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The March-May 1965 Floods in the Upper Mississippi, Missouri, and Red River of the North Basins

SILVER SPRING, MARYLAND
August 1967

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WB-1 Monthly Mean 100-, 50-, 30-, and 10-Millibar Charts January 1964 through December 1965 of the IQSY Period. Staff, Upper Air Branch, National Meteorological Center. February 1967.

WB-2 Weekly Synoptic Analyses, 5-, 2-, and 0.4-Mb. Surfaces for 1964 (based on observations of the Meteorological Rocket Network during the IQSY). Staff, Upper Air Branch, National Meteorological Center. April 1967.

WB-3 Weekly Synoptic Analyses, 5-, 2-, and 0.4-Mb. Surface for 1965 (based on observations of the Meteorological Rocket Network during the IQSY). Staff, Upper Air Branch, National Meteorological Center. August 1967.

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ESSA TECHNICAL REPORT WB-4

The March-May 1965 Floods in the Upper Mississippi, Missouri, and Red River of the North Basins

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SILVER SPRING, MARYLAND
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Contents

LIST OF TABLES

LIST OF ILLUSTRATIONS

The March-May 1965 Floods in the Mississippi, Missouri, and Red River of the North Basins

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1. INTRODUCTION

The March-May 1965 floods in the Upper Mississippi, Missouri, and Red River of the North Basins were among the most disastrous ever experienced in these areas. New record high stages were established at many stations. There were four fairly distinct periods of flooding (fig. 4) during the March-May period: (1) early March, (2) mid-March, (3) April, with flooding on the Mississippi extending into May, and (4) late May. Some streams flooded in one period only, while others exceeded flood stages in all four periods. In some cases, particularly in the March and late May floods, streams were above flood stage for a few days only; at several stations, for only one day. The flooding which began in April was generally of longer duration, with about 20 stations on the Minnesota, Illinois, and Mississippi Rivers reporting above-flood stages for at least four weeks (fig. 4).

New record high stages were established at several stations in all flood periods except mid-March. The April flood established new record stages at most stations along the Upper Mississippi down to Hannibal, Mo. (figs. 5C, 5D). It was the greatest flood in more than 100 years along that 700-mile reach of the Mississippi. More than 100,000 acres were inundated, over 16,000 persons were forced to leave their homes, and 600 to 700 were injured [1, 2].

Loss of life and property in the flooded areas was minimized by protective action (effective operation of flood-control works, sand-bagging, evacuation, etc.) taken as a result of advance warnings. Nevertheless, at least 15 lives were lost and property damages in the Upper Mississippi Basin alone exceeded $105 million.

The March and April floods resulted from favorable combinations of rain and snowmelt—the rains occurring during or following periods of rapid melting. Precipitation was generally above normal for these months. Soil moisture was high, and conditions were favorable for heavy surface runoff.

The early May floods in the Upper Mississippi and Red River of the North Basins were generally a continuation of the April floods prolonged by early May rains. The late May floods resulted from a series of rainstorms that produced above normal precipitation for the month. Soil moisture was maintained at a high level, and the more intense storms in the latter part of the month brought streams above flood stages.

This report describes some of the meteorological events responsible for the floods and presents pertinent meteorological data. It also presents statistics on flood and crest stages and on flood damages.

2. FLOOD AREA AND BASIN DESCRIPTIONS

The flood area covered portions of three major basins, namely: the Upper Mississippi, the Missouri, and the Red River of the North. It included portions of nine States: Minnesota, Wisconsin, Iowa, Illinois, Missouri, the Dakotas, Nebraska, and Kansas. The flood in the Mississippi extended from its headwaters in northern Minnesota almost to its confluence with the Illinois and Missouri Rivers near St. Louis, Mo. The area contributing to the severe flooding was about 171,000 sq. mi.

Severe flooding in the Missouri Basin was confined mostly to the Big Sioux, Little Sioux, and Floyd Rivers in Iowa, draining altogether an area of about 15,000 sq. mi.

The Red River of the North adjoins the Mississippi River System, but is not part of it, and drains northward into Canada. The total drainage area south of the International Boundary is 40,200 sq. mi., including the closed basins in North Dakota, and about 90 percent of it contributed to the severe floods experienced in April.

The total drainage area that contributed to the severe flooding in these three major basins was about 223,000 sq. mi.

3. ANTECEDENT CONDITIONS

Upper Mississippi Basin

The average weather for the winter season (December 1964-February 1965) was colder than normal, with precipitation, in general, near or slightly above normal. Mean monthly temperatures for January, February, and March were well below normal (fig. 1). The soil in the northern part of the basin was frozen to considerable depths (table 2).

January saw some new record low temperatures established in the extreme northern portion of the basin, and that region could be classified as very cold and dry for that month. Average temperatures for the month were as much as 6° F. below normal. Frost penetration was deeper than normal, particularly in Minnesota and Wisconsin, where the ground was frozen to depths of 2 to 4 ft. Precipitation in the northern part of the basin averaged about 0.5 in., or slightly over 50 percent of normal (figs. 1 and 2A). In the extreme northern end of the basin, the snow cover was from about 1-1/2 to 3 ft. deep by the end of January.

In the southern portion of the basin, January weather was much different. Monthly average temperatures were near normal, but precipitation was well above normal (fig. 1). Greatest monthly precipitation extended along a line from about Peoria, Ill., to near Kirksville, Mo. (fig. 2A). The 8-in. amounts reported in that area were over four times normal. Slightly less than half of this precipitation fell in the last 10 days of the month. Most of it was rain, but a 1- to 6-in. snow cover extended over most of the area on February 1.

February was colder than normal (fig. 1) over the entire basin, with temperatures averaging 2° to 6° F. below normal. Precipitation was heaviest in the northern portion (fig. 2B) where centers of over twice-normal precipitation were located in northwestern Wisconsin, southern Minnesota, and in the western half of Iowa (fig. 1). Most of this precipitation fell as snow between the 9th and 12th of the month, bringing a mid-month snow cover of 6 to 12 in. over most of this area (fig. 3A). Four days of melting temperatures beginning on the 17th and terminating on the 20th rapidly reduced this snow cover, but there was very little change in the extreme upper end of the basin, where snow depths ranged from 1 to 2 ft. (fig. 3A).

A second warm spell on the last two days of February and the first of March, when a southerly flow of warm air from the Gulf of Mexico invaded the area (fig. 10B), further reduced the snow cover, eliminating it completely over most of eastern Iowa (fig. 3A). This late February melting, plus the rains of February 28-March 1, produced flooding at the beginning of March on streams in southeastern Minnesota, southwestern Wisconsin, and Iowa (figs. 4A and 5A).

Missouri Basin

Temperatures over the middle and lower portions of the basin averaged only slightly below normal for the winter season (December-February). Precipitation was somewhat above normal, averaging about 150 percent of normal in western Iowa and north-central Nebraska.

January temperatures and precipitation were near or somewhat below normal (fig. 1) except in northern Missouri, where precipitation was about 3 to 8 in. (fig. 2A) or about 2 to 3 times normal (fig. 1). Most of the precipitation fell in the last 10 days of the month, starting as rain and ending as snow and leaving a snow cover of 2 to 8 in. over northeastern Missouri on February 1. On that date, snow covered most of the basin except for Kansas and southwestern Missouri.

February temperatures averaged 2° to 6° F. below normal (fig. 1). Precipitation was above normal in western Iowa, eastern Nebraska, and eastern Kansas. Heaviest precipitation centers in those areas were 2 or 3 in. (fig. 2B) or 2 to 3 times normal (fig. 1). Most of the precipitation fell in the period February 7-12, starting as rain and changing to a heavy snowfall on about the 10th. The snowfall totaled over 20 in. in some places in eastern Nebraska and western Iowa. On February 15 the 1-in. snow line reached southward to near the Oklahoma border (fig. 3A). A warm spell of about four days, beginning on February 17 and ending on the 20th, melted practically all of the newly fallen snow so that the 1-in. snow line on February 22 (fig. 3A) was just about where it had been two weeks before, on the 8th. This melting gave the soil a high moisture content.

On February 22-24, a second snowfall over the same region deposited a new cover of 2 to 7 in. A strong warming trend (fig. 10B) on the 27th and 28th rapidly disposed of practically all of this new snow and much of the older. Melting degree days above base 32° F. (daily mean temperature minus 32° F.) for these two days are shown in figures 7A and 7B. Except for a narrow ridge extending from Minnesota into northeastern Kansas, the 1-in. snow line had receded northward to southern North Dakota and southern Wisconsin by March 1 (fig. 3A). The rapid melting, plus the moderate to heavy rains on March 1 (table 3B), occurring just after the soil had been well primed only a few days before, led to early March flooding in Iowa, southeastern Nebraska, northeastern Kansas, and northwestern Missouri (figs. 4B and 5A).

Red River of the North Basin

Temperature for the winter season (December-February) averaged 6° to 8° F. below normal, with precipitation generally totaling 1 to 2 in., or about 50 to 75 percent of normal.

January was an unusually cold month, average temperatures being 8° or more below normal (fig. 1). It was also a dry month; the average precipitation over the basin was less than 0.5 in. (fig. 2A) or less than half of normal (fig. 1).

February was also cold and dry, with average temperatures more than 4° to 6° F. below normal (fig. 1), and with average precipitation of less than 0.25 in. (fig. 2B)—less than one-quarter of normal (fig. 1).

March temperatures were much lower than usual, averaging 8° to 10° F. below normal (fig. 1). Precipitation in the western portion of the

basin averaged less than 0.5 in. (fig. 2C), or slightly over half of normal (fig. 1). In the southeastern portion, however, precipitation was relatively heavy, ranging from about 1 to 2 in. (fig. 2C), or from about normal to about twice normal (fig. 1). Most of the precipitation fell in three periods: March 1-3, 12-18, and 27-28 (table 3B and figs. 10C-10F), and practically all of it was snow.

Altogether, the October-March period was slightly colder and drier than normal. Early cold weather conditions in the fall of 1964 caused deep frost penetration in the ground before the first snow. A very high percentage of the precipitation was snow, with a substantial portion of it falling in March. The abnormally cold weather in the latter part of the season resulted in very little melting. Consequently, in spite of the precipitation deficit for the season, the snow cover at the end of March extended over the entire basin, with depths ranging from 1 in. to 2 ft., the accumulation being heaviest over the Red Lake River Basin (fig. 3B).

4. THE EARLY MARCH FLOODS

Upper Mississippi Basin

Flooding was confined to tributaries in southeastern Minnesota, southwestern Wisconsin, northwestern Illinois, and Iowa (figs. 4A and 5A). Flood stages, periods of flooding, and dates of crests are given in tables 1A to 1D. Most stations reported flooding for one to three days only and in no case did flooding persist for more than 11 days. All streams had receded to below flood stages by March 12. Flooding was very severe in southeastern Minnesota, where most stations on the Root and Zumbro Rivers reported new record crest stages (table 1A).

The flooding that occurred in the first week of March resulted from rapid snow melt supplemented by moderate to heavy rains beginning late on February 28 and continuing into the afternoon of March 1 (table 3A). Figure 6A shows the water equivalent of the snow cover on February 25, just after a light to moderate snowfall. The February snow cover had been at its deepest about mid-month (fig. 3A). This snow cover was effectively reduced (fig. 3A) by relatively mild temperatures associated with the passage of two low-pressure systems along the Canadian border in the period February 17-20 (fig. 10A). The soil was thus well primed before the beginning of the snowfall of February 23-24.

On February 27-28 a strong flow of warm, moist air from the Gulf of Mexico invaded the region (fig. 10B) and produced rapid melting. Daily maximum temperatures reached the low 40's (° F.) in southern Minnesota and Wisconsin, and low 60's in Iowa, Illinois, and northern Missouri. Dew points in these areas were in the 30's and 40's, indicating that condensation of atmospheric moisture on the snow surface may have been responsible for much of the melting. Figure 6B shows the water equivalent of the snow cover early on February 28. Comparison of figures 6A and 6B indicates the extent of the melting, and figure 3A shows the 1-in. snow line had been pushed northward into southeastern Minnesota and central Wisconsin by March 1. Figures 7A and 7B show the melting degree days above base 32° F. for February 27 and 28.

The first high water bulletin for the Zumbro, Whitewater, Root, and upper Iowa Rivers in Minnesota was issued by the Weather Bureau on February 28. From a stage of 2 ft. at the time the first bulletin was issued, the South Fork of the Zumbro River rose rapidly to a record crest of 19.12 ft. at Rochester, Minn., by 6:30 p.m., March 1. The previous record stage of 18.5 ft. occurred March 29, 1962. The Zumbro River rose to a near record crest of 28.4 ft. at Zumbro Falls, Minn., on March 2, and a record crest of 45.75 ft., at Theilman, Minn., on the same date. The previous record stage of 43.43 ft. at Theilman occurred July 22, 1951. Flood stage at this point is 38 ft. The stage at Theilman was 31 ft. when the first bulletin was issued on February 28. The Root River in Minnesota rose rapidly to record stages on March 2. Because of alternating periods of freezing and thawing, the rise along the Kickapoo River in southwestern Wisconsin extended over a longer period, March 1 through 11 (table 1B).

Near record stages occurred on the Pecatonica River in southwestern Wisconsin and on the Turkey River in northeastern Iowa. The snow cover on these two basins was almost entirely melted during the last two days of February (figs. 6A and 6B). The rapid melting of the snow cover and the rainfall which began early on March 1 caused these rivers to start rising rapidly on that day. The ice in the rivers broke up and moved out rapidly, forming only temporary jams. Flood damage was minor since mostly unplanted farmland and pastures were involved. These same areas had been inundated in February.

Rapid rises also occurred on the Skunk River, the middle reaches of the Des Moines River, and throughout the Cedar River in Iowa (tables 1B, 1C). Ice jams, from thick blocks of ice formed during the cold winter, complicated the flood problems for many communities. At Charles City, Iowa, on the Cedar River, an ice jam below the gaging station caused the water level to rise to a stage of 21.64 ft., barely exceeding the previous record stage of 21.60 ft., on March 27, 1961. At Des Moines, Iowa, a major ice jam, which lasted through March, formed on the Raccoon River a short distance upstream from the water works. Downstream on the Des Moines River a major ice jam caused a crest 2.7 ft. above flood stage at Keosaugua on March 5. Farther upstream a major ice jam between

Chillicothe and Tracy, Iowa, caused high readings at Eddyville and Tracy. Downstream from the ice jams, at Ottumwa, Iowa, the crest, on March 6 was below flood stage.

Missouri Basin

Early March flooding was limited mainly to tributaries in Iowa, southeastern Nebraska, northeastern Kansas, and northwestern Missouri (table 1E to 1G and fig. 5A). Flood stages were also exceeded on the Missouri itself in southeastern Nebraska and northwestern Missouri. On February 25, snow depths in these areas ranged from 4 to 12 in., with water equivalent generally between 0.5 and 1 in. (fig. 6A). Rapid melting of the snow cover (figs. 6A, 6B, 7A, 7B, and 10B) on the last two days of February and rainfall on March 1 (table 3B) caused the streams to rise rapidly. Rising waters broke up the ice in the streams, causing many ice jams.

The Floyd River, in northwestern Iowa, rose above flood stage at Alton, Iowa, on February 28, but did not crest until March 1. Flooding in all streams was of short duration; all receded to below flood stages by March 4.

Most tributaries of the Elkhorn River in Nebraska ran near bankfull stage during the first seven days of March. The Elkhorn was at bankfull stage from West Point, Nebr., to the mouth from March 1 to 16. Overflow occurred in the vicinity of ice jams between West Point and Scribner, Nebr. At Waterloo, Nebr., the Elkhorn was above flood stage from March 13 to 15, and crested at 15.5 ft. (0.5 ft. above flood stage) on the 15th. The North Fork was near bankfull on March 1-4, between Pierce and Norfolk, Nebr. Damages were confined mostly to pasturelands along the lower reaches of the Elkhorn. Some damage resulted to fences and a few homes in the town of Waterloo, Nebr., and a few persons were evacuated from their homes.

The upper Republican River at Stratton, Nebr., rose to near flood stage on March 7 because of a brief ice jam.

Severe flooding, augmented by ice jams, occurred in the lower reaches of the Boyer River in western Iowa. High flows tore loose some of the ice in the stream causing many ice jams. Many families were evacuated from the southern and eastern parts of the town of Missouri Valley, Iowa. Colder weather set in March 1 and persisted for four days (table 3B). Ice jams continued at the mouth of the Boyer River, impounding water which poured into sections of Missouri Valley and blocked main highways leading to it. Many additional families were evacuated from their homes by March 3. By March 5, the water had receded about 1 ft., but the remaining water in the lowland portions of the town froze.

Light to moderate overflows developed on the Big Blue River from near DeWitt, Nebr., downstream into Tuttle Creek Reservoir, near Manhattan, Kans., on the night of February 28-March 1. The Black Vermillion River at Frankfort, Kans., overflowed moderately during the first two days of March. Flooding occurred in the upper Kansas River Valley on Mill Creek at Paxico, Kans., and on Vermillion Creek at Wamego, Kans. Heavy snowmelt runoff during the last two days of February, augmented by rainfall of about an inch, caused the Big Blue River to rise 4 ft. above flood stage in the reach between Beatrice, Nebr., and Blue Rapids, Kans. Tributaries in the upper Kansas River Basin rose to flood stage following heavier rainfall, which exceeded 2 in. locally. The greater part of the snowmelt was released slowly by gradual daytime warming and nighttime freezing.

In northwestern Missouri, 1-in. rains on March 1 plus snowmelt from the February 27-28 warm spell caused flooding in tributary streams. Minor flooding occurred intermittently along the Missouri itself below Nebraska City, Nebr. Minor flooding occurred on the Grand River at Brunswick, Mo., on March 3, from backwater from the Missouri.

5. THE MID-MARCH FLOODS

Upper Mississippi Basin

Flooding was confined to tributaries in the southern portion of the basin, that is, in Iowa, Illinois, and Missouri (tables 1C to 1E and fig. 5B). Moderate to heavy snowfalls in early March had brought the 1-in. snowline southward to central Illinois and southern Missouri by March 8 (fig. 3A). A week of relatively warm weather from March 11 to 17 (table 3A and figs. 10D, 10E) caused melting in the southern part of the basin. Melting was intensified in the last four days of the period when daily maximum temperatures reached the high 40's and 50's. By March 15 the 1-in. snowline had receded northward to extreme northern Missouri and southern Wisconsin (fig. 3A).

Some streams exceeded flood stages as early as March 13, but most did not flood until the 17th, after the beginning of moderate to heavy rains in southern Iowa, Illinois, and northern Missouri. These 1- and 2-in. rains in the period March 16-18 (table 3A and fig. 8A), falling on well-saturated soils, caused most of the streams in these regions to exceed flood stages (fig. 5B). Rapid rises occurred on the South, Middle, North Raccoon, and Skunk Rivers in Iowa from heavy rains during the night of March 16 and the morning of March 17. The rainfall was heaviest across the upper Des Moines Basin with amounts ranging up to 1-1/2 in. Farther north, snow accumulated over a wide area in northern Iowa.

Rains of 1 to 1-1/2 in. on March 16-17, (fig. 8A) plus some snowmelt, caused minor flooding on the Fox and Illinois Rivers in Illinois and on the Salt

River at New London, Mo. Flooding was limited to farmlands immediately adjacent to the rivers.

Minor flooding, limited to farmlands bordering the river, occurred along the main stem of the Mississippi in the reach from Hannibal to Winfield, Mo., between March 18 and 21 (fig. 5B). Stages were generally higher than those reported in the early March floods, but no new records were established. Most streams had receded to below flood stages by March 21.

Missouri Basin

Moderate to heavy snowfalls (table 3B and fig. 10C) in the first week of March had brought the 1-in. snow line southward to eastern Nebraska and southern Missouri by March 8 (fig. 3A). Generally mild weather following the snowfalls caused melting which, by March 15 (fig. 3A), had pushed back the snow line eastward and northward to western Iowa and extreme northern Missouri, where daily maximum temperatures in the 50's and 60's on the 16th and 17th (table 3B) practically eliminated the snow cover over Missouri. Rainfall of 1 to 2 in. in southwestern Iowa and northwestern Missouri on March 16-17 (fig. 8A) flooded streams in those areas (tables 1E to 1F and fig. 5B).

In western Iowa the mild temperatures of March 11-17 (table 3B and figs. 10D, 10E) melted most of the remaining winter snow and caused the ice on the rivers to break up. Heavy runoff and ice jams caused the Floyd to rise 2-1/2 ft. above flood stage. The Big Sioux River below Sioux Falls, S. Dak., rose to about three-quarters bankfull stage during this period and broke the ice loose from the banks. The threat from ice jams on the Boyer River finally ended on March 17, when mild weather and rains caused another rise which cleared out the jams. Flood damage was heavy. Over 200 homes at Missouri Valley, Iowa, reported water over the first floor to a maximum depth of 5-1/2 ft. Some residents were still removing foot-thick ice floes from their yards on March 22.

Minor overflow occurred on Stranger Creek at Easton, Kans., in the Kansas River Basin on March 17. Stages downstream rose to near bankfull at Tongonoxie, Kans. Losses were negligible. A substantial rise of about two-thirds bankfull developed along the Marais des Cygnes in Kansas on March 17-19. There was widespread overflow in the tributaries in northwestern Missouri, with stages exceeding flood stages by 1 to 6 ft., and minor intermittent flooding in the lower Missouri. Practically all streams were back to below flood stages by March 21 (fig. 4B).

6. THE APRIL FLOODS

Upper Mississippi Basin

One of the worst flood disasters in a century developed in the Upper Mississippi Basin during April. It was born in the swirling blizzards of an abnormally long and bitter winter. It was nurtured by a combination of climatic conditions that led to persistence of a deep snow cover through an abnormally cold, wet March, well into a rainy April. Throughout much of the Minnesota River Basin and the lower Crow drainage, this deep snow cover lay on top of an inch or more of ice.

While April temperatures were near normal, they were considerably higher than those usually found in March, when the greatest depletion of the winter snow cover usually occurs. The rapid melting, plus moderate to heavy early April rains coming before the ground was sufficiently thawed to absorb the runoff, produced near-record to record floods. Table 7A shows how some of the crest stages in these floods compare with those of the greatest floods of record.

March had been an unusually cold and wet month. Monthly mean temperatures were from 4° to over 10° F. below normal (fig. 1) over the basin. March precipitation was above normal over almost the entire basin (fig. 1). Centers of 5 to 6 in., over 3 times normal, occurred in southern Minnesota; and of 4 to 5 in., over twice normal, in Iowa (fig. 2C). On March 29 deep snow covered Minnesota and Wisconsin (fig. 3B) with depths reaching 5 ft. in some places. The water equivalent of this snow was as much as 7 to 9 in. in eastern Minnesota and northwestern Wisconsin (fig. 6C).

Alternating cool, wet periods and warm spells comprised the sequence of weather events in April that produced the highest water observed along the Upper Mississippi up to 1965. Figures 10G to 10J show the sequence of storms that produced these events. At least ten low-pressure centers affected the weather of the region during the month, and measurable precipitation was reported on about half the days in the northern portion of the basin (table 4A). These events added up to near normal temperature and above normal precipitation for April (fig. 1). Precipitation centers of 4 to 6 in. in southern Minnesota and northeastern Iowa (fig. 2D) were over twice normal. A center of over 8 in. in southeastern Iowa was over three times normal. Figure 5C shows the river stations which reported above-flood stages in April, and tables 1A to 1E give observed and comparative stage data.

Most of the precipitation (largely rain) in the basin fell in three periods, April 2-7, 8-12, and 23-28 (figs. 8B to 8D). In that part of the basin with a snow cover, i.e., Iowa northward, (fig. 3B) daily maximum temperatures during the wet periods generally ranged from the mid-30's into the high 40's, and were in the 50's and 60's during the warm spells. Dew point temperatures were generally in the 30's and 40's. Figures 7C to 7E show the accumulated melting degree days above base 32° F. for the three periods, March 31-April 5, April 6-12, and April 13-19, respectively.

The degree-day map for the period March 31-April 5 (fig. 7C) and the water equivalent maps for March 30 and April 5 (figs. 6C and 6D) indicate there was relatively little snowmelt in the first five days of April except in northern Iowa. Daily maximum temperatures were generally in the 30's and 40's (table 4A), with dew points in the 20's and 30's. Flooding during this 5-day period was restricted to tributaries in southeastern Minnesota, southwestern Wisconsin, Iowa, and Illinois.

Relatively high temperatures with daily maxima in the 40's and 50's generally prevailed over the snow-covered portion of the basin during the period April 6-12 (table 4A). Dew point temperatures were generally in the 30's. Figure 7D shows accumulations of at least 40 degree days during this period in most of Minnesota and Wisconsin. Considerable snowmelt took place between April 5 and April 12, as is indicated by comparison of the water equivalent maps for those dates (figs. 6D and 6E) and by the snow-on-ground data of table 4A. In some places in Minnesota, over 5 in. of water equivalent were converted into runoff during this period. The snow cover in extreme southern Minnesota and southern Wisconsin was almost completely eliminated. The snowmelt was augmented by the rains of April 8-12 (fig. 8C).

The weather conditions leading to the record mid-April crest stages on the Mississippi River above Minneapolis, Minn., were typical of the conditions associated with the floods over most of the snow-covered portion of the basin and are delineated in figure 11. This figure shows that while daily insolation was mostly above normal at St. Cloud, Minn., in the latter part of March, temperatures were well below normal, dew points remained below freezing, and there was no decrease in the water equivalent of the snow cover, hence, very little or no melting. Snowfall on March 27-28 and 31 added slightly to the water equivalent.

In April, daily insolation tended to be below normal because of unusual cloudiness. Daily maximum temperatures were above freezing, but mostly below normal. Daily minimum temperatures were mostly below freezing through April 9, and fluctuated slightly above and below freezing through April 20, but were near normal for the season. General moderate to heavy rains in the period April 3-6 raised the water equivalent of the snow cover to a maximum on April 6. Thereafter, above-freezing temperatures and dew points, plus rains in the period April 8-12, rapidly depleted the snow cover so there was only a trace left on the 14th.

The most abnormal weather features depicted on figure 11 are the depth and water equivalent of the snow cover and the low March temperatures at St. Cloud. The abnormality of the snow data is not evident from the graph, as normal values of depth and water equivalent are not available. However, a survey of the St. Cloud record for the 15 years, 1950-64, revealed that there was no year in which the winter snow cover persisted beyond April 5. On April 6, 1965, depth and water equivalent of the snow cover at St. Cloud were 14 and 7.7 in., respectively.

Southeastern Minnesota got the first taste of the severe floods that were to ravage the southern half of the State (table 1A and fig. 4A). One by one, the tributaries of the Minnesota River spilled over their banks as the heavy snow cover melted and ran off over the frozen ground. The flow from the Watonwan, Le Sueur, Blue Earth, and Cottonwood Rivers raised the Minnesota River to a near record stage of 29.07 ft. at Mankato, Minn., on April 9 (fig. 9A). This was the highest water at Mankato since April 26, 1881, when it reached a level of 29.9 ft. as determined from high water marks. The community worked feverishly to protect itself from the near record high water. Approximately 1,500 families were evacuated from Mankato and North Mankato. From Mankato, the swollen Minnesota pushed northeastward bringing record crests to, and isolating, St. Peter, Henderson, Carver, Chaska, Shakopee, and Savage, Minn., before emptying into the Mississippi River.

As the Minnesota River carried its near record to record flood crests downstream, the Mississippi River tributaries in south-central Minnesota began overflowing their banks. The Crow River at Delano, Minn., reached a near record stage of 18.4 ft. on April 13, 10.4 ft. above flood stage. Farther downstream at Rockford, Minn., a record crest of 19.28 ft. was reached on April 15. This was over 3 ft. above the record crest of 16.24 ft. on April 13, 1952.

The Rum River was above flood stage at St. Francis, Minn., from April 17 to 25, and established a new record stage of 11.5 ft. on April 19 (fig. 9A). This record stage is 3.5 ft. above flood stage and exceeded the previous maximum, recorded on April 13, 1952, by half a foot.

The St. Croix River reached bankfull stage at Stillwater, Minn., on April 12. Six days later it reached a record crest of 94.1 ft., nearly 4.5 ft. above the previous crest of April 1952 (fig. 9A). Convicts from the Minnesota State Penitentiary helped to construct emergency dikes to save the business district from complete inundation. Many families in the area were evacuated from their homes.

The Cottonwood River at New Ulm, Minn., was in flood from April 6 to 16. Its crest of 20.86 ft. on April 8 exceeded the previous record crest of 16.94 ft. recorded on July 9, 1947 (table 1A).

The South Fork of the Zumbro River at Rochester, Minn., which suffered record flooding early in March, had comparatively minor flooding during April. It fluctuated from above to below

flood stage during the period from April 4 to 9. Four flood crests occurred during that period with the highest crest of 13.55 ft. (flood stage 12 ft.) on April 6. Flooding along the main stem of the Zumbro was more severe and on April 7 approached within 1/2 ft. of the new record stage of 45.75 ft. set in March at Theilman, Minn. This crest and those on April 5 and April 8, exceeded the previous record stage of 43.43 ft. which occurred on July 22, 1951 (table 1A).

The Root River, which experienced record flooding during March, exceeded flood stage by 0.5 to 2.5 ft. during the first half of April. On April 6 and 7 it came within 1.5 ft. of the new record crest of 50.8 ft. set on March 2 at Hokah, Minn. (table 1A).

The upper Iowa River near Dorchester, Iowa, was out of its banks from April 3 to 9 (table 1B). It receded below bankfull stage briefly on April 4 and was back above flood stage again on April 5. The highest flood crest of the four reported during April was 17.5 ft. (flood stage 14 ft.) on April 6. This was less than 0.4 ft. below the March 1 crest of 17.85 ft.

The Kickapoo River at Soldiers Grove, Wis., exceeded flood stage from April 4 to 13, with a crest of 725.3 ft. (flood stage 723.0 ft.) on April 12. The flooding during March was higher than in April, with a crest of 726.0 ft. on March 3. This was 0.7 ft. higher than the April 12 crest, but was 5.6 ft. below the record stage of 731.6 ft. reported on July 21, 1951 (table 1B).

The Wisconsin River reached bankfull stage at Wisconsin Rapids, Wis., on April 13, but did not rise any higher. Farther downstream at Portage, Wis., it exceeded flood stage by 1.5 ft. on April 16.

Minor flooding occurred on the Turkey and Wapsipinicon Rivers in Iowa and on the Pecatonica and Rock Rivers in southern Wisconsin and northern Illinois (table 1B). Flood damage was negligible as higher stages had been reached in the same areas in February and March. Only unplanted farmland and pastures were involved.

Major flooding occurred on streams in the interior sections of Iowa during April (tables 1C and 1D). The West Fork of the Des Moines River reached a record stage of 15.61 ft. at Estherville, Iowa, on April 10, exceeding the previous record stage of 15.53 ft. set on June 8, 1953. At Humboldt, it was above flood stage from April 4 to 26, and the new record crest of 13.9 ft. on April 8 exceeded flood stage by 5.9 ft. and the previous record stage on June 23, 1947, by 1.7 ft. (table 1C). At Boone and Des Moines, Iowa, on the Des Moines, the crests were the second highest of record (table 7A). At Ottumwa, Iowa, the river was in flood from April 5 to 21, and the crest on April 11 was the fourth highest of record (table 7A).

On the Iowa River the crest on April 13 was the highest of record at Wapello and the second highest of record at Marshalltown, Iowa. On other streams in Iowa, the crests were the third and fourth highest of record.

A general period of showers and thunderstorms over most of Missouri and Illinois from April 3 to 6 (table 4A and figs. 8B and 10G) produced general rises in all tributary streams in the two States to bankfull or slightly above during the first half of the month. General rains on April 14-15 (table 4A and fig. 10H) produced some marked rises on most rivers and prolonged the flooding on the Illinois River and some of its tributaries. A third period of general rain on April 24-25 (table 4A and figs. 8D, 10I, and 10J) produced second crests above flood stage on the Illinois. Exceptionally intense rainfall, totaling from 2 to 4 in. in the upper portion of the Kaskaskia, produced a crest of 20.2 ft., 2.2 ft. above flood stage, at Vandalia, Ill., on April 28, (table 1D). The Big Muddy River at Murphysboro, Ill., was out of its banks from April 9 to 22, with a crest 1.4 ft. above flood stage on April 12 and 13.

Unprecedented flooding (tables 1D and 1E) along the Mississippi exceeded flood levels at all gaging stations from Libby, Minn., to Caruthersville, Mo. (below the mouth of the Ohio River). The only exception was St. Louis, Mo., where the crest came within 1.2 ft. of flood stage on April 17. Flooding in the reach at and above Keithsburg, Ill., generally started in the period April 8-18 (tables 1D and 1E). Below Keithsburg, flood stages were exceeded a few days earlier, mainly in the period April 6-11, because of the concentrations in Iowa and Illinois of the moderate to heavy rainfalls of April 5-6 and 8-11 (table 4A and figs. 8B, 8C).

New record high stages were established from Fort Ripley, Minn., to Hannibal, Mo., a distance of 672 miles, during the period April 16 to May 4. The May crests, in the reach between Keokuk, Iowa, and Alton, Ill., occurred within the first four days of the month (table 1E and fig. 4B). All gaging stations from St. Paul, Minn., to Muscatine, Iowa, experienced crest stages 1.4 to 4.5 ft. above previous record flood peaks (tables 1D and 1E). The river was at a level higher than the previous maximum crests for an average of 13 days from Red Wing, Minn., to Burlington, Iowa (figs. 9C to 9E). Between Quincy and Grafton, Ill., the river was above flood stage for over 40 successive days (table 1E).

At the time the Mississippi was cresting at St. Paul, Minn., on April 16, contributions from downstream tributaries had already raised the river in the reach from Keithsburg, Ill., to Louisiana, Mo., to levels approaching those attained during the major floods of 1947 and 1960. A crest of 16.5 ft. was observed at Keithsburg on April 17 (table 1E). The river then fell only slightly (0.6 ft.) at Keithsburg before it began to rise again, reaching a new record stage of 20.36 ft. on April 27, when the upstream crest was augmented by the heavy rains of April 23-26 in southeastern Iowa and

northeastern Illinois (table 4A and fig. 8D). The new record stage was about 3-1/4 ft. above the previous maximum reported April 29, 1951.

The crest became very flat as it progressed downstream so that near-crest conditions prevailed approximately 48 hours in advance of and following the time of the peak stage (fig. 9E). As the upstream rise approached the Quincy, Ill., reach of the river, major levee failures resulted in a temporary reduction in stage. The river rose again after filling-in behind the breaks. However, the upstream crest, when it arrived in the Quincy, Ill.-Hannibal, Mo., area on May 3-4, was not as high as the crest that had already occurred on May 1, just prior to a major levee failure at Quincy (table 1E and fig. 9E).

Missouri Basin

There was some flooding during the first half of April in Montana (table 1E). Rapid thawing of stream ice and low-level snowmelt throughout the lower Yellowstone River Basin in Montana during the period from April 1 to 7 (fig. 10G) caused localized ice jams. Flooding occurred along the Powder River in the vicinity of Broadus, Mont., and on the Yellowstone River from Billings to Sidney, Mont. A section of the Milwaukee Railroad track, west of Miles City, Mont., was washed out. Some damage resulted to summer cabins, recreational areas, roads, and bridges.

Runoff from melting snow in the Sage and Big Sandy Creeks in Hill County, Mont., during the period April 12-17, resulted in flooding of lowlands. There was some damage to highways, culverts, and bridges. Flooding along the main stem of the Milk River was minor (table 1E). Several sections of U.S. Highway No. 2 were covered with several inches of water for several hundred feet.

The major April flooding was in the lower tributaries starting with the Big Sioux River in South Dakota (tables 1E-1G). Winter precipitation amounts through March in the Dakotas and most of Nebraska had been lower than normal as were the temperatures (fig. 1). However, precipitation was above normal in Iowa, eastern Nebraska, northeastern Kansas, and northern Missouri. March and April precipitation in these areas ranged from 1 to over 4 in., (figs. 2C, 2D) or generally between 100 and 200 percent of normal.

A snowstorm on March 23-25 (table 3A and figs. 10E, 10F) produced a continuous snow cover from Kansas and Missouri northward. Daily maximum temperatures ranging from the 30's in South Dakota to the 50's in Kansas on March 27-28 greatly depleted this snow cover. On March 29 the 1-in. snow line lay across northern Nebraska and central Iowa (fig. 3B). Snow depths in northeastern South Dakota, southwestern Minnesota, and northwestern Iowa ranged from 4 to 12 in., with water equivalent as high as 3 in. (fig. 6C).

During the period March 30-April 1, maximum temperatures in western Iowa reached the 50's (tables 3B, 4B). This caused heavy melting and ice breakup on the Floyd and the Big Sioux Rivers in northwestern Iowa. Cooler weather in northeastern South Dakota and southwestern Minnesota delayed melting in those areas for a few days until rain hastened the process. From April 2 to 6 (figs. 8B, 10G) 1 to 2 in. of rain fell over most of the Floyd and Big Sioux drainage. The Floyd River was in flood from March 31 to April 7. The record crest of 17.4 ft. at Alton, Iowa, on April 1 (table 1E) exceeded flood stage by 5.4 ft. and the previous maximum stage, recorded March 28, 1960, by 0.4 ft. The 1960 record stage was again exceeded on April 6 by 0.2 ft.

The Big Sioux was out of its banks from the mouth of the Rock River to the edge of Sioux City, Iowa, throughout the first half of April. At Akron, Iowa, on April 8, it reached within 0.7 ft. of the record stage of 21.56 ft. established on April 1, 1960 (table 1E). The April 8 crest of 20.85 ft. was the second highest of record (table 7B).

A snow survey of the Little Sioux Basin in northwestern Iowa on March 26-29, showed the water equivalent to range from 6 to 8 in. in the area of Spirit Lake, Iowa, to 2 in. at Spencer, Iowa, to over 3 in. at Cherokee, Iowa, to less than 1 in. near Oto, Iowa. The late March and early April mild temperatures rapidly depleted this snow cover so that very little remained by April 5 (fig. 6D).

Lowland flooding along the Little Sioux River at Spencer, Iowa, began on March 31. With the ground still frozen, practically all of the snowmelt became surface runoff into the frozen streams. The runoff caused the ice to break up, resulting in many local ice jams. Showers and thundershowers, totaling 1/2 to 3/4 in. of rain, occurred in the basin during the late afternoon and night of April 2-3 (table 4B and fig. 10G). Additional showers and thundershowers (0.8 to 1.8 in.) occurred during the night of April 5-6. This rain completely dissipated the ice. Record stages were reached on the Little Sioux at Linn Grove, Peterson, Cherokee, and Turin, Iowa, between April 6 and 8 (table 1F). The flooding was extended by more rain on April 8-12 (fig. 8C), and continued through April 22 at Linn Grove, Iowa.

The Nishnabotna River at Hamburg, Iowa, exceeded flood stage by 3 to 4 ft. on April 1 and April 6.

Melting snow in southwestern Iowa and northwestern Missouri on March 31-April 1, followed by repeated moderate to heavy rains during the first two weeks of April (table 4B and figs. 8B, 8C, 10G, and 10H), caused prolonged flooding along the Grand River in Missouri. The Grand was out of its banks at Sumner, Mo., from April 6 to 13, and at Brunswick, from April 6 to 14. Crests

ranged from 1 to 4.5 ft. above flood stage (table 1G).

Rainfall ranging from 3 to 4 in. on April 2-3 over the Osage and Sac River Basins in Missouri caused 3 to 4 ft. of flooding along those streams during the first part of April (table 1G). Minor damages were reported along the Sac.

Minor flooding occurred along the main stem of the Missouri at Hermann and St. Charles, Mo., on April 6-14 (table 1G).

Red River of the North Basin

Temperatures had been abnormally low all winter. Precipitation was also below normal, but the eastern portion of the basin experienced above-normal precipitation in March (fig. 1). Practically all of the precipitation was in the form of snow, and at the end of March there was a continuous snow cover over the basin ranging from as low as 1 in. in places in the western portion to 12-18 in. in the eastern portion (fig. 3B). Water equivalent values on March 30 generally ranged from 0.5 to over 3.0 in. (fig. 6C).

April was a wet month, with measurable precipitation (mostly rain) reported on about one-third of the days. Monthly totals generally ranged from 2 to over 4 in. (fig. 2D), or somewhat over 150 percent of normal (fig. 1).

Relatively mild weather (temperatures in the 30's) during the period March 31-April 5 (table 4B and fig. 7C) resulted in some melting as indicated by comparison of water equivalent values for March 30 and April 5 (figs. 6C and 6D). On April 5-6, a storm (fig. 10G) deposited from 1 to 2 in. of mixed rain and snow (table 4B) over most of the basin except the extreme western portion (fig. 8B). This storm was followed immediately by warm weather with daily maximum temperatures in the 40's and dew points in the 30's. Melting was rapid and the river rose above flood stage at Wahpeton, N. Dak., on April 9 (fig. 9F).

The warm weather and melting continued, and on April 10-11, a second storm (fig. 10H) deposited from 1 to over 2 in. of rain over the central portion of the basin (table 4B and fig. 8C). This rain plus the high temperatures during the period April 6-12 (fig. 7D) practically eliminated the snow cover except over northwestern Minnesota, where 1 to 4 in. of snow with a water equivalent 0.5 to slightly over 1 in. still remained on April 12 (fig. 6E). By that date the Sheyenne River was above flood stage at West Fargo, N. Dak., and so was the Red Lake River at Crookston, Minn. (table 1G). The entire reach of the main stream of the Missouri at and above Grand Forks, N. Dak., also was above flood stage by April 12. Flood stages at Drayton and Pembina, N. Dak., were reached on April 14 and 16, respectively.

A record crest of 25.8 ft. occurred on the Red Lake River at Crookston, Minn., on April 13, exceeding the previous record crest of 25.70 ft., which occurred on May 7, 1950. The Sheyenne River, cresting at 20.75 ft., on April 19, exceeded the previous record stage (May 11, 1950) at West Fargo, N. Dak., by 0.14 ft. Crests along the main stem of the Red River of the North in the reach from Fargo to Grand Forks, N. Dak., ranked fifth or sixth among floods of record (table 7B). They ranged from 13 to 17 ft. above flood stage but 3 to 10 ft. below the previous record stage. Below Grand Forks, crests ranged from 5.4 to 8.4 ft. above flood stage. At Drayton, N. Dak., the Red River of the North approached to within 1.2 ft. of the previous record stage of 41.58 ft., which occurred on May 12, 1950. Flooding on the main stream below Fargo continued into May (table 1G and fig. 9F).

7. THE MAY FLOODS

Upper Mississippi Basin

May was a warm and wet month. At least nine low-pressure centers affected the weather of the area during the month (figs. 10K-10N). Measurable precipitation (practically all rain) was reported on 10 or more days in the central and northern portions of the basin (table 5). Over most of Minnesota, at least 15 days had measurable precipitation. Over the basin precipitation ranged from 3 to over 8 in. (fig. 2E) or from normal to twice normal (fig. 1).

Most of this precipitation fell in three storm periods, May 4-10 (fig. 8E), 14-18, and 20-27 (fig. 8F), the major portion falling in the last period. Average temperatures for the month ranged from 2° to 6° F. above normal (fig. 1).

Tributaries in Minnesota, Wisconsin, and Iowa that had reached record to near record crests during April were in recession during May, except for minor rises from heavy precipitation (fig. 5D). The Crow River, which had reached a record crest of 19.28 ft. at Rockford, Minn., on April 15, was back within its banks at all points by May 4.

The Minnesota River had receded within its banks in the reach above Mankato, Minn., by May 1. In the reach below, where record crests occurred on April 12-14, it receded within it banks by May 17, except at Savage, Minn., where it continued in flood until June 20. Three rises occurred during May on the Minnesota River and its tributaries upstream from Mankato, Minn. The Cottonwood River near New Ulm, Minn., came closest to reaching flood stage (11 ft.) on May 9 when it crested at 10.7 ft. The main stem of the Minnesota approached within 4 to 5 ft. of flood stage on May 12, 19, and 30. These rises were caused by heavy rains on May 8-9, 14-16, and 21-25 (fig. 8F).

The Chippewa River at Durand, Wis., crested 4 ft. below flood stage on May 11 and 2.5 ft. be-

low flood stage on May 19. The increased flow along the Chippewa produced a slight rise along the Mississippi River from its confluence near Alma, Wis., through LaCrosse.

Frequent thundershowers during the latter part of May (table 5 and fig. 8F) throughout central Iowa produced minor flooding on the Raccoon and Des Moines Rivers. The showers on May 25 totaled 3 in. or more in the area from Carroll to Iowa Falls, Iowa. The North Raccoon at Jefferson, Iowa, crested 4.9 ft. above flood stage on May 27 (table 1C).

In Illinois, minor flooding on the Kaskaskia and Illinois Rivers, which began in April, continued into May (table 1D). General rains of 1 to 2 in. on May 4-9 (table 5 and fig. 8E) prolonged the high stages. At some points on the Illinois, secondary crests above flood stage were recorded, but they were lower than the April crests. The Vermillion River at Lowell, Ill., was 1.2 ft. above flood stage on May 5-6.

Above Keokuk, Iowa, the Mississippi River, which had reached new high record stages in April, was in recession on May 1 (figs. 9B-9D). It had receded within its banks at a few upstream points, (Minneapolis, Hastings, and Wabasha, Minn., and Alma, Wis.) by May 1. It was still above record levels at the beginning of the month (table 1E and figs. 9C-9E) in the reach from McGregor, Iowa, to below Burlington, Iowa, a distance of more than 230 miles. It remained above the previous record stage at Burlington, Iowa, for a total of 13 days, and above flood stage for a total of 36 days before receding within its banks on May 16 (fig. 9E).

In the reach from Hannibal, Mo., to Clarksville, Mo., the Mississippi was out of its banks for a total of 43 days (table 1E and fig. 9E). In the reach below the Missouri River confluence, there was no flooding during May. The Mississippi was back within its banks at all points on May 20.

Heavy rains on May 23-25 (table 5 and fig. 8F) produced another rise along the upper Mississippi River, which crested at 9.65 ft. at Fort Ripley, Minn., on May 28 (flood stage 10 ft.) after receding to 8.35 ft. on May 19. The combination of the rises on the Minnesota and the upper Mississippi resulted in rises in the main stem at both Minneapolis and St. Paul, Minn., during the last week in May.

As the Mississippi River was receding from a crest of 10.5 ft. at St. Paul, Minn., (flood stage 14 ft.) on May 31, heavy showers occurred over the area around 9 p.m. By early June 1, 7.44 in. of rain had fallen at South St. Paul. Stillwater, Minn., recorded 7.98 in. during the same period. Local floodings and washouts occurred over parts of St. Paul and Stillwater. The Mississippi rose to a stage of 11.8 ft. at St. Paul on June 1 and then continued to recede.

Missouri Basin

May precipitation was generally heavy, ranging from 3 to over 10 in. (fig. 2E), or from about normal to over twice normal (fig. 1). Heaviest precipitation was in southwestern Minnesota, western Iowa, eastern South Dakota, and eastern Nebraska (fig. 2E). In those areas measurable precipitation was generally reported on about half the days. Most of the precipitation fell in three stormy periods, May 3-9, 14-18, and 20-27, the last period (fig. 8F) being the heaviest contributor. Monthly average temperatures ranged from about 2° F. below normal in the Dakotas to over 6° F. above normal in northern Missouri (fig. 1).

Minor rises occurred on the Elkhorn at and below West Point, Nebr., on May 9-11, when the river ran near bankfull. Heavy rains in the period May 21-26, climaxed by downpours on May 25, over the central and southeastern portions of the Elkhorn Basin caused brief overflow on some of the smaller tributaries (fig. 5D and table 1F). Below Winslow, Nebr., the river ran near bankfull on May 25-27. No damage was reported.

Locally heavy rains during the afternoon and evening of May 24 and 25 over eastern Nebraska and western Iowa resulted in some slight overflows in the upper and lower reaches of the Little Sioux and Boyer Rivers in Iowa and in the lower reaches of the Loup River in Nebraska (table 1F and fig. 5D). Flooding at Linn Grove, Iowa, on the Little Sioux, was minor in comparison to the record flooding during April. The Boyer River near Denison, Iowa, was out of its banks for a brief period on May 25. Two bridges were washed out.

Locally heavy rains on May 21 and 22 caused more than 2 ft. of overflow on Salt Creek at Ashland, Nebr., on May 22. Some county roads were inundated. Mill Creek, which flows into the Platte River at Louisville, Nebr., overflowed its banks from the heavy rain. Several families were evacuated from their homes for a short period.

Major tributary flooding on Beaver Creek in northwestern Kansas on May 24-26, extended downstream to the vicinity of Danbury, Nebr., on May 27. The crest of 16.7 ft. at Cedar Bluffs, Kans., on May 26 was 2.7 ft. above flood stage (table 1F). On May 22 Little Blue River at Deweese, Nebr., exceeded the previous record stage of 13.3 ft. recorded on June 17, 1957, by 1.3 ft. (table 1F). This was the most extensive local overflow in 45 years. The only flooding on the Big Blue was at Crete, Nebr., on May 22-27. The crest of 20.2 ft. on May 23 was 4.2 ft. above flood stage (table 1F). Minor overflows occurred on the Republican at Orleans, Nebr., on May 27 and on the West Fork Big Blue at Dorchester, Nebr., on May 25. Turkey Creek was out of its banks at Wilber, Nebr., on May 24-27, with a crest over 3 ft. above flood stage on May 24. The crest of

14.05 ft. was 1.5 ft. below the record crest of June 1957 (table 1F). This flooding, which was the first of the year at all these stations, was due to general rains of 2 to 5 in., with local reports of 6 to 8 in. of rain on May 21-22 (fig. 8F). Comparatively heavy agricultural and highway losses were sustained in limited areas.

Moderate to heavy rains on May 7-8 (fig. 8E) in northwestern Missouri resulted in minor flooding on the lower Grand on May 9-10 (table 1G). Sumner, Mo., reported a crest of 29.15 ft. on May 9. This was 3.2 ft. above flood stage. Heavy rain in southwestern Iowa on the night of May 21-22 (fig. 8F) caused brief flooding on the lower Nishnabotna River on May 22. The crest of 21.1 ft. at Hamburg, Iowa, was 3.1 ft. above flood stage.

Heavy rains in western Iowa and eastern Nebraska on May 21-22 brought rises to near flood stage along the Missouri above Boonville, Mo., on May 23. This was followed by general moderate rains on May 25-26 (fig. 8F), which caused the Missouri to rise 0.3 ft. over its banks at St. Joseph, Mo., on May 27 (table 1G).

Red River of the North Basin

The Red River of the North was in recession along its entire course on May 1 (fig. 9F). It was still above flood stage at Halstad, Minn., and Grand Forks, N. Dak., on May 1, but receded within its banks before the end of the day. On May 1 the stage at Drayton, N. Dak., was 38.5 ft. or 6.5 ft. above flood stage. At Pembina, N. Dak., it was 46.3 ft., or 4.3 ft. above flood stage. The Red River of the North was back within its banks at all points within the United States on May 8.

8. FLOOD DAMAGES

Flood damages exceeded $180 million. In the Upper Mississippi Basin alone, damages were over $105 million. This is almost six times the damages over the same area in the 1951 and 1952 floods, which were estimated at $18.5 million and $19 million, respectively. Tables 8 to 10 show the breakdown of damages for the 1965 flood as compiled by the U.S. Corps of Engineers. Table 8 lists estimated damages and other flood statistics for the Upper Mississippi Basin above Guttenberg, Iowa. It shows estimated total damages of almost $46,200,000 for various places on the Minnesota, St. Croix, Chippewa, and the Mississippi Rivers. Table 9 indicates total damages of about $55,100,000 along the reach of the Mississippi River between Cassville, Wis., and Hannibal, Mo. Table 10 indicates total damages approximating $2,700,000 for the combined Iowa-Cedar River Basins. In addition to the above, total damages in the Des Moines River Basin were estimated from stage-damage curves, based on previous surveys, as about $2,200,000. Included in this amount was $700,000 in municipal damage in the city of Des Moines. The loss of a bridge accounted for a major portion of this municipal damage.

The number of lives lost, as compiled by the American Red Cross, was 16. The greatest loss of life occurred in Minnesota, where the floods took a toll of 13 lives. Over 700 persons were injured; about 60 of these were hospitalized.

More than 11,000 homes in Illinois, Iowa, Minnesota, Missouri, and North Dakota were damaged. Over 1,000 of these suffered major structural damage. In addition, nearly 1,000 farm buildings received major damage. About 12,000 families suffered some financial loss. Approximately 150,000 workers and disaster victims received food and shelter from the American Red Cross. The Corps of Engineers provided technical assistance and several hundred thousand sandbags for at least 100 communities.

Damage to crops and hayfields was heavy, consisting of soil erosion, wrecked fences, loss of crops, destruction of soil conservation structures, and deposits of debris. Cost of debris removal was estimated as high as $60 an acre.

In the Missouri Basin, damages in the Floyd and the Big Sioux Basins were entirely rural. About 7,000 acres in the Floyd Basin and 42,000 acres in the Big Sioux Basin were flooded. Ice breakup and ice jamming caused serious damage to farm fences, water gates, and county- and privately-owned bridges. Semidormant legumes, winter wheat, and spring grass seedings were destroyed in the lower section by the long duration of overflow. While the flooding was not as deep or extensive as in 1960 and 1962, the Big Sioux averaged about a mile wide from Hawarden, Iowa, to the northern edge of Sioux City. Thirty-five farmsteads were isolated by flood water, and many of them were flooded. In the Little Sioux Basin, considerable damage occurred in urban areas as well. At Cherokee, Iowa, the Corps of Engineers estimated damages at $666,000.

In the Red River of the North Basin, considerable damage occurred to city property and farmlands, especially in the reach north of Fargo-Moorhead. Extensive flooding of farmlands occurred with loss of some topsoil. The planting of spring crops was delayed. Some bridges were lost and roads damaged. Extensive sandbagging was done to protect property at many locations.

9. FLOOD WARNINGS ISSUED BY THE WEATHER BUREAU

Effective forecasts, warnings, and advisories were issued by the Weather Bureau and given wide dissemination. An advisory on the flood potential in the Upper Mississippi Basin was issued as early as March 19. On that date flooding was

predicted for all points along the Mississippi River as far downstream as Louisiana, Mo. Record flooding was indicated for the Crow and Rum Rivers. The *Spring Outlook* pointed out that if rainfall of 1 in. should fall just before or during the time of the forecast crests, the resulting crests in other parts of the Upper Mississippi Basin would be near those recorded in 1952; if more than 1 in. of rain occurred, the crests would be even higher.

Cities and town along the river banks were warned by the Weather Bureau to prepare for the floods. So thorough were the preparations, that, even though critical stages were reached, there were no major overflows that had not been anticipated. On the basis of the warnings the Minnesota Department of Civil Defense called a meeting on March 25 of State and Federal Agencies concerned to implement plans for protective measures against the major flooding expected in Minnesota within the next two to three weeks [2]. On March 27, the South St. Paul stockyards began to build an earthen levee to protect the yards. It was completed within 10 days. This levee, large enough so that earth-moving equipment could travel on top of it, more than paid for itself, as the stockyards were dry, and were out of operation for only 10 days (April 10-19). (In the March 1952 flood, the stockyards were inundated.) On March 29, the city of St. Paul, Minn., started to ready the flood wall and to begin preparations to add extensions should it become necessary. On March 31, the Red Cross, on the basis of Weather Bureau forecasts, moved several families from South St. Paul. On April 5-7, many families in Lilydale and Invergrove were evacuated. At points downstream along the Mississippi River, from St. Paul through LaCrosse, the evacuation of residents from lowland areas was continuous from April 1 through April 6.

Forecasts for record flooding along the Mississippi River were issued on April 8. On that date, a crest of 27.0 ft. was forecast to occur on April 16 at St. Paul. The river stage at that time was 5.3 ft. On the basis of this forecast, the city of St. Paul directed its employees to install a plywood extension on top of the flood wall [2]. These extensions were completed by April 11, five days before the expected record crest. The observed crest at St. Paul was 26.0 ft. on April 16.

On April 9, forecasts were issued for the Mississippi River below St. Paul for stages exceeding the 1952 flood. At Winona, Minn., and LaCrosse, Wis., the peak of the flood was forecast to occur on April 20-21. Both municipalities, on the basis of this forecast, prepared for this record flood by building protective dikes. Although there were minor failures, the dikes paid off and saved much misery and property loss.

An advisory on the flood potential in the Missouri Basin on the Floyd and Big Sioux Rivers in Iowa was issued on March 26, two weeks before the actual crests. On April 1 an advisory was issued for the Little Sioux Basin, where the first cresting occurred on April 10.

Forecasts for the Red River of the North Basin were issued in ample time to be of considerable value in planning the moving of property and evacuation of some people living in the flood plains.

Special bulletins concerning the expected flood conditions over the flood area were issued daily and disseminated by press, radio, and TV. Newspapers, radio and TV stations cooperated fully in keeping the public advised. Cities and towns along the river banks received adequate warning to prepare for the floods. Several cities secured supplies of sandbags for the anticipated floods.

The timely and accurate warnings were credited with having saved at least $174 million of additional flood damage along the main stem of the Mississippi River from Cassville, Wis., to Hannibal, Mo., (table 9D). This amount is well over three times the estimated total damages of $55 million for that reach. If the same ratio of damages saved to damages sustained prevailed throughout the flood area, total damages saved as a result of the flood warnings may have approximated $335 million for the Upper Mississippi Basin alone, i.e., exclusive of the Missouri and Red River of the North Basins.

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Table 1A.—Flood stage and comparative crest stage data—Upper Mississippi River tributary systems in Minnesota and Wisconsin

River and station	Flood stage	Above flood stages March-May 1965 From—	To—	Crest March-May 1965 Stage	Date[1]	Previous Maximum Crest of record Stage	Date[2]
Upper Mississippi Basin	Ft.			Ft.		Ft.	
Crow:							
Delano, Minn. (1)	8	Apr. 9	May 4	18.40	Apr. 13		
Rockford, Minn. (2)	10	Apr. 11	May 1	19.28	Apr. 15	16.24	Apr.13,1952
Rum:							
St. Francis (nr), Minn. (3)	8	Apr. 17	Apr. 25	11.5	Apr. 19	11.03	Apr.13,1952
St. Croix:							
Stillwater, Minn. (4)	87	Apr. 12	Apr. 29	94.1	Apr. 18	89.71	Apr.14,1952
Yellow Medicine:							
Granite Falls (nr), Minn. (5)	6	Apr. 9	Apr. 17	9.8	Apr. 10	17.5	Jun. 1919
Redwood:							
Redwood Falls (nr), Minn. (6)	6	Apr. 8	Apr. 14	J15.88	Apr. 8	P17.0	1917
Cottonwood:							
New Ulm (nr), Minn. (7)	11	Apr. 6	Apr. 16	J20.86	Apr. 8	16.94	Jul. 9,1947
Le Sueur:							
Rapidan (nr), Minn. (8)	15	Apr. 6	Apr. 12	22.10	Apr. 8	22.5	May 22,1960
Minnesota:							
Montevideo, Minn. (9)	14	Apr. 10	Apr. 26	16.64	Apr. 14	20.02	Apr.10,1952
Mankato, Minn. (10)	19	Apr. 6	Apr. 23	29.07	Apr. 9	P29.9	Apr.26,1881
Carver, Minn. (11)	18	Apr. 7	May 8	34.28	Apr. 12	28.31	Apr.16,1952
Chaska, Minn. (12)	18	Apr. 7	May 9	34.25	Apr. 13	29.1	Apr.15,16, 1952
Savage, Minn. (13)	698	Apr. 8	Jun. 20	719.35	Apr. 14	714.2	Apr.16,1952
Mendota, Minn. (14)	699	Apr. 8	May 17	717.46	Apr. 16		
Chippewa:							
Durand, Wis. (15)	11	Apr. 7	Apr. 10	13.7	Apr. 9	P18.4	Sep.12,1884
		Apr. 11	Apr. 20	13.4	Apr. 15		
South Fork Zumbro:							
Rochester, Minn. (16)	12	Mar. 1	Mar. 2	19.12	Mar. 1	18.5	Mar.29,1962
		Apr. 4	Apr. 5	13.2	Apr. 5		
		Apr. 6	Apr. 7	13.55	Apr. 6		
		Apr. 7	Apr. 9	12.4	Apr. 7		
				13.3	Apr. 8		
Bear Creek:							
Rochester (Belt Line), Minn.(17)	8	Mar. 1	Mar. 1	9.8	Mar. 1		
Zumbro:							
Zumbro Falls, Minn. (18)	18	Mar. 1	Mar. 3	28.4	Mar. 2	30.80	Jul.22,1951
		Apr. 4	Apr. 10	27.25	Apr. 7		
				26.0	Apr. 8		
Theilman, Minn. (19)	38	Mar. 1	Mar. 4	45.75	Mar. 2	43.43	Jul.22,1951
		Apr. 4	Apr. 12	41.0	Apr. 5		
				44.2	Apr. 5		
				45.2	Apr. 7		
				44.2	Apr. 8		
Whitewater:							
Beaver (nr), Minn. (20)	7	Mar. 1	Mar. 2	9.8	Mar. 2	10.75	Jun.13,1950
		Apr. 2	Apr. 2	7.6	Apr. 2		
		Apr. 3	Apr. 10	8.7	Apr. 4		
				8.7	Apr. 6		
				8.2	Apr. 8		
Trempealeau:							
Dodge, Wis. (21)	7	Mar. 3	Mar. 5	8.1	Mar. 4	10.35	Apr. 4,1956
		Apr. 5	Apr. 13	9.06	Apr. 7		
Black:							
Galesville, Wis. (22)	12	Apr. 12	Apr. 15	13.60	Apr. 13	14.31	Sep.11,1938
Root:							
Houston, Minn. (23)	15	Mar. 1	Mar. 3	19.5	Mar. 2	18.05	Sep.10 & 11 1938
		Apr. 4	Apr. 10	15.5	Apr. 4		
				16.1	Apr. 6		
				17.07	Apr. 7		
				17.05	Apr. 9		
Hokah, Minn. (24)	47	Mar. 1	Mar. 4	50.8	Mar. 2	50.0	Mar. 9,1950
		Apr. 1	Apr. 2	47.5	Apr. 2		
		Apr. 4	Apr. 13	49.0	Apr. 4		
				49.3	Apr. 6,7		
				49.0	Apr. 12		

Table 1B.—Flood stage and comparative crest stage data—Upper Mississippi River tributary systems in Wisconsin, Iowa, and Illinois

River and station	Flood stage	Above flood stages March-May 1965		Crest March-May 1965		Previous Maximum Crest of record	
		From—	To—	Stage	Date[2]	Stage	Date[2]
Upper Mississippi Basin (Cont'd.)	Ft.			Ft.		Ft.	
Upper Iowa:							
Dorchester (nr), Iowa (25)	14	Mar. 1	Mar. 3	17.85	Mar. 1	22.20	Feb.28,1948
		Apr. 3	Apr. 4	16.05	Apr. 4		
		Apr. 5	Apr. 9	17.5	Apr. 6		
				16.80	Apr. 7		
				17.25	Apr. 8		
Kickapoo:							
La Farge, Wis. (26)	12	Mar. 2	Mar. 3	J12.55	Mar. 2	P15.5	Aug. 1935
Soldiers Grove, Wis. (27)	723	Mar. 1	Mar. 8	726.0	Mar. 3	731.6	Jul.21,1951
		Apr. 4	Apr. 13	724.8	Apr. 8		
				725.3	Apr. 12		
Gays Mills, Wis. (28)	698	Mar. 1	Mar. 8	701.05	Mar. 3		
		Apr. 5	Apr. 14	698.8	Apr. 5		
				698.9	Apr. 6		
				698.6	Apr. 7		
				699.1	Apr. 8		
				699.7	Apr. 12		
Steuben, Wis. (29)	8	Mar. 1	Mar. 11	11.05	Mar. 3	13.66	Jul.22,1951
				11.2	Mar. 4		
				10.0	Mar. 6,8		
				9.6	Mar. 10		
		Apr. 1	Apr. 16	9.35	Apr. 7		
				9.3	Apr. 9,11		
				9.6	Apr. 13		
Wisconsin:							
Wisconsin Rapids, Wis. (30)	12	Apr. 13	Apr. 13	12.0	Apr. 13	14.1	Mar.24,1935
Portage, Wis. (31)	17	Apr. 15	Apr. 19	18.5	Apr. 16	20.5	Sep.14,1938
Turkey:							
Garber, Iowa (32)	17	Mar. 1	Mar. 3	26.0	Mar. 1	28.06	Feb.23,1922
		Apr. 1	Apr. 1	18.95	Apr. 1		
Wapsipinicon:							
Independence, Iowa (33)	12	Apr. 7	Apr. 8	12.3	Apr. 7	18.74	Jun.14,1947
De Witt, Iowa (34)	10	Apr. 6	Apr. 17	11.1	Apr. 7	12.07	Jun.27,1944
East Branch Pecatonica:							
Blanchardville, Wis. (35)	11	Mar. 1	Mar. 3	14.9	Mar. 2	15.74	Feb.28,1948
Pecatonica:							
Darlington, Wis. (36)	11	Mar. 1	Mar. 3	14.7	Mar. 2	20.71	Jul.16,1950
Martintown, Wis. (37)	11	Mar. 2	Mar. 9	19.9	Mar. 4	20.24	Feb.29,1948
		Apr. 1	Apr. 9	15.8	Apr. 3		
Freeport, Ill. (38)	13	Mar. 5	Mar. 9	14.3	Mar. 6		
		Apr. 5	Apr. 7	13.3	Apr. 6	17.0	Mar.16,1929
Shirland, Ill. (39)	10	Apr. 1	Apr. 12	13.9	Apr. 4	17.08	Apr. 3,1960
Rock:							
Joslin, Ill. (40)	10	Apr. 2	Apr. 18	13.1	Apr. 8	16.23	Mar. 3,1948
Shell Rock:							
Marble Rock, Iowa (41)	4	Mar. 1	Mar. 3	9.3	Mar. 2	11.8	Mar.28,1961
		Apr. 4	Apr. 15	8.9	Apr. 6		
Shell Rock, Iowa (42)	12	Mar. 1	Mar. 3	14.49	Mar. 2	16.26	Mar.28,1961
		Apr. 2	Apr. 2	#12.23	Apr. 2		
		Apr. 5	Apr. 14	15.08	Apr. 7		
West Fork Cedar:							
Finchford, Iowa (43)	12	Mar. 3	Mar. 5	13.37	Mar. 3		
		Apr. 3	Apr. 11	15.91	Apr. 7		
Black Hawk Creek:							
Hudson, Iowa (44)	12	Mar. 1	Mar. 3	15.28	Mar. 1	15.46	Feb.21,1953
Cedar:							
Austin, Minn. (45)	12	Mar. 1	Mar. 1	18.0	Mar. 1		
		Apr. 5	Apr. 10	16.2	Apr. 6		
Charles City, Iowa (46)	12	Mar. 1	Mar. 4	21.64	Mar. 2	21.60	Mar.27,1961
		Apr. 5	Apr. 12	19.1	Apr. 7		
Janesville, Iowa (47)	11	Mar. 3	Mar. 5	16.39	Mar. 3		
		Apr. 7	Apr. 11	14.3	Apr. 7		

Table 1C.—Flood stage and comparative crest stage data—Upper Mississippi River tributary systems in Iowa

River and station	Flood stage	Above flood stages March-May 1965		Crest March-May 1965		Previous Maximum Crest of record	
		From—	To—	Stage	Date[1]	Stage	Date[2]
Upper Mississippi Basin (Cont'd.)	Ft.			Ft.		Ft.	
Cedar (Cont'd.)							
Waterloo, Iowa (48)	15	Apr. 6	Apr. 14	21.67	Apr. 8	21.86	Mar.29,1961
Cedar Rapids, Iowa (49)	13	Apr. 8	Apr. 13	18.49	Apr. 10	20.1	Mar.19,1929
Iowa:							
Steamboat Rock, Iowa (50)	10	Apr. 4	Apr. 17	16.4	Apr. 8		
Marshalltown, Iowa (51)	13	Mar. 1	Mar. 4	16.5	Mar. 2	17.74	Jun. 4,1918
		Apr. 1	Apr. 18	17.6	Apr. 6		
Wapello, Iowa (52)	10	Mar. 4	Mar. 11	14.2	Mar. 5	17.02	Apr. 5,1960
		Apr. 7	Apr. 22	17.25	Apr. 13		
		Apr. 25	Apr. 27	12.1	Apr. 26		
North Fork Skunk:							
Sigourney, Iowa (53)	16	Mar. 17	Mar. 17	18.15	Mar. 17	25.33	Mar.31,1960
		Apr. 5	Apr. 6	#16.0	Apr. 5		
		Apr. 8	Apr. 9	17.55	Apr. 8		
Skunk:							
Ames, Iowa (54)	10	Mar. 1	Mar. 1	10.9	Mar. 1		
		Apr. 1	Apr. 2	11.8	Apr. 1		
		Apr. 5	Apr. 7	12.6	Apr. 6		
Oskaloosa, Iowa (55)	15	Mar. 4	Mar. 4	15.3	Mar. 4	P25.8	May 23,1944
		Mar. 17	Mar. 17	17.5	Mar. 17		
		Apr. 3	Apr. 13	19.85	Apr. 9		
Augusta, Iowa (56)	15	Mar. 18	Mar. 19	16.95	Mar. 18	25.0	Apr. 3,1960
		Apr. 9	Apr. 13	16.45	Apr. 12		
West Fork Des Moines:							
Humbolt, Iowa (57)	8	Apr. 4	Apr. 26	13.90	Apr. 8	12.2	Jun.23,1947
East Fork Des Moines:							
Humbolt, Iowa (58)	20	Apr. 6	Apr. 11	23.15	Apr. 9		
Boone:							
Webster City, Iowa (59)	10	Apr. 5	Apr. 11	15.92	Apr. 6	P19.1	Jun.10,1918
North Raccoon:							
Jefferson, Iowa (60)	10	Mar. 1	Mar. 4	13.85	Mar. 2	22.3	Jun.23,1947
		Mar. 13	Mar. 19	12.11	Mar. 17		
		Apr. 1	Apr. 14	15.65	Apr. 4		
		May 26	May 29	14.92	May 27		
South Raccoon:							
Redfield, Iowa (61)	14	Mar. 1	Mar. 2	17.65	Mar. 2	29.04	Jul. 2,1958
		Mar. 17	Mar. 17	19.60	Mar. 17		
		Apr. 1	Apr. 2	15.1	Apr. 1		
		Apr. 5	Apr. 6	16.99	Apr. 5		
Raccoon:							
Van Meter, Iowa (62)	13	Mar. 2	Mar. 2	15.20	Mar. 2	21.77	Jul. 3,1958
		Mar. 17	Mar. 18	18.20	Mar. 17		
		Apr. 1	Apr. 1	13.93	Apr. 1		
		Apr. 4	Apr. 11	18.35	Apr. 6		
Middle:							
Indianola (nr), Iowa (63)	19	Mar. 17	Mar. 17	20.45	Mar. 17	28.27	Jun.13,1947
		Apr. 6	Apr. 6	21.00	Apr. 6		
South:							
Ackworth, Iowa (64)	19	Mar. 17	Mar. 17	#25.03	Mar. 17	25.53	Mar.19,1962
		Apr. 5	Apr. 5	#22.80	Apr. 5		
Cedar Creek:							
Bussey, Iowa (65)	16	Mar. 17	Mar. 17	19.1	Mar. 17	H28.45	Jun. 1946
Des Moines:							
Boone, Iowa (66)	12	Apr. 3	Apr. 17	22.93	Apr. 9	25.3	Jun.22,1954
Des Moines (2nd Ave.), Iowa (67)	23	Apr. 6	Apr. 16	28.73	Apr. 10	30.16	Jun.24,1954
Des Moines (SE 14th St.), Iowa (68)	21	Mar. 18	Mar. 18	21.50	Mar. 18	P30.5	May 31,1903
		Apr. 2	Apr. 19	29.78	Apr. 11		
		May 30	May 30	21.20	May 29		
Tracy, Iowa (69)	14	Mar. 3	Mar. 8	19.11	Mar. 5	26.5	Jun.14,1947
		Mar. 17	Mar. 20	18.27	Mar. 18		
		Apr. 2	Apr. 21	23.18	Apr. 11		
		Apr. 25	Apr. 26	15.5	Apr. 26		
Eddyville, Iowa (70)	15	Mar. 4	Mar. 9	#19.7	Mar. 5	28.1	Jun.14,1947
		Mar. 16	Mar. 21	#19.8	Mar. 19		
		Apr. 2	Apr. 22	#24.69	Apr. 11		

Table 1D.—Flood stage and comparative crest stage data—Upper Mississippi River tributary systems in Iowa, Illinois, and Missouri, and main stream above Genoa, Wis.

River and station	Flood stage	Above flood stages March-May 1965 From—	To—	Crest March-May 1965 Stage	Date[1]	Previous Maximum Crest of record Stage	Date[2]
Upper Mississippi Basin (Cont'd.)	*Ft.*			*Ft.*		*Ft.*	
Des Moines (Cont'd.)							
Ottumwa, Iowa (71)	10	Mar. 17	Mar. 21	12.63	Mar. 17	23.0	May 31,1903
		Apr. 5	Apr. 21	18.33	Apr. 11		
		May 30	May 30	10.0	May 30		
Keosauqua, Iowa (72)	15	Mar. 5	Mar. 7	17.68	Mar. 5	P27.85	Jun. 1,1903
		Apr. 9	Apr. 16	19.36	Apr.11,12		
Fox:							
Wayland, Mo. (73)	15	Apr. 6	Apr. 6	15.9	Apr. 6	21.53	Jun.29,1933
Salt:							
New London, Mo. (74)	19	Mar. 18	Mar. 19	21.1	Mar. 18	29.92	Aug. 2,1958
		Apr. 7	Apr. 8	21.5	Apr. 7		
Fox:							
Dayton, Ill. (75)	12	Mar. 21	Mar. 22	14.6	Mar. 21	32.04	Jan.30,1952
		Mar. 25	Mar. 25	12.1	Mar. 25		
Vermilion:							
Lowell, Ill. (76)	10	Apr. 7	Apr. 7	10.1	Apr. 7	15.30	Jul.15,1958
		May 5	May 6	11.15	May 5		
Sangamon:							
Riverton, Ill. (77)	13	Apr. 13	Apr. 19	13.8	Apr. 17	31.52	May 19,1943
La Moine:							
Ripley, Ill. (78)	22	Apr. 6	Apr. 11	23.80	Apr. 8	26.03	Apr.25,1944
Illinois:							
Morris, Ill.	13	Apr. 7	Apr. 7	13.0	Apr. 7	P26.85	1866
		Apr. 26	Apr. 27	16.0	Apr. 26		
LaSalle, Ill. (79)	20	Mar. 18	Mar. 19	20.95	Mar. 18	31.0	May 22,1943
		Apr. 7	Apr. 14	21.9	Apr. 7		
		Apr. 16	Apr. 17	20.15	Apr. 16		
		Apr. 25	May 1	23.35	Apr. 26		
		May 6	May 9	21.3	May 6		
Peoria, Ill. (80)	18	Apr. 11	Apr. 19	18.6	Apr. 13	28.6	May 23,1943
		Apr. 27	May 4	19.4	Apr. 29		
		May 8	May 11	18.3	May 9		
Havana, Ill. (81)	14	Mar. 20	Mar. 24	14.45	Mar. 21	27.3	May 25,1943
		Apr. 6	May 20	17.2	Apr. 16		
				17.4	Apr. 29		
Beardstown, Ill. (82)	14	Apr. 7	May 20	18.45	Apr. 17	29.7	May 26, 27, 1943
				17.72	May 2		
Meredosia, Ill. (83)	10	Mar. 17	May 25	12.3	Mar. 22	28.61	May 26,1943
				17.65	Apr.18,19		
				16.9	May 3		
Meramec:							
Pacific, Mo. (84)	11	Apr. 8	Apr. 9	14.6	Apr. 8	P30.8	Aug.22,1915
Kaskaskia:							
Vandalia, Ill. (85)	18	Apr. 27	Apr. 30	20.2	Apr. 28	27.39	Jun.29,1951
Carlyle, Ill. (86)	21	May 2	May 5	21.53	May 4		
Big Muddy:							
Murphysboro, Ill.	16	Apr. 9	Apr. 22	17.4	Apr.12,13	36.01	Jan.28,1949
Mississippi:							
Libby, Minn. (87)	13	Apr. 21	May 6	14.50	Apr. 24	20.02	May 17,1950
Aitkin, Minn. (88)	12	Apr. 14	May 6	14.4	Apr. 18	19.49	May 20,1950
				14.5	Apr. 26		
Fort Ripley, Minn. (89)	10	Apr. 12	May 4	13.55	Apr. 16	13.3	May 22,1950
Minneapolis, Minn. (90)	16	Apr. 12	Apr. 12	J16.6	Apr. 12	19.5	Apr.14,1952
		Apr. 14	Apr. 22	20.0	Apr. 16		
St. Paul, Minn. (91)	14	Apr. 10	May 2	25.95	Apr. 16	22.02	Apr.16,1952
Hastings, Minn. (92)	18	Apr. 12	May 3	25.4	Apr. 17	20.93	Apr.16,1952
Red Wing, Minn. (93)	14	Apr. 12	May 1	20.9	Apr. 18	16.85	Apr.18,1952
Lake City, Minn. (94)	14	Apr. 10	May 7	22.18	Apr. 19		
Wabasha, Minn. (95)	16	Apr. 14	Apr. 27	20.05	Apr. 19	P17.1	Jun.18,1880
Alma, Wis. (96)	16	Apr. 14	Apr. 27	19.85	Apr. 19		
Winona, Minn. (97)	13	Apr. 10	May 4	20.75	Apr. 19	17.91	Apr.20,1952
La Crosse, Wis. (98)	12	Apr. 9	May 6	17.9	Apr. 21	16.5	Jun.19,1880
Genoa, Wis. (99)	31	Apr. 9	May 6	39.2	Apr. 23	P35.8	Jun.19,1880

Table 1E.—Flood stage and comparative crest stage data—Upper Mississippi River from Lansing, Iowa, to Cape Girardeau, Mo., and Missouri River tributary systems in Montana and Iowa.

River and station	Flood stage	Above flood stages March-May 1965		Crest March-May 1965		Previous Maximum Crest of record	
		From—	To—	Stage	Date[2]	Stage	Date[3]
Upper Mississippi Basin (Cont'd.)	Ft.			Ft.		Ft.	
Mississippi (Cont'd.)							
Lansing, Iowa (100)	18	Apr. 18	May 3	22.52	Apr. 22	P19.9	Jun.20 or 21, 1880
McGregor, Iowa (101)	18	Apr. 14	May 6	25.4	Apr. 24	21.10	Jun.22,1880
Guttenberg, Iowa (102)	15	Apr. 12	May 9	23.65	Apr. 24	20.1	1880
Dubuque, Iowa (103)	17	Apr. 13	May 11	26.81	Apr. 26	22.70	Apr.25,1952
Bellevue, Iowa (104)	17	Apr. 16	May 9	23.5	Apr. 26	20.11	Apr.26,1952
Clinton, Iowa (105)	16	Apr. 15	May 13	24.85	Apr. 28	20.92	Apr.28,1952
Le Claire, Iowa (106)	10	Apr. 14	May 13	17.75	Apr. 28	14.0	Apr.27,1952
Davenport, Iowa (107)	15	Apr. 16	May 12	22.48	Apr. 28	20.9	Mar.10,1868
Muscatine, Iowa (108)	16	Apr. 13	May 14	24.81	Apr. 29	21.05	Apr.28,1952
Keithsburg, Ill. (109)	12	Apr. 8	May 17	16.5	Apr. 17	17.1	Apr.29,1951
				20.36	Apr. 27		
Burlington, Iowa (110)	15	Apr. 11	May 16	21.0	Apr. 30	18.94	Jun. 1851
Keokuk, Iowa (111)	16	Apr. 10	May 13	22.14	May 1	21.83	Apr. 3,1960
Gregory Landing, Mo. (112)	15	Apr. 7	May 15	21.61	Apr. 16	22.31	Apr. 4,1960
				22.71	May 1		
Quincy, Ill. (113)	17	Apr. 7	May 17	24.25	Apr. 17	24.38	Apr. 4,1960
				24.80	Apr. 28		
				24.68	May 1		
				24.30	May 4		
Hannibal, Mo. (114)	16	Mar. 18	Mar. 20	17.2	Mar. 19	24.1	Jun.10,1947
		Apr. 6	May 18	23.82	Apr. 17		
				24.59	May 1		
				24.28	May 3,4		
Louisiana, Mo. (115)	15	Mar. 18	Mar. 20	16.7	Mar. 19	22.6	Jun.22,1947
		Apr. 7	May 19	21.6	Apr. 17		
				22.10	May 1		
Clarksville, Mo. (116)	25	Mar. 18	Mar. 21	26.8	Mar. 20	32.53	Jun.22,1947
		Apr. 7	May 19	31.9	Apr. 18		
				32.2	May 2		
Winfield, Mo. (117)	26	Mar. 20	Mar. 21	26.2	Mar. 21	33.64	Jun.24,1947
		Apr. 8	May 19	32.4	Apr. 19		
				32.7	May 2		
Grafton, Ill. (118)	18	Apr. 8	May 20	23.8	Apr. 19	P32.13	Jun. 1844
				23.5	May 3		
Alton, Ill. (119)	21	Apr. 8	May 14	25.2	Apr. 17	P36.94	Jun. 1844
				23.3	May 1		
Chester, Ill.	27	Apr. 9	Apr. 23	29.32	Apr. 17	P39.83	Jun.30,1844
Cape Girardeau, Mo.	32	Apr. 9	Apr. 24	34.40	Apr. 18	P42.53	Jul. 4,1844
Missouri Basin							
Milk:							
Havre, Mont.	14	Apr. 12	Apr. 16	15.6	Apr. 13	L19.30	Apr.12,1899
Hinsdale, Mont.	104	Apr. 13	Apr. 15	106.3	Apr. 14		
Nashua, Mont.	20	Apr. 14	Apr. 14	20.0	Apr. 14	31.38	Apr.18,1952
Rock:							
Rock Rapids, Iowa (120)	9	Apr. 5	Apr. 7	12.0	Apr. 7		
Rock Valley, Iowa (121)	11	Apr. 1	Apr. 9	14.0	Apr. 2	P17.0	1897
				15.0	Apr. 7		
Big Sioux:							
Hawarden, Iowa (122)	15	Apr. 2	Apr. 14	19.9	Apr. 8	22.3	Apr. 1,1960
Akron, Iowa (123)	16	Apr. 2	Apr. 15	20.85	Apr. 8	21.56	Apr. 1,1960
Floyd:							
Alton, Iowa (124)	12	Feb. 28	Mar. 1	13.0	Mar. 1	17.0	Mar.28,1960
		Mar. 13	Mar. 17	14.86	Mar. 16		
		Mar. 31	Apr. 7	17.36	Apr. 1		
				16.85	Apr. 4		
				17.21	Apr. 6		

Table 1F.—Flood stage and comparative crest stage data—Missouri River tributary systems in Iowa, Nebraska, Kansas, and Missouri.

River and station	Flood stage	Above flood stages March-May 1965		Crest March-May 1965		Previous Maximum Crest of record,	
		From—	To—	Stage	Date[1]	Stage	Date[1]
Missouri Basin (Cont'd.)	*Ft.*			*Ft.*		*Ft.*	
Floyd (Cont'd.):							
Le Mars, Iowa (125)	19	Mar. 31	Apr. 8	22.0	Apr. 1	P26.4	Jun. 8,1953
James, Iowa (126)	16	Feb. 28	Mar. 2	18.42	Mar. 1	25.3	Jun. 8,1953
		Mar. 13	Mar. 17	18.41	Mar. 16		
		Mar. 31	Apr. 9	20.20	Apr. 2		
				19.55	Apr. 4		
				19.19	Apr. 7		
Little Sioux:							
Spencer, Iowa (127)	10	Mar. 31	Apr. 19	17.2	Apr. 6	20.05	Jun. 8,1953
		May 27	May 27	10.3	May 27		
Linn Grove, Iowa (128)	12	Mar. 31	Apr. 22	22.35	Apr. 6	20.9	Jun. 1953
		May 28	May 31	13.5	May 29		
Peterson, Iowa (129)	15	Apr. 1	Apr. 16	22.0	Apr. 6	20.90	Jun. 1953
Cherokee, Iowa (130)	17	Mar. 31	Apr. 15	27.2	Apr. 6	P25.7	1891
Correctionville, Iowa (131)	19	Mar. 31	Apr. 15	26.0	Apr. 7	P29.34	Jun.23 or 24 1891
Kennebec, Iowa (132)	25	Apr. 6	Apr. 11	26.57	Apr. 8	26.63	Jun.21,1954
Turin, Iowa (133)	25	Apr. 6	Apr. 10	#26.2	Apr. 8	26.0	Mar. 1949
Elkhorn:							
Waterloo, Nebr. (134)	15	Mar. 13	Mar. 15	15.5	Mar. 15	P16.6	Jun.12,1944
Salt Creek:							
Ashland, Nebr. (135)	11	May 22	May 23	13.25	May 22	P21.9	Jul. 7,1908
West Nishnabotna:							
Randolph, Iowa (136)	19	Mar. 1	Mar. 2	22.65	Mar. 1	24.8	Mar. 5,1949
		Mar. 17	Mar. 17	19.25	Mar. 17		
East Nishnabotna:							
Red Oak, Iowa (137)	15	Mar. 17	Mar. 17	16.4	Mar. 17	23.23	Jun.13,1947
Nishnabotna:							
Hamburg, Iowa (138)	18	Mar. 1	Mar. 4	#25.8	Mar. 2	27.3	Mar. 7,1949
		Mar. 17	Mar. 18	#24.3	Mar. 17		
		Apr. 1	Apr. 1	21.8	Apr. 1		
		Apr. 5	Apr. 6	22.0	Apr. 6		
		May 22	May 22	21.1	May 22		
Nodaway:							
Clarinda, Iowa (139)	14	Mar. 1	Mar. 1	16.9	Mar. 1	P25.4	Aug. 1903
		Mar. 17	Mar. 17	16.4	Mar. 17		
One Hundred and Two:							
Rosendale, Mo. (140)	13	Mar. 18	Mar. 18	#16.1	Mar. 18		
Platte:							
Agency, Mo. (141)	20	Mar. 17	Mar. 19	22.7	Mar. 18	30.46	Jun.23,1947
Beaver Creek:							
Cedar Bluffs, Kans.	14	May 26	May 26	16.7	May 26	18.71	Jun.11,1960
Republican:							
Orleans, Nebr. (142)	11	May 27	May 27	11.4	May 27	H14.00	Jun.23,1947
West Fork Big Blue:							
Dorchester, Nebr. (143)	15	May 25	May 25	15.05	May 25	P24.8	Jul.10,1950
Turkey Creek:							
Wilber, Nebr. (144)	11	May 24	May 27	14.05	May 24	P15.5	Jun. 1957
Little Blue:							
DeWeese (nr), Nebr. (145)	8	May 22	May 26	14.6	May 22	13.3	Jun.17,1957
				11.55	May 25		
Fairbury (nr), Nebr. (146)	10	May 24	May 25	12.1	May 25	17.6	Jun.27,1951
		May 27	May 27	10.3	May 27		
Black Vermilion:							
Frankfort, Kans. (147)	19	Mar. 1	Mar. 2	26.2	Mar. 1	H30.2	Aug. 3,1948
Big Blue:							
Crete, Nebr. (148)	16	May 22	May 27	20.2	May 23	28.74	Jul.10,1950
Beatrice, Nebr. (149)	16	Mar. 1	Mar. 1	19.35	Mar. 1	28.3	Jun. 4,1951
Barneston, Nebr. (150)	18	Mar. 1	Mar. 1	22.1	Mar. 1	34.3	Jun. 9,1941
Marysville, Kans. (151)	35	Mar. 1	Mar. 1	35.8	Mar. 1	P45.39	Jun. 9,1941
Blue Rapids, Kans. (152)	20	Mar. 1	Mar. 1	#23.8	Mar. 1	39.5	Jun.10,1941
Vermillion Creek:							
Wamego, Kans. (153)	24	Mar. 1	Mar. 1	25.2	Mar. 1	P30.9	1915
Mill Creek:							
Paxico, Kans. (154)	19	Mar. 1	Mar. 1	19.1	Mar. 1	P34.7	Jul.12,1951
Stranger Creek:							
Easton, Kans. (155)	15	Mar. 17	Mar. 17	16.1	Mar. 17		

Table 1G.—Flood stage and comparative crest stage data—Missouri River tributary systems in Iowa and Missouri; main stream below Rulo, Nebr.; and Red River of the North Basin

River and station	Flood stage	Above flood stages March-May 1965 From—	To—	Crest March-May 1965 Stage	Date[2]	Previous Maximum Crest of record Stage	Date[2]
Missouri Basin (Cont'd.)	Ft.			Ft.		Ft.	
Grand:							
Pattonsburg, Mo. (156)	25	Mar. 17	Mar. 18	27.75	Mar. 18	P34.25	Jun. 1947
Gallatin, Mo. (157)	21	Mar. 18	Mar. 18	#22.05	Mar. 18	P40.0	Jul. 8,1909
Chillicothe, Mo. (158)	24	Mar. 17	Mar. 19	#29.40	Mar. 18	33.8	Jun. 7,1947
		Apr. 11	Apr. 11	25.2	Apr. 11		
		May 9	May 9	24.4	May 9		
Sumner, Mo. (159)	26	Mar. 15	Mar. 15	26.0	Mar. 15	39.5	Jun.7,8,1947
		Mar. 16	Mar. 21	32.3	Mar. 19		
		Apr. 6	Apr. 13	30.2	Apr. 7,9		
				30.35	Apr. 12		
		May 9	May 10	29.15	May 9		
Brunswick, Mo. (160)	12	Mar. 3	Mar. 3	12.55	Mar. 3	26.1	Jul.17,1951
		Mar. 17	Mar. 22	16.6	Mar. 19		
		Apr. 6	Apr. 14	15.1	Apr. 8		
				14.55	Apr. 11		
Chariton:							
Rathbun (nr), Iowa (161)	18	Apr. 17	Apr. 18	19.2	Apr. 17	H25.3	Mar.31,1960
Novinger, Mo. (162)	20	Mar. 17	Mar. 17	#20.3	Mar. 17	H28.6	Jun. 1,1917
		Apr. 11	Apr. 11	20.8	Apr. 11		
Prairie Hill (nr), Mo. (163)	15	Mar. 17	Mar. 18	#18.3	Mar. 17		
		Apr. 6	Apr. 6	17.7	Apr. 6		
		Apr. 11	Apr. 13	17.3	Apr. 12		
Blackwater:							
Blue Lick, Mo. (164)	25	Mar. 20	Mar. 20	25.2	Mar. 20	H41.25	Nov.18,1928
		Apr. 6	Apr. 9	26.3	Apr. 6		
				25.5	Apr. 8		
		Apr. 11	Apr. 11	25.4	Apr. 11		
Sac:							
Stockton, Mo.	19	Apr. 4	Apr. 7	21.96	Apr. 4	31.8	May 19,1943
Osage:							
Schell City, Mo.	25	Apr. 6	Apr. 11	28.2	Apr. 8	45.1	Jun.17,1951
Osceola, Mo.	22	Apr. 6	Apr. 8	26.6	Apr. 6	41.5	May 21,1943
Gasconade:							
Hazlegreen, Mo.	21	Apr. 7	Apr. 7	21.0	Apr. 7	P30.6	Jan. 1916
Missouri:							
Rulo, Nebr. (165)	17	Mar. 1	Mar. 2	#17.35	Mar. 1	25.6	Apr.22,1952
St. Joseph, Mo. (166)	17	Mar. 1	Mar. 2	#19.1	Mar. 2	27.2	Apr.29,1881
		Mar. 18	Mar. 18	#17.2	Mar. 18		
		May 27	May 27	17.3	May 27		
Lexington, Mo. (167)	22	Mar. 3	Mar. 3	#22.0	Mar. 3	P33.9	1844
Waverly, Mo. (168)	18	Mar. 3	Mar. 3	#19.3	Mar. 3	28.2	Jul.14,1951
		Mar. 18	Mar. 19	#19.7	Mar. 19		
Hermann, Mo. (169)	21	Mar. 20	Mar. 20	21.8	Mar. 20	P35.5	Jun. 1844
		Apr. 6	Apr. 13	23.5	Apr. 8		
St. Charles, Mo. (170)	25	Mar. 20	Mar. 21	25.2	Mar. 21	P40.1	Jun.27,1844
		Apr. 7	Apr. 14	26.9	Apr. 10		
HUDSON BAY DRAINAGE							
Red River of the North Basin							
Sheyenne:							
West Fargo, N. Dak. (171)	16	Apr. 11	Apr. 30	20.75	Apr. 19	20.61	May 11,1950
Red Lake:							
Crookston, Minn. (172)	15	Apr. 11	Apr. 21	25.8	Apr. 13	25.70	May 7,1950
Red River of the North:							
Wahpeton, N. Dak. (173)	10	Apr. 9	Apr. 14	14.34	Apr. 11	P17.0	Apr. 1897
Fargo, N. Dak. (174)	17	Apr. 11	Apr. 24	30.50	Apr. 16	P40.1	Apr. 7,1897
Halstad, Minn. (175)	24	Apr. 12	May 1	35.35	Apr. 17	P38.5	1897
Grand Forks, N. Dak. (176)	28	Apr. 12	May 1	44.91	Apr. 17	P50.2	Apr.10,1897
Drayton, N. Dak. (177)	32	Apr. 14	May 8	40.4	Apr. 22	41.58	May 12,1950
Pembina, N. Dak. (178)	42	Apr. 16	May 7	47.4	Apr. 25	52.9	May 14,1950

\# Highest Stage Reported
Exceeded previous Maximum Crest of Record
H High Water Mark
J Ice Jam
P Prior to Gage Readings
L Prior to Construction of Local Levees
Numbers in ( ) following station names are index numbers by which the stations are identified on various maps in this report.

Table 2.—Frost depth, February-March 1965

Station	Depth	Date	Station	Depth	Date
MINNESOTA					
Albert Lea	36-42	2/15	New London	48	2/19
Baudette	66	2/12	New Ulm	36	2/19
Beardsley	48	2/15	North Mankato	30-60	2/20
Caledonia	36	2/15	Onamia	3-6	2/19
Canby	24	2/22	Park Rapids	40	2/19
Crookston	48	2/2	Pipestone	12-42	2/13
Duluth	18-66	2/15	Remer	5-6	2/23
Fairmont	20-48	2/20	Rochester	47	2/16
Faribault	40	2/23	Rockford	2-60	2/18
Fergus Falls	48-66	2/18	St. Cloud	24-30	2/12
Grand Marais	8-40	2/16	Tyler	36	2/18
Hallock	60-72	2/13	Virginia	23	2/17
Hibbing	24-48	2/15	Wadena	30-72	2/18
Hinckley	6	2/19	Waseca	24-30	3/1
International Falls	20	2/12	Wells	29	2/18
Itasca	28	2/15	Willmar	36	2/20
Lanesboro	30	2/25	Worthington	48	2/15
Litchfield	60	2/22	Young America	48	2/18
Marshall	54	2/22			
Melrose	36-60	2/22			
Minneota	30	2/22			
Milaca	18	2/19			
Moose Lake	3	2/18			
Montevideo	48	2/22			
Morris	36-48	2/23			
NORTH DAKOTA			**SOUTH DAKOTA**		
Fargo	18	2/15	Sioux Falls	36	2/15
WISCONSIN					
Antigo	36-40	2/18	La Crosse	54-60	2/16
Baldwin	40	2/19	La Farge	30	2/22
Blair	44	2/15	Mather	16	2/19
Cumberland	36	2/22	Ontario	31	2/21
Danbury	30	2/20	Owen	24-40	2/22
Flambeau Res.	19	2/22	Portage	42	2/18
Gays Mills	42	2/19	Readstown	54	2/22
Hillsboro	32	2/22	Soldiers Grove	27	2/23
Holcombe	48	2/18	Summit Lake	12-16	2/19
Ladysmith	15	2/22	Winter	60-66	2/13

Table 3A.—Daily precipitation, snowfall, snow on ground, and temperatures (° F.) for selected stations in the Upper Mississippi Basin—March 1965.

(6 p.m. after station name indicates all data are for 24-hour period ending at that time. If no time is indicated, data are for 24-hour period ending at midnight except for snow on ground, which is measured at 6 a.m.)

Station	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
UPPER MISSISSIPPI BASIN																																
Pine River Dam, Minn. (6 p.m.)																																
Precip.	.77	.40	.20			T		T					.17	T	.07		.27	T				.09					.18	.18	.02		.07	2.42
Snowfall	9.0	4.7	2.5			T		T					2.1	T	2.0		4.0	T				2.0					2.5	3.0	0.2		.09	
Snow on grnd.	24	28	26	25	24	23	23	23	23	23	22	21	23	22	24	24	27	27	27	27	26	27	27	26	26	26	26	28	29	26	20	
Max. temp.	34	13	37	37	36	39	40	35	28	30	35	39	33	38	38	32	29	20	16	14	14	18	13	16	28	29	27	24	34	40	34	
Min. temp.	9	6	13	21	23	20	0	23	-2	-13	-3	1	24	1	1	-5	18	2	-7	-19	-17	1	-19	-28	-20	-3	-2	11	6	0	21	
Alexandria, Minn.																																
Precip.	.80	.40	.05	T		T		T		T	.03	.01	T	T	T	.03	.72	.19	T	T	T		T				.14	.23	T		.02	2.62
Snowfall	8.0	4.0	0.5	T		T		T		T	0.3	0.1	T	T	T	1.0	10.0	2.0	T	T	T		T				3.0	3.7	T		T	
Snow on grnd.	4	12	16	16	15	14	12	11	11	11	11	11	10	10	10	10	14	22	23	23	23	20	18	18	17	16	17	18	23	22	21	
Max. temp.	24	14	30	33	32	35	36	31	20	28	36	31	30	33	29	23	23	7	16	9	16	18	9	16	23	21	22	25	31	29	36	
Min. temp.	6	2	14	21	17	18	3	8	-1	-8	10	7	20	6	11	-1	3	-2	-11	-8	-16	-3	-16	-14	-4	-5	10	9	7	5	21	
Minneapolis, Minn.																																
Precip.	1.82	.38	.26	.03	T			T	T		.20		.04	T	.05	T	.80	.07		T	.02	T					.45	.41	T		.32	4.75
Snowfall	1.2	4.7	3.4	0.2	T			T	T		0.2		0.6	T	0.5	T	11.2	1.0		T	0.4	T					5.6	5.1	T		T	
Snow on grnd.	2	3	9	10	10	8	8	7	7	7	8	10	10	10	9	8	10	20	20	20	20	20	20	20	19	18	17	22	27	16	12	
Max. temp.	36	26	36	34	38	35	34	34	25	26	36	31	32	34	31	29	29	13	14	15	13	18	10	17	21	23	24	28	31	33	36	
Min. temp.	15	13	26	30	30	27	18	19	13	5	12	2	24	17	23	12	13	5	-3	-9	-8	9	-4	-8	10	0	15	20	10	8	24	
Weyerhauser, Wis (6 p.m.)																																
Precip.	.59	.43	.27	.04				T	T		.08		.02	.07	.05		.30	.13	.06	T	T	.09			T		.27	.17	.04		.11	2.72
Snowfall			2.5	0.5				T	T		1.0		0.3	1.0	1.0		5.0	1.5	0.8	T	T	2.0			T		5.0	2.5	0.5		1.0	
Snow on grnd.	8	6	8	8	7	7	6	6	6	6	7	7	7	8	9	8	14	15	16	16	16	17	17	17	16	15	20	22	22	18	17	
Max. temp.	37	37	37	34	36	33	38	35	30	31	25	37	32	37	33	32	26	27	15	18	12	22	22	16	24	29	21	26	33	37	33	
Min. temp.	33	24	31	27	26	25	18	11	15	7	5	-4	19	22	17	9	22	10	-1	-17	-16	2	-1	-18	1	-11	-2	11	11	9	18	
La Crosse, Wis																																
Precip.	.21	.52	.04	.23	T			.02	T		.21		T	T	.07		.62	T		T	T	.03			T		.01	.04			.03	2.05
Snowfall		1.4	0.3	T	T			T	T		2.9		T	T	0.8		8.4	T		T	T	0.9			T		0.1	0.1				
Snow on grnd.	T	T	2	1	T	T			T	T		2	1	1	1	T	1	8	7	7	6	7	6	6	5	4	4	3	3	3	1	
Max. temp.	40	33	32	35	39	39	40	35	29	32	30	36	36	37	36	35	32	20	16	20	15	24	23	19	25	28	29	32	34	38	41	
Min. temp.	25	23	28	31	29	28	24	23	19	13	18	8	18	24	24	20	20	7	-2	-13	-3	12	-4	-5	10	-2	8	25	16	12	27	
Madison, Wis																																
Precip.	.12	.29	.03	.54	.27	T		T	.02		.10	T	.02	.04	.05		.77	T		T	.01	.18	.03		.02	T		.02				2.51
Snowfall		0.6	T	4.4	0.3	T		T	0.3		1.6	T	0.3	0.5	0.5		6.9	T		T	0.2	3.2	0.2		0.3	T		T				
Snow on grnd.	T	T	T	T	3	2	1	T	T	T	T	2	T	1	T	T	3	7	6	6	5	7	7	6	6	6	5	5	4	3	2	
Max. temp.	46	42	34	35	36	35	40	41	34	33	30	34	34	34	40	40	32	28	17	19	17	29	26	20	25	28	30	36	37	36	39	
Min. temp.	36	33	32	31	31	30	26	21	20	16	17	19	18	24	19	25	28	6	2	-7	-1	11	5	2	10	7	2	16	22	18	22	
Mason City, Iowa																																
Precip.	.78	.23	T	.05	T			T	T		.08		T	T	.07	T	.79	.10	.06			.15			T	T	.09	T			T	2.41
Snowfall	1.4	6.0	T	2.0	T			T	T		0.8		T	T	0.7	T	4.2	1.0	1.0			1.5			T	T	0.9	T				
Snow on grnd.	1	3	8	8	12	10	9	8	7	6	7	6	5	4	4	5	6	13	13	14	14	14	15	14	14	13	12	11	9	8	7	
Max. temp.	40	15	22	32	35	36	30	32	20	23	35	30	36	31	35	32	31	9	16	15	14	20	10	15	18	24	31	34	28	32	40	
Min. temp.	15	10	11	22	28	24	15	16	8	-1	10	8	19	17	17	20	8	5	-7	-13	-8	9	0	0	5	2	15	29	17	13	28	
Des Moines, Iowa																																
Precip.	.16	.95	T	.22	.19			T	T		T		.12	T	.01	.64	.48	.01	.01	.02	.02	.06	.07	.03	.01	T	.02	T	T			3.02
Snowfall	T	7.5	T	2.6	1.7			T	T		0.2		1.2	T	0.1		0.4	0.3	0.1	0.3	0.2	0.8	0.9	0.5	0.2	T	0.3		T			
Snow on grnd.		5	7	7	10	9	8	8	8	8	5	4	3	3	2	1	T	T	T	T	T	T	2	2	2	2	2	T	T	T	T	
Max. temp.	47	15	18	32	34	32	33	34	26	28	39	32	37	38	40	37	37	12	19	21	26	32	15	13	19	26	37	36	33	40	54	
Min. temp.	15	10	5	18	27	20	19	14	14	1	19	14	20	20	26	28	12	5	5	10	7	10	4	4	10	5	19	32	25	21	38	
Cedar Rapids, Iowa																																
Precip.	.40	.60	T	.28	.09	T	T	T	T		.02		.13	T	.01	T	.71	.02	T	.01	.07	.11	.09	T	T	T		T				2.61
Snowfall	T	1.0	T	2.0	0.9	T	T	T	T		0.3		1.3	T	0.1	T	3.0	2.0	T	T	0.7	1.1	1.0	T	T	T						
Snow on grnd.		T	1	2	4	3	2	2	2	2	1	T	T	1	T	T	3	2	2	2	2	2	1	3	4	3		1	1	T		
Max. temp.	52	28	24	36	37	35	35	35	29	29	27	35	38	34	38	41	36	13	17	21	25	27	21	18	25	27	38	38	37	42	48	
Min. temp.	26	16	14	24	34	29	25	20	18	13	19	23	24	19	28	28	13	9	7	7	10	14	6	5	12	10	18	32	26	23	28	
Rockford, Ill.																																
Precip.	.49	.34	T	.36	.09	T	T	T	.02	T	.05		.02	.11	.01	T	.35	T	T	T	.05	.21	.13		.05	T		T				3.30
Snowfall			T	5.0	0.5	T	0.2	0.1	0.3	T	0.1		0.3	2.2	0.1	T	2.7	T	T	T	1.0	3.3	1.9		1.5	T						
Snow on grnd.				2	5	4	3	2	2	2	1	1	T	2	T	T	3	2	2	2	1	3	5	5	4	5	4	4	2	1	T	
Max. temp.	52	44	34	35	37	34	38	36	33	31	32	35	39	35	39	40	36	21	17	22	21	30	27	20	26	26	31	36	36	37	41	
Min. temp.	41	33	25	26	22	30	23	19	25	17	18	27	21	20	23	29	21	9	6	4	6	12	5	7	16	6	2	23	26	22	25	
Peoria, Ill.																																
Precip.	.57	.53	.02	.54	.08	T	.02	T	T		T	T		.02	T	.02	1.08	T	T	T	.04		.27	.08	.14	.01		T				3.40
Snowfall			.02	5.6	0.5	T	0.4	T	T		T	T		0.4	T		T	T	T	T	0.8		2.7	1.0	1.7	0.2						
Snow on grnd.	T			4	8	4	3	3	1	1	1	T	T	T	T	4	3	3	3	4	3	2	1	3	5	4	3	4	3	T	T	
Max. temp.	56	49	25	27	38	33	34	38	31	31	38	34	42	38	46	48	47	22	24	30	27	44	28	19	24	27	37	45	38	41	50	
Min. temp.	49	20	18	20	11	27	30	20	19	13	14	24	18	27	22	24	22	11	9	7	11	27	16	14	17	15	12	26	30	25	28	
MISSOURI BASIN																																
Aberdeen, S. Dak.																																
Precip.		.03	.08	.01				T	T	.06	.01	T	.04	.01	T	T	.08	T	T	T		T			T	T	.05	.36	T		T	0.71
Snowfall		0.4	0.8	0.2				T	T	1.1	0.3	T	0.7	0.1	T	T	1.0	T	T	0.1		T			T	T	0.8	4.8	T			
Snow on grnd.	T	T	1	1	1	T	T	T	T		1	T	T	T	T	T	1	T	T	T	T	T	T	T	T	T	1	2	5	4	2	
Max. temp.	19	14	16	31	43	41	49	35	32	41	38	39	33	43	35	29	20	12	21	20	32	17	19	22	28	31	30	23	24	35	44	
Min. temp.	7	2	6	15	8	28	15	20	12	13	19	21	22	12	20	17	2	-5	-11	-6	-12	-1	-9	-5	-3	9	20	7	3	16	32	

Table 3B.—Daily precipitation, snowfall, snow on ground, and temperatures (°F.) for selected stations in the Missouri and Red River of the North Basins—March 1965.

(6 p. m. after station name indicates all data are for 24-hour period ending at that time. If no time is indicated, data are for 24-hour period ending at midnight except for snow on ground, which is measured at 6 a. m.)

Station	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
MISSOURI BASIN (Continued)																																
Sioux Falls, S. Dak.																																
Precip.	.29	.05	.04	T		.01		T	T	T	T		T	T	T	.11	.47	T	T	T		.05	T	T	.01		T	.06	T			1.09
Snowfall	4.4	0.4	0.2	T		0.1		T	T	T	T		T	T	T	1.0	6.7	T	T	T		0.4	T	T	0.1		T	T	T			
Snow on grnd.	1	5	5	5	5	3	2	1	1	1	1	1	1	1	1	T	3	7	6	5	4	3	3	3	2	2	2	1	1	1	1	
Max. temp.	30	14	19	30	35	35	39	33	28	35	36	36	36	38	42	34	24	9	19	18	25	23	13	22	23	25	38	32	29	40	60	
Min. temp.	10	6	9	18	23	25	16	20	13	11	23	19	26	19	26	23	6	-1	-5	-2	-5	9	-1	8	9	1	22	21	19	20	33	
Norfolk, Nebr.																																
Precip.	.05	T	T	T		T			T	T			.03			.29	.03	T	T	T		.01	T	T	.03				T	T		.44
Snowfall	.07	T	T	T		T			T	T			0.3			1.8	0.5	T	T	T		0.2	T	T	0.6				T	T		
Snow on grnd.	T	1	1	1	1	T	T	T	T	T	T						2	2	2	2	2	1	1	1	2	2	2	T	T	T	T	
Max. temp.	34	19	19	27	38	38	45	35	31	42	44	46	36	51	50	35	30	10	24	23	30	29	10	16	20	24	38	37	33	43	61	
Min. temp.	14	8	9	15	21	27	20	28	20	15	24	20	23	20	25	28	4	1	-5	0	-4	6	1	7	5	-4	23	22	18	23	33	
Grand Island, Nebr.																																
Precip.	.04		T	T		T		T	.02	T			.04			.68	.09					.05	.03	.10	.01	T		T		T		1.26
Snowfall	0.4		T	T		T		T	T	T			T			1.0	1.0					1.0	0.3	2.4	0.2	T		T		T		
Snow on grnd.	T	T	T	T	T								T				2	2	2	1	T	T	1	3	4	3	3	T	T	T	T	
Max. temp.	38	23	26	30	44	42	46	37	34	39	49	47	35	54	51	49	30	15	24	32	36	29	13	13	16	30	43	38	38	44	66	
Min. temp.	17	11	9	14	20	24	19	22	16	14	24	18	25	20	21	24	5	1	-2	4	6	7	4	4	-5	-3	23	24	19	27	33	
Sioux City, Iowa																																
Precip.	.97	.04	T	.06	T	.04		T		T	T		.04		T	.22	.55	T	T	T		.09		.01	.05	T	T	T		T		1.67
Snowfall	7.2	0.4	0.1	0.9	T	0.7		T		T	T		0.4		T	T	5.7	T	T	T		1.0		0.1	0.7	T		T				
Snow on grnd.	2	7	7	7	7	6	6	4	4	3	3	1	1	1	T	T	3	6	6	4	3	3	4	4	4	4	3	1	1	T		
Max. temp.	36	17	16	31	35	32	37	34	30	37	41	38	38	40	47	36	34	11	21	20	25	27	12	18	20	24	40	38	32	41	59	
Min. temp.	14	9	9	17	24	24	20	24	19	14	27	23	27	22	29	29	8	3	0	4	3	12	4	9	9	-2	24	27	22	23	32	
Shenandoah, Iowa (6 p.m.)																																
Precip.	1.12	.12		.08	T	T	.03	T					.03	.11		.25	1.06				.02		T	.25	.02		T	.01				3.08
Snowfall		2.0		1.0	T	T	0.5	T					0.5	1.5							0.3		T	3.5	0.5							
Snow on grnd.		2	2	3	2	2	2	1	1	1			1											4	4	3						
Max. temp.	41	20	24	30	40	35	40	40	33	40	46	42	45	41	49	51	41	17	26	32	37	38	24	19	24	34	47	46	39	52	64	
Min. temp.	19	11	10	17	27	23	24	26	24	18	30	26	27	27	29	30	17	7	7	14	7	24	11	6	9	4	25	34	28	26	32	
Concordia, Kans.																																
Precip.	.13	T		T		.01			T				.11	T		.50	.02						T	.02	.05	.04	T		T			0.88
Snowfall	1.5	T		T		T			T				1.4				0.2						T	0.2	0.7	0.6	T					
Snow on grnd.	1	1	1	T	T	T	T			T				1			T							T	T	1	T					
Max. temp.	37	25	29	33	44	37	45	41	38	39	50	52	52	55	53	52	43	22	28	37	52	48	23	19	21	39	60	47	39	52	69	
Min. temp.	20	15	13	17	25	28	25	25	22	21	27	25	29	23	28	39	12	7	6	15	17	16	10	8	9	8	28	31	24	27	33	
Topeka, Kans.																																
Precip.	.34	.01	T	.08	T	T	T						.13	T		.88	.04			T			T	.10	T	T	T		T			1.58
Snowfall	1.0	0.5	T	1.5	T	0.4	T						0.9	T			T			T			T	0.6	0.1	T	T		T			
Snow on grnd.		2	1	T	2	T	T							1							T			1	T	1	T					
Max. temp.	43	23	27	29	36	37	42	45	43	40	50	49	54	51	53	68	50	23	28	37	50	50	26	23	20	37	52	59	43	52	66	
Min. temp.	20	16	15	21	27	28	28	26	31	24	27	29	29	29	30	32	18	12	11	18	22	20	15	13	14	17	25	34	31	28	29	
Kirksville, Mo.																																
Precip.	.25	.32	T	.29	.22	T	.05	T			T		.02	.05		.35	.59	T		T	.04	T	.28	.10	.09	T		.01	T			2.66
Snowfall	1.0	1.0	T	4.0	3.0	T	0.5	T			T		0.3	3.0			T	T		T	1.0	T	4.0	2.1	0.9	T			T			
Snow on grnd.		2	3	3	6	7	7	6	5	4	3	2	2	5	2	1		T			1	T	4	3	5	6	4	1				
Max. temp.	53	21	23	34	35	34	39	39	32	38	40	34	43	36	45	52	46	19	24	32	37	45	24	20	23	34	44	43	41	47	55	
Min. temp.	20	14	10	17	28	26	30	16	19	11	18	18	17	26	27	30	18	9	7	11	11	22	11	7	10	11	18	29	29	24	28	
Columbia, Mo.																																
Precip.	.47	.57	T	.39	.27	T	.01						.07	.04		.69	.28	T		T		.07	.42	.09	.02	T						3.40
Snowfall	T	0.7	T	6.4	2.8	T	T						0.7	0.3			T	T		T			0.7	1.3	0.6	T						
Snow on grnd.		T	1	2	9	5	5	4	3	2	1	T	T	1	T			T					T	1	2	3	2	T				
Max. temp.	58	28	24	32	35	34	38	44	36	37	47	41	51	45	54	68	55	25	27	35	45	62	32	21	21	35	56	66	46	50	63	
Min. temp.	28	15	14	18	26	30	27	21	27	17	23	27	25	32	30	38	20	13	11	14	27	32	18	14	16	18	23	34	32	30	31	
RED RIVER OF THE NORTH BASIN																																
Fargo, N. Dak.																																
Precip.		.25	.12	T				.01			T	.04	.02	.01	T	T	.00	T	.02	.02	.02	T	T		T	T	.11	.14	T		T	1.36
Snowfall		2.8	1.2	T				0.1			T	0.4	0.2	0.1	T	T	4.8	T	0.2	0.2	T	T	T		T	1.3	1.4	T			T	
Snow on grnd.	2	2	5	5	5	5	3	3	3	2	2	2	2	1	1	1	1	5	5	4	3	3	3	2	2	3	3	4	4	4	4	
Max. temp.	14	7	13	25	30	35	38	31	24	32	34	35	32	34	32	18	15	10	17	12	19	12	13	20	25	27	28	25	24	30	37	
Min. temp.	-4	0	4	4	2	12	8	10	0	7	20	24	12	8	8	-1	4	-3	-10	-12	-12	-9	-16	-10	-8	11	7	4	1	2	29	
Grand Forks, N. Dak.																																
Precip.	T	.05	.03					.03		T	T	.03	.01	T	.01		.02		T	T	.04	T	T			T	.01	.08	T		.01	0.32
Snowfall	T	0.3	0.3					0.3		T	T	0.5	0.1	T	0.1		0.2		T	T	0.4	T	T			T	0.1	0.8	T		0.1	
Snow on grnd.	5	5	5	5	5	5	3	3	3	2	2	2	3	3	3	3	3	3	3	3	2	2	2	2	2	1	1	1	2	1	1	
Max. temp.	13	7	14	29	37	36	39	31	27	32	34	34	32	32	30	18	13	11	18	13	20	11	13	19	28	29	28	25	27	35	37	
Min. temp.	3	-1	4	3	3	23	21	11	6	12	24	28	19	13	8	0	5	-2	-5	-4	-7	-7	-10	-4	-1	13	15	11	4	14	29	
Thurbult, Minn. (6 p.m.)																																
Precip.	.14	.05	.01									.02	.06		.07		.10	.07				.04						.05			.14	0.75
Snowfall	2.0	1.0	0.3									0.4	1.0		1.5		4.0	1.0				1.5						1.0			3.5	
Snow on grnd.	12	13	13	13	12	12	11	11	11	11	10	10	10	10	11	11	15	16	16	16	18	16	17	17	17	17	17	17	16	15	18	
Max. temp.	32	15	28	32	30	39	38	34	24	31	35	34	35	33	27	26	19	10	11	9	13	15	7	11	19	26	28	25	24	33	32	
Min. temp.	8	0	12	5	2	22	1	18	-7	-13	13	20	21	-7	12	-14	9	-1	-16	-28	-30	-7	-24	-20	-20	-11	-9	-2	5	5	24	

Table 4A.—Daily precipitation, snowfall, snow on ground, and temperatures (°F.) for selected stations in the Upper Mississippi Basin—April 1965.

(6 p.m. after station name indicates all data are for 24-hour period ending at that time. If no time is indicated, data are for 24-hour period ending at midnight except for snow on ground, which is measured at 6 a.m.)

Station	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
UPPER MISSISSIPPI BASIN																															
Pine River Dam, Minn. (6 p.m.)																															
Precip.	.20		.29	.22	T	1.25	T			.03	.07						T			T	.26	.08								2.40
Snowfall	2.0			1.0	T												T			T										
Snow on grnd.	29	26	24	24	23	21	20	19	16	14	10	8	5	5	4	4	3	3	2	T	T	T	T	T	T	T	T	T			
Max. temp.	36	41	38	40	48	41	40	45	51	49	44	47	53	50	47	41	50	50	47	45	52	50	44	53	50	64	58	65	80	72	
Min. temp.	28	28	29	31	32	33	32	33	20	29	36	35	25	37	34	40	29	28	31	28	35	31	34	30	30	31	29	20	35	35	
Alexandria, Minn.																															
Precip.		.09	.31	.02	.83	.78				.38	.03		T	.13		.05	.04	T		.13	.03	.03		T	.09		T				2.93
Snowfall						T										0.5	0.4	T		T				T			T				
Snow on grnd.	19	18	18	14	12	9	7	6	4	2	T	T	T				T	T		T											
Max. temp.	35	32	32	39	38	35	46	44	46	43	42	49	55	50	42	36	46	50	49	56	56	53	45	47	66	62	52	63	63	67	
Min. temp.	29	27	30	31	28	32	31	31	29	39	36	31	28	40	29	28	28	30	35	33	41	38	34	31	34	28	31	27	43	43	
Minneapolis, Minn.																															
Precip.	.03		.39	.01	T	.16		.19		.50	.05	.01	1	.34	T	.12	.07	.10		.02	T	.74		T	.78		.01				3.52
Snowfall	T		T													0.9	0.2	T							0.9		T				
Snow on grnd.	6	7	7	6	5	4	3	1	1	1	T	T	T				1	T													
Max. temp.	36	35	37	40	40	38	42	44	50	49	48	48	54	49	48	41	45	49	58	57	60	68	55	44	39	60	50	59	76	72	
Min. temp.	31	27	31	30	30	35	34	32	28	41	36	33	29	44	34	28	29	34	31	36	42	39	37	36	33	28	30	26	40	55	
Meyerhauser, Wis. (6 p.m.)																															
Precip.	.37			.28		.75	.03			T	.36			.25	.03	T	.02	.04			.07	.03	.07		.54	.05					2.89
Snowfall	4.0			2.0		T	T									T	0.2	0.5							1.5	0.5					
Snow on grnd.	19	17	16	16	13	10	8	7	5	4	2	1	T	T	T	T	T	T	T	T	T				1						
Max. temp.	38	36	39	37	44	39	41	43	52	47	48	44	52	45	45	41	48	49	54	51	56	55	53	42	41	58	56	58	76	73	
Min. temp.	27	28	23	28	30	33	34	26	25	35	36	34	23	33	37	29	30	32	25	30	36	32	35	31	32	28	32	20	29	51	
La Crosse, Wis																															
Precip.	.07		.27	.02	T	.15		1.05		.65	.78			.13	T	.03	.28	T	T	T	.01	T	.01	.80	.60		.02				4.87
Snowfall	T															T	1.6													
Snow on grnd.	T	T	T													T	1													
Max. temp.	39	41	41	41	45	44	51	38	58	56	58	46	55	53	47	44	49	51	59	59	68	70	56	41	41	57	47	60	80	78	
Min. temp.	32	27	27	33	33	37	31	28	24	39	40	30	27	37	37	33	31	34	30	35	43	41	40	36	35	37	30	30	40	49	
Madison, Wis.																															
Precip.	.05		.03	.02	.08	.02		.50		.83	.12	T		.15	.01	.01	.10	T	.02		T	T	.07	.23	.72	T	T				2.94
Snowfall	0.4		T	T												T	0.4	T													
Snow on grnd.	T	T	T	T	T	T											T														
Max. temp.	39	40	41	43	50	58	61	42	55	52	68	51	59	48	50	51	50	54	64	57	70	66	49	43	39	54	65	50	74	75	
Min. temp.	30	27	27	32	34	37	34	31	20	31	42	38	29	36	40	34	32	34	28	33	35	34	38	34	34	33	27	30	32	43	
Mason City, Iowa																															
Precip.		T	.27	T	.34	.27	T	.33		.12	1.42	.02		.08			.15			T	T		.04	.23	.47		.10				4.02
Snowfall																	T								T						
Snow on grnd.	5	3	2	2	2	1	T	T	T	T	T						T								T						
Max. temp.	40	35	35	39	41	44	53	43	56	54	63	47	55	52	47	46	50	48	62	63	61	75	58	45	40	59	42	58	81	81	
Min. temp.	33	31	33	33	34	37	35	33	32	48	45	35	31	45	35	33	34	33	32	40	43	42	45	39	38	38	35	33	40	48	
Des Moines, Iowa																															
Precip.			.25	.03	1.22	T		.61	T	.23	.01	T	T	.19	.03					T			.14	.76	.53		.18				4.18
Max. temp.	42	38	37	46	48	55	67	54	55	54	70	47	57	55	54	60	55	54	71	73	78	78	71	48	44	58	46	58	80	88	
Min. temp.	32	30	33	34	38	38	33	40	35	43	43	35	29	46	33	25	39	38	29	41	48	51	48	44	39	37	38	35	38	56	
Cedar Rapids, Iowa																															
Precip.			.06	T	1.56	.03		.36		.83	.03			.10	.01					T	T		.29	1.77	.38		.11	.02			5.37
Max. temp.	45	40	39	49	49	58	64	53	62	58	72	50	59	51	52	55	55	59	67	64	78	77	71	47	48	59	55	59	73	80	
Min. temp.	36	30	33	35	40	39	34	41	36	51	47	38	33	47	38	34	40	38	31	45	46	51	47	45	39	38	38	38	38	53	
Rockford, Ill.																															
Precip.	.10	T	.04	T	.77	T		.47		.48	.02	T		.92	.10	.08	.09	T			T		.06	1.11	.36	T	.02	T			4.02
Snowfall		T																													
Max. temp.	44	39	44	43	51	65	62	50	54	53	72	49	56	46	53	40	48	55	60	54	69	67	61	43	52	47	60	56	68	73	
Min. temp.	32	30	28	33	35	40	35	38	34	33	38	41	32	38	40	38	36	38	30	40	43	40	42	39	39	34	30	36	32	45	
Peoria, Ill.																															
Precip.	T		.01	T	1.69			1.26		.31	.15			.66	.35			T		T	T	.01	.23	.37	.23		.08	.02			5.58
Max. temp.	53	43	43	50	58	71	72	68	58	55	70	53	58	51	56	53	63	59	62	67	76	73	76	58	59	48	61	57	69	82	
Min. temp.	34	31	33	38	41	45	39	41	40	43	52	43	35	42	41	34	40	38	37	44	50	48	48	38	41	38	36	39	39	44	
MISSOURI BASIN																															
Aberdeen, S. Dak.																															
Precip.	T	.40	.18		.29	.47			.22	.17	.05	.01	T	.16	T	.22	.31	T	.01	.13	T	.01	.03	.15	T	.12					2.93
Snowfall	T		T		1.2	4.2					T					1.5	3.8	T						0.2							
Snow on grnd.	T	T	T	T	T	3	2	T	T									T													
Max. temp.	36	35	40	45	41	37	45	40	60	68	46	56	61	63	48	37	46	56	62	71	57	60	46	51	61	68	55	75	88	77	
Min. temp.	30	31	33	30	33	32	22	32	33	43	34	34	29	30	33	33	25	32	32	35	37	40	36	35	37	31	27	28	34	40	
Sioux Falls, S. Dak.																															
Precip.	T	.12	.32		1.02	.01	T	.38		.21	.10	.01			.02	.01	.09	T	T	.08		.02	.11	.19	.46	T	.20				3.35
Snowfall	T	T														T	0.4								T		T				
Snow on grnd.	T	T	T	T	T												T														
Max. temp.	40	35	41	56	42	46	60	46	56	72	55	54	56	70	47	60	49	55	61	72	60	80	53	39	50	64	53	68	86	87	
Min. temp.	33	31	34	32	37	30	28	34	32	39	34	33	30	44	28	27	32	33	30	38	46	45	38	36	30	28	33	25	45	42	

Table 4B.—Daily precipitation, snowfall, snow on ground, and temperatures (°F.) for selected stations in the Missouri and Red River of the North Basins—April 1965.

(6 p. m. after station name indicates all data are for 24-hour period ending at that time. If no time is indicated, data are for 24-hour period ending at midnight except for snow on ground, which is measured at 6 a. m.)

Station	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
MISSOURI BASIN (Continued)																															
Norfolk, Nebr.																															
Precip.		T	.20	.12	.12	T	.14	.01	T	.14	T	T			T	T								.02	.03	.19	.06	.01				1.04
Snowfall																										0.2					
Snow on grnd.																										T					
Max. temp.	42	40	46	53	44	59	69	54	53	72	57	51	57	73	54	77	56	60	67	60	68	64	61	42	48	66	52	69	90	94	
Min. temp.	31	31	37	32	39	37	33	43	38	46	35	33	27	42	34	30	34	37	41	44	52	51	42	39	33	31	34	25	41	44	
Grand Island, Nebr.																															
Precip.		.23	.04	.26	.17		.79	T		.55		T										T	T	.09	.03	.02	T				2.16
Max. temp.	50	44	51	50	46	65	69	57	60	70	58	53	55	72	59	78	56	63	74	83	76	85	62	45	49	65	55	70	89	92	
Min. temp.	31	34	36	38	38	37	34	46	42	45	38	35	31	40	39	35	34	41	43	42	54	53	44	38	38	32	31	26	46	50	
Sioux City, Iowa																															
Precip.			.40		.58	.35		.34		.14	T	.08			.02								T	.22	.74		.12				2.97
Snowfall																T									1.0		T				
Max. temp.	42	39	42	56	43	56	71	54	54	77	60	54	59	75	52	78	55	57	71	74	70	86	62	47	52	67	54	66	89	93	
Min. temp.	35	32	37	33	40	35	31	43	40	47	35	35	31	45	36	29	36	36	36	41	51	52	47	41	35	32	36	31	41	44	
Shenandoah Iowa (6 p.m.)																															
Precip.			.22	T	.86			.88		.15				.07						T				.09			T				2.29
Max. temp.	58	49	47	51	54	62	75	69	60	72	68	57	60	69	60	71	69	57	75	81	80	86	77	69	46	63	68	68	88	80	
Min. temp.	34	33	39	39	43	43	38	52	40	48	51	41	30	48	44	31	39	43	36	47	57	54	60	47	40	34	40	29	40	50	
Concordia, Kans.																															
Precip.		.48	.02	.08	.04		.57		T	T			.01	T										.12	.02						1.34
Max. temp.	59	49	58	53	64	65	70	66	66	77	66	50	50	70	61	78	64	63	76	86	80	87	81	56	51	62	54	68	87	92	
Min. temp.	37	40	45	42	47	38	48	50	44	56	45	39	35	46	43	36	41	41	44	51	53	51	56	41	39	37	39	29	46	53	
Topeka, Kans.																															
Precip.		.33	.58	.04	.21	.06			T	.08			.04	.36										.34	.29						2.31
Max. temp.	62	56	58	60	68	68	77	75	65	80	71	55	57	67	61	72	73	65	74	85	82	86	88	73	54	58	51	63	82	86	
Min. temp.	40	41	44	46	51	44	41	51	40	59	53	43	36	53	39	33	52	40	33	40	54	59	62	47	43	42	34	30	35	60	
Kirksville, Mo.																															
Precip.			.40	.12	.65	.10		.16		.48	.05		T	.63	.02									.07	.13		.03				3.14
Max. temp.	51	45	40	56	57	66	76	74	61	60	70	52	59	52	53	59	62	60	68	80	78	79	80	68	51	53	58	59	75	86	
Min. temp.	36	32	36	38	44	46	41	44	39	47	50	42	33	49	38	29	47	40	30	46	56	55	56	51	41	38	37	38	36	54	
Columbia, Mo.																															
Precip.			.82	.05	1.15					.38	1.02			.54	T									.12	.40		T				4.48
Max. temp.	67	47	45	52	57	76	82	83	61	80	75	60	64	57	56	64	76	67	68	82	88	91	80	68	60	49	60	57	75	87	
Min. temp.	39	38	40	44	48	54	48	51	44	49	50	47	37	49	40	34	53	45	40	48	63	60	57	60	48	43	41	41	39	55	
RED RIVER OF THE NORTH BASIN																															
Fargo, N. Dak.																															
Precip.	T	.07	.54	T	.42	.47			T	1.35	.08	T	T			.01	T	.01	T	.09	T	T									3.04
Snowfall	T		T	T	T	2.5					T	T				T				T											
Snow on grnd.	2	1	T	T	T	2	1	T	T	T	T	T								T											
Max. temp.	34	35	34	38	41	35	44	39	40	48	43	50	50	56	43	40	47	53	45	58	51	62	40	55	61	60	54	73	84	72	
Min. temp.	30	31	32	30	32	32	29	34	34	40	38	34	31	42	32	30	26	30	34	33	31	37	33	34	37	30	26	30	44	36	
Grand Forks, N. Dak.																															
Precip.		.10	.40	T	.18	.72	T		T	.64	.74		.01	.04		T			T	.08	T	T				T				.03	2.92
Snowfall			T		T	6.0					T					T			T	T										
Snow on grnd.	1	1	1	1	1	7	6	1	1																						
Max. temp.	35	36	34	38	39	34	40	37	40	43	39	48	57	49	38	44	47	48	41	49	39	59	43	50	58	42	51	70	75	56	
Min. temp.	28	32	33	33	33	32	33	32	33	36	34	33	34	38	33	32	30	33	33	34	28	33	34	33	33	32	29	33	43	36	
Thorhult, Minn. (6 p.m.)																															
Precip.			.27			.76	.02		.05	.25	.36			T			.04					T					T				1.74
Snowfall			1.0														1.0														
Snow on grnd.	17	15	15	13	12	10	9	—	7	6	5	—	2	1		—	48	—	48	46	48	54	48	—	61	60	52	66	76	65	
Max. temp.	37	43	38	41	44	40	39	—	46	43	42	—	68	54	45	—	48	—	48	46	48	54	48	—	61	60	52	66	76	65	
Min. temp.	24	27	31	31	33	32	32	—	21	36	32	—	28	36	30	—	28	—	23	25	24	32	33	—	27	25	25	32	49	30	

Table 5.—Daily precipitation, for selected stations in the Upper Mississippi, Missouri, and Red River of the North Basins—May 1965.

(Amounts are for 24-hour period ending at midnight except where 6 p. m. is indicated as observation time)

Station	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
UPPER MISSISSIPPI BASIN																																
Pine River Dam, Minn. (6 p.m.)		.09			.66	.02			.28	.06				.42	.95	.05	.05	.25		.32	.65	.07	.67	.09	1.14			.16		.02	.08	6.23
Alexandria, Minn.					.60		.02	.33	.42	T				.69	.36	T	.02		.01	.24	.24	.03	1.29	.53		T	.02	T			.66	5.06
Minneapolis, Minn.		T	.08		.08	.75	.37	.95	.10	T				.47	1.44	.09	.12		T	.03	.06	T	.15	.34	.04	.08	.03	T			2.39	7.66
Weyerhaeuser, Wis.					.29	.04	.62	1.33	.14	T				.06	.47	.15	.01	.27		.03	.04		T		.31	1.00	.01	.05			.05	4.68
La Crosse, Wis. (6 p.m.)			.46	T	.16	.09			.29	.15					.70	.43		.30			.07	.10	.21	.04	1.53	.40	T	T			.18	5.11
Madison, Wisc.	T			T	.32			.16	.03					T	.15	T	T	.07			T	.11	.02	.01	.40	.45	T	T			.14	1.86
Mason City, Iowa				T	.37		T	.02		T			.28	.17	.67	.22		T			.14	.34	1.12	.39	.36	.03	T		.51			5.22
Des Moines, Iowa				T	.14		.02	.81						T	.02	T		T			.14	1.05	.04	.29	.22	.71			.34		.01	3.89
Cedar Rapids, Iowa				.36	.15		.01	.03	.53				T	T	.89	T						.59	.77	.18	.10	1.09	T		.31		.39	5.29
Rockford, Ill.			T	.83	1.53	T	.26	1.50	.26					.01	.07	T					.40		.26		.15	.59	T	T	T		T	5.68
Peoria, Ill.				.44	T	.13	1.08	T	T					T	.54	T		.03				.30		.01	.75	.44			.13			3.85
MISSOURI BASIN																																
Aberdeen, S. Dak.	T			T	.17			.29	.02				.08	.88	.01				.04	.06	T	.28	.95	.23	T	.01	.01		.07			3.01
Sioux Falls, S. Dak.	.04		.02	T	.14	T	.10	2.26		T				.82	1.36		T	T		.84	.06	.10	T	.76	.62	.02	T		.02	T		7.29
Norfolk, Nebr.					.20		.74	.91					T	.10	.27		.21	.02			.06	1.00		1.64	1.50	.07	T		T			6.62
Grand Island, Nebr.			T	.45	.05		1.58	.44						.17	.04		.03	.01	T		T	.94	T	1.62	.62	.02						5.97
Sioux City, Iowa	T				.06	T	.69	1.00	T					.06	.95		.03	.23			.46	.22	.01	.88	.33	.07	.01		.02			5.78
Shenandoah, Iowa (6 p.m.)			.08	T	.28			1.05							.02			.85	T		.84	3.12		.50		.72			.15		T	7.09
Concordia, Kans.				.47	.58		.04	.64		.02	.01		.04	.18				T			.01	T	T	.74	.58					.10	1.77	5.19
Topeka, Kans.					.28			.05			T		T	.12				.06	T		.53	.02	T	.98	T	.89			T		.38	3.41
Kirksville, Mo.					.30	T	.02	T						T	1.20	T		.03		T				.03	.04	1.03			.03			2.68
Columbia, Mo.					T			.36			T			.02				.07					.07			1.34			.26			2.12
RED RIVER OF THE NORTH BASIN																																
Fargo, N. Dak.	T	.28				.06		.01	.25					.57	.60		.08			.01			.34	.45	T	.08	.01		T	T	.32	3.08
Grand Forks, N. Dak.	.18	.52			.98	T		T	.42	T				.10	T		.13			.15			.02	.64	.02	.14	.02		.01	.25	.34	3.91
Thorhult, Minn. (6 p.m.)		.72			.36				.25	.25				.06	1.10		.02			.09	.13		.07			.02	.12	.06		.06	.14	3.34

Table 6A.—Depth of snow on ground and water equivalent, March 1965—Iowa.

(Supplements snow data published in Climatological Data)

Location	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date
							IOWA											
Algona	5	0.5	3/16															
Ames	1	0.2	3/16	6	1.7	3/23												
Artesian	8	1.6	3/22															
Austin	6	1.2	3/9	4	1.3	3/16												
Basset, 3 E	9	2.2	3/23															
Boone	4	1.0	3/16	8	2.0	3/23	2	1.0	3/30									
Buckeye	6	0.6	3/16	19	1.9	3/23	15	1.5	3/30									
Carroll	1	0.1	3/16															
Clarion	4	0.9	3/16	12	2.8	3/23	6	1.6	3/30									
Charles City	4	2.6	3/9	6	2.4	3/16	16	5.2	3/23	11	4.5	3/30						
Cherokee	4	3.4	3/29															
Correctionville	5	1.1	3/20	3	2.3	3/29												
Cresco	9	3.9	3/23															
Cresco, 8 W	8	2.9	3/23															
Denison	4	1.3	3/2	2	0.4	3/20												
Dumont	6	1.8	3/9	7	1.9	3/16	12	2.2	3/23	10	1.7	3/30						
Durango	6	1.2	3/22															
Durango, 7 W	6	1.4	3/22															
Edgewood	8	1.7	3/22															
Elkader, 4 NE	6	1.1	3/23															
Elkader, 5 W	6	1.0	3/23															
Emmetsburg	2	0.2	3/16															
Estherville	6	1.0	3/16	19	2.0	3/23	12	1.0	3/30									
Floyd, 4 N	5	1.7	3/23															
Forest City	12	3.2	3/9	13	3.6	3/16	14	4.2	3/23	13	4.4	3/30						
Fort Dodge	6	1.9	3/16	12	2.6	3/23	7	1.7	3/30									
Fredericksburg, 2 E	11	2.4	3/23															
Fredericksburg, 7 W	12	2.8	3/23															
Frederika, 2 W	6	1.4	3/22															
Froelich	8	1.6	3/23															
Galva	9	2.0	3/20															
Humboldt	10	2.0	3/16	17	3.0	3/23												
Ida Grove	5	1.9	3/2	2	0.8	3/29												
Jefferson	2	1.0	3/16	9	0.9	3/23	6	0.6	3/30									
Jewell	3	1.1	3/16	11	2.5	3/23	7	2.6	3/30									
Kanawha	6	3.0	3/16	10	3.9	3/23	8	2.8	3/30									
Luana	8	1.8	3/23															
Luxemburg, 2 E	6	1.5	3/22															
Luxemburg, 6 W	4	0.8	3/22															
Luxemburg, 14 W	8	1.2	3/22															
Marble Rock	6	1.5	3/9	5	1.6	3/16												
Marshalltown	7	3.1	3/30															
New Hampton	10	2.3	3/23															
New Haven, 2 W	8	2.3	3/23															
Northwood	7	2.2	3/9															
Oelwein, 3 E	6	1.2	3/22															
Oelwein, 6 W	5	1.3	3/22															
Onawa	5	2.2	3/2															
Oran, 1 N	4	2.7	3/22															
Osage	5	2.0	3/9	6	2.1	3/16	13	4.3	3/23	10	5.6	3/30						
Ossian	10	2.5	3/23															
Parkersburg	6	1.6	3/9	4	1.1	3/16	6	1.5	3/23	7	2.6	3/30						
Perry	2	0.2	3/17															
Pocahontas	5	1.1	3/16	11	2.5	3/23	7	2.5	3/30									
Paullina	3	1.0	3/29															
Peterson	5	2.8	3/29															
Postville, 2 W	6	2.4	3/23															
Readlyn, 1 N	4	2.6	3/22															
Riceville, 3 W	9	3.4	3/23															
Riceville, 6 E	9	3.0	3/23															
Ridgeway, 1 S	8	2.8	3/23															
Rockwell City	3	1.1	3/16	10	2.1	3/23	7	2.6	3/30									
Sac City	9	1.8	3/23	5	1.5	3/30												
Sanborn	2	0.9	3/2	4	1.7	3/29												
Sheffield	5	1.6	3/9	5	1.5	3/16	9	3.5	3/23	7	3.0	3/30						
Shell Rock	6	2.0	3/9	6	2.8	3/16												
Spencer	5	2.6	3/2	11	2.0	3/20												
Spillville, 1 S	8	2.8	3/23															
Spillville, 3 E	9	3.6	3/23															
Storm Lake	2	0.9	3/16															

Table 6B.—Depth of snow on ground and water equivalent, February-April 1965—Iowa (cont'd) and Minnesota.
(Supplements snow data published in Climatological Data)

Location	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date
Strawberry Point, 2 S	7	1.0	3/22															
Strawberry Point, 12 W	7	1.3	3/22															
Traer	3	-	3/30															
Webster City	4	2.1	3/16	10	2.3	3/23	7	2.3	3/30									
West Union	8	1.8	3/23															
West Union, 9 E	7	1.0	3/23															
West Union, 9 W	8	2.2	3/23															
Winterset	1	0.1	3/16	3	0.2	3/23												
Zearing	3	1.0	3/16	10	1.5	3/23												
MINNESOTA																		
Ada	10	3.8	3/3	8	2.7	3/9	5	2.2	3/16	5	2.4	3/22	4	2.1	3/30	1	0.6	4/2
"	1	0.2	4/5															
Agassiz	13	-	3/30	13	3.9	4/2	5	0.6	4/5	T	-	4/8						
Aitkin	27	5.8	3/2	24	5.4	3/5	24	5.7	3/16	28	6.1	3/23	34	7.8	3/30	28	7.1	4/2
"	25	6.6	4/5	22	6.1	4/7	9	2.2	4/12									
Alexandria	10	3.9	3/25															
Anoka	21	7.3	3/26															
Appleton	11	3.8	3/24															
Argyle	2	0.3	3/30	T	-	4/2												
Beardsley	2	0.3	2/23	T	-	3/2	1	0.2	3/9	7	0.8	3/23	12	1.0	3/30	6	0.6	4/2
Beardsley	3	0.4	4/5	T	-	4/7												
Becker	17	6.0	3/15	21	7.8	3/26												
Benson	8	1.6	2/23	6	1.3	3/9	16	2.4	3/23									
Blue Earth	6	2.8	3/11															
Campbell	7	0.4	3/30	2	0.5	4/2	3	0.6	4/5									
Canby	3	1.0	2/23	3	0.8	3/2	5	1.1	3/9	4	1.0	3/16	11	2.1	3/23	19	3.0	3/30
"	10	2.6	4/2	6	1.6	4/7	2	0.6	4/9									
Cloverdale	22	6.4	3/16															
Comfrey	3	0.3	2/23	9	1.2	3/9	18	2.5	3/18	6	1.0	4/5						
Correll	1	0.9	2/23															
Crookston	3	1.0	3/3	2	0.5	3/9	2	0.3	3/16	2	0.3	3/18	1	0.2	3/25	1	0.2	3/30
"	T	-	4/2															
Delano	17	4.7	3/9															
Detroit Lakes	5	0.5	3/3	8	1.7	3/9	9	1.3	3/16	12	1.5	3/22	10	1.4	3/30	13	1.8	4/2
" "	10	1.2	4/5	1	0.5	4/8												
Elk River	13	5.8	3/15	20	7.6	3/26												
Fairfax	15	5.0	3/12															
Fairmont	9	2.0	2/23	9	1.8	3/2	14	2.1	3/9	14	2.9	3/23	10	2.1	3/30	4	1.9	4/2
"	1	0.9	4/5															
Foley	17	6.3	3/16	23	7.8	3/25												
Fort Ripley	12	2.2	2/23	22	3.5	3/2	20	4.6	3/16	29	6.5	3/23	31	8.3	4/2	27	8.2	4/5
" "	24	7.0	4/7	8	2.6	4/12	2	0.7	4/14									
Fosston	4	1.6	3/3	6	2.1	3/9	9	4.5	3/16	13	5.0	3/18	13	3.5	3/22	13	3.1	3/25
"	13	4.9	3/30	7	2.6	4/2	4	1.4	4/5	2	0.7	4/8						
Granite Falls	12	4.8	3/23															
Gull	25	4.2	3/1															
Hallock	5	0.4	3/3	3	0.9	3/9	5	1.6	3/16	2	0.3	3/30	1	0.2	4/2	4	0.7	4/5
Halstad	3	0.4	3/9	3	0.7	3/16	4	0.5	3/30	T	-	4/2						
Hastings	16	5.2	3/19															
Highlanding	8	0.1	3/16	8	2.0	3/30	T	-	4/8									
Hinckley	20	3.5	2/23	17	3.6	3/2	18	4.1	3/9	19	4.3	3/16	34	5.6	3/23	34	5.7	3/30
"	33	6.2	4/2	24	6.2	4/5	18	5.4	4/7	6	2.4	4/12	3	1.2	4/14			
Kasson, 1 E	4	1.4	3/23															
Lanesboro	3	0.7	2/23	2	0.3	3/16												
Litchfield	10	2.3	2/23	15	3.0	3/2	14	3.4	3/9	24	5.9	3/23	29	7.0	3/30	20	7.0	4/2
"	15	5.5	4/5	9	4.0	4/7	4	2.3	4/9									
Little Falls	19	6.2	3/25															
Long Prairie	12	4.2	3/25															
Madelia	8	3.8	3/11															
Mahnomen	8	2.2	3/3	8	2.6	3/16	9	2.8	3/22	9	2.8	3/30	6	2.2	4/2	5	1.6	4/5
"	T	-	4/8															
Mankato	8	3.1	3/11															
Mapleton	6	2.2	3/11															
Marshall	6	1.1	2/23	7	1.0	3/2	8	1.4	3/9	6	1.5	3/16	16	2.5	3/23	19	3.0	3/30
"	14	3.0	4/2	8	3.0	4/5	3	1.5	4/7									
Melrose	14	2.7	2/23	18	3.0	3/2	18	3.2	3/9	18	2.9	3/16	23	4.2	3/23	25	4.6	3/30
"	19	5.6	4/2	11	4.2	4/5	5	2.6	4/7	3	0.9	4/9						
Milaca	21	4.0	2/23	27	5.6	3/2	25	6.3	3/9	23	6.4	3/16	39	7.4	3/23	38	7.8	3/30
"	33	8.1	4/2	30	8.4	4/5	25	7.6	4/7	23	7.4	4/9	16	6.0	4/12	6	2.2	4/14
Minneota	3	0.6	2/23	5	-	3/2	6	0.7	3/9	2	0.7	3/16	8	1.7	3/23	11	2.2	3/30
"	7	2.4	4/2	3	1.3	4/5												
Moose Lake	24	3.6	2/23	30	4.6	3/2	28	3.8	3/9	29	3.8	3/16	45	5.4	3/23	48	5.8	3/30

Table 6C.—Depth of snow on ground and water equivalent, February-April 1965—Minnesota (cont'd) and North Dakota.

(Supplements snow data published in Climatological Data)

Location	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date
Moose Lake	12	2.3	4/14															
Montevideo	10	2.2	2/23	14	4.2	3/9	15	4.6	3/16	16	5.4	4/2						
Mora	15	6.4	3/16															
Morris	3	0.7	2/23	1	0.2	3/2	2	0.4	3/9	1	0.3	3/16	7	1.8	3/23	9	2.4	3/30
"	6	2.0	4/2	2	1.3	4/5	1	0.5	4/7									
New London	3	0.6	2/23	1	-	3/16	8	0.9	3/23	4	0.6	3/30	8	0.7	4/2	2	0.3	4/5
New Ulm	5	1.3	2/23	9	1.9	3/2	10	2.4	3/9	8	2.3	3/16	20	3.6	3/23	16	3.6	3/30
" "	10	3.3	4/2	5	2.0	4/5												
Niccolet, 1 #	5	2.3	3/23															
North Branch	30	6.7	3/19															
North Mankato	6	3.2	2/23	8	4.2	3/2	10	5.7	3/9	11	6.3	3/16	14	6.7	3/23	12	6.6	3/30
Onamia	19	3.4	2/23	23	4.9	3/2	23	6.1	3/9	24	6.0	3/16	32	7.4	3/23	35	7.6	3/30
"	31	7.6	4/2	28	7.4	4/5	23	7.4	4/7	13	4.0	4/12	8	2.4	4/14			
Park Rapids	14	2.6	2/23	17	3.1	3/2	17	3.5	3/9	15	3.5	3/16	18	3.5	3/23	20	4.0	3/30
" "	17	4.0	4/2	13	4.6	4/5	11	4.5	4/7	10	2.5	4/9	2	0.8	4/12			
Pine	24	4.0	3/1															
Redwood Falls	11	4.4	3/23															
Remer	21	4.4	2/23	26	4.9	3/2	25	4.8	3/9	27	5.2	3/16	32	6.0	3/23	36	6.6	4/2
"	32	6.9	4/5	26	6.8	4/7	17	4.6	4/12	10	2.7	4/14						
Rice	26	8.2	3/15															
Rochester	5	2.3	3/30	T	-	4/6												
Rockford	12	3.1	2/23	14	3.8	3/2	12	4.2	3/9	14	4.6	3/16	24	5.4	3/23	13	5.9	4/7
Rush City	30	7.5	3/19															
Sandy	18	3.2	3/1	21	2.9	3/8												
St. Cloud	25	8.5	3/15	36	10.4	3/25												
St. Francis	11	2.3	2/23	13	4.0	3/9	13	4.1	3/16	22	6.2	3/23	26	8.5	3/30	23	6.5	4/2
" "	18	6.0	4/5	14	6.0	4/7	6	1.6	4/9									
St. James	10	4.6	3/11															
Shakopee	13	4.2	3/22															
Sleepy Eye	14	4.3	3/12															
Springfield	16	5.0	3/12															
Stewart	12	5.3	3/24															
Stillwater	23	6.5	3/19															
Thief River Falls	9	3.0	3/3	10	2.7	3/16	12	2.9	3/18	16	1.9	3/22	16	2.8	3/25	17	2.8	3/30
" " "	2	0.5	4/5	1	0.2	4/8												
Tyler	2	0.5	2/23	2	0.6	3/2	6	1.4	3/23	10	2.2	3/30	7	2.3	4/2	5	2.2	4/5
"	2	1.2	4/7	2	0.7	4/9												
Vernon Center	10	3.7	3/11															
Wadena	14	2.6	2/23	19	3.1	3/2	17	3.5	3/9	16	3.6	3/16	23	4.7	3/23	25	6.0	3/30
"	23	5.5	4/2	19	5.6	4/5	15	4.7	4/7	10	5.4	4/9						
Waseca	3	0.6	3/2	6	1.6	3/9	5	1.3	3/16	18	5.0	3/23	15	4.7	3/30	9	4.5	4/2
"	6	5.4	4/5	1	0.7	4/7												
Watson	17	5.2	3/24															
Wells	6	1.5	2/23	4	2.0	3/2	9	2.6	3/9	7	2.2	3/30	5	2.2	4/2			
White Rock Dam	2	0.5	3/3	1	0.7	3/9	2	0.8	3/22	5	0.9	3/30	1	0.5	4/5			
Willmar	9	2.4	2/23	12	2.0	3/2	14	3.3	3/9	11	3.1	3/16	27	4.0	3/23	32	6.9	3/30
"	9	3.9	4/7	5	2.2	4/9												
Willow River	26	7.1	3/16															
Winnebago	5	2.2	3/23															
Winthrop	13	5.8	3/24															
Young America	17	3.5	3/9	32	4.5	3/23	26	7.8	3/30	20	7.8	4/2	17	7.4	4/5	14	5.5	4/7
Zumbrota	4	0.4	3/2	18	3.6	3/16												
NORTH DAKOTA																		
Abercrombie	2	0.4	3/3	2	0.5	3/9	2	0.5	3/16	5	0.8	3/18	3	0.6	3/22	1	0.3	3/25
"	6	0.8	3/30	1	0.2	4/2	T	-	4/8									
Amenia	3	1.2	3/3	1	0.8	3/9	1	0.5	3/16	0	-	3/18	1	0.2	3/30	T	-	4/2
"	T	-	4/5	T	-	4/8												
Baldhill Dam	3	0.5	3/18	2	0.2	3/30	1	0.2	4/2	9	1.0	4/5	2	0.3	4/8			
Cavalier	2	0.4	3/9	2	0.5	3/16	2	0.5	3/18	2	0.5	3/22	2	0.5	3/30	2	0.6	4/2
"	6	1.0	4/5	T	-	4/8												
Chaffee	3	0.5	3/3	2	0.4	3/9	0	-	3/16	T	-	3/22	2	0.2	3/30	T	-	4/2
"	3	0.4	4/5	0	-	4/8												
Colgate	3	1.1	3/3	T	-	3/9	T	-	3/16	1	0.2	3/18	2	0.3	3/22	1	0.2	3/25
Colgate	2	0.3	3/30	0	-	4/2	6	0.3	4/5	T	-	4/8						
Drayton	7	1.2	3/3	4	0.6	3/16	T	-	3/25	2	0.4	3/30	4	0.3	4/2	T	-	4/5
"	T	-	4/8															
Forman	1	0.1	3/3	T	-	3/9	T	-	3/16	1	0.1	3/18	1	0.1	3/22	4	0.3	3/30
"	0	-	4/8															

Table 6D.—Depth of snow on ground and water equivalent, March-April 1965—North Dakota (cont'd) and South Dakota.

(Supplements snow data published in Climatological Data)

Location	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date
Larimore	8	1.4	3/3	4	0.8	3/9	T	-	3/16	1	0.1	3/22	2	0.1	3/30	T	-	4/2
"	10	1.4	4/5	1	0.4	4/8												
Lisbon	6	1.5	3/3	4	0.9	3/9	1	0.2	3/16	3	0.4	3/18	1	0.2	3/22	1	0.1	3/25
"	4	0.5	3/30	T	-	4/2												
Mayville	3	0.5	3/3	2	0.3	3/16	2	0.3	3/18	2	0.3	3/22	1	0.3	3/25	2	0.4	3/30
Mayville	1	0.3	4/2	0	-	4/5	1	0.6	4/8									
McLeod	3	0.9	3/3	2	0.6	3/9	3	0.6	3/18	3	0.6	3/22	2	0.5	3/30	1	0.3	4/2
"	T	-	4/5															
Park River	4	1.0	3/3	1	0.2	3/9	T	-	3/16	T	-	3/22	0	-	3/30	4	1.0	4/2
" "	T	-	4/5	T	-	4/8												
Pembina	7	1.5	3/3	2	0.2	3/9	3	0.7	3/22	1	0.1	3/30	T	-	4/5	T	-	4/8
Valley City	1	0.3	3/3	T	-	3/16	1	0.1	3/18	1	0.1	3/22	1	0.1	3/30	1	0.4	4/8
Wahpeton	5	1.4	3/3	3	0.9	3/9	1	0.2	3/16	5	0.5	3/22	4	0.5	3/25	12	0.8	3/30
"	3	0.8	4/2	1	0.3	4/5												
Walhalla	1	0.6	3/16	3	0.4	4/2	4	1.2	4/8									
						SOUTH DAKOTA												
Academy	1	-	3/19	3	0.4	3/26												
Alexandria	4	-	3/19															
Arlington	1	-	3/5	3	0.3	3/19	T	-	3/26									
Ashton	2	-	3/5															
Blunt	6	-	3/26															
Bowdle	2	0.3	3/19	3	0.3	3/26												
Bridgewater	4	-	3/19	1	-	3/26												
Brittan	T	-	3/5	T	-	3/26												
Brookings	1	0.2	3/5	T	-	3/12	7	0.7	3/19	7	-	3/26	T	-	4/2			
Bryant	4	0.5	3/5	1	-	3/12	5	1.0	3/19	2	0.6	3/26	1	0.8	4/2			
Canton	4	-	3/5	5	-	3/19	4	-	3/26									
Carthage	1	-	3/5	T	-	3/12	16	-	3/19	5	-	3/26	2	-	4/2			
Castlewood	4	1.0	3/5	3	0.5	3/12	4	1.2	3/19	1	1.0	3/26	T	-	4/2			
Centerville	2	0.3	3/5	4	0.4	3/19	3	0.4	3/26									
Chamberlain	3	-	3/5	1	-	3/19	T	-	3/26	T	-	4/2						
Clark	3	0.4	3/5	1	0.5	3/12	2	0.4	3/19	2	0.4	3/24	3	0.5	4/2			
Clear Lake	4	-	3/5	10	-	4/2												
Columbia	T	-	3/5	T	-	3/12	T	-	3/19									
Eagle Butte	2	-	3/5	T	-	3/12	T	-	3/19									
Flandreau	10	3.5	3/5	5	1.8	3/12	9	2.8	3/19	8	2.4	3/26	1	-	4/2			
Forestburg	1	-	3/5	T	-	3/12	5	-	3/19	4	-	3/26	T	-	4/2			
Fort Pierre	1	-	3/5															
Gann Valley	3	-	3/5	T	-	3/12	T	-	3/26									
Gettysburg	1	-	3/5															
Gettysburg, 14 W	2	-	3/5	T	-	3/12	2	-	3/19									
Harrington	T	-	3/5	2	-	3/19	2	-	3/26									
Hopewell	1	-	3/5	T	-	3/12	1	-	3/19	T	-	3/26						
Ipswich	T	-	3/5	1	-	3/19	T	-	3/26	T	-	4/2						
Iroquois	T	-	3/5	1	-	3/19	T	-	3/26	T	-	4/2						
Kennebec	T	-	3/5	T	-	3/19	T	-	3/26									
LaDelle	4	0.2	3/5	T	-	3/12	3	-	3/19	2	-	3/26	T	-	4/2			
Leola	3	-	3/5	1	-	3/19												
Little Eagle	1	-	3/5															
Madison	3	1.6	3/5	1	-	3/12	9	1.5	3/19	6	2.2	3/26						
Marion	4	-	3/19	4	-	3/26												
McIntosh	T	-	3/5	T	-	3/12												
Mellette	T	-	3/5	T	-	3/12	T	-	3/19	T	-	3/26						
Menno	5	0.5	3/19	3	0.3	3/26												
Mitchell	T	-	3/5	5	0.3	3/19	1	0.1	3/26									
Montrose	1	-	3/5	6	-	3/19	4	-	3/26									
Onaha	T	-	3/12	1	-	4/2												
Onida	2	-	3/5	1	-	3/19	T	-	3/26									
Parkston	T	-	3/5	4	0.3	3/19	3	0.2	3/26									
Platte	1	-	3/5															
Raymond	2	-	3/5	1	-	3/19												
Redfield, 6 E	2	0.2	3/5	3	0.1	3/19	T	-	3/26	1	-	4/2						
Rockham	2	-	3/5	3	-	3/15	2	-	3/26	4	-	4/2						
Salem	1	-	3/5	6	-	3/19	4	-	3/26									
Selby	1	-	3/5	1	-	3/19	1	-	3/26	1	-	4/2						
Sisseton	1	-	3/5	4	-	3/19	2	-	3/26									
Summit	2	0.1	3/12	3	0.4	4/2												
Vermillion	T	-	3/5	5	0.5	3/19	4	0.3	3/26									
Victor	10	2.8	3/5	1	-	3/12	7	2.0	3/19	4	1.8	3/26	2	0.8	4/2			
Wagner	T	-	3/5	1	-	3/19	1	-	3/26									
Watertown	6	0.7	3/5	2	0.2	3/12	7	0.8	3/19	2	0.2	3/26						

Table 6E.—Depth of snow on ground and water equivalent, February-April 1965—South Dakota (cont'd) and Wisconsin.

(Supplements snow data published in Climatological Data)

Location	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date	SOG	WE	Date
Wentworth	T	-	3/12	6	1.3	3/19	1	-	3/26	T	-	4/2						
Wessington	2	-	3/5	1	-	3/19	T	-	4/2									
Wessington Springs	1	-	3/5	T	-	3/12	2	-	3/19	T	-	3/26						
Wessington Springs 9 SW	1	-	3/5	T	-	3/19												
Wewela	3	-	3/26															
Wilmot	6	1.9	3/5	4	1.1	3/12	8	0.6	3/19	6	0.4	3/26	7	0.4	4/2			
Wolsey	2	0.1	3/5	T	-	3/12	1	-	3/19	T	-	3/26						
Wood	2	0.4	3/26															
Yankton	T	-	3/5	3	-	3/19	3	-	3/26									
							WISCONSIN											
Abbotsford	12	4.4	3/17															
Antigo	8	3.0	3/5	7	1.3	3/26	10	2.8	4/2									
Arpin	11	2.6	2/15	8	2.6	3/1	5	1.2	3/15	12	2.9	4/1						
Baldwin	14	3.1	2/23	6	2.1	3/2	6	2.1	3/9	7	1.3	3/16	15	2.4	3/23	15	2.8	3/30
"	12	3.5	4/2	8	2.6	4/5	3	1.2	4/7	1	0.6	4/9						
Blair	1	0.6	3/5	7	0.9	3/26												
Burnt Rollway	26	4.5	2/14	22	4.5	2/28	21	4.6	3/14	27	5.6	3/31	18	3.6	4/14			
Cadott	22	5.2	3/18															
Cameron	18	5.0	3/19															
Cedar Falls	6	3.4	3/8	4	3.4	3/15	15	5.2	3/22	19	5.6	3/29	8	6.2	4/5			
Clam Lake	21	6.4	3/17															
Cornell	18	4.5	3/18															
Cumberland	16	3.6	2/23	14	3.7	3/2	13	3.6	3/9	12	4.4	3/16	23	5.2	3/23	27	6.6	3/30
"	25	6.2	4/2	22	7.2	4/5	21	7.6	4/7	16	5.8	4/9	4	1.3	4/12			
Danbury	17	4.2	2/23	15	3.9	3/2	14	4.4	3/9	14	4.5	3/16	24	3.2	3/23	27	6.8	3/30
Danbury	27	7.4	4/2	23	7.5	4/5	18	6.3	4/7	10	3.5	4/12						
Eau Pleine	8	2.0	2/26	10	1.5	3/22	10	2.8	4/2									
Flambeau Res.	20	5.0	2/28	17	4.5	3/6	16	4.4	3/13	24	6.7	3/26	25	6.5	4/3			
Glidden	18	6.5	3/17															
Grantsburg	11	5.2	3/16															
Hatfield Dam	10	1.4	3/26															
Haugen	26	6.7	3/18															
Hayward	19	6.5	3/17															
Hillsboro	2	0.2	2/23	8	1.6	3/23	4	1.2	3/30									
Holcombe	5	1.5	3/6	5	1.6	3/12	10	2.2	3/26	10	3.2	4/2						
Ladysmith	10	2.8	3/8	10	2.8	3/15	16	3.2	3/22	22	4.7	4/4	4	1.2	4/12			
La Farge	5	0.5	3/27															
Mather	0	-	3/8	3	0.7	3/15	13	2.1	3/22	9	1.9	3/29	4	1.7	4/5			
Medford	13	4.4	3/17															
Ogema	16	5.5	3/17															
Ontario	3	0.4	2/23	1	0.3	3/9	10	1.8	3/23	6	1.5	3/30	4	1.2	4/2			
Owen	6	2.2	2/23	3	1.4	3/2	2	0.8	3/9	3	1.0	3/16	13	2.7	3/23	18	3.4	3/30
"	16	3.1	4/2	13	3.2	4/5	6	2.6	4/7									
Park Falls	16	5.5	3/17															
Portage	7	1.4	3/23															
Prentice	16	6.0	3/17															
Radisson	26	7.2	3/18															
Rainbow	20	3.8	3/3	21	4.5	3/16	27	6.9	3/31									
Rice Lake	23	6.2	3/19															
St. Croix Falls	22	6.6	3/19															
Solon Springs	21	5.4	3/2	21	5.4	3/9	21	5.5	3/16	31	7.0	3/23	15	5.4	4/12	14	4.9	4/14
Spooner	11	3.0	3/8	12	3.1	3/15	23	4.3	3/22	29	4.4	3/29	17	3.0	4/5			
Summit Lake	12	3.8	3/5	12	3.7	3/15	22	4.3	3/26	30	5.5	4/2	16	5.0	4/9			
Tiger Cat	18	6.0	3/17															
Turtle Lake	24	6.5	3/19															
Viroqua, 6 NE	2	0.9	2/23	1	0.8	3/2	8	1.2	3/23	6	1.4	3/30	4	1.3	4/2	1	0.8	4/5
Winter	18	4.2	3/16	28	6.0	3/27	20	6.0	4/10									

Table 7A.—Major floods in order of magnitude at selected stations on the Mississippi, Des Moines, and Big Sioux Rivers.

MISSISSIPPI RIVER

St. Paul, Minn.:
Zero of gage - 683.68 feet (1929 adj.)
Drainage area - 36,780 square miles
Flood Stage - 14 feet
Period of record - 1866-1965

Crest stage	Date
25.95	Apr. 16, 1965
22.0	Apr. 16, 1952
19.7	Apr. 29, 1881
18.8	Apr. 16, 1951
18.6(2)	Jul. 23, 1867
18.0(2)	Apr. 16, 1875
18.0	Apr. 6, 1897
16.8	Jun. 29, 1908
16.6	Apr. 6 and 9, 1916
16.4	Apr. 21, 1873

La Crosse, Wis.
Zero of gage - 625.83 feet (1929 adj.)
Drainage area - 62,840 square miles
Flood stage - 12 feet
Period of record - 1873-1965

Crest stage	Date
17.9	Apr. 21, 1965
16.5(1)	Jun. 19, 1880
15.3	Apr. 20, 1952
14.9	Apr. 19, 1951
14.5	May 8-9, 1888
14.4	Oct. 17, 1881
14.2	Apr. 2, 1920
13.7	Apr. 17, 1922
13.7	Apr. 10, 1897
13.6	Apr. 28-29, 1916 and Apr. 18-20, 1888

Davenport, Iowa:
Zero of gage - 542.00 feet (1929 adj.)
Drainage area - 88,449 square miles
Flood stage - 15 feet
Period of record - 1860-1965

Crest stage	Date
22.5	Apr. 28, 1965
20.9	Mar. 10, 1868
19.4	Jun. 27, 1892
18.6	Apr. 28, 1952
18.6	May 15-16, 1888
18.4	Jun. 26, 1880
18.3	Apr. 28-29, 1951
17.7	Oct. 25-27, 1881
17.1	Apr. 23, 1922
17.1	Apr. 9, 1920

Keokuk, Iowa:
Zero of gage - 477.41 feet (1929 adj.)
Drainage area - 119,000 square miles
Flood stage - 16 feet
Period of record - 1868-1965

Crest stage	Date
22.1	May 1, 1965
21.9	Apr. 3, 1960
21.0(1)	Jun. 16, 1851
20.85	May 27, 1944
20.25	May 12, 1951
20.2	Jun. 8 and 20, 1947
19.65	May 16-17, 1888
19.6	Jun. 5, 1903
19.3	Mar. 23, 1929
19.25	Jun. 30, 1892

MISSISSIPPI RIVER (Cont'd.)

Hannibal, Mo.:
Zero of gage - 449.07 feet (1929 adj.)
Drainage area - 137,200 square miles
Flood stage - 16 feet
Period of record - 1878-1965

Crest stage	Date
24.6	May 1, 1965
24.1	Jun. 10, 1947
22.6	May 13, 1951
22.5	May 28, 1944
22.5(9)	Jun. 8, 1903
22.1	Apr. 27, 1929
21.8(9)	May 17, 1888
21.7	Apr. 25, 1952
21.6	Mar. 24, 1948
21.6(1)	Jun. 1851

DES MOINES RIVER

Des Moines, (2nd Ave.) Iowa:
Zero of gage - 773.68 feet (1929 adj.)
Drainage area - 6,245 square miles
Flood stage - 23 feet
Period of record - 1893-1965

Crest stage	Date
30.2	Jun. 24, 1954
28.7	Apr. 10, 1965
27.3(3)	May 31, 1903
26.5	Jun. 26, 1947
25.2	Apr. 1, 1960
25.2(3)	Jul. 10, 1902
24.5	May 23, 1944
24.3	Apr. 3, 1962
23.8	Mar. 31, 1951
23.7	Apr. 10, 1951

Ottumwa, Iowa:
Zero of gage - 622.00 feet (1929 adj.)
Drainage area - 13,374 square miles
Flood stage - 10 feet
Period of record - 1917-1965

Crest stage	Date
21.1(5)	Jun. 7, 1947
21.0(3)	Jun. 15, 1947
18.4(3)	Apr. 1, 1960 and May 24, 1944
18.3	Apr. 11, 1965
17.8(3)	Jun. 28, 1954
17.5(3)	Jun. 28, 1947
17.1(3)	Aug. 1, 1915
16.1(3)	Apr. 4, 1951
15.7(3)	Mar. 23, 1948 and Mar. 6, 1937

BIG SIOUX RIVER

Akron, Iowa:
Zero of gage - 1,118.90 feet
Drainage area - 9,030 square miles
Flood stage - 16 feet
Period of record - 1926-1965

Crest stage	Date
21.6	Apr. 1, 1960
20.85	Apr. 8, 1965

Table 7B.—Major floods in order of magnitude at selected stations on the Big Sioux River (cont'd), Little Sioux River, and Red River of the North.

BIG SIOUX RIVER (Cont'd.)

Akron, Iowa (Cont'd.):

Crest stage	Date
20.0	Jun. 22, 1954
19.8	Jun. 21, 1957
19.8	Apr. 1, 1952
19.7	Apr. 6, 1951
19.3	Jun. 8, 1953
19.2	Jun. 4, 1942
18.6	Mar. 12, 1936
18.6	Mar. 15, 1929

LITTLE SIOUX RIVER

Cherokee, Iowa:
Zero of gage - 1,150.0 feet
Drainage area - 2,182 square miles
Flood stage - 17 feet
Period of record - 1891-1965

Crest stage	Date
27.2	Apr. 6, 1965
25.7(8)	1891
22.7	Jun. 11, 1953
22.0	Jun. 20, 1954

RED RIVER OF NORTH

Wahpeton, N. Dak.:
Zero of gage - 942.97 feet (1929 adj.)
Drainage area - 4,010 square miles
Flood stage - 10 feet
Period of record - 1943-1965

Crest stage	Date
17.0(1)	Apr. 1897
15.0	Apr. 12, 1952
14.8(1)	Spring 1916
14.8	Apr. 2, 1943
14.3	Apr. 11, 1965
14.0	Apr. 7, 1951

RED RIVER OF NORTH (Cont'd.)

Wahpeton, N. Dak. (Cont'd.)

Crest stage	Date
12.1	Jun. 6, 1944
11.9	Apr. 12, 1947
11.6	Apr. 2, 1950
11.5	May 10, 1950

Fargo, N. Dak.:
Zero of gage - 861.80 feet (1929 adj.)
Drainage area - 6,800 square miles
Flood stage - 17 feet
Period of record - 1901-1965

Crest stage	Date
40.1(1)	Apr. 7, 1897
37.8(1)	Apr. 11, 1882
34.65	Apr. 16, 1952
34.3	Apr. 7, 1943
31.2	Apr. 6, 1916
30.5	Apr. 16, 1965
29.8	Mar. 30-31, 1907
28.9	Apr. 15, 1947
28.6	Jul. 12, 1916
27.8	Apr. 12, 1951

Grand Forks, N. Dak.:
Zero of gage - 778.35 feet (1929 adj.)
Drainage area - 30,100 square miles(6)
Flood stage - 28 feet
Period of record - 1882-1965

Crest stage	Date
50.2(7)	Apr. 10, 1897
49.5	Apr. 21, 1882
45.6	May 12, 1950
45.5	Apr. 24, 1893
44.9	Apr. 17, 1965
41.7	Apr. 16, 1948
41.0	Apr. 17, 1916
41.0	Mar. 29, 1920
40.7	Apr. 22, 1947
40.6	Apr. 27, 1904 and Apr. 28, 1883

(1) From high water mark
(2) Incomplete record, may have been higher
(3) Adjusted to present datum
(4) Also in earlier year(s)
(5) Flood of May 31, 1903, may have reached 23.0 feet
(6) Includes 3,800 sq. mi. in closed basins in North Dakota
(7) Legendary flood of 1852 probably was higher by 0.3 foot or more
(8) Prior to gage record
(9) Stage referred to gage datum and site then in use

Table 8.—April 1965 flood damages on Minnesota, St. Croix, Chippewa, and Upper Mississippi Rivers (compiled by St. Paul District, U.S. Corps of Engineers).

KEY TO COLUMN SUB-HEADINGS

(a) Physical damage
(b) Income, wages and other losses

Location	Industrial & Commercial (a)	Industrial & Commercial (b)	Residential (a)	Public (a)	Emergency Protection Evacuation, Rehabilitation Relief	Total Damages	Units Affected	Lives Lost
Mankato & No. Mankato, Minn.	$ 2,010,000	$ -	$ 1,484,000	$ 1,056,000	$ 2,365,000	$ 6,915,000	-	0
Carver, Minn.	91,000	-	234,000	2,000	-	327,000	68	0
Chaska, Minn.	100,000	-	995,000	369,000	242,000	1,706,000	232	0
Shakopee, Minn.	40,000	-	-	115,000	10,000	165,000	0	0
Savage, Minn.	2,945,000	-	-	10,000	450,000	3,405,000	0	0
Stillwater, Minn.	1,849,000	-	1,089,000	1,339,000	1,351,000	5,428,000	273	0
Durand, Wis.	23,000	-	-	-	-	23,000	0	0
Aitkin, Minn.	-	-	109,000	-	3,000	112,000	-	-
St. Paul, Minn.	2,713,000	-	-	870,000	509,000	4,092,000	0	1
Minneapolis, Minn.	-	76,000	-	108,000	85,000	269,000	-	0
Hastings, Nebr.								
Mississippi River	-	-	48,000	0	0	48,000	10	0
Vermillion River	23,000	-	660,000	20,000	23,000	726,000	302	0
Red Wing, Minn.	369,000	-	174,000	25,000	40,000	608,000	-	0
Lake City, Minn.	6,000	-	131,000	13,000	17,000	167,000	57	-
Wabasha, Minn.	60,000	-	248,000	12,000	30,000	350,000	139	0
Winona, Minn.	3,140,000	-	6,067,000	425,000	1,000,000	10,632,000	-	0
LaCrosse, Wis.	4,900,000	-	1,273,000	732,000	691,000	7,596,000	480	1
Lansing, Iowa	80,000	-	25,000	2,000	-	107,000	-	0
Prairie du Chien, Wis.	953,000	-	447,000	221,000	278,000	1,899,000	290	1
McGregor, Iowa	35,000	-	41,000	2,000	37,000	115,000	10	0
Guttenberg, Iowa	488,000	-	716,000	140,000	143,000	1,487,000	386	0
Totals	$19,625,000	$76,000	$13,741,000	$ 5,461,000	$ 7,274,000	$46,177,000	2,247	3

Table 9A.—April-May 1965 Upper Mississippi River flood damages (compiled by Rock Island District, U.S. Corps of Engineers).

KEY TO COLUMN SUB-HEADINGS

(a) Physical damage
(b) Income, wages and other losses
(c) Flood fighting, evacuation and reoccupation costs
(d) Crop and property damage and other losses

CITIES, TOWNS AND URBANIZED AREAS

Location	Industrial and Commercial (a)	Industrial and Commercial (b)	Industrial and Commercial (c)	Residential (a)	Residential (c)	Public (a)	Public (c)	Total Damages	Est. Damages Saved Due to Flood Warnings	Persons Displaced
Cassville, Wis.	$ 14,700	$ 45,300	$ 28,700	$ 72,200	$ 66,500	$ 22,800	$ 53,500	$ 303,700	$ 410,000	220
East Dubuque, Ill.	26,400	59,000	26,300	139,800	135,100	193,400	469,100	1,049,100	450,000	561
Dubuque, Iowa	2,033,700	2,034,400	1,243,600	27,300	41,400	333,200	1,940,400	7,654,000	19,048,000	157
Galena, Ill.	6,800	12,300	900	400	1,000	-	5,700	27,100	7,000	-
Bellevue, Iowa	18,700	10,900	6,200	-	-	900	1,600	38,300	43,000	-
Green Island, Iowa	200	-	500	4,900	6,300	-	-	11,900	-	28
Sabula, Iowa	1,200	16,800	5,400	33,100	23,000	12,500	93,400	185,400	16,000	242
Savanna, Ill.	79,700	47,700	54,100	6,900	8,200	-	24,100	220,700	389,000	-
Fulton, Ill.	221,400	251,200	130,900	370,500	305,900	193,900	216,700	1,690,500	1,521,000	1,475
East Fulton, Ill.	112,750	8,000	30,400	177,600	100,150	950	150	430,000	79,900	448
East Clinton, Ill.	95,000	218,500	30,000	16,500	17,300	900	200	378,400	1,018,000	56
Clinton, Ill.	969,100	1,520,800	1,177,100	414,700	432,700	71,200	708,600	5,294,200	9,471,000	1,349
Camanche, Iowa	159,900	874,700	453,400	28,100	32,700	34,100	58,200	1,641,100	5,267,000	4
Albany, Ill.	800	5,000	600	19,700	12,600	11,800	3,000	53,500	-	45
Cordova, Ill.	300	200	200	6,600	3,100	100	-	10,500	-	12
Princeton, Iowa	14,950	19,400	14,000	12,500	21,900	16,300	21,300	120,350	192,000	15
Leclaire, Iowa	2,400	900	2,500	5,100	2,000	-	-	12,900	2,500	5
Port Byron, Ill.	100	100	3,600	20,200	13,000	1,000	3,900	41,900	-	50
Rapids City, Ill.	4,200	-	100	36,200	15,100	2,500	1,200	53,300	-	56
Hampton, Ill.	5,000	5,400	7,900	38,900	31,300	5,700	27,500	121,700	56,000	94
Pleasant Valley, Iowa	-	300	9,300	219,300	95,500	-	8,600	333,000	-	739
Riverdale, Iowa	1,200	4,300	130,200	-	-	-	-	135,700	950,000	-
Bettendorf, Iowa	27,200	258,300	316,700	-	13,000	61,800	496,000	1,170,900	10,988,000	40
Campbells Island, Ill.	67,000	18,600	5,700	317,000	117,400	400	11,900	538,000	-	463
East Moline, Ill.	48,150	57,100	663,700	169,300	382,600	105,800	214,700	1,621,350	31,615,000	2,537
Moline, Ill.	106,300	321,800	703,300	38,100	31,800	86,500	232,200	1,520,000	15,486,000	145
Rock Island, Ill.	376,900	1,797,200	430,300	35,300	25,800	196,000	491,600	3,353,100	16,884,000	97
Milan, Ill.	-	-	5,400	-	-	77,700	62,800	140,900	600,000	0
Davenport, Iowa	425,200	883,600	783,600	492,100	253,400	332,400	653,700	3,824,000	26,232,000	1,318
Smiths Island, Ill.	-	-	-	139,000	7,000	-	7,765	153,765	-	125
Big Island, Ill.	10,600	900	2,100	206,400	63,200	3,200	43,700	330,000	-	323
Linwood, Iowa	-	-	500	-	-	-	870	1,370	-	-
Buffalo, Iowa	20,900	9,500	4,600	17,600	16,100	60,230	38,280	167,210	-	63
Andalusia, Ill.	17,300	10,400	6,500	31,100	20,600	35,500	65,000	186,400	103,000	40
Fairport, Iowa	-	-	-	4,500	5,000	-	-	9,500	-	23
Muscatine, Iowa	51,100	47,400	186,200	37,400	12,400	116,200	177,675	628,375	223,000	40
New Boston, Ill.	-	15,000	300	-	-	-	-	15,300	-	-
Keithsburg, Ill.	97,900	52,400	30,400	45,200	34,200	76,600	60,300	397,000	100,000	123
Oquawka, Ill.	53,100	5,100	6,900	7,300	3,800	5,100	26,200	107,500	-	13
Gulfport, Ill.	157,800	127,000	23,600	132,500	155,500	7,500	19,400	623,300	-	72

Table 9B.—April-May 1965 Upper Mississippi River flood damages (cont'd).

Location	Industrial and Commercial (a)	(b)	(c)	Residential (a)	(c)	Public (a)	(c)	Total Damages	Est. Damages Saved Due to Flood Warnings	Persons Displaced
Burlington, Iowa	$ 132,800	$ 147,700	$ 100,500	$ -	$ 1,000	$ 31,800	$ 16,300	$ 430,100	$ 415,000	-
Dallas City, Ill.	2,000	500	300	1,500	300	-	2,400	7,000	-	-
Pontoosuc, Ill.	-	-	-	15,800	8,400	3,200	500	27,900	-	-
Niota, Ill.	-	-	-	-	-	-	31,855	31,855	56,000	-
Ft. Madison, Iowa	19,100	14,100	29,900	-	-	-	3,000	66,100	81,000	-
Nauvoo, Ill.	-	-	-	-	-	2,500	-	2,500	-	-
Montrose, Iowa	-	-	-	100	200	-	600	900	-	-
Keokuk, Iowa	53,900	451,600	101,700	-	-	-	14,400	621,600	4,500,000	-
Hamilton, Ill.	-	9,000	2,300	500	1,600	2,000	11,100	26,500	-	-
Warsaw, Ill.	1,000	800	5,300	-	-	1,000	1,000	9,100	-	-
Alexandria, Mo.	-	700	50	-	70,000	-	6,500	77,250	-	425
Canton, Mo.	1,100	6,300	700	-	-	-	6,500	14,600	-	-
La Grange, Mo.	49,300	195,000	30,000	300	6,300	-	10,200	291,100	100,000	27
Quincy, Ill.	98,100	84,200	154,100	-	-	3,000	27,300	366,700	289,000	-
Hannibal, Mo.	263,400	251,000	117,800	37,000	68,700	16,300	120,100	874,300	2,797,000	224
Totals	$5,848,450	$9,898,400	$7,068,350	$3,378,500	$2,643,050	$2,125,980	$6,490,995	$37,453,725	$154,389,400	11,654

ORGANIZED LEVEE AND DRAINAGE DISTRICTS

LEGEND

(1) District flooded because of levee failure
(2) Louisa County Drainage District No. 8 flooded because of levee failure

Levee District	Crop Damage	Property Damage	Flood Fighting Costs	Other Damages	Total Damages	Flooded Area (Acres)	Est. Damages Saved Due to Flood Warnings	Persons Displaced
Green Island Levee & Drainage Dist. (1)	$ 323,650	$ 43,500	$ 0	$ 1,500	$ 368,650	7,219	$ 0	0
Savanna & York Drainage Dist. (1)	46,920	5,000	600	4,000	56,520	3,338	0	0
Johnson Creek Levee & Drainage Dist. (1)	172,830	6,430	4,300	1,000	184,560	3,211	0	0
Cat Tail Drainage Dist. (1)	277,980	153,850	15,700	47,450	494,980	5,979	0	0
Meredosia Levee & Drainage Dist.	0	2,500	112,600	124,530	239,630	0	1,826,000	31
Drury Drainage Dist.	0	5,850	3,000	0	8,850	0	0	0
Muscatine Island Levee Dist.	208,670	10,980	625,980	130,890	976,520	7,164	4,700,000	0
Bay Island Drainage & Levee Dist.) Sub-Dist. No. 1 of Drainage Union No.1)	0	43,500	65,700	6,700	115,900	0	1,351,200	0
Iowa River-Flint Creek Levee Dist. No. 16(2)	205,380	486,100	149,700	226,320	1,067,500	3,800	2,162,000	282
Henderson County Drainage Dist. No. 3 (1)	98,020	19,070	56,970	109,850	283,910	2,186	0	24
Henderson County Drainage Dist. No. 1 (1)	290,900	258,900	116,080	809,240	1,475,120	6,183	0	18
Henderson County Drainage Dist. No. 2 (1)	374,870	360,150	103,300	229,400	1,067,720	6,970	0	0
Green Bay Levee & Drainage Dist. No. 2	0	21,900	8,900	4,800	35,600	0	907,200	0
Des Moines & Mississippi Levee Dist. No. 1	109,000	400	23,800	0	133,200	2,346	1,650,800	0
Mississippi & Fox River Drainage Dist.	83,800	28,500	13,400	0	125,700	4,040	161,100	0
Hunt Drainage Dist.	98,160	0	1,000	400	99,560	3,442	0	0
Lima Lake Drainage Dist.	108,820	0	13,640	800	123,260	2,925	0	0
Gregory Drainage Dist.	85,020	3,500	52,800	350	141,670	2,499	950,000	0
Indian Grave Drainage Dist. (1)	980,840	1,500,950	66,650	120,190	2,668,630	17,777	0	300
Union Township Drainage Dist.	98,700	0	81,800	6,000	186,500	2,081	159,000	0
South Quincy Drainage & Levee Dist. (1)	231,260	481,530	33,810	372,800	1,119,400	5,045	0	150
Fabius River Drainage Dist.	134,490	0	1,750	0	136,240	6,484	0	0
Marion County Drainage Dist.	21,710	0	177,350	0	199,060	620	359,500	0
South River Drainage Dist.	41,460	0	21,325	0	62,785	1,150	780,300	0
Sny Island Levee Drainage Dist.	1,815,900	43,610	160,630	12,130	2,032,270	44,071	4,998,100	0
Totals	$5,808,380	$3,478,220	$1,910,785	$2,208,350	$13,403,735	138,530	$20,005,200	805

Table 9C.—April-May 1965 Upper Mississippi River flood damages (cont'd).

UNPROTECTED RURAL AREAS (DAMAGES IN HUNDREDS OF DOLLARS)

KEY TO COLUMN SUB-HEADINGS

(a) Physical damage
(b) Income, wages and other losses
(c) Flood fighting, evacuation and reoccupation costs
(d) Crop and property damage and other losses
(e) Number of persons displaced
(f) Number of units

Location	Industrial & Commercial (a)	(c)	(b)	Residential (a)	(c)	(e)	(f)	Public Prop. & Relief Agencies (a)	(c)	Railroads (a)	(c)	(b)	Highways (a)	(c)	Locks & Dams (a)	(c)	Camps (a)	Farms (d)	Total Damages
Pool No. 11	$ -	$ -	$ -	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 415	$ 15	$ -	$ -	$ 430
Wisconsin	-	-	-	-	-	-	-	23	-	344	88	227	5	-	-	-	-	-	687
Sub-total	-	-	-	-	-	-	-	23		344	88	227	5		415	15			1,117
Pool No. 12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	185	371	-	-	556
Wisconsin	-	-	-	-	-	-	-	-	-	-	-	-	126	24	-	-	-	-	150
Illinois	363	61	127	491	413	13	48	4	-	344	88	227	-	-	-	-	88	-	2,206
Iowa	-	-	-	144	93	-	42	-	-	-	-	-	-	-	-	-	-	-	237
Sub-total	363	61	127	635	506	13	90	4	-	344	88	227	126	24	185	371	88	-	3,149
Pool No. 13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	470	310	-	-	780
Illinois	204	15	9	276	180	58	43	288	1,091	344	88	227	45	10	-	-	-	-	2,777
Iowa	-	-	-	109	23	-	9	27	-	-	-	-	34	13	-	-	-	-	206
Sub-total	204	15	9	385	203	58	52	315	1,091	344	88	227	79	23	470	310	-	-	3,763
Pool No. 14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	26	-	-	28
Illinois	12	11	3	920	177	71	184	17	-	-	-	-	1,473	10	-	-	11	-	2,634
Iowa	154	28	2	1,601	568	177	134	-	12	500	50	-	106	41	-	-	8	-	3,070
Sub-total	166	39	5	2,521	745	248	318	17	12	500	50	-	1,579	51	2	26	19	-	5,732
Pool No. 15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	5
Illinois	-	-	-	15	60	21	12	2,105	6,230	-	-	-	3	10	-	-	-	-	8,423
Iowa	-	558	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	558
Sub-total	-	558	-	15	60	21	12	2,105	6,230	-	-	-	3	10	-	5	-	-	8,986
Pool No. 16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	-	-	37
Illinois	34	11	6	609	232	73	51	18	-	634	-	-	-	14	-	-	-	-	1,558
Iowa	-	-	160	1,393	453	81	121	45	18	-	-	-	2	-	-	-	22	-	2,093
Sub-total	34	11	166	2,002	685	154	172	63	18	634	-	-	2	14	-	37	22	-	3,688
Pool No. 17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	137	-	-	137
Illinois	-	-	-	-	-	-	-	23	-	-	-	-	-	10	-	-	-	-	33
Iowa	-	-	-	-	-	-	-	709	-	-	-	-	-	-	-	-	-	-	709
Sub-total	-	-	-	-	-	-	-	732	-	-	-	-	-	10	-	137	-	-	879
Pool No. 18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	-	-	48
Illinois	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	55	62
Iowa	-	-	-	-	-	-	-	27	-	-	-	-	689	-	-	-	-	-	716
Sub-total	-	-	-	-	-	-	-	27	-	-	-	-	689	7	-	48	-	55	826
Pool No. 19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Illinois	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	7
Iowa	-	-	-	1,510	162	-	108	-	-	326	330	505	-	-	-	-	-	-	2,833
Sub-total	-	-	-	1,510	162	-	108	-	-	326	330	505	-	7	-	-	-	-	2,840
Pool No. 20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Illinois	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	7
Iowa	-	-	-	-	-	-	-	-	-	50	-	-	3	-	-	-	-	-	53
Missouri	21	5	292	4	6	3	1	14	17	326	330	505	72	58	-	-	-	-	1,650
Sub-total	21	5	292	4	6	3	1	14	17	376	330	505	75	65	-	-	-	-	1,710

Table 9D.—April-May 1965 Upper Mississippi River flood damages (cont'd).

Location	Industrial & Commercial (a)	(c)	(b)	Residential (a)	(c)	(e)	(f)	Public Prop. & Relief Agencies (a)	(c)	Railroads (a)	(c)	(b)	Highways (a)	(c)	Locks & Dams (a)	(c)	Camps (a)	Farms (d)	Total Damages
Pool No. 21	$ -	$ -	$ -	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 180	$ -	$ -	$ 180
Illinois	-	-	-	-	-	-	-	-	-	326	330	505	-	7	-	-	-	-	1,168
Missouri	-	-	-	-	-	-	-	-	-	-	-	-	-	41	-	-	-	-	41
Sub-total	-	-	-	-	-	-	-	-	-	326	330	505	-	48	-	180	-	-	1,389
Pool No. 22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Illinois	-	-	-	-	-	-	-	19	-	423	345	539	-	7	-	-	-	-	1,333
Missouri	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	8
Sub-total	-	-	-	-	-	-	-	19	-	423	345	539	-	15	-	1	-	-	1,342
Pool No. 24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Missouri	-	-	-	-	-	-	-	1	-	326	330	505	-	-	-	-	-	-	1,162
Sub-total	-	-	-	-	-	-	-	1	-	326	330	505	-	-	-	-	-	-	1,162
SUMMARY																			
Wisconsin	-	-	-	-	-	-	-	23	-	344	88	227	131	24	-	-	-	-	837
Illinois	613	98	145	2,311	1,062	236	338	2,474	7,321	2,071	851	1,498	1,521	89	-	-	99	55	20,208
Iowa	154	586	162	4,757	1,299	258	414	808	30	876	380	505	834	54	-	-	30	-	10,475
Missouri	21	5	292	4	6	3	1	15	17	652	660	1,010	72	107	-	-	-	-	2,861
Total States	788	689	599	7,072	2,367	497	753	3,320	7,368	3,943	1,979	3,240	2,558	274	-	-	129	55	34,381
Locks & Dams	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,072	1,130	-	-	2,202
Navigation) Interests)	-	-	5,753	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,753
Total	$788	$689	$6,352	$7,072	$2,367	497	753	$3,320	$7,368	$3,943	$1,979	$3,240	$2,558	$274	$1,072	$1,130	$129	$55	$42,336

RECAP SUMMARY

	(a)	(b)	(c)	Crop Damage	Total Damage	Estimated Damages Saved Due to Flood Warnings	People Evacuated
CITIES, TOWNS & URBANIZED AREAS							
Industrial & Commercial	$ 5,848,450	$ 9,898,400	$ 7,068,350	$ -	$22,815,200	$ -	-
Residential	3,378,500	-	2,643,050	-	6,021,550	-	-
Public & Relief Agencies	2,125,980	-	6,490,995	-	8,616,975	-	-
Sub-totals	$11,352,930	$ 9,898,400	$16,202,395	-	$37,453,725	$154,389,400	11,654
ORGANIZED LEVEE & DRAINAGE DISTRICTS							
Twenty Six Districts	$ 3,476,220	$ 2,208,350	$ 1,910,785	$5,808,380	$13,403,735	$ 20,005,200	805
UNPROTECTED RURAL AREAS							
Industrial & Commercial	$ 78,800	$ 59,900	$ 68,900	$ -	$ 207,600	$ -	-
Residential	707,200	-	236,700	-	943,900	-	-
Public & Relief Agencies	332,000	-	736,800	-	1,068,800	-	-
Railroads	394,300	324,000	197,900	-	916,200	-	-
Highways	255,800	-	27,400	-	283,200	-	-
Locks & Dams	107,200	-	113,000	-	220,200	-	-
Camps	12,900	-	-	-	12,900	-	-
Farms	-	-	-	5,500	5,500	-	-
Navigation Interests	-	575,300	-	-	575,300	-	-
Sub-totals	$ 1,888,200	$ 959,200	$ 1,380,700	$ 5,500	$ 4,233,600	$ -	497
Totals for Rock Island District	$16,717,350	$13,065,950	$19,493,880	$5,813,880	$55,091,060	$174,394,600	12,956

Table 10.—March-April 1965 Iowa-Cedar River flood damages (compiled by Rock Island District, U.S. Corps of Engineers).

KEY TO COLUMN SUB-HEADINGS

(a) Physical damage
(b) Income, wages and other losses
(c) Flood fighting, evacuation and reoccupation costs

Location	Flood Month	Industrial and Commercial (a)	Industrial and Commercial (b)	Industrial and Commercial (c)	Residential (a)	Residential (c)	Public (a)	Public (c)	Total Damages	Persons Displaced	Units Affected
Iowa Falls, Iowa	April	$ 17,235	$ 21,470	$ 6,010	$ 8,085	$ 4,635	$ 8,125	$ 9,460	$ 75,020	29	15
Marshalltown, Iowa	April	50	720	235	0	4,385	32,900	53,630	91,920	66	22
Tama, Iowa	April	200	750	50	-	2,010	7,840	655	11,505	81	23
Chelsea, Iowa	April	1,920	1,810	4,000	6,825	10,250	585	970	26,360	0	125
Austin, Minn.	March	185,710	63,530	22,800	101,020	25,350	31,275	16,265	445,950	438	200
Austin, Minn.	April	100	0	1,985	375	3,225	0	0	5,685	74	71
Charles City, Iowa	March	3,070	1,020	2,375	16,765	21,790	9,835	8,165	63,020	322	147
Charles City, Iowa	April	245	915	2,935	10,310	21,900	6,145	5,790	48,240	343	205
Nashua, Iowa	March	0	0	1,000	500	300	0	300	2,100	0	-
Nashua, Iowa	April	500	0	200	0	700	0	1,500	2,900	0	6
Waverly, Iowa	April	620	65	1,350	165	430	10,400	5,735	18,765	8	10
Cottage Row, Iowa	April	0	0	0	23,040	6,535	100	25	29,700	17	46
North Cedar, Iowa	April	6,850	7,340	9,260	8,750	11,870	75	12,565	56,710	327	86
Cedar City, Iowa	April	0	0	0	6,440	5,415	225	115	12,195	121	30
Cedar Falls, Iowa	April	12,015	34,610	26,100	14,510	34,500	32,550	16,115	170,400	399	162
Sherwood Park, Iowa	April	0	0	0	25,095	32,500	0	4,600	62,195	237	118
Waterloo, Iowa	April	35,990	133,710	124,415	35,870	83,770	123,010	187,955	724,720	831	518
Evansdale, Iowa	April	500	485	1,530	2,120	4,445	29,985	82,115	121,180	58	38
Rockford, Iowa	April	0	0	0	155	230	2,790	425	3,600	6	10
Greene, Iowa	March	95	1,670	1,015	260	1,505	4,275	0	8,820	18	11
Greene, Iowa	April	1,395	2,200	2,330	885	2,120	24,225	4,035	37,190	20	15
Shell Rock, Iowa	April	0	0	0	430	520	4,640	225	5,815	5	6
Cedar Rapids, Iowa	April	-	-	-	-	-	-	159,000	159,000	-	-
Totals		$266,495	$270,295	$207,590	$261,600	$278,385	$328,980	$569,645	$2,182,990	3,400	1,864
Rural Flood Damages – Roads, fences, etc.									$ 500,000		
Total									$2,682,990		

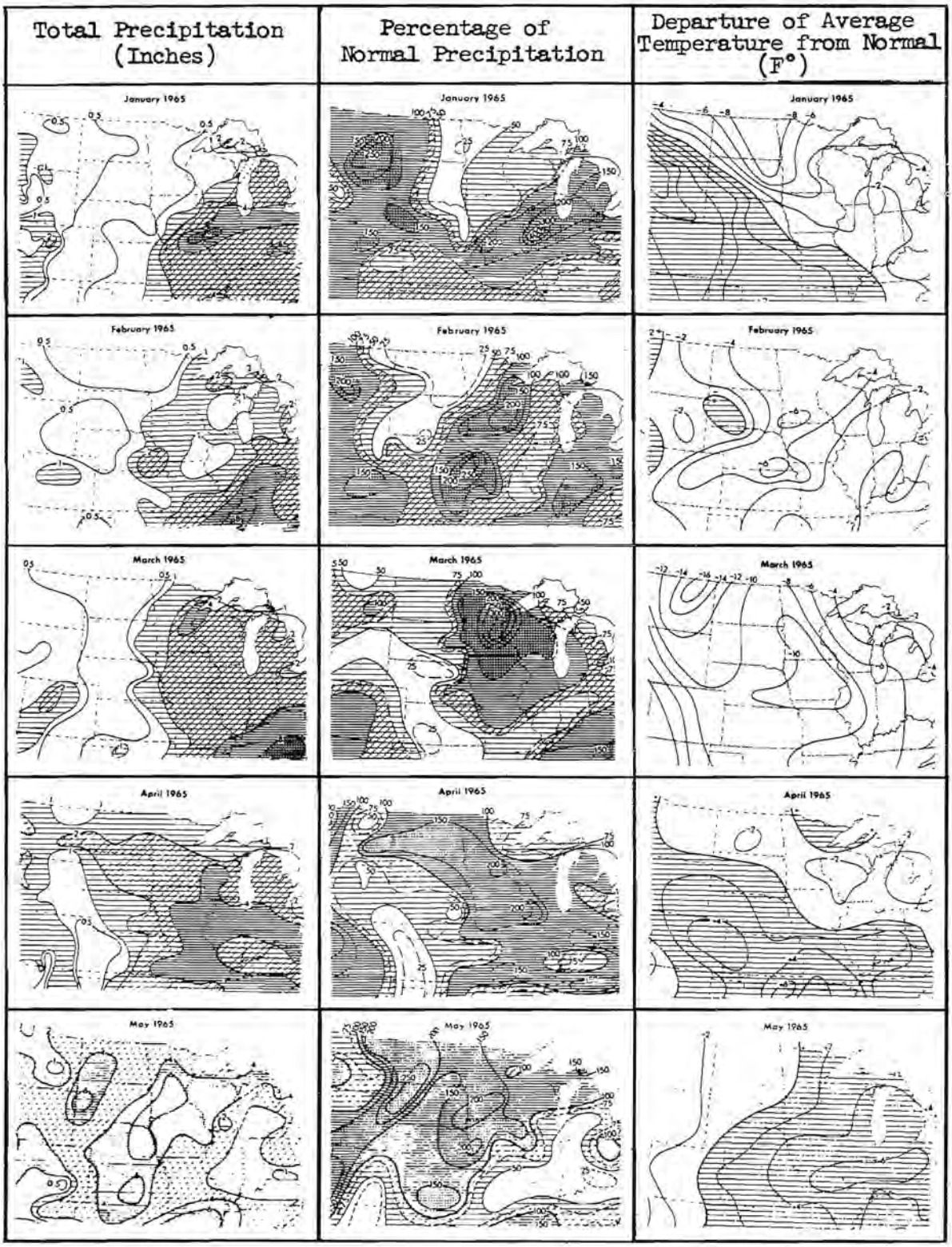


FIGURE 1.—Total monthly precipitation (in.), percent of normal, and departure of average temperature from normal (° F.), January-May 1965.

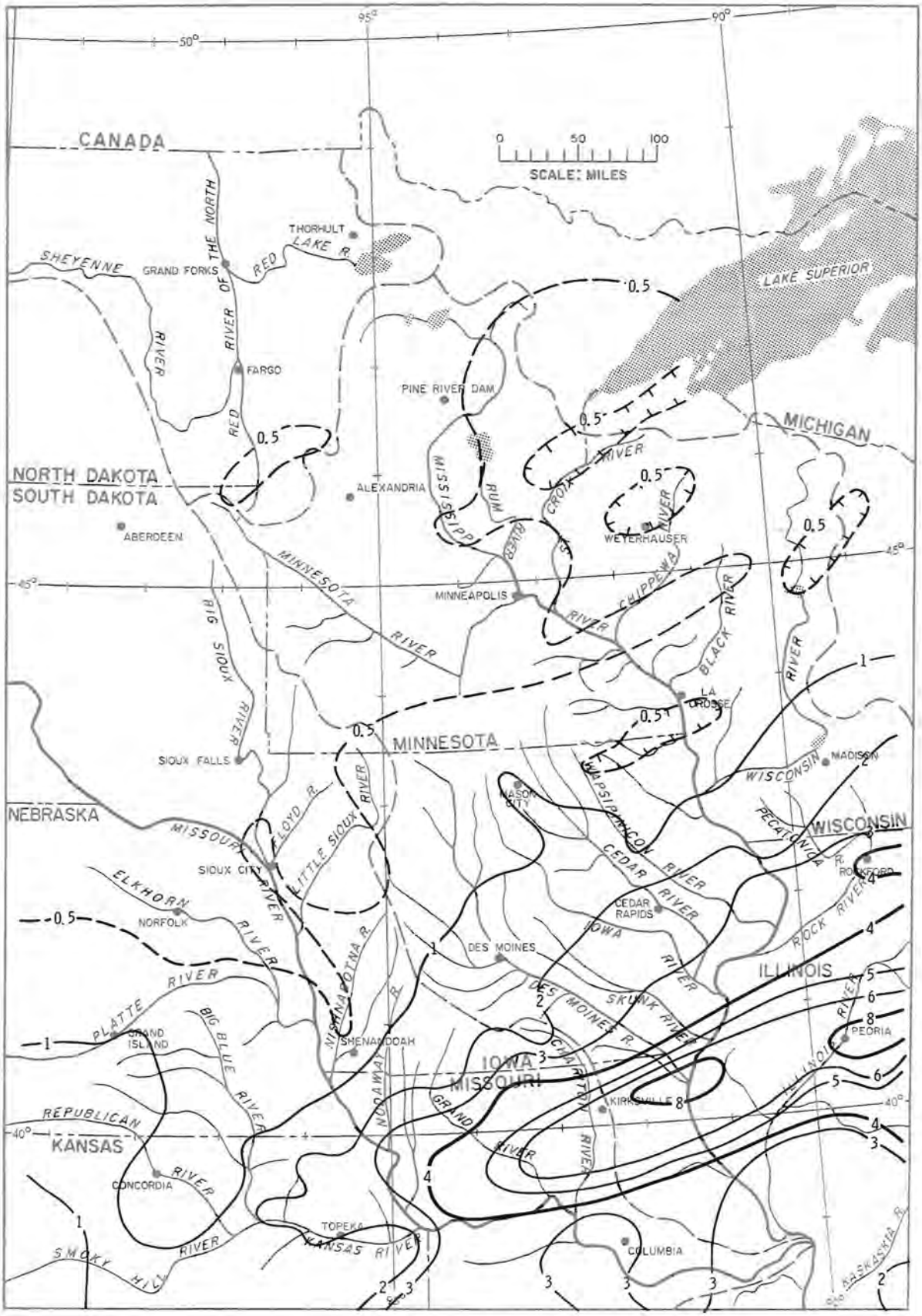


FIGURE 2A.—Total monthly precipitation—January.

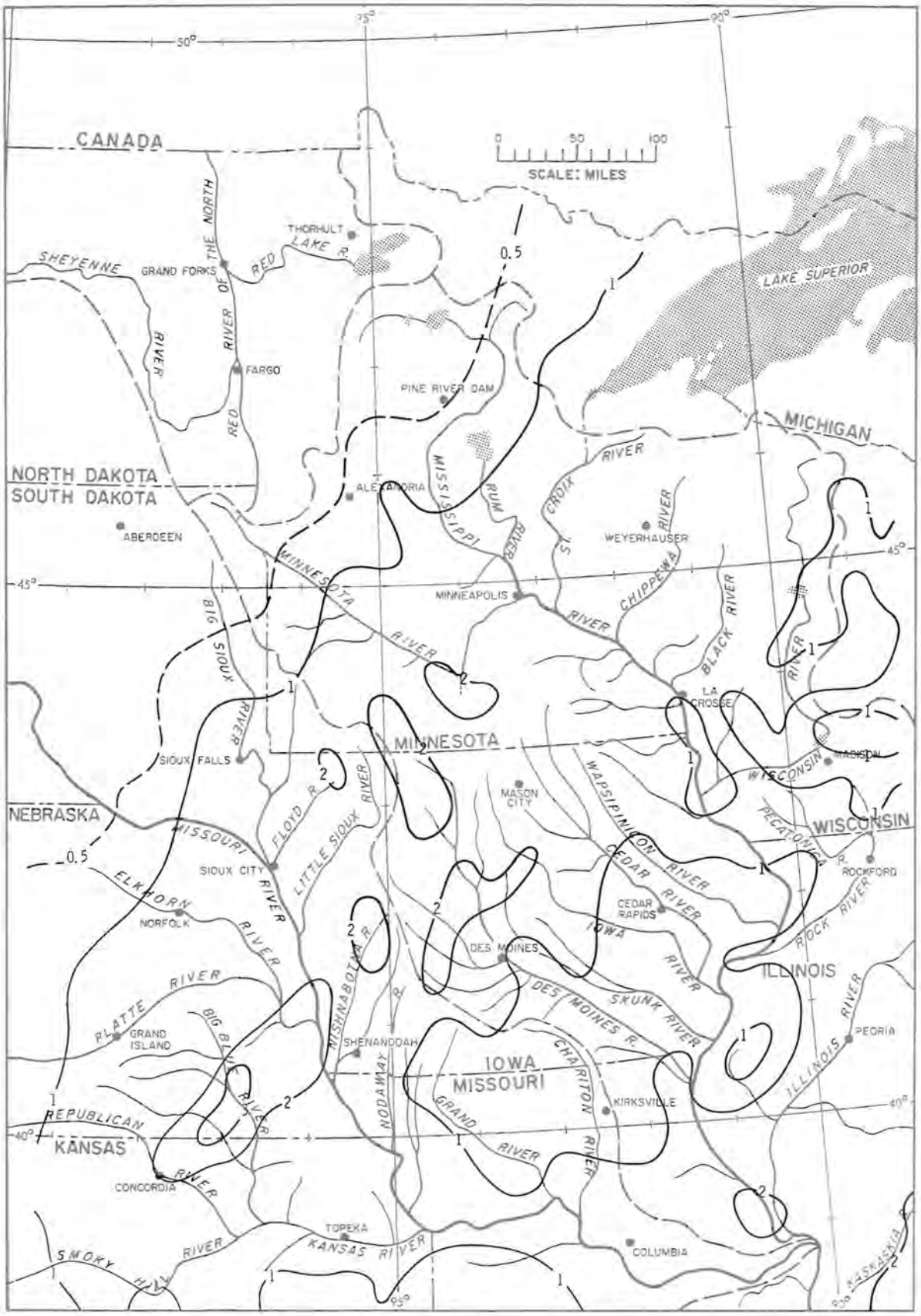


FIGURE 2B.—Total monthly precipitation—February.

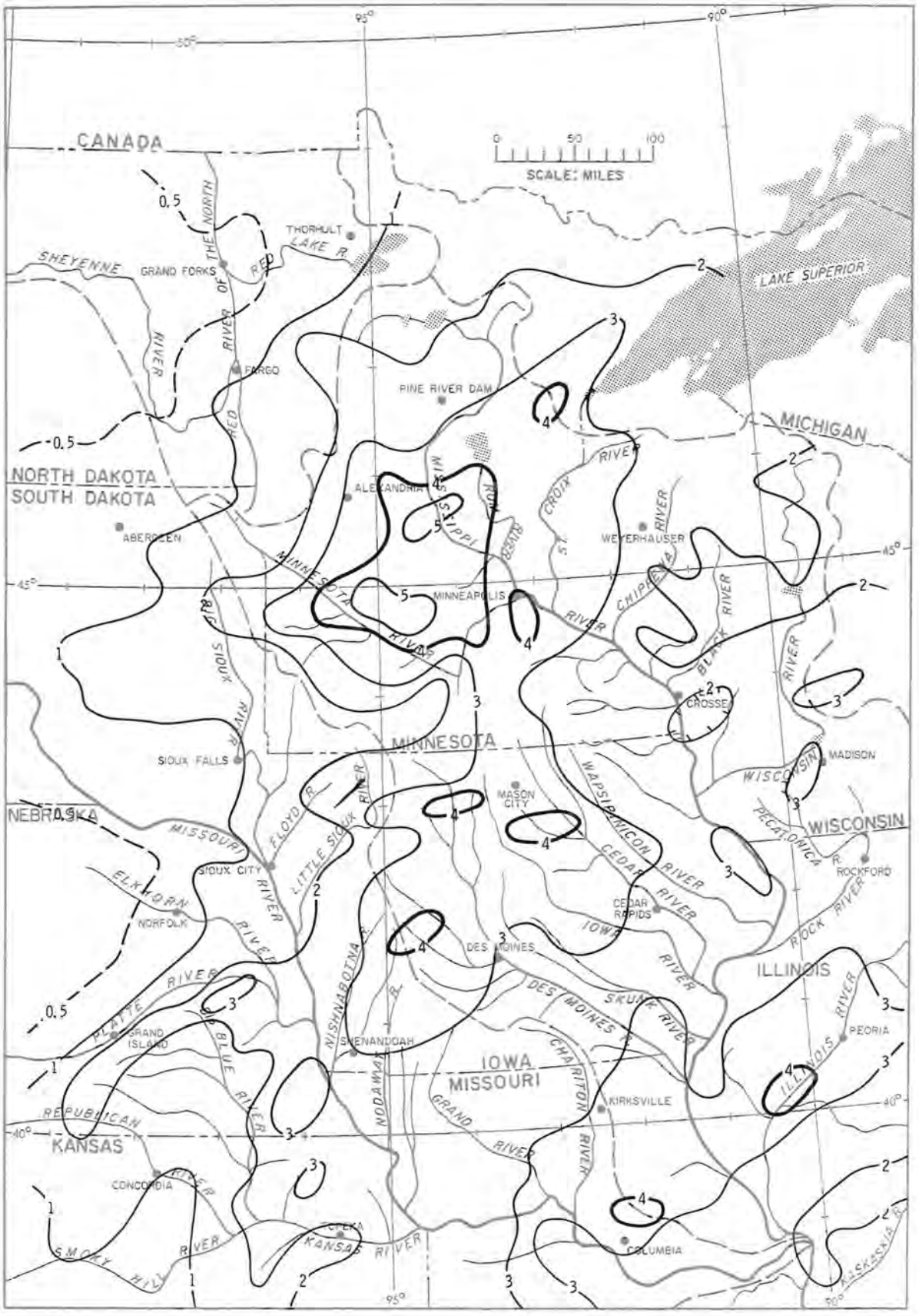


FIGURE 2C.—Total monthly precipitation—March.

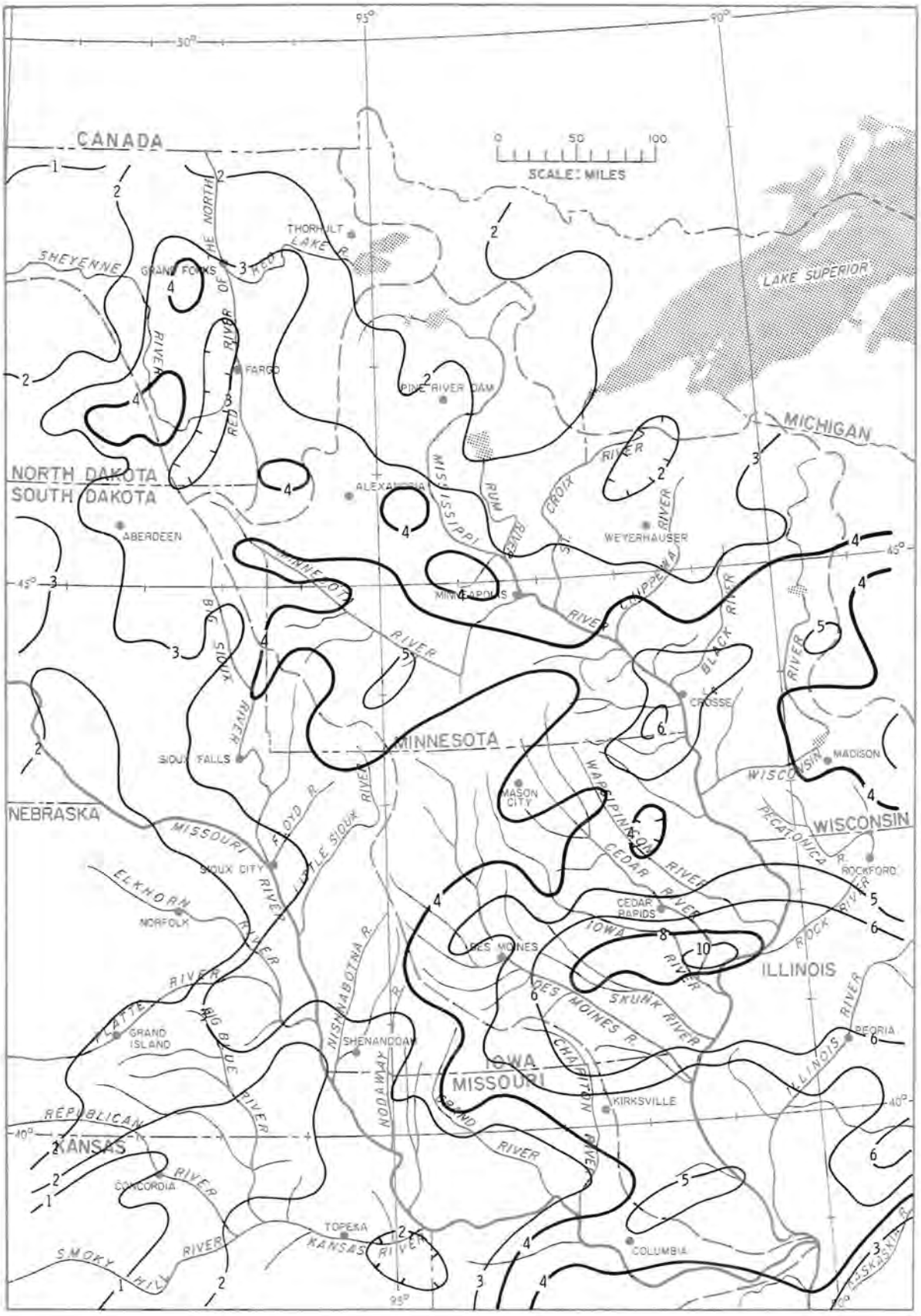


FIGURE 2D.—Total monthly precipitation—April.

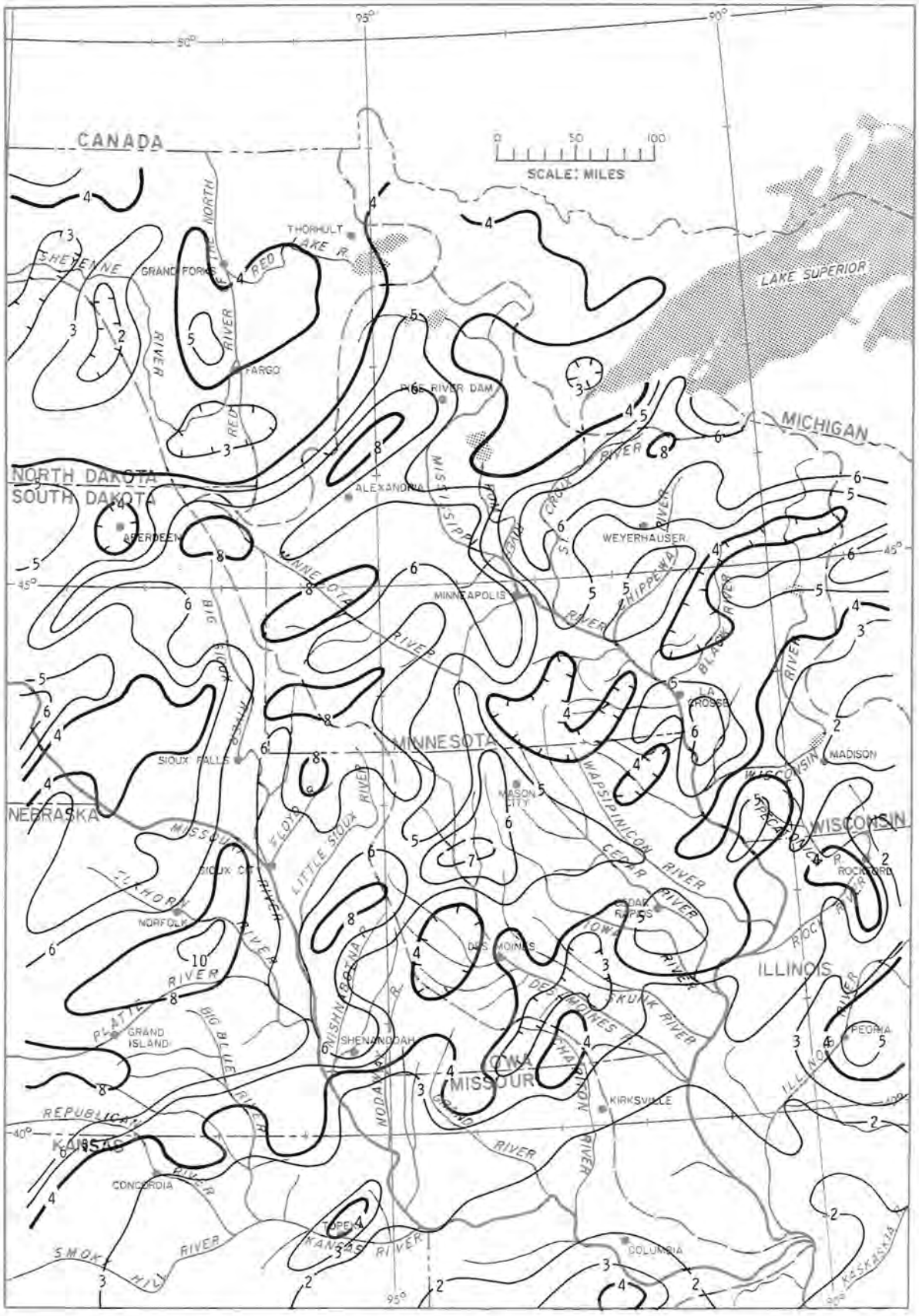


FIGURE 2E.—Total monthly precipitation—May.

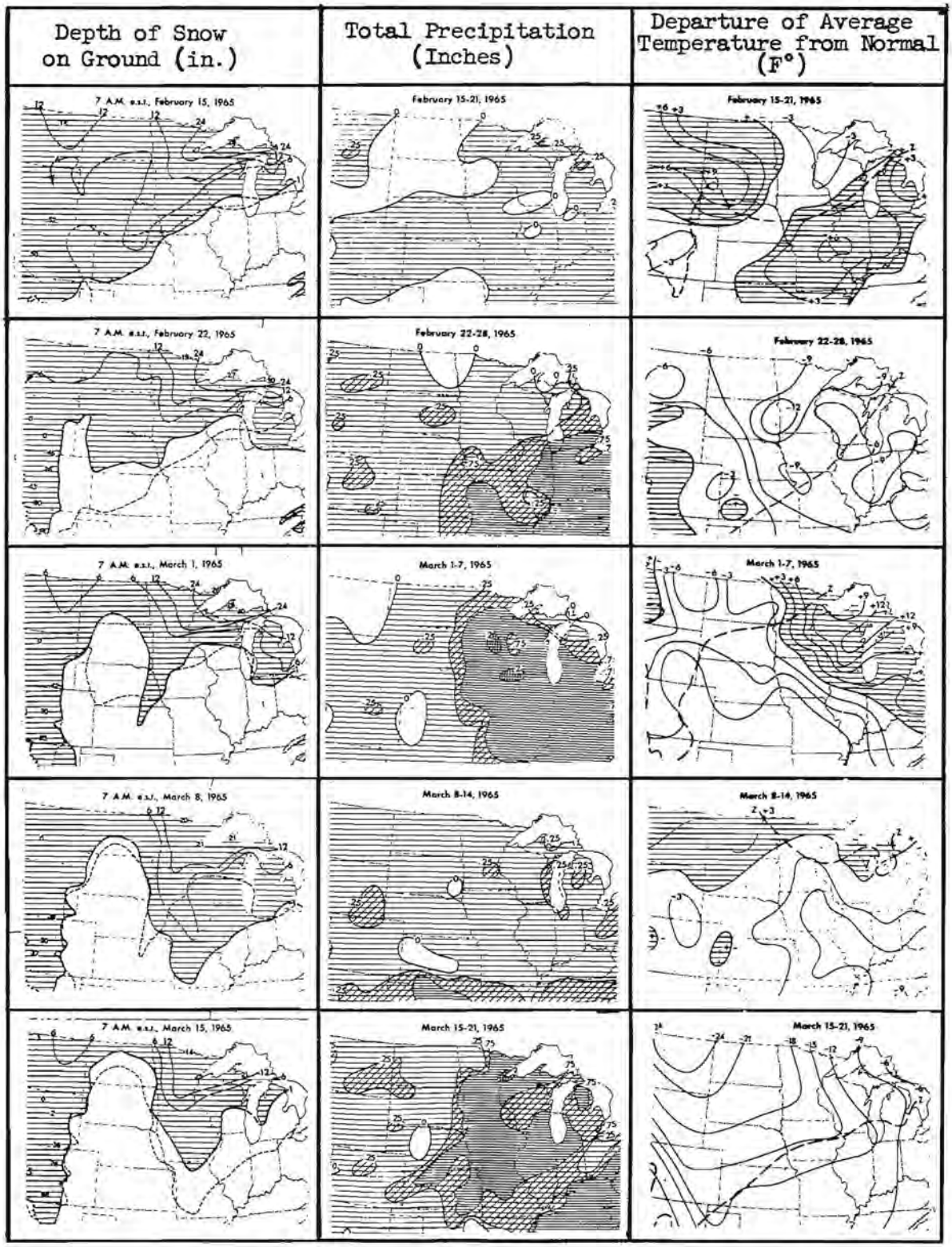


FIGURE 3A.—Weekly depth of snow on ground, total precipitation, and departure of average temperature from normal—February 15 to March 21.

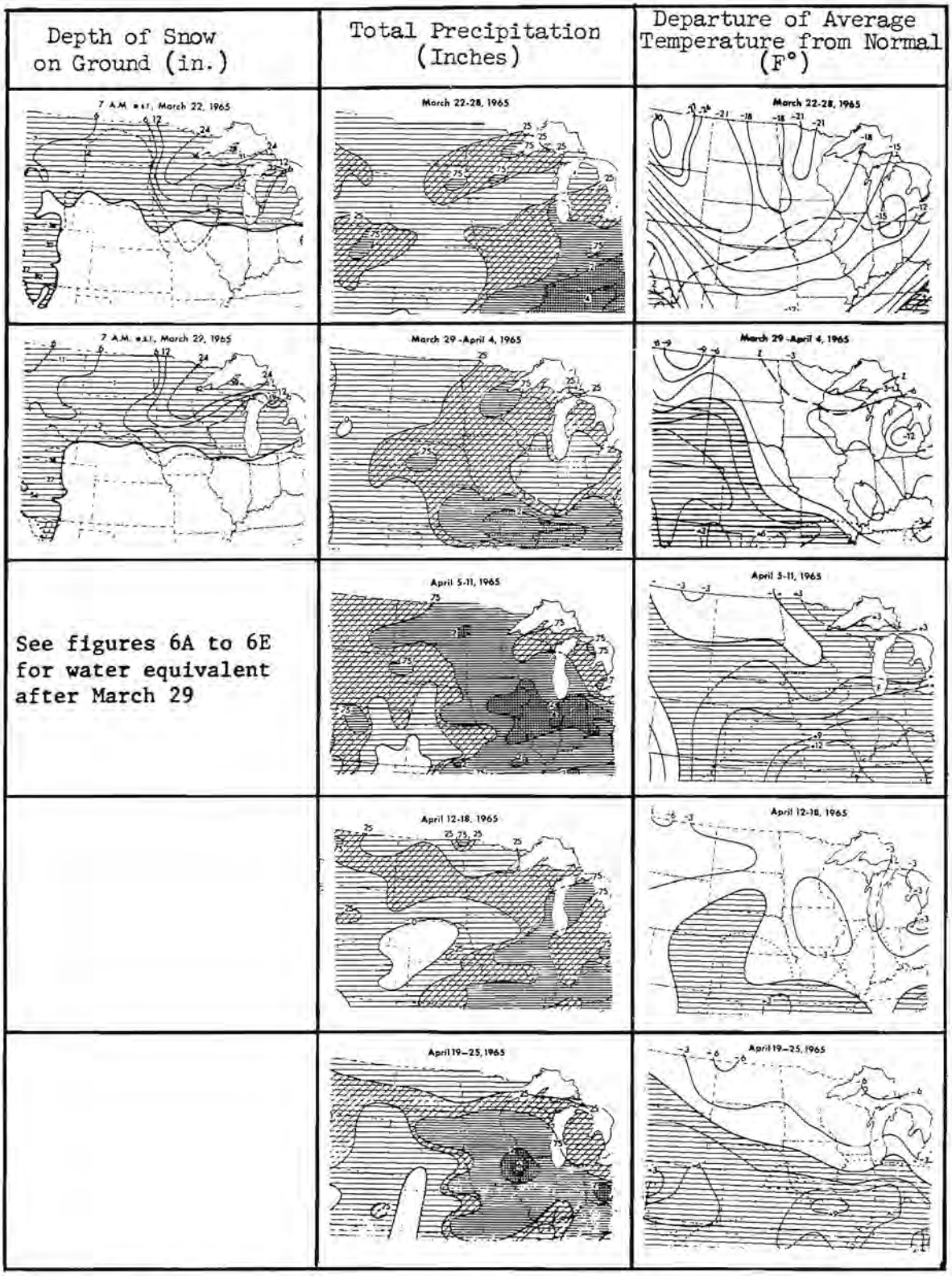


FIGURE 3B.—Weekly depth of snow on ground, total precipitation, and departure of average temperature from normal—March 22 to April 25.

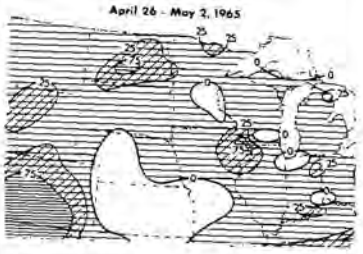
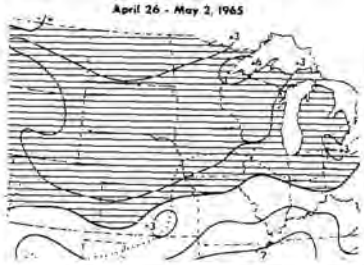
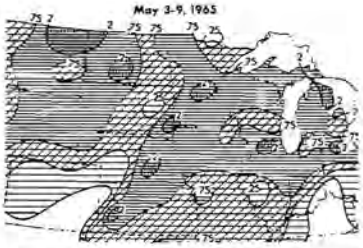
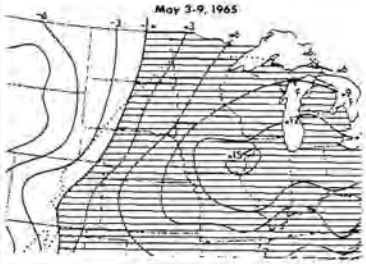
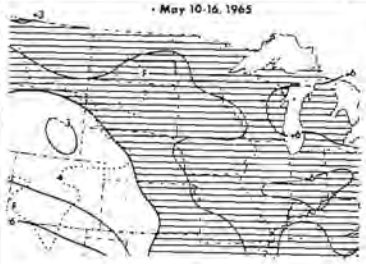
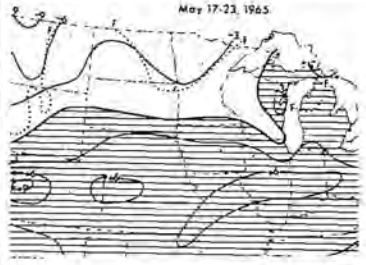
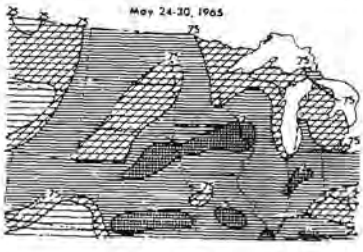
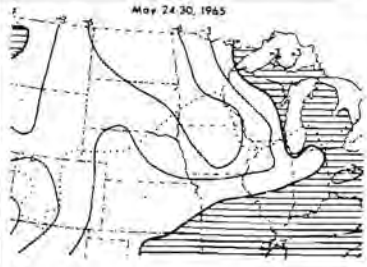
Depth of Snow on Ground (in.)	Total Precipitation (Inches)	Departure of Average Temperature from Normal (F°)
		
		
		
		
		

FIGURE 3C.—Weekly total precipitation and departure of average temperature from normal—April 26 to May 30.

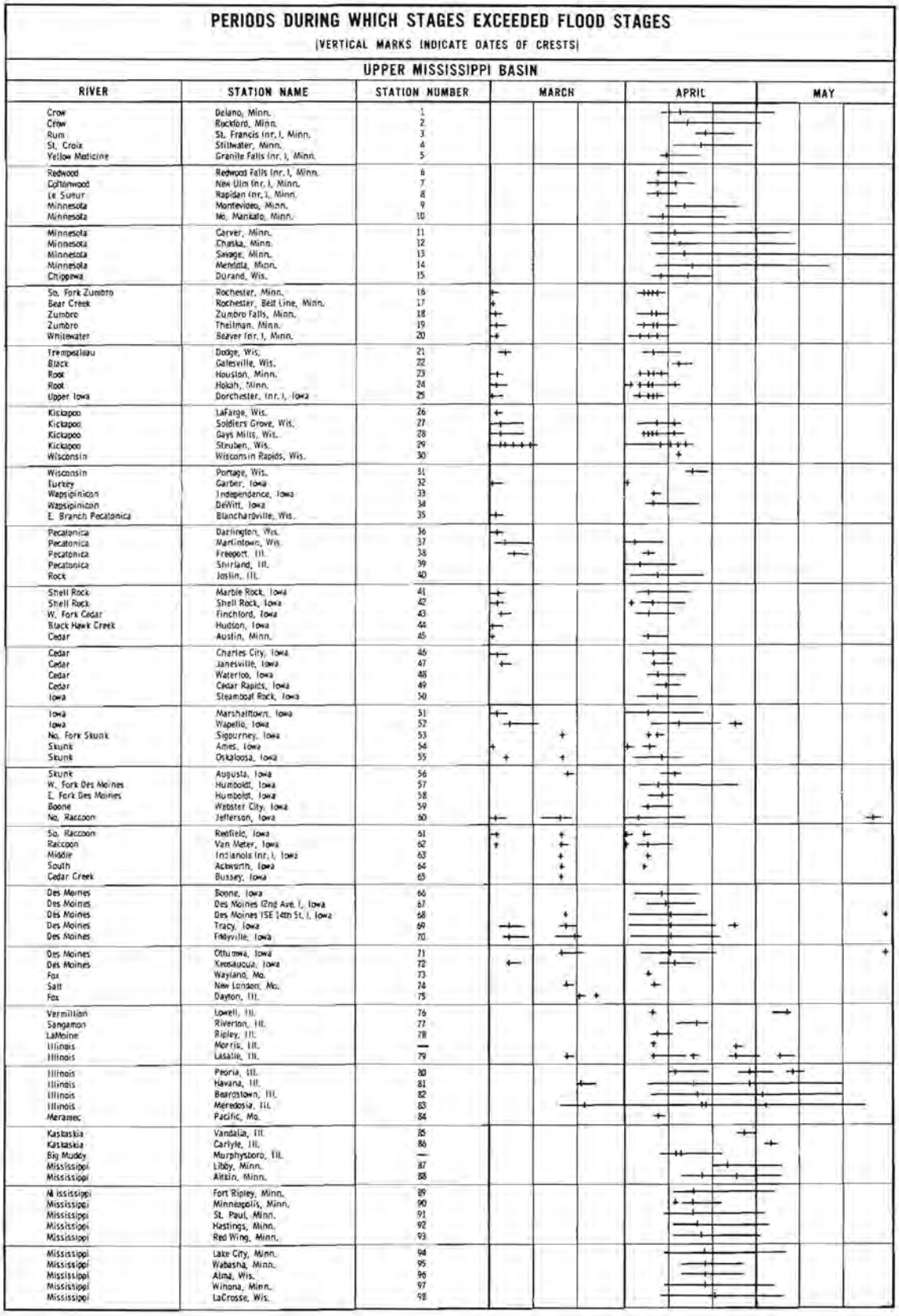


FIGURE 4A.—Periods of flooding and crest dates—Upper Mississippi Basin.

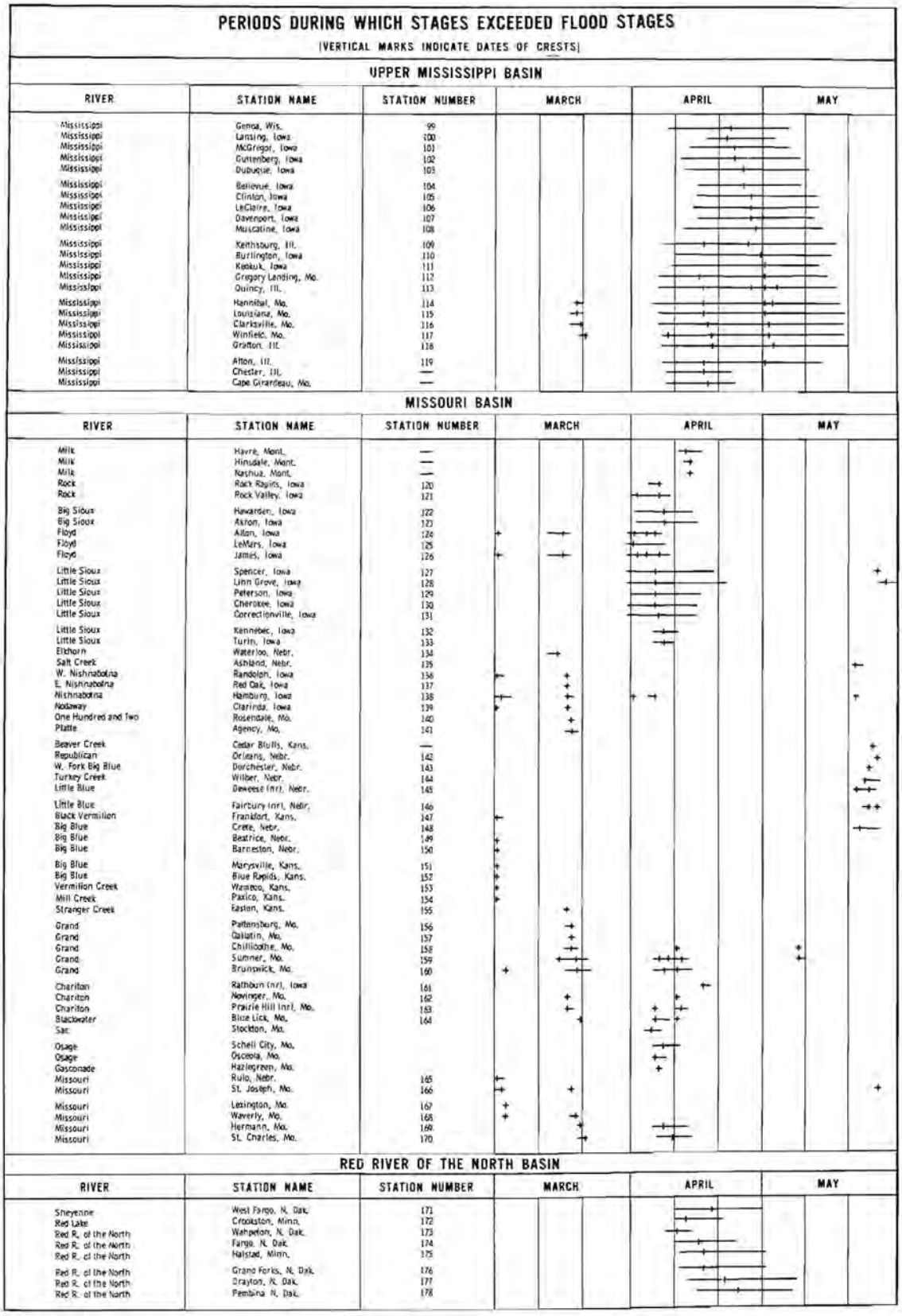


FIGURE 4B.—Periods of flooding and crest dates—Upper Mississippi (cont'd), Missouri, and Red River of the North basins

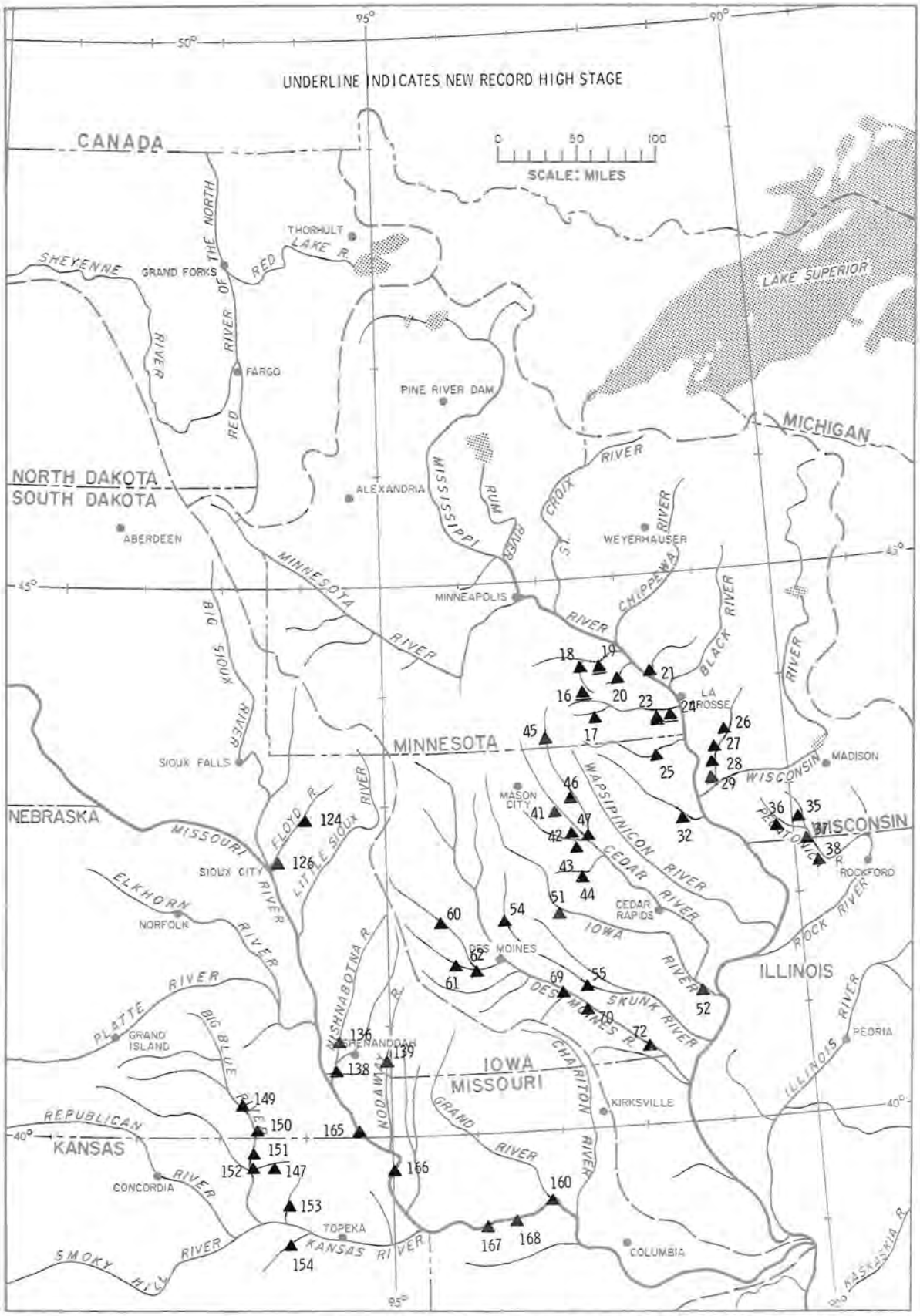


FIGURE 5A.—River stations where flood stages were exceeded during the first week of March. (Station numbers are identified in table 1 and fig. 4.)

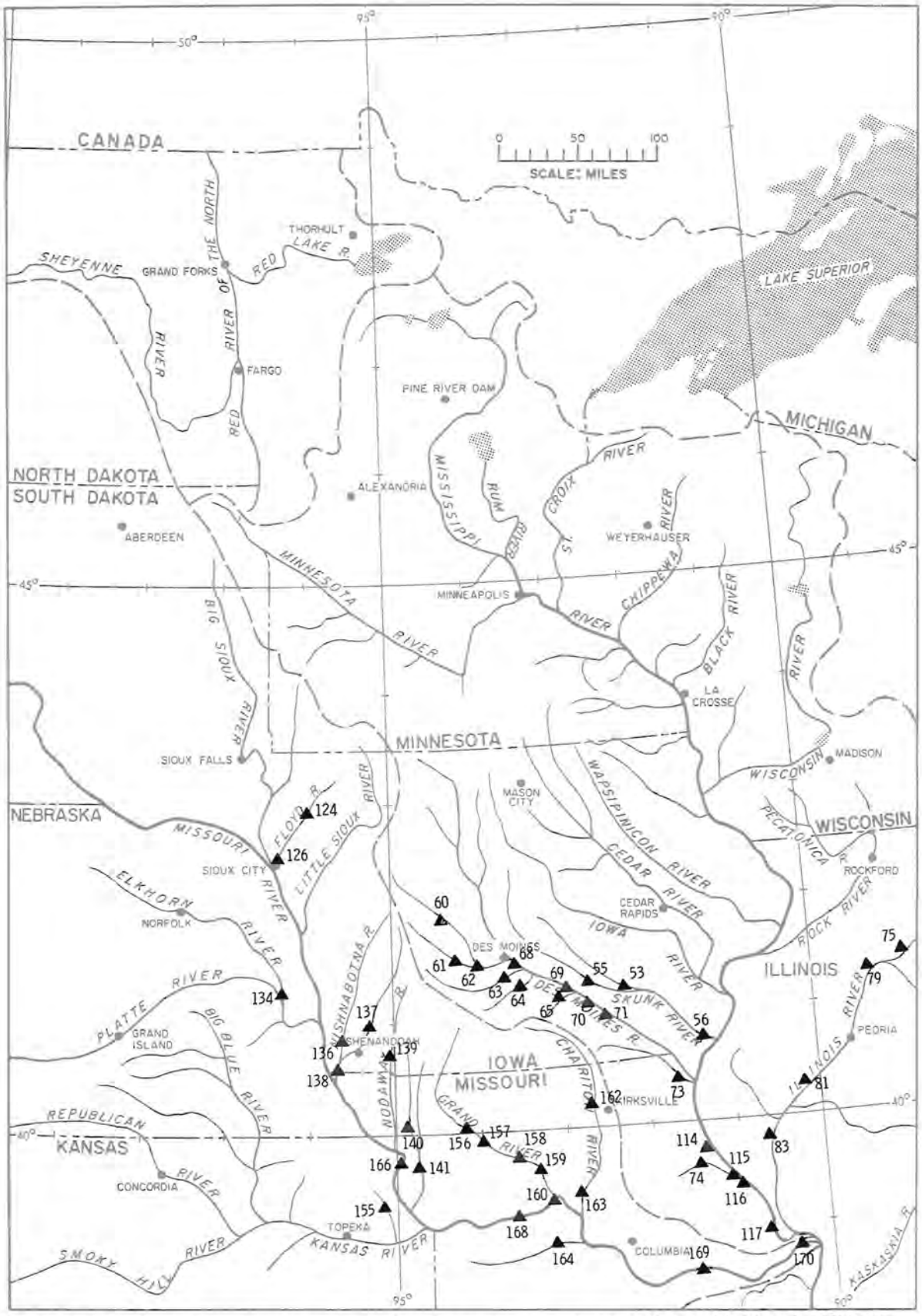


FIGURE 5B.—River stations where flood stages were exceeded in mid-March. (Station numbers are identified in table 1 and fig. 4.)

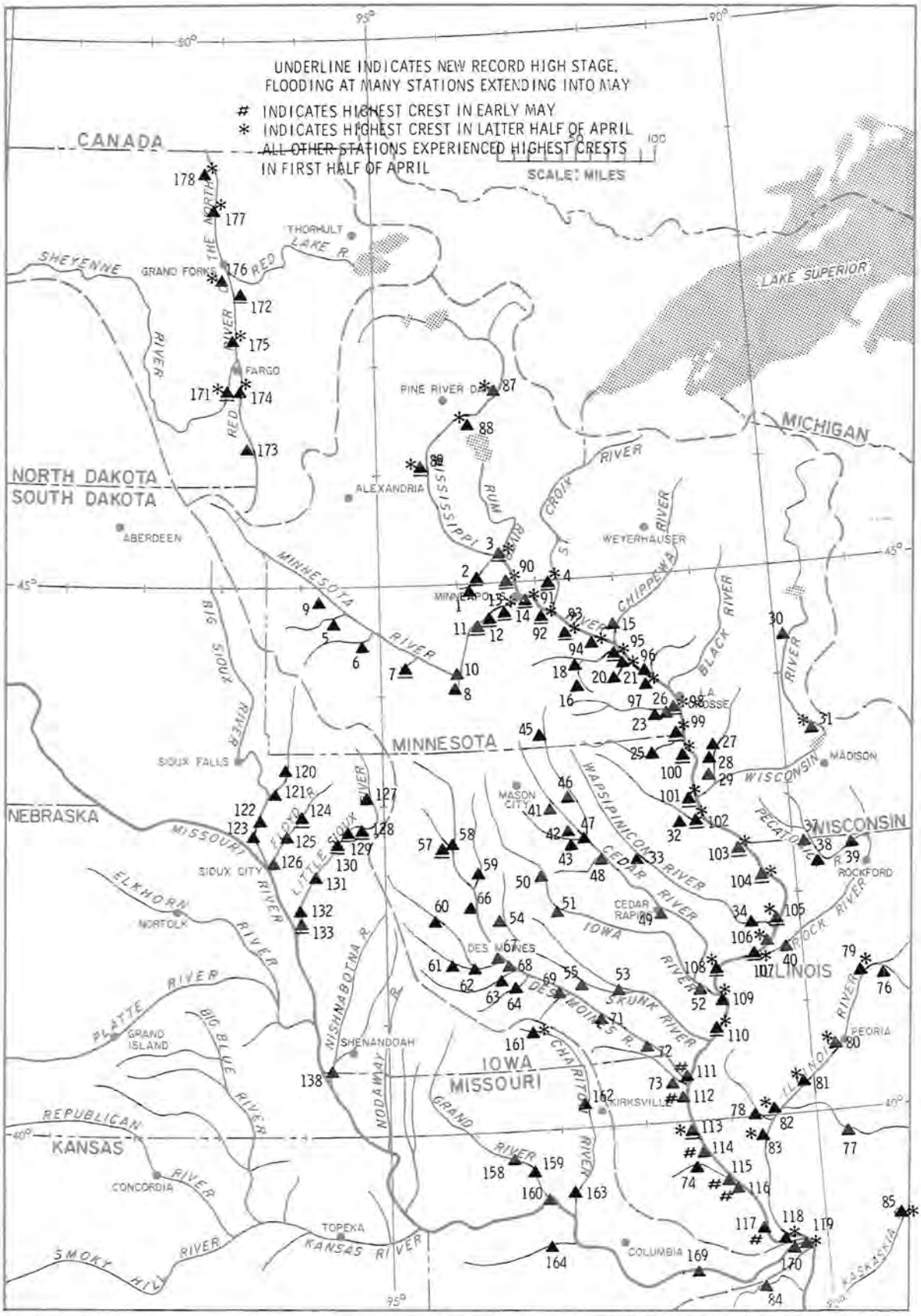


FIGURE 5C.—River stations where flood stages were exceeded in April. (Station numbers are identified in table 1 and fig. 4.)

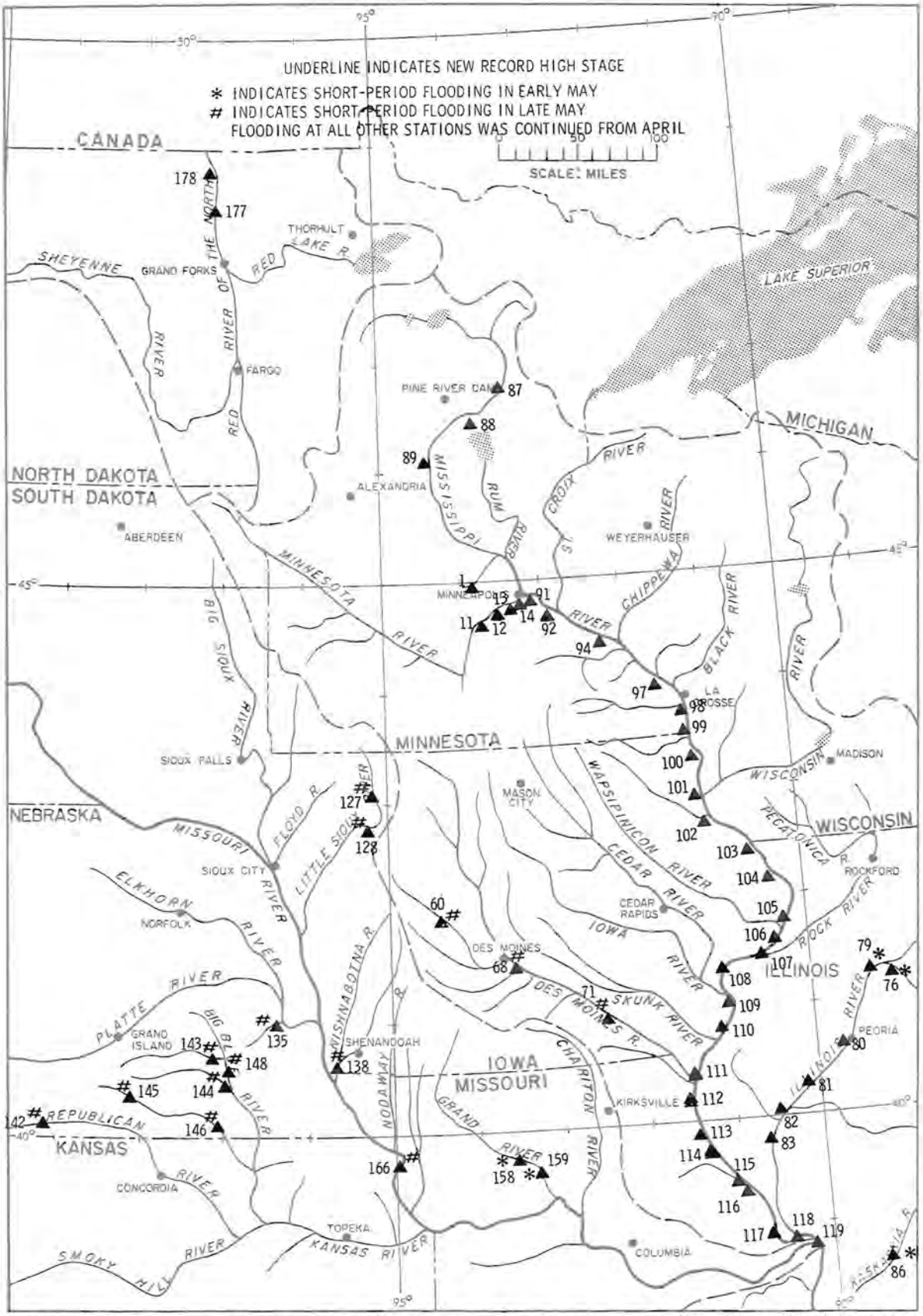


FIGURE 5D.—River stations where flood stages were exceeded in late May. (Station numbers are identified in table 1 and fig. 4.)

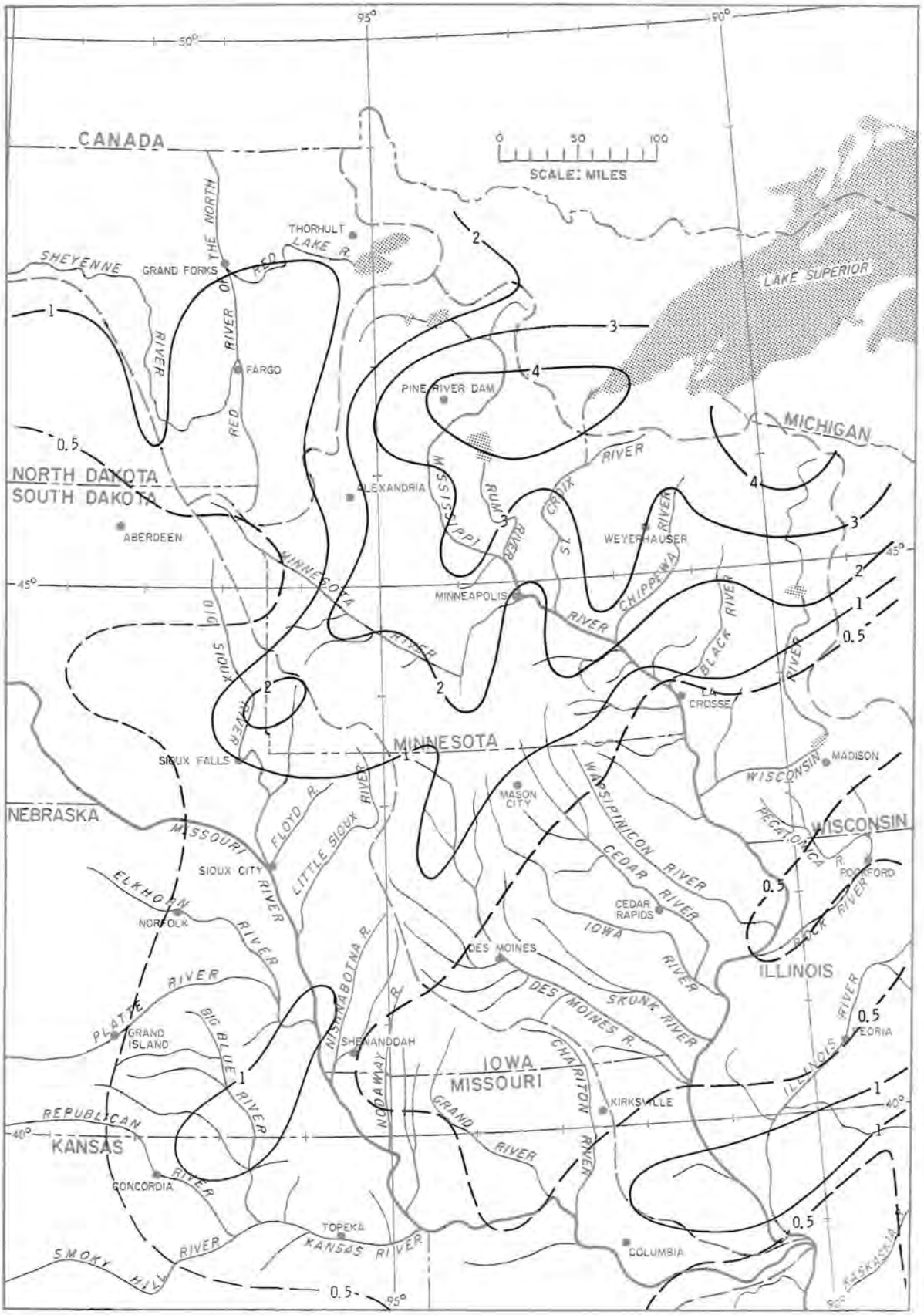


FIGURE 6A.—Water equivalent of snow on ground on February 25.

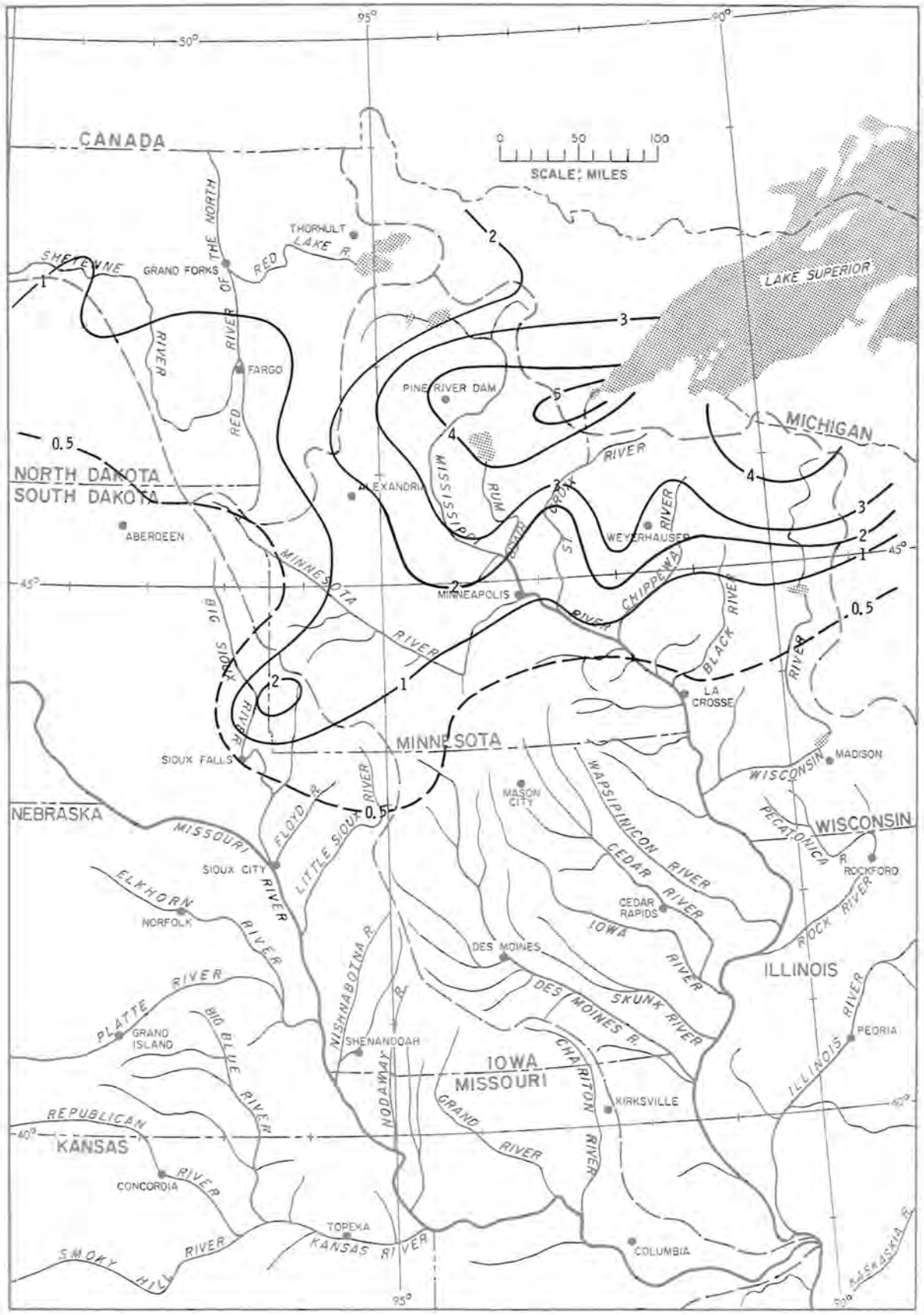


FIGURE 6B.—Water equivalent of snow on ground on February 28.

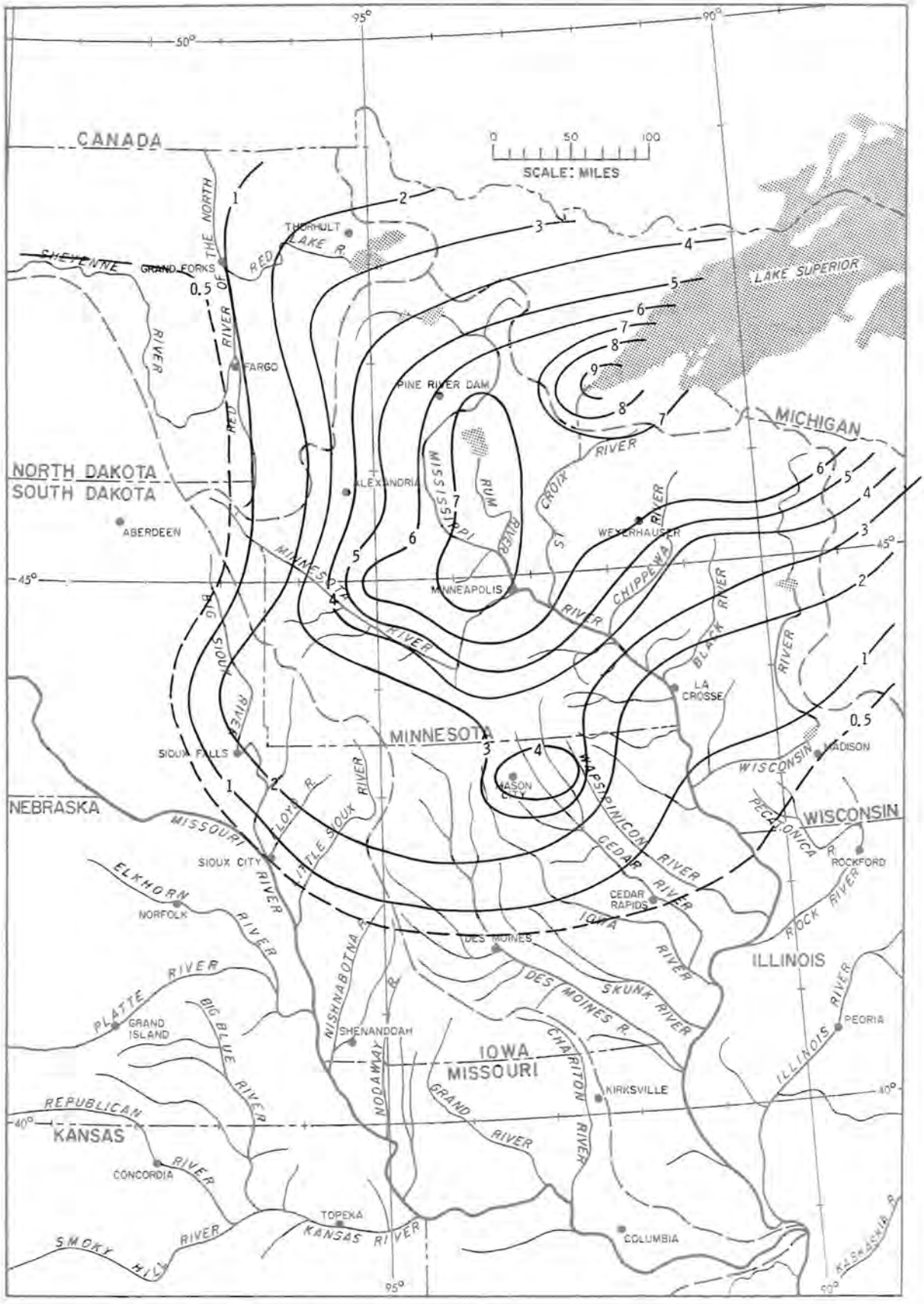


FIGURE 6C.—Water equivalent of snow on ground on March 30.

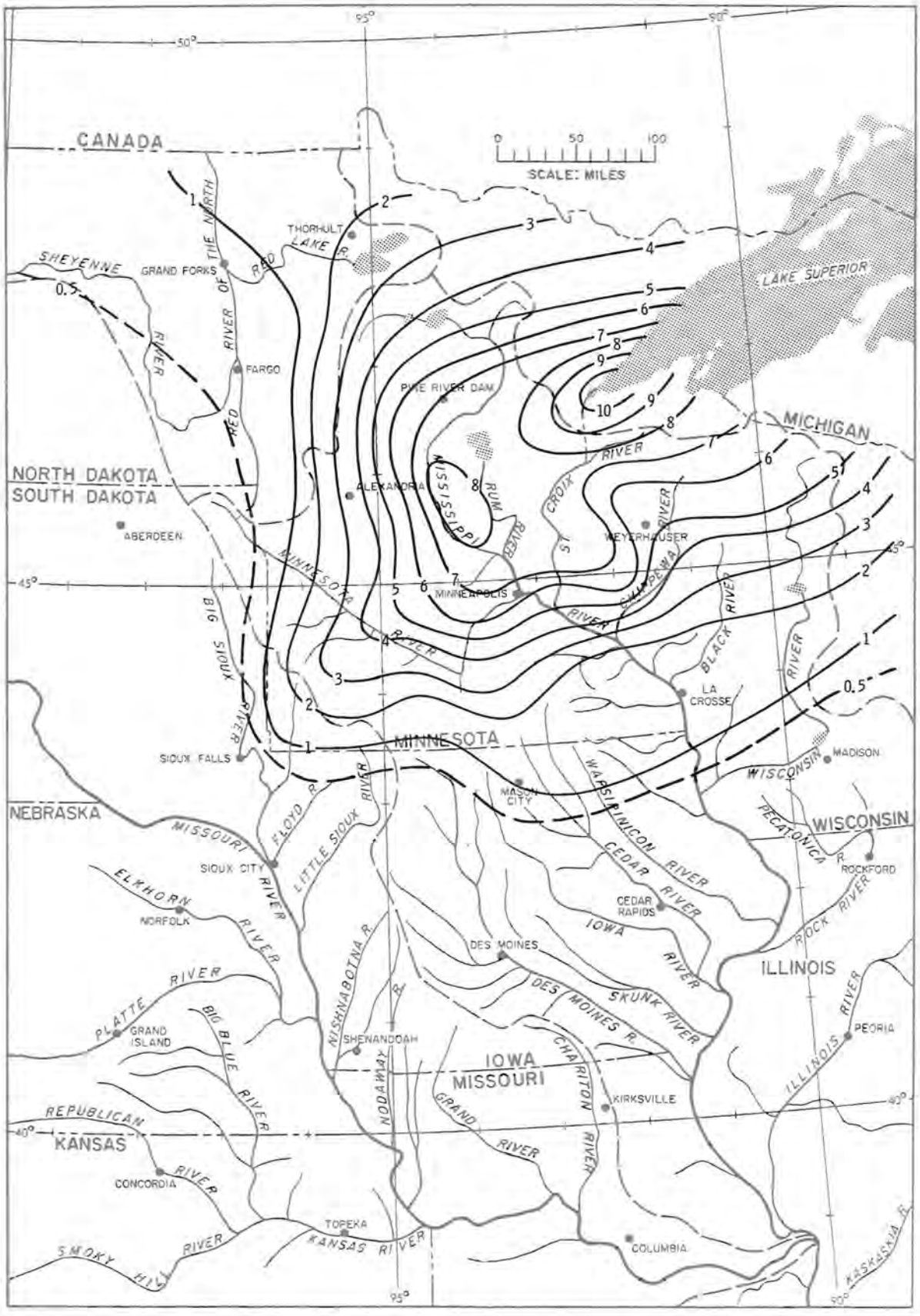


FIGURE 6D.—Water equivalent of snow on ground on April 5.

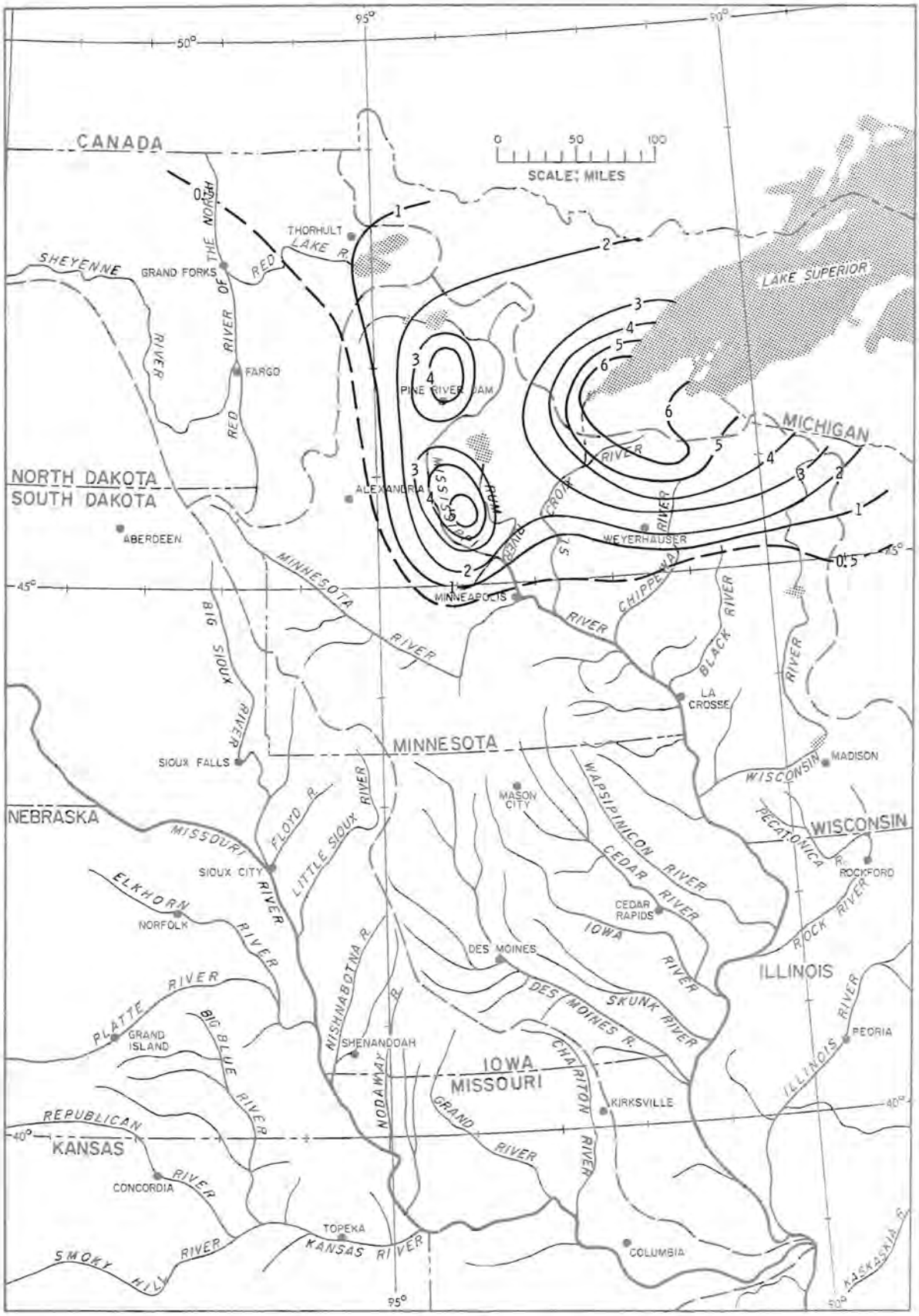


FIGURE 6E.—Water equivalent of snow on ground on April 12.

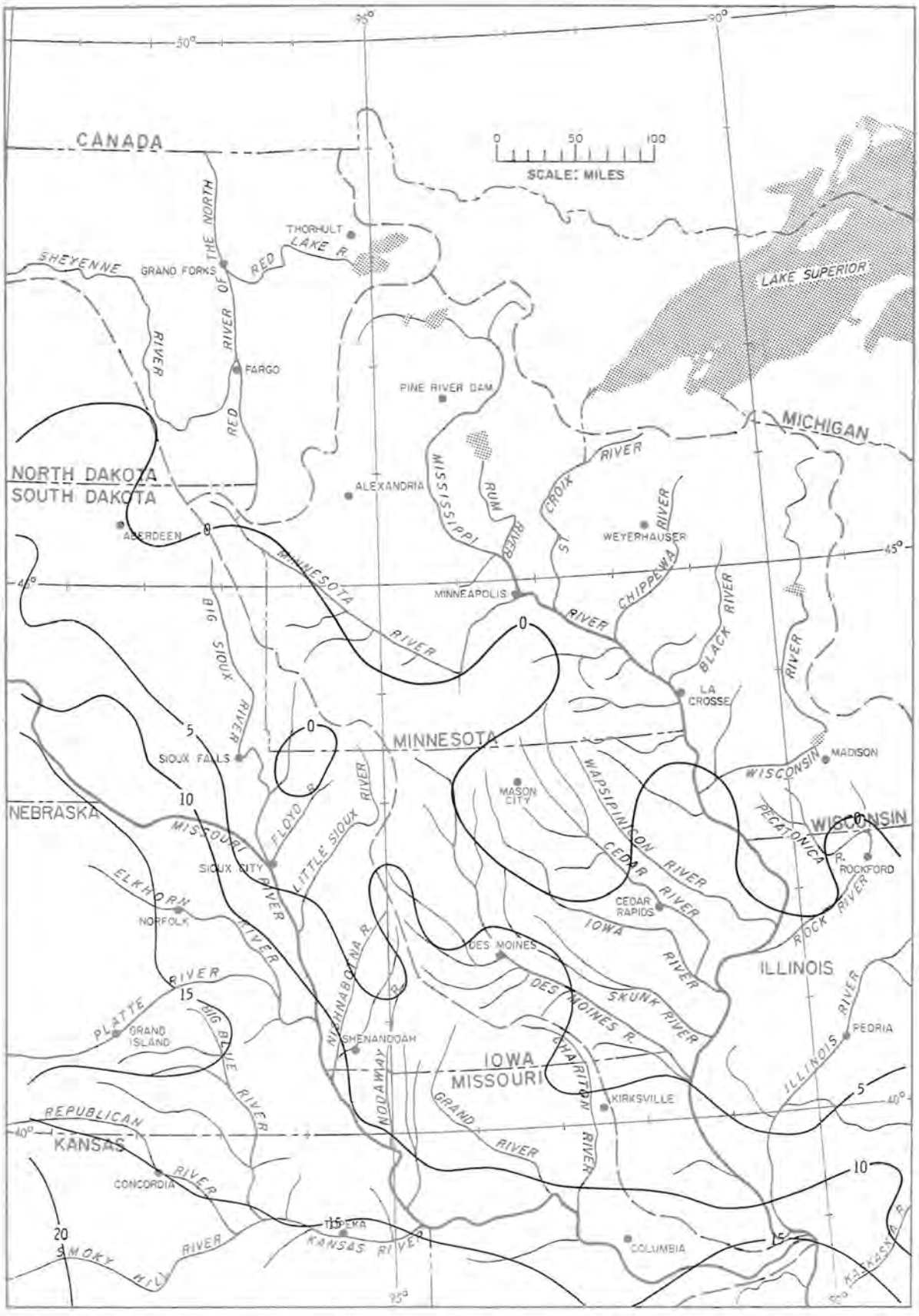


FIGURE 7A.—Melting degree days above 32° F.—February 27.

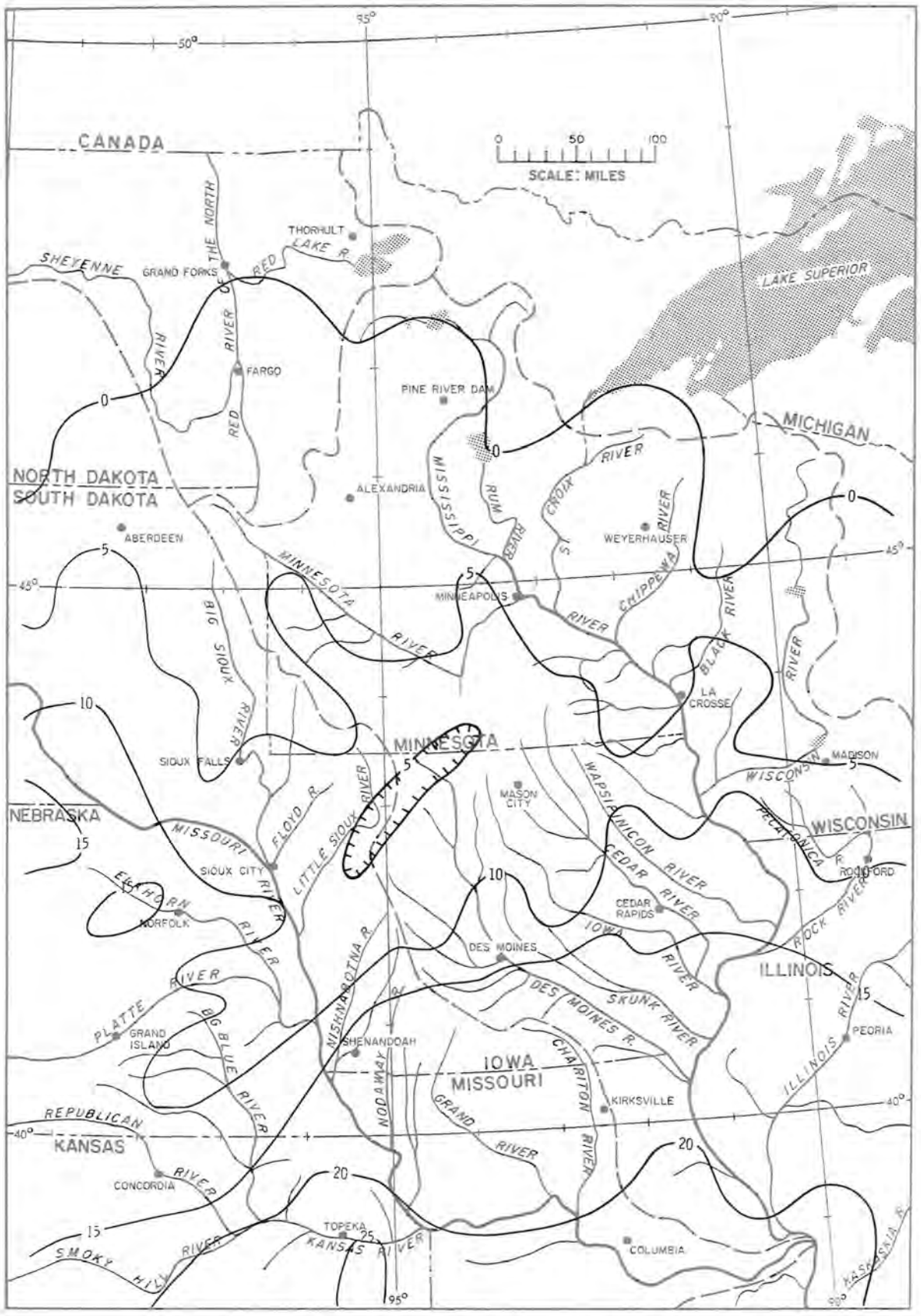


FIGURE 7B.—Melting degree days above 32° F.—February 28.

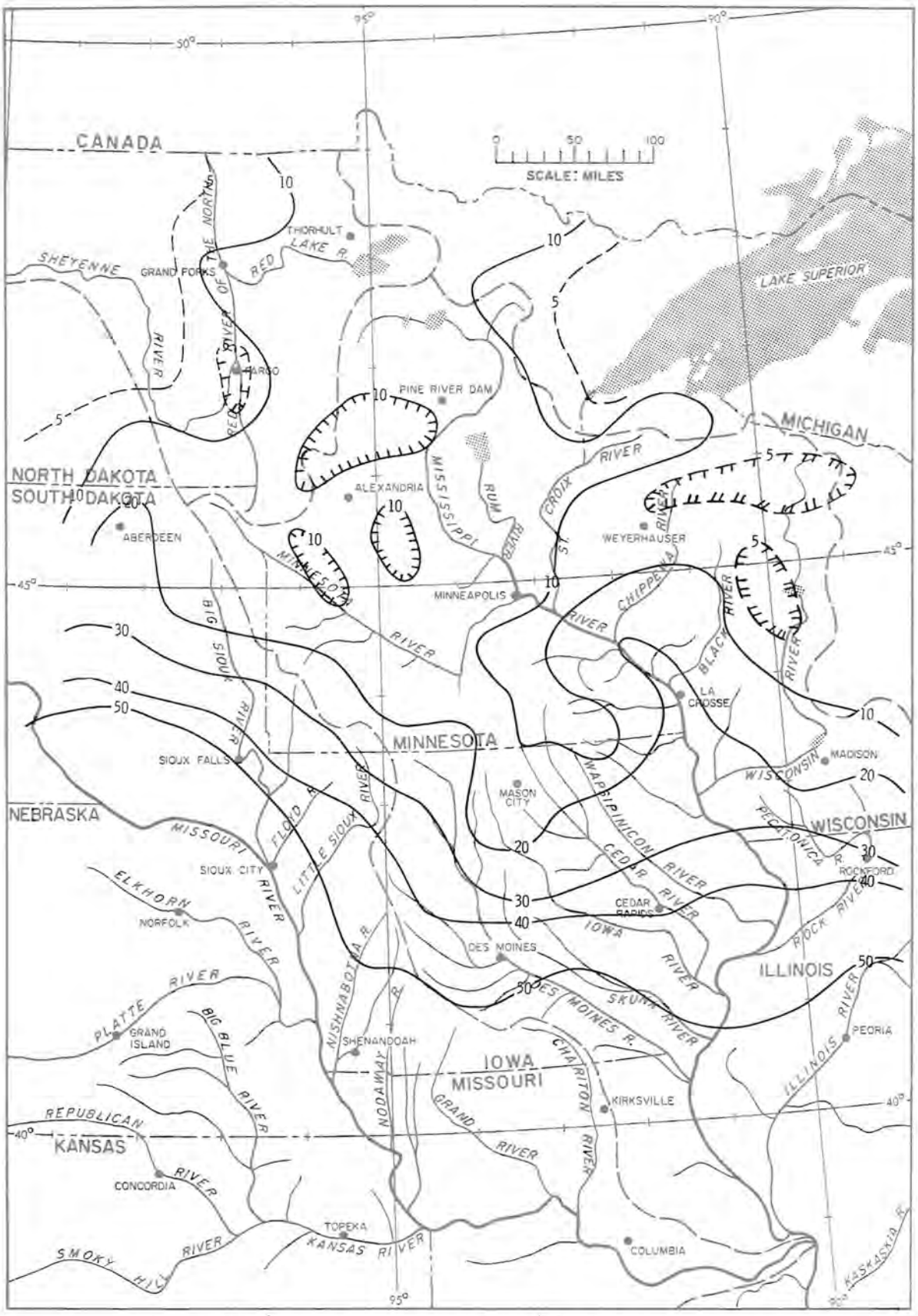


FIGURE 7C.—Melting degree days above 32° F.—March 31-April 5.

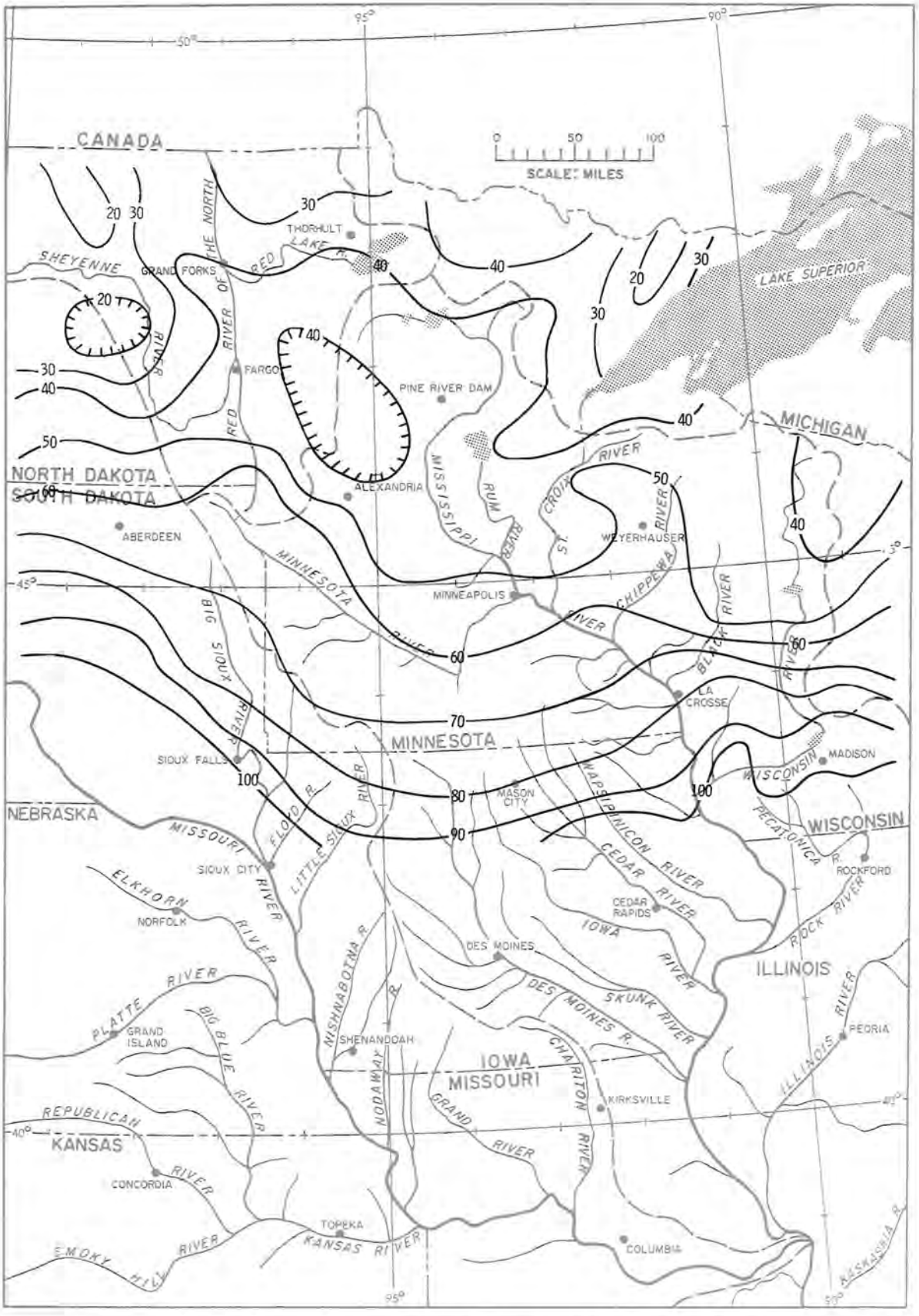


FIGURE 7D.—Melting degree days above 32° F.—April 6-12.

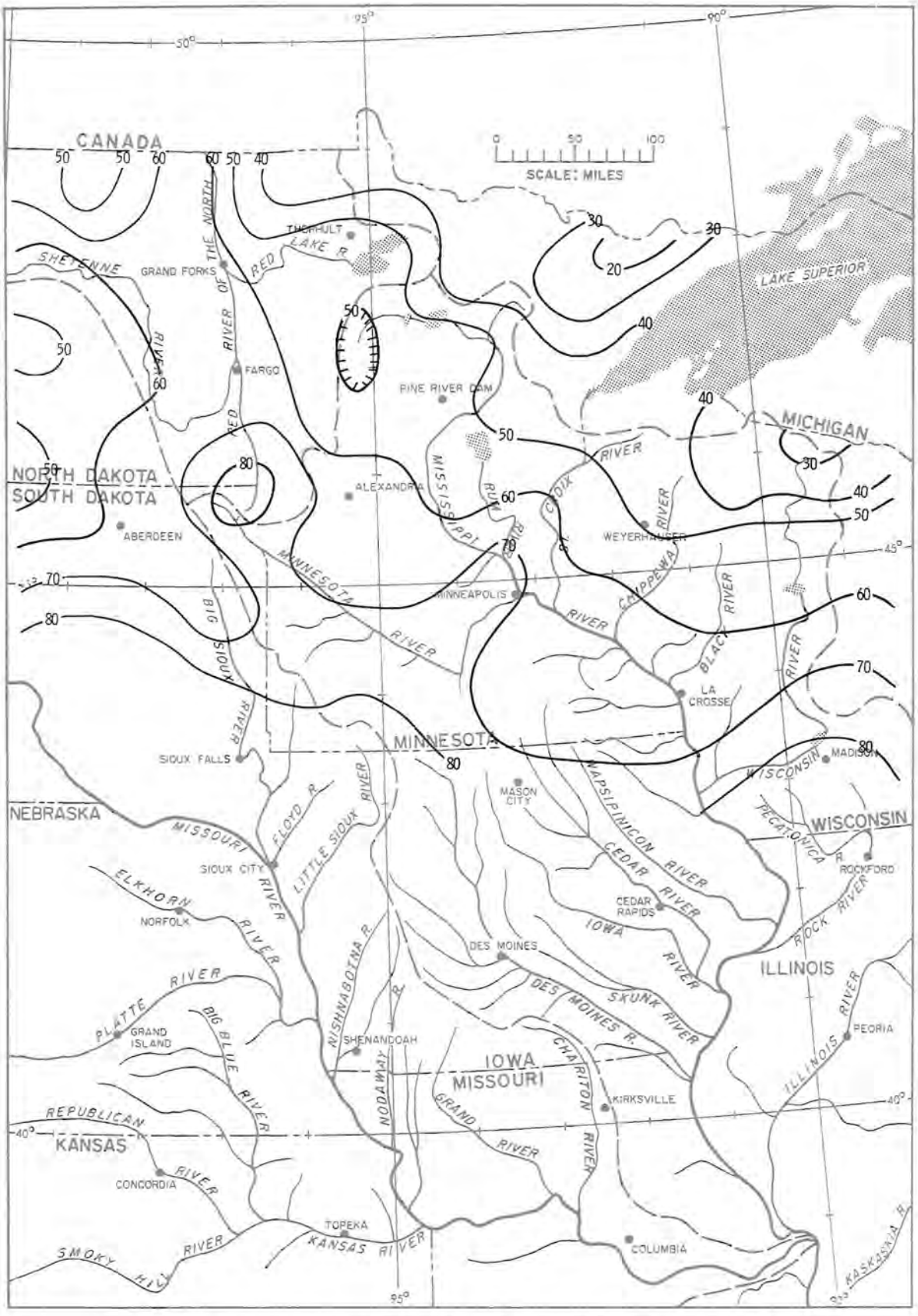


FIGURE 7E.—Melting degree days above 32° F.—April 13-19.

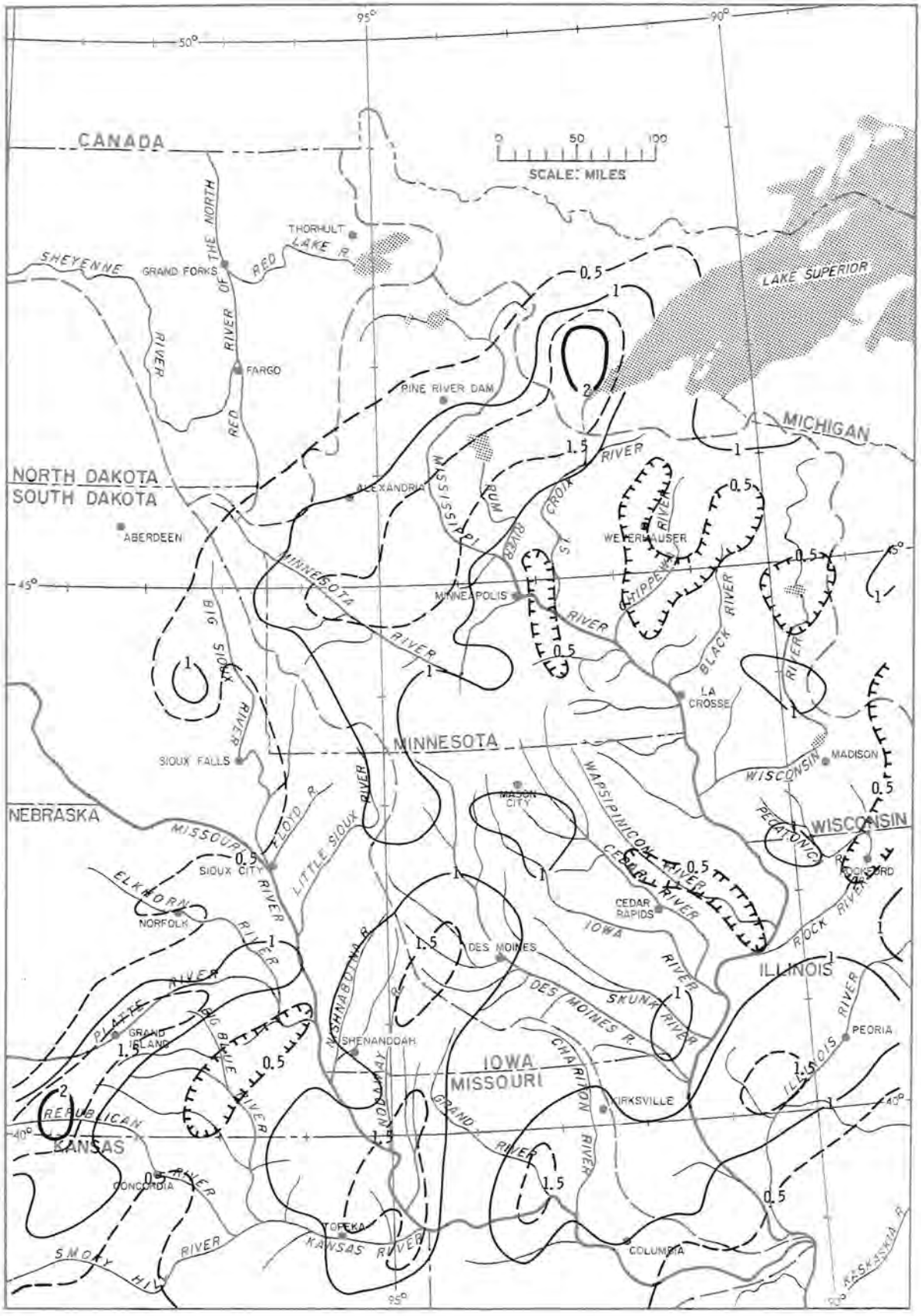


FIGURE 8A.—Total storm precipitation—March 16-18.

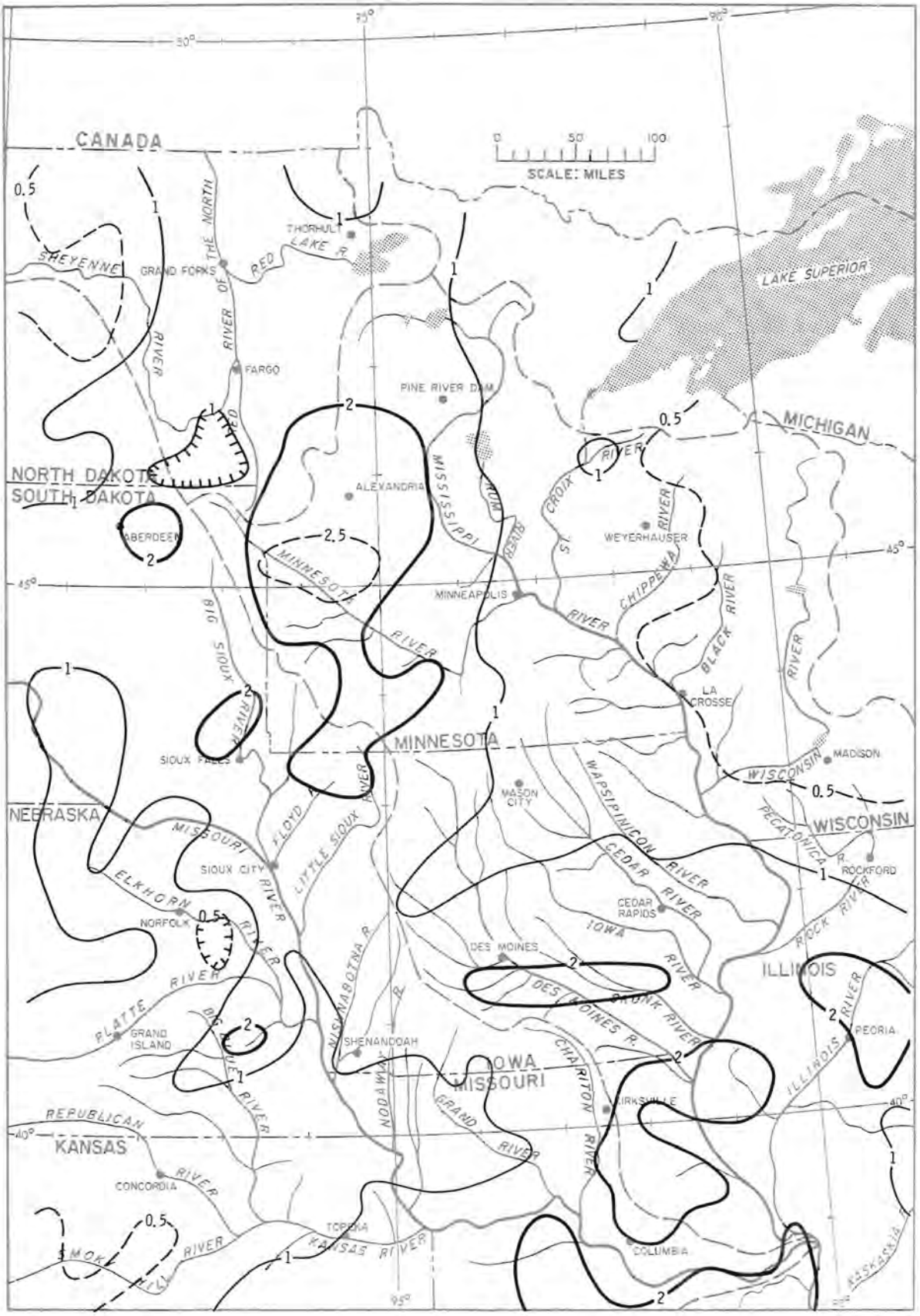


FIGURE 8B.—Total storm precipitation—April 2-7.

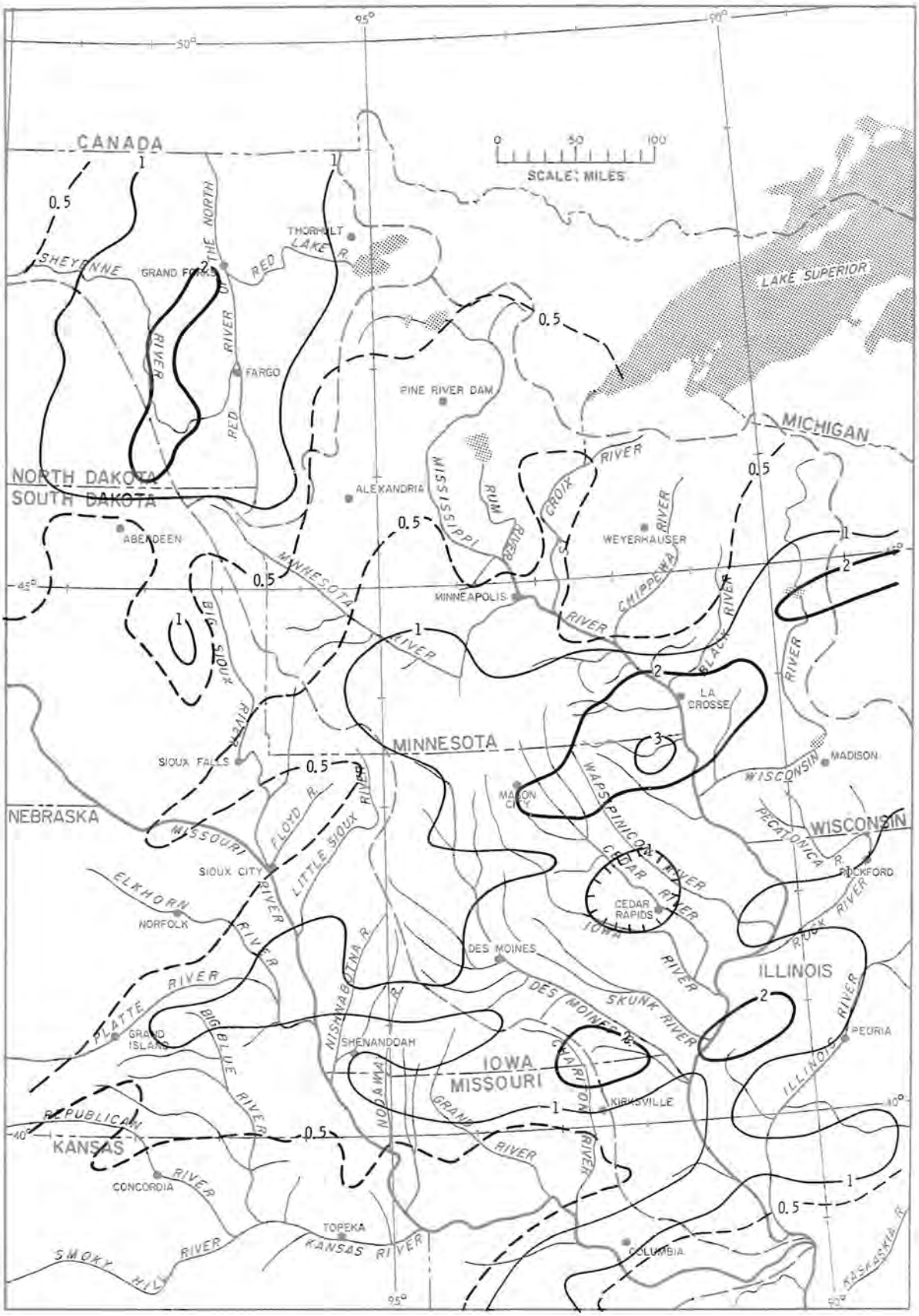


FIGURE 8C.—Total storm precipitation—April 8-12.

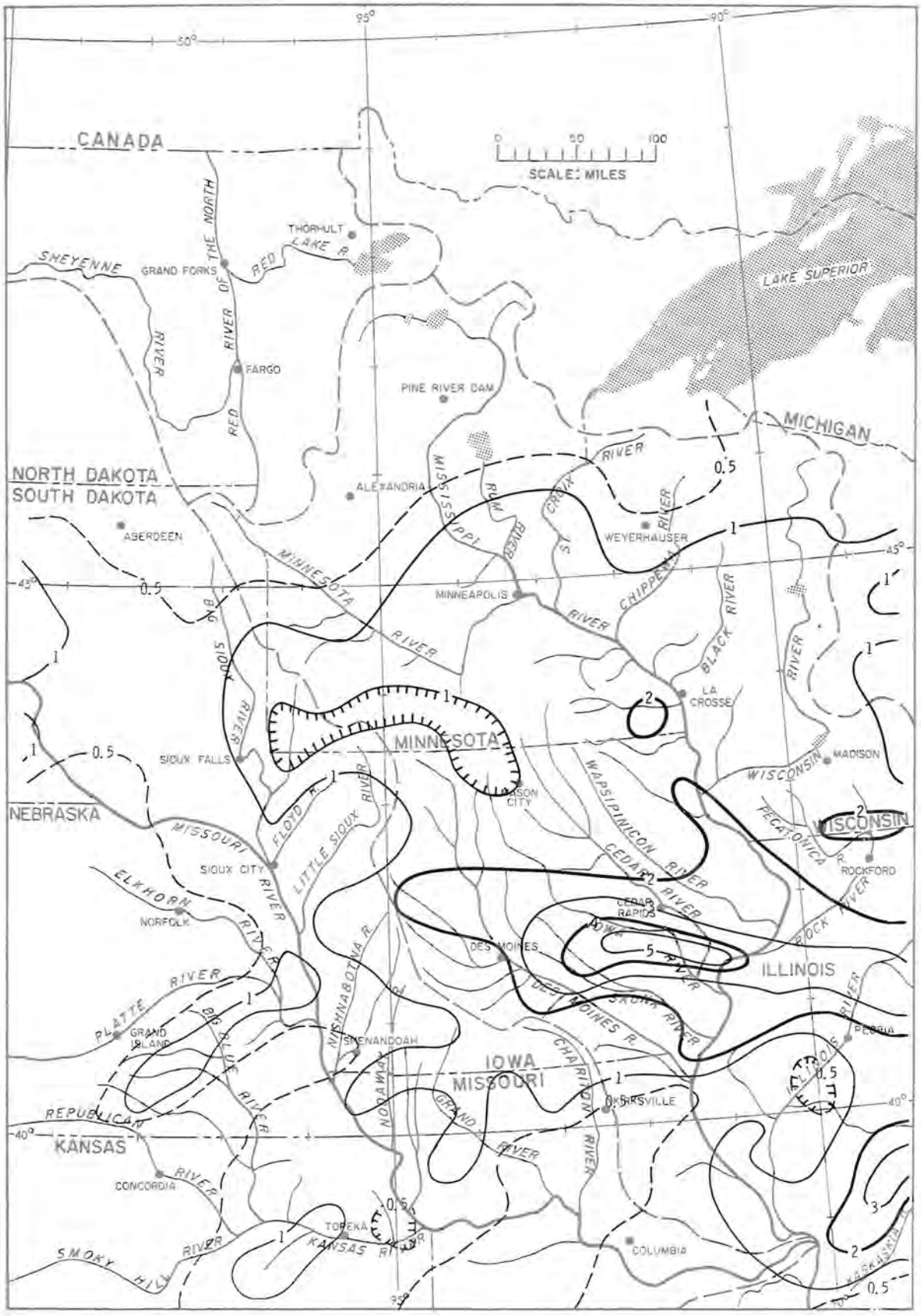


FIGURE 8D.—Total storm precipitation—April 23-28.

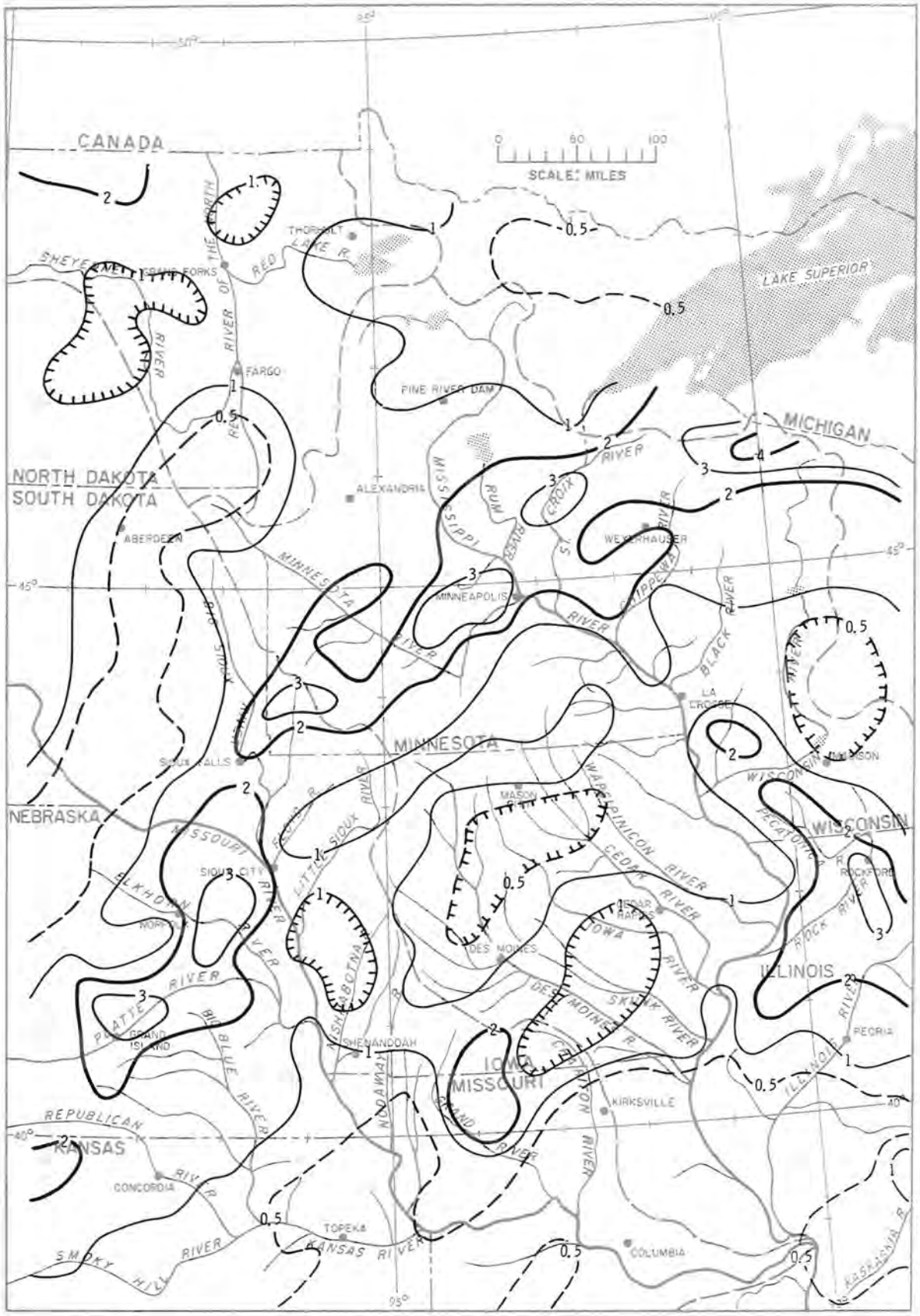


FIGURE 8E.—Total storm precipitation—May 4-10.

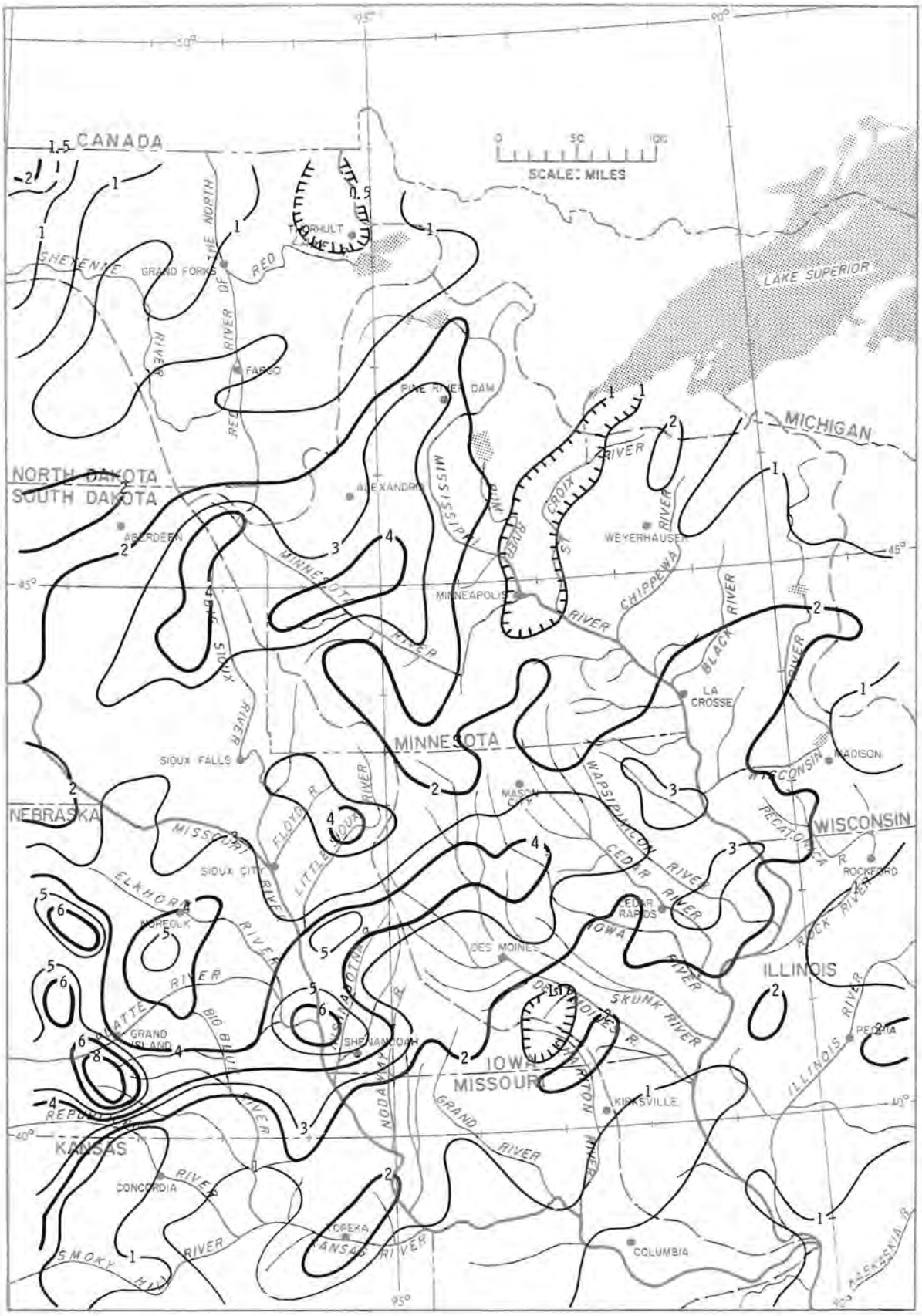


FIGURE 8F.—Total storm precipitation—May 20-27.

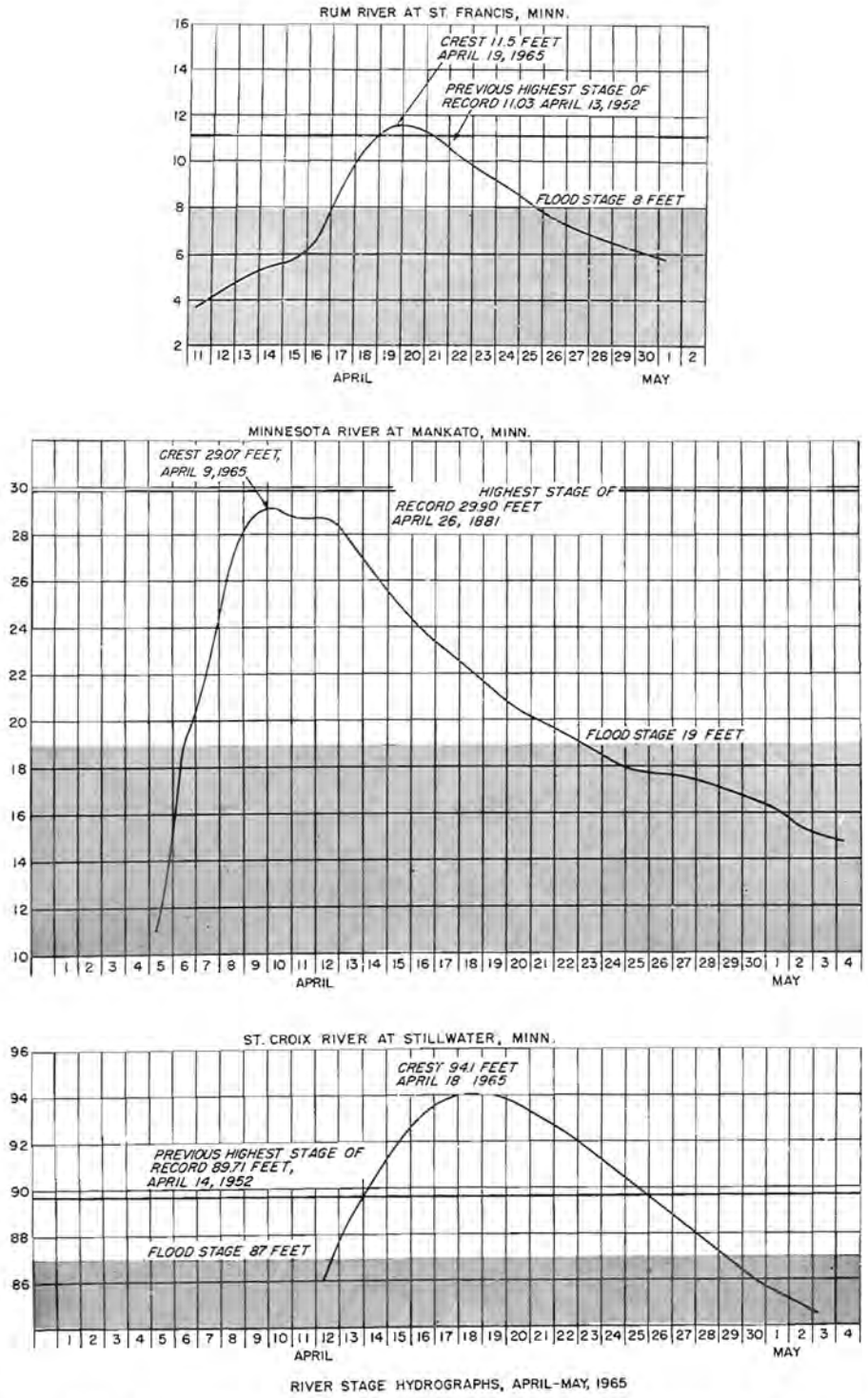


FIGURE 9A.—April-May river stage hydrographs—Rum, Minnesota, and St. Croix Rivers.

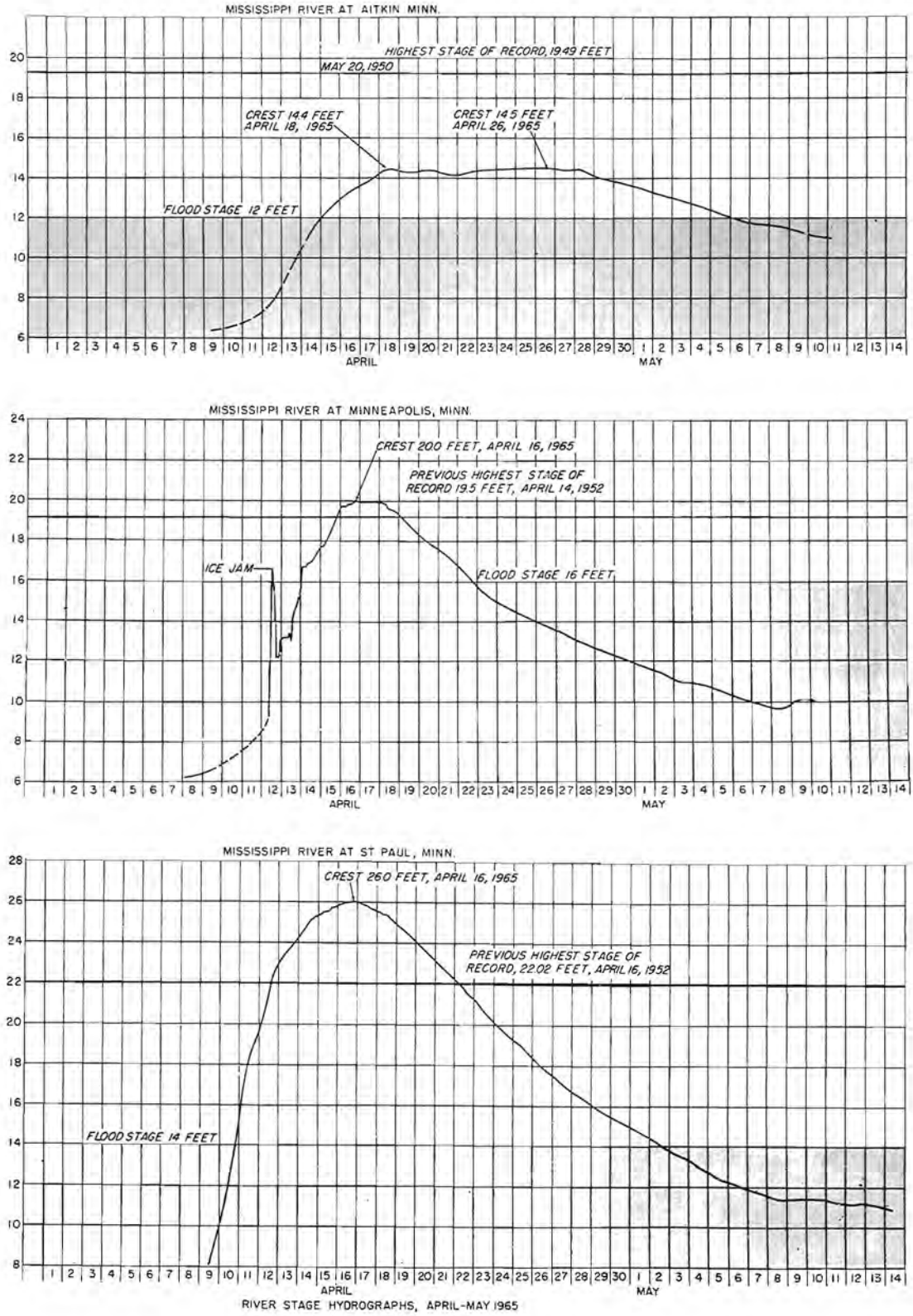


FIGURE 9B.—April-May river stage hydrographs—Mississippi River at Aitkin, Minneapolis, and St. Paul, Minn.

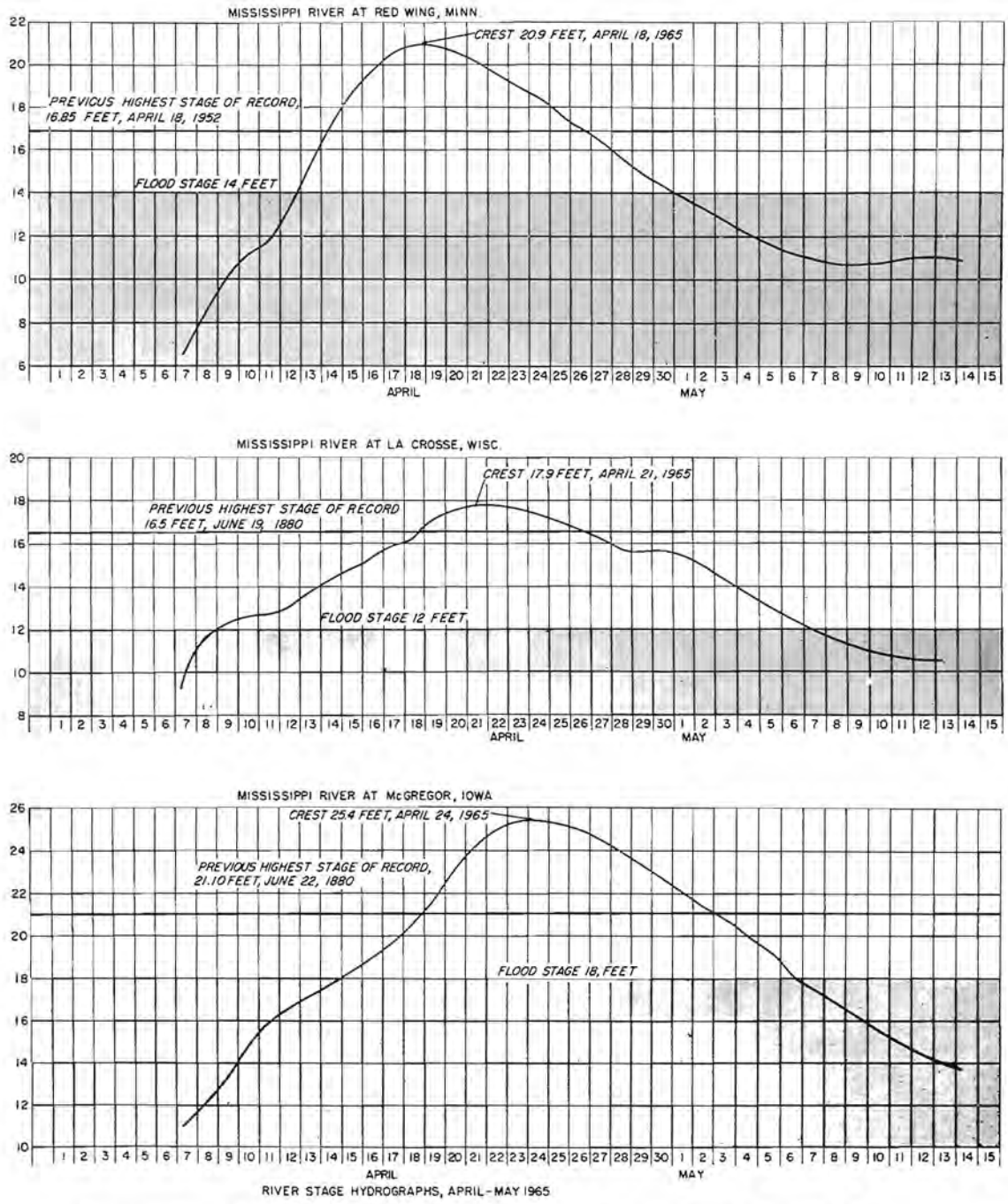


FIGURE 9C.—April-May river stage hydrographs—Mississippi River at Red Wing, Minn.; LaCrosse, Wis.; and McGregor, Iowa.

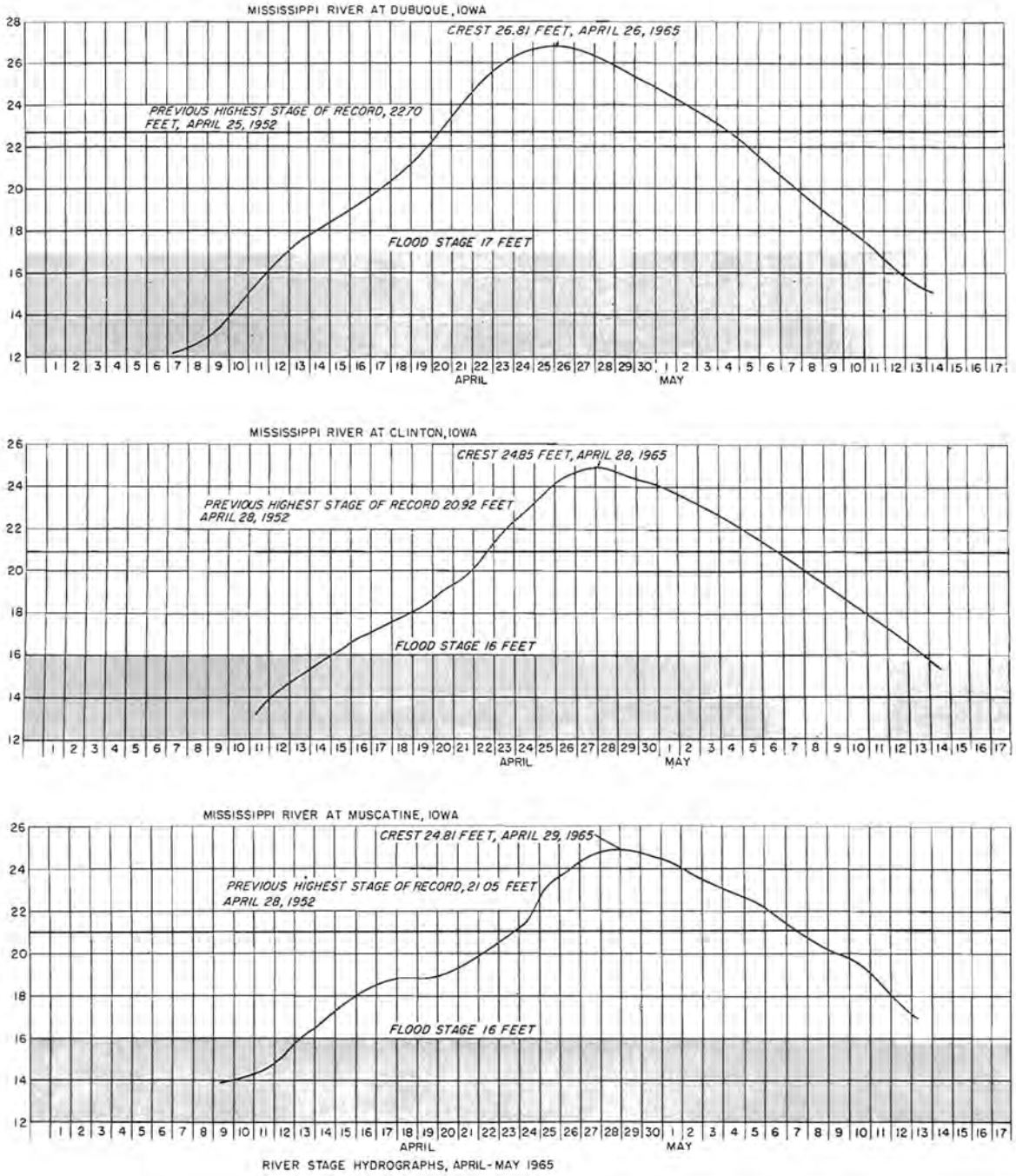


FIGURE 9D.—April-May river stage hydrographs—Mississippi River at Dubuque, Clinton, and Muscatine, Iowa.

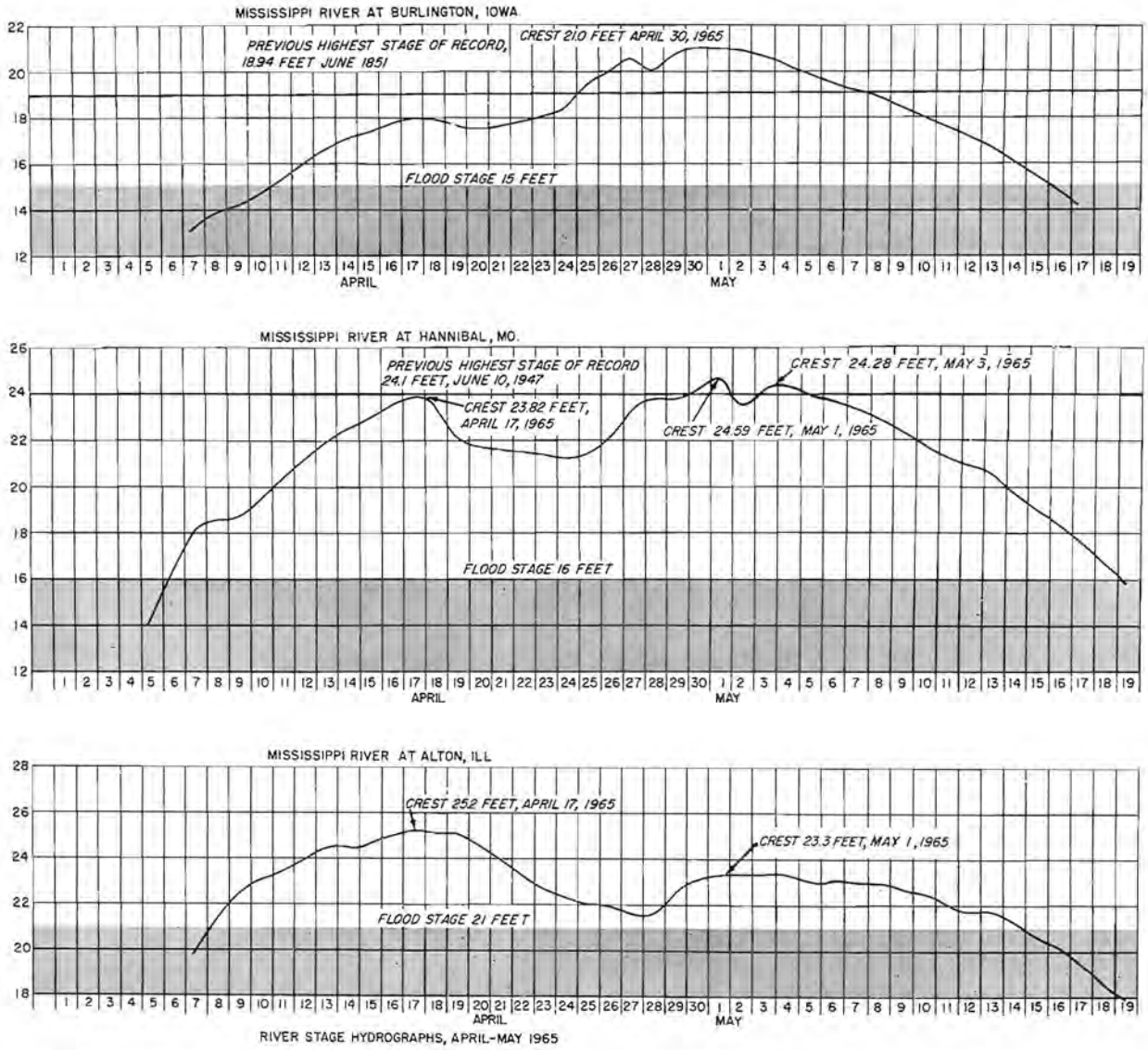


FIGURE 9E.—April-May river stage hydrographs—Mississippi River at Burlington, Iowa; Hannibal, Mo.; and Alton, Ill.

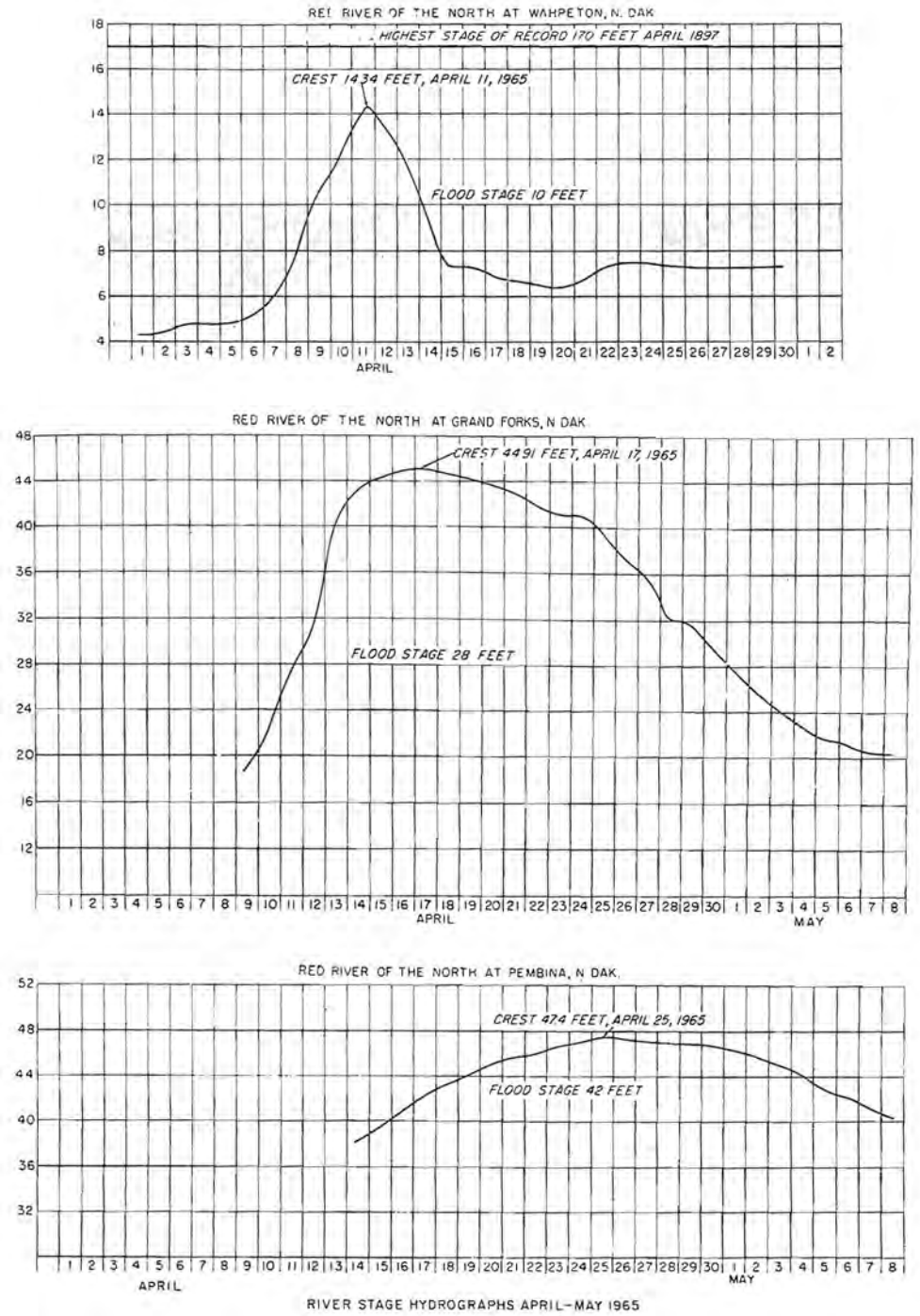


FIGURE 9F.—April-May river stage hydrographs—Red River of the North at Wahpeton, Grand Forks, and Pembina, N. Dak.

FEBRUARY 1965

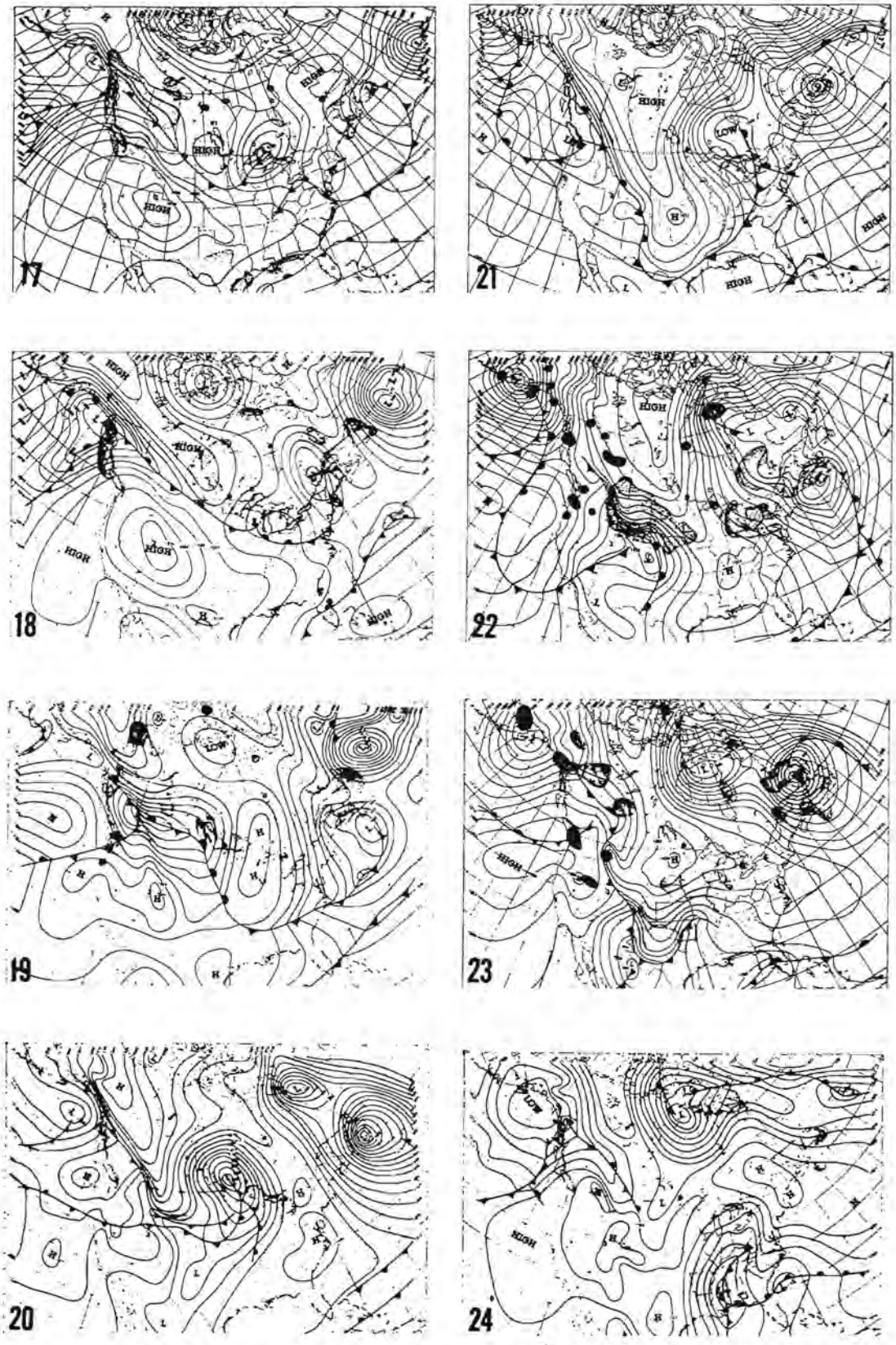


FIGURE 10A.—Daily weather maps, Feb. 17-24 (Noon, CST).

FEBRUARY 1965

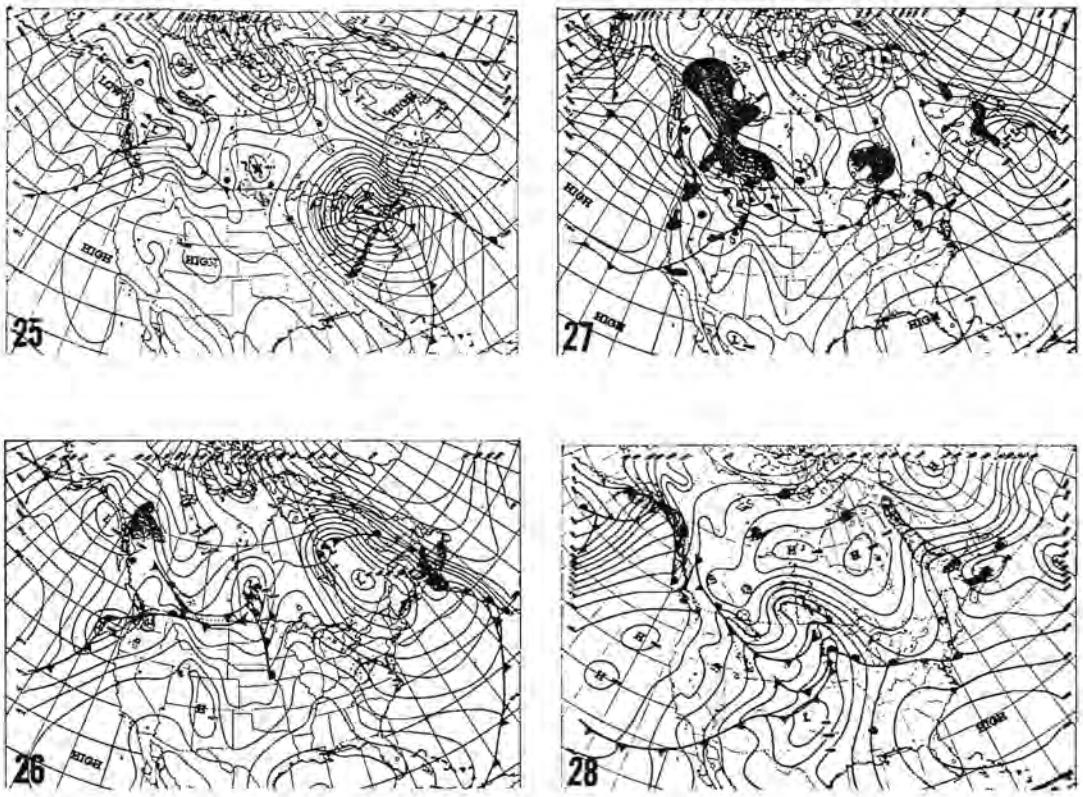


FIGURE 10B.—Daily weather maps, Feb. 25-28 (Noon, CST).

MARCH 1965

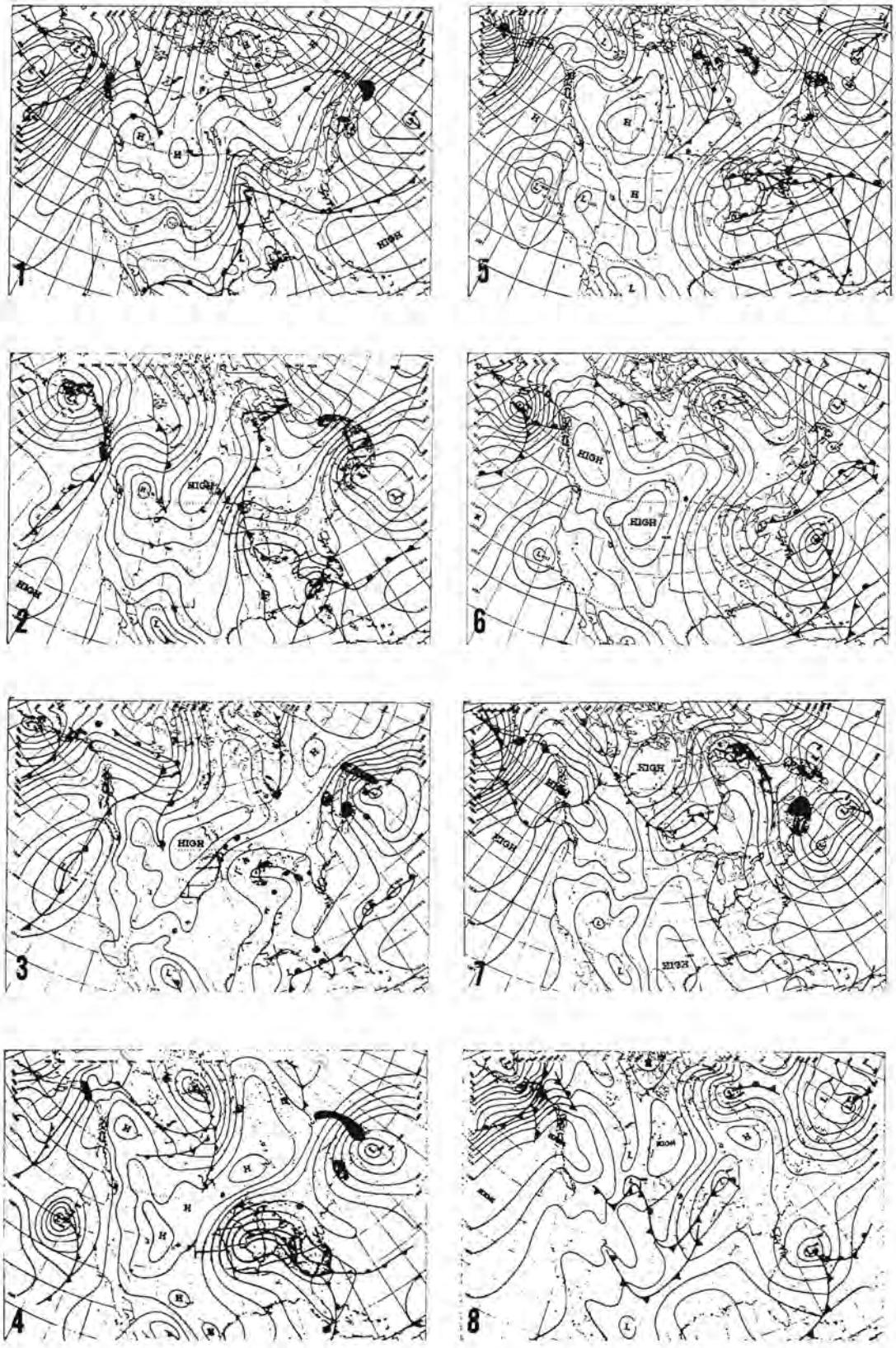


FIGURE 10C.—Daily weather maps, March 1-8 (Noon, CST).

MARCH 1965

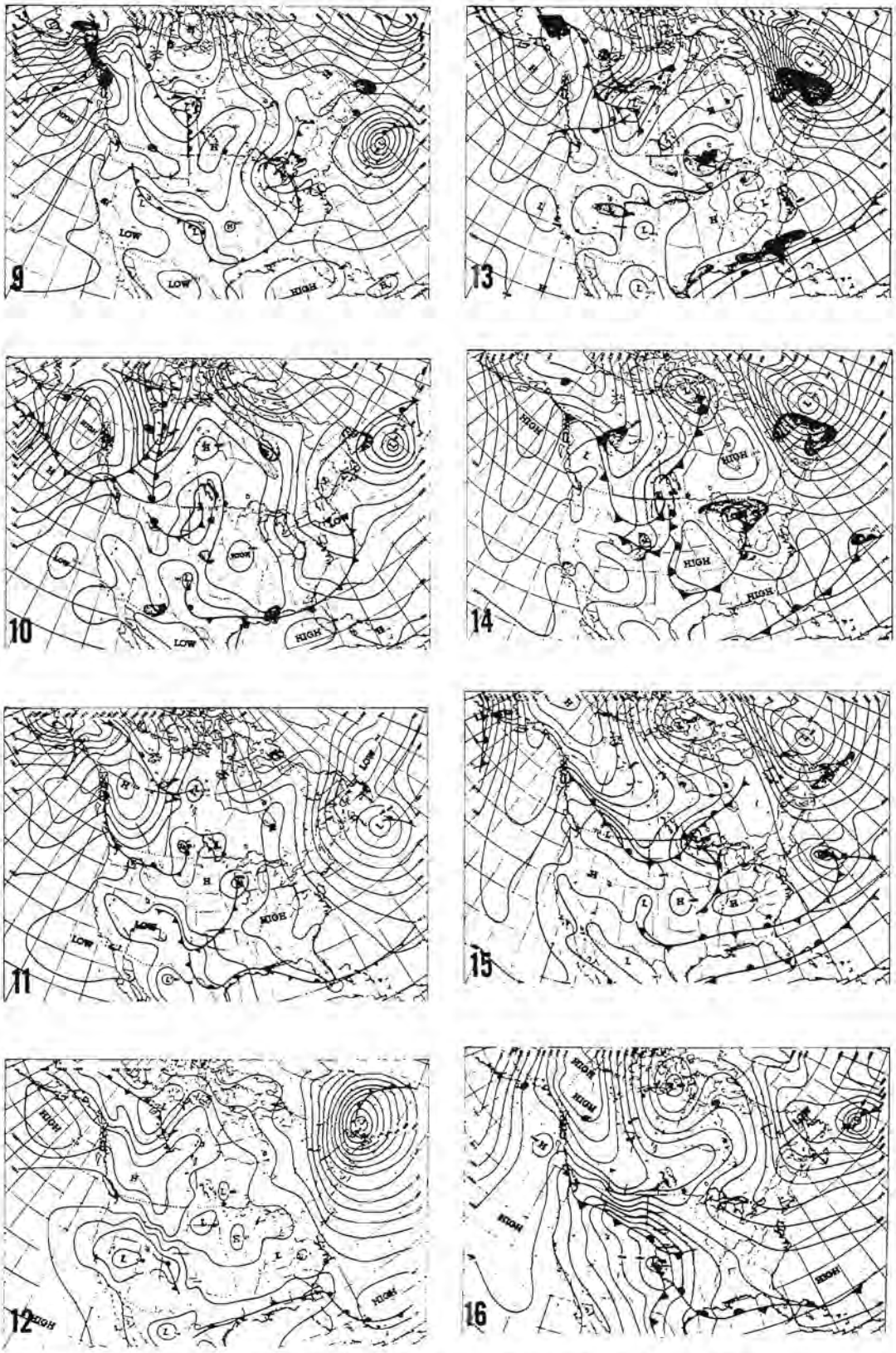


FIGURE 10D.—Daily weather maps, March 9-16 (Noon, CST).

MARCH 1965

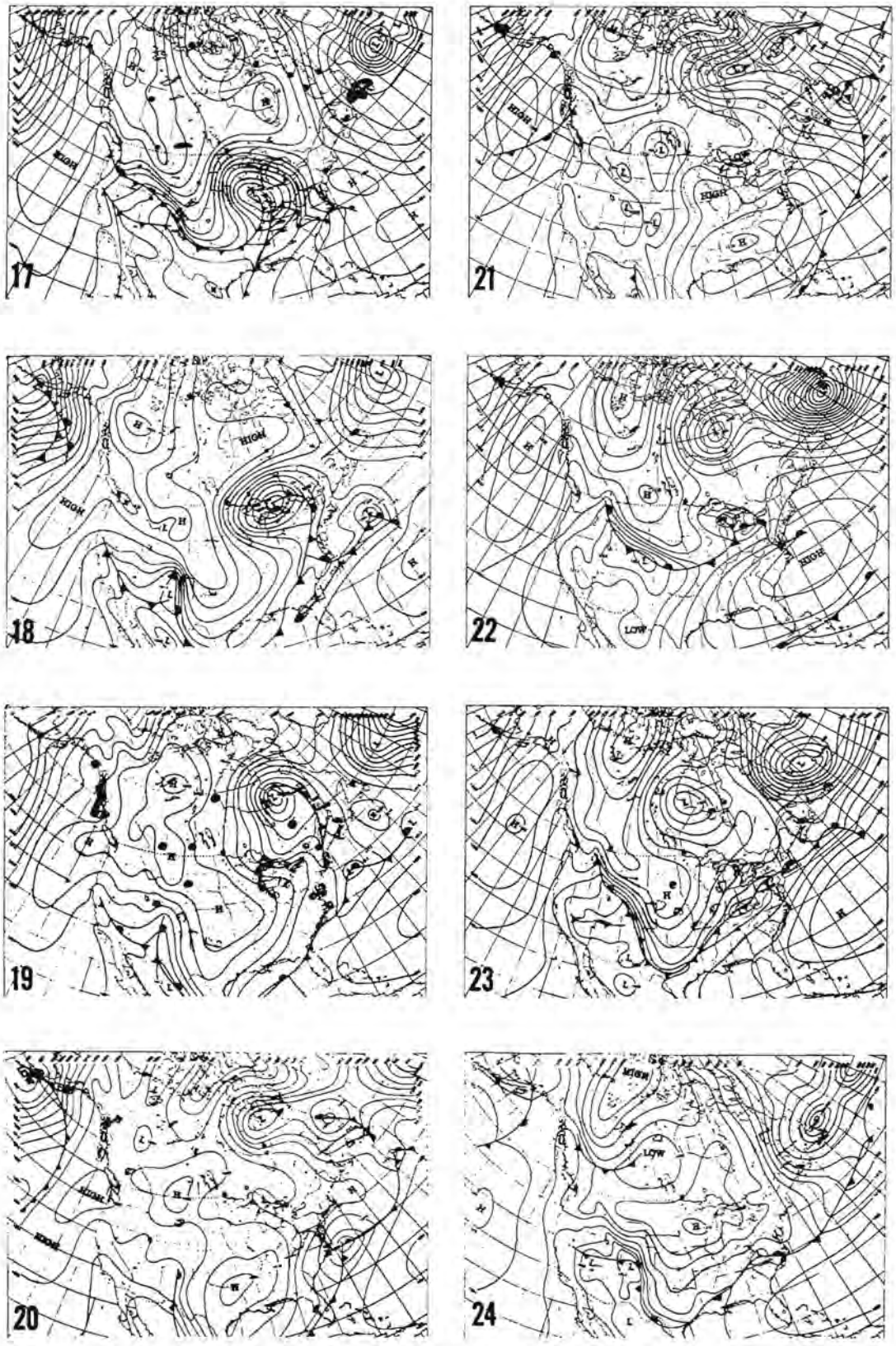


FIGURE 10E.—Daily weather maps, March 17-24 (Noon, CST).

MARCH 1965

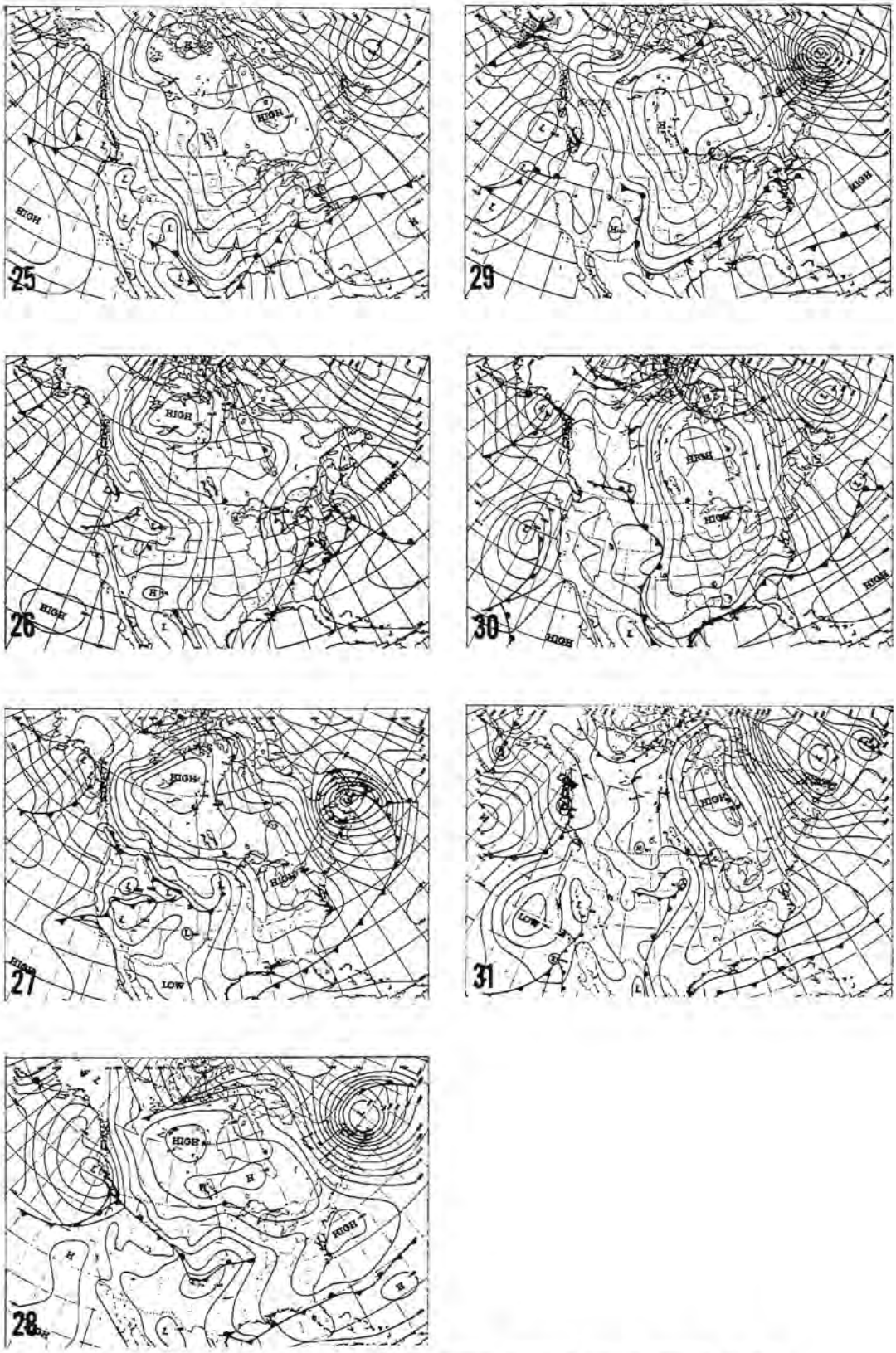


FIGURE 10F.—Daily weather maps, March 25-31 (Noon, CST).

APRIL 1965

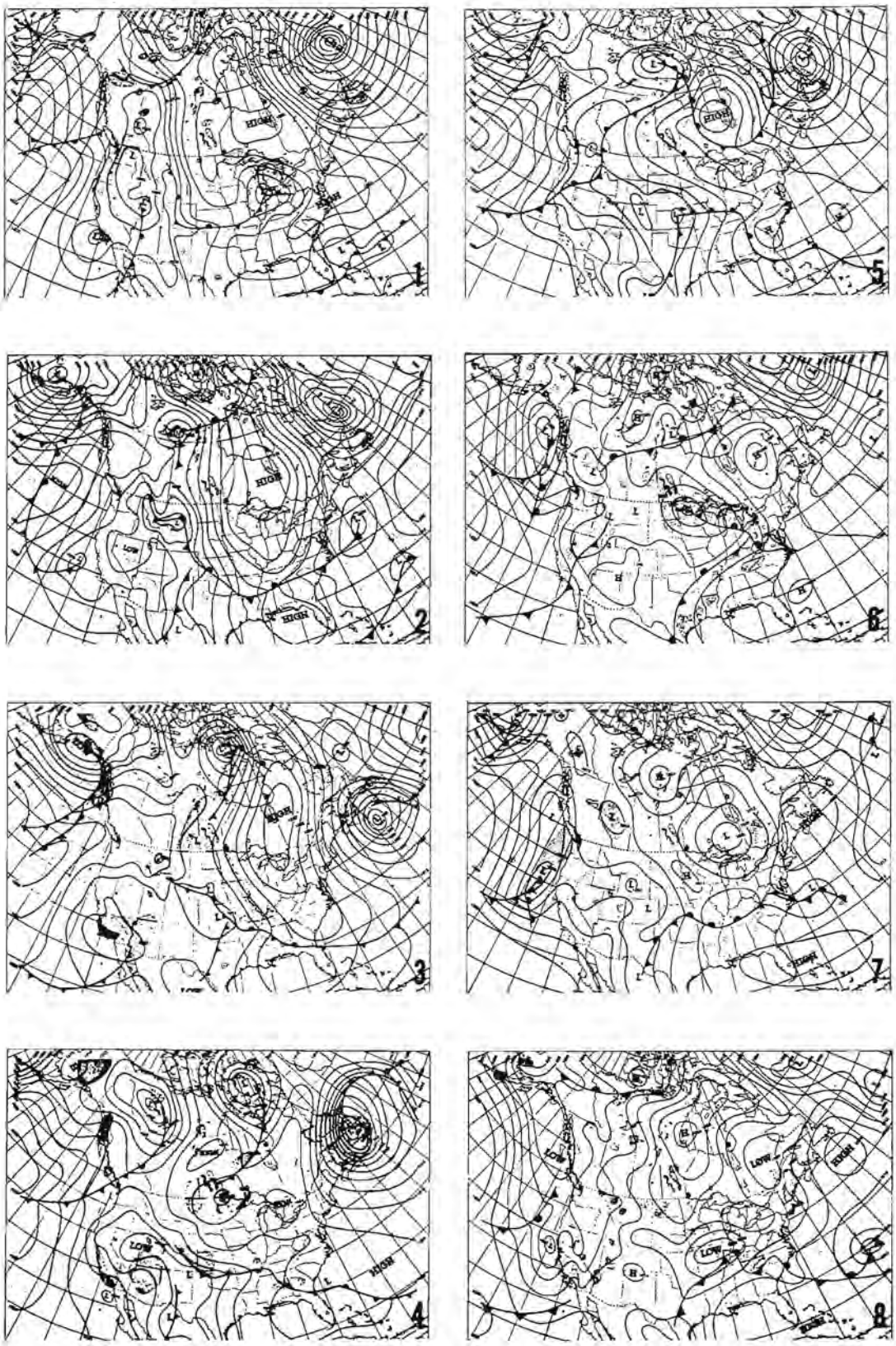


FIGURE 10G.—Daily weather maps, April 1-8 (Noon, CST).

APRIL 1965

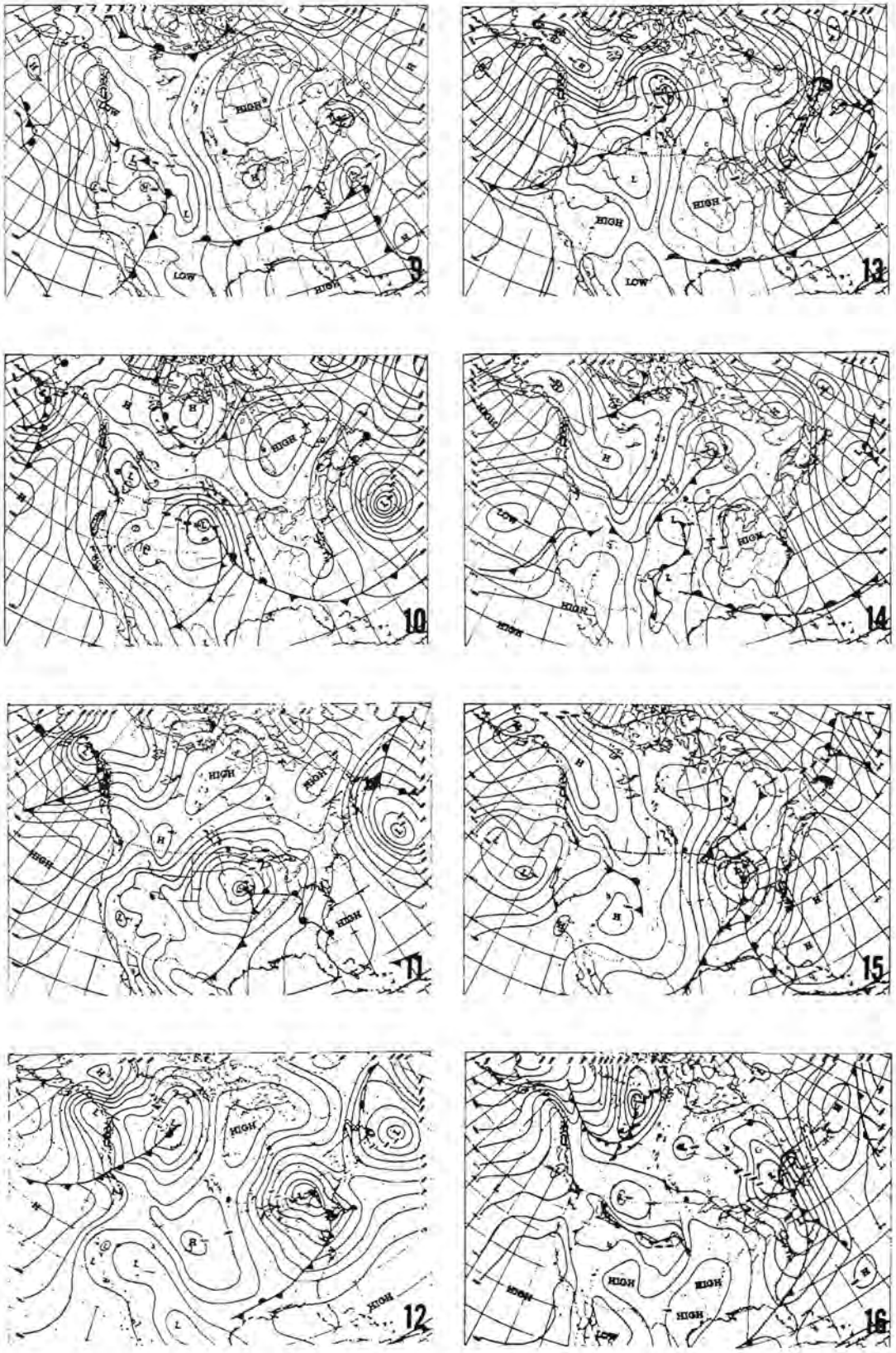


FIGURE 10H.—Daily weather maps, April 9-16 (Noon, CST).

APRIL 1965

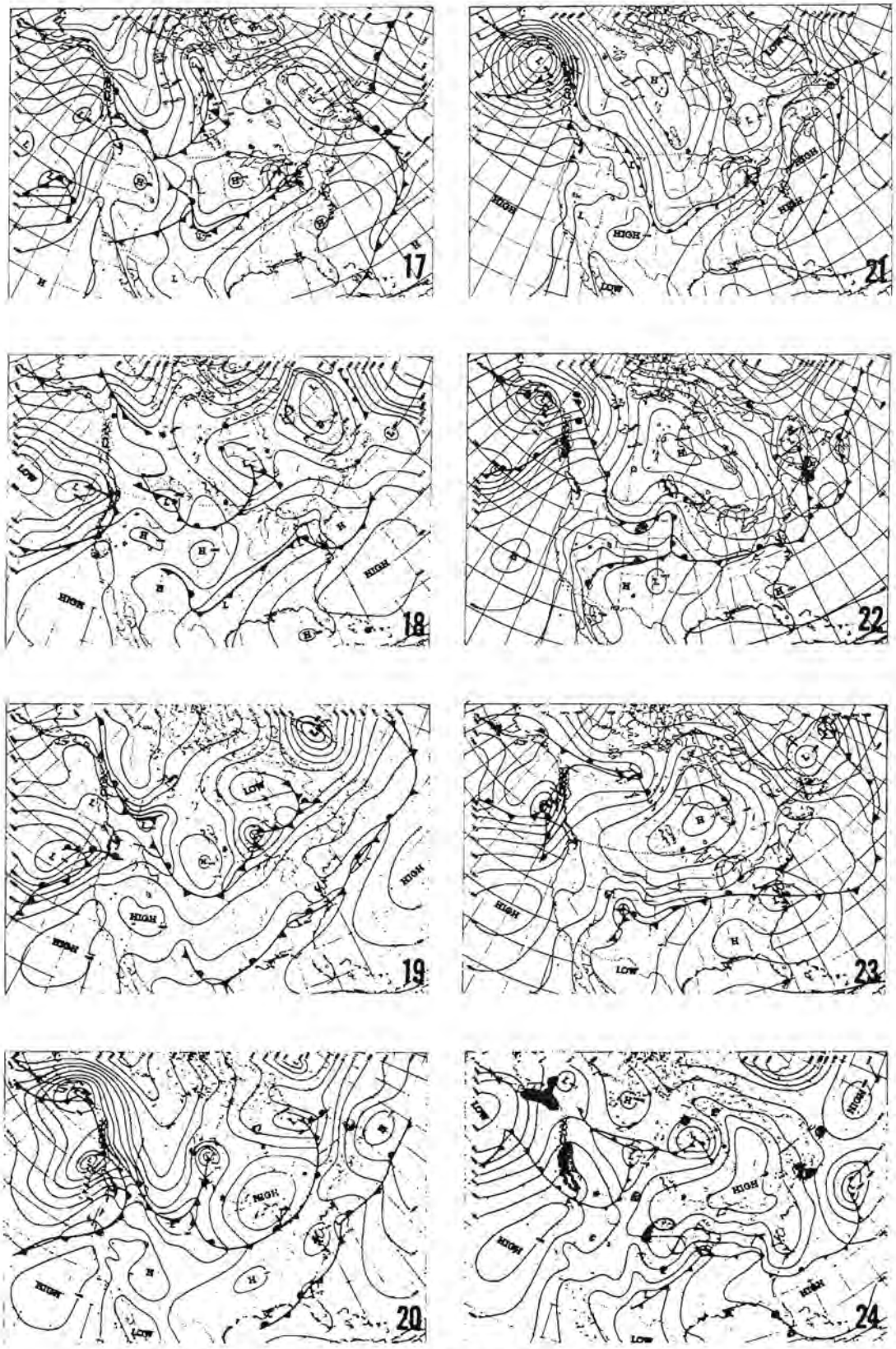


FIGURE 10I.—Daily weather maps, April 17-24 (Noon, CST).

APRIL 1965

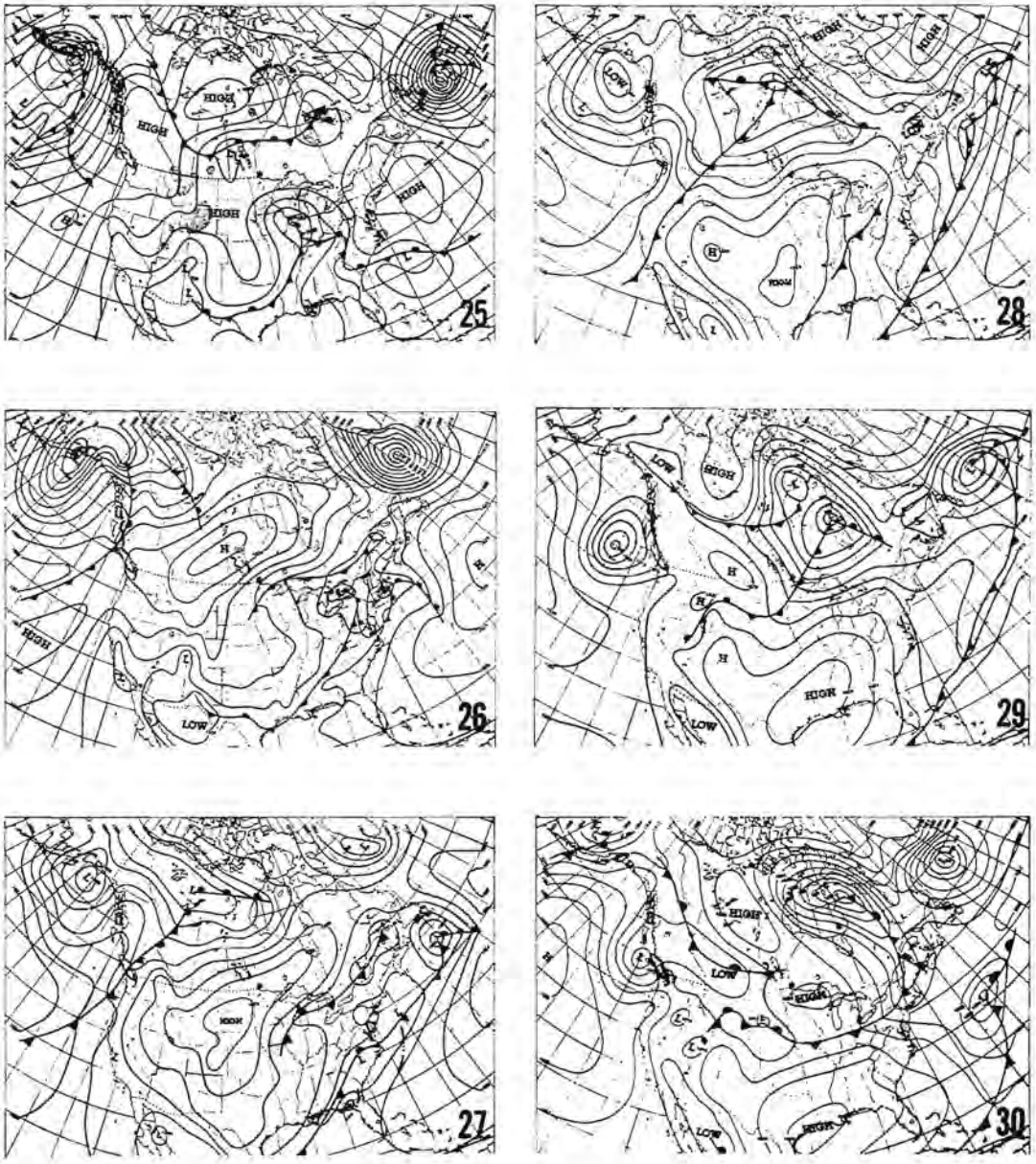


FIGURE 10J.—Daily weather maps, April 25-30 (Noon, CST).

MAY 1965

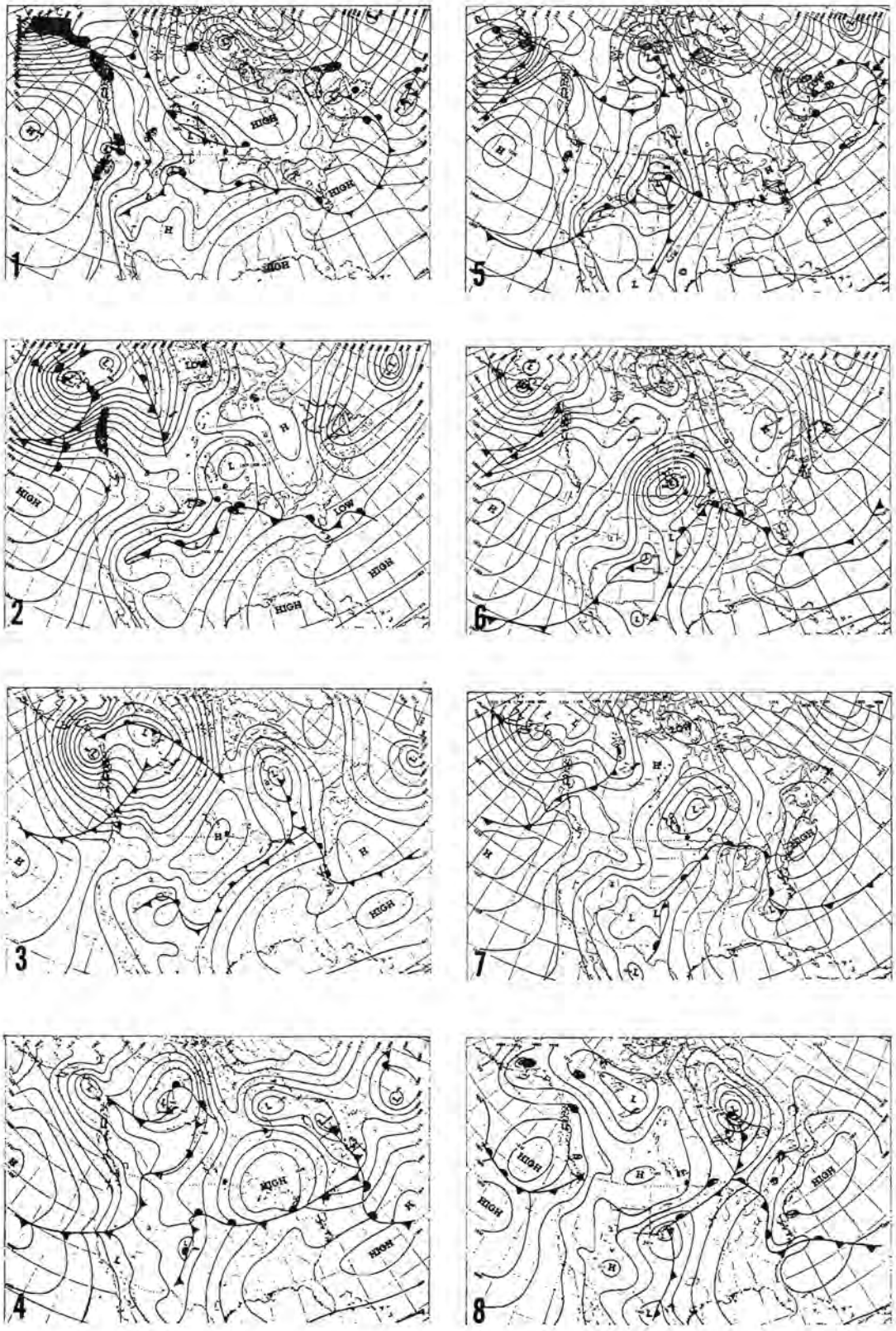


FIGURE 10K.—Daily weather maps, May 1-8 (Noon, CST).

MAY 1965

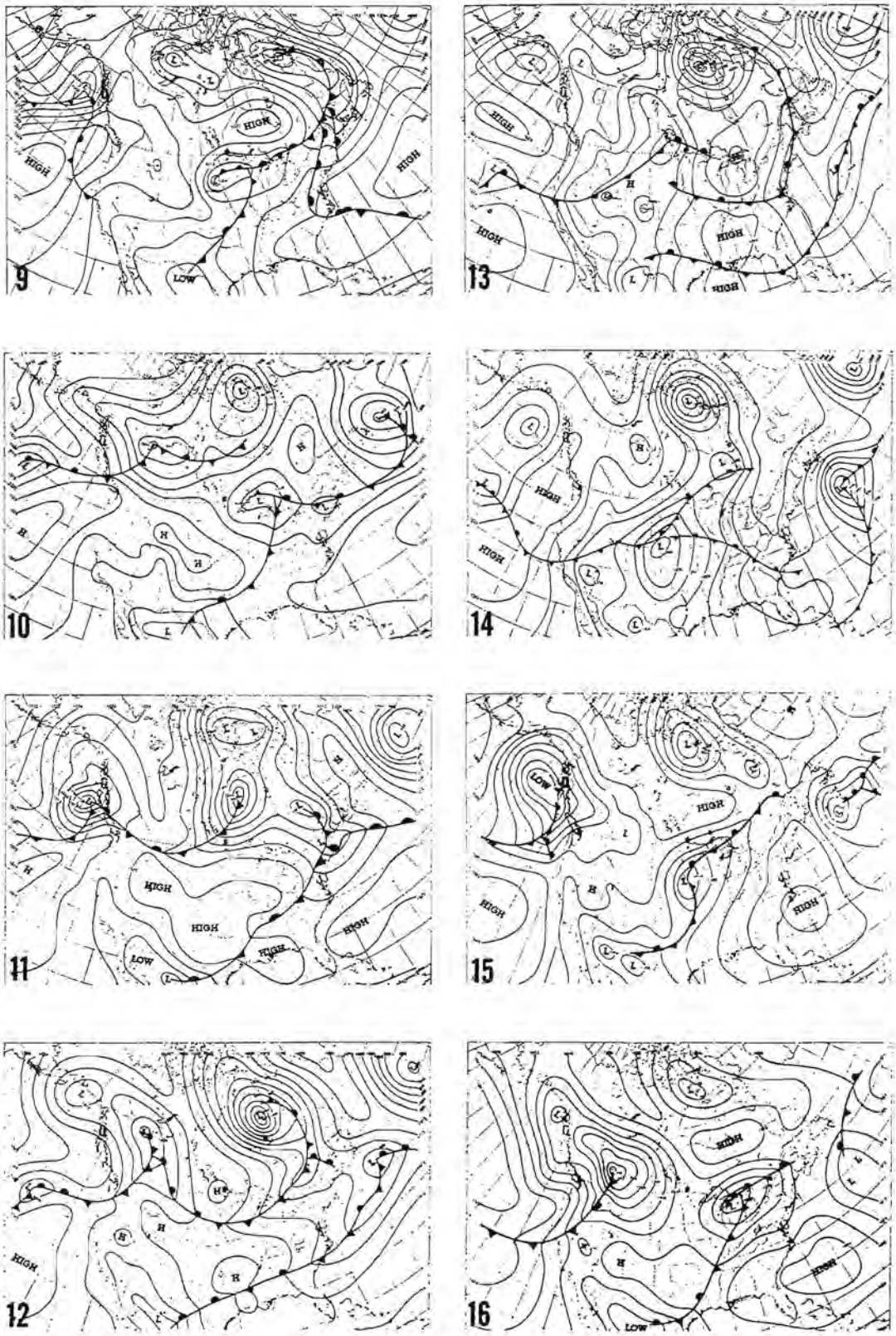


FIGURE 10L.—Daily weather maps, May 9-16 (Noon, CST).

MAY 1965

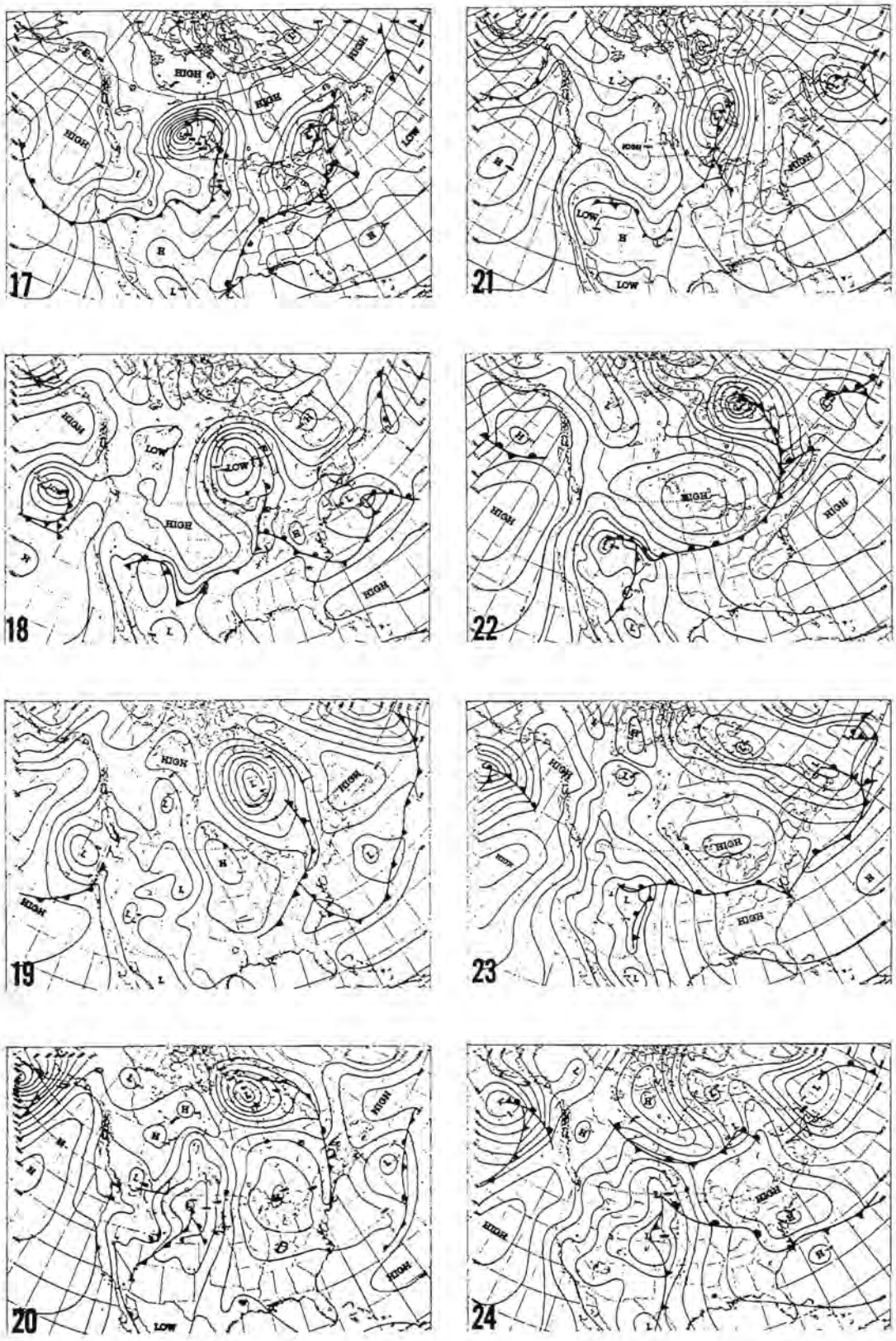


FIGURE 10M.—Daily weather maps, May 17-24 (Noon, CST).

MAY 1965

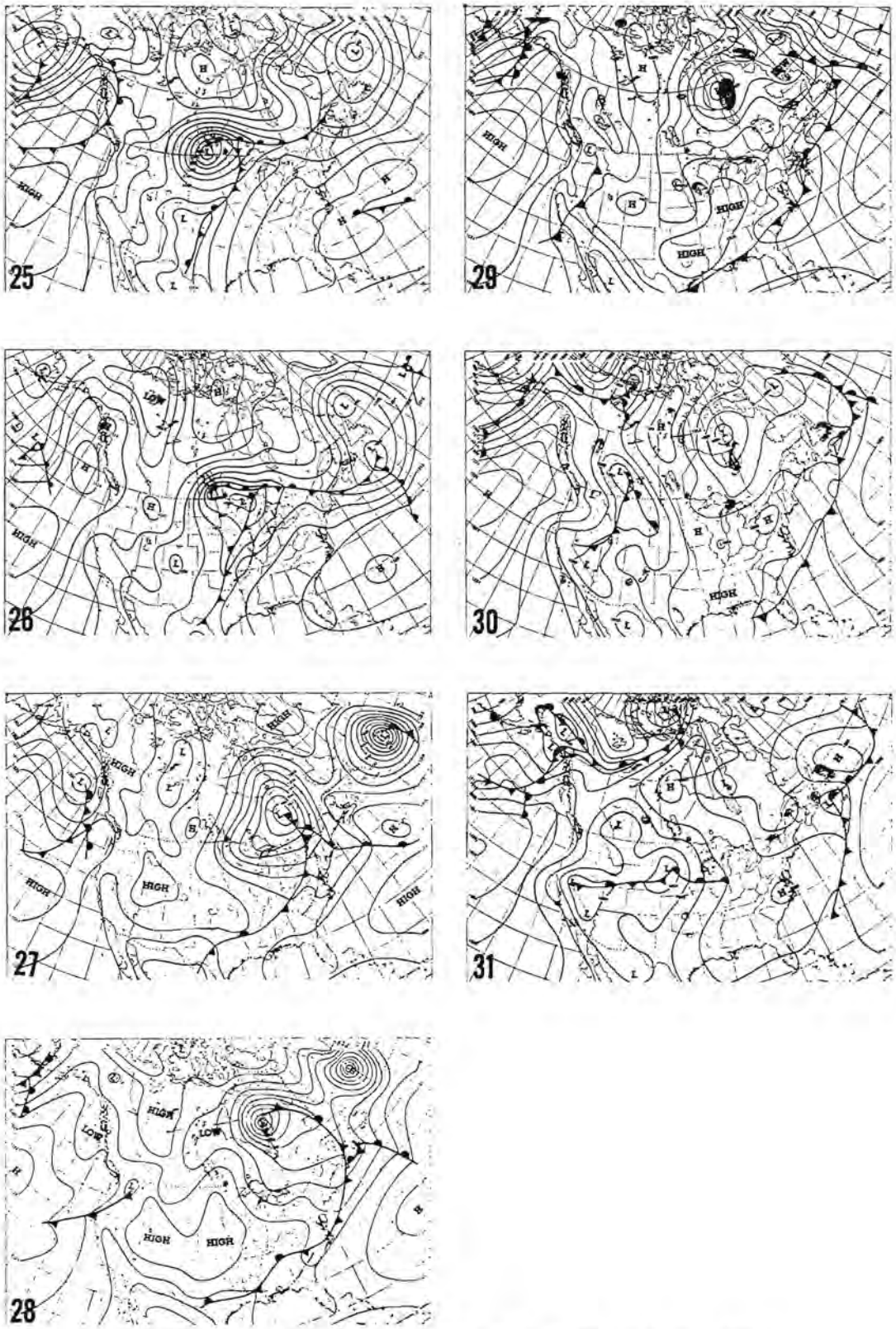


FIGURE 10N.—Daily weather maps, May 25-31 (Noon, CST).

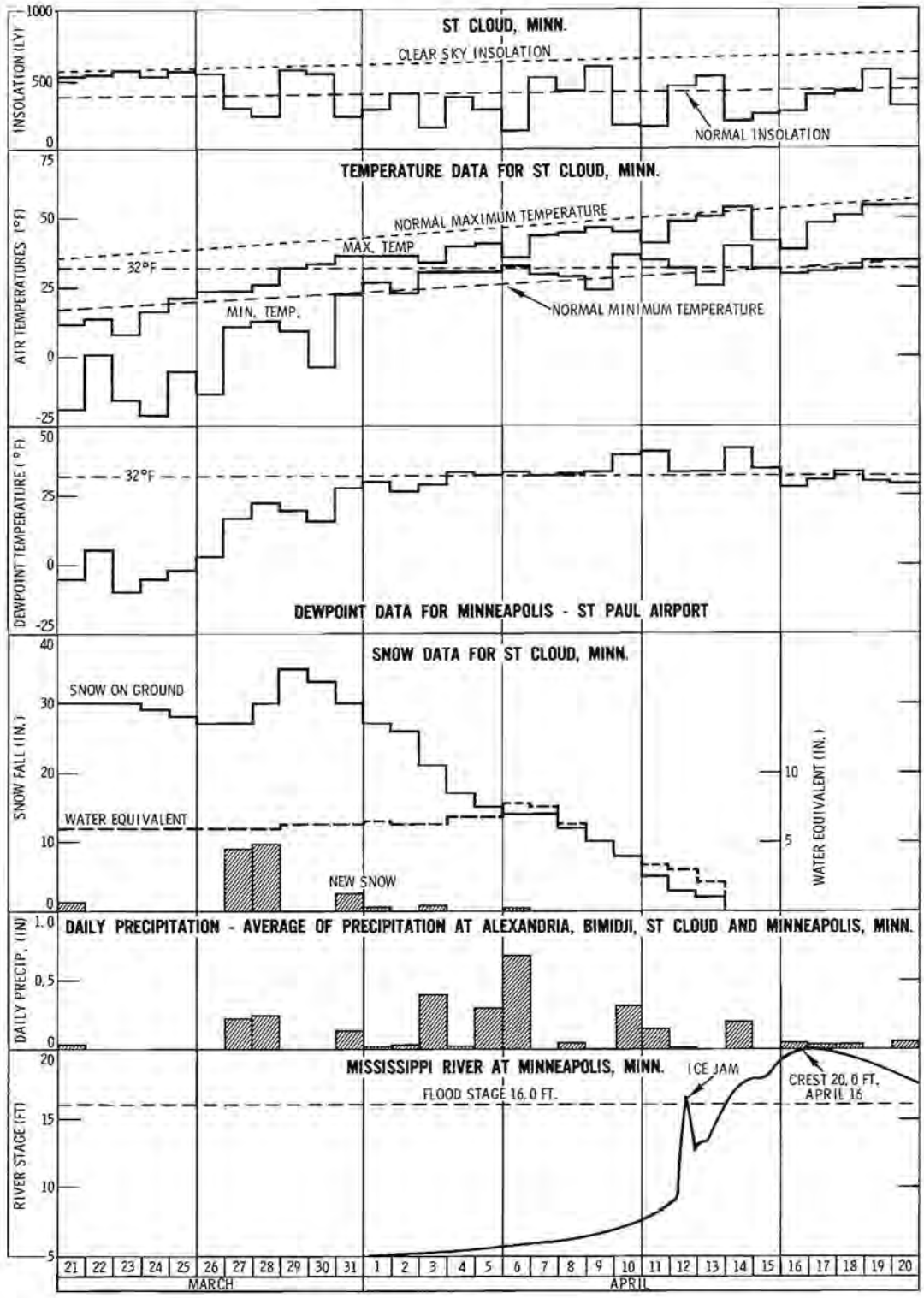


FIGURE 11.—Weather conditions associated with April 1965 flood on the Mississippi River at Minneapolis, Minn.

FIGURE 12A.—Climatological stations—Illinois.

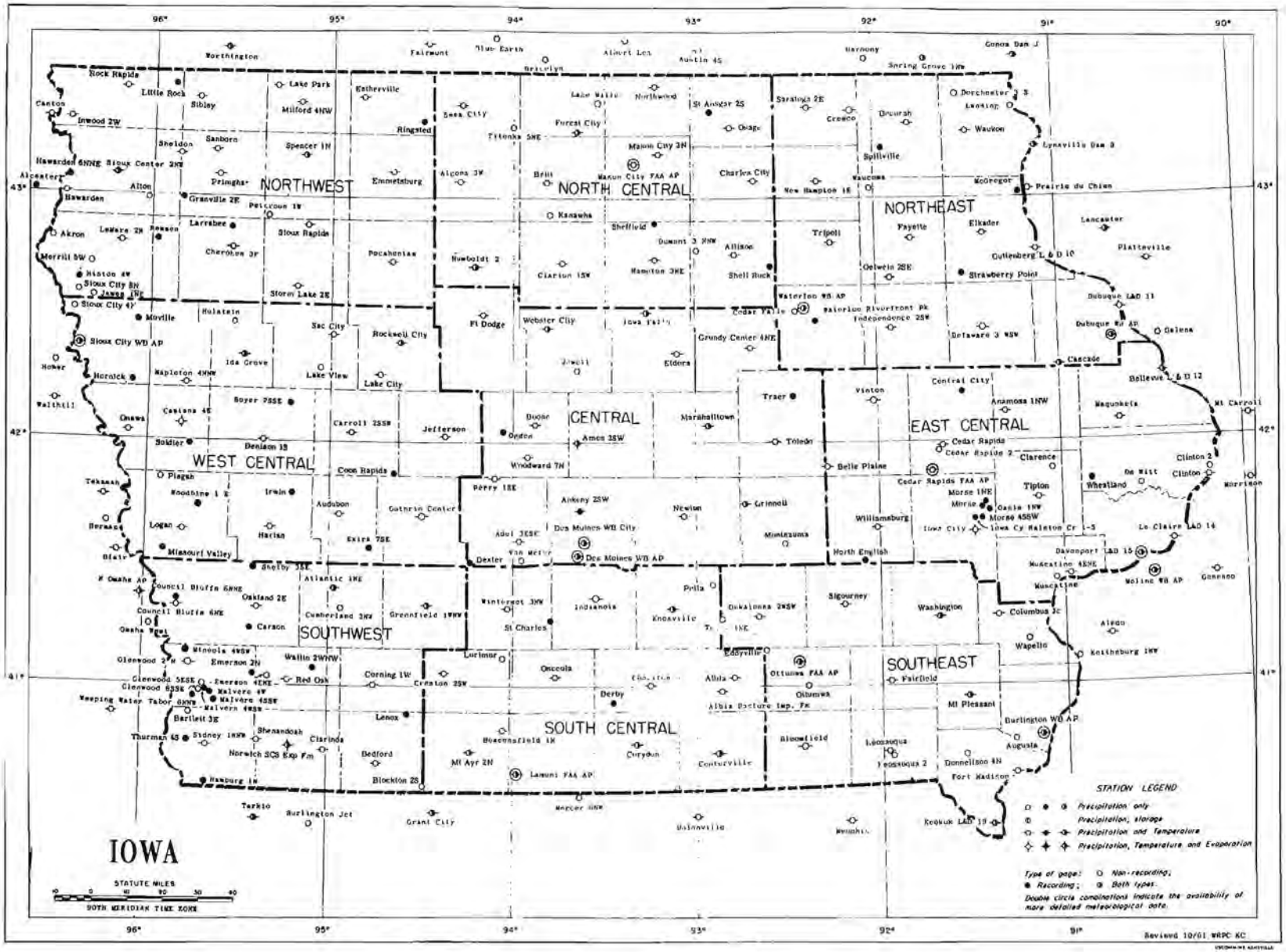


FIGURE 12B.—Climatological stations—Iowa.

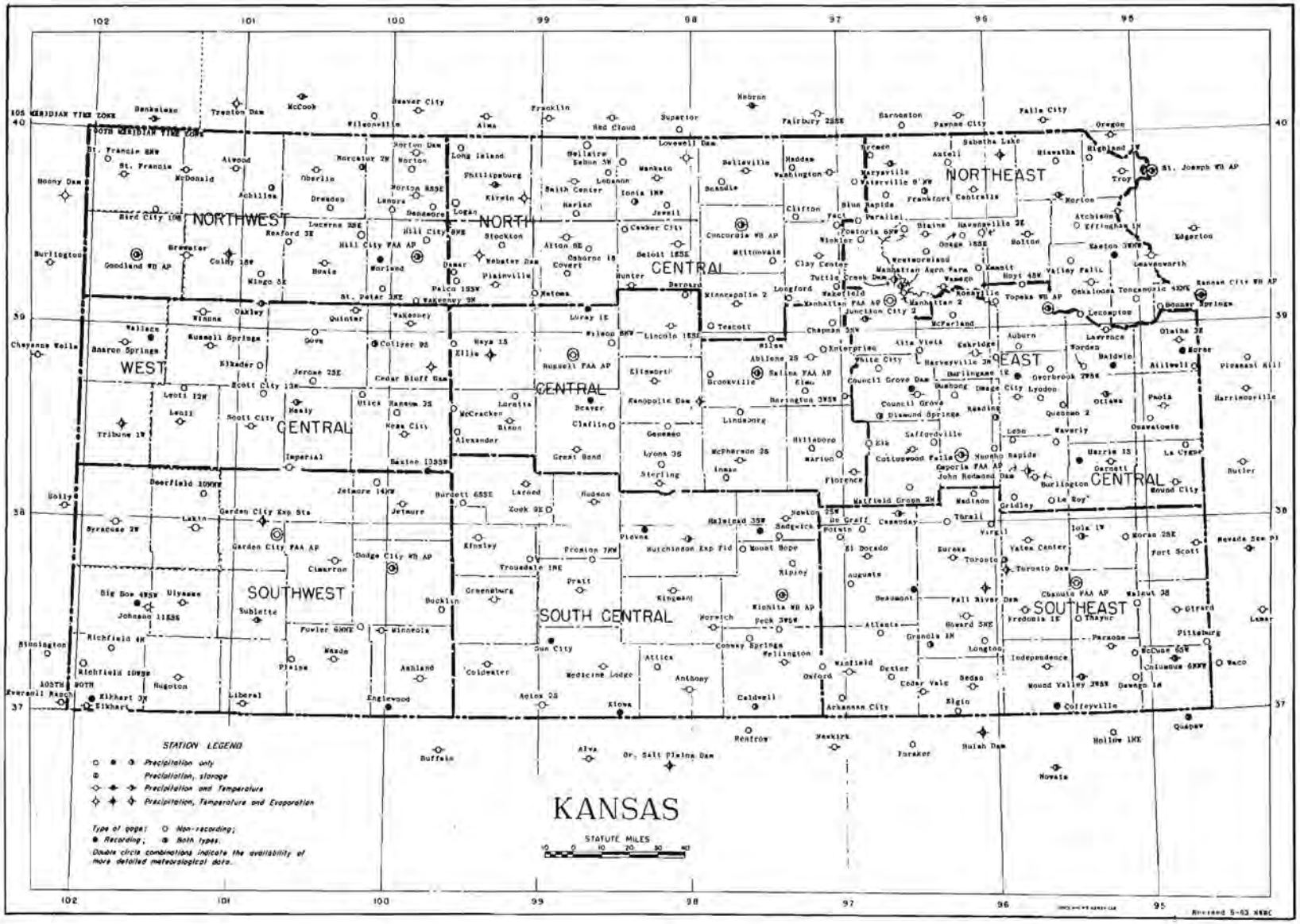


FIGURE 12C.—Climatological stations—Kansas.

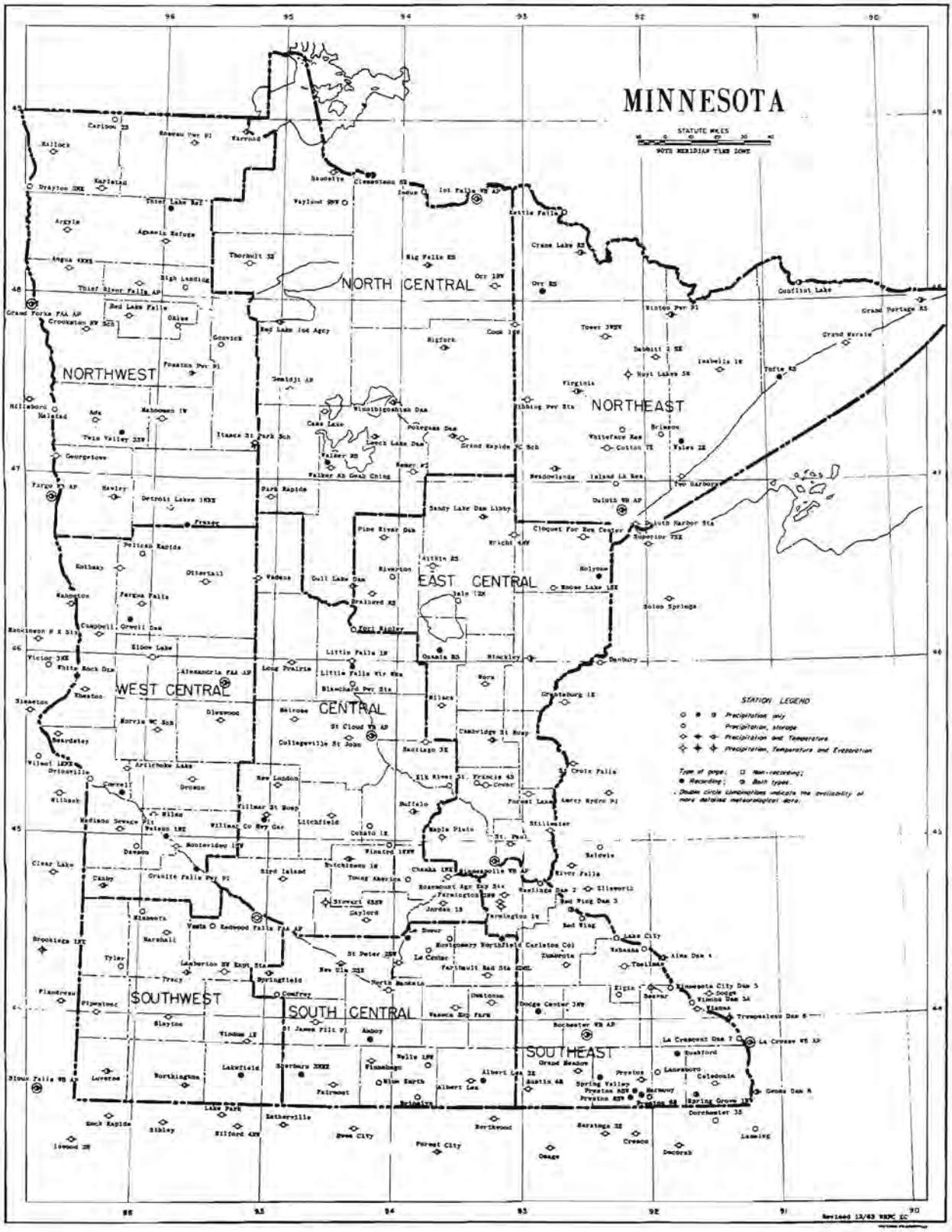


FIGURE 12D.—Climatological stations—Minnesota.

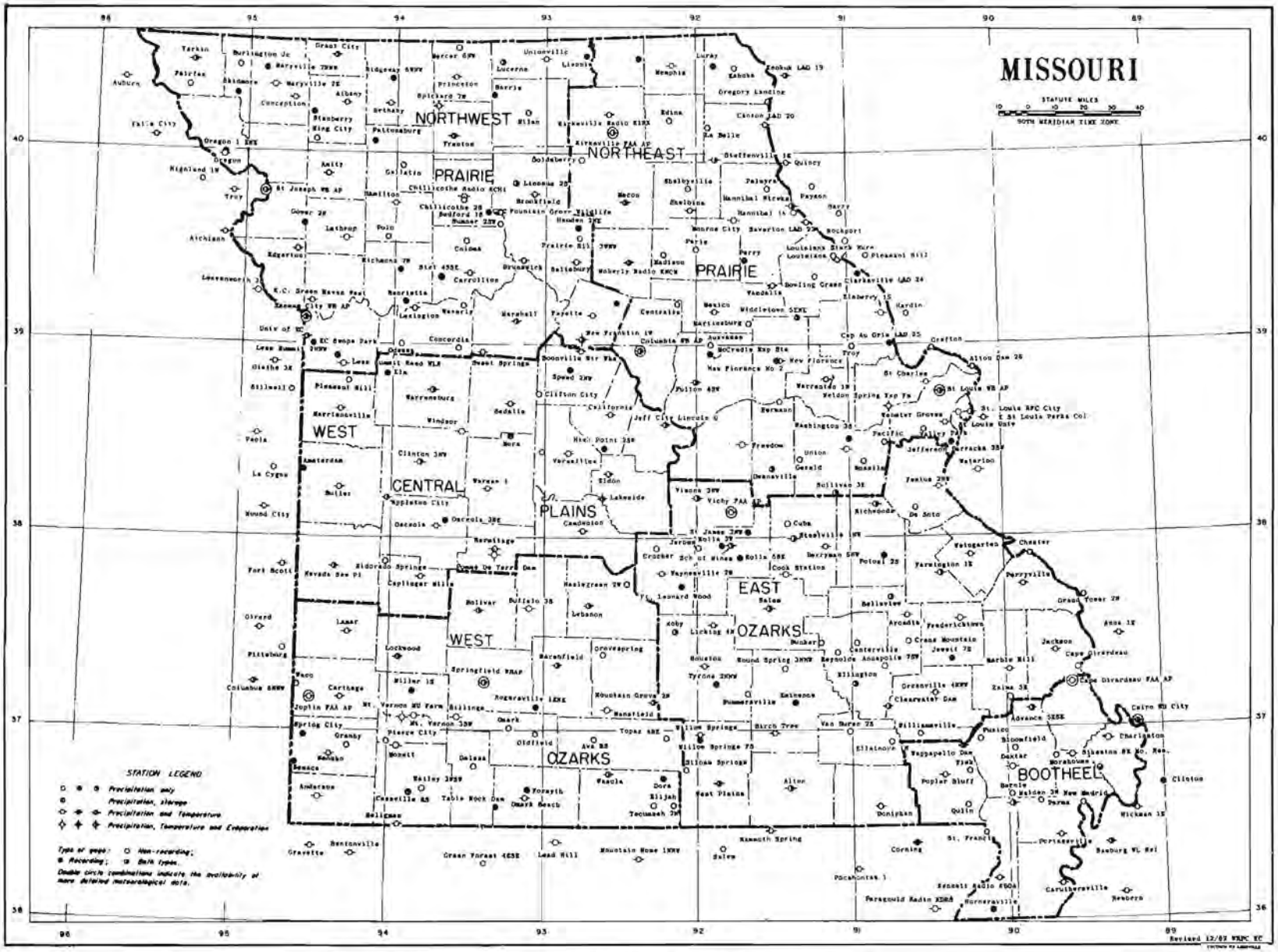


FIGURE 12E.—Climatological stations—Missouri.

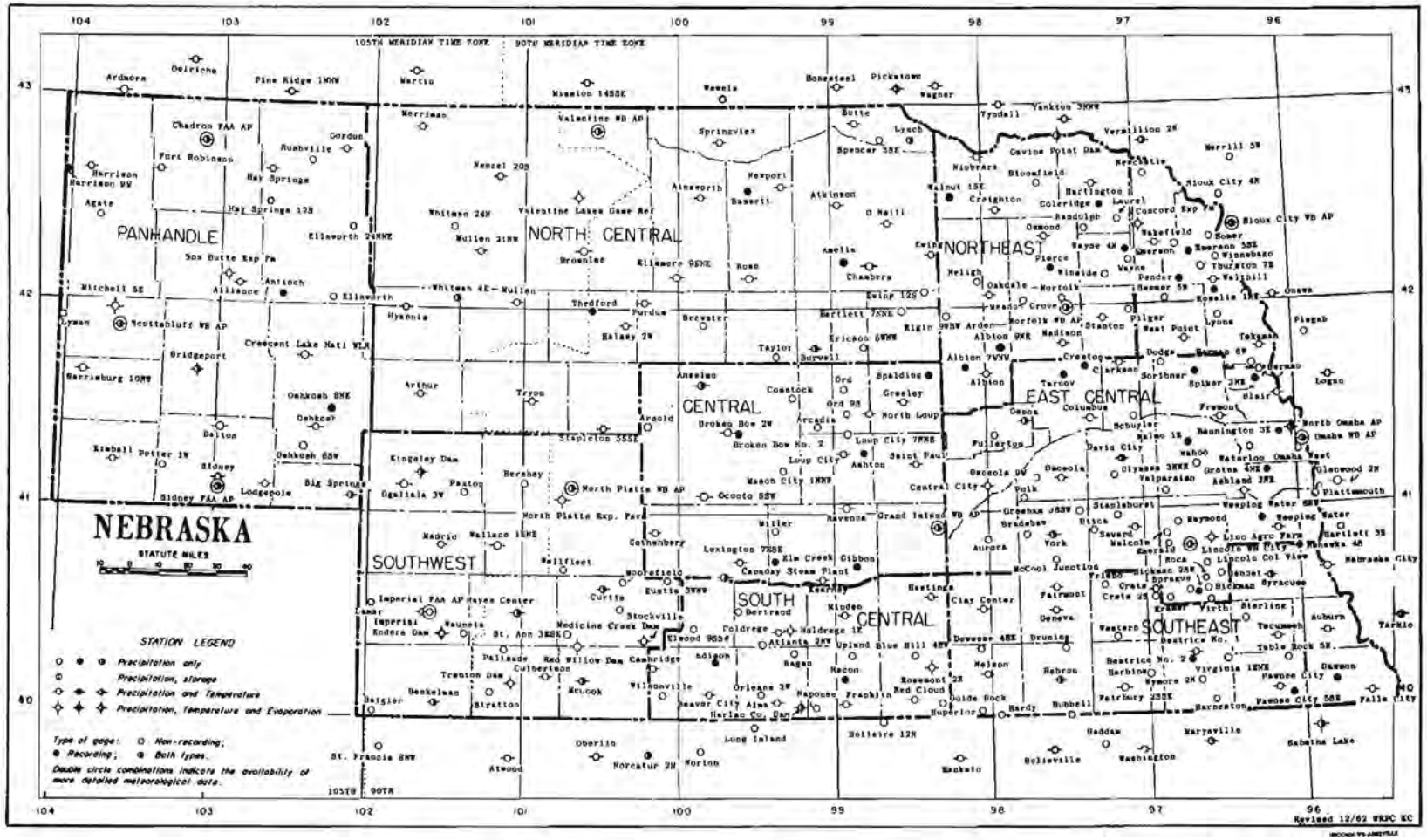


FIGURE 12F.—Climatological stations—Nebraska.

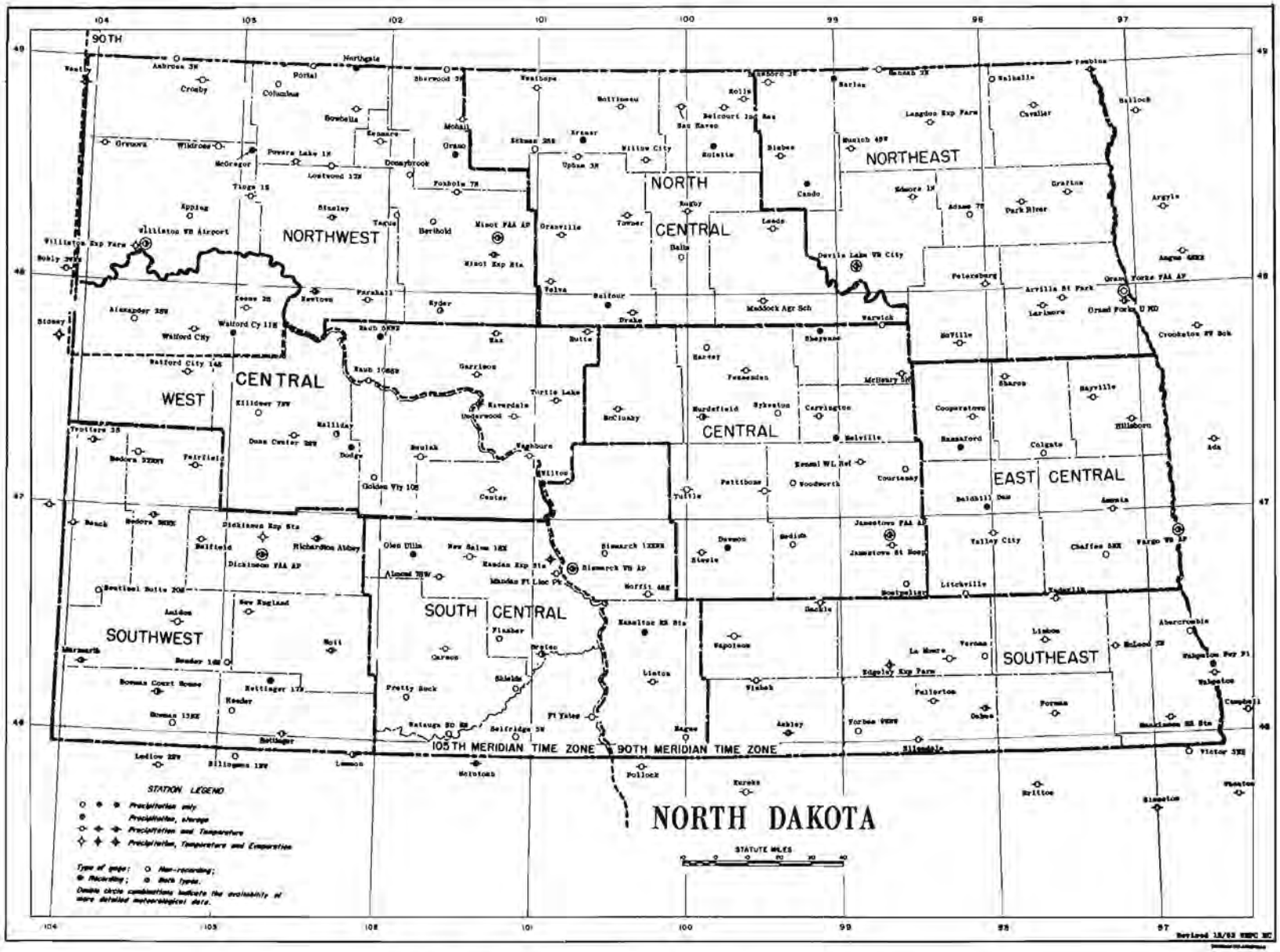


FIGURE 12G.—Climatological stations—North Dakota.

FIGURE 12H.—Climatological stations—South Dakota.

FIGURE 12I.—Climatological stations—Wisconsin.

APPENDIX

SOURCES OF DATA

Degree days. The degree-day maps of figures 7A-7E are based on data computed from daily maximum and minimum temperatures published by ESSA—Environmental Data Service in its monthly *Climatological Data.* All stations for which these data are published were used in the preparation of the maps. Their locations are shown in figures 12A-12I.

Flood data. Data on flood and crest stages (table 1 and figs. 9A-9F) and dates of flooding were obtained from the ESSA-Weather Bureau River District Offices at the following cities:

Moline, Ill.	Kansas City, Mo.
Des Moines, Iowa	St. Louis, Mo.
Sioux City, Iowa	Norfolk, Nebr.
Topeka, Kans.	Omaha, Nebr.
Minneapolis, Minn.	Fargo, N. Dak.

Other agencies, notably the Corps of Engineers and Geological Survey, were involved in collecting these data. Estimates of flood damages and damages saved by flood warnings were provided by the Corps of Engineers.

Frost depth. These data (table 2) were provided by the River District Office at Minneapolis.

Precipitation. The isohyetal maps of figures 2A-2E and 8A-8E are based on daily precipitation data published in ESSA—Environmental Data Services monthly *Climatological Data.* All stations for which these data are published were used in the preparation of these figures. Station locations are shown in figures 12A-12I. Precipitation data given for selected stations in tables 3 to 5 were obtained from *Climatological Data.*

Snow depths (snow on ground). The snow depths presented in table 6 were obtained from the Minneapolis River District Office. Additional snow-depth data published in *Climatological Data* were also considered in the preparation of this report, and are presented for selected stations in tables 3 to 5.

Snowfall. The snowfall data given for selected stations in tables 3 and 4 were obtained from *Climatological Data.*

Temperatures. Daily maximum and minimum temperatures are published in *Climatological Data* for most stations shown in figures 11A-11I. Data shown in tables 3 and 4 are from that publication. References to dew point temperatures in this report are based on the *Daily Weather Map* published by ESSA-Weather Bureau.

Water equivalent. The water equivalent maps of figures 6A-6E are based on data (table 6) obtained from the River District Office at Minneapolis and those published in *Climatological Data.*

* U.S. GOVERNMENT PRINTING OFFICE : 1967 O—277-502

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