

colder weather to the north and west. This secondary center of the LOW gave considerable precipitation in the form of snow over the western upper peninsula of Michigan on this date, amounting to about 11 inches in portions of Ontonagon and Gogebic Counties (fig. 1), a very unusual fall for so late in the season even in that section of the State. Comparison may be made with the monthly

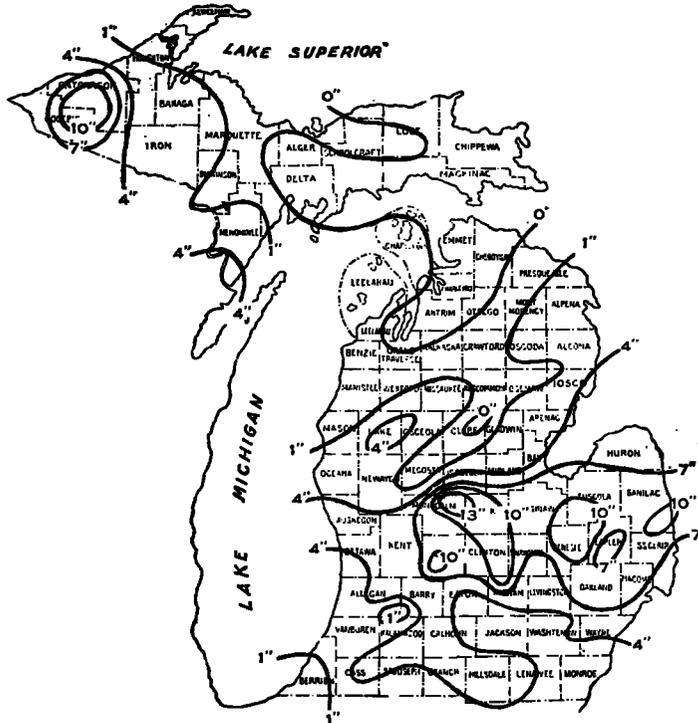


FIG. 1.—Snowstorm of May 8-10, 1923, in Michigan.

snowfall for May, 1917, the previous heaviest record for the upper peninsula, when 14 inches was reported in Alger County, and 17 inches on Mackinac Island.

On the morning of the 9th the low-pressure area showed a united center over Lake Erie, the low temperature having overspread the State with west and northwest winds on the surface, forcing the warm, moist air aloft, and heavy snow falling in the southern counties. All previous

snowfall records for May were broken on the night of the 8th and on the 9th in the "palm" and "thumb" districts, with 14 inches in eastern Montcalm County, and from 8 to 12 inches from Kent County eastward (fig. 1). Comparison may be made with the total snowfall for May, 1907, the greatest previous snowfall in southern counties, and the second greatest previous record for the entire State. In that month the heaviest fall in the southern portion of the State was 8 inches in southern Lapeer County, a fall of 10 inches near the northern end of the lower peninsula helping to raise the average for the State.

The regular Weather Bureau offices at Grand Haven, Grand Rapids, Lansing, Saginaw, Port Huron, and Detroit, being in the line of heavy snow, all reported falls exceeding previous records by from 2 to 7 inches. (See Table 1 for depths.) The snow was moist and heavy, though soft, and in some sections some damage was caused by breaking limbs, wires, etc., though fortunately the economic damage was surprisingly small. Melting occurred rapidly, especially as the ground was still warm, causing the snow to melt at the bottom and settle. Traffic was considerably demoralized, especially in the eastern counties, where the snow was still falling on the morning of the 9th, but being soft many automobiles ventured forth and soon plowed lanes on the main-traveled highways. By the morning of the 10th most of the snow had disappeared, and by the evening of the 10th this record storm was but a memory.

TABLE 1.—Stations in the lower peninsula of Michigan reporting 5 inches or more of snow on May 8 and 9.

	Inches.		Inches.
Edmore.....	14.0	Port Huron.....	6.5
Alma.....	12.0	Battle Creek.....	6.0
Flint.....	12.0	Durand.....	6.0
Millington.....	12.0	Harbor Beach.....	6.0
Lansing.....	11.5	Lapeer.....	6.0
Saranac.....	11.0	Lowell.....	6.0
Crosswell.....	10.0	Plymouth.....	6.0
Pontiac.....	9.0	Grand Rapids.....	5.5
Saginaw.....	9.0	Grand Ledge.....	5.0
Sandusky.....	9.0	Hillsdale.....	5.0
Bay City.....	8.0	Howell.....	5.0
Greenville.....	8.0	Muskegon.....	5.0
Owosso.....	8.0	Port Austin.....	5.0
Webber Dam.....	8.0	Grand Haven.....	4.8
Detroit.....	6.7		

SNOWSTORM OF MAY 9, 1923, IN THE SAGINAW VALLEY, MICH.

By F. H. COLEMAN, Meteorologist.

[Weather Bureau Office, Saginaw, Mich., May 23, 1923.]

On May 8-9, 1923, there was a very unusual snowfall in the Saginaw Valley, and in fact all of southern Michigan, unusual in view of the fact that snow of any amount rarely falls so late in the season. The ground within the valley limits was covered to a depth ranging from 4 to 14 inches.

At Saginaw, where the depth was 9 inches, records have been kept since 1897, and the greatest previous snowfall in any May was 0.8 of an inch on the 4th in 1907 and the same amount on the 2d in 1909. In no other May was more than a trace recorded.

This investigation covers only the watershed of the Saginaw River, and was undertaken not only because of the unusual nature of the phenomena, but also because of the great destruction wrought by its peculiar character in certain localities.

The snow depth was least over the western portion of the watershed, attained an average depth of 8 to 10 inches

in the middle portion, and increased to 12 inches or more over the eastern portion.

As it fell, the snow was very wet, and in the eastern portion of the watershed over an oval-shaped area about 70 miles long and 15 miles wide at the greatest width, it adhered firmly to such objects as branches of trees and telephone and telegraph wires.

In Saginaw, which lay well within this area, it was no unusual sight to see telephone poles bearing the burden of many wires each of which presented the appearance of a cable of snow 2 inches or more in diameter. The weight of these masses of wet, heavy snow not only snapped many wires, but dragged down the cross pieces to which they were attached and even pulled over or broke down many poles. Out of approximately 11,000 telephones in the Saginaw district, nearly 4,000 were put out of commission in this manner.

Many branches of trees of the less sturdy varieties were broken. The damage to cherry and plum trees was especially noticeable, as the opening foliage presented a large surface on which great masses of snow lodged.

Strong convection was evidenced during midday of the 8th by towering cumulus clouds, which were followed by a sharp fall in temperature in the early afternoon accompanied by rain. From 1 p. m. to 4 p. m. the temperature fell from 59 to 39, after which it fell

slowly throughout the night and until noon of the 9th, the lowest being 28. The rain turned to snow in the night and ranged from 3 to 7 inches deep by morning and reaching its maximum depth about noon.

The influence of topography is clearly seen. The prevailing winds were west and northwest; where these winds were blowing down the slope of the western portion of the watershed, the snowfall was least, while the greatest snowfall occurred where the air was driven up the slope of the eastern side of the valley.

#### TORNADO IN DAVIDSON COUNTY, TENNESSEE, MAY 12, 1923.

By R. M. WILLIAMSON, Meteorologist.

[Weather Bureau Office, Nashville, Tenn., May 31, 1923.]

The elongated barometric depression extending from Arkansas to New England on the morning of May 12, 1923, contained some features which usually attend the formation of tornadoes, but it could hardly be considered an ideal type of tornado low. The sharp temperature contrast was lacking, at least on the surface. There was a well-defined wind-shift line running northeastward through the trough and a drop in temperature accompanied the shift of wind from the southwest to the northwest, but the change to cooler was only moderate. It was by no means a hot, sultry afternoon in the vicinity of Nashville, the maximum temperature being only 71°, and the temperature change with the shift of the wind not exceeding 10°. The long, narrow trough of low pressure had two centers, one of which was over Indiana at 7 a. m., or due north of Nashville, the other over western Pennsylvania. By 2 p. m., at which time a tornado of considerable violence developed some miles north of this station, the Indiana center had doubtless moved to a location about northeast of Nashville. The tornado, therefore, was distinctly within the southwest quadrant of the storm, another feature which occurs only occasionally. The tornado moved in a general west-east line, although in a part of its course it bore somewhat toward the southeast. That it did not take the usual southwest-northeast direction was due unquestionably to the fact that the pressure trough, by reason of its position and extent, was drawing the winds almost uniformly from the southwest and the shift in direction was from the southwest to west or northwest instead of the usual change from southeast or south to southwest or west.

So far as is known here, only one tornado occurred. It started, apparently, in the north-central part of Davidson County about 8 miles north of Nashville, being first observed near and to the east of some hills that rise 200 to 300 feet higher than the surrounding country. It moved eastwardly across the Dickerson and Gallatin pikes, through the village of Edenwold, across the Cumberland River into the powder plant, and on into the southern part of Sumner County, where it spent its force. The length of the path was about 10 miles. Its width varied from 50 to 200 yards, being determined to some extent, no doubt, by the rolling character of the country. Fortunately, it passed mostly through open country and not much timber was destroyed. A few large trees were in the path, some being uprooted, others twisted into

shreds, while still others were carried away entirely leaving only a portion of the trunk standing.

The storm crossed the Dickerson Pike near Lowe's store, about 3 miles south of Goodlettsville. Here one residence and five barns were damaged to the extent of about \$2,500. A house a mile or so east of this pike was partly wrecked and a portion of the roof dropped into a yard near Edenwold, more than a mile away. From that point the destruction was of little consequence until it struck a large, handsome residence a little east of the Gallatin Pike, tearing a gaping hole in the roof and wrenching off and carrying away a 2-story veranda extending a distance of 125 feet along two sides of the house. The village of Edenwold, next in its path, suffered severely, several residences, two stores, and the schoolhouse being completely demolished and other buildings partly so. Six persons were injured at this point, one seriously, but, strange to say, no lives were lost. In one instance, there was nothing left of an 8-room cottage except the floor, and yet the occupants, a mother and two daughters, received only slight injuries. A man was buried beneath a pile of brick and debris as the roof of another house collapsed, but escaped with only cuts about the head. One house showed clearly the effect of the sudden expansion of the air within. The roof was entirely gone and two of the walls were flat on the ground, as if pushed outward, while the remaining walls were unharmed. The loss from the storm in the vicinity of Edenwold was probably not less than \$35,000, at least half of which was suffered by the large mansion, mentioned above.

The storm turned slightly southeastward from Edenwold, and after crossing a mile or two of open country it devastated an area of the United States Government powder plant (Old Hickory), wrecking seven iron buildings, either partially or totally, the estimated loss being \$25,000. Fortunately, the Government stores, consisting of smokeless powder, were not damaged by water as they are contained in water proof boxes. Had the storm taken a different course through the reservation the loss might have been tremendous, inasmuch as the buildings are compactly arranged and represent a total outlay of more than \$50,000,000. After leaving the powder plant the storm crossed the river again and continued somewhat southeastward into Sumner County, where it is reported that many trees were uprooted.