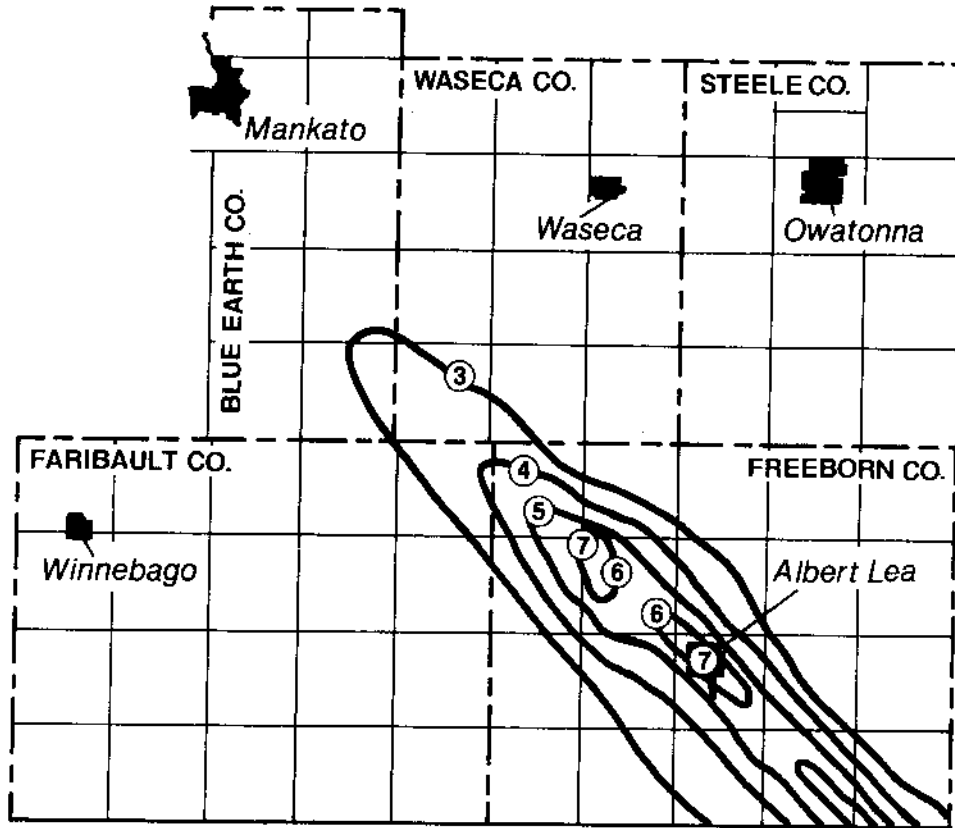
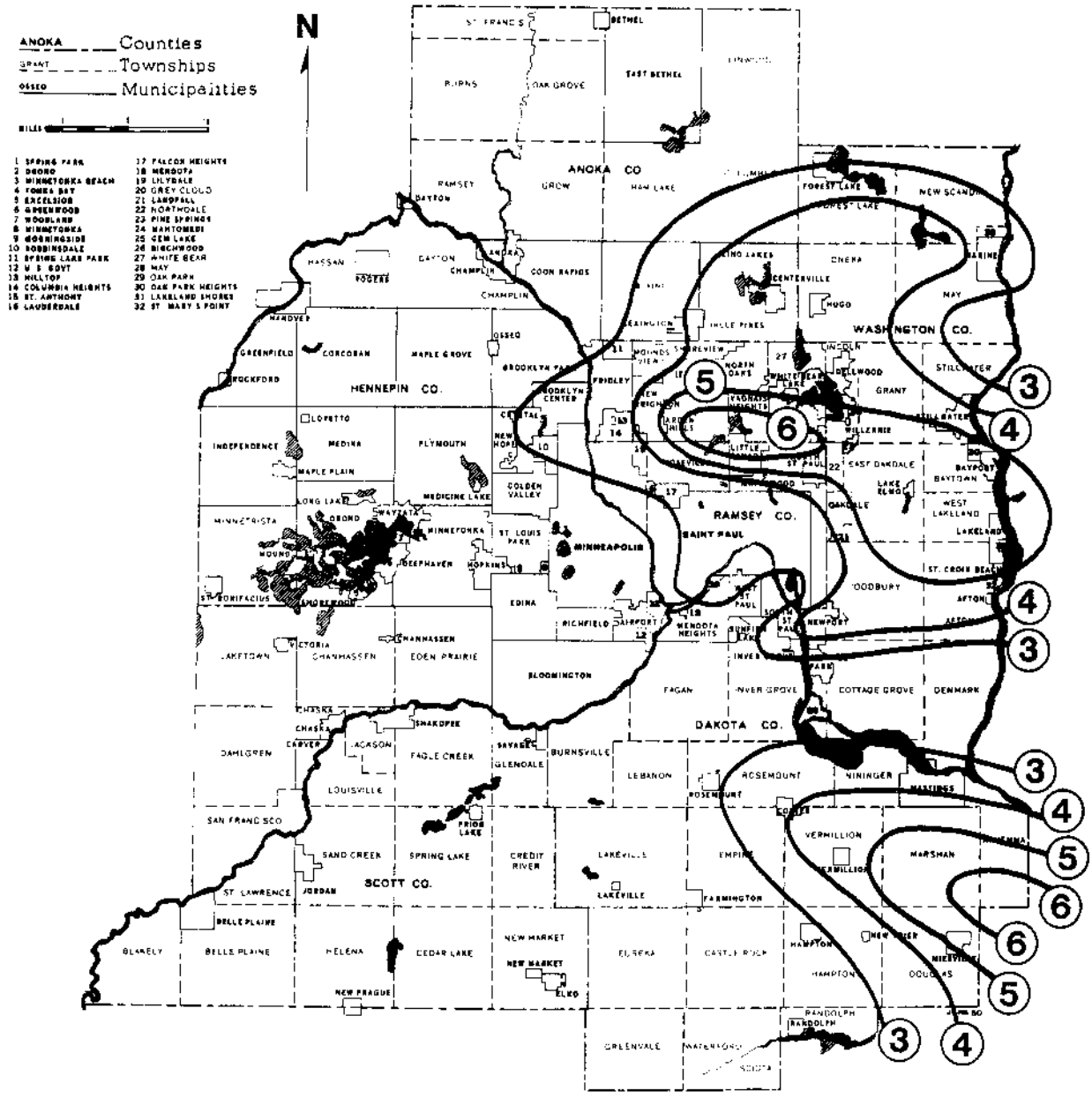


ALBERT LEA FLASH FLOOD
(South Central MN)
June 14, 1978

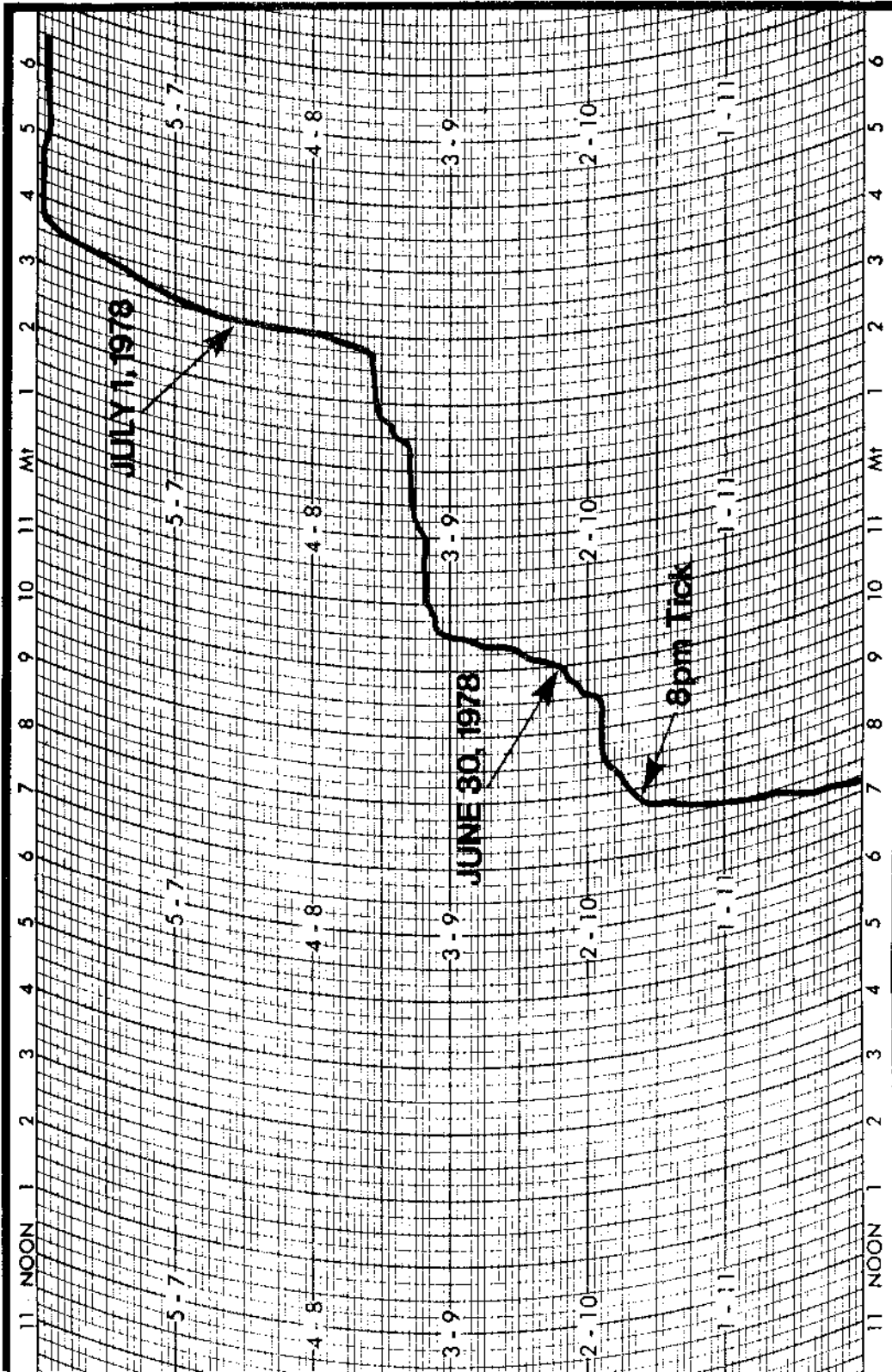


The Albert Lea flash flood occurred between 7 PM and midnight CDST on June 14, 1978. Two areas received over 7 inches of rainfall. Albert Lea reported 7.50 inches, and an area about 2 miles east of Freeborn in northwest Freeborn County reported 7.30 inches. More than 4 inches of rain fell on a 6 to 8 mile wide band from northwest Freeborn County through Albert Lea and Glenville into Iowa. This covers an area of 200 square miles. The isohyet map was plotted from 53 Future Farmers of America reports.

EASTCENTRAL FLASH FLOOD (Northern Suburbs of St. Paul) June 30 – July 1, 1978



Portions of the northern suburbs of St. Paul received heavy rains on the evening of June 30 and July 1, 1978. The largest observed rainfall was 6.7 inches in north central Ramsey County. Northern Ramsey County and north and central Washington County, a 400 square mile area, received greater than 4 inches of precipitation. Heavy rain showers began in the area at approximately 7 PM CDST June 30 and continued intermittently until 4 AM July 1. These rain showers were the northern part of a 140-mile long line of showers that extended from the Twin Cities to the Minnesota-Wisconsin-Iowa border.

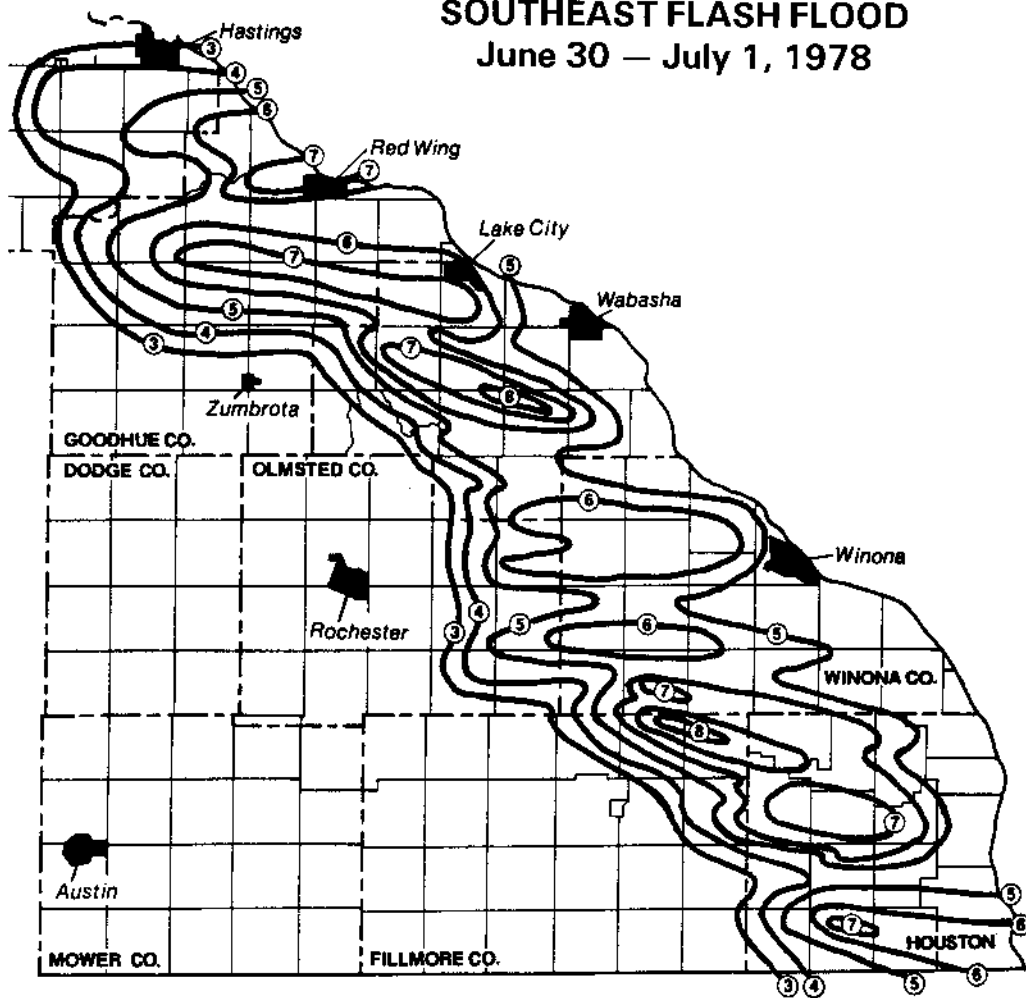


PRECIPITATION RECORD FROM 12" DUAL WEIGHING RAIN GAUGE

RAMSEY COUNTY

SHOREVIEW: TWP - 030N RGE - 23W SEC - 35

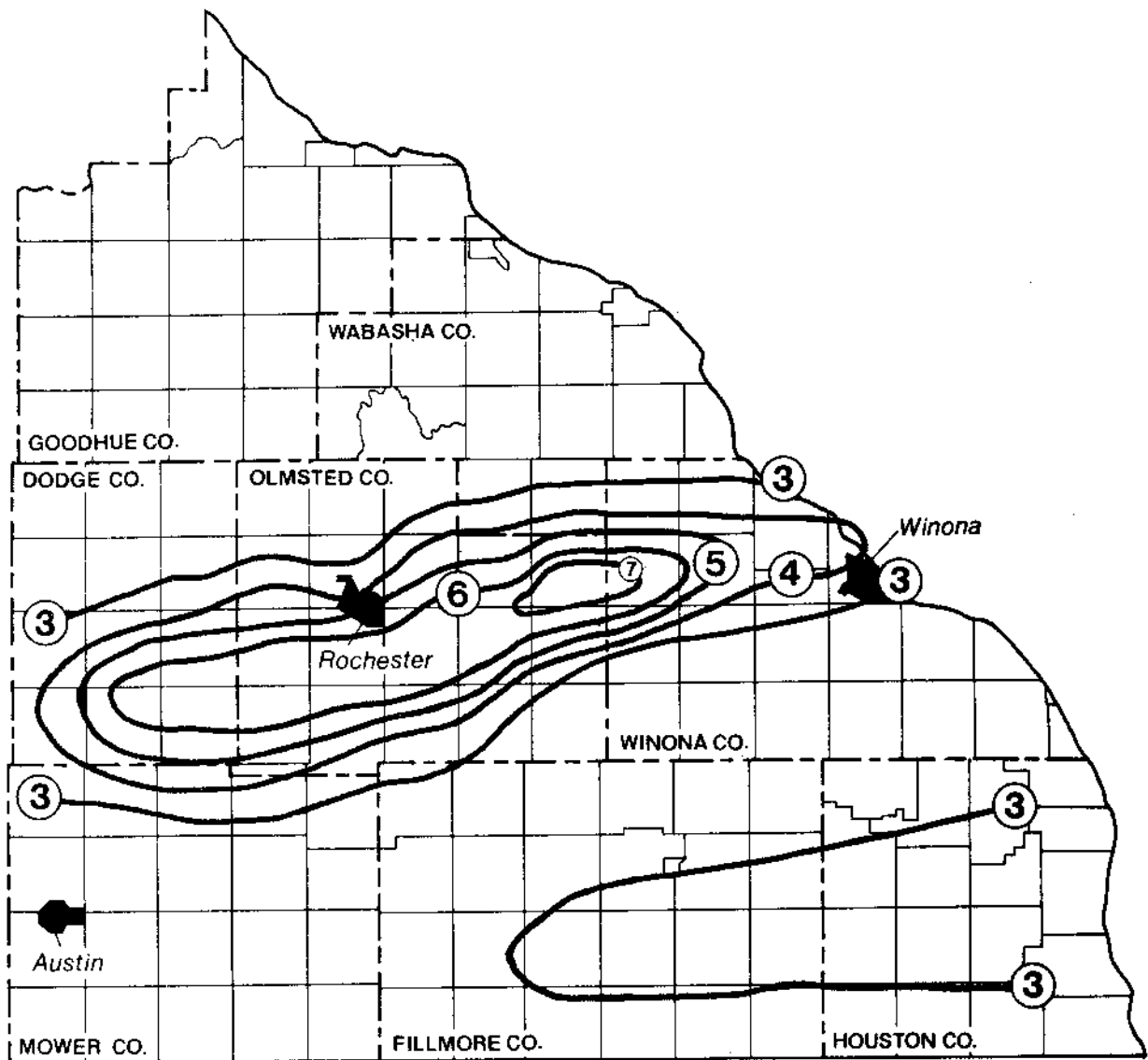
SOUTHEAST FLASH FLOOD June 30 – July 1, 1978



East and southeast Minnesota experienced widespread flash flooding on June 30 thru July 1, 1978. These floods differed from the usual flash flood pattern. A typical pattern has only one localized area of high-intensity precipitation, generally from a single cell. Seven to nine separate areas in east and southeast Minnesota had over 6 inches of precipitation on June 30-July 1 from several storm cells forming during a 14-hour period. Numerous heavy thunderstorms moved east to southeast from a 140-mile long line extending from western Ramsey County (the Twin Cities) to western Houston County (25 miles west of the Iowa-Minnesota-Wisconsin border). Radar shows heavy showers occurred from about 6 PM CDST June 30 until 1 AM July 1, and moderate showers continued across the area until approximately 7 AM July 1.

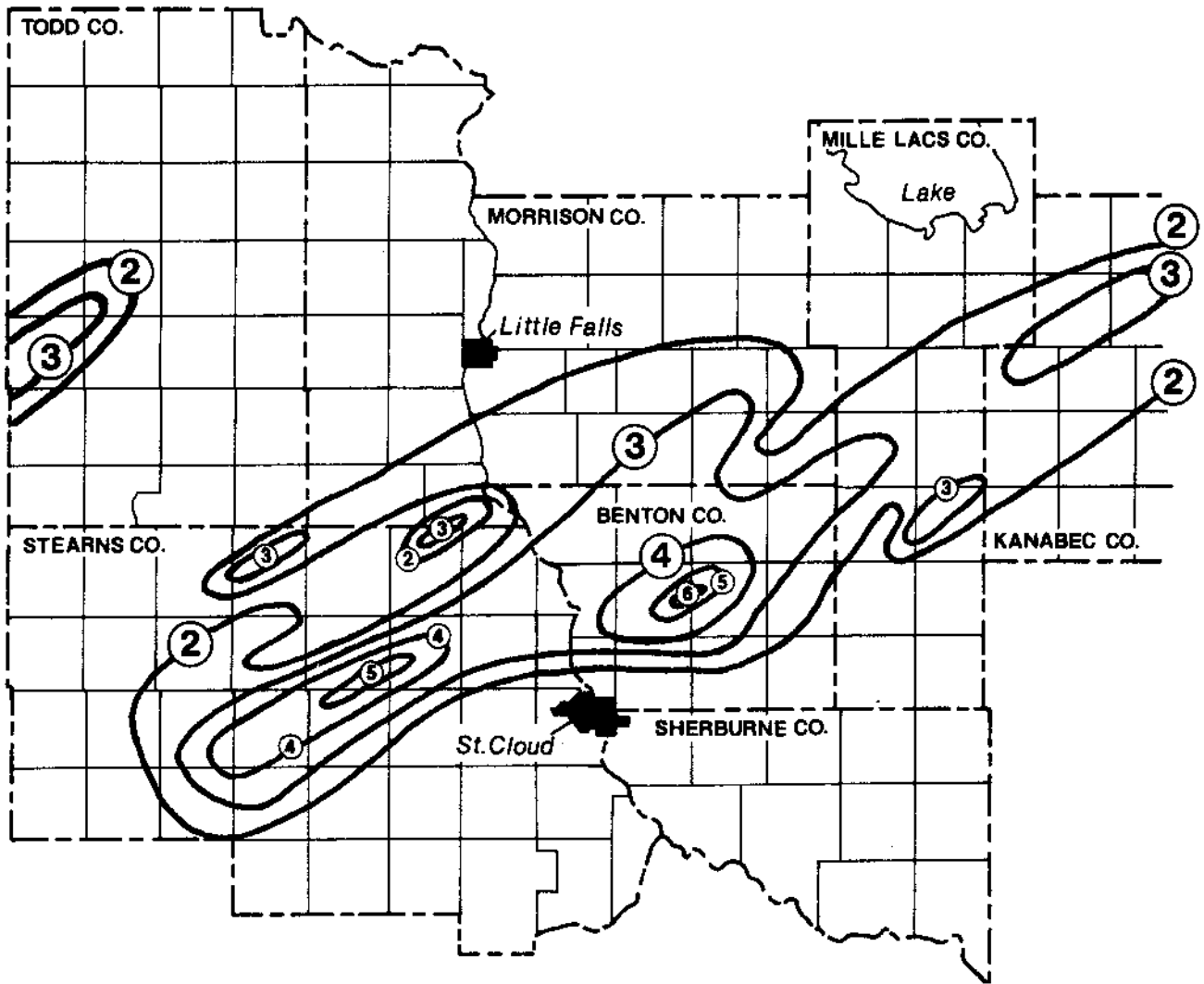
Portions of Ramsey, Dakota, Goodhue, Wabasha, Olmsted, Winona, Fillmore, and Houston Counties received over 6 inches of precipitation. A 6 or more inch rainfall is a 100-year or greater storm for this area. Greater than 8 inches of precipitation was reported in Mount Pleasant and Highland Townships in Wabasha County and in Arendahl and Rushford Townships in Fillmore County. The largest recorded amount was 8.68 inches. A 2,850 square mile area received greater than 4 inches of precipitation in Minnesota. Generally, the heaviest and most extensive rainfalls were across Goodhue, Wabasha, Winona, and Houston Counties. Northern Ramsey, central Washington, eastern Dakota, eastern Olmsted, and northeastern Fillmore also had extensive rainfalls. The above map was prepared from 115 precipitation reports. Flash flood areas for Ramsey and Washington Counties are drawn on a separate map.

SOUTHEAST FLASH FLOOD
(Rochester Storm No. 1 & Austin Storm No. 1)
July 5-6, 1978



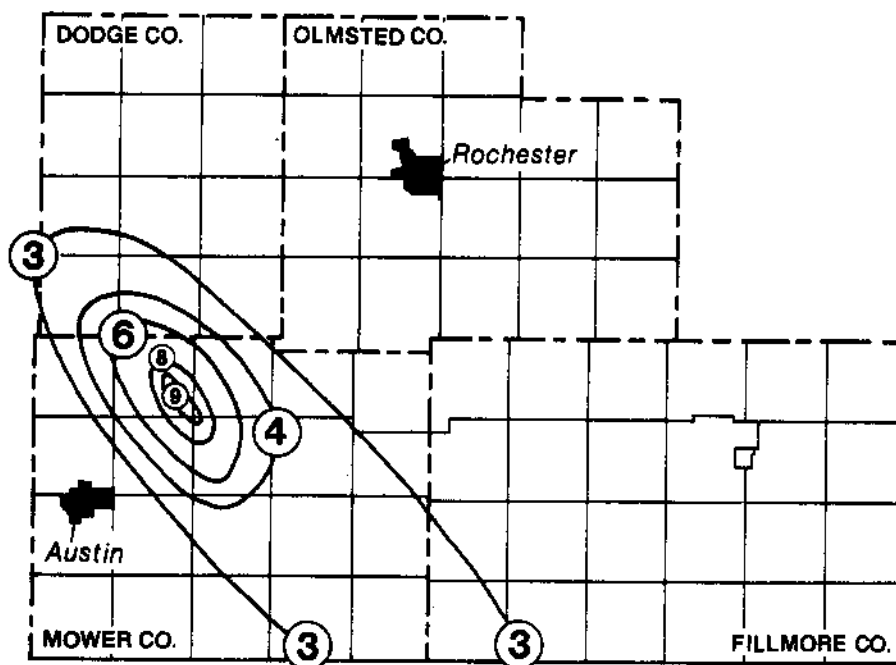
The flash flood for Rochester, Minnesota occurred from heavy rains of 6 inches or more. The storm began at Rochester airport at 5:53 PM CDST on July 5, 1978 and ended at 1:50 AM CDST on July 6, 1978. The National Weather Service weighing rain gage recorded in a 3-hour period, 5:53 PM CDST to 8:53 PM CDST, 4.99 inches of rain, which is well above the 100- year return period. The heaviest amount, 7.3 inches, occurred in Quincy Township in eastern Olmsted County. The 4-inch or more rainfall band was about 12-15 miles wide and 74 miles long and covered an area of 700 square miles. The line which oriented east-northeast began 25 miles west-southwest of Rochester and ended 50 miles east on the Minnesota-Wisconsin border. The map was prepared from 64 Future Farmer of America reports and 16 National Weather Service reports.

**EAST-CENTRAL
(Benton, Stearns Counties)
July 6-7, 1978**



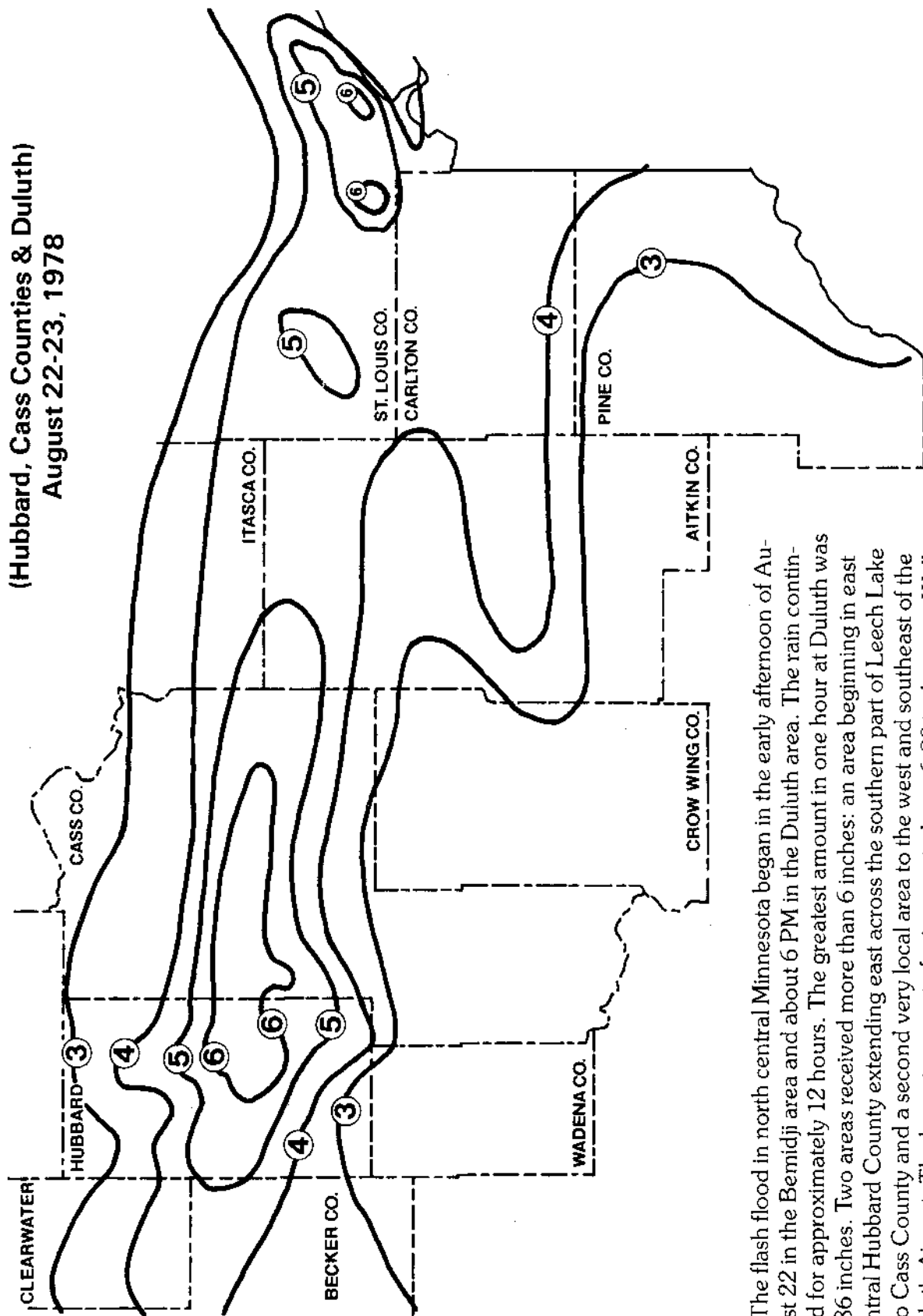
Benton and Stearns Counties received heavy rains on the evening of July 6-7, 1978. The rainshowers began at approximately 6:00 PM in Stearns County and at 6:45 PM CDST in Benton County. Radar indicates that maximum rainfall intensities occurred at approximately 7:00 PM. The rain ended about 9:00 PM. The largest amounts, greater than 5 inches, were reported in Mayhew Lake Township in Benton County and Avon and Albany Townships in Stearns County. A 110 square mile area received greater than 4 inches of precipitation.

AUSTIN STORM NO. 2
(Southeast MN)
July 16-17, 1978



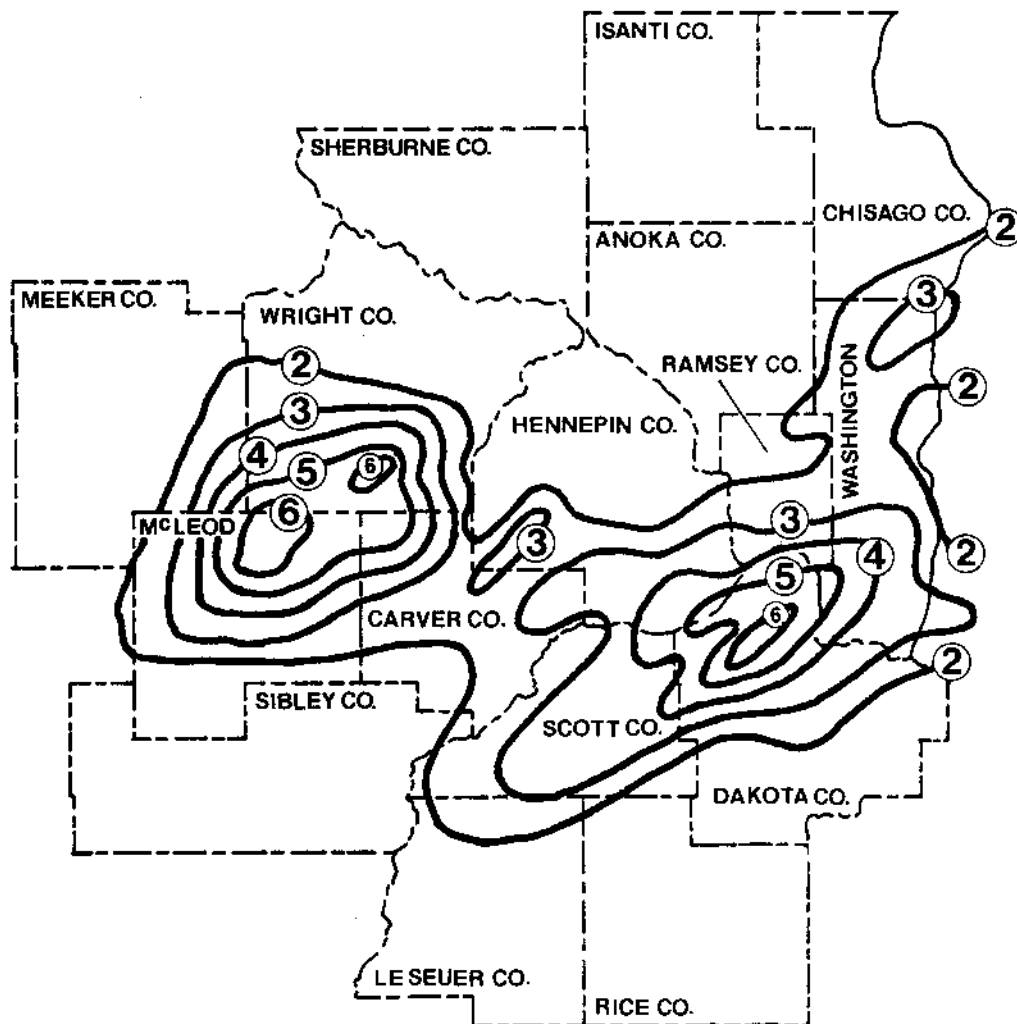
The flash flood at Austin, Minnesota, occurred from heavy rains of 8 inches or more. The rain began at approximately 9:00 PM CDST on July 16 and ended during the early morning hours of July 17. This was the second flash flood to occur in the headwaters of the Cedar River, north of Austin, in 11 days. Both floods resulted in record-breaking flood levels at Austin. The largest amount of rain reported was 9.50 inches in Watham Township (2 miles southwest of Sargeant) in northwestern Mower County. The 4-inch or greater rainfalls were oriented northwest to southeast and covered an area of 160 square miles.

NORTH CENTRAL FLASH FLOOD
 (Hubbard, Cass Counties & Duluth)
 August 22-23, 1978



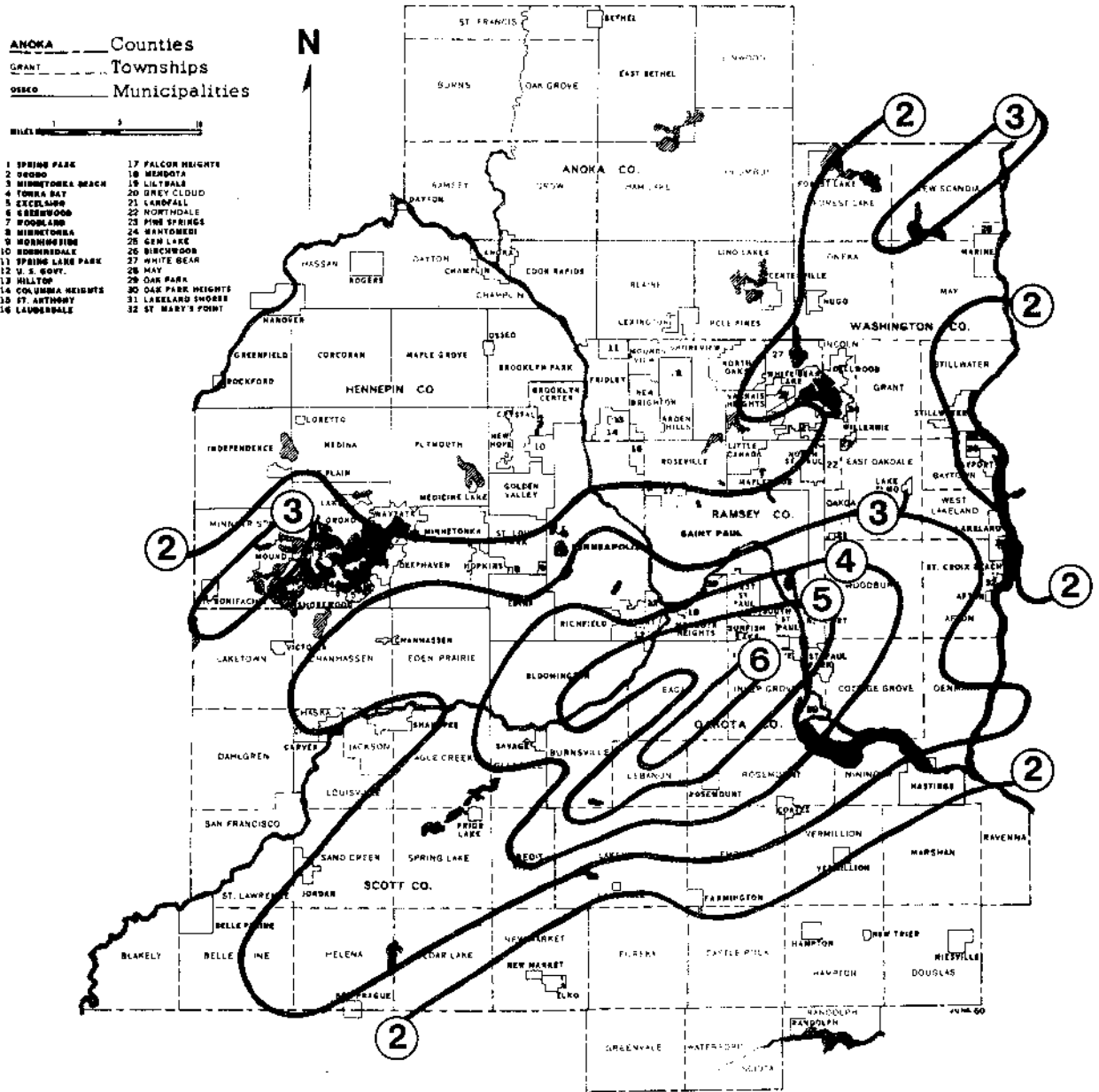
The flash flood in north central Minnesota began in the early afternoon of August 22 in the Bemidji area and about 6 PM in the Duluth area. The rain continued for approximately 12 hours. The greatest amount in one hour at Duluth was 0.86 inches. Two areas received more than 6 inches: an area beginning in east central Hubbard County extending east across the southern part of Leech Lake into Cass County and a second very local area to the west and southeast of the Duluth Airport. The largest amount of rain reported was 6.80 inches near Walker. The 4-inch or greater rainfalls were oriented toward the east at about 100 degrees and covered an area of 4,100 square miles.

EAST-CENTRAL
(McLeod, Wright Counties and Southern Twin Cities)
August 26-27, 1978



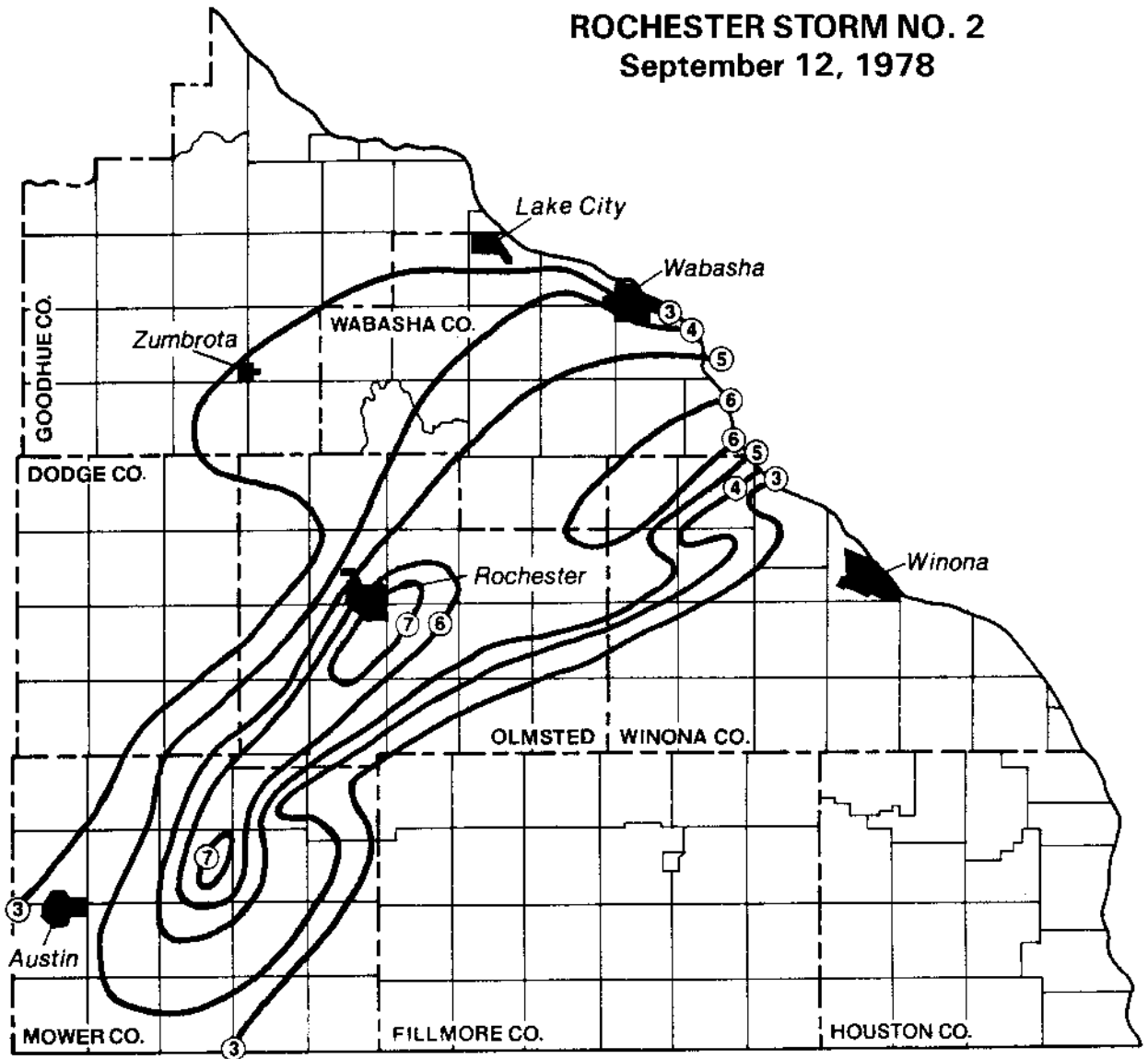
Flash floods occurred in central and east central Minnesota during the evening of August 26 and early morning hours of August 27. The rains began in northern McLeod and southern Wright Counties at 8 PM CDST and ended at about 2 AM August 27. Two small areas received more than 6 inches of rainfall: one area in northern McLeod County and another in southern Wright County. The heavy rains in the southern part of the Twin Cities began just before midnight and continued for about 6 hours. Rainfall amounts of 6 inches or more were received in Apple Valley and Eagan. The 4-inch or more rainfalls covered 365 square miles in McLeod and Wright counties and 265 square miles in the southern Twin Cities area. The map was prepared from 255 reports taken by volunteer observers throughout the area.

EASTCENTRAL FLASH FLOOD (McLeod, Wright Counties & Southern Twin Cities) August 26-27, 1978



A flash flood occurred in the Twin Cities area during the evening of August 26 and early morning hours of August 27. The heavy rains in the southern part of the Twin Cities began just before midnight and continued for about 6 hours. Rain-fall amounts of 5 inches or more were received in Apple Valley and Eagan. The 4-inch or more rainfalls covered 265 square miles in the Twin Cities area.

ROCHESTER STORM NO. 2
September 12, 1978



The flash flood at Rochester, Minnesota occurred from heavy rains greater than 6 inches. The storm began about 10 AM CDST September 12, 1978 and ended about midnight. The hourly amounts for the first 6 hours, 10 AM to 4 PM, were 0.98", 0.16", 0.94", 0.64", 1.80" and 1.23". The heaviest amount of rainfall reported was 7.07 inches in downtown Rochester. The 4-inch or more rainfall band in Minnesota was about 12-24 miles wide and 80 miles long and covered 1,200 square miles. This was the second flash flood for Rochester during the summer. The July 5-6 flash flood recorded almost 5 inches of rain in 3 hours and this flood was over 5 inches in a 6-hour period.