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# CLIMATE OF MINNESOTA

## Part X
## Precipitation Normals for Minnesota: 1941-1970

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# Precipitation Normals for Minnesota: 1941-1970

The authors wish to acknowledge their indebtedness to the many volunteer observers who constitute the National Weather Service climatological network. Without their valuable but essentially unknown services the climate of the United States would be only poorly known.

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The World Meteorological Organization established a uniform method of determining temperature and precipitation averages for purposes of comparison. These special averages, called normals, are calculated in 30-year increments and the 30-year period is changed each decade. The current 30-year normal period is 1941-70 and will remain in effect until 1981. Beginning in 1981 the new normal period 1951-80 will then be used.

This bulletin supplements the precipitation data in Part V (1) of the Climate of Minnesota series. There are two reasons for this supplement. One is to revise the normals shown in Part V, which are based upon precipitation for the period 1931-60. A second reason is that improved maps of Minnesota precipitation characteristics can be drawn, because there are now 91 stations with the required 30 year normal periods. The maps in Part V were drawn based upon only 64 stations.

These new maps were drawn with the aid of an additional 23 stations that had 1 to 2 years of substituted data for the required 30 years of record and also 49 periphery stations located in surrounding states. Altogether a total of 163 stations were used to make the analysis. The distribution of stations across the state is not uniform. There are more stations within the metropolitan area of the Twin Cities and the detail there is better known than elsewhere.

The normals of the current 30-year base period, 1941-70, are generally higher than those of 1931-60 because the 1931-60 period included the relatively dry decade of the 1930's. In this regard it was found that at all 10 of the stations listed in table 1 there are 3 months (April, July, and September) in addition to the annual totals, which have consistently higher normals for the 1941-70 period than the 1931-60 period. Only in November were the 1931-60 normals greater than the 1941-70 normals at all 10 stations. For these same 10 stations the annual total percipitation averaged 1.19 inches greater in the 1941-70 than the 1931-60 period.

## Precipitation Normals: 1941-70

### JANUARY

During the month of January the state is under the domination of northwest winds and the cold, dry air of the interior of the North American continent. As a result it is the coldest month of the year and the second lowest precipitation month with a state mean of only 0.74 inches as shown in table 2. This table is based upon the nine National Weather Service divisions of the state. The division abbreviations, for example, are NW, NC and NE for the northwest, northcentral and the northeast divisions, respectively. The nine divisions are shown in figure 1.

**Table 1. Difference in inches between the 1941-70 and the 1931-60 normal monthly and annual precipitation at 10 selected stations. Positive values indicate the 1941-70 normal is the larger one.**

| Station | J | F | M | A | M | J | J | A | S | O | N | D | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bird Island | .00 | .01 | .05 | .26 | −.23 | −.01 | .54 | −.08 | .16 | .24 | −.18 | .08 | 0.84 |
| Cloquet | −.04 | −.07 | .06 | .15 | −.05 | .23 | .36 | −.06 | .39 | .08 | −.12 | .22 | 1.15 |
| Crookston | .04 | −.05 | .01 | .10 | .07 | .58 | .15 | −.03 | .45 | −.10 | −.13 | .04 | 1.13 |
| Grand Rapids | −.02 | −.10 | .10 | .21 | .14 | .14 | .16 | .10 | .46 | .00 | −.36 | .15 | 0.98 |
| Itasca | .07 | −.02 | .10 | .32 | −.01 | .30 | .10 | .17 | .60 | .14 | .10 | .25 | 1.92 |
| Minneapolis | .03 | .06 | .15 | .19 | .18 | −.06 | .42 | −.13 | .30 | .19 | −.20 | .03 | 1.16 |
| Morris | .05 | −.05 | −.14 | .43 | .14 | −.08 | .26 | −.04 | .38 | .27 | −.06 | .12 | 1.18 |
| Pine River Dam | .04 | −.04 | .11 | .24 | −.29 | −.04 | .19 | .09 | .62 | −.03 | −.14 | .15 | 0.90 |
| Waseca | .13 | .00 | .18 | .15 | .18 | .17 | .76 | .13 | .53 | .35 | −.31 | .09 | 2.36 |
| Worthington | −.06 | .06 | .20 | .09 | −.02 | .19 | .22 | −.42 | .23 | .14 | −.15 | −.04 | 0.44 |
| Mean | .01 | −.02 | .08 | .21* | .01 | .14 | .32* | −.03 | .41* | .13 | .18** | .11 | 1.19* |

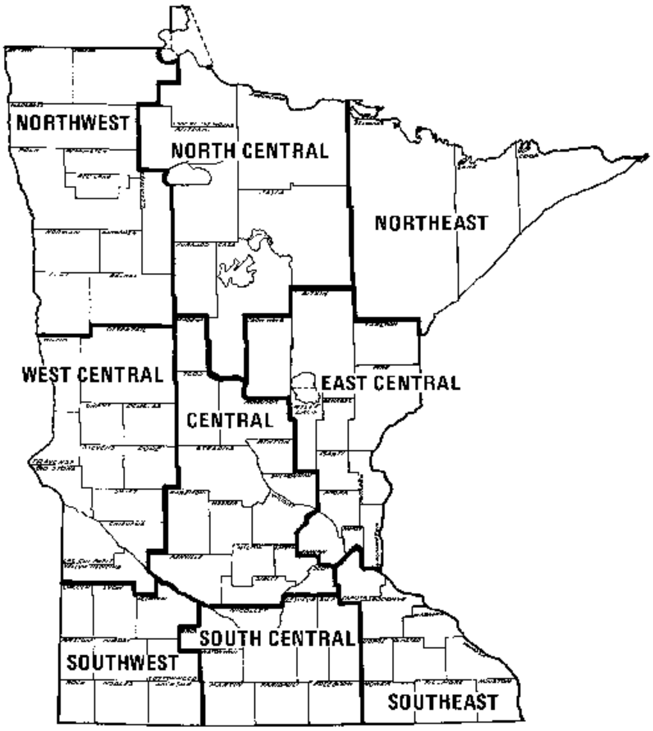
*All 10 values are positive.
**All 10 values are negative.

**Table 2. Monthly and annual* 1941-70 normals in inches for each division of the state (4).**

| Division | J | F | M | A | M | J | J | A | S | O | N | D | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NW | 0.64 | 0.46 | 0.93 | 1.74 | 2.63 | 3.97 | 3.38 | 3.31 | 2.49 | 1.28 | 0.87 | 0.71 | 22.41 |
| NC | 0.73 | 0.55 | 1.09 | 2.11 | 3.08 | 4.07 | 3.83 | 3.68 | 2.89 | 1.67 | 1.07 | 0.88 | 25.63 |
| NE | 0.97 | 0.66 | 1.24 | 2.33 | 3.19 | 4.08 | 3.80 | 3.77 | 3.35 | 2.13 | 1.52 | 1.09 | 28.13 |
| WC | 0.63 | 0.70 | 1.19 | 2.51 | 3.13 | 4.28 | 3.39 | 3.14 | 2.38 | 1.59 | 1.01 | 0.74 | 24.70 |
| C | 0.73 | 0.75 | 1.39 | 2.38 | 3.57 | 4.64 | 3.66 | 3.63 | 2.74 | 1.78 | 1.12 | 0.83 | 27.21 |
| EC | 0.82 | 0.74 | 1.49 | 2.38 | 3.61 | 4.69 | 3.81 | 3.87 | 2.93 | 1.96 | 1.33 | 0.96 | 28.57 |
| SW | 0.53 | 0.78 | 1.35 | 2.28 | 3.49 | 4.42 | 3.69 | 2.99 | 3.07 | 1.70 | 0.99 | 0.70 | 26.00 |
| SC | 0.74 | 0.66 | 1.70 | 2.47 | 3.90 | 4.67 | 4.21 | 3.71 | 3.16 | 1.84 | 1.16 | 0.93 | 29.35 |
| SE | 0.86 | 0.81 | 1.90 | 2.44 | 3.85 | 4.78 | 3.95 | 3.61 | 3.31 | 2.05 | 1.36 | 1.03 | 29.94 |
| State mean** | 0.74 | 0.68 | 1.36 | 2.29 | 3.38 | 4.40 | 3.75 | 3.52 | 2.92 | 1.78 | 1.16 | 0.87 | 26.88 |

*Monthly totals may differ slightly from annual amounts because of rounding of monthly values.
**The state mean is not a weighted mean but simply the mean of all nine divisions.

**Figure 1. The nine climatological divisions of the state.**




The region of maximum precipitation is the northeast, averaging 0.97 inch, and the least is in the southwest averaging only 0.53 inch. The greatest January difference between regions of the state is, therefore, only 0.44 inch which indicates a very weak precipitation gradient that is shown in figure 2.

The southeastern part of the state is closest to the state's prime moisture source, the Gulf of Mexico, and for this reason it ordinarily receives the most precipitation. For the same reason the northwestern part of Minnesota normally receives the least amount of precipitation. However, in January and the other winter months, the general atmospheric circulation is such that the entire state is largely cut off from the Gulf moisture source. As a result there is little precipitation variation across Minnesota.

The relatively high amount that falls along Lake Superior in January occurs because the lake serves as a very localized moisture source for snow showers. Winds from the southeasterly quadrant that move across the lake, which is still ice-free and relatively very warm, absorb additional moisture in the lower levels. Upon moving up and over the snow-covered shore and highland just behind the shore, the air is cooled, triggering condensation and precipitation in the form of snow showers. It is for this reason that the northeastern corner of the state receives 0.11 inch or 13 percent more precipitation than does the southeastern corner (table 3).

**Table 3. Monthly and annual comparison of the precipitation received in the southeastern division to that received in the northwestern, northeastern and the southwestern divisions of the state.***

| Month | Percentage ratios | Absolute differences (inches) |
|---|---|---|
| January | NW/SE = 74 | NW-SE = −0.22 |
| | NE/SE = 113 | NE-SE = 0.11 |
| | SW/SE = 62 | SW-SE = −0.33 |
| February | NW/SE = 57 | NW-SE = −0.35 |
| | NE/SE = 81 | NE-SE = −0.15 |
| | SW/SE = 96 | SW-SE = −0.03 |
| March | NW/SE = 49 | NW-SE = −0.97 |
| | NE/SE = 65 | NE-SE = −0.66 |
| | SW/SE = 71 | SW-SE = −0.55 |
| April | NW/SE = 71 | NW-SE = −0.70 |
| | NE/SE = 95 | NE-SE = −0.11 |
| | SW/SE = 93 | SW-SE = −0.16 |
| May | NW/SE = 68 | NW-SE = −1.22 |
| | NE/SE = 83 | NE-SE = −0.66 |
| | SW/SE = 91 | SW-SE = −0.36 |
| June | NW/SE = 83 | NW-SE = −0.81 |
| | NE/SE = 85 | NE-SE = −0.70 |
| | SW/SE = 92 | SW-SE = −0.36 |
| July | NW/SE = 86 | NW-SE = −0.57 |
| | NE/SE = 96 | NE-SE = −0.15 |
| | SW/SE = 93 | SW-SE = −0.26 |
| August | NW/SE = 92 | NW-SE = −0.30 |
| | NE/SE = 104 | NE-SE = 0.16 |
| | SW/SE = 83 | SW-SE = −0.62 |
| September | NW/SE = 75 | NW-SE = −0.82 |
| | NE/SE = 101 | NE-SE = 0.04 |
| | SW/SE = 93 | SW-SE = −0.24 |
| October | NW/SE = 62 | NW-SE = −0.77 |
| | NE/SE = 104 | NE-SE = 0.08 |
| | SW/SE = 83 | SW-SE = −0.35 |
| November | NW/SE = 64 | NW-SE = −0.49 |
| | NE/SE = 112 | NE-SE = 0.16 |
| | SW/SE = 73 | SW-SE = −0.37 |
| December | NW/SE = 69 | NW-SE = −0.32 |
| | NE/SE = 106 | NE-SE = 0.06 |
| | SW/SE = 68 | SW-SE = −0.33 |
| Annual | NW/SE = 75 | NW-SE = −7.53 |
| | NE/SE = 94 | NE-SE = −1.81 |
| | SW/SE = 87 | SW-SE = −3.94 |

*The division precipitation is the mean of all stations within the division having 30-year precipitation normals.

Figure 2. Normal total January precipitation in inches.

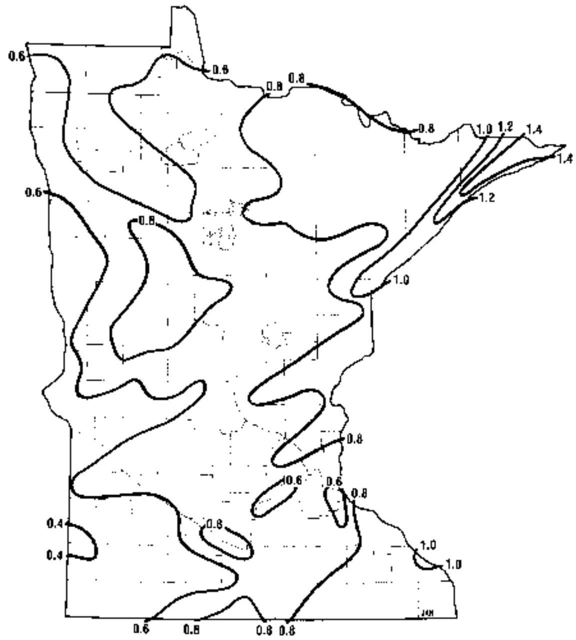


Figure 3. Normal total February precipitation in inches.

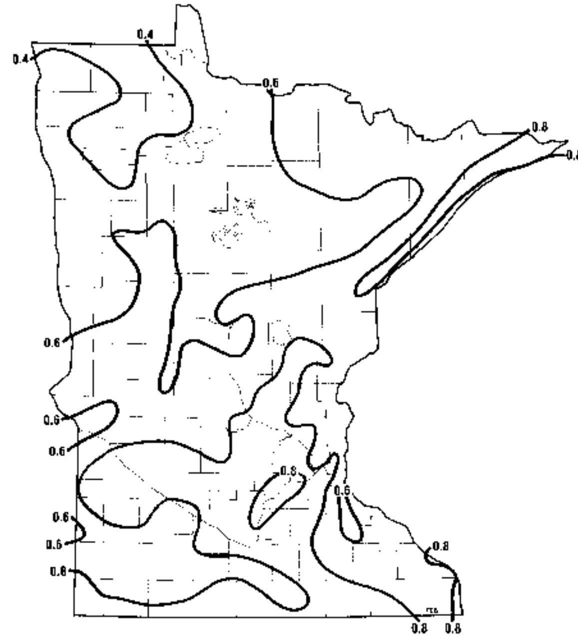
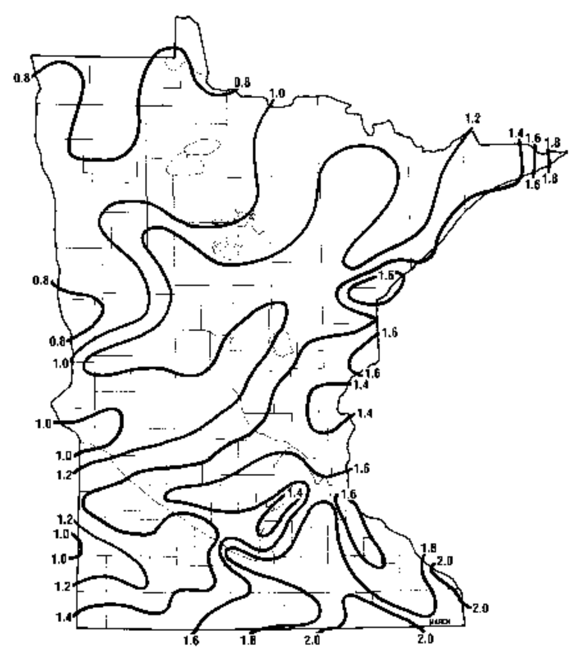


Figure 4. Normal total March precipitation in inches.



## FEBRUARY

During February the state is still under the domination of cold and dry northwest winds. Although February is not the coldest month, it is slightly drier on a state-wide basis than January (table 2 and figure 3). Western Lake Superior is ice covered during much of February and March resulting in little or no temperature difference between the lake and the surrounding land. Thus, any lake-derived precipitation along the north shore is of only minor importance.

Although the Gulf of Mexico is not yet an important moisture source, a gradual shift of the maximum precipitation area from the northeast to the southeast is evident. This is also shown in table 3.

## MARCH

March (figure 4) is a month of transition between the periods when dry and cold continental air dominate and the time when the warm and moist air from the Gulf of Mexico can move into the area on a more frequent basis. The transition is shown by the mean state-wide precipitation which equals 1.36 inches; the first month it has exceeded 1 inch since November.

A further indicator of the transition that occurs during March is that the precipitation increase from February to March averages 50 percent (table 2). This is the greatest percentage increase between any two successive months during the year.

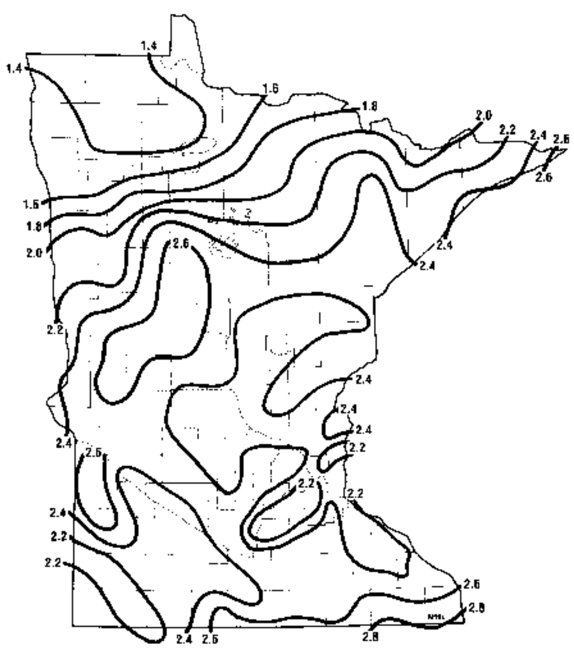
The difference in precipitation between the northwestern and southeastern corners of the state is now almost 1 inch (table 3). However, the relatively flat precipitation gradient typical of winter still persists in March.

### APRIL

In April (figure 5) a very marked ENE-WSW orientation of the precipitation isolines occurs across the northern part of the state. Although the gradient and orientation of the isolines may be accentuated in localized areas due to topographic variations, the general feature is too broad in scope to be topographic in origin. This feature is believed to mark the northward extension of precipitation brought into the state by migratory low pressure centers and the associated polar front whose mean path is still to the south of Minnesota.

Within this broad scale precipitation feature laying across the northern part of the state, an extremely steep precipitation gradient occurs which is probably accentuated by topographic variation. In a distance of about 60 miles between Pennington County (1.40 inches) and Hubbard County (2.60 inches) the difference is 1.20 inches. This is a much greater difference than the mean difference between the northwestern and southeastern divisions of the state which is but 0.70 inch as shown in table 3.

**Figure 5. Normal total April precipitation in inches.**



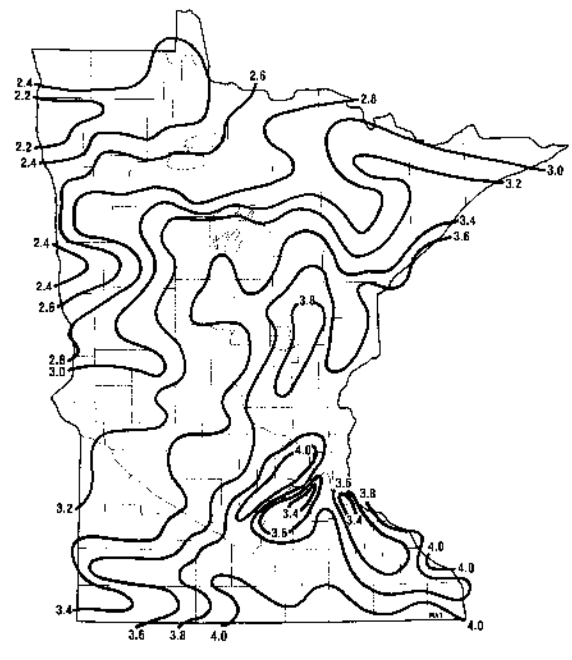
Steeper gradients, though over shorter distances than that just noted, may be found elsewhere in the state in April. However, these are probably largely topographically induced. Such a situation is believed to be the case for the gradient in precipitation found in the Twin Cities area, for example (2).

### MAY

The May precipitation map (figure 6) shows a definite summer character to the distribution across the state. For example, the statewide mean equals 3.38 inches in May, only 1 of 4 months in which the mean exceeds three inches. Another summer characteristic evident is the tighter precipitation gradients. In May these gradients arise from two features.

One is that the mean path of the low pressure systems and associated polar front, though still south of the state, is much closer and the resulting precipitation is higher. The largest mean difference between the northwestern and southeastern divisions amounting to 1.22 inches (table 3) is a reflection of the approach of the low pressure systems.

**Figure 6. Normal total May precipitation in inches.**



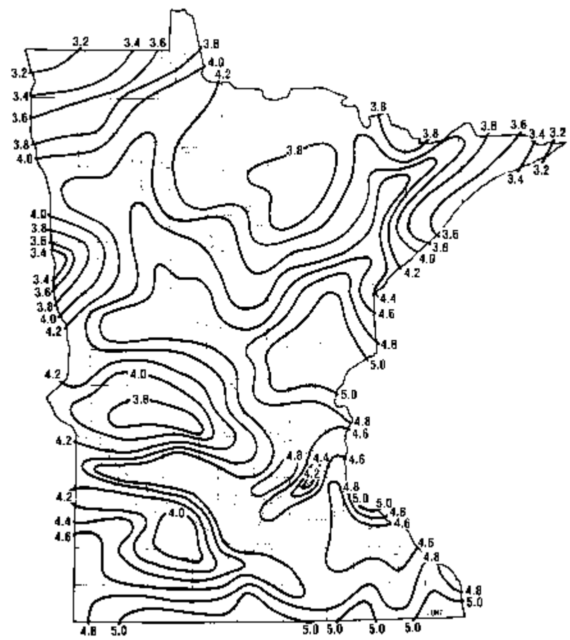
The second feature is the local variation in precipitation induced by the warmer temperatures. Topographic variation, slope, and aspect as well as vegetative cover differences, are accentuated by solar radiation intensity and duration, which is rapidly increasing at this time. The resulting differential heating between surfaces of varying orientation and cover leads to local precipitation differences.

### JUNE

June (figure 7) is the month of maximum precipitation in all parts of the state and equals 4.40 inches for the state as a whole. It is evident from table 3 that there is little difference between precipitation in the southeast and the other three corners of the state. However, differences between localities within the state can be very great as the map shows. As explained earlier local variation in precipitation is a warm season phenomenon reaching a peak in June, July, and August.

Definite wet and dry areas are apparent in the June map. Maximum precipitation of slightly more than 5 inches occurs in a very small area of the extreme southern part of the state. There are five dry areas worthy of mention. Three of these are topographically induced.

**Figure 7. Normal total June precipitation in inches.**



The first is located in the immediate area of the Twin Cities metropolitan airport (for a detailed explanation of this phenomenon see reference 2). The second and third are the dry "tongues" that extend eastward into the state from South Dakota and are located in the southwestern and westcentral parts of the state. The fourth relatively dry area is in the northwestern corner of the state and is simply the result of being far from the Gulf of Mexico moisture source. The fifth area is along the northern portion of the Lake Superior shore line. Because the water temperature is now cooler than the adjoining land surfaces the lake is no longer a moisture source for air passing over its surface. The lake now acts as a cooling source and thus has a stabilizing effect upon passing air masses.

## JULY

The mean July precipitation is 3.75 inches. Thus, precipitation has decreased from the maximum reached in June. The differences in vegetative cover and topography have their greatest influence on precipitation in July. This is very evident in the July map (figure 8) where the concentration of precipitation isolines indicates that very large gradients occur within short distances, even though the differences in precipitation between the four divisions representing the corners of the state are nearly at a minimum (table 3).

**Figure 8. Normal total July precipitation in inches.**

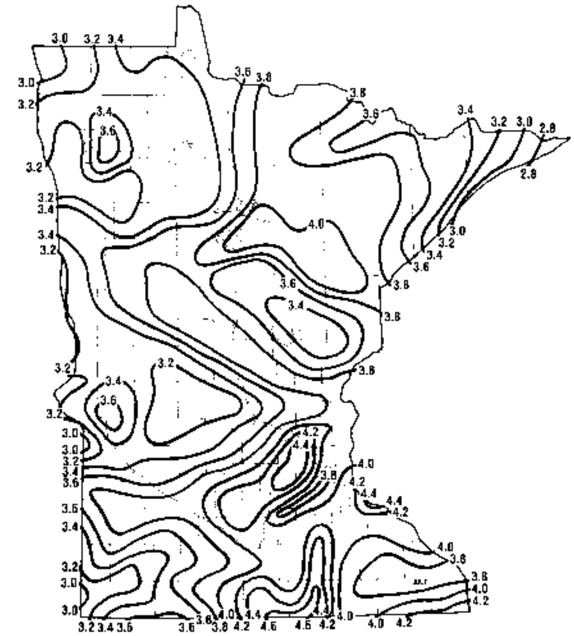
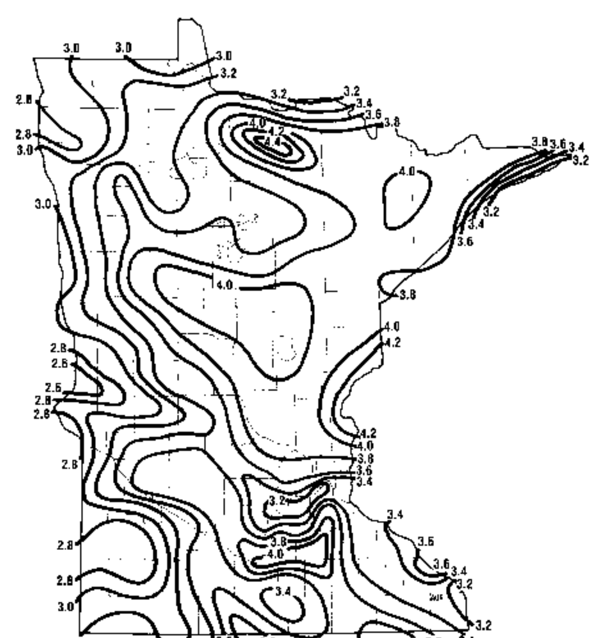


**Figure 9. Normal total August precipitation in inches.**



The same five regions of persistently low precipitation noted in June are also found on the July map.

## AUGUST

In August the precipitation within the state averages 3.52 inches. This is the fourth and last month in which the state-wide average exceeds 3 inches. Although there is great local variation as shown on the map (figure 9), there is perhaps the least regional variation in precipitation as shown in table 3.

Beginning in August and continuing through January the precipitation in the northeastern division exceeds that received in the southeast. The August map indicates that this is still a summer month across the state. The precipitation variation from point to point remains high.

## SEPTEMBER

Both September (figure 10) and October (figure 11) are transitional months to the winter period, but September is still essentially a summer month with respect to its precipitation characteristics. It marks the end of the growing season for most agricultural crops, although growth of some native plants does continue until October and occasionally November. The mean precipitation for the state has dropped to 2.92 inches after 4 successive months of greater than 3 inches. As shown in table 3 there is the least difference this month between the southeastern division and the other three corners of the state. It is also apparent from the map, however, that local differentials in precipitation are nearly as great as during the June-August period.

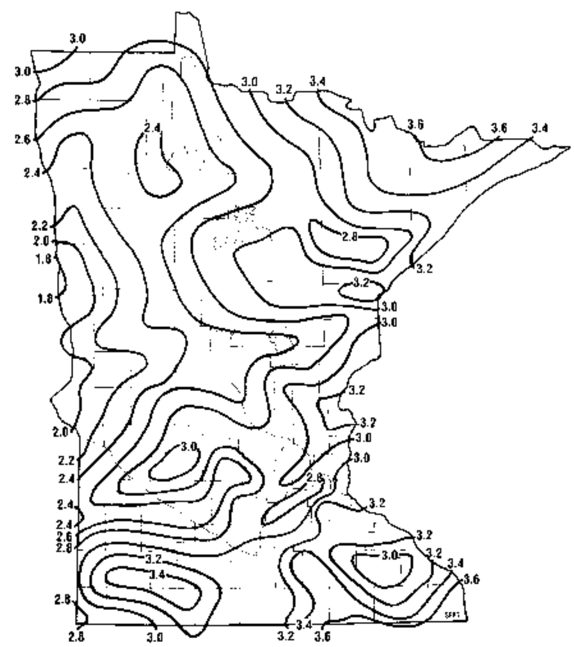


**Figure 10. Normal total September precipitation in inches.**

Several unusual features appear in the September map for which a satisfactory explanation cannot be offered. One is the area of relatively high precipitation in the southwestern corner and another is the area of relatively low precipitation in the southeastern division. A third feature is the tongue of low precipitation extending across the center of the state. This extension of lower precipitation across the state was also found in the July map where it is about 50 miles south of the September position.

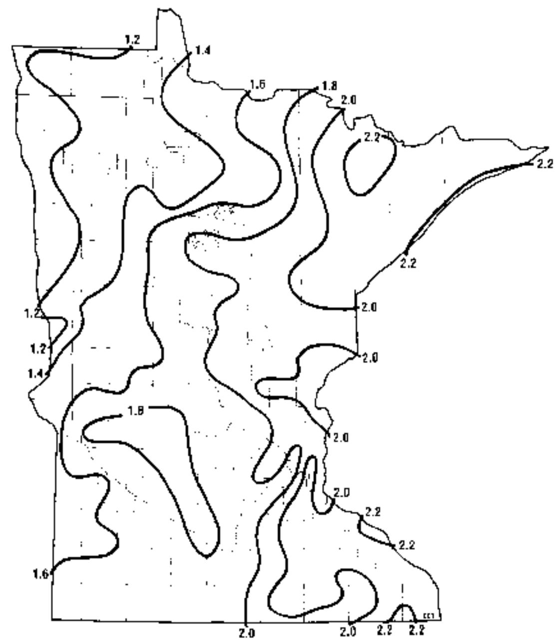


**Figure 11. Normal total October precipitation in inches.**

## OCTOBER

A very marked change occurs in the October precipitation. The state-wide mean is only 1.78 inches; a 64 percent decrease from the September mean and the greatest change both absolutely and proportionally between any 2 successive months of the year (table 2). There is also a noticeable decrease in the precipitation gradient across the state which is evident in figure 11.

The solar altitude and day length are now approximately comparable to that of February. As a result precipitation caused by differential surface heating is less likely to occur. For this reason there is a marked decrease in local variation of precipitation. Of equal or even greater importance is the decrease in statewide precipitation because Minnesota is now largely cut off from the Gulf of Mexico moisture source due to a seasonal shift of the winds from a southerly to a more westerly origin.

Table 3 shows that the precipitation in the northeastern and southeastern divisions of the state is nearly equal. However, due to the reduction in moisture from the Gulf source the precipitation in the northwestern division is only 62 percent of that received in the southeast.

## NOVEMBER

November shows the characteristics of a winter month. That is, the gradient is very weak and the total precipitation is low, averaging only 1.16 inches for the state (table 3). A feature not apparent before is the approximate north-south orientation of the precipitation isolines indicating that precipitation decreases from east to west (figure 12). In most months the isolines have been oriented such that precipitation decreases across the state from southeast to northwest.

The precipitation in the northeastern division of the state is now 12 percent greater (0.16 inch) than that in the southeastern division. As noted, this will continue through the month of January.

**Figure 12. Normal total November precipitation in inches.**

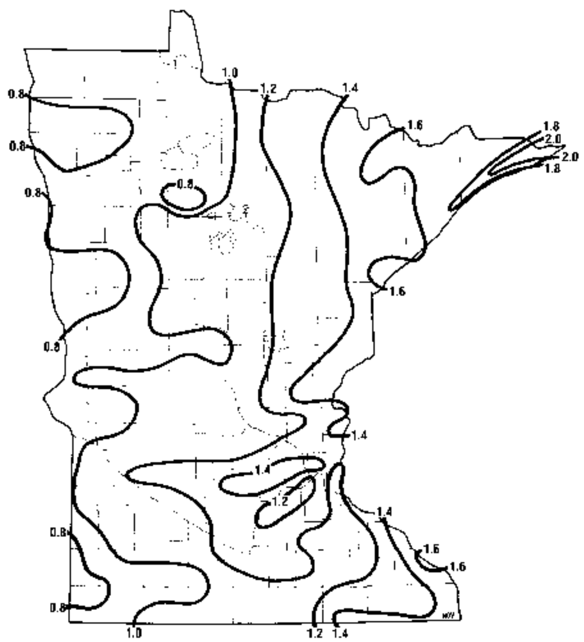
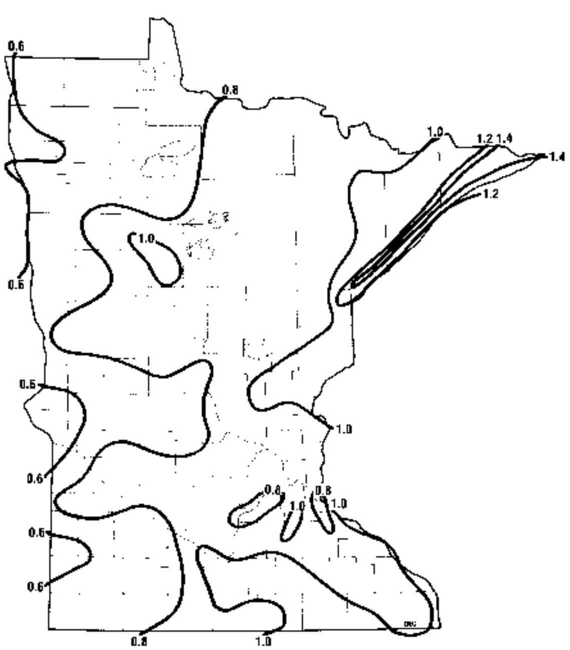



**Figure 13. Normal total December precipitation in inches.**



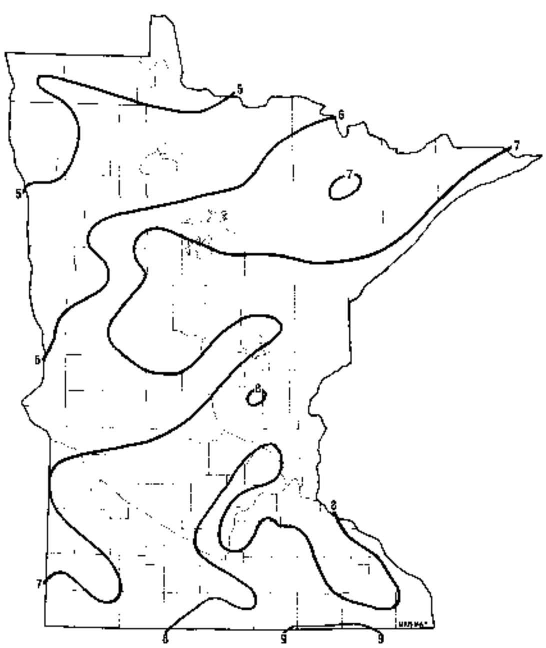

## DECEMBER

The mean precipitation in December is only 0.87 inch. Precipitation exceeds 1 inch in a few small areas of the state. The most notable exception is in a very narrow band along the north shore of Lake Superior (figure 13). This area of relatively high precipitation arises from a combination of the relatively warm and ice-free lake surface adjacent to the snow covered land surface and the rise in land elevation that parallels the shore line. This is described in greater detail in the sections on January and winter precipitation.

## SPRING (MARCH-MAY)

About 25 percent of the total annual precipitation occurs during the spring months of March, April, and May (figure 14). For the state as a whole this amounts to about 7 inches. The least precipitation, (less than 5 inches) falls in the northwest and the greatest (more than 8 inches) falls in the southeast.

**Figure 14. Normal total precipitation in inches for the period March-May.**

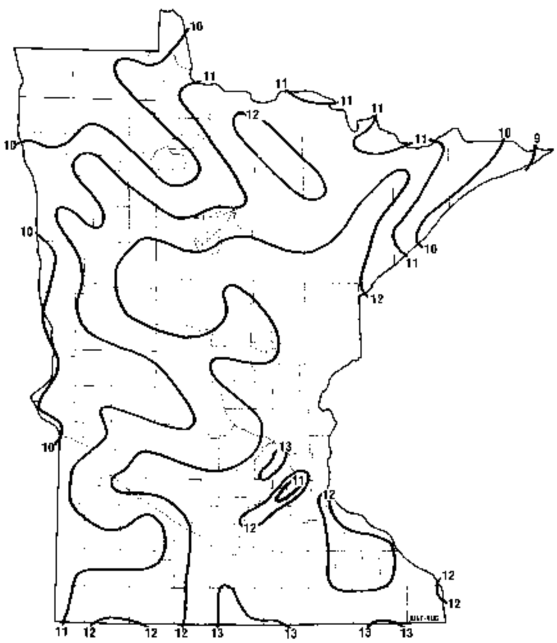



The basic pattern for spring shows a general precipitation increase from northwest to southeast across the state and a disparity in seasons between the two extreme corners of the state. In general, storm centers remain south of Minnesota during this period as they move in a northeasterly direction across the country. In northwestern Minnesota the so-called spring season of March-May, in terms of plant growth, is more correctly late winter-spring. But in southeastern Minnesota the March-May period is more correctly spring-late spring.

## SUMMER (JUNE-AUGUST)

Almost 45 percent or nearly 12 inches of the state's total annual precipitation occurs during this 3-month period (figure 15). The least precipitation is found in the extreme northwestern and northeastern divisions. The northwest is low because it is the most distant from the Gulf of Mexico, and the northeast is low because the land is fast becoming warmer than the water in Lake Superior. Thus, air passing across the lake is ordinarily cooled and stabilized, occasionally to the point of condensation. For this reason fog is not an uncommon feature on the lake and nearby shoreline during the summer.

**Figure 15. Normal total precipitation in inches for the period June-August.**



The precipitation pattern shows a gradient that increases from west to east except in the two northern corners of the state. This orientation is the result of winds from the Gulf of Mexico moisture source being oriented more nearly south to north and reaching farther north than at any other season.

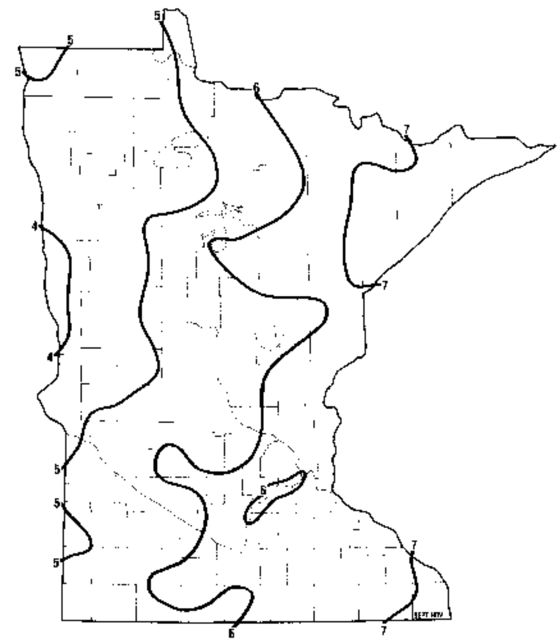
#### FALL (SEPTEMBER-NOVEMBER)

For the state as a whole, about 6 inches or nearly 22 percent of the annual precipitation falls in this season (figure 16). The smallest amount, less than 4 inches, is centered around western Clay and Wilkin counties. The highest amounts extend north to south across eastern Minnesota with maxima greater than 7 inches in the extreme northeast and southeast.

The north to south orientation of the precipitation isolines is a result of the low pressure systems moving across the country in a west to east fashion, and does not show the kind of northward or southward lateral movement typical of summer and winter, respectively. In the fall the mean position of the "tongue" of moist air from the Gulf of Mexico does not extend as far north nor as far west as during the summer months.

As a result the eastward moving low pressure systems do not encounter appreciable atmospheric moisture until eastern Minnesota is reached. This is not to be confused with the lake effect, for although the moist air is not as far north as in the summer, the Lake Superior effect is sufficient to bring the fall total in extreme northeastern Minnesota to equal the extreme southeast.

**Figure 16. Normal total precipitation in inches for the period September-November.**

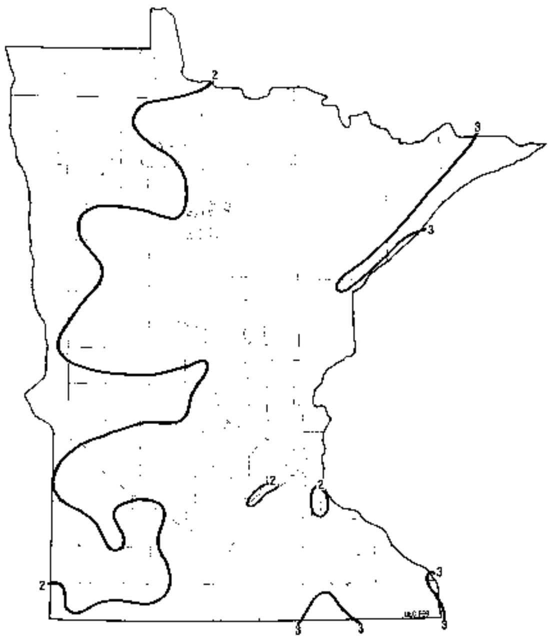


#### WINTER (DECEMBER-FEBRUARY)

Only 8 percent of the annual precipitation falls in this period for a statewide average of less than 2.5 inches (figure 17). The low precipitation amounts are evidence that the warm and moist Gulf air seldom intrudes into the state. For this reason the total barely exceeds 3 inches even in the extreme southeast.

A little more than 3 inches is found in a narrow band along the Lake Superior shoreline. This occurs for another reason. At this time of year, and especially in December and January, Lake Superior is ordinarily still ice-free and thus warmer than the land. Southerly and easterly winds crossing the open lake absorb moisture which is later precipitated when the air encounters the colder, snow-covered land surface and is forced up and over highland west of the shore. Therefore, the maximum snowfall occurs about 5-7 miles inland from the lake shore. Because the snow is deeper and lasts longer there than along the immediate shore, an area that is both cooler and more moist later in the succeeding spring season is produced. The occurrence of fires is reduced in this area and north shore foresters have given the name "asbestos belt" to the narrow strip paralleling the lake shore.

**Figure 17. Normal total precipitation in inches for the period December-February.**




## GROWING SEASON (MAY-SEPTEMBER)

The normal growing season precipitation for the state equals nearly 18 inches or about 67 percent of the total for the year (figure 18). This is very beneficial to Minnesota's vegetation and agriculture.

The fact that more than 18 inches is received in north-central Minnesota along the Canadian border (only 2 inches less than in the southeast along the Iowa border) shows that the Gulf moisture reaches far northward. However, with only 14 inches or so received along the North Dakota border it is evident that the "tongue" of moisture from the Gulf is rapidly reduced across western Minnesota.

The low precipitation in the northeastern corner of the state is largely due to Lake Superior which is coolest relative to the land in the summer. As a result the lake is more effective in producing fog than precipitation.

## ANNUAL

The annual normal map (figure 19) shows a strong precipitation gradient across most of the state. For example, between the northwestern and southeastern corners of the state the differential amounts to 7.53 inches (table 3). However, between the northeastern and southeastern corners the differential is less than 2 inches.

The strongest precipitation gradient occurs around the Twin Cities area and is largely a topographically induced feature (2). Of greater importance is a large area of rapid change in precipitation which exists between north-central Minnesota, where the annual normal is 26-27 inches, and then decreases to a minimum of 20-21 inches in the northwestern corner of the state as well as to the west in the Fargo-Moorhead area.

**Figure 18. Normal total precipitation in inches for the period May-September.**

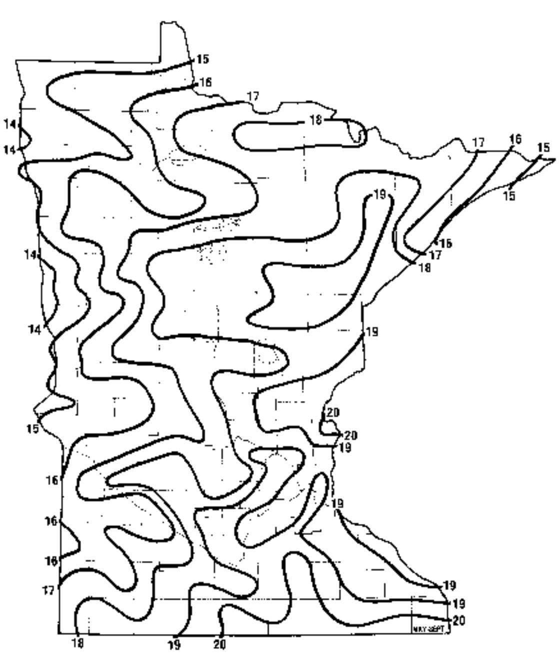
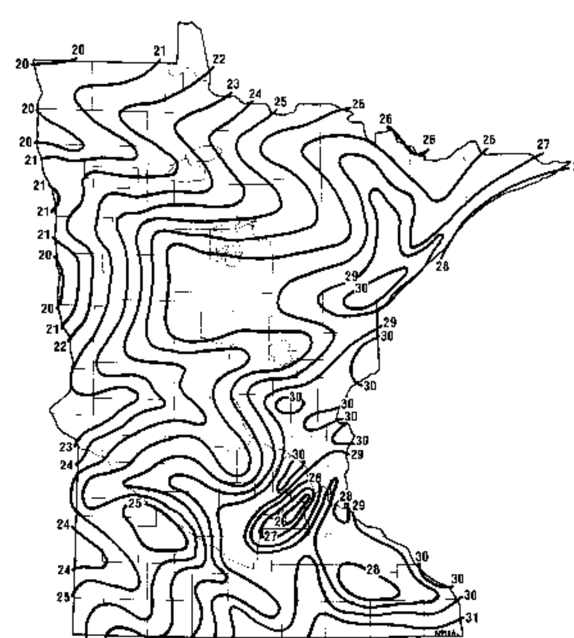



**Figure 19. Normal annual total precipitation in inches.**



An interesting phenomenon is exhibited in the comparison between the precipitation received in the northeastern division relative to that in the southeastern division. The results of this comparison are shown in table 4.

**Table 4. Comparison of the precipitation received in the northeastern division relative to that received in the southeastern division.**

| Month | Percentage ratios (NE/SE) | Absolute differences (inches) (NE-SE) |
|---|---|---|
| January | 113 | 0.11 |
| February | 81 | −0.15 |
| March | 65 | −0.66 |
| April | 95 | −0.11 |
| May | 83 | −0.66 |
| June | 85 | −0.70 |
| July | 96 | −0.15 |
| August | 104 | 0.16 |
| September | 101 | 0.04 |
| October | 104 | 0.08 |
| November | 112 | 0.16 |
| December | 106 | 0.06 |

For the 6 months from August to January more precipitation is received in the northeast, while from February through July more is received in the southeast. This phenomenon is related in a large measure to the temperature difference between land and large water bodies. For several reasons, including the higher heat capacity of water, the temperature of Lake Superior remains relatively constant compared to the land temperature. When the lake is warmer than the land, approximately November-January, winds from the lake act as a moisture source. When the lake water is cooler than the land surface, about May-September, the lake winds serve to decrease precipitation. When the lake is ice covered, usually February and March, the lake winds have no influence. The land and lake water temperatures are about equal in April and again in late October-early November.

Important as Lake Superior is, its effect on the weather of northeastern Minnesota should not be overemphasized. The prevailing winds across Minnesota are westerly, that is, they are from a westerly direction. As a result the westerly winds serve to decrease the lake effect in Minnesota but increase the effect in northern Wisconsin and the Upper Peninsula of Michigan.

For example, even though the land is warmer than the lake in August more precipitation is received in the northeast than in the southeast. This is because the storm track of the polar front is moving southward with the approach of winter. As a result of the more frequent passage of low pressure systems across northern Minnesota in August, and more particularly in September and October, the precipitation in the northeast generally exceeds that in the southeast during this period.

## ADDITIONAL MONTHLY COMBINATIONS

A few of the possible monthly combinations of normals have been presented in figures 14-19. In addition to these the normals for any possible combination of consecutive months have been prepared in table form for nine stations across the state: Crookston, Duluth, International Falls, Grand Marais, Minneapolis-St. Paul, Morris, Pine River, Rochester, and Worthington (tables 5-13, respectively). These tables show 144 monthly combinations for each of the stations.

To find the desired combination in tables 5-13 follow these three steps:

1. Find the first month of the combination in the vertical columns headed J (January) through D (December).
2. Find the number of months in the desired combination as listed in the first column.
3. Then read over the month row to the proper month column.

For example, the normal June precipitation at Crookston (table 5) is 4.17 inches. For the 2-month period June-July the total is 7.27 inches and for the 6-month period of June-November the total is 14.81 inches. The 12-month June-May period total is 21.47 inches.

**Table 5. Cumulative monthly total precipitation at Crookston for the normal period 1941-1970**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.61 | 0.50 | 0.90 | 1.46 | 2.57 | 4.17 | 3.10 | 3.21 | 2.31 | 1.21 | 0.81 | 0.62 |
| 2 | 1.11 | 1.40 | 2.36 | 4.03 | 6.74 | 7.27 | 6.31 | 5.52 | 3.52 | 2.02 | 1.43 | 1.23 |
| 3 | 2.01 | 2.86 | 4.93 | 8.20 | 9.84 | 10.48 | 8.62 | 6.73 | 4.33 | 2.64 | 2.04 | 1.73 |
| 4 | 3.47 | 5.43 | 9.10 | 11.30 | 13.05 | 12.79 | 9.83 | 7.54 | 4.95 | 3.25 | 2.54 | 2.63 |
| 5 | 6.04 | 9.60 | 12.20 | 14.51 | 15.36 | 14.00 | 10.64 | 8.16 | 5.56 | 3.75 | 3.44 | 4.09 |
| 6 | 10.21 | 12.70 | 15.41 | 16.82 | 16.57 | 14.81 | 11.26 | 8.77 | 6.06 | 4.65 | 4.90 | 6.66 |
| 7 | 13.31 | 15.91 | 17.72 | 18.03 | 17.38 | 15.43 | 11.87 | 9.27 | 6.96 | 6.11 | 7.47 | 10.83 |
| 8 | 16.52 | 18.22 | 18.93 | 18.84 | 18.00 | 16.04 | 12.37 | 10.17 | 8.42 | 8.68 | 11.64 | 13.93 |
| 9 | 18.83 | 19.43 | 19.74 | 19.46 | 18.61 | 16.54 | 13.27 | 11.63 | 10.99 | 12.85 | 14.74 | 17.14 |
| 10 | 20.04 | 20.24 | 20.36 | 20.07 | 19.11 | 17.44 | 14.73 | 14.20 | 15.16 | 15.95 | 17.95 | 19.45 |
| 11 | 20.85 | 20.86 | 20.97 | 20.57 | 20.01 | 18.90 | 17.30 | 18.37 | 18.26 | 19.16 | 20.26 | 20.66 |
| 12 | 21.47 | 21.47 | 21.47 | 21.47 | 21.47 | 21.47 | 21.47 | 21.47 | 21.47 | 21.47 | 21.47 | 21.74 |

**Table 6. Cumulative monthly total precipitation at Duluth for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.16 | 0.85 | 1.76 | 2.55 | 3.41 | 4.44 | 3.73 | 3.79 | 3.06 | 2.30 | 1.73 | 1.40 |
| 2 | 2.01 | 2.61 | 4.31 | 5.96 | 7.85 | 8.17 | 7.52 | 6.85 | 5.36 | 4.03 | 3.13 | 2.56 |
| 3 | 3.77 | 5.16 | 7.72 | 10.40 | 11.58 | 11.96 | 10.58 | 9.15 | 7.09 | 5.43 | 4.29 | 3.41 |
| 4 | 6.32 | 8.57 | 12.16 | 14.13 | 15.37 | 15.02 | 12.88 | 10.88 | 8.49 | 6.59 | 5.14 | 5.17 |
| 5 | 9.73 | 13.01 | 15.89 | 17.92 | 18.43 | 17.32 | 14.61 | 12.28 | 9.65 | 7.44 | 6.90 | 7.72 |
| 6 | 14.17 | 16.74 | 19.68 | 20.98 | 20.73 | 19.05 | 16.01 | 13.44 | 10.50 | 9.20 | 9.45 | 11.13 |
| 7 | 17.90 | 20.53 | 22.74 | 23.28 | 22.46 | 20.45 | 17.17 | 14.29 | 12.26 | 11.75 | 12.86 | 15.57 |
| 8 | 21.69 | 23.59 | 25.04 | 25.01 | 23.86 | 21.61 | 18.02 | 16.05 | 14.81 | 15.16 | 17.30 | 19.30 |
| 9 | 24.75 | 25.89 | 26.77 | 26.41 | 25.02 | 22.46 | 19.78 | 18.60 | 18.22 | 19.60 | 21.03 | 23.09 |
| 10 | 27.05 | 27.62 | 28.17 | 27.57 | 25.87 | 24.22 | 22.33 | 22.01 | 22.66 | 23.33 | 24.82 | 26.15 |
| 11 | 28.78 | 29.02 | 29.33 | 28.42 | 27.63 | 26.777 | 25.74 | 26.45 | 26.39 | 27.12 | 27.88 | 28.45 |
| 12 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 | 30.18 |

**Table 7. Cumulative monthly total precipitation at International Falls for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.85 | 0.71 | 1.10 | 1.67 | 2.75 | 3.91 | 3.98 | 3.39 | 3.32 | 1.69 | 1.30 | 0.98 |
| 2 | 1.56 | 1.81 | 2.77 | 4.42 | 6.66 | 7.89 | 7.37 | 6.71 | 5.01 | 2.99 | 2.28 | 1.83 |
| 3 | 2.66 | 3.48 | 5.52 | 8.33 | 10.64 | 11.28 | 10.69 | 8.40 | 6.31 | 3.97 | 3.13 | 2.54 |
| 4 | 4.33 | 6.23 | 9.43 | 12.31 | 14.03 | 14.60 | 12.38 | 9.70 | 7.29 | 4.82 | 3.84 | 3.64 |
| 5 | 7.08 | 10.14 | 13.41 | 15.70 | 17.35 | 16.29 | 13.68 | 10.68 | 8.14 | 5.53 | 4.94 | 5.31 |
| 6 | 10.99 | 14.12 | 16.80 | 19.02 | 19.04 | 17.59 | 14.66 | 11.53 | 8.85 | 6.63 | 6.61 | 8.06 |
| 7 | 14.97 | 17.51 | 20.12 | 20.71 | 20.34 | 18.57 | 15.51 | 12.24 | 9.95 | 8.30 | 9.36 | 11.97 |
| 8 | 18.36 | 20.83 | 21.81 | 22.01 | 21.32 | 19.42 | 16.22 | 13.34 | 11.62 | 11.05 | 13.27 | 15.95 |
| 9 | 21.68 | 22.52 | 23.11 | 22.99 | 22.17 | 20.13 | 17.32 | 15.01 | 14.37 | 14.96 | 17.25 | 19.34 |
| 10 | 23.37 | 23.82 | 24.09 | 23.84 | 22.88 | 21.23 | 18.99 | 17.76 | 18.28 | 18.94 | 20.64 | 22.66 |
| 11 | 24.67 | 24.80 | 24.94 | 24.55 | 23.98 | 22.90 | 21.74 | 21.67 | 22.26 | 22.33 | 23.96 | 24.35 |
| 12 | 25.65 | 25.65 | 25.65 | 25.56 | 25.65 | 25.65 | 25.65 | 25.65 | 25.65 | 25.65 | 25.65 | 25.65 |

**Table 8. Cumulative monthly precipitation at Grand Marais for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.19 | 0.79 | 1.30 | 2.19 | 3.06 | 3.52 | 3.00 | 3.08 | 3.29 | 2.22 | 1.72 | 1.29 |
| 2 | 1.98 | 2.09 | 3.49 | 5.25 | 6.58 | 6.52 | 6.08 | 6.37 | 5.51 | 3.94 | 3.01 | 2.48 |
| 3 | 3.28 | 4.28 | 6.55 | 8.77 | 9.58 | 9.60 | 9.37 | 8.59 | 7.23 | 5.23 | 4.20 | 3.27 |
| 4 | 5.47 | 7.34 | 10.07 | 11.77 | 12.66 | 12.89 | 11.59 | 10.31 | 8.52 | 6.42 | 4.99 | 4.57 |
| 5 | 8.53 | 10.86 | 13.07 | 14.85 | 15.95 | 15.11 | 13.31 | 11.60 | 9.71 | 7.21 | 6.29 | 6.76 |
| 6 | 12.05 | 13.86 | 16.15 | 18.14 | 18.17 | 16.83 | 14.60 | 12.79 | 10.50 | 8.51 | 8.48 | 9.82 |
| 7 | 15.05 | 16.94 | 19.44 | 20.36 | 19.89 | 18.12 | 15.79 | 13.58 | 11.80 | 10.70 | 11.54 | 13.34 |
| 8 | 18.13 | 20.23 | 21.66 | 22.08 | 21.18 | 19.31 | 16.58 | 14.88 | 13.99 | 13.76 | 15.06 | 16.34 |
| 9 | 21.42 | 22.45 | 23.38 | 23.37 | 22.37 | 20.10 | 17.88 | 17.07 | 17.05 | 17.28 | 18.06 | 19.42 |
| 10 | 23.64 | 24.17 | 24.67 | 24.56 | 23.16 | 21.40 | 20.07 | 20.13 | 20.57 | 20.28 | 21.14 | 22.71 |
| 11 | 25.36 | 25.46 | 25.86 | 25.35 | 24.46 | 23.59 | 23.13 | 23.65 | 23.57 | 23.36 | 24.43 | 24.93 |
| 12 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 | 26.65 |

**Table 9. Cumulative monthly total precipitation at Minneapolis-St. Paul for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.73 | 0.84 | 1.68 | 2.04 | 3.37 | 3.94 | 3.69 | 3.05 | 2.73 | 1.78 | 1.20 | 0.89 |
| 2 | 1.57 | 2.52 | 3.72 | 5.41 | 7.31 | 7.63 | 6.74 | 5.78 | 4.51 | 2.98 | 2.09 | 1.62 |
| 3 | 3.25 | 4.56 | 7.09 | 9.35 | 11.00 | 10.68 | 9.47 | 7.56 | 5.71 | 3.87 | 2.82 | 2.46 |
| 4 | 5.29 | 7.93 | 11.03 | 13.04 | 14.05 | 13.41 | 11.25 | 8.76 | 6.60 | 4.60 | 3.66 | 4.14 |
| 5 | 8.66 | 11.87 | 14.72 | 16.09 | 16.78 | 15.19 | 12.45 | 9.65 | 7.33 | 5.44 | 5.34 | 6.18 |
| 6 | 12.60 | 15.56 | 17.77 | 18.82 | 18.56 | 16.39 | 13.34 | 10.38 | 8.17 | 7.12 | 7.38 | 9.55 |
| 7 | 16.29 | 18.61 | 20.50 | 20.60 | 19.76 | 17.28 | 14.07 | 11.22 | 9.85 | 9.16 | 10.75 | 13.49 |
| 8 | 19.34 | 21.34 | 22.28 | 21.80 | 20.65 | 18.01 | 14.91 | 12.90 | 11.89 | 12.53 | 14.69 | 17.18 |
| 9 | 22.07 | 23.12 | 23.48 | 22.69 | 21.38 | 18.85 | 16.59 | 14.94 | 15.26 | 16.47 | 18.38 | 20.23 |
| 10 | 23.85 | 24.32 | 24.37 | 23.42 | 22.22 | 20.53 | 18.63 | 18.31 | 19.20 | 20.16 | 21.43 | 22.96 |
| 11 | 25.05 | 25.21 | 25.10 | 24.26 | 23.90 | 22.57 | 22.00 | 22.25 | 22.89 | 23.21 | 24.16 | 24.74 |
| 12 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 | 25.94 |

**Table 10. Cumulative monthly total precipitation at Morris for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.52 | 0.61 | 1.00 | 2.57 | 3.10 | 3.86 | 3.44 | 2.99 | 2.27 | 1.72 | 0.95 | 0.73 |
| 2 | 1.13 | 1.61 | 3.57 | 5.67 | 6.96 | 7.30 | 6.43 | 5.26 | 3.99 | 2.67 | 1.68 | 1.25 |
| 3 | 2.13 | 4.18 | 6.67 | 9.53 | 10.40 | 10.29 | 8.70 | 6.98 | 4.94 | 3.40 | 2.20 | 1.86 |
| 4 | 4.70 | 7.28 | 10.53 | 12.97 | 13.39 | 12.56 | 10.42 | 7.93 | 5.67 | 3.92 | 2.81 | 2.86 |
| 5 | 7.80 | 11.14 | 13.97 | 15.96 | 15.66 | 14.28 | 11.37 | 8.66 | 6.19 | 4.53 | 3.81 | 5.43 |
| 6 | 11.66 | 14.58 | 16.96 | 18.23 | 17.38 | 15.23 | 12.10 | 9.18 | 6.80 | 5.53 | 6.38 | 8.53 |
| 7 | 15.10 | 17.57 | 19.23 | 19.95 | 18.33 | 15.96 | 12.62 | 9.79 | 7.80 | 8.10 | 9.48 | 12.39 |
| 8 | 18.09 | 19.84 | 20.95 | 20.90 | 19.06 | 16.48 | 13.23 | 10.79 | 10.37 | 11.20 | 13.34 | 15.83 |
| 9 | 20.36 | 21.56 | 21.90 | 21.63 | 19.58 | 17.09 | 14.23 | 13.36 | 13.47 | 15.06 | 16.78 | 18.82 |
| 10 | 22.08 | 22.51 | 22.63 | 22.15 | 20.19 | 18.09 | 16.80 | 16.46 | 17.33 | 18.50 | 19.77 | 21.09 |
| 11 | 23.03 | 23.24 | 23.15 | 22.76 | 21.19 | 20.66 | 19.90 | 20.32 | 20.77 | 21.49 | 22.04 | 22.81 |
| 12 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 | 23.76 |

**Table 11. Cumulative monthly total precipitation at Pine River for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.77 | 0.61 | 1.31 | 2.44 | 3.39 | 4.26 | 3.49 | 4.10 | 2.98 | 1.77 | 1.16 | 0.84 |
| 2 | 1.38 | 1.92 | 3.75 | 5.83 | 7.65 | 7.75 | 7.59 | 7.08 | 4.75 | 2.93 | 2.00 | 1.61 |
| 3 | 2.69 | 4.36 | 7.14 | 10.09 | 11.14 | 11.85 | 10.57 | 8.85 | 5.91 | 3.77 | 2.77 | 2.22 |
| 4 | 5.13 | 7.75 | 11.40 | 13.58 | 15.24 | 14.83 | 12.34 | 10.01 | 6.75 | 4.54 | 3.38 | 3.53 |
| 5 | 8.52 | 12.01 | 14.89 | 17.68 | 18.22 | 16.60 | 13.50 | 10.85 | 7.52 | 5.15 | 4.69 | 5.97 |
| 6 | 12.78 | 15.50 | 18.99 | 20.66 | 19.99 | 17.76 | 14.34 | 11.62 | 8.13 | 6.46 | 7.13 | 9.36 |
| 7 | 16.27 | 19.60 | 21.97 | 22.43 | 21.15 | 18.60 | 15.11 | 12.23 | 9.44 | 8.90 | 10.52 | 13.62 |
| 8 | 20.37 | 22.58 | 23.74 | 23.59 | 21.99 | 19.37 | 15.72 | 13.54 | 11.88 | 12.29 | 14.78 | 17.11 |
| 9 | 23.35 | 24.35 | 24.90 | 24.43 | 22.76 | 19.98 | 17.03 | 15.98 | 15.27 | 16.55 | 18.27 | 21.21 |
| 10 | 25.12 | 25.51 | 25.74 | 25.20 | 23.37 | 21.29 | 19.47 | 19.37 | 19.53 | 20.04 | 22.37 | 24.19 |
| 11 | 26.28 | 26.35 | 26.51 | 25.81 | 24.68 | 23.73 | 22.86 | 23.63 | 23.02 | 24.14 | 25.35 | 25.96 |
| 12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 | 27.12 |

**Table 12. Cumulative monthly total precipitation at Rochester for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.65 | 0.65 | 1.70 | 2.36 | 3.46 | 4.63 | 3.74 | 3.59 | 3.08 | 1.82 | 1.02 | 0.77 |
| 2 | 1.30 | 2.35 | 4.06 | 5.82 | 8.09 | 8.37 | 7.33 | 6.67 | 4.90 | 2.84 | 1.79 | 1.42 |
| 3 | 3.00 | 4.71 | 7.52 | 10.45 | 11.83 | 11.96 | 10.41 | 8.49 | 5.92 | 3.61 | 2.44 | 2.07 |
| 4 | 5.36 | 8.17 | 12.15 | 14.19 | 15.42 | 15.04 | 12.23 | 9.51 | 6.69 | 4.26 | 3.09 | 3.77 |
| 5 | 8.82 | 12.80 | 15.89 | 17.78 | 18.50 | 16.86 | 13.25 | 10.28 | 7.34 | 4.91 | 4.79 | 6.13 |
| 6 | 13.45 | 16.54 | 19.48 | 20.86 | 20.32 | 17.88 | 14.02 | 10.93 | 7.99 | 6.61 | 7.15 | 9.59 |
| 7 | 17.19 | 20.13 | 22.56 | 22.68 | 21.34 | 18.65 | 14.67 | 11.58 | 9.69 | 8.97 | 10.61 | 14.22 |
| 8 | 20.78 | 23.21 | 24.38 | 23.70 | 22.11 | 19.30 | 15.32 | 13.28 | 12.05 | 12.43 | 15.24 | 17.96 |
| 9 | 23.86 | 25.03 | 25.40 | 24.47 | 22.76 | 19.95 | 17.02 | 15.64 | 15.51 | 17.06 | 18.98 | 21.55 |
| 10 | 25.68 | 26.05 | 26.17 | 25.12 | 23.41 | 21.65 | 19.38 | 19.10 | 20.14 | 20.80 | 22.57 | 24.63 |
| 11 | 26.70 | 26.82 | 26.82 | 25.77 | 25.11 | 24.01 | 22.84 | 23.73 | 23.88 | 24.39 | 25.65 | 26.45 |
| 12 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 | 27.47 |

**Table 13. Cumulative monthly total precipitation at Worthington for the normal period 1941-1970.**

| Number of Months | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.53 | 0.81 | 1.43 | 2.18 | 3.44 | 5.01 | 3.46 | 3.28 | 3.00 | 1.68 | 0.99 | 0.70 |
| 2 | 1.34 | 2.24 | 3.61 | 5.62 | 8.45 | 8.47 | 6.74 | 6.28 | 4.68 | 2.67 | 1.69 | 1.23 |
| 3 | 2.77 | 4.42 | 7.05 | 10.63 | 11.91 | 11.75 | 9.74 | 7.96 | 5.67 | 3.37 | 2.22 | 2.04 |
| 4 | 4.95 | 7.86 | 12.06 | 14.09 | 15.19 | 14.75 | 11.42 | 8.95 | 6.37 | 3.90 | 3.03 | 3.47 |
| 5 | 8.39 | 12.87 | 15.52 | 17.37 | 18.19 | 16.43 | 12.41 | 9.65 | 6.90 | 4.71 | 4.46 | 5.65 |
| 6 | 13.40 | 16.33 | 18.80 | 20.37 | 19.87 | 17.42 | 13.11 | 10.18 | 7.71 | 6.14 | 6.64 | 9.09 |
| 7 | 16.86 | 19.61 | 21.80 | 22.05 | 20.86 | 18.12 | 13.64 | 10.99 | 9.14 | 8.32 | 10.08 | 14.10 |
| 8 | 20.14 | 22.61 | 23.48 | 23.04 | 21.56 | 18.65 | 14.45 | 12.42 | 11.32 | 11.76 | 15.09 | 17.56 |
| 9 | 23.14 | 24.29 | 24.47 | 23.74 | 22.09 | 19.46 | 15.88 | 14.60 | 14.76 | 16.77 | 18.55 | 20.84 |
| 10 | 24.82 | 25.28 | 25.17 | 24.27 | 22.90 | 20.89 | 18.06 | 18.04 | 19.77 | 20.23 | 21.83 | 23.84 |
| 11 | 25.81 | 25.98 | 25.70 | 25.08 | 24.33 | 23.07 | 21.50 | 23.05 | 23.23 | 23.51 | 24.83 | 25.52 |
| 12 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 | 26.51 |

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