	5.71	6.68
7	4	Bloomington	1.86	2.32	2.92	3.43	4.07	4.62	5.39
7	4	Decatur	1.88	2.33	2.97	3.43	4.09	4.63	5.33
7	4	Havana	1.69	2.04	2.60	3.09	3.79	4.41	5.19
7	4	Lincoln	1.73	2.13	2.77	3.33	4.17	4.76	5.40
7	4	Minonk	1.69	2.07	2.65	3.16	3.90	4.59	5.40
7	4	Peoria	1.76	2.13	2.76	3.40	4.28	4.97	5.80
7	4	Rushville	1.82	2.14	2.64	3.10	3.78	4.36	5.09
7	5	Danville	1.98	2.42	3.06	3.57	4.32	4.90	5.60
7	5	Hoopeston	1.76	2.13	2.63	3.05	3.64	4.13	4.67
7	5	Pontiac	1.81	2.25	2.91	3.45	4.20	4.91	5.63
7	5	Roberts	1.66	2.07	2.66	3.27	4.11	5.00	5.95
7	5	Urbana	1.84	2.27	2.80	3.25	3.88	4.46	5.10
7	6	Carlinville	1.86	2.27	2.88	3.49	4.32	5.15	6.14
7	6	Griggsville	1.76	2.17	2.79	3.36	4.18	4.94	5.70
7	6	Hillsboro	1.85	2.24	2.86	3.49	4.41	5.16	6.15
7	6	Jacksonville	1.72	2.15	2.82	3.40	4.31	5.07	5.97
7	6	Morrisonville	1.80	2.21	2.97	3.53	4.27	4.92	5.51
7	6	Pana	1.81	2.23	2.78	3.31	4.02	4.69	5.51
7	6	Springfield	1.80	2.21	2.88	3.49	4.31	4.92	5.65
7	6	White Hall	1.74	2.11	2.81	3.44	4.26	4.97	5.82
7	7	Charleston	1.80	2.20	2.80	3.35	4.13	4.92	5.85
7	7	Effingham	1.67	2.08	2.73	3.38	4.35	5.25	6.43
7	7	Palestine	1.75	2.16	2.86	3.37	4.16	5.04	6.27
7	7	Paris	1.77	2.18	2.81	3.42	4.25	5.04	5.80
7	7	Windsor	1.82	2.24	2.87	3.43	4.25	5.11	6.29
7	8	Belleville	1.75	2.28	3.06	3.81	5.11	6.27	8.01
7	8	DuQuoin	1.64	2.17	2.94	3.58	4.56	5.43	6.31
7	8	Greenville	1.72	2.19	2.90	3.54	4.65	5.63	6.85
7	8	Sparta	1.59	2.10	2.86	3.55	4.51	5.43	6.31
7	8	St Louis	1.65	2.14	3.02	3.78	5.02	6.15	7.39
7	9	Fairfield	1.69	2.07	2.69	3.24	4.04	4.77	5.72
7	9	Flora	1.75	2.14	2.72	3.28	4.16	4.97	5.75
7	9	McLeansboro	1.68	2.09	2.73	3.30	4.18	4.85	5.89
7	9	Mt Carmel	1.70	2.07	2.65	3.16	3.87	4.57	5.40
7	9	Mt Vernon	1.65	2.02	2.62	3.08	3.82	4.40	5.08
7	9	Olney	1.61	2.01	2.62	3.16	4.02	4.71	5.70
7	10	Anna	1.89	2.38	3.01	3.57	4.21	4.77	5.33
7	10	Cairo	1.81	2.32	3.04	3.63	4.40	5.16	5.75
7	10	Carbondale	1.75	2.18	2.89	3.42	4.14	4.72	5.26
7	10	Harrisburg	1.71	2.12	2.81	3.42	4.28	5.09	6.11
7	10	New Burnside	1.78	2.18	2.91	3.42	4.19	4.79	5.55

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
8	1	Aledo	1.68	2.08	2.65	3.09	3.83	4.54	5.30
8	1	Dixon	1.66	2.04	2.62	3.09	3.91	4.72	5.62
8	1	Freeport	1.63	1.98	2.56	3.08	3.96	4.83	5.87
8	1	Galva	1.64	1.98	2.53	3.02	3.76	4.46	5.24
8	1	Moline	1.50	1.93	2.55	3.09	3.84	4.49	5.05
8	1	Morrison	1.50	1.93	2.48	2.98	3.69	4.33	5.05
8	1	Mt Carroll	1.50	1.93	2.62	3.12	3.72	4.25	4.80
8	1	Rockford	1.52	1.91	2.55	3.04	3.72	4.30	4.80
8	1	Walnut	1.58	1.93	2.51	3.02	3.68	4.25	4.83
8	2	Aurora	1.58	2.01	2.60	3.23	4.26	5.19	6.17
8	2	Chicago	1.53	1.94	2.52	3.07	3.92	4.66	5.52
8	2	DeKalb	1.60	1.95	2.53	3.09	3.84	4.57	5.43
8	2	Joliet	1.66	2.06	2.69	3.31	4.26	5.16	6.22
8	2	Kankakee	1.72	2.17	2.82	3.43	4.36	5.15	6.13
8	2	Marengo	1.52	1.86	2.30	2.64	3.31	3.89	4.78
8	2	Ottawa	1.56	1.94	2.52	3.07	3.84	4.57	5.33
8	2	Waukegan	1.41	1.72	2.21	2.65	3.35	3.93	4.68
8	3	La Harpe	1.72	2.17	2.89	3.46	4.27	5.09	6.23
8	3	Monmouth	1.62	2.07	2.74	3.33	4.18	4.99	5.95
8	3	Quincy	1.72	2.25	2.85	3.38	4.20	4.93	5.78
8	4	Bloomington	1.60	2.00	2.51	2.95	3.50	3.98	4.63
8	4	Decatur	1.62	2.00	2.56	2.95	3.52	4.00	4.59
8	4	Havana	1.46	1.76	2.24	2.66	3.26	3.80	4.47
8	4	Lincoln	1.51	1.85	2.39	2.87	3.60	4.10	4.66
8	4	Minonk	1.46	1.79	2.28	2.71	3.37	3.96	4.66
8	4	Peoria	1.52	1.84	2.39	2.93	3.69	4.28	4.99
8	4	Rushville	1.57	1.85	2.28	2.68	3.26	3.77	4.39
8	5	Danville	1.71	2.09	2.64	3.08	3.73	4.23	4.83
8	5	Hoopeston	1.52	1.83	2.26	2.63	3.14	3.56	4.03
8	5	Pontiac	1.56	1.94	2.51	2.98	3.63	4.24	4.86
8	5	Roberts	1.43	1.79	2.30	2.84	3.54	4.31	5.14
8	5	Urbana	1.58	1.96	2.42	2.80	3.35	3.84	4.39
8	6	Carlinville	1.61	1.96	2.49	3.00	3.72	4.45	5.30
8	6	Griggsville	1.51	1.87	2.40	2.89	3.59	4.25	4.90
8	6	Hillsboro	1.59	1.93	2.46	3.00	3.79	4.44	5.28
8	6	Jacksonville	1.48	1.86	2.43	2.93	3.71	4.37	5.15
8	6	Morrisonville	1.56	1.91	2.56	3.04	3.68	4.25	4.75
8	6	Pana	1.54	1.92	2.39	2.85	3.47	4.05	4.75
8	6	Springfield	1.56	1.91	2.49	3.01	3.72	4.25	4.89
8	6	White Hall	1.49	1.82	2.42	2.96	3.67	4.27	5.01
8	7	Charleston	1.56	1.90	2.43	2.90	3.58	4.26	5.06
8	7	Effingham	1.45	1.80	2.35	2.90	3.75	4.53	5.55
8	7	Palestine	1.51	1.86	2.46	2.90	3.59	4.34	5.40
8	7	Paris	1.52	1.89	2.42	2.95	3.67	4.34	4.99
8	7	Windsor	1.58	1.94	2.47	2.96	3.67	4.42	5.41
8	8	Belleville	1.53	1.99	2.68	3.33	4.46	5.48	7.00
8	8	DuQuoin	1.42	1.87	2.53	3.09	3.93	4.68	5.43
8	8	Greenville	1.48	1.88	2.49	3.04	3.99	4.84	5.88
8	8	Sparta	1.38	1.81	2.47	3.04	3.89	4.68	5.43
8	8	St Louis	1.42	1.85	2.60	3.28	4.33	5.30	6.37
8	9	Fairfield	1.46	1.79	2.32	2.80	3.49	4.13	4.95
8	9	Flora	1.51	1.85	2.36	2.84	3.61	4.30	4.97
8	9	McLeansboro	1.45	1.81	2.36	2.84	3.60	4.19	5.08
8	9	Mt Carmel	1.47	1.79	2.29	2.73	3.34	3.94	4.67
8	9	Mt Vernon	1.42	1.75	2.25	2.65	3.30	3.79	4.38
8	9	Olney	1.39	1.73	2.26	2.73	3.47	4.06	4.91
8	10	Anna	1.62	2.05	2.59	3.07	3.62	4.10	4.58
8	10	Cairo	1.56	2.00	2.62	3.13	3.80	4.45	4.96
8	10	Carbondale	1.51	1.88	2.49	2.95	3.57	4.07	4.54
8	10	Harrisburg	1.48	1.83	2.43	2.95	3.69	4.39	5.27
8	10	New Burnside	1.53	1.88	2.51	2.95	3.61	4.13	4.79

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	Aledo	1.44	1.78	2.27	2.64	3.27	3.88	4.53
9	1	Dixon	1.42	1.74	2.24	2.64	3.34	4.03	4.80
9	1	Freeport	1.39	1.69	2.19	2.63	3.38	4.12	5.01
9	1	Galva	1.39	1.69	2.15	2.57	3.20	3.79	4.46
9	1	Moline	1.29	1.65	2.18	2.64	3.28	3.83	4.31
9	1	Morrison	1.29	1.64	2.12	2.54	3.14	3.69	4.31
9	1	Mt Carroll	1.29	1.65	2.24	2.67	3.18	3.63	4.09
9	1	Rockford	1.30	1.63	2.18	2.60	3.18	3.67	4.09
9	1	Walnut	1.34	1.65	2.14	2.57	3.14	3.63	4.12
9	2	Aurora	1.35	1.72	2.22	2.76	3.64	4.44	5.27
9	2	Chicago	1.30	1.65	2.15	2.61	3.35	3.97	4.70
9	2	DeKalb	1.36	1.66	2.15	2.65	3.28	3.90	4.63
9	2	Joliet	1.41	1.76	2.30	2.82	3.64	4.41	5.31
9	2	Kankakee	1.46	1.84	2.40	2.92	3.71	4.39	5.21
9	2	Marengo	1.29	1.58	1.96	2.26	2.83	3.32	4.08
9	2	Ottawa	1.33	1.65	2.15	2.61	3.28	3.90	4.55
9	2	Waukegan	1.20	1.46	1.88	2.25	2.85	3.34	3.97
9	3	La Harpe	1.48	1.86	2.48	2.97	3.67	4.37	5.35
9	3	Monmouth	1.38	1.77	2.34	2.84	3.57	4.26	5.08
9	3	Quincy	1.46	1.91	2.42	2.87	3.57	4.19	4.91
9	4	Bloomington	1.37	1.71	2.15	2.52	2.99	3.40	3.96
9	4	Decatur	1.39	1.71	2.18	2.52	3.01	3.41	3.91
9	4	Havana	1.25	1.51	1.92	2.28	2.80	3.26	3.83
9	4	Lincoln	1.27	1.57	2.05	2.46	3.07	3.50	3.98
9	4	Minonk	1.25	1.53	1.95	2.30	2.86	3.38	3.98
9	4	Peoria	1.30	1.57	2.04	2.50	3.15	3.66	4.27
9	4	Rushville	1.37	1.61	1.94	2.29	2.78	3.21	3.74
9	5	Danville	1.46	1.79	2.26	2.63	3.18	3.61	4.13
9	5	Hoopeston	1.29	1.56	1.93	2.24	2.67	3.03	3.43
9	5	Pontiac	1.34	1.66	2.15	2.55	3.10	3.63	4.16
9	5	Roberts	1.22	1.53	1.96	2.41	3.04	3.68	4.38
9	5	Urbana	1.34	1.66	2.06	2.39	2.85	3.28	3.74
9	6	Carlinville	1.37	1.68	2.12	2.56	3.17	3.79	4.51
9	6	Griggsville	1.29	1.59	2.05	2.47	3.07	3.63	4.19
9	6	Hillsboro	1.36	1.64	2.10	2.56	3.24	3.79	4.51
9	6	Jacksonville	1.26	1.58	2.07	2.50	3.17	3.73	4.39
9	6	Morrisonville	1.33	1.63	2.18	2.59	3.14	3.62	4.06
9	6	Pana	1.33	1.64	2.04	2.43	2.96	3.45	4.06
9	6	Springfield	1.33	1.63	2.12	2.57	3.17	3.62	4.16
9	6	White Hall	1.27	1.55	2.06	2.52	3.12	3.64	4.27
9	7	Charleston	1.32	1.61	2.06	2.46	3.04	3.62	4.30
9	7	Effingham	1.23	1.53	2.01	2.47	3.19	3.87	4.73
9	7	Palestine	1.29	1.58	2.10	2.48	3.06	3.70	4.61
9	7	Paris	1.30	1.61	2.07	2.52	3.13	3.70	4.26
9	7	Windsor	1.34	1.65	2.11	2.53	3.13	3.80	4.61
9	8	Belleville	1.30	1.70	2.28	2.84	3.81	4.68	5.97
9	8	DuQuoin	1.21	1.59	2.16	2.69	3.36	3.99	4.64
9	8	Greenville	1.26	1.61	2.13	2.60	3.41	4.14	5.03
9	8	Sparta	1.17	1.54	2.11	2.60	3.32	3.99	4.64
9	8	St Louis	1.21	1.58	2.22	2.81	3.69	4.52	5.43
9	9	Fairfield	1.25	1.53	1.99	2.40	2.99	3.54	4.24
9	9	Flora	1.29	1.58	2.02	2.43	3.09	3.68	4.26
9	9	McLeansboro	1.24	1.55	2.01	2.43	3.08	3.58	4.33
9	9	Mt Carmel	1.25	1.52	1.94	2.32	2.84	3.35	3.96
9	9	Mt Vernon	1.21	1.49	1.93	2.27	2.82	3.23	3.74
9	9	Olney	1.19	1.48	1.92	2.32	2.96	3.46	4.19
9	10	Anna	1.38	1.75	2.21	2.62	3.09	3.50	3.91
9	10	Cairo	1.33	1.71	2.25	2.68	3.25	3.81	4.25
9	10	Carbondale	1.28	1.60	2.12	2.51	3.04	3.46	3.86
9	10	Harrisburg	1.25	1.56	2.06	2.51	3.14	3.74	4.48
9	10	New Burnside	1.30	1.60	2.14	2.51	3.07	3.51	4.08

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
10	1	Aledo	1.32	1.64	2.09	2.43	3.01	3.57	4.17
10	1	Dixon	1.31	1.60	2.06	2.43	3.07	3.71	4.42
10	1	Freeport	1.28	1.56	2.02	2.43	3.13	3.81	4.63
10	1	Galva	1.29	1.56	1.99	2.38	2.96	3.51	4.13
10	1	Moline	1.19	1.52	2.00	2.43	3.02	3.53	3.97
10	1	Morrison	1.19	1.51	1.95	2.35	2.90	3.41	3.97
10	1	Mt Carroll	1.19	1.52	2.06	2.46	2.92	3.35	3.78
10	1	Rockford	1.20	1.50	2.00	2.39	2.92	3.39	3.78
10	1	Walnut	1.24	1.52	1.98	2.38	2.90	3.35	3.80
10	2	Aurora	1.25	1.58	2.04	2.55	3.35	4.09	4.86
10	2	Chicago	1.20	1.52	1.98	2.41	3.08	3.67	4.33
10	2	DeKalb	1.26	1.53	1.98	2.44	3.03	3.60	4.26
10	2	Joliet	1.30	1.63	2.12	2.60	3.35	4.06	4.90
10	2	Kankakee	1.35	1.70	2.21	2.69	3.42	4.04	4.80
10	2	Marengo	1.20	1.46	1.80	2.07	2.60	3.06	3.75
10	2	Ottawa	1.22	1.52	1.98	2.41	3.03	3.60	4.19
10	2	Waukegan	1.11	1.34	1.73	2.07	2.62	3.07	3.66
10	3	La Harpe	1.36	1.71	2.27	2.72	3.36	4.00	4.90
10	3	Monmouth	1.27	1.64	2.16	2.62	3.29	3.93	4.67
10	3	Quincy	1.35	1.76	2.24	2.65	3.30	3.87	4.53
10	4	Bloomington	1.26	1.57	1.98	2.32	2.75	3.13	3.64
10	4	Decatur	1.28	1.57	2.02	2.32	2.78	3.14	3.61
10	4	Havana	1.15	1.39	1.77	2.10	2.58	3.00	3.53
10	4	Lincoln	1.17	1.45	1.89	2.26	2.83	3.23	3.66
10	4	Minonk	1.15	1.41	1.80	2.12	2.66	3.12	3.66
10	4	Peoria	1.19	1.44	1.88	2.30	2.90	3.37	3.93
10	4	Rushville	1.24	1.48	1.80	2.11	2.57	2.96	3.45
10	5	Danville	1.34	1.64	2.08	2.42	2.93	3.32	3.80
10	5	Hoopeston	1.19	1.44	1.77	2.06	2.46	2.79	3.16
10	5	Pontiac	1.23	1.53	1.98	2.35	2.86	3.35	3.83
10	5	Roberts	1.12	1.41	1.81	2.22	2.77	3.39	4.04
10	5	Urbana	1.25	1.54	1.90	2.21	2.63	3.03	3.46
10	6	Carlinville	1.26	1.54	1.95	2.36	2.92	3.50	4.16
10	6	Griggsville	1.19	1.47	1.89	2.28	2.83	3.35	3.87
10	6	Hillsboro	1.25	1.52	1.94	2.36	2.98	3.49	4.16
10	6	Jacksonville	1.16	1.46	1.90	2.30	2.91	3.43	4.04
10	6	Morrisonville	1.22	1.50	2.02	2.39	2.89	3.33	3.74
10	6	Pana	1.23	1.51	1.88	2.24	2.73	3.18	3.74
10	6	Springfield	1.22	1.50	1.95	2.36	2.92	3.34	3.83
10	6	White Hall	1.17	1.43	1.90	2.32	2.87	3.35	3.93
10	7	Charleston	1.22	1.49	1.90	2.27	2.80	3.34	3.96
10	7	Effingham	1.14	1.41	1.85	2.29	2.95	3.56	4.36
10	7	Palestine	1.19	1.46	1.94	2.29	2.82	3.41	4.24
10	7	Paris	1.20	1.48	1.90	2.32	2.88	3.41	3.93
10	7	Windsor	1.24	1.52	1.95	2.32	2.88	3.51	4.24
10	8	Belleville	1.20	1.57	2.11	2.62	3.51	4.31	5.51
10	8	DuQuoin	1.12	1.47	1.99	2.40	3.09	3.68	4.27
10	8	Greenville	1.16	1.48	1.96	2.39	3.14	3.80	4.62
10	8	Sparta	1.08	1.42	1.94	2.38	3.06	3.68	4.27
10	8	St Louis	1.12	1.46	2.05	2.60	3.40	4.17	5.01
10	9	Fairfield	1.16	1.42	1.84	2.22	2.77	3.27	3.92
10	9	Flora	1.19	1.46	1.86	2.24	2.84	3.39	3.92
10	9	McLeansboro	1.14	1.44	1.86	2.24	2.84	3.30	4.00
10	9	Mt Carmel	1.15	1.40	1.79	2.14	2.62	3.09	3.66
10	9	Mt Vernon	1.12	1.37	1.77	2.09	2.59	2.98	3.44
10	9	Olney	1.09	1.36	1.78	2.14	2.72	3.19	3.86
10	10	Anna	1.28	1.61	2.04	2.42	2.86	3.23	3.61
10	10	Cairo	1.22	1.57	2.06	2.46	2.98	3.50	3.90
10	10	Carbondale	1.18	1.48	1.96	2.32	2.81	3.20	3.57
10	10	Harrisburg	1.16	1.44	1.91	2.32	2.90	3.45	4.14
10	10	New Burnside	1.20	1.48	1.98	2.32	2.84	3.25	3.77

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
11	1	Aledo	1.06	1.31	1.67	1.94	2.40	2.85	3.33
11	1	Dixon	1.05	1.28	1.64	1.94	2.45	2.96	3.53
11	1	Freeport	1.02	1.24	1.60	1.93	2.48	3.03	3.68
11	1	Galva	1.02	1.24	1.58	1.89	2.35	2.79	3.28
11	1	Moline	0.94	1.21	1.60	1.94	2.40	2.81	3.16
11	1	Morrison	0.94	1.20	1.55	1.87	2.31	2.71	3.16
11	1	Mt Carroll	0.94	1.21	1.64	1.95	2.33	2.67	3.01
11	1	Rockford	0.96	1.20	1.60	1.91	2.33	2.69	3.01
11	1	Walnut	0.99	1.21	1.57	1.89	2.30	2.67	3.03
11	2	Aurora	0.99	1.26	1.63	2.03	2.67	3.25	3.87
11	2	Chicago	0.95	1.21	1.58	1.92	2.45	2.92	3.46
11	2	DeKalb	1.00	1.22	1.58	1.94	2.41	2.86	3.40
11	2	Joliet	1.04	1.29	1.69	2.07	2.67	3.24	3.90
11	2	Kankakee	1.08	1.36	1.77	2.15	2.73	3.23	3.84
11	2	Marengo	0.95	1.16	1.44	1.66	2.08	2.44	3.00
11	2	Ottawa	0.97	1.21	1.58	1.92	2.41	2.86	3.34
11	2	Waukegan	0.89	1.08	1.38	1.66	2.10	2.46	2.93
11	3	La Harpe	1.08	1.36	1.81	2.17	2.68	3.19	3.91
11	3	Monmouth	1.02	1.30	1.72	2.08	2.62	3.13	3.72
11	3	Quincy	1.07	1.40	1.78	2.11	2.62	3.08	3.61
11	4	Bloomington	1.00	1.25	1.58	1.85	2.19	2.49	2.91
11	4	Decatur	1.01	1.25	1.60	1.85	2.21	2.50	2.88
11	4	Havana	0.91	1.10	1.40	1.67	2.05	2.38	2.80
11	4	Lincoln	0.95	1.16	1.51	1.80	2.25	2.57	2.92
11	4	Minonk	0.92	1.12	1.44	1.70	2.11	2.48	2.92
11	4	Peoria	0.95	1.16	1.50	1.84	2.31	2.69	3.13
11	4	Rushville	0.99	1.16	1.42	1.67	2.04	2.36	2.75
11	5	Danville	1.07	1.31	1.66	1.93	2.33	2.65	3.03
11	5	Hoopeston	0.95	1.15	1.42	1.65	1.97	2.23	2.53
11	5	Pontiac	0.98	1.22	1.58	1.87	2.28	2.66	3.05
11	5	Roberts	0.90	1.12	1.44	1.74	2.16	2.71	3.22
11	5	Urbana	0.99	1.23	1.51	1.75	2.10	2.41	2.76
11	6	Carlinville	1.01	1.23	1.55	1.88	2.33	2.78	3.32
11	6	Griggsville	0.95	1.17	1.50	1.81	2.25	2.66	3.07
11	6	Hillsboro	1.00	1.21	1.54	1.88	2.38	2.78	3.31
11	6	Jacksonville	0.93	1.17	1.52	1.84	2.33	2.75	3.23
11	6	Morrisonville	0.98	1.20	1.60	1.90	2.30	2.66	2.97
11	6	Pana	0.98	1.21	1.50	1.78	2.17	2.53	2.97
11	6	Springfield	0.98	1.20	1.55	1.89	2.33	2.66	3.04
11	6	White Hall	0.93	1.13	1.50	1.84	2.28	2.66	3.11
11	7	Charleston	0.97	1.19	1.51	1.81	2.23	2.66	3.16
11	7	Effingham	0.91	1.12	1.47	1.81	2.35	2.84	3.48
11	7	Palestine	0.95	1.16	1.54	1.82	2.25	2.73	3.39
11	7	Paris	0.96	1.18	1.52	1.85	2.29	2.73	3.13
11	7	Windsor	0.99	1.21	1.55	1.86	2.29	2.78	3.44
11	8	Belleville	0.96	1.25	1.68	2.09	2.80	3.44	4.39
11	8	DuQuoin	0.89	1.17	1.59	1.91	2.47	2.93	3.41
11	8	Greenville	0.93	1.18	1.56	1.91	2.51	3.04	3.69
11	8	Sparta	0.86	1.13	1.54	1.90	2.44	2.93	3.41
11	8	St Louis	0.89	1.16	1.63	2.09	2.71	3.32	3.99
11	9	Fairfield	0.93	1.14	1.49	1.79	2.23	2.64	3.16
11	9	Flora	0.96	1.18	1.50	1.81	2.30	2.74	3.17
11	9	McLeansboro	0.91	1.15	1.48	1.79	2.26	2.62	3.18
11	9	Mt Carmel	0.92	1.12	1.43	1.71	2.09	2.47	2.92
11	9	Mt Vernon	0.89	1.10	1.42	1.67	2.07	2.38	2.75
11	9	Olney	0.87	1.09	1.42	1.71	2.17	2.54	3.08
11	10	Anna	1.01	1.28	1.62	1.92	2.27	2.56	2.87
11	10	Cairo	0.98	1.25	1.64	1.96	2.38	2.79	3.11
11	10	Carbondale	0.94	1.18	1.56	1.85	2.24	2.55	2.84
11	10	Harrisburg	0.93	1.15	1.52	1.85	2.31	2.75	3.31
11	10	New Burnside	0.96	1.18	1.57	1.85	2.26	2.59	3.00

Summer rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
12	1	Aledo	0.83	1.02	1.31	1.52	1.88	2.23	2.61
12	1	Dixon	0.82	1.00	1.29	1.52	1.92	2.32	2.76
12	1	Freeport	0.80	0.98	1.26	1.52	1.96	2.38	2.90
12	1	Galva	0.81	0.98	1.25	1.49	1.85	2.20	2.59
12	1	Moline	0.74	0.95	1.26	1.52	1.90	2.21	2.49
12	1	Morrison	0.74	0.95	1.22	1.47	1.82	2.14	2.49
12	1	Mt Carroll	0.74	0.95	1.30	1.54	1.84	2.10	2.37
12	1	Rockford	0.75	0.95	1.26	1.50	1.84	2.12	2.37
12	1	Walnut	0.77	0.95	1.24	1.49	1.82	2.10	2.38
12	2	Aurora	0.78	0.99	1.28	1.59	2.10	2.56	3.05
12	2	Chicago	0.76	0.95	1.24	1.51	1.94	2.29	2.72
12	2	DeKalb	0.79	0.96	1.24	1.53	1.90	2.26	2.68
12	2	Joliet	0.81	1.01	1.33	1.63	2.10	2.54	3.07
12	2	Kankakee	0.85	1.07	1.39	1.69	2.15	2.54	3.02
12	2	Marengo	0.75	0.90	1.14	1.30	1.64	1.92	2.35
12	2	Ottawa	0.77	0.95	1.24	1.51	1.90	2.26	2.63
12	2	Waukegan	0.70	0.85	1.10	1.32	1.67	1.96	2.33
12	3	La Harpe	0.85	1.07	1.43	1.71	2.11	2.52	3.08
12	3	Monmouth	0.80	1.02	1.36	1.65	2.06	2.47	2.93
12	3	Quincy	0.86	1.12	1.42	1.68	2.09	2.45	2.87
12	4	Bloomington	0.79	0.98	1.24	1.45	1.72	1.95	2.28
12	4	Decatur	0.80	0.99	1.26	1.45	1.74	1.97	2.27
12	4	Havana	0.72	0.87	1.11	1.32	1.62	1.88	2.22
12	4	Lincoln	0.76	0.93	1.19	1.42	1.77	2.02	2.29
12	4	Minonk	0.72	0.89	1.13	1.34	1.67	1.95	2.29
12	4	Peoria	0.75	0.91	1.18	1.45	1.82	2.11	2.47
12	4	Rushville	0.78	0.91	1.13	1.32	1.61	1.86	2.16
12	5	Danville	0.84	1.03	1.30	1.52	1.84	2.09	2.39
12	5	Hoopeston	0.75	0.91	1.12	1.30	1.55	1.76	1.99
12	5	Pontiac	0.77	0.96	1.24	1.47	1.79	2.09	2.40
12	5	Roberts	0.71	0.88	1.13	1.37	1.72	2.12	2.53
12	5	Urbana	0.78	0.97	1.19	1.38	1.65	1.90	2.17
12	6	Carlinville	0.80	0.97	1.23	1.48	1.83	2.19	2.61
12	6	Griggsville	0.75	0.92	1.19	1.43	1.78	2.10	2.42
12	6	Hillsboro	0.78	0.95	1.21	1.48	1.87	2.19	2.61
12	6	Jacksonville	0.73	0.92	1.20	1.45	1.84	2.16	2.55
12	6	Morrisonville	0.77	0.94	1.26	1.50	1.81	2.09	2.34
12	6	Pana	0.77	0.95	1.18	1.40	1.71	1.99	2.34
12	6	Springfield	0.77	0.94	1.23	1.49	1.83	2.09	2.37
12	6	White Hall	0.73	0.89	1.19	1.45	1.80	2.09	2.45
12	7	Charleston	0.77	0.94	1.20	1.43	1.76	2.10	2.50
12	7	Effingham	0.71	0.89	1.16	1.42	1.85	2.24	2.74
12	7	Palestine	0.74	0.92	1.22	1.43	1.77	2.14	2.67
12	7	Paris	0.75	0.93	1.20	1.45	1.81	2.14	2.47
12	7	Windsor	0.77	0.95	1.22	1.46	1.81	2.21	2.69
12	8	Belleville	0.75	0.98	1.32	1.64	2.20	2.70	3.45
12	8	DuQuoin	0.70	0.92	1.25	1.51	1.94	2.31	2.68
12	8	Greenville	0.73	0.94	1.24	1.51	1.98	2.40	2.92
12	8	Sparta	0.68	0.89	1.21	1.51	1.92	2.31	2.68
12	8	St Louis	0.70	0.92	1.29	1.66	2.14	2.61	3.14
12	9	Fairfield	0.74	0.91	1.18	1.42	1.77	2.09	2.51
12	9	Flora	0.75	0.92	1.17	1.41	1.79	2.13	2.47
12	9	McLeansboro	0.71	0.91	1.16	1.41	1.77	2.07	2.50
12	9	Mt Carmel	0.72	0.88	1.12	1.34	1.64	1.94	2.29
12	9	Mt Vernon	0.70	0.86	1.12	1.31	1.63	1.87	2.16
12	9	Olney	0.68	0.85	1.12	1.34	1.71	2.00	2.43
12	10	Anna	0.80	1.01	1.28	1.52	1.79	2.03	2.27
12	10	Cairo	0.77	0.99	1.30	1.55	1.88	2.20	2.46
12	10	Carbondale	0.75	0.93	1.23	1.46	1.77	2.01	2.25
12	10	Harrisburg	0.73	0.91	1.20	1.46	1.83	2.17	2.61
12	10	New Burnside	0.76	0.93	1.24	1.46	1.79	2.04	2.37

Appendix D. Point Frequency Distributions at 61 Stations for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Fall

Storm codes

1 – 10 days	7 – 12 hours
2 – 5 days	8 – 6 hours
3 – 72 hours	9 – 3 hours
4 – 48 hours	10 – 2 hours
5 – 24 hours	11 – 1 hour
6 – 18 hours	12 – 30 minutes

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1	1	Aledo	2.81	3.53	4.61	5.56	6.69	7.69	9.03
1	1	Dixon	2.60	3.31	4.40	5.41	6.80	7.96	9.63
1	1	Freeport	2.74	3.47	4.56	5.55	7.01	8.42	10.28
1	1	Galva	2.72	3.40	4.56	5.54	6.80	7.65	8.80
1	1	Moline	2.76	3.52	4.72	5.69	6.84	7.94	9.16
1	1	Morrison	2.75	3.40	4.54	5.50	6.80	7.99	9.68
1	1	Mt Carroll	2.81	3.47	4.63	5.60	6.76	7.71	8.90
1	1	Rockford	2.78	3.47	4.66	5.65	6.80	7.67	8.72
1	1	Walnut	2.78	3.43	4.56	5.59	6.84	7.70	8.81
1	2	Aurora	2.52	3.24	4.54	5.75	7.46	8.94	10.21
1	2	Chicago	2.33	2.96	3.95	4.87	6.21	7.51	8.97
1	2	DeKalb	2.68	3.39	4.47	5.36	6.55	7.54	8.73
1	2	Joliet	2.58	3.29	4.51	5.55	7.06	8.33	9.56
1	2	Kankakee	2.47	3.13	4.29	5.24	6.69	8.15	9.80
1	2	Marengo	2.42	3.06	4.05	4.87	5.92	6.90	8.12
1	2	Ottawa	2.52	3.19	4.25	5.19	6.55	7.75	8.85
1	2	Waukegan	2.46	3.11	4.13	5.02	6.22	7.14	7.91
1	3	La Harpe	2.92	3.73	5.04	6.31	8.07	9.68	11.94
1	3	Monmouth	2.69	3.46	4.69	5.94	7.85	9.45	10.82
1	3	Quincy	2.82	3.56	4.78	5.93	7.63	9.03	10.34
1	4	Bloomington	2.75	3.53	4.75	5.75	7.29	8.45	9.60
1	4	Decatur	2.83	3.68	5.00	6.19	7.73	8.73	9.96
1	4	Havana	2.57	3.23	4.35	5.36	6.84	8.01	9.40
1	4	Lincoln	2.63	3.33	4.53	5.52	6.95	7.96	9.41
1	4	Minonk	2.59	3.20	4.29	5.20	6.45	7.83	9.66
1	4	Peoria	2.67	3.33	4.45	5.46	7.01	8.23	9.69
1	4	Rushville	2.87	3.50	4.50	5.52	7.00	8.13	9.28
1	5	Danville	2.75	3.44	4.65	5.70	7.01	8.07	8.93
1	5	Hoopeston	2.86	3.44	4.45	5.48	6.96	8.16	9.48
1	5	Pontiac	2.58	3.24	4.41	5.49	6.89	8.07	9.38
1	5	Roberts	2.60	3.11	4.18	5.15	6.48	7.80	9.76
1	5	Urbana	2.68	3.28	4.31	5.23	6.36	7.16	8.06
1	6	Carlinville	2.95	3.60	4.83	5.90	7.56	9.02	10.77
1	6	Griggsville	2.82	3.58	4.91	6.02	7.60	8.67	10.01
1	6	Hillsboro	2.95	3.56	4.80	5.83	7.34	8.54	10.11
1	6	Jacksonville	2.87	3.57	4.79	5.84	7.39	8.89	10.21
1	6	Morrisonville	2.82	3.50	4.69	5.63	7.17	8.35	9.34
1	6	Pana	3.02	3.73	4.87	5.83	7.25	8.45	9.85
1	6	Springfield	2.75	3.37	4.53	5.55	7.25	8.62	9.78
1	6	White Hall	2.85	3.53	4.83	5.90	7.41	8.49	9.37
1	7	Charleston	2.93	3.53	4.51	5.37	6.71	7.62	8.59
1	7	Effingham	2.83	3.59	4.72	5.77	7.15	8.22	9.58
1	7	Palestine	3.00	3.62	4.47	5.36	6.61	7.55	8.82
1	7	Paris	2.88	3.58	4.65	5.67	7.17	8.30	9.37
1	7	Windsor	2.98	3.59	4.69	5.78	7.35	8.55	9.94
1	8	Belleville	3.02	3.60	4.55	5.47	6.85	8.39	10.60
1	8	DuQuoin	3.23	4.01	4.97	5.75	6.83	7.82	8.72
1	8	Greenville	2.94	3.61	4.50	5.20	6.44	7.58	8.89
1	8	Sparta	3.20	3.88	4.80	5.61	6.93	8.16	9.48
1	8	St Louis	2.99	3.64	4.64	5.56	6.88	8.47	10.34
1	9	Fairfield	2.95	3.65	4.82	5.88	7.33	8.65	10.23
1	9	Flora	2.92	3.59	4.69	5.62	7.09	8.48	10.06
1	9	McLeansboro	3.04	3.72	4.86	5.88	7.25	8.57	10.06
1	9	Mt Carmel	3.04	3.77	5.03	6.05	7.71	8.86	10.15
1	9	Mt Vernon	3.02	3.72	4.88	5.88	7.28	8.61	10.06
1	9	Olney	3.02	3.65	4.69	5.58	6.82	8.08	9.58
1	10	Anna	3.30	4.12	5.25	6.14	7.68	9.02	10.44
1	10	Cairo	3.07	3.88	5.12	6.04	7.75	9.43	10.88
1	10	Carbondale	2.98	3.84	5.05	5.96	7.45	8.69	9.83
1	10	Harrisburg	2.98	3.73	5.02	6.27	8.53	10.17	12.24
1	10	New Burnside	3.19	4.04	5.25	6.22	7.90	9.43	11.01

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
2	1	Aledo	2.26	2.82	3.73	4.49	5.67	6.75	7.90
2	1	Dixon	2.26	2.83	3.76	4.55	5.83	7.03	8.47
2	1	Freeport	2.21	2.76	3.72	4.50	5.89	7.29	9.11
2	1	Galva	2.21	2.76	3.61	4.37	5.54	6.64	7.84
2	1	Moline	2.30	2.90	3.76	4.60	5.77	6.89	8.16
2	1	Morrison	2.23	2.77	3.66	4.41	5.62	6.77	8.16
2	1	Mt Carroll	2.28	2.83	3.67	4.42	5.57	6.65	7.92
2	1	Rockford	2.21	2.76	3.70	4.45	5.63	6.72	7.71
2	1	Walnut	2.26	2.84	3.69	4.45	5.62	6.64	7.78
2	2	Aurora	2.08	2.65	3.58	4.41	5.99	7.39	8.84
2	2	Chicago	2.04	2.58	3.45	4.26	5.51	6.66	7.78
2	2	DeKalb	2.24	2.74	3.56	4.26	5.38	6.45	7.55
2	2	Joliet	2.19	2.77	3.83	4.77	6.14	7.19	8.42
2	2	Kankakee	2.11	2.68	3.56	4.41	5.80	6.95	8.25
2	2	Marengo	2.05	2.51	3.29	4.01	5.01	6.02	7.04
2	2	Ottawa	2.23	2.73	3.59	4.42	5.67	6.66	7.75
2	2	Waukegan	2.02	2.49	3.23	3.91	5.02	5.90	6.76
2	3	La Harpe	2.42	3.04	4.11	5.14	6.72	8.16	10.02
2	3	Monmouth	2.27	2.90	3.97	4.89	6.37	7.61	9.03
2	3	Quincy	2.32	2.89	3.88	4.76	6.06	7.21	8.51
2	4	Bloomington	2.38	2.96	3.85	4.58	5.76	6.73	7.89
2	4	Decatur	2.49	3.11	4.08	4.97	6.12	7.11	8.17
2	4	Havana	2.14	2.65	3.45	4.26	5.51	6.61	7.94
2	4	Lincoln	2.19	2.77	3.59	4.34	5.54	6.47	7.61
2	4	Minonk	2.17	2.65	3.43	4.12	5.21	6.21	7.46
2	4	Peoria	2.24	2.82	3.63	4.42	5.81	7.00	8.09
2	4	Rushville	2.36	2.86	3.63	4.39	5.61	6.69	7.69
2	5	Danville	2.23	2.79	3.73	4.49	5.56	6.44	7.57
2	5	Hoopeston	2.23	2.75	3.51	4.16	5.16	5.96	6.90
2	5	Pontiac	2.15	2.75	3.69	4.45	5.69	6.72	7.92
2	5	Roberts	2.06	2.49	3.28	4.01	5.26	6.44	8.07
2	5	Urbana	2.15	2.64	3.37	3.97	4.91	5.74	6.72
2	6	Carlinville	2.32	2.88	3.79	4.69	6.24	7.59	9.18
2	6	Griggsville	2.21	2.78	3.66	4.52	5.73	6.91	8.02
2	6	Hillsboro	2.38	2.93	3.79	4.71	6.08	7.24	8.59
2	6	Jacksonville	2.24	2.81	3.71	4.63	5.96	7.22	8.50
2	6	Morrisonville	2.24	2.84	3.81	4.78	6.06	7.12	8.29
2	6	Pana	2.39	2.94	3.81	4.62	6.01	7.18	8.52
2	6	Springfield	2.17	2.74	3.61	4.43	5.65	6.71	8.00
2	6	White Hall	2.25	2.82	3.81	4.71	6.00	7.05	8.23
2	7	Charleston	2.38	2.84	3.64	4.31	5.46	6.44	7.66
2	7	Effingham	2.27	2.76	3.57	4.30	5.59	6.71	8.03
2	7	Palestine	2.51	3.02	3.83	4.52	5.54	6.54	7.72
2	7	Paris	2.39	2.95	3.81	4.61	5.84	6.85	7.85
2	7	Windsor	2.39	2.91	3.81	4.64	5.88	6.99	8.50
2	8	Belleville	2.25	2.76	3.64	4.44	5.86	7.12	8.78
2	8	DuQuoin	2.55	3.10	3.88	4.58	5.63	6.58	7.62
2	8	Greenville	2.31	2.77	3.54	4.24	5.38	6.41	7.57
2	8	Sparta	2.52	3.04	3.87	4.58	5.71	6.67	7.62
2	8	St Louis	2.27	2.76	3.64	4.42	5.79	7.14	8.74
2	9	Fairfield	2.43	3.04	3.98	4.81	6.16	7.46	9.21
2	9	Flora	2.32	2.89	3.80	4.67	6.03	7.45	8.75
2	9	McLeansboro	2.43	3.09	4.05	4.92	6.36	7.74	9.21
2	9	Mt Carmel	2.51	3.11	3.98	4.81	6.04	7.26	8.86
2	9	Mt Vernon	2.55	3.15	4.09	5.00	6.40	7.68	9.04
2	9	Olney	2.48	3.04	3.97	4.72	6.06	7.28	8.81
2	10	Anna	2.67	3.31	4.22	5.12	6.57	7.94	9.28
2	10	Cairo	2.55	3.13	4.15	5.05	6.54	8.01	9.68
2	10	Carbondale	2.54	3.15	4.12	4.95	6.48	7.75	8.95
2	10	Harrisburg	2.42	2.99	3.93	4.90	6.75	8.64	10.15
2	10	New Burnside	2.57	3.15	4.11	5.08	6.72	8.14	9.95

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
3	1	Aledo	1.98	2.47	3.27	3.94	4.98	5.92	6.93
3	1	Dixon	1.98	2.48	3.30	3.99	5.11	6.16	7.43
3	1	Freeport	1.97	2.47	3.25	3.96	5.24	6.56	8.20
3	1	Galva	1.96	2.44	3.20	3.87	4.91	5.88	6.94
3	1	Moline	1.95	2.45	3.28	4.05	5.17	6.14	7.25
3	1	Morrison	1.99	2.47	3.27	3.94	5.02	6.05	7.29
3	1	Mt Carroll	2.04	2.54	3.29	3.96	4.99	5.96	7.10
3	1	Rockford	1.94	2.43	3.25	3.91	4.95	5.90	6.77
3	1	Walnut	2.01	2.53	3.28	3.96	5.00	5.91	6.92
3	2	Aurora	1.83	2.34	3.16	3.89	5.28	6.52	7.80
3	2	Chicago	1.73	2.19	2.93	3.62	4.68	5.66	6.61
3	2	DeKalb	1.96	2.39	3.11	3.72	4.70	5.63	6.59
3	2	Joliet	1.90	2.40	3.32	4.14	5.33	6.24	7.31
3	2	Kankakee	1.90	2.41	3.20	3.97	5.22	6.26	7.43
3	2	Marengo	1.74	2.13	2.80	3.41	4.26	5.12	5.99
3	2	Ottawa	1.95	2.38	3.14	3.86	4.95	5.82	6.77
3	2	Waukegan	1.76	2.17	2.81	3.40	4.37	5.13	5.88
3	3	La Harpe	2.17	2.72	3.68	4.60	6.01	7.30	8.97
3	3	Monmouth	2.02	2.58	3.53	4.35	5.67	6.77	8.03
3	3	Quincy	2.07	2.58	3.46	4.25	5.41	6.44	7.60
3	4	Bloomington	2.17	2.70	3.51	4.18	5.26	6.14	7.20
3	4	Decatur	2.23	2.79	3.66	4.46	5.49	6.38	7.33
3	4	Havana	1.85	2.29	2.98	3.68	4.76	5.71	6.86
3	4	Lincoln	1.98	2.51	3.25	3.93	5.02	5.86	6.89
3	4	Minonk	1.90	2.32	3.00	3.60	4.55	5.43	6.52
3	4	Peoria	2.05	2.58	3.32	4.04	5.31	6.40	7.39
3	4	Rushville	2.06	2.50	3.17	3.83	4.89	5.84	6.71
3	5	Danville	2.01	2.51	3.36	4.04	5.00	5.79	6.81
3	5	Hoopeston	1.98	2.44	3.11	3.69	4.58	5.29	6.12
3	5	Pontiac	1.92	2.45	3.29	3.97	5.08	6.00	7.07
3	5	Roberts	1.85	2.24	2.95	3.61	4.74	5.80	7.27
3	5	Urbana	1.94	2.38	3.04	3.58	4.43	5.18	6.06
3	6	Carlinville	2.08	2.58	3.39	4.20	5.59	6.80	8.22
3	6	Griggsville	1.97	2.47	3.26	4.02	5.10	6.15	7.13
3	6	Hillsboro	2.07	2.54	3.29	4.09	5.28	6.29	7.46
3	6	Jacksonville	2.00	2.51	3.32	4.14	5.33	6.46	7.60
3	6	Morrisonville	2.02	2.55	3.43	4.30	5.45	6.41	7.46
3	6	Pana	2.11	2.59	3.36	4.07	5.29	6.33	7.51
3	6	Springfield	1.98	2.50	3.29	4.04	5.15	6.12	7.30
3	6	White Hall	2.01	2.52	3.41	4.21	5.36	6.30	7.36
3	7	Charleston	2.20	2.63	3.37	3.99	5.05	5.96	7.09
3	7	Effingham	2.10	2.55	3.30	3.98	5.17	6.21	7.43
3	7	Palestine	2.31	2.78	3.52	4.16	5.10	6.02	7.11
3	7	Paris	2.15	2.65	3.42	4.14	5.24	6.15	7.05
3	7	Windsor	2.16	2.63	3.44	4.19	5.31	6.31	7.68
3	8	Belleville	2.08	2.55	3.36	4.10	5.41	6.57	8.11
3	8	DuQuoin	2.28	2.78	3.47	4.10	5.04	5.89	6.82
3	8	Greenville	2.12	2.55	3.26	3.90	4.95	5.90	6.96
3	8	Sparta	2.26	2.73	3.47	4.11	5.12	5.99	6.84
3	8	St Louis	2.12	2.57	3.39	4.12	5.40	6.66	8.15
3	9	Fairfield	2.24	2.73	3.63	4.44	5.65	6.64	8.30
3	9	Flora	2.09	2.65	3.54	4.38	5.67	7.04	8.36
3	9	McLeansboro	2.21	2.81	3.68	4.47	5.78	7.03	8.37
3	9	Mt Carmel	2.26	2.81	3.66	4.39	5.52	6.77	8.16
3	9	Mt Vernon	2.27	2.81	3.65	4.46	5.71	6.85	8.06
3	9	Olney	2.20	2.74	3.60	4.38	5.67	6.94	8.28
3	10	Anna	2.42	3.00	3.82	4.64	5.95	7.20	8.41
3	10	Cairo	2.31	2.83	3.76	4.57	5.92	7.25	8.76
3	10	Carbondale	2.29	2.80	3.62	4.47	5.75	6.87	8.01
3	10	Harrisburg	2.23	2.75	3.60	4.43	6.00	7.62	9.20
3	10	New Burnside	2.23	2.73	3.56	4.40	5.82	7.05	8.62

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
4	1	Aledo	1.84	2.30	3.04	3.66	4.62	5.50	6.44
4	1	Dixon	1.82	2.28	3.02	3.66	4.69	5.65	6.81
4	1	Freeport	1.75	2.15	2.97	3.66	4.89	6.08	7.62
4	1	Galva	1.80	2.25	2.94	3.56	4.51	5.41	6.39
4	1	Moline	1.74	2.21	3.00	3.72	4.74	5.63	6.73
4	1	Morrison	1.81	2.25	2.97	3.58	4.56	5.50	6.62
4	1	Mt Carroll	1.87	2.32	3.01	3.63	4.57	5.46	6.50
4	1	Rockford	1.78	2.23	2.98	3.59	4.54	5.42	6.22
4	1	Walnut	1.85	2.32	3.02	3.64	4.60	5.43	6.36
4	2	Aurora	1.67	2.13	2.88	3.55	4.82	5.95	7.12
4	2	Chicago	1.59	2.00	2.68	3.31	4.28	5.17	6.05
4	2	DeKalb	1.79	2.19	2.85	3.41	4.31	5.16	6.04
4	2	Joliet	1.74	2.20	3.04	3.79	4.88	5.71	6.69
4	2	Kankakee	1.77	2.24	2.98	3.69	4.85	5.82	6.90
4	2	Marengo	1.53	1.88	2.46	3.00	3.75	4.50	5.27
4	2	Ottawa	1.72	2.10	2.76	3.40	4.36	5.12	5.96
4	2	Waukegan	1.56	1.92	2.49	3.01	3.86	4.54	5.20
4	3	La Harpe	1.99	2.50	3.37	4.22	5.52	6.70	8.23
4	3	Monmouth	1.86	2.38	3.26	4.01	5.22	6.24	7.40
4	3	Quincy	1.93	2.40	3.22	3.95	5.03	5.98	7.06
4	4	Bloomington	1.96	2.44	3.18	3.78	4.75	5.55	6.51
4	4	Decatur	2.00	2.50	3.28	3.99	4.91	5.71	6.56
4	4	Havana	1.68	2.08	2.70	3.34	4.32	5.18	6.23
4	4	Lincoln	1.77	2.24	2.90	3.51	4.48	5.23	6.15
4	4	Minonk	1.75	2.14	2.77	3.33	4.21	5.02	6.03
4	4	Peoria	1.85	2.33	3.00	3.65	4.80	5.78	6.68
4	4	Rushville	1.77	2.15	2.73	3.30	4.22	5.03	5.78
4	5	Danville	1.82	2.27	3.04	3.66	4.53	5.25	6.17
4	5	Hoopeston	1.79	2.21	2.82	3.34	4.14	4.79	5.54
4	5	Pontiac	1.72	2.20	2.95	3.56	4.55	5.38	6.34
4	5	Roberts	1.68	2.04	2.68	3.28	4.30	5.27	6.60
4	5	Urbana	1.74	2.13	2.72	3.21	3.97	4.64	5.43
4	6	Carlinville	1.86	2.30	3.03	3.75	4.99	6.07	7.34
4	6	Griggsville	1.80	2.27	2.99	3.69	4.68	5.64	6.55
4	6	Hillsboro	1.85	2.28	2.95	3.67	4.74	5.64	6.69
4	6	Jacksonville	1.79	2.25	2.96	3.70	4.76	5.77	6.79
4	6	Morrisonville	1.83	2.32	3.12	3.91	4.96	5.82	6.78
4	6	Pana	1.89	2.33	3.02	3.66	4.76	5.69	6.75
4	6	Springfield	1.82	2.30	3.03	3.72	4.74	5.63	6.72
4	6	White Hall	1.80	2.25	3.04	3.76	4.79	5.63	6.57
4	7	Charleston	2.02	2.41	3.09	3.66	4.64	5.47	6.50
4	7	Effingham	1.93	2.34	3.03	3.65	4.74	5.70	6.82
4	7	Palestine	2.12	2.55	3.23	3.81	4.67	5.51	6.51
4	7	Paris	1.94	2.39	3.09	3.74	4.74	5.56	6.37
4	7	Windsor	1.93	2.35	3.07	3.74	4.74	5.63	6.85
4	8	Belleville	1.96	2.40	3.16	3.86	5.09	6.19	7.63
4	8	DuQuoin	2.07	2.51	3.14	3.71	4.56	5.33	6.17
4	8	Greenville	1.92	2.30	2.94	3.52	4.47	5.32	6.28
4	8	Sparta	2.00	2.42	3.08	3.64	4.54	5.30	6.06
4	8	St Louis	1.94	2.35	3.10	3.77	4.94	6.09	7.45
4	9	Fairfield	2.02	2.50	3.31	4.01	5.02	6.10	7.51
4	9	Flora	1.92	2.39	3.20	4.02	5.26	6.52	7.65
4	9	McLeansboro	2.02	2.56	3.36	4.08	5.27	6.42	7.64
4	9	Mt Carmel	2.03	2.51	3.27	3.95	5.06	6.08	7.50
4	9	Mt Vernon	2.06	2.55	3.30	4.04	5.17	6.21	7.30
4	9	Olney	2.02	2.47	3.26	4.02	5.18	6.24	7.54
4	10	Anna	2.15	2.67	3.40	4.13	5.30	6.40	7.49
4	10	Cairo	2.16	2.65	3.52	4.28	5.54	6.79	8.20
4	10	Carbondale	2.07	2.52	3.27	3.98	5.09	6.04	7.24
4	10	Harrisburg	2.02	2.48	3.20	4.01	5.45	6.68	8.26
4	10	New Burnside	2.02	2.47	3.23	3.99	5.28	6.39	7.82

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	Aledo	1.70	2.12	2.80	3.37	4.26	5.07	5.93
5	1	Dixon	1.70	2.13	2.83	3.42	4.38	5.28	6.37
5	1	Freeport	1.57	1.98	2.73	3.41	4.52	5.51	6.89
5	1	Galva	1.69	2.11	2.76	3.34	4.23	5.07	5.99
5	1	Moline	1.55	1.99	2.73	3.42	4.38	5.13	6.10
5	1	Morrison	1.67	2.07	2.74	3.30	4.21	5.07	6.11
5	1	Mt Carroll	1.75	2.17	2.81	3.39	4.27	5.10	6.07
5	1	Rockford	1.67	2.09	2.80	3.37	4.26	5.09	5.84
5	1	Walnut	1.70	2.13	2.77	3.34	4.22	4.98	5.84
5	2	Aurora	1.54	1.96	2.65	3.27	4.44	5.48	6.55
5	2	Chicago	1.48	1.88	2.51	3.10	4.01	4.85	5.66
5	2	DeKalb	1.65	2.01	2.62	3.13	3.95	4.74	5.55
5	2	Joliet	1.54	1.95	2.69	3.35	4.31	5.05	5.91
5	2	Kankakee	1.66	2.10	2.79	3.46	4.55	5.45	6.47
5	2	Marengo	1.36	1.67	2.19	2.67	3.34	4.01	4.69
5	2	Ottawa	1.56	1.91	2.52	3.10	3.98	4.67	5.44
5	2	Waukegan	1.40	1.73	2.24	2.71	3.48	4.09	4.69
5	3	La Harpe	1.80	2.26	3.05	3.82	4.99	6.06	7.45
5	3	Monmouth	1.72	2.20	3.01	3.71	4.83	5.77	6.85
5	3	Quincy	1.83	2.28	3.06	3.75	4.77	5.68	6.70
5	4	Bloomington	1.68	2.09	2.72	3.24	4.07	4.76	5.58
5	4	Decatur	1.62	2.03	2.66	3.24	3.99	4.64	5.33
5	4	Havana	1.47	1.82	2.37	2.93	3.79	4.55	5.46
5	4	Lincoln	1.59	2.02	2.61	3.16	4.03	4.71	5.54
5	4	Minonk	1.58	1.93	2.50	3.00	3.79	4.52	5.43
5	4	Peoria	1.63	2.05	2.64	3.22	4.23	5.10	5.89
5	4	Rushville	1.58	1.92	2.43	2.94	3.76	4.48	5.15
5	5	Danville	1.60	2.01	2.68	3.23	4.00	4.63	5.45
5	5	Hoopeston	1.48	1.82	2.33	2.76	3.42	3.95	4.58
5	5	Pontiac	1.49	1.90	2.55	3.08	3.94	4.65	5.48
5	5	Roberts	1.52	1.83	2.41	2.95	3.87	4.74	5.94
5	5	Urbana	1.59	1.96	2.50	2.94	3.64	4.25	4.98
5	6	Carlinville	1.68	2.08	2.74	3.39	4.51	5.49	6.64
5	6	Griggsville	1.60	2.01	2.65	3.27	4.15	5.00	5.80
5	6	Hillsboro	1.71	2.11	2.73	3.39	4.38	5.21	6.18
5	6	Jacksonville	1.60	2.01	2.65	3.31	4.26	5.16	6.08
5	6	Morrisonville	1.61	2.04	2.73	3.43	4.35	5.11	5.95
5	6	Pana	1.67	2.05	2.66	3.22	4.19	5.00	5.94
5	6	Springfield	1.67	2.10	2.77	3.40	4.34	5.15	6.14
5	6	White Hall	1.61	2.02	2.73	3.38	4.31	5.06	5.91
5	7	Charleston	1.84	2.19	2.81	3.33	4.22	4.98	5.92
5	7	Effingham	1.77	2.16	2.79	3.36	4.37	5.24	6.27
5	7	Palestine	1.85	2.23	2.83	3.34	4.09	4.83	5.70
5	7	Paris	1.76	2.18	2.81	3.40	4.31	5.05	5.79
5	7	Windsor	1.75	2.13	2.79	3.40	4.31	5.12	6.23
5	8	Belleville	1.78	2.18	2.88	3.51	4.63	5.63	6.94
5	8	DuQuoin	1.82	2.21	2.76	3.26	4.01	4.68	5.42
5	8	Greenville	1.74	2.08	2.66	3.19	4.05	4.82	5.70
5	8	Sparta	1.78	2.15	2.74	3.24	4.04	4.72	5.39
5	8	St Louis	1.77	2.15	2.83	3.44	4.51	5.56	6.80
5	9	Fairfield	1.86	2.28	2.93	3.62	4.60	5.50	6.74
5	9	Flora	1.79	2.24	2.96	3.66	4.81	5.95	6.99
5	9	McLeansboro	1.83	2.32	3.05	3.70	4.78	5.82	6.93
5	9	Mt Carmel	1.84	2.25	2.90	3.54	4.55	5.50	6.71
5	9	Mt Vernon	1.76	2.17	2.82	3.45	4.42	5.30	6.24
5	9	Olney	1.81	2.22	2.85	3.54	4.50	5.41	6.71
5	10	Anna	2.00	2.48	3.16	3.83	4.91	5.94	6.94
5	10	Cairo	1.97	2.42	3.21	3.91	5.06	6.20	7.49
5	10	Carbondale	1.90	2.32	2.98	3.67	4.66	5.54	6.37
5	10	Harrisburg	1.85	2.24	2.89	3.67	4.98	6.01	7.17
5	10	New Burnside	1.86	2.28	2.97	3.67	4.85	5.88	7.19

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
6	1	Aledo	1.59	1.98	2.62	3.15	3.98	4.74	5.54
6	1	Dixon	1.56	1.96	2.60	3.15	4.04	4.87	5.86
6	1	Freeport	1.45	1.82	2.50	3.14	4.16	5.07	6.34
6	1	Galva	1.55	1.94	2.54	3.07	3.89	4.66	5.51
6	1	Moline	1.43	1.80	2.50	3.15	4.03	4.72	5.62
6	1	Morrison	1.54	1.91	2.52	3.04	3.87	4.67	5.63
6	1	Mt Carroll	1.64	2.04	2.64	3.18	4.01	4.78	5.70
6	1	Rockford	1.54	1.92	2.58	3.10	3.92	4.68	5.37
6	1	Walnut	1.56	1.96	2.55	3.07	3.88	4.58	5.37
6	2	Aurora	1.42	1.81	2.44	3.01	4.09	5.04	6.03
6	2	Chicago	1.36	1.73	2.31	2.85	3.69	4.46	5.20
6	2	DeKalb	1.51	1.85	2.41	2.88	3.64	4.36	5.10
6	2	Joliet	1.41	1.79	2.47	3.08	3.96	4.64	5.44
6	2	Kankakee	1.53	1.94	2.58	3.19	4.20	5.03	5.97
6	2	Marengo	1.26	1.54	2.02	2.46	3.07	3.69	4.32
6	2	Ottawa	1.44	1.76	2.31	2.85	3.66	4.29	5.00
6	2	Waukegan	1.27	1.56	2.02	2.45	3.15	3.70	4.24
6	3	La Harpe	1.66	2.09	2.82	3.53	4.62	5.60	6.88
6	3	Monmouth	1.58	2.02	2.77	3.41	4.44	5.31	6.30
6	3	Quincy	1.69	2.11	2.83	3.47	4.42	5.26	6.20
6	4	Bloomington	1.55	1.93	2.51	2.98	3.75	4.38	5.13
6	4	Decatur	1.49	1.86	2.45	2.98	3.67	4.26	4.90
6	4	Havana	1.35	1.67	2.18	2.69	3.48	4.17	5.01
6	4	Lincoln	1.46	1.85	2.40	2.90	3.70	4.32	5.09
6	4	Minonk	1.45	1.78	2.30	2.76	3.49	4.16	5.00
6	4	Peoria	1.50	1.89	2.43	2.96	3.89	4.69	5.42
6	4	Rushville	1.45	1.76	2.23	2.70	3.45	4.11	4.73
6	5	Danville	1.48	1.85	2.47	2.97	3.68	4.26	5.01
6	5	Hoopeston	1.36	1.67	2.13	2.53	3.14	3.62	4.20
6	5	Pontiac	1.37	1.76	2.35	2.84	3.63	4.29	5.05
6	5	Roberts	1.40	1.70	2.23	2.73	3.58	4.38	5.49
6	5	Urbana	1.46	1.80	2.29	2.70	3.34	3.90	4.57
6	6	Carlinville	1.54	1.92	2.52	3.12	4.15	5.05	6.11
6	6	Griggsville	1.47	1.85	2.44	3.01	3.82	4.60	5.34
6	6	Hillsboro	1.58	1.94	2.51	3.12	4.03	4.80	5.69
6	6	Jacksonville	1.48	1.85	2.44	3.05	3.93	4.76	5.60
6	6	Morrisonville	1.48	1.88	2.52	3.16	4.01	4.71	5.48
6	6	Pana	1.53	1.88	2.44	2.96	3.85	4.60	5.46
6	6	Springfield	1.53	1.93	2.54	3.12	3.98	4.73	5.63
6	6	White Hall	1.47	1.84	2.49	3.08	3.92	4.61	5.38
6	7	Charleston	1.69	2.02	2.58	3.06	3.88	4.57	5.44
6	7	Effingham	1.63	1.98	2.57	3.09	4.02	4.82	5.77
6	7	Palestine	1.71	2.06	2.61	3.08	3.78	4.46	5.26
6	7	Paris	1.62	2.00	2.58	3.12	3.95	4.64	5.31
6	7	Windsor	1.61	1.96	2.57	3.13	3.97	4.72	5.73
6	8	Belleville	1.64	2.01	2.66	3.24	4.28	5.20	6.41
6	8	DuQuoin	1.67	2.03	2.54	3.00	3.69	4.31	4.99
6	8	Greenville	1.61	1.93	2.47	2.96	3.76	4.47	5.28
6	8	Sparta	1.63	1.97	2.51	2.97	3.70	4.33	4.94
6	8	St Louis	1.63	1.98	2.61	3.17	4.15	5.12	6.27
6	9	Fairfield	1.71	2.09	2.70	3.33	4.23	5.06	6.20
6	9	Flora	1.65	2.06	2.72	3.37	4.42	5.47	6.45
6	9	McLeansboro	1.68	2.14	2.80	3.40	4.40	5.35	6.36
6	9	Mt Carmel	1.69	2.07	2.66	3.26	4.19	5.06	6.17
6	9	Mt Vernon	1.62	2.00	2.59	3.17	4.06	4.87	5.73
6	9	Olney	1.66	2.04	2.63	3.26	4.14	4.98	6.17
6	10	Anna	1.84	2.28	2.90	3.52	4.52	5.46	6.38
6	10	Cairo	1.82	2.23	2.96	3.60	4.66	5.71	6.90
6	10	Carbondale	1.75	2.13	2.74	3.38	4.29	5.09	5.86
6	10	Harrisburg	1.70	2.06	2.66	3.38	4.58	5.53	6.60
6	10	New Burnside	1.71	2.10	2.73	3.38	4.47	5.42	6.62

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
7	1	Aledo	1.49	1.87	2.47	2.97	3.75	4.46	5.23
7	1	Dixon	1.48	1.85	2.45	2.97	3.81	4.59	5.53
7	1	Freeport	1.37	1.72	2.37	2.96	3.93	4.80	5.99
7	1	Galva	1.47	1.84	2.40	2.91	3.69	4.42	5.22
7	1	Moline	1.35	1.71	2.37	2.97	3.81	4.46	5.32
7	1	Morrison	1.45	1.80	2.38	2.87	3.66	4.41	5.31
7	1	Mt Carroll	1.55	1.93	2.50	3.01	3.79	4.53	5.39
7	1	Rockford	1.46	1.82	2.44	2.93	3.71	4.42	5.08
7	1	Walnut	1.48	1.86	2.41	2.91	3.68	4.34	5.09
7	2	Aurora	1.34	1.71	2.31	2.84	3.86	4.76	5.69
7	2	Chicago	1.29	1.64	2.19	2.70	3.49	4.22	4.93
7	2	DeKalb	1.44	1.76	2.28	2.73	3.45	4.13	4.84
7	2	Joliet	1.34	1.69	2.34	2.91	3.75	4.39	5.14
7	2	Kankakee	1.44	1.84	2.44	3.02	3.97	4.76	5.65
7	2	Marengo	1.19	1.46	1.91	2.33	2.91	3.50	4.09
7	2	Ottawa	1.36	1.67	2.19	2.70	3.46	4.07	4.73
7	2	Waukegan	1.20	1.48	1.92	2.32	2.98	3.50	4.01
7	3	La Harpe	1.57	1.98	2.67	3.34	4.37	5.30	6.51
7	3	Monmouth	1.50	1.92	2.62	3.23	4.21	5.03	5.96
7	3	Quincy	1.59	1.99	2.67	3.27	4.16	4.95	5.85
7	4	Bloomington	1.47	1.82	2.37	2.82	3.55	4.14	4.86
7	4	Decatur	1.41	1.76	2.32	2.82	3.47	4.03	4.64
7	4	Havana	1.28	1.59	2.07	2.55	3.30	3.96	4.75
7	4	Lincoln	1.38	1.75	2.27	2.74	3.50	4.08	4.80
7	4	Minonk	1.37	1.67	2.16	2.60	3.29	3.92	4.71
7	4	Peoria	1.42	1.79	2.30	2.80	3.68	4.43	5.12
7	4	Rushville	1.38	1.67	2.12	2.56	3.27	3.90	4.48
7	5	Danville	1.40	1.75	2.33	2.81	3.48	4.03	4.74
7	5	Hoopeston	1.29	1.59	2.03	2.40	2.98	3.44	3.98
7	5	Pontiac	1.29	1.66	2.22	2.68	3.43	4.05	4.77
7	5	Roberts	1.32	1.60	2.10	2.57	3.37	4.13	5.17
7	5	Urbana	1.39	1.70	2.17	2.56	3.17	3.70	4.33
7	6	Carlinville	1.46	1.81	2.38	2.95	3.92	4.77	5.77
7	6	Griggsville	1.39	1.75	2.30	2.84	3.60	4.34	5.04
7	6	Hillsboro	1.49	1.84	2.37	2.95	3.81	4.53	5.38
7	6	Jacksonville	1.39	1.75	2.31	2.88	3.71	4.49	5.29
7	6	Morrisonville	1.40	1.78	2.38	2.99	3.79	4.45	5.19
7	6	Pana	1.45	1.78	2.31	2.80	3.64	4.35	5.16
7	6	Springfield	1.45	1.83	2.41	2.96	3.78	4.48	5.35
7	6	White Hall	1.39	1.75	2.36	2.92	3.72	4.37	5.10
7	7	Charleston	1.60	1.91	2.45	2.90	3.67	4.33	5.15
7	7	Effingham	1.54	1.87	2.42	2.92	3.80	4.56	5.45
7	7	Palestine	1.62	1.94	2.47	2.91	3.57	4.21	4.97
7	7	Paris	1.53	1.89	2.45	2.96	3.75	4.40	5.04
7	7	Windsor	1.52	1.86	2.43	2.96	3.75	4.46	5.42
7	8	Belleville	1.55	1.90	2.51	3.06	4.04	4.91	6.05
7	8	DuQuoin	1.58	1.92	2.41	2.84	3.49	4.08	4.73
7	8	Greenville	1.53	1.84	2.35	2.81	3.57	4.25	5.02
7	8	Sparta	1.55	1.87	2.38	2.82	3.52	4.11	4.69
7	8	St Louis	1.54	1.87	2.47	3.00	3.93	4.85	5.93
7	9	Fairfield	1.62	1.98	2.56	3.16	4.00	4.79	5.87
7	9	Flora	1.56	1.95	2.57	3.20	4.19	5.17	6.11
7	9	McLeansboro	1.59	2.02	2.65	3.22	4.16	5.07	6.03
7	9	Mt Carmel	1.60	1.96	2.52	3.08	3.96	4.79	5.84
7	9	Mt Vernon	1.53	1.89	2.45	3.00	3.84	4.61	5.42
7	9	Olney	1.57	1.92	2.48	3.08	3.92	4.71	5.84
7	10	Anna	1.74	2.15	2.74	3.33	4.27	5.16	6.04
7	10	Cairo	1.72	2.11	2.79	3.40	4.40	5.39	6.52
7	10	Carbondale	1.65	2.02	2.59	3.20	4.06	4.82	5.54
7	10	Harrisburg	1.61	1.95	2.52	3.20	4.33	5.23	6.24
7	10	New Burnside	1.62	1.98	2.59	3.20	4.23	5.13	6.27

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
8	1	Aledo	1.29	1.61	2.13	2.56	3.23	3.85	4.50
8	1	Dixon	1.27	1.59	2.12	2.56	3.28	3.96	4.77
8	1	Freeport	1.18	1.49	2.04	2.56	3.39	4.13	5.17
8	1	Galva	1.26	1.58	2.07	2.50	3.17	3.80	4.49
8	1	Moline	1.16	1.47	2.04	2.56	3.29	3.85	4.50
8	1	Morrison	1.25	1.55	2.05	2.47	3.15	3.79	4.57
8	1	Mt Carroll	1.34	1.66	2.15	2.59	3.26	3.90	4.64
8	1	Rockford	1.26	1.57	2.10	2.53	3.20	3.82	4.38
8	1	Walnut	1.27	1.60	2.07	2.50	3.16	3.73	4.37
8	2	Aurora	1.16	1.47	1.99	2.45	3.33	4.11	4.91
8	2	Chicago	1.12	1.41	1.89	2.33	3.01	3.64	4.26
8	2	DeKalb	1.24	1.51	1.96	2.35	2.97	3.56	4.16
8	2	Joliet	1.15	1.46	2.02	2.51	3.23	3.78	4.43
8	2	Kankakee	1.24	1.58	2.10	2.60	3.42	4.10	4.86
8	2	Marengo	1.02	1.25	1.64	2.00	2.50	3.00	3.51
8	2	Ottawa	1.18	1.44	1.89	2.33	2.99	3.51	4.09
8	2	Waukegan	1.04	1.28	1.66	2.01	2.58	3.03	3.48
8	3	La Harpe	1.36	1.71	2.31	2.89	3.78	4.59	5.63
8	3	Monmouth	1.29	1.65	2.26	2.78	3.62	4.33	5.13
8	3	Quincy	1.37	1.71	2.30	2.82	3.59	4.27	5.04
8	4	Bloomington	1.26	1.57	2.04	2.43	3.06	3.57	4.19
8	4	Decatur	1.22	1.52	1.99	2.43	2.99	3.48	3.99
8	4	Havana	1.10	1.36	1.77	2.19	2.83	3.40	4.08
8	4	Lincoln	1.20	1.51	1.96	2.37	3.03	3.53	4.16
8	4	Minonk	1.17	1.43	1.86	2.23	2.82	3.36	4.04
8	4	Peoria	1.22	1.54	1.98	2.41	3.17	3.82	4.41
8	4	Rushville	1.18	1.43	1.82	2.20	2.81	3.35	3.85
8	5	Danville	1.20	1.50	2.01	2.42	3.00	3.47	4.08
8	5	Hoopeston	1.11	1.37	1.75	2.07	2.57	2.97	3.43
8	5	Pontiac	1.12	1.43	1.92	2.31	2.95	3.49	4.11
8	5	Roberts	1.15	1.38	1.82	2.23	2.93	3.58	4.49
8	5	Urbana	1.19	1.46	1.87	2.20	2.72	3.18	3.72
8	6	Carlinville	1.26	1.56	2.05	2.54	3.38	4.11	4.97
8	6	Griggsville	1.20	1.51	1.98	2.45	3.11	3.75	4.35
8	6	Hillsboro	1.28	1.58	2.04	2.54	3.28	3.90	4.63
8	6	Jacksonville	1.20	1.51	1.99	2.48	3.19	3.87	4.55
8	6	Morrisonville	1.21	1.53	2.06	2.58	3.27	3.84	4.47
8	6	Pana	1.25	1.53	1.99	2.41	3.14	3.75	4.44
8	6	Springfield	1.25	1.58	2.08	2.55	3.25	3.86	4.60
8	6	White Hall	1.20	1.50	2.03	2.51	3.20	3.76	4.39
8	7	Charleston	1.38	1.65	2.11	2.50	3.17	3.74	4.44
8	7	Effingham	1.33	1.61	2.08	2.51	3.26	3.92	4.69
8	7	Palestine	1.39	1.68	2.13	2.51	3.08	3.63	4.29
8	7	Paris	1.32	1.63	2.11	2.55	3.23	3.79	4.34
8	7	Windsor	1.31	1.60	2.09	2.55	3.23	3.84	4.67
8	8	Belleville	1.34	1.64	2.16	2.64	3.48	4.23	5.22
8	8	DuQuoin	1.36	1.66	2.08	2.45	3.01	3.52	4.08
8	8	Greenville	1.31	1.57	2.01	2.41	3.06	3.64	4.30
8	8	Sparta	1.33	1.60	2.04	2.41	3.00	3.51	4.01
8	8	St Louis	1.34	1.62	2.14	2.60	3.41	4.20	5.14
8	9	Fairfield	1.39	1.71	2.20	2.73	3.45	4.12	5.06
8	9	Flora	1.34	1.68	2.22	2.76	3.61	4.45	5.25
8	9	McLeansboro	1.37	1.74	2.28	2.77	3.58	4.36	5.19
8	9	Mt Carmel	1.38	1.69	2.18	2.66	3.41	4.12	5.03
8	9	Mt Vernon	1.32	1.63	2.12	2.59	3.32	3.98	4.68
8	9	Olney	1.35	1.66	2.14	2.66	3.38	4.06	5.03
8	10	Anna	1.50	1.86	2.37	2.87	3.68	4.45	5.20
8	10	Cairo	1.48	1.82	2.41	2.93	3.79	4.65	5.62
8	10	Carbondale	1.42	1.74	2.24	2.76	3.50	4.16	4.78
8	10	Harrisburg	1.38	1.68	2.17	2.76	3.74	4.51	5.38
8	10	New Burnside	1.40	1.71	2.23	2.76	3.65	4.42	5.41

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	Aledo	1.10	1.38	1.82	2.19	2.77	3.29	3.85
9	1	Dixon	1.09	1.36	1.81	2.19	2.81	3.38	4.08
9	1	Freeport	1.01	1.27	1.75	2.18	2.90	3.53	4.41
9	1	Galva	1.08	1.35	1.76	2.13	2.70	3.24	3.82
9	1	Moline	0.99	1.25	1.75	2.19	2.80	3.28	3.84
9	1	Morrison	1.07	1.33	1.75	2.11	2.69	3.24	3.90
9	1	Mt Carroll	1.14	1.41	1.84	2.21	2.79	3.33	3.96
9	1	Rockford	1.07	1.33	1.79	2.15	2.72	3.25	3.73
9	1	Walnut	1.08	1.36	1.77	2.13	2.69	3.18	3.72
9	2	Aurora	0.99	1.26	1.70	2.09	2.84	3.50	4.19
9	2	Chicago	0.95	1.20	1.60	1.98	2.56	3.10	3.62
9	2	DeKalb	1.06	1.29	1.68	2.01	2.54	3.04	3.56
9	2	Joliet	0.98	1.24	1.72	2.14	2.75	3.23	3.78
9	2	Kankakee	1.06	1.34	1.78	2.21	2.91	3.48	4.13
9	2	Marengo	0.87	1.07	1.40	1.71	2.14	2.57	3.00
9	2	Ottawa	1.00	1.22	1.61	1.98	2.54	2.98	3.47
9	2	Waukegan	0.88	1.08	1.40	1.70	2.18	2.57	2.94
9	3	La Harpe	1.17	1.47	1.98	2.48	3.24	3.94	4.83
9	3	Monmouth	1.10	1.41	1.92	2.37	3.09	3.69	4.38
9	3	Quincy	1.16	1.45	1.95	2.39	3.04	3.62	4.27
9	4	Bloomington	1.08	1.34	1.74	2.07	2.60	3.04	3.57
9	4	Decatur	1.04	1.30	1.70	2.07	2.55	2.96	3.40
9	4	Havana	0.94	1.17	1.52	1.88	2.43	2.92	3.50
9	4	Lincoln	1.02	1.29	1.67	2.02	2.58	3.01	3.54
9	4	Minonk	1.00	1.22	1.58	1.90	2.40	2.86	3.44
9	4	Peoria	1.04	1.31	1.69	2.06	2.71	3.26	3.77
9	4	Rushville	1.01	1.22	1.55	1.88	2.40	2.86	3.29
9	5	Danville	1.03	1.29	1.72	2.07	2.56	2.97	3.49
9	5	Hoopeston	0.94	1.16	1.49	1.76	2.18	2.52	2.92
9	5	Pontiac	0.95	1.22	1.63	1.97	2.52	2.97	3.51
9	5	Roberts	0.98	1.18	1.55	1.90	2.49	3.05	3.82
9	5	Urbana	1.02	1.25	1.60	1.88	2.33	2.72	3.18
9	6	Carlinville	1.07	1.33	1.75	2.17	2.89	3.51	4.25
9	6	Griggsville	1.03	1.29	1.70	2.10	2.66	3.21	3.73
9	6	Hillsboro	1.10	1.35	1.75	2.17	2.80	3.34	3.96
9	6	Jacksonville	1.03	1.29	1.70	2.12	2.73	3.31	3.89
9	6	Morrisonville	1.03	1.31	1.75	2.20	2.79	3.28	3.82
9	6	Pana	1.07	1.31	1.70	2.06	2.68	3.20	3.80
9	6	Springfield	1.06	1.34	1.77	2.17	2.77	3.29	3.92
9	6	White Hall	1.02	1.28	1.73	2.14	2.73	3.20	3.74
9	7	Charleston	1.18	1.40	1.80	2.13	2.70	3.18	3.79
9	7	Effingham	1.13	1.37	1.78	2.14	2.78	3.34	4.00
9	7	Palestine	1.19	1.43	1.81	2.14	2.62	3.10	3.66
9	7	Paris	1.13	1.39	1.79	2.17	2.75	3.22	3.70
9	7	Windsor	1.12	1.37	1.79	2.18	2.76	3.28	3.99
9	8	Belleville	1.14	1.40	1.84	2.25	2.97	3.61	4.45
9	8	DuQuoin	1.19	1.44	1.80	2.13	2.62	3.06	3.54
9	8	Greenville	1.12	1.35	1.72	2.06	2.61	3.11	3.68
9	8	Sparta	1.13	1.37	1.74	2.06	2.57	3.00	3.43
9	8	St Louis	1.15	1.39	1.84	2.23	2.92	3.60	4.41
9	9	Fairfield	1.19	1.46	1.88	2.34	2.94	3.52	4.32
9	9	Flora	1.15	1.43	1.89	2.37	3.08	3.80	4.50
9	9	McLeansboro	1.17	1.48	1.94	2.36	3.05	3.71	4.42
9	9	Mt Carmel	1.18	1.44	1.85	2.26	2.92	3.52	4.29
9	9	Mt Vernon	1.13	1.39	1.81	2.21	2.83	3.39	4.00
9	9	Olney	1.15	1.42	1.83	2.26	2.88	3.46	4.29
9	10	Anna	1.28	1.58	2.02	2.45	3.14	3.80	4.44
9	10	Cairo	1.27	1.56	2.06	2.51	3.25	3.98	4.81
9	10	Carbondale	1.22	1.48	1.91	2.35	2.99	3.55	4.08
9	10	Harrisburg	1.18	1.44	1.85	2.35	3.18	3.85	4.59
9	10	New Burnside	1.19	1.46	1.90	2.35	3.11	3.77	4.60

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
10	1	Aledo	1.01	1.26	1.67	2.01	2.54	3.02	3.54
10	1	Dixon	1.00	1.25	1.66	2.01	2.58	3.11	3.74
10	1	Freeport	0.93	1.17	1.61	2.01	2.66	3.25	4.07
10	1	Galva	1.00	1.24	1.63	1.97	2.50	2.99	3.53
10	1	Moline	0.92	1.15	1.61	2.01	2.59	3.03	3.54
10	1	Morrison	0.99	1.22	1.62	1.95	2.49	2.99	3.61
10	1	Mt Carroll	1.05	1.31	1.69	2.04	2.57	3.07	3.66
10	1	Rockford	0.99	1.23	1.65	1.99	2.52	3.01	3.45
10	1	Walnut	1.00	1.26	1.63	1.97	2.49	2.94	3.44
10	2	Aurora	0.91	1.16	1.57	1.93	2.62	3.23	3.87
10	2	Chicago	0.88	1.11	1.48	1.83	2.37	2.86	3.34
10	2	DeKalb	0.97	1.19	1.55	1.85	2.34	2.80	3.28
10	2	Joliet	0.90	1.14	1.58	1.97	2.54	2.97	3.48
10	2	Kankakee	0.98	1.24	1.65	2.04	2.68	3.21	3.82
10	2	Marengo	0.80	0.98	1.29	1.57	1.96	2.36	2.76
10	2	Ottawa	0.92	1.13	1.49	1.83	2.35	2.76	3.21
10	2	Waukegan	0.81	1.00	1.30	1.57	2.02	2.37	2.71
10	3	La Harpe	1.07	1.34	1.82	2.27	2.97	3.60	4.43
10	3	Monmouth	1.02	1.30	1.78	2.19	2.85	3.41	4.04
10	3	Quincy	1.08	1.34	1.80	2.21	2.81	3.35	3.95
10	4	Bloomington	0.99	1.23	1.61	1.91	2.40	2.81	3.29
10	4	Decatur	0.96	1.20	1.57	1.91	2.35	2.73	3.14
10	4	Havana	0.87	1.08	1.40	1.73	2.24	2.68	3.22
10	4	Lincoln	0.94	1.19	1.54	1.86	2.37	2.77	3.26
10	4	Minonk	0.92	1.12	1.45	1.74	2.20	2.62	3.15
10	4	Peoria	0.96	1.21	1.56	1.90	2.50	3.01	3.48
10	4	Rushville	0.94	1.13	1.44	1.74	2.22	2.65	3.05
10	5	Danville	0.94	1.18	1.58	1.90	2.35	2.73	3.20
10	5	Hoopeston	0.87	1.07	1.37	1.62	2.01	2.32	2.69
10	5	Pontiac	0.88	1.12	1.51	1.82	2.33	2.75	3.24
10	5	Roberts	0.89	1.08	1.42	1.74	2.28	2.79	3.50
10	5	Urbana	0.94	1.16	1.48	1.74	2.15	2.52	2.95
10	6	Carlinville	0.99	1.23	1.62	2.00	2.66	3.24	3.91
10	6	Griggsville	0.94	1.19	1.56	1.93	2.45	2.95	3.42
10	6	Hillsboro	1.01	1.24	1.61	2.00	2.58	3.07	3.65
10	6	Jacksonville	0.94	1.18	1.56	1.95	2.51	3.04	3.58
10	6	Morrisonville	0.95	1.20	1.61	2.02	2.56	3.01	3.50
10	6	Pana	0.98	1.21	1.57	1.90	2.47	2.95	3.50
10	6	Springfield	0.98	1.24	1.63	2.00	2.55	3.03	3.61
10	6	White Hall	0.94	1.18	1.59	1.97	2.51	2.95	3.44
10	7	Charleston	1.08	1.29	1.66	1.96	2.48	2.93	3.48
10	7	Effingham	1.05	1.27	1.64	1.98	2.57	3.09	3.70
10	7	Palestine	1.10	1.32	1.68	1.98	2.43	2.86	3.38
10	7	Paris	1.04	1.29	1.66	2.01	2.55	2.99	3.42
10	7	Windsor	1.04	1.26	1.65	2.01	2.55	3.03	3.68
10	8	Belleville	1.05	1.29	1.71	2.08	2.75	3.34	4.11
10	8	DuQuoin	1.06	1.29	1.61	1.90	2.34	2.73	3.16
10	8	Greenville	1.04	1.24	1.59	1.90	2.41	2.87	3.39
10	8	Sparta	1.04	1.25	1.60	1.89	2.36	2.75	3.14
10	8	St Louis	1.06	1.29	1.70	2.06	2.70	3.33	4.07
10	9	Fairfield	1.09	1.34	1.73	2.16	2.71	3.25	3.98
10	9	Flora	1.06	1.32	1.74	2.19	2.84	3.50	4.13
10	9	McLeansboro	1.08	1.37	1.79	2.18	2.82	3.43	4.08
10	9	Mt Carmel	1.08	1.33	1.71	2.09	2.69	3.25	3.96
10	9	Mt Vernon	1.04	1.28	1.66	2.03	2.60	3.12	3.67
10	9	Olney	1.06	1.31	1.69	2.09	2.65	3.19	3.96
10	10	Anna	1.18	1.46	1.86	2.26	2.90	3.50	4.10
10	10	Cairo	1.16	1.43	1.89	2.30	2.98	3.65	4.41
10	10	Carbondale	1.12	1.37	1.76	2.17	2.75	3.27	3.76
10	10	Harrisburg	1.09	1.33	1.71	2.17	2.93	3.55	4.23
10	10	New Burnside	1.10	1.35	1.76	2.17	2.87	3.48	4.25

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
11	1	Aledo	0.81	1.01	1.34	1.61	2.03	2.42	2.83
11	1	Dixon	0.80	1.00	1.33	1.61	2.06	2.49	3.00
11	1	Freeport	0.74	0.93	1.28	1.60	2.13	2.59	3.24
11	1	Galva	0.79	0.99	1.30	1.57	1.99	2.39	2.82
11	1	Moline	0.73	0.92	1.28	1.61	2.06	2.41	2.82
11	1	Morrison	0.78	0.97	1.29	1.55	1.98	2.38	2.87
11	1	Mt Carroll	0.84	1.04	1.35	1.62	2.04	2.44	2.90
11	1	Rockford	0.78	0.98	1.31	1.58	2.00	2.39	2.74
11	1	Walnut	0.80	1.00	1.30	1.57	1.98	2.34	2.74
11	2	Aurora	0.73	0.93	1.25	1.54	2.09	2.58	3.09
11	2	Chicago	0.70	0.88	1.18	1.46	1.89	2.28	2.67
11	2	DeKalb	0.77	0.95	1.23	1.47	1.86	2.23	2.61
11	2	Joliet	0.72	0.91	1.26	1.57	2.02	2.37	2.77
11	2	Kankakee	0.78	0.99	1.32	1.63	2.14	2.57	3.05
11	2	Marengo	0.64	0.79	1.03	1.26	1.57	1.89	2.21
11	2	Ottawa	0.74	0.90	1.19	1.46	1.87	2.20	2.56
11	2	Waukegan	0.65	0.80	1.04	1.26	1.62	1.90	2.18
11	3	La Harpe	0.86	1.08	1.46	1.82	2.38	2.89	3.55
11	3	Monmouth	0.81	1.03	1.41	1.74	2.27	2.71	3.21
11	3	Quincy	0.86	1.07	1.43	1.76	2.24	2.67	3.15
11	4	Bloomington	0.80	0.99	1.29	1.53	1.92	2.25	2.64
11	4	Decatur	0.77	0.96	1.26	1.53	1.88	2.19	2.52
11	4	Havana	0.69	0.85	1.11	1.37	1.77	2.13	2.55
11	4	Lincoln	0.75	0.94	1.22	1.48	1.89	2.21	2.60
11	4	Minonk	0.74	0.90	1.17	1.40	1.77	2.11	2.53
11	4	Peoria	0.77	0.96	1.24	1.51	1.98	2.39	2.76
11	4	Rushville	0.74	0.90	1.14	1.38	1.76	2.10	2.42
11	5	Danville	0.75	0.94	1.26	1.52	1.88	2.18	2.56
11	5	Hoopeston	0.69	0.85	1.09	1.29	1.60	1.85	2.14
11	5	Pontiac	0.70	0.90	1.20	1.45	1.85	2.19	2.58
11	5	Roberts	0.70	0.85	1.12	1.37	1.80	2.20	2.76
11	5	Urbana	0.75	0.92	1.17	1.38	1.71	2.00	2.34
11	6	Carlinville	0.79	0.98	1.28	1.59	2.12	2.57	3.11
11	6	Griggsville	0.75	0.94	1.24	1.53	1.94	2.34	2.71
11	6	Hillsboro	0.80	0.99	1.28	1.59	2.05	2.44	2.90
11	6	Jacksonville	0.75	0.95	1.25	1.56	2.01	2.43	2.86
11	6	Morrisonville	0.75	0.96	1.28	1.61	2.04	2.40	2.79
11	6	Pana	0.78	0.96	1.25	1.51	1.96	2.35	2.78
11	6	Springfield	0.78	0.99	1.30	1.60	2.04	2.42	2.89
11	6	White Hall	0.75	0.93	1.26	1.56	1.99	2.34	2.73
11	7	Charleston	0.87	1.03	1.33	1.57	1.99	2.35	2.79
11	7	Effingham	0.83	1.01	1.30	1.57	2.04	2.45	2.93
11	7	Palestine	0.87	1.05	1.33	1.57	1.92	2.27	2.68
11	7	Paris	0.83	1.02	1.32	1.60	2.03	2.38	2.72
11	7	Windsor	0.82	1.00	1.31	1.60	2.03	2.41	2.93
11	8	Belleville	0.84	1.03	1.36	1.66	2.19	2.66	3.28
11	8	DuQuoin	0.85	1.03	1.29	1.52	1.87	2.18	2.53
11	8	Greenville	0.83	0.99	1.27	1.52	1.93	2.30	2.71
11	8	Sparta	0.83	1.00	1.27	1.50	1.87	2.18	2.50
11	8	St Louis	0.85	1.04	1.37	1.66	2.17	2.68	3.28
11	9	Fairfield	0.88	1.07	1.38	1.74	2.16	2.58	3.16
11	9	Flora	0.84	1.05	1.39	1.76	2.26	2.79	3.29
11	9	McLeansboro	0.86	1.09	1.43	1.74	2.25	2.74	3.26
11	9	Mt Carmel	0.87	1.06	1.37	1.66	2.14	2.58	3.16
11	9	Mt Vernon	0.83	1.02	1.33	1.62	2.07	2.49	2.93
11	9	Olney	0.85	1.04	1.34	1.66	2.12	2.54	3.16
11	10	Anna	0.94	1.16	1.48	1.80	2.31	2.79	3.26
11	10	Cairo	0.93	1.14	1.51	1.84	2.38	2.92	3.53
11	10	Carbondale	0.89	1.09	1.39	1.73	2.19	2.60	2.99
11	10	Harrisburg	0.86	1.05	1.36	1.73	2.34	2.83	3.37
11	10	New Burnside	0.88	1.07	1.40	1.73	2.29	2.77	3.39

Fall rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
12	1	Aledo	0.63	0.79	1.05	1.26	1.59	1.89	2.22
12	1	Dixon	0.63	0.78	1.04	1.26	1.61	1.95	2.35
12	1	Freeport	0.58	0.73	1.01	1.26	1.67	2.04	2.55
12	1	Galva	0.62	0.78	1.02	1.23	1.56	1.87	2.21
12	1	Moline	0.57	0.72	1.01	1.26	1.62	1.90	2.22
12	1	Morrison	0.62	0.77	1.01	1.22	1.55	1.87	2.26
12	1	Mt Carroll	0.66	0.82	1.06	1.28	1.61	1.93	2.29
12	1	Rockford	0.62	0.78	1.04	1.25	1.58	1.89	2.17
12	1	Walnut	0.62	0.78	1.02	1.23	1.55	1.84	2.15
12	2	Aurora	0.57	0.73	0.98	1.21	1.64	2.03	2.43
12	2	Chicago	0.55	0.70	0.93	1.15	1.49	1.80	2.10
12	2	DeKalb	0.61	0.75	0.97	1.16	1.46	1.76	2.06
12	2	Joliet	0.57	0.72	1.00	1.24	1.60	1.87	2.19
12	2	Kankakee	0.61	0.78	1.03	1.28	1.68	2.02	2.39
12	2	Marengo	0.51	0.62	0.81	0.99	1.24	1.49	1.74
12	2	Ottawa	0.58	0.71	0.93	1.15	1.48	1.73	2.02
12	2	Waukegan	0.52	0.64	0.83	1.00	1.28	1.51	1.73
12	3	La Harpe	0.67	0.85	1.14	1.43	1.87	2.27	2.79
12	3	Monmouth	0.64	0.82	1.12	1.38	1.80	2.15	2.55
12	3	Quincy	0.69	0.86	1.15	1.41	1.80	2.14	2.52
12	4	Bloomington	0.62	0.78	1.01	1.20	1.51	1.76	2.07
12	4	Decatur	0.60	0.75	0.99	1.20	1.48	1.72	1.97
12	4	Havana	0.54	0.67	0.87	1.08	1.40	1.68	2.01
12	4	Lincoln	0.59	0.75	0.97	1.17	1.49	1.74	2.05
12	4	Minonk	0.58	0.71	0.92	1.11	1.40	1.67	2.01
12	4	Peoria	0.60	0.76	0.98	1.19	1.56	1.88	2.18
12	4	Rushville	0.58	0.70	0.89	1.08	1.38	1.65	1.89
12	5	Danville	0.60	0.75	1.00	1.20	1.49	1.72	2.02
12	5	Hoopeston	0.55	0.67	0.86	1.02	1.27	1.46	1.69
12	5	Pontiac	0.55	0.70	0.95	1.14	1.46	1.72	2.03
12	5	Roberts	0.55	0.67	0.88	1.08	1.42	1.73	2.17
12	5	Urbana	0.58	0.72	0.92	1.08	1.34	1.56	1.83
12	6	Carlinville	0.62	0.77	1.01	1.25	1.66	2.02	2.45
12	6	Griggsville	0.59	0.74	0.98	1.21	1.53	1.85	2.15
12	6	Hillsboro	0.63	0.78	1.01	1.25	1.61	1.92	2.28
12	6	Jacksonville	0.59	0.74	0.98	1.22	1.57	1.90	2.24
12	6	Morrisonville	0.60	0.75	1.01	1.27	1.61	1.89	2.20
12	6	Pana	0.62	0.76	0.98	1.19	1.55	1.85	2.19
12	6	Springfield	0.62	0.78	1.03	1.26	1.61	1.91	2.28
12	6	White Hall	0.58	0.73	0.99	1.22	1.55	1.83	2.13
12	7	Charleston	0.68	0.81	1.04	1.23	1.56	1.84	2.19
12	7	Effingham	0.64	0.78	1.01	1.22	1.59	1.90	2.28
12	7	Palestine	0.69	0.83	1.05	1.24	1.52	1.79	2.12
12	7	Paris	0.65	0.80	1.03	1.25	1.58	1.86	2.13
12	7	Windsor	0.65	0.79	1.03	1.26	1.60	1.90	2.31
12	8	Belleville	0.66	0.81	1.07	1.30	1.72	2.08	2.57
12	8	DuQuoin	0.67	0.81	1.02	1.20	1.48	1.72	2.00
12	8	Greenville	0.65	0.78	1.00	1.20	1.52	1.81	2.14
12	8	Sparta	0.65	0.79	1.01	1.19	1.48	1.73	1.98
12	8	St Louis	0.68	0.82	1.09	1.32	1.73	2.13	2.61
12	9	Fairfield	0.69	0.84	1.09	1.39	1.70	2.03	2.49
12	9	Flora	0.66	0.83	1.10	1.38	1.78	2.19	2.61
12	9	McLeansboro	0.68	0.86	1.13	1.37	1.77	2.16	2.56
12	9	Mt Carmel	0.68	0.83	1.07	1.31	1.68	2.03	2.49
12	9	Mt Vernon	0.65	0.81	1.05	1.28	1.64	1.97	2.31
12	9	Olney	0.66	0.82	1.06	1.31	1.67	2.00	2.49
12	10	Anna	0.74	0.92	1.17	1.42	1.82	2.20	2.57
12	10	Cairo	0.73	0.90	1.19	1.45	1.88	2.30	2.78
12	10	Carbondale	0.70	0.86	1.11	1.36	1.72	2.05	2.35
12	10	Harrisburg	0.68	0.83	1.07	1.36	1.84	2.23	2.66
12	10	New Burnside	0.69	0.84	1.10	1.36	1.80	2.18	2.66

Appendix E. Point Frequency Distributions at 61 Stations for Storm Periods of 30 Minutes to 10 Days and Recurrence Intervals of 1 to 100 Years in Winter

Storm codes

1 – 10 days	7 – 12 hours
2 – 5 days	8 – 6 hours
3 – 72 hours	9 – 3 hours
4 – 48 hours	10 – 2 hours
5 – 24 hours	11 – 1 hour
6 – 18 hours	12 – 30 minutes

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1	1	Aledo	1.55	1.90	2.43	2.87	3.42	4.00	4.79
1	1	Dixon	1.44	1.76	2.20	2.67	3.44	4.17	5.10
1	1	Freeport	1.52	1.84	2.33	2.84	3.65	4.47	5.45
1	1	Galva	1.51	1.80	2.33	2.78	3.44	4.06	4.66
1	1	Moline	1.56	1.89	2.41	2.86	3.56	4.21	4.86
1	1	Morrison	1.53	1.80	2.29	2.77	3.44	4.21	5.13
1	1	Mt Carroll	1.56	1.84	2.31	2.77	3.42	4.04	4.76
1	1	Rockford	1.54	1.84	2.35	2.82	3.44	4.04	4.60
1	1	Walnut	1.54	1.82	2.33	2.81	3.46	4.09	4.82
1	2	Aurora	1.65	2.00	2.59	3.25	4.31	5.27	6.27
1	2	Chicago	1.48	1.82	2.34	2.86	3.62	4.40	5.30
1	2	DeKalb	1.68	2.01	2.58	3.10	3.85	4.50	5.17
1	2	Joliet	1.60	1.95	2.60	3.21	4.15	4.94	5.63
1	2	Kankakee	1.57	1.90	2.48	3.04	3.87	4.75	5.80
1	2	Marengo	1.54	1.82	2.34	2.82	3.48	4.06	4.71
1	2	Ottawa	1.60	1.90	2.46	3.01	3.85	4.63	5.33
1	2	Waukegan	1.55	1.87	2.38	2.93	3.65	4.22	4.79
1	3	La Harpe	1.77	2.16	2.81	3.36	4.38	5.26	6.62
1	3	Monmouth	1.63	2.00	2.61	3.17	4.07	5.04	6.00
1	3	Quincy	1.71	2.06	2.66	3.19	4.05	4.81	5.73
1	4	Bloomington	1.78	2.19	2.93	3.61	4.75	5.73	6.74
1	4	Decatur	1.80	2.25	3.14	3.89	5.03	5.92	7.00
1	4	Havana	1.66	2.01	2.68	3.34	4.45	5.43	6.60
1	4	Lincoln	1.70	2.07	2.79	3.44	4.52	5.39	6.61
1	4	Minonk	1.68	2.03	2.70	3.29	4.28	5.31	6.78
1	4	Peoria	1.66	2.01	2.68	3.34	4.58	5.58	6.80
1	4	Rushville	1.81	2.17	2.84	3.47	4.56	5.51	6.51
1	5	Danville	2.02	2.46	3.26	3.93	4.81	5.50	6.12
1	5	Hoopeston	1.95	2.32	3.03	3.74	4.73	5.56	6.49
1	5	Pontiac	1.82	2.25	3.00	3.72	4.67	5.50	6.43
1	5	Roberts	1.83	2.18	2.87	3.46	4.45	5.41	6.74
1	5	Urbana	1.96	2.34	3.00	3.58	4.31	4.88	5.52
1	6	Carlinville	2.00	2.40	3.05	3.71	4.80	5.84	7.22
1	6	Griggsville	1.91	2.35	3.09	3.78	4.83	5.65	6.71
1	6	Hillsboro	2.00	2.38	3.02	3.66	4.67	5.53	6.78
1	6	Jacksonville	1.94	2.35	3.04	3.68	4.69	5.72	6.71
1	6	Morrisonville	1.91	2.33	2.95	3.54	4.55	5.41	6.26
1	6	Pana	2.04	2.49	3.11	3.68	4.63	5.47	6.60
1	6	Springfield	1.85	2.23	2.89	3.49	4.54	5.54	6.55
1	6	White Hall	1.93	2.35	3.05	3.71	4.71	5.50	6.28
1	7	Charleston	2.32	2.87	3.65	4.38	5.35	6.06	6.87
1	7	Effingham	2.33	2.92	3.82	4.58	5.58	6.53	7.66
1	7	Palestine	2.42	2.94	3.62	4.31	5.16	6.01	7.06
1	7	Paris	2.24	2.87	3.76	4.68	5.78	6.60	7.49
1	7	Windsor	2.32	2.92	3.81	4.69	5.91	6.80	7.87
1	8	Belleville	2.22	2.70	3.63	4.54	5.88	7.22	9.17
1	8	DuQuoin	2.38	3.01	3.96	4.78	5.89	6.80	7.63
1	8	Greenville	2.22	2.78	3.67	4.41	5.47	6.60	7.78
1	8	Sparta	2.35	2.91	3.82	4.66	5.89	7.10	8.30
1	8	St Louis	2.19	2.73	3.70	4.62	5.92	7.37	9.05
1	9	Fairfield	2.79	3.48	4.42	5.44	6.56	7.35	8.43
1	9	Flora	2.76	3.40	4.27	5.20	6.34	7.21	8.28
1	9	McLeansboro	2.84	3.54	4.49	5.47	6.49	7.28	8.28
1	9	Mt Carmel	2.85	3.54	4.58	5.51	6.77	7.53	8.36
1	9	Mt Vernon	2.83	3.54	4.48	5.40	6.51	7.32	8.28
1	9	Olney	2.86	3.48	4.29	5.13	6.11	6.87	7.89
1	10	Anna	3.42	4.19	5.33	6.41	7.88	9.02	10.32
1	10	Cairo	3.17	3.94	5.19	6.30	7.96	9.43	10.75
1	10	Carbondale	3.13	4.00	5.23	6.30	7.64	8.69	9.72
1	10	Harrisburg	3.13	3.85	5.11	6.54	8.75	10.17	12.10
1	10	New Burnside	3.29	4.11	5.33	6.49	8.11	9.43	10.88

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
2	1	Aledo	1.27	1.53	1.94	2.27	2.81	3.31	3.94
2	1	Dixon	1.23	1.48	1.91	2.27	2.87	3.43	4.09
2	1	Freeport	1.21	1.46	1.89	2.28	2.91	3.54	4.31
2	1	Galva	1.22	1.45	1.85	2.22	2.77	3.21	3.79
2	1	Moline	1.23	1.48	1.93	2.27	2.89	3.37	3.91
2	1	Morrison	1.28	1.53	1.91	2.27	2.87	3.43	4.20
2	1	Mt Carroll	1.29	1.55	1.94	2.30	2.85	3.32	3.98
2	1	Rockford	1.24	1.46	1.89	2.25	2.78	3.25	3.84
2	1	Walnut	1.28	1.53	1.94	2.29	2.85	3.37	4.02
2	2	Aurora	1.34	1.64	2.13	2.59	3.43	4.28	5.18
2	2	Chicago	1.27	1.56	2.01	2.44	3.09	3.75	4.44
2	2	DeKalb	1.37	1.63	2.13	2.54	3.13	3.71	4.37
2	2	Joliet	1.37	1.72	2.29	2.81	3.55	4.25	4.98
2	2	Kankakee	1.30	1.61	2.14	2.62	3.35	4.06	4.80
2	2	Marengo	1.26	1.51	1.95	2.35	2.95	3.52	4.08
2	2	Ottawa	1.35	1.63	2.10	2.57	3.25	3.87	4.53
2	2	Waukegan	1.23	1.47	1.88	2.26	2.86	3.34	3.87
2	3	La Harpe	1.40	1.73	2.29	2.82	3.61	4.46	5.68
2	3	Monmouth	1.34	1.67	2.16	2.67	3.52	4.35	5.39
2	3	Quincy	1.35	1.65	2.12	2.56	3.26	3.93	4.87
2	4	Bloomington	1.49	1.85	2.41	2.95	3.84	4.66	5.64
2	4	Decatur	1.52	1.92	2.55	3.20	4.13	5.00	5.91
2	4	Havana	1.33	1.63	2.16	2.73	3.67	4.55	5.66
2	4	Lincoln	1.41	1.71	2.24	2.80	3.69	4.49	5.48
2	4	Minonk	1.35	1.65	2.18	2.69	3.55	4.48	5.73
2	4	Peoria	1.39	1.72	2.29	2.88	3.92	4.87	5.93
2	4	Rushville	1.46	1.76	2.30	2.86	3.74	4.60	5.41
2	5	Danville	1.64	1.98	2.56	3.10	3.89	4.55	5.40
2	5	Hoopeston	1.57	1.91	2.38	2.87	3.60	4.25	4.99
2	5	Pontiac	1.51	1.91	2.50	3.07	3.97	4.84	5.77
2	5	Roberts	1.47	1.75	2.27	2.77	3.68	4.59	5.76
2	5	Urbana	1.53	1.86	2.33	2.78	3.47	4.13	4.90
2	6	Carlinville	1.57	1.93	2.46	3.00	3.91	4.73	5.76
2	6	Griggsville	1.57	1.91	2.39	2.90	3.65	4.38	5.08
2	6	Hillsboro	1.66	1.96	2.48	3.02	3.88	4.64	5.66
2	6	Jacksonville	1.56	1.93	2.47	2.98	3.82	4.50	5.32
2	6	Morrisonville	1.55	1.95	2.52	3.07	3.88	4.49	5.26
2	6	Pana	1.65	2.02	2.55	3.00	3.83	4.55	5.43
2	6	Springfield	1.53	1.86	2.35	2.83	3.57	4.30	5.14
2	6	White Hall	1.59	1.94	2.51	3.05	3.83	4.54	5.37
2	7	Charleston	1.96	2.32	2.94	3.49	4.29	5.10	5.95
2	7	Effingham	1.88	2.27	2.91	3.48	4.48	5.32	6.40
2	7	Palestine	1.98	2.40	3.02	3.60	4.35	5.04	5.98
2	7	Paris	1.90	2.37	3.05	3.78	4.76	5.37	5.91
2	7	Windsor	1.94	2.37	3.05	3.67	4.58	5.41	6.38
2	8	Belleville	1.80	2.26	3.00	3.80	5.07	6.09	7.49
2	8	DuQuoin	1.96	2.47	3.19	3.92	4.81	5.54	6.38
2	8	Greenville	1.79	2.23	2.91	3.63	4.74	5.64	6.70
2	8	Sparta	1.97	2.44	3.19	3.92	4.94	5.72	6.59
2	8	St Louis	1.82	2.25	3.00	3.75	5.00	6.05	7.37
2	9	Fairfield	2.21	2.70	3.58	4.22	5.03	5.65	6.34
2	9	Flora	2.20	2.65	3.42	4.10	5.02	5.64	6.16
2	9	McLeansboro	2.25	2.78	3.65	4.32	5.27	5.80	6.43
2	9	Mt Carmel	2.28	2.78	3.58	4.22	5.04	5.50	6.08
2	9	Mt Vernon	2.29	2.84	3.65	4.42	5.31	5.80	6.30
2	9	Olney	2.26	2.73	3.49	4.11	5.00	5.49	6.14
2	10	Anna	2.84	3.52	4.41	5.24	6.41	7.32	7.93
2	10	Cairo	2.74	3.37	4.24	5.17	6.48	7.43	8.28
2	10	Carbondale	2.74	3.35	4.31	5.17	6.48	7.47	8.28
2	10	Harrisburg	2.59	3.18	4.13	5.11	6.58	7.74	8.96
2	10	New Burnside	2.80	3.38	4.35	5.18	6.55	7.58	8.65

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
3	1	Aledo	1.15	1.38	1.75	2.05	2.54	2.99	3.56
3	1	Dixon	1.09	1.31	1.69	2.01	2.54	3.04	3.62
3	1	Freeport	1.09	1.32	1.71	2.06	2.63	3.20	3.89
3	1	Galva	1.10	1.31	1.68	2.01	2.51	2.91	3.43
3	1	Moline	1.11	1.33	1.73	2.04	2.60	3.03	3.51
3	1	Morrison	1.15	1.35	1.70	2.05	2.57	3.04	3.72
3	1	Mt Carroll	1.12	1.34	1.72	2.06	2.57	2.99	3.50
3	1	Rockford	1.13	1.35	1.70	2.04	2.53	2.92	3.38
3	1	Walnut	1.14	1.35	1.72	2.04	2.55	2.98	3.49
3	2	Aurora	1.17	1.44	1.87	2.37	3.16	3.92	4.80
3	2	Chicago	1.13	1.42	1.84	2.25	2.92	3.50	4.21
3	2	DeKalb	1.22	1.46	1.90	2.27	2.80	3.32	3.91
3	2	Joliet	1.27	1.60	2.10	2.58	3.34	4.01	4.69
3	2	Kankakee	1.18	1.46	1.94	2.38	3.04	3.69	4.36
3	2	Marengo	1.13	1.35	1.74	2.10	2.64	3.15	3.65
3	2	Ottawa	1.19	1.46	1.91	2.33	3.01	3.56	4.10
3	2	Waukegan	1.08	1.32	1.71	2.06	2.61	3.01	3.54
3	3	La Harpe	1.26	1.55	2.08	2.57	3.31	4.09	5.05
3	3	Monmouth	1.22	1.49	1.98	2.44	3.23	3.94	4.81
3	3	Quincy	1.23	1.50	1.97	2.38	3.06	3.62	4.37
3	4	Bloomington	1.34	1.67	2.17	2.66	3.46	4.20	5.09
3	4	Decatur	1.40	1.77	2.35	2.95	3.81	4.61	5.45
3	4	Havana	1.19	1.46	1.94	2.45	3.29	4.08	5.08
3	4	Lincoln	1.27	1.57	2.10	2.57	3.44	4.06	4.89
3	4	Minonk	1.24	1.52	1.99	2.45	3.26	3.99	4.97
3	4	Peoria	1.28	1.58	2.10	2.64	3.57	4.39	5.28
3	4	Rushville	1.31	1.58	2.07	2.58	3.35	4.04	4.81
3	5	Danville	1.47	1.77	2.29	2.77	3.48	4.07	4.83
3	5	Hoopeston	1.39	1.65	2.11	2.53	3.15	3.74	4.38
3	5	Pontiac	1.33	1.68	2.26	2.77	3.55	4.30	5.04
3	5	Roberts	1.31	1.57	2.03	2.49	3.31	4.09	5.08
3	5	Urbana	1.36	1.65	2.08	2.51	3.13	3.68	4.35
3	6	Carlinville	1.38	1.70	2.16	2.64	3.44	4.16	5.07
3	6	Griggsville	1.37	1.67	2.09	2.53	3.18	3.82	4.43
3	6	Hillsboro	1.45	1.72	2.17	2.58	3.28	3.92	4.73
3	6	Jacksonville	1.37	1.69	2.16	2.61	3.35	3.94	4.66
3	6	Morrisonville	1.37	1.69	2.27	2.76	3.45	3.98	4.65
3	6	Pana	1.44	1.76	2.22	2.61	3.33	3.96	4.72
3	6	Springfield	1.37	1.67	2.13	2.55	3.22	3.78	4.46
3	6	White Hall	1.44	1.72	2.20	2.65	3.34	3.92	4.57
3	7	Charleston	1.71	2.01	2.58	3.08	3.78	4.35	5.15
3	7	Effingham	1.66	2.00	2.50	3.00	3.83	4.52	5.47
3	7	Palestine	1.76	2.10	2.69	3.18	3.84	4.46	5.22
3	7	Paris	1.65	2.06	2.65	3.28	4.13	4.66	5.13
3	7	Windsor	1.70	2.07	2.67	3.21	4.01	4.73	5.58
3	8	Belleville	1.64	2.06	2.73	3.46	4.62	5.55	6.82
3	8	DuQuoin	1.73	2.18	2.82	3.46	4.25	4.89	5.63
3	8	Greenville	1.62	2.02	2.70	3.29	4.31	5.08	5.98
3	8	Sparta	1.75	2.15	2.85	3.48	4.45	5.05	5.81
3	8	St Louis	1.64	2.02	2.70	3.37	4.49	5.44	6.62
3	9	Fairfield	1.95	2.45	3.17	3.74	4.44	4.94	5.61
3	9	Flora	1.90	2.35	3.06	3.70	4.39	4.96	5.45
3	9	McLeansboro	1.96	2.45	3.17	3.82	4.44	4.93	5.55
3	9	Mt Carmel	2.06	2.49	3.21	3.75	4.27	4.73	5.29
3	9	Mt Vernon	2.00	2.47	3.19	3.87	4.57	4.98	5.47
3	9	Olney	2.00	2.42	3.11	3.70	4.39	4.92	5.34
3	10	Anna	2.55	3.04	3.93	4.64	5.65	6.51	7.34
3	10	Cairo	2.49	2.99	3.85	4.57	5.72	6.61	7.65
3	10	Carbondale	2.45	2.92	3.73	4.47	5.48	6.38	7.20
3	10	Harrisburg	2.25	2.76	3.58	4.43	5.70	6.71	7.77
3	10	New Burnside	2.52	2.99	3.69	4.40	5.48	6.44	7.58

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
4	1	Aledo	1.05	1.27	1.61	1.88	2.33	2.74	3.26
4	1	Dixon	0.98	1.17	1.51	1.80	2.28	2.72	3.24
4	1	Freeport	1.00	1.21	1.57	1.89	2.41	2.93	3.57
4	1	Galva	1.02	1.21	1.54	1.85	2.31	2.67	3.16
4	1	Moline	1.01	1.21	1.58	1.86	2.37	2.76	3.20
4	1	Morrison	1.01	1.21	1.50	1.82	2.32	2.75	3.32
4	1	Mt Carroll	1.00	1.22	1.55	1.88	2.32	2.72	3.17
4	1	Rockford	1.02	1.24	1.55	1.87	2.31	2.68	3.08
4	1	Walnut	1.00	1.22	1.54	1.84	2.31	2.68	3.12
4	2	Aurora	1.02	1.28	1.72	2.15	2.81	3.45	4.17
4	2	Chicago	1.01	1.28	1.68	2.08	2.70	3.21	3.78
4	2	DeKalb	1.13	1.34	1.75	2.09	2.58	3.05	3.60
4	2	Joliet	1.09	1.36	1.87	2.28	2.93	3.55	4.21
4	2	Kankakee	1.10	1.36	1.81	2.21	2.83	3.42	4.05
4	2	Marengo	1.01	1.21	1.56	1.88	2.36	2.82	3.26
4	2	Ottawa	1.04	1.30	1.71	2.11	2.71	3.19	3.70
4	2	Waukegan	0.98	1.21	1.57	1.89	2.36	2.77	3.18
4	3	La Harpe	1.15	1.44	1.94	2.36	3.06	3.65	4.54
4	3	Monmouth	1.09	1.36	1.83	2.25	2.95	3.60	4.38
4	3	Quincy	1.10	1.37	1.78	2.16	2.82	3.34	3.92
4	4	Bloomington	1.23	1.53	1.99	2.44	3.18	3.85	4.66
4	4	Decatur	1.27	1.61	2.14	2.68	3.46	4.19	4.95
4	4	Havana	1.10	1.34	1.78	2.25	3.02	3.75	4.66
4	4	Lincoln	1.13	1.42	1.88	2.34	3.15	3.72	4.39
4	4	Minonk	1.07	1.31	1.78	2.21	2.93	3.62	4.38
4	4	Peoria	1.12	1.40	1.87	2.40	3.26	3.96	4.75
4	4	Rushville	1.12	1.38	1.81	2.22	2.92	3.53	4.28
4	5	Danville	1.29	1.56	2.01	2.44	3.06	3.58	4.25
4	5	Hoopeston	1.27	1.51	1.94	2.32	2.88	3.31	3.82
4	5	Pontiac	1.17	1.48	2.00	2.46	3.18	3.78	4.39
4	5	Roberts	1.13	1.37	1.81	2.22	2.95	3.66	4.50
4	5	Urbana	1.21	1.48	1.89	2.27	2.82	3.26	3.79
4	6	Carlinville	1.22	1.50	1.91	2.33	3.04	3.67	4.47
4	6	Griggsville	1.23	1.50	1.87	2.27	2.86	3.43	3.98
4	6	Hillsboro	1.31	1.55	1.96	2.31	2.87	3.36	4.01
4	6	Jacksonville	1.21	1.50	1.91	2.31	2.96	3.49	4.12
4	6	Morrisonville	1.24	1.53	2.03	2.46	3.02	3.49	4.04
4	6	Pana	1.25	1.53	1.93	2.27	2.90	3.44	4.11
4	6	Springfield	1.23	1.50	1.92	2.31	2.90	3.41	3.97
4	6	White Hall	1.28	1.56	2.00	2.39	3.01	3.51	4.05
4	7	Charleston	1.49	1.79	2.26	2.67	3.29	3.83	4.44
4	7	Effingham	1.47	1.74	2.23	2.69	3.40	4.06	4.76
4	7	Palestine	1.50	1.83	2.32	2.77	3.39	3.96	4.58
4	7	Paris	1.42	1.77	2.28	2.82	3.55	4.01	4.41
4	7	Windsor	1.52	1.86	2.39	2.88	3.59	4.25	5.01
4	8	Belleville	1.53	1.93	2.56	3.24	4.32	5.19	6.39
4	8	DuQuoin	1.54	1.94	2.51	3.08	3.78	4.35	5.01
4	8	Greenville	1.47	1.81	2.46	3.02	3.87	4.58	5.24
4	8	Sparta	1.52	1.91	2.50	3.08	3.91	4.51	5.10
4	8	St Louis	1.50	1.85	2.47	3.09	4.12	4.99	6.07
4	9	Fairfield	1.71	2.13	2.76	3.26	3.87	4.30	4.87
4	9	Flora	1.69	2.09	2.71	3.25	3.98	4.50	4.92
4	9	McLeansboro	1.74	2.18	2.81	3.41	4.01	4.41	4.92
4	9	Mt Carmel	1.83	2.21	2.84	3.31	3.88	4.25	4.72
4	9	Mt Vernon	1.75	2.20	2.82	3.34	3.97	4.32	4.76
4	9	Olney	1.72	2.11	2.70	3.25	3.92	4.36	4.74
4	10	Anna	2.24	2.67	3.54	4.19	5.05	5.81	6.48
4	10	Cairo	2.20	2.66	3.48	4.14	5.11	5.83	6.82
4	10	Carbondale	2.10	2.52	3.27	3.95	4.79	5.52	6.26
4	10	Harrisburg	1.98	2.43	3.15	3.90	5.02	5.91	6.84
4	10	New Burnside	2.22	2.66	3.34	3.98	4.94	5.68	6.71

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
5	1	Aledo	0.92	1.11	1.40	1.64	2.03	2.39	2.85
5	1	Dixon	0.86	1.04	1.34	1.59	2.01	2.40	2.86
5	1	Freeport	0.90	1.08	1.40	1.69	2.16	2.62	3.19
5	1	Galva	0.88	1.05	1.33	1.60	2.00	2.31	2.73
5	1	Moline	0.89	1.07	1.39	1.64	2.09	2.43	2.82
5	1	Morrison	0.87	1.05	1.31	1.54	1.97	2.29	2.71
5	1	Mt Carroll	0.86	1.06	1.38	1.61	1.98	2.24	2.58
5	1	Rockford	0.85	1.04	1.34	1.57	1.98	2.27	2.58
5	1	Walnut	0.86	1.06	1.32	1.55	1.96	2.24	2.59
5	2	Aurora	0.89	1.12	1.49	1.90	2.48	2.96	3.53
5	2	Chicago	0.87	1.08	1.45	1.80	2.28	2.65	3.15
5	2	DeKalb	0.98	1.17	1.53	1.82	2.24	2.66	3.13
5	2	Joliet	0.91	1.15	1.55	1.94	2.48	2.94	3.56
5	2	Kankakee	1.00	1.24	1.64	2.01	2.57	3.11	3.68
5	2	Marengo	0.85	1.02	1.32	1.59	2.00	2.38	2.76
5	2	Ottawa	0.87	1.08	1.45	1.80	2.23	2.60	3.04
5	2	Waukegan	0.82	1.01	1.28	1.54	1.92	2.26	2.69
5	3	La Harpe	0.89	1.16	1.59	2.01	2.58	3.07	3.65
5	3	Monmouth	0.84	1.09	1.54	1.94	2.43	2.85	3.32
5	3	Quincy	0.90	1.16	1.63	2.00	2.46	2.75	3.12
5	4	Bloomington	1.06	1.31	1.71	2.09	2.72	3.30	4.00
5	4	Decatur	1.02	1.28	1.71	2.14	2.76	3.34	3.95
5	4	Havana	0.94	1.15	1.52	1.92	2.58	3.20	3.98
5	4	Lincoln	0.91	1.16	1.59	1.98	2.66	3.11	3.73
5	4	Minonk	0.91	1.13	1.52	1.89	2.47	3.00	3.73
5	4	Peoria	0.93	1.17	1.59	2.02	2.71	3.25	4.00
5	4	Rushville	0.96	1.17	1.52	1.85	2.40	2.85	3.51
5	5	Danville	1.12	1.35	1.75	2.12	2.66	3.11	3.69
5	5	Hoopeston	1.03	1.22	1.51	1.77	2.20	2.52	2.88
5	5	Pontiac	0.98	1.24	1.63	1.98	2.58	3.01	3.40
5	5	Roberts	0.96	1.16	1.51	1.86	2.38	2.88	3.42
5	5	Urbana	1.05	1.27	1.59	1.89	2.28	2.56	2.93
5	6	Carlinville	1.04	1.28	1.63	1.99	2.59	3.14	3.82
5	6	Griggsville	1.06	1.29	1.62	1.96	2.47	2.96	3.43
5	6	Hillsboro	1.18	1.37	1.68	1.93	2.34	2.78	3.25
5	6	Jacksonville	1.02	1.26	1.62	1.95	2.50	2.94	3.48
5	6	Morrisonville	1.06	1.29	1.66	1.96	2.39	2.80	3.15
5	6	Pana	1.03	1.26	1.59	1.87	2.39	2.84	3.38
5	6	Springfield	1.06	1.29	1.62	1.94	2.42	2.79	3.18
5	6	White Hall	1.09	1.31	1.62	1.93	2.31	2.73	3.15
5	7	Charleston	1.27	1.50	1.88	2.19	2.74	3.22	3.71
5	7	Effingham	1.22	1.46	1.85	2.21	2.80	3.28	3.93
5	7	Palestine	1.27	1.51	1.93	2.20	2.68	3.14	3.83
5	7	Paris	1.15	1.44	1.85	2.29	2.88	3.25	3.58
5	7	Windsor	1.21	1.48	1.90	2.29	2.86	3.38	3.98
5	8	Belleville	1.31	1.64	2.18	2.76	3.68	4.42	5.44
5	8	DuQuoin	1.33	1.67	2.16	2.65	3.25	3.75	4.31
5	8	Greenville	1.26	1.53	2.07	2.49	3.17	3.68	4.35
5	8	Sparta	1.22	1.51	2.09	2.54	3.13	3.59	4.15
5	8	St Louis	1.31	1.61	2.15	2.69	3.59	4.34	5.29
5	9	Fairfield	1.46	1.77	2.21	2.63	3.14	3.49	3.92
5	9	Flora	1.41	1.73	2.23	2.66	3.29	3.77	4.05
5	9	McLeansboro	1.47	1.79	2.24	2.69	3.20	3.54	4.03
5	9	Mt Carmel	1.45	1.74	2.18	2.64	3.11	3.49	3.90
5	9	Mt Vernon	1.45	1.73	2.18	2.51	2.93	3.20	3.47
5	9	Olney	1.42	1.72	2.15	2.58	3.08	3.43	3.90
5	10	Anna	1.79	2.14	2.75	3.25	4.03	4.61	4.99
5	10	Cairo	1.77	2.14	2.83	3.31	3.98	4.68	5.25
5	10	Carbondale	1.69	2.03	2.58	3.11	3.77	4.45	4.97
5	10	Harrisburg	1.58	1.94	2.51	3.11	4.00	4.71	5.45
5	10	New Burnside	1.75	2.04	2.60	3.11	3.84	4.55	5.35

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
6	1	Aledo	0.83	1.00	1.27	1.49	1.84	2.17	2.59
6	1	Dixon	0.80	0.96	1.24	1.47	1.86	2.22	2.65
6	1	Freeport	0.80	0.97	1.25	1.51	1.93	2.34	2.85
6	1	Galva	0.80	0.95	1.22	1.46	1.82	2.11	2.49
6	1	Moline	0.81	0.97	1.27	1.49	1.90	2.21	2.57
6	1	Morrison	0.80	0.97	1.20	1.41	1.81	2.10	2.49
6	1	Mt Carroll	0.79	0.97	1.27	1.48	1.83	2.06	2.37
6	1	Rockford	0.77	0.96	1.23	1.44	1.83	2.09	2.37
6	1	Walnut	0.80	0.97	1.22	1.43	1.80	2.06	2.38
6	2	Aurora	0.81	1.03	1.38	1.74	2.28	2.72	3.25
6	2	Chicago	0.79	0.99	1.33	1.65	2.10	2.44	2.90
6	2	DeKalb	0.90	1.07	1.40	1.67	2.06	2.44	2.87
6	2	Joliet	0.84	1.06	1.42	1.78	2.28	2.71	3.27
6	2	Kankakee	0.92	1.14	1.51	1.85	2.37	2.87	3.39
6	2	Marengo	0.78	0.93	1.20	1.45	1.82	2.17	2.52
6	2	Ottawa	0.80	0.99	1.33	1.65	2.05	2.39	2.80
6	2	Waukegan	0.75	0.93	1.18	1.42	1.76	2.08	2.47
6	3	La Harpe	0.82	1.06	1.46	1.85	2.37	2.82	3.36
6	3	Monmouth	0.77	1.00	1.41	1.78	2.24	2.62	3.05
6	3	Quincy	0.83	1.07	1.50	1.86	2.26	2.53	2.87
6	4	Bloomington	0.96	1.19	1.55	1.90	2.47	3.00	3.63
6	4	Decatur	0.91	1.15	1.53	1.92	2.48	3.00	3.55
6	4	Havana	0.84	1.03	1.37	1.73	2.33	2.88	3.59
6	4	Lincoln	0.83	1.07	1.47	1.83	2.44	2.86	3.43
6	4	Minonk	0.84	1.05	1.40	1.73	2.28	2.76	3.43
6	4	Peoria	0.85	1.07	1.46	1.86	2.50	2.99	3.68
6	4	Rushville	0.88	1.08	1.39	1.70	2.21	2.62	3.23
6	5	Danville	1.03	1.24	1.60	1.94	2.43	2.85	3.38
6	5	Hoopeston	0.95	1.12	1.39	1.63	2.04	2.32	2.65
6	5	Pontiac	0.91	1.15	1.50	1.82	2.37	2.77	3.14
6	5	Roberts	0.88	1.07	1.39	1.71	2.19	2.65	3.15
6	5	Urbana	0.97	1.17	1.46	1.74	2.10	2.35	2.69
6	6	Carlinville	0.96	1.18	1.50	1.83	2.39	2.89	3.51
6	6	Griggsville	0.95	1.16	1.45	1.76	2.22	2.66	3.08
6	6	Hillsboro	1.08	1.26	1.55	1.78	2.15	2.56	2.99
6	6	Jacksonville	0.92	1.14	1.46	1.76	2.26	2.66	3.14
6	6	Morrisonville	0.98	1.18	1.53	1.80	2.20	2.57	2.90
6	6	Pana	0.95	1.16	1.46	1.72	2.20	2.61	3.11
6	6	Springfield	0.98	1.18	1.48	1.78	2.23	2.57	2.92
6	6	White Hall	1.00	1.21	1.49	1.75	2.13	2.51	2.89
6	7	Charleston	1.17	1.38	1.73	2.02	2.52	2.96	3.42
6	7	Effingham	1.12	1.35	1.70	2.03	2.58	3.02	3.61
6	7	Palestine	1.17	1.39	1.77	2.03	2.46	2.89	3.52
6	7	Paris	1.05	1.31	1.69	2.09	2.63	2.97	3.27
6	7	Windsor	1.10	1.35	1.74	2.09	2.61	3.08	3.63
6	8	Belleville	1.21	1.52	2.01	2.55	3.40	4.09	5.03
6	8	DuQuoin	1.20	1.51	1.94	2.39	2.93	3.38	3.89
6	8	Greenville	1.15	1.41	1.91	2.32	2.92	3.39	4.00
6	8	Sparta	1.13	1.39	1.92	2.32	2.88	3.30	3.82
6	8	St Louis	1.20	1.49	1.98	2.48	3.31	4.00	4.87
6	9	Fairfield	1.34	1.62	2.04	2.42	2.89	3.21	3.61
6	9	Flora	1.30	1.60	2.05	2.45	3.02	3.47	3.73
6	9	McLeansboro	1.36	1.64	2.06	2.48	2.95	3.26	3.71
6	9	Mt Carmel	1.33	1.61	2.01	2.41	2.86	3.21	3.59
6	9	Mt Vernon	1.33	1.59	2.01	2.31	2.70	2.95	3.19
6	9	Olney	1.30	1.58	1.98	2.37	2.83	3.16	3.59
6	10	Anna	1.64	1.97	2.53	2.98	3.71	4.24	4.60
6	10	Cairo	1.62	1.97	2.60	3.05	3.66	4.30	4.83
6	10	Carbondale	1.56	1.87	2.37	2.86	3.46	4.09	4.58
6	10	Harrisburg	1.45	1.78	2.31	2.86	3.68	4.33	5.01
6	10	New Burnside	1.61	1.88	2.39	2.86	3.53	4.19	4.90

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
7	1	Aledo	0.77	0.93	1.18	1.38	1.71	2.01	2.40
7	1	Dixon	0.75	0.90	1.16	1.38	1.74	2.09	2.49
7	1	Freeport	0.73	0.88	1.14	1.38	1.76	2.14	2.61
7	1	Galva	0.74	0.88	1.13	1.35	1.68	1.95	2.30
7	1	Moline	0.75	0.90	1.17	1.38	1.76	2.05	2.38
7	1	Morrison	0.75	0.91	1.14	1.34	1.71	1.99	2.36
7	1	Mt Carroll	0.74	0.92	1.20	1.40	1.72	1.95	2.24
7	1	Rockford	0.73	0.91	1.17	1.36	1.72	1.97	2.24
7	1	Walnut	0.76	0.92	1.15	1.35	1.71	1.95	2.25
7	2	Aurora	0.77	0.98	1.30	1.65	2.15	2.57	3.07
7	2	Chicago	0.74	0.94	1.26	1.56	1.98	2.31	2.74
7	2	DeKalb	0.85	1.01	1.32	1.58	1.95	2.31	2.72
7	2	Joliet	0.79	1.00	1.35	1.69	2.15	2.56	3.10
7	2	Kankakee	0.87	1.08	1.43	1.75	2.24	2.71	3.21
7	2	Marengo	0.72	0.87	1.12	1.35	1.69	2.02	2.34
7	2	Ottawa	0.76	0.94	1.26	1.56	1.94	2.26	2.65
7	2	Waukegan	0.71	0.88	1.12	1.34	1.66	1.96	2.34
7	3	La Harpe	0.77	1.01	1.38	1.76	2.24	2.67	3.17
7	3	Monmouth	0.73	0.95	1.34	1.69	2.12	2.48	2.89
7	3	Quincy	0.79	1.01	1.41	1.75	2.14	2.39	2.72
7	4	Bloomington	0.89	1.11	1.45	1.77	2.30	2.80	3.38
7	4	Decatur	0.84	1.06	1.41	1.77	2.28	2.77	3.27
7	4	Havana	0.78	0.96	1.27	1.60	2.15	2.67	3.32
7	4	Lincoln	0.79	1.01	1.39	1.72	2.30	2.70	3.24
7	4	Minonk	0.78	0.99	1.33	1.64	2.15	2.61	3.24
7	4	Peoria	0.80	1.01	1.38	1.76	2.36	2.83	3.48
7	4	Rushville	0.83	1.02	1.32	1.61	2.09	2.48	3.06
7	5	Danville	0.95	1.15	1.49	1.80	2.26	2.64	3.14
7	5	Hoopeston	0.89	1.06	1.32	1.54	1.90	2.19	2.51
7	5	Pontiac	0.86	1.08	1.42	1.72	2.24	2.62	2.96
7	5	Roberts	0.83	1.01	1.32	1.62	2.07	2.50	2.98
7	5	Urbana	0.92	1.11	1.38	1.64	1.98	2.23	2.55
7	6	Carlinville	0.88	1.08	1.38	1.68	2.19	2.65	3.23
7	6	Griggsville	0.88	1.07	1.34	1.62	2.04	2.45	2.84
7	6	Hillsboro	1.02	1.19	1.46	1.68	2.03	2.42	2.83
7	6	Jacksonville	0.86	1.06	1.36	1.64	2.10	2.48	2.93
7	6	Morrisonville	0.92	1.12	1.45	1.70	2.08	2.43	2.74
7	6	Pana	0.87	1.07	1.35	1.59	2.03	2.41	2.88
7	6	Springfield	0.92	1.12	1.41	1.69	2.10	2.43	2.76
7	6	White Hall	0.94	1.14	1.41	1.66	2.01	2.37	2.74
7	7	Charleston	1.11	1.30	1.63	1.90	2.39	2.81	3.23
7	7	Effingham	1.06	1.27	1.61	1.92	2.44	2.85	3.42
7	7	Palestine	1.11	1.32	1.68	1.91	2.33	2.73	3.33
7	7	Paris	0.98	1.22	1.57	1.95	2.46	2.77	3.05
7	7	Windsor	1.03	1.26	1.62	1.95	2.43	2.87	3.39
7	8	Belleville	1.14	1.43	1.89	2.40	3.20	3.85	4.73
7	8	DuQuoin	1.11	1.40	1.81	2.22	2.72	3.14	3.61
7	8	Greenville	1.09	1.33	1.80	2.20	2.76	3.20	3.78
7	8	Sparta	1.06	1.32	1.81	2.20	2.73	3.12	3.61
7	8	St Louis	1.14	1.41	1.88	2.35	3.13	3.79	4.62
7	9	Fairfield	1.27	1.53	1.93	2.30	2.73	3.04	3.41
7	9	Flora	1.23	1.51	1.94	2.32	2.86	3.28	3.53
7	9	McLeansboro	1.28	1.56	1.95	2.34	2.79	3.08	3.51
7	9	Mt Carmel	1.26	1.52	1.90	2.24	2.71	3.04	3.39
7	9	Mt Vernon	1.26	1.50	1.90	2.18	2.55	2.79	3.03
7	9	Olney	1.23	1.49	1.87	2.24	2.68	2.98	3.39
7	10	Anna	1.55	1.86	2.39	2.82	3.51	4.02	4.35
7	10	Cairo	1.52	1.86	2.46	2.88	3.46	4.07	4.56
7	10	Carbondale	1.47	1.77	2.24	2.71	3.28	3.87	4.33
7	10	Harrisburg	1.37	1.69	2.19	2.71	3.49	4.10	4.75
7	10	New Burnside	1.53	1.77	2.26	2.71	3.35	3.96	4.64

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
8	1	Aledo	0.67	0.80	1.02	1.19	1.47	1.74	2.07
8	1	Dixon	0.64	0.78	1.00	1.19	1.50	1.80	2.14
8	1	Freeport	0.63	0.76	0.99	1.19	1.52	1.85	2.25
8	1	Galva	0.64	0.76	0.98	1.17	1.46	1.69	2.00
8	1	Moline	0.64	0.78	1.01	1.19	1.52	1.77	2.05
8	1	Morrison	0.65	0.79	0.98	1.15	1.48	1.71	2.03
8	1	Mt Carroll	0.64	0.79	1.04	1.21	1.49	1.68	1.93
8	1	Rockford	0.63	0.78	1.01	1.18	1.49	1.70	1.93
8	1	Walnut	0.65	0.79	0.99	1.17	1.47	1.68	1.94
8	2	Aurora	0.65	0.84	1.12	1.42	1.86	2.22	2.65
8	2	Chicago	0.65	0.81	1.09	1.35	1.71	1.99	2.36
8	2	DeKalb	0.73	0.87	1.14	1.36	1.68	1.99	2.34
8	2	Joliet	0.68	0.86	1.16	1.46	1.86	2.21	2.67
8	2	Kankakee	0.75	0.93	1.23	1.51	1.93	2.34	2.77
8	2	Marengo	0.62	0.75	0.96	1.16	1.46	1.74	2.01
8	2	Ottawa	0.65	0.81	1.09	1.35	1.68	1.95	2.28
8	2	Waukegan	0.61	0.76	0.97	1.16	1.43	1.70	2.01
8	3	La Harpe	0.66	0.87	1.19	1.52	1.94	2.30	2.73
8	3	Monmouth	0.63	0.82	1.15	1.45	1.82	2.13	2.49
8	3	Quincy	0.66	0.87	1.22	1.51	1.84	2.06	2.35
8	4	Bloomington	0.77	0.96	1.25	1.53	1.99	2.42	2.93
8	4	Decatur	0.73	0.92	1.22	1.53	1.97	2.39	2.83
8	4	Havana	0.67	0.82	1.09	1.38	1.86	2.30	2.86
8	4	Lincoln	0.69	0.88	1.20	1.49	1.99	2.33	2.80
8	4	Minonk	0.67	0.85	1.14	1.40	1.86	2.25	2.80
8	4	Peoria	0.70	0.87	1.19	1.52	2.04	2.44	3.00
8	4	Rushville	0.72	0.88	1.14	1.39	1.80	2.14	2.64
8	5	Danville	0.83	1.00	1.29	1.56	1.96	2.29	2.72
8	5	Hoopeston	0.77	0.91	1.14	1.33	1.64	1.89	2.16
8	5	Pontiac	0.75	0.93	1.23	1.48	1.93	2.26	2.55
8	5	Roberts	0.72	0.87	1.14	1.41	1.79	2.16	2.57
8	5	Urbana	0.79	0.96	1.20	1.42	1.71	1.92	2.19
8	6	Carlinville	0.76	0.93	1.19	1.45	1.89	2.29	2.78
8	6	Griggsville	0.75	0.92	1.15	1.39	1.75	2.10	2.43
8	6	Hillsboro	0.88	1.03	1.26	1.45	1.75	2.09	2.43
8	6	Jacksonville	0.74	0.91	1.17	1.41	1.81	2.13	2.52
8	6	Morrisonville	0.80	0.97	1.25	1.47	1.80	2.10	2.36
8	6	Pana	0.75	0.92	1.16	1.37	1.75	2.08	2.48
8	6	Springfield	0.80	0.97	1.21	1.45	1.81	2.10	2.39
8	6	White Hall	0.81	0.98	1.21	1.43	1.73	2.05	2.36
8	7	Charleston	0.95	1.13	1.40	1.64	2.06	2.42	2.78
8	7	Effingham	0.92	1.10	1.38	1.65	2.10	2.46	2.95
8	7	Palestine	0.95	1.13	1.45	1.65	2.01	2.36	2.87
8	7	Paris	0.84	1.05	1.35	1.67	2.10	2.37	2.61
8	7	Windsor	0.89	1.08	1.40	1.68	2.10	2.48	2.92
8	8	Belleville	0.98	1.23	1.63	2.07	2.76	3.32	4.08
8	8	DuQuoin	0.96	1.21	1.56	1.92	2.36	2.71	3.12
8	8	Greenville	0.94	1.15	1.55	1.88	2.38	2.76	3.26
8	8	Sparta	0.92	1.13	1.57	1.88	2.35	2.69	3.11
8	8	St Louis	0.99	1.22	1.63	2.04	2.72	3.29	4.01
8	9	Fairfield	1.09	1.33	1.66	1.99	2.36	2.62	2.94
8	9	Flora	1.06	1.30	1.67	2.01	2.47	2.82	3.04
8	9	McLeansboro	1.11	1.34	1.68	2.02	2.40	2.66	3.03
8	9	Mt Carmel	1.08	1.31	1.64	1.93	2.33	2.62	2.92
8	9	Mt Vernon	1.08	1.30	1.64	1.88	2.20	2.40	2.61
8	9	Olney	1.06	1.29	1.61	1.93	2.31	2.57	2.92
8	10	Anna	1.34	1.60	2.06	2.43	3.02	3.46	3.74
8	10	Cairo	1.31	1.60	2.12	2.48	2.98	3.51	3.94
8	10	Carbondale	1.27	1.53	1.94	2.34	2.83	3.33	3.73
8	10	Harrisburg	1.19	1.46	1.89	2.34	3.01	3.54	4.10
8	10	New Burnside	1.32	1.53	1.95	2.34	2.88	3.41	3.94

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
9	1	Aledo	0.57	0.69	0.87	1.02	1.26	1.49	1.77
9	1	Dixon	0.55	0.67	0.86	1.02	1.29	1.54	1.84
9	1	Freeport	0.54	0.65	0.85	1.02	1.30	1.58	1.93
9	1	Galva	0.54	0.65	0.83	0.99	1.24	1.43	1.69
9	1	Moline	0.55	0.67	0.87	1.02	1.30	1.51	1.76
9	1	Morrison	0.55	0.67	0.84	0.98	1.26	1.46	1.73
9	1	Mt Carroll	0.55	0.68	0.88	1.03	1.27	1.44	1.65
9	1	Rockford	0.54	0.67	0.86	1.00	1.27	1.45	1.65
9	1	Walnut	0.56	0.68	0.85	0.99	1.26	1.44	1.66
9	2	Aurora	0.55	0.72	0.96	1.21	1.59	1.89	2.26
9	2	Chicago	0.54	0.69	0.93	1.15	1.46	1.70	2.02
9	2	DeKalb	0.63	0.74	0.97	1.16	1.43	1.69	2.00
9	2	Joliet	0.58	0.74	0.99	1.24	1.59	1.88	2.28
9	2	Kankakee	0.64	0.79	1.05	1.28	1.64	1.98	2.35
9	2	Marengo	0.53	0.64	0.82	0.99	1.24	1.48	1.72
9	2	Ottawa	0.56	0.69	0.93	1.15	1.43	1.66	1.95
9	2	Waukegan	0.53	0.64	0.82	0.99	1.23	1.44	1.72
9	3	La Harpe	0.57	0.74	1.02	1.30	1.65	1.96	2.34
9	3	Monmouth	0.54	0.70	0.98	1.23	1.56	1.82	2.12
9	3	Quincy	0.56	0.74	1.04	1.27	1.57	1.76	2.00
9	4	Bloomington	0.66	0.82	1.06	1.30	1.69	2.05	2.49
9	4	Decatur	0.62	0.78	1.04	1.30	1.68	2.03	2.40
9	4	Havana	0.57	0.70	0.93	1.18	1.59	1.97	2.45
9	4	Lincoln	0.58	0.75	1.02	1.27	1.70	1.99	2.39
9	4	Minonk	0.57	0.73	0.97	1.19	1.58	1.92	2.39
9	4	Peoria	0.59	0.74	1.02	1.29	1.74	2.09	2.56
9	4	Rushville	0.61	0.76	0.97	1.18	1.54	1.83	2.25
9	5	Danville	0.70	0.85	1.10	1.33	1.67	1.95	2.32
9	5	Hoopeston	0.66	0.78	0.97	1.13	1.41	1.61	1.84
9	5	Pontiac	0.63	0.80	1.04	1.27	1.65	1.93	2.19
9	5	Roberts	0.61	0.75	0.97	1.20	1.52	1.84	2.19
9	5	Urbana	0.67	0.81	1.02	1.21	1.46	1.64	1.87
9	6	Carlinville	0.64	0.79	1.01	1.23	1.60	1.94	2.36
9	6	Griggsville	0.64	0.78	0.98	1.19	1.50	1.80	2.08
9	6	Hillsboro	0.75	0.88	1.07	1.23	1.50	1.78	2.08
9	6	Jacksonville	0.63	0.78	1.00	1.21	1.55	1.83	2.16
9	6	Morrisonville	0.68	0.82	1.07	1.25	1.53	1.79	2.01
9	6	Pana	0.64	0.79	0.99	1.17	1.49	1.77	2.12
9	6	Springfield	0.68	0.82	1.03	1.24	1.55	1.79	2.03
9	6	White Hall	0.70	0.84	1.03	1.22	1.48	1.75	2.01
9	7	Charleston	0.81	0.96	1.20	1.40	1.75	2.06	2.38
9	7	Effingham	0.78	0.94	1.18	1.40	1.79	2.10	2.51
9	7	Palestine	0.81	0.96	1.24	1.41	1.71	2.01	2.45
9	7	Paris	0.72	0.90	1.15	1.43	1.80	2.03	2.24
9	7	Windsor	0.76	0.92	1.19	1.43	1.78	2.11	2.49
9	8	Belleville	0.83	1.05	1.39	1.76	2.35	2.82	3.47
9	8	DuQuoin	0.83	1.05	1.36	1.67	2.05	2.36	2.72
9	8	Greenville	0.81	0.98	1.33	1.61	2.03	2.35	2.78
9	8	Sparta	0.78	0.97	1.34	1.61	2.01	2.30	2.66
9	8	St Louis	0.84	1.04	1.39	1.74	2.32	2.81	3.42
9	9	Fairfield	0.94	1.13	1.41	1.68	2.01	2.23	2.51
9	9	Flora	0.90	1.11	1.42	1.72	2.11	2.41	2.60
9	9	McLeansboro	0.95	1.15	1.44	1.72	2.05	2.27	2.58
9	9	Mt Carmel	0.92	1.12	1.40	1.65	1.99	2.23	2.49
9	9	Mt Vernon	0.92	1.11	1.40	1.61	1.88	2.05	2.22
9	9	Olney	0.91	1.10	1.38	1.65	1.97	2.19	2.49
9	10	Anna	1.14	1.37	1.76	2.07	2.58	2.95	3.19
9	10	Cairo	1.12	1.37	1.81	2.12	2.55	3.00	3.36
9	10	Carbondale	1.08	1.30	1.65	1.99	2.41	2.85	3.18
9	10	Harrisburg	1.01	1.24	1.61	1.99	2.56	3.01	3.49
9	10	New Burnside	1.12	1.31	1.66	1.99	2.46	2.91	3.32

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
10	1	Aledo	0.53	0.63	0.80	0.94	1.16	1.37	1.63
10	1	Dixon	0.51	0.61	0.79	0.94	1.19	1.42	1.69
10	1	Freeport	0.50	0.60	0.78	0.94	1.20	1.46	1.78
10	1	Galva	0.51	0.60	0.77	0.92	1.15	1.33	1.57
10	1	Moline	0.51	0.61	0.80	0.94	1.20	1.40	1.62
10	1	Morrison	0.52	0.62	0.77	0.91	1.16	1.35	1.60
10	1	Mt Carroll	0.50	0.62	0.82	0.95	1.17	1.32	1.52
10	1	Rockford	0.49	0.62	0.79	0.92	1.17	1.34	1.52
10	1	Walnut	0.51	0.62	0.78	0.92	1.16	1.32	1.53
10	2	Aurora	0.51	0.66	0.88	1.12	1.46	1.75	2.08
10	2	Chicago	0.50	0.64	0.86	1.06	1.34	1.57	1.86
10	2	DeKalb	0.58	0.69	0.90	1.07	1.32	1.56	1.84
10	2	Joliet	0.54	0.68	0.92	1.14	1.46	1.73	2.10
10	2	Kankakee	0.59	0.73	0.96	1.18	1.51	1.83	2.16
10	2	Marengo	0.49	0.58	0.76	0.91	1.14	1.36	1.58
10	2	Ottawa	0.51	0.64	0.86	1.06	1.32	1.54	1.80
10	2	Waukegan	0.48	0.59	0.76	0.91	1.12	1.33	1.59
10	3	La Harpe	0.52	0.68	0.94	1.20	1.52	1.81	2.15
10	3	Monmouth	0.49	0.64	0.91	1.14	1.43	1.68	1.96
10	3	Quincy	0.51	0.69	0.96	1.18	1.45	1.62	1.85
10	4	Bloomington	0.61	0.75	0.98	1.20	1.56	1.90	2.29
10	4	Decatur	0.57	0.72	0.96	1.20	1.55	1.88	2.22
10	4	Havana	0.53	0.65	0.86	1.09	1.47	1.82	2.26
10	4	Lincoln	0.54	0.69	0.94	1.17	1.56	1.84	2.20
10	4	Minonk	0.53	0.67	0.90	1.10	1.47	1.77	2.20
10	4	Peoria	0.54	0.69	0.94	1.19	1.60	1.91	2.36
10	4	Rushville	0.57	0.71	0.90	1.09	1.42	1.68	2.07
10	5	Danville	0.65	0.78	1.01	1.22	1.53	1.79	2.13
10	5	Hoopeston	0.61	0.72	0.89	1.04	1.29	1.49	1.70
10	5	Pontiac	0.58	0.74	0.96	1.17	1.52	1.78	2.01
10	5	Roberts	0.56	0.69	0.89	1.10	1.41	1.70	2.02
10	5	Urbana	0.62	0.75	0.94	1.12	1.34	1.51	1.73
10	6	Carlinville	0.60	0.73	0.93	1.14	1.49	1.80	2.19
10	6	Griggsville	0.60	0.72	0.91	1.10	1.38	1.66	1.93
10	6	Hillsboro	0.69	0.81	0.99	1.14	1.38	1.64	1.91
10	6	Jacksonville	0.58	0.72	0.92	1.11	1.42	1.68	1.98
10	6	Morrisonville	0.63	0.76	0.98	1.15	1.41	1.65	1.86
10	6	Pana	0.59	0.73	0.92	1.08	1.38	1.64	1.95
10	6	Springfield	0.63	0.76	0.95	1.14	1.43	1.65	1.87
10	6	White Hall	0.64	0.77	0.95	1.12	1.37	1.61	1.86
10	7	Charleston	0.75	0.88	1.11	1.29	1.62	1.90	2.19
10	7	Effingham	0.72	0.86	1.09	1.30	1.65	1.93	2.32
10	7	Palestine	0.75	0.89	1.14	1.30	1.58	1.85	2.25
10	7	Paris	0.66	0.83	1.07	1.32	1.66	1.88	2.06
10	7	Windsor	0.70	0.85	1.10	1.32	1.65	1.95	2.29
10	8	Belleville	0.77	0.97	1.29	1.63	2.17	2.61	3.21
10	8	DuQuoin	0.75	0.94	1.21	1.49	1.83	2.11	2.43
10	8	Greenville	0.74	0.90	1.22	1.49	1.87	2.17	2.56
10	8	Sparta	0.72	0.89	1.23	1.48	1.85	2.12	2.45
10	8	St Louis	0.78	0.97	1.29	1.61	2.15	2.60	3.16
10	9	Fairfield	0.86	1.04	1.30	1.55	1.85	2.06	2.32
10	9	Flora	0.83	1.02	1.31	1.59	1.94	2.22	2.39
10	9	McLeansboro	0.87	1.07	1.33	1.58	1.89	2.09	2.38
10	9	Mt Carmel	0.85	1.03	1.29	1.52	1.84	2.06	2.30
10	9	Mt Vernon	0.85	1.02	1.29	1.48	1.73	1.89	2.05
10	9	Olney	0.84	1.01	1.27	1.52	1.81	2.02	2.30
10	10	Anna	1.06	1.26	1.62	1.92	2.38	2.72	2.94
10	10	Cairo	1.03	1.26	1.66	1.95	2.34	2.76	3.10
10	10	Carbondale	1.00	1.20	1.52	1.84	2.22	2.63	2.93
10	10	Harrisburg	0.93	1.15	1.49	1.84	2.37	2.79	3.23
10	10	New Burnside	1.03	1.20	1.53	1.84	2.27	2.68	3.13

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
11	1	Aledo	0.42	0.51	0.64	0.75	0.93	1.09	1.30
11	1	Dixon	0.41	0.49	0.63	0.75	0.95	1.13	1.35
11	1	Freeport	0.39	0.47	0.61	0.74	0.94	1.15	1.40
11	1	Galva	0.40	0.48	0.61	0.73	0.91	1.06	1.25
11	1	Moline	0.41	0.49	0.64	0.75	0.95	1.11	1.29
11	1	Morrison	0.41	0.49	0.61	0.72	0.93	1.07	1.27
11	1	Mt Carroll	0.40	0.50	0.65	0.75	0.93	1.05	1.21
11	1	Rockford	0.40	0.49	0.63	0.74	0.93	1.07	1.21
11	1	Walnut	0.41	0.50	0.62	0.73	0.92	1.05	1.22
11	2	Aurora	0.40	0.53	0.70	0.89	1.16	1.39	1.66
11	2	Chicago	0.40	0.51	0.68	0.84	1.07	1.25	1.48
11	2	DeKalb	0.46	0.55	0.71	0.85	1.05	1.24	1.46
11	2	Joliet	0.43	0.54	0.73	0.91	1.16	1.38	1.67
11	2	Kankakee	0.47	0.58	0.77	0.94	1.20	1.46	1.72
11	2	Marengo	0.39	0.47	0.61	0.73	0.92	1.09	1.27
11	2	Ottawa	0.41	0.51	0.68	0.84	1.05	1.22	1.43
11	2	Waukegan	0.38	0.48	0.60	0.73	0.90	1.06	1.26
11	3	La Harpe	0.42	0.54	0.75	0.96	1.21	1.44	1.71
11	3	Monmouth	0.39	0.51	0.72	0.90	1.14	1.34	1.56
11	3	Quincy	0.41	0.54	0.76	0.93	1.16	1.29	1.47
11	4	Bloomington	0.48	0.60	0.78	0.96	1.25	1.52	1.84
11	4	Decatur	0.46	0.58	0.76	0.96	1.24	1.50	1.77
11	4	Havana	0.42	0.51	0.68	0.86	1.16	1.43	1.78
11	4	Lincoln	0.43	0.55	0.76	0.93	1.24	1.46	1.75
11	4	Minonk	0.42	0.53	0.72	0.88	1.17	1.41	1.75
11	4	Peoria	0.43	0.55	0.75	0.95	1.28	1.53	1.88
11	4	Rushville	0.45	0.55	0.71	0.87	1.13	1.34	1.65
11	5	Danville	0.52	0.63	0.81	0.98	1.23	1.44	1.71
11	5	Hoopeston	0.48	0.57	0.71	0.83	1.05	1.18	1.35
11	5	Pontiac	0.46	0.58	0.77	0.93	1.21	1.41	1.60
11	5	Roberts	0.45	0.55	0.71	0.88	1.12	1.35	1.61
11	5	Urbana	0.50	0.60	0.75	0.89	1.07	1.20	1.38
11	6	Carlinville	0.48	0.59	0.75	0.91	1.19	1.43	1.75
11	6	Griggsville	0.47	0.57	0.72	0.87	1.09	1.31	1.52
11	6	Hillsboro	0.55	0.66	0.79	0.91	1.10	1.31	1.53
11	6	Jacksonville	0.47	0.58	0.74	0.89	1.14	1.34	1.59
11	6	Morrisonville	0.50	0.60	0.78	0.92	1.13	1.32	1.47
11	6	Pana	0.47	0.58	0.73	0.86	1.10	1.30	1.56
11	6	Springfield	0.50	0.60	0.76	0.91	1.14	1.32	1.48
11	6	White Hall	0.51	0.62	0.76	0.89	1.09	1.28	1.48
11	7	Charleston	0.60	0.70	0.88	1.03	1.29	1.51	1.74
11	7	Effingham	0.57	0.69	0.87	1.03	1.32	1.54	1.85
11	7	Palestine	0.60	0.71	0.90	1.03	1.26	1.48	1.80
11	7	Paris	0.53	0.66	0.85	1.05	1.32	1.49	1.64
11	7	Windsor	0.56	0.68	0.87	1.05	1.31	1.55	1.83
11	8	Belleville	0.62	0.77	1.03	1.30	1.73	2.08	2.56
11	8	DuQuoin	0.60	0.75	0.97	1.19	1.46	1.68	1.94
11	8	Greenville	0.59	0.72	0.98	1.19	1.49	1.73	2.04
11	8	Sparta	0.57	0.71	0.98	1.18	1.47	1.68	1.95
11	8	St Louis	0.63	0.78	1.04	1.30	1.73	2.10	2.55
11	9	Fairfield	0.69	0.83	1.04	1.25	1.48	1.64	1.84
11	9	Flora	0.66	0.81	1.04	1.28	1.54	1.77	1.92
11	9	McLeansboro	0.69	0.85	1.06	1.27	1.51	1.66	1.89
11	9	Mt Carmel	0.68	0.82	1.03	1.21	1.46	1.64	1.84
11	9	Mt Vernon	0.68	0.81	1.03	1.18	1.38	1.51	1.63
11	9	Olney	0.67	0.81	1.01	1.21	1.45	1.61	1.84
11	10	Anna	0.84	1.00	1.29	1.53	1.90	2.17	2.35
11	10	Cairo	0.82	1.00	1.33	1.56	1.87	2.20	2.46
11	10	Carbondale	0.79	0.96	1.21	1.46	1.77	2.09	2.34
11	10	Harrisburg	0.74	0.91	1.18	1.46	1.88	2.21	2.56
11	10	New Burnside	0.82	0.96	1.22	1.46	1.81	2.14	2.48

Winter rainfall (inches) for given recurrence interval

Storm code	Zone code	Station	1-year	2-year	5-year	10-year	25-year	50-year	100-year
12	1	Aledo	0.33	0.40	0.50	0.59	0.73	0.86	1.02
12	1	Dixon	0.32	0.38	0.50	0.59	0.75	0.89	1.06
12	1	Freeport	0.31	0.38	0.49	0.59	0.75	0.92	1.12
12	1	Galva	0.31	0.37	0.48	0.57	0.71	0.82	0.97
12	1	Moline	0.32	0.38	0.50	0.59	0.75	0.88	1.02
12	1	Morrison	0.32	0.39	0.48	0.57	0.73	0.85	1.00
12	1	Mt Carroll	0.31	0.39	0.51	0.60	0.73	0.83	0.95
12	1	Rockford	0.30	0.39	0.50	0.58	0.73	0.84	0.95
12	1	Walnut	0.31	0.39	0.49	0.57	0.73	0.83	0.96
12	2	Aurora	0.31	0.41	0.55	0.70	0.91	1.09	1.31
12	2	Chicago	0.31	0.40	0.54	0.66	0.84	0.98	1.17
12	2	DeKalb	0.36	0.43	0.56	0.67	0.83	0.98	1.15
12	2	Joliet	0.33	0.42	0.57	0.72	0.91	1.09	1.31
12	2	Kankakee	0.37	0.45	0.60	0.74	0.95	1.15	1.36
12	2	Marengo	0.31	0.37	0.47	0.57	0.72	0.85	0.99
12	2	Ottawa	0.32	0.40	0.54	0.66	0.83	0.96	1.13
12	2	Waukegan	0.30	0.37	0.47	0.58	0.70	0.83	0.99
12	3	La Harpe	0.33	0.43	0.59	0.75	0.96	1.14	1.35
12	3	Monmouth	0.31	0.40	0.57	0.72	0.90	1.05	1.23
12	3	Quincy	0.32	0.43	0.60	0.75	0.91	1.02	1.16
12	4	Bloomington	0.38	0.47	0.61	0.75	0.98	1.18	1.43
12	4	Decatur	0.36	0.45	0.60	0.75	0.97	1.17	1.39
12	4	Havana	0.33	0.41	0.54	0.68	0.91	1.13	1.41
12	4	Lincoln	0.35	0.44	0.60	0.73	0.98	1.15	1.38
12	4	Minonk	0.33	0.42	0.56	0.70	0.92	1.11	1.38
12	4	Peoria	0.34	0.43	0.59	0.75	1.00	1.20	1.48
12	4	Rushville	0.36	0.43	0.56	0.68	0.89	1.05	1.30
12	5	Danville	0.41	0.49	0.64	0.77	0.97	1.13	1.34
12	5	Hoopeston	0.38	0.45	0.56	0.66	0.82	0.93	1.07
12	5	Pontiac	0.36	0.45	0.61	0.73	0.95	1.11	1.26
12	5	Roberts	0.35	0.43	0.56	0.69	0.88	1.06	1.27
12	5	Urbana	0.39	0.47	0.59	0.70	0.84	0.95	1.08
12	6	Carlinville	0.37	0.46	0.58	0.71	0.93	1.12	1.36
12	6	Griggsville	0.37	0.45	0.57	0.69	0.87	1.04	1.21
12	6	Hillsboro	0.44	0.52	0.62	0.71	0.87	1.03	1.20
12	6	Jacksonville	0.37	0.45	0.58	0.70	0.90	1.06	1.25
12	6	Morrisonville	0.39	0.47	0.62	0.72	0.89	1.03	1.16
12	6	Pana	0.37	0.46	0.58	0.68	0.87	1.03	1.23
12	6	Springfield	0.39	0.47	0.60	0.72	0.89	1.03	1.16
12	6	White Hall	0.40	0.48	0.59	0.70	0.86	1.01	1.17
12	7	Charleston	0.47	0.56	0.69	0.81	1.01	1.19	1.37
12	7	Effingham	0.45	0.54	0.69	0.81	1.04	1.21	1.45
12	7	Palestine	0.47	0.56	0.71	0.81	0.99	1.16	1.42
12	7	Paris	0.41	0.51	0.66	0.82	1.03	1.16	1.28
12	7	Windsor	0.44	0.54	0.69	0.83	1.04	1.22	1.44
12	8	Belleville	0.48	0.61	0.81	1.02	1.36	1.63	2.01
12	8	DuQuoin	0.47	0.59	0.76	0.94	1.15	1.33	1.53
12	8	Greenville	0.46	0.57	0.77	0.94	1.17	1.36	1.61
12	8	Sparta	0.45	0.56	0.77	0.93	1.16	1.33	1.53
12	8	St Louis	0.50	0.62	0.82	1.03	1.37	1.66	2.02
12	9	Fairfield	0.54	0.65	0.82	0.99	1.16	1.29	1.45
12	9	Flora	0.52	0.64	0.83	1.00	1.22	1.39	1.52
12	9	McLeansboro	0.54	0.68	0.83	1.00	1.18	1.31	1.49
12	9	Mt Carmel	0.53	0.64	0.81	0.95	1.15	1.29	1.45
12	9	Mt Vernon	0.53	0.64	0.81	0.93	1.09	1.19	1.28
12	9	Olney	0.52	0.63	0.80	0.95	1.14	1.27	1.45
12	10	Anna	0.66	0.79	1.01	1.20	1.49	1.71	1.85
12	10	Cairo	0.64	0.79	1.04	1.23	1.47	1.73	1.94
12	10	Carbondale	0.63	0.75	0.96	1.15	1.39	1.64	1.84
12	10	Harrisburg	0.58	0.72	0.93	1.15	1.48	1.74	2.02
12	10	New Burnside	0.65	0.75	0.96	1.15	1.42	1.68	1.92