PRELIMINARY REPORT ON TORNADOES IN THE UNITED STATES DURING 1934

By R. J. MARTIN

[Weather Bureau, Washington, January 28, 1935]

In keeping with the custom of recent years, a preliminary statement of loss of life and property damage by windstorms is here included in the December issue of the REVIEW. A final and more detailed study will appear in the report of the Chief of the Weather Bureau for the year 1934–35. Practically all the information given in this summary is abstracted from the monthly tables of "Severe Local Storms", which are compiled from the reports of many observers and various section directors of the Bureau. While it is thought the figures given are substantially correct, it must be remembered that all are subject to change after the final study mentioned above.

June, with 30 (possibly 34) tornadoes, was the month with the greatest number of such storms; but the total loss of life, 4, was less than in February, May, or October. July, with 17 (possibly 19) storms, was second, while February and November each had 12 tornadoes. The greatest loss of life occurred in February, when 20 persons were killed; 12 deaths were reported in Mississippi, caused by the two storms of the 25th, which are described on page 59, February, 1934, MONTHLY WEATHER REVIEW. Tornadoes caused the death of 8 persons during May, and 5 members of a C. C. C. camp were killed near Marysville, Mo., on the afternoon of October 23; several other deaths were caused by tornadic winds during May and October, including 5 persons who were burned to death in Laurel County, Ky., on the night of October 31.

June, with estimated tornado or tornadic wind damage of over $1,448,000, was also the month of greatest property loss. The second highest figure was $1,035,000 in October; over $900,000 of this was caused by the Marysville, Mo., storm (mentioned above) over a path 14 miles long, and 300 to 400 feet wide. The July storms resulted in losses of more than $955,600, most of which occurred on the 10th, at Jacksonville, Ill., and vicinity.

Tornadoes occurred without loss of life in March, April, July, and September. A child was fatally injured at Pensacola, Fla., on January 4, the only tornado death of that month. August also had one fatality; a man was killed in Wisconsin when his wagon was overturned by a tornadic wind. No tornadoes were reported in December.

The total number of tornadoes during the year, approximately 114, was 146 less than in the preceding year, and the least since 1931, when the total was 94. During March and May of 1933, 150 tornadoes occurred; the total for the corresponding months of 1934 was less than 30, even when tornadic winds and possible tornadoes are included. The total number of deaths resulting from the 1934 storms was 45, which is the least since 1931 (when only 36 deaths were caused by tornadoes) and the second lowest since 1916. Other than the Missouri and Mississippi storms mentioned above there were no unusually severe tornadoes during 1934, and both of these have been greatly exceeded in other years. In March of 1925, 689 deaths resulted from a single tornado, while on September 29, 1927, a tornado caused property damage in Missouri estimated at $25,000,000.

If further study shows the storms listed in the table of tornadic winds to be true tornadoes, the 1934 sums will be 140 tornadoes, 45 deaths, and property losses exceeding $5,713,300.

TORNADOES AND PROBABLE TORNADOES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Number	4	12	3	5	13	30	17	7	7	3	13	0	114
Deaths	1	20	0	0	8	2	0	0	0	5	4	----	40
Damage [1]	[2] 55	[2] 602	156.3	[2] 7	273	1,425	159.6	[2] 23	[2] 48	910	174.2	----	3,833.1

TORNADIC WINDS AND POSSIBLE TORNADOES [3]

Number	0	0	4	5	6	4	2	1	2	1	1	0	26
Deaths	----	----	0	0	1	2	0	1	0	1	0	----	5
Damage [1]	----	----	29	44.6	26.1	23	925	700	5.5	125	2	----	1,880.2

[1] In thousands of dollars.
[2] Additional damage occurred but no estimate secured.
[3] Some of these may not be classed as tornadoes in the final study.

THE WEATHER OF 1934 IN THE UNITED STATES

By R. J. MARTIN

[Weather Bureau, Washington, D. C., January 1935]

The widespread severe drought during the crop-growing season of 1934 was the outstanding feature of the year's weather. It began in the Northwest early in the spring, spread rapidly, and by the end of May had become the most extensive drought in the climatological history of the United States. In general by that date nearly three-fourths of the country was experiencing droughty conditions, which were most severe in the Ohio, central and upper Mississippi Valleys, the central and northern Plains, most Rocky Mountain sections, and the Great Basin. The drought is discussed in detail in the Report of the Chief of the Weather Bureau for the year 1933–34.

The year was abnormally warm nearly everywhere; only small areas in Michigan and North Carolina, and portions of New Jersey, New York, and New England averaged cooler than normal. The average for the entire year was 54.8°, giving a plus departure for the year of 2.5°. Precipitation was decidedly below normal; the deficiency, for all States, was 3.7 inches. State deficiencies were greatest in the Ohio Valley, and the central Plains States, and ranged from 11.37 inches in Ohio to 0.04 inch in New Jersey; 14 States had deficiencies of more than 5 inches. Ten of the forty-two climatic sections were wetter than normal, with excesses ranging from 0.20 inch in Oregon to 5.29 inches in Maryland-Delaware.

More temperature records were broken in 1934 than in any previous year of Weather Bureau history. For example, every station in Iowa established new high records for May except Glenwood, where the previous record was equaled; on the 31st every station in the State had a maximum of 100° or above. At many points in the interior valleys and the Northwest the May averages were higher than the June normal, and most central States reported one or more hottest months of record during the year. A few minimum temperature records (mostly seasonal) were broken in 1934; and some unusually cold weather occurred in Florida on December 12 and 13.

Extremes for the year were well within the previous records of −66° (February 1933) and 134° (July 1913). The lowest reported was −52° at Stillwater, N. Y., on February 9, with −51° noted at Vanderbilt, Mich., on the same date. All but 7 States had minima of zero or below, and in 27 States the minima were −20° or lower. The highest maximum reported was 125° at Greenland Ranch, Calif., on several days in July; Quartzsite, Ariz., had 124° on July 11. With the exception of Maine, New Hampshire, Vermont, and Rhode Island, all States had maxima of 100° or higher; in 12 States they exceeded 115°.

The summer of 1934 was by far the hottest of climatological history in a large midwestern area; at many points the excess was nearly double that of the previous record. At Columbia, Mo., and Oklahoma City, Okla., the average July maximum was 100°, and at Topeka, Kans., and Fort Smith, Ark., 102°. From June to August, inclusive, Des Moines, Iowa, had 22 days with maximum temperature of 100° or higher; Columbia, Mo., 34; Topeka, Kans., 47; Oklahoma City, Okla., 47; and Fort Smith, Ark., 53. The accumulated departures for the year at several outstanding stations were: Amarillo, Tex., 1,860°; Sheridan, Wyo., 1,983°; North Platte, Nebr., 2,099°; Miles City, Mont., 2,068°; Huron, S. Dak., 2,042°; and Pocatello, Idaho, 2,168°. Despite the hot weather of the summer, 13 States had minima of 32° or lower in July, and 20 States had such minima in August.

Table 1 shows that for the United States as a whole every month was warmer than normal, with the largest departures in January, May, and November. In January all sections were abnormally warm, with departures ranging from 1.4° in New England, to 11.7° over the northern slope (Montana, Wyoming, and western South Dakota and Nebraska). July and November were also above normal in all sections, but the departures were smaller. September was the nearest to normal, with a departure of only 0.1°. The largest negative departures occurred in February, mostly to east of the Mississippi River, and ranged from only 0.1° on the Florida Peninsula to 11.4° in the lower Lake region. Extreme variability in temperature during the year is shown by the fact that North Dakota had a plus departure of 11.3° for February. When sections, rather than stations, are considered the last column shows that only New England was cooler than normal for the year, and 7 months in that section were abnormally warm.

Table 2 shows that only September and November averaged above normal in precipitation for the entire United States; November was the relatively wettest month, with an excess of 0.8 inch. May and July were the driest, with deficiencies of 0.7 inch. No month had above-normal precipitation in North Dakota, and 6 of the districts listed in the table had only 2 months with above-normal precipitation. The largest annual deficiency, over 9 inches, occurred in the lower Lake region.

The spring of 1934 was the driest of record in the Dakotas, Minnesota, Nebraska, Iowa, and Illinois, and the second driest of record in Ohio, Indiana, Wisconsin, Missouri, and Kansas. The previous low records for this period were 40 percent to 70 percent greater than the 1934 totals. Rains in June, the first part of August, and early in September, with the cooler weather of the latter half of August, relieved droughty conditions, at least temporarily, over considerable areas.

During the year 1,106 stations reported at least 1 month with no precipitation, and 76 had months with totals of less than 0.01 inch. The greatest monthly total was 35.06 inches at Wynooche Oxbow, Wash., in January. This total was considerably exceeded by some stations in Alaska and Hawaii; Puohakamoa No. 2, Hawaii, measured 52 inches in April. Snowfall was variable in 1934, and was reported as far south as Georgia in April. California, Colorado, and Nevada had the least of record in March, and Maryland-Delaware had twice the normal that month. The total for April in California was only 3 percent of the normal. Three States had light snow in August; California had the heaviest September fall since 1901 over the northern and central Sierra Nevadas. September snows in Montana interrupted traffic, and in some areas remained on the ground for nearly a week. New December records were established in portions of Minnesota and Ohio, and light snow fell in portions of Florida in December.

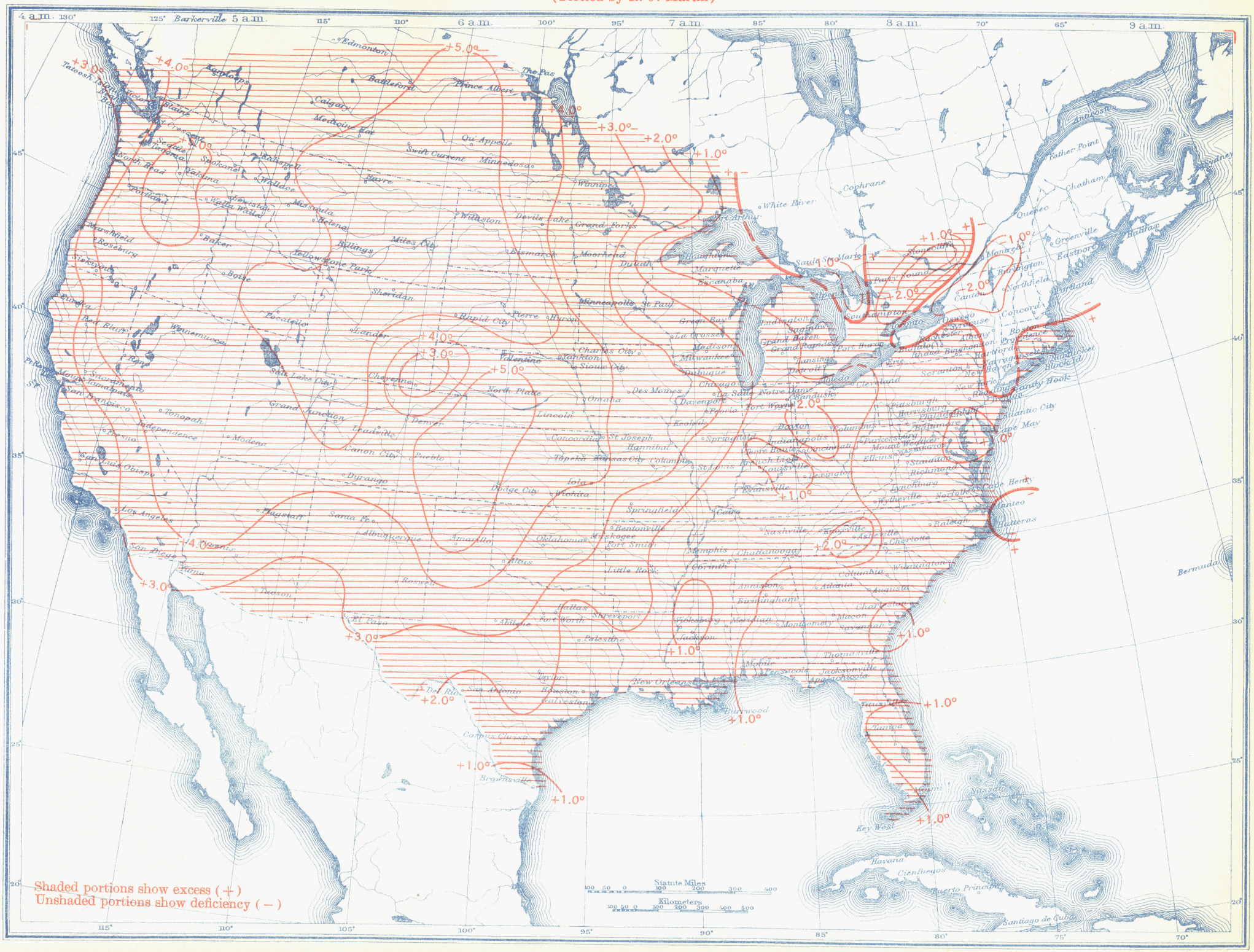
The accompanying charts based on reports from some 200 stations show temperature and precipitation departures in the United States for the year 1934. Floods, hurricanes, tornadoes, and other outstanding features of the year 1934 are discussed elsewhere in this issue of the REVIEW.

TABLE 1.—*Monthly and annual temperature departures, 1934*

District	January	February	March	April	May	June	July	August	September	October	November	December	Average
New England	+1.4	−10.7	−0.4	+1.5	+2.6	+1.3	+1.8	−2.0	+3.3	−2.4	+4.0	−3.2	−0.2
Middle Atlantic	+4.4	−10.6	−1.9	+.3	+1.8	+4.0	+2.7	−1.3	+2.4	−1.5	+3.9	−.5	+.3
South Atlantic	+3.6	−6.2	−1.5	+.7	−1.1	+2.1	+2.2	+1.5	+2.6	+.8	+2.7	−1.0	+.5
Florida Peninsula	+2.6	−.1	+.3	+1.2	+1.1	+.6	+.5	+.4	+.7	+2.2	+1.1	+.7	+.9
East Gulf	+3.7	−3.7	−1.5	+.8	.0	+1.7	+1.0	+1.1	+.3	+2.5	+3.0	−.8	+.7
West Gulf	+3.8	−.3	−2.6	+1.4	+.8	+3.6	+2.4	+3.0	−.5	+5.2	+4.4	+1.3	+1.9
Ohio Valley and Tennessee	+4.5	−7.4	−2.6	+.6	+2.5	+5.0	+4.3	+1.0	+.8	+1.3	+4.2	−1.1	+1.1
Lower Lakes	+4.0	−11.4	−2.3	−.4	+2.9	+4.5	+3.0	−1.3	+3.4	−1.2	+4.9	−2.8	+.3
Upper Lakes	+7.6	−5.9	−3.2	−.9	+4.7	+3.2	+1.7	−1.4	−.8	+1.5	+5.0	−2.4	+.8
North Dakota	+10.6	+11.3	+3.6	+2.7	+9.6	+1.4	+3.8	+1.8	−4.9	+5.6	+7.4	+.3	+4.4
Upper Mississippi Valley	+8.4	−.3	−1.8	+1.0	+7.7	+7.6	+5.2	+1.0	−2.7	+4.4	+6.0	−2.9	+2.8
Missouri Valley	+8.4	+4.2	−.2	+2.9	+8.1	+7.2	+8.4	+4.7	−3.9	+5.7	+5.5	−.6	+4.2
Northern Slope	+11.7	+9.5	+5.4	+5.4	+9.1	+2.0	+4.9	+2.7	−4.3	+5.6	+6.2	+1.6	+5.0
Middle Slope	+7.4	+3.6	+1.4	+3.0	+6.1	+6.4	+7.9	+5.5	−2.8	+6.3	+4.9	+1.8	+4.3
Southern Slope	+3.0	+2.8	−.2	+2.6	+2.8	+4.8	+3.7	+4.0	+1.2	+6.8	+5.0	+3.1	+3.3
Southern Plateau	+3.9	+5.4	+7.5	+6.2	+5.8	−.8	+3.0	+2.6	+2.0	+4.2	+1.9	+3.2	+3.7
Middle Plateau	+7.4	+7.9	+8.8	+7.3	+8.0	+.3	+3.8	+3.9	+.9	+4.1	+3.9	+2.9	+4.9
Northern Plateau	+10.5	+9.3	+8.0	+7.8	+6.5	+1.6	+2.5	+3.6	−.4	+4.0	+5.4	+2.4	+5.1
North Pacific	+5.9	+7.0	+7.2	+6.3	+4.7	+1.4	+.3	+2.0	+.9	+3.1	+3.9	+2.3	+3.8
Middle Pacific	+3.0	+3.6	+7.3	+5.4	+4.4	+1.8	+1.4	+2.0	+1.6	+1.5	+2.2	+1.4	+3.0
South Pacific	+2.5	+3.5	+7.3	+5.5	+4.5	−1.2	+1.2	+.2	+3.2	+1.8	+1.6	+2.9	+2.8
United States	+5.6	+.5	+1.8	+2.9	+4.4	+2.8	+3.1	+1.7	+.1	+2.9	+4.1	+.4	+2.5

I. Annual Temperature Departures (°F.) in the United States, 1934

(Plotted by R. J. Martin)



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December 1934. M. W. R.

II. Annual Precipitation Departures (inches) in the United States, 1934

(Plotted by R. J. Martin)

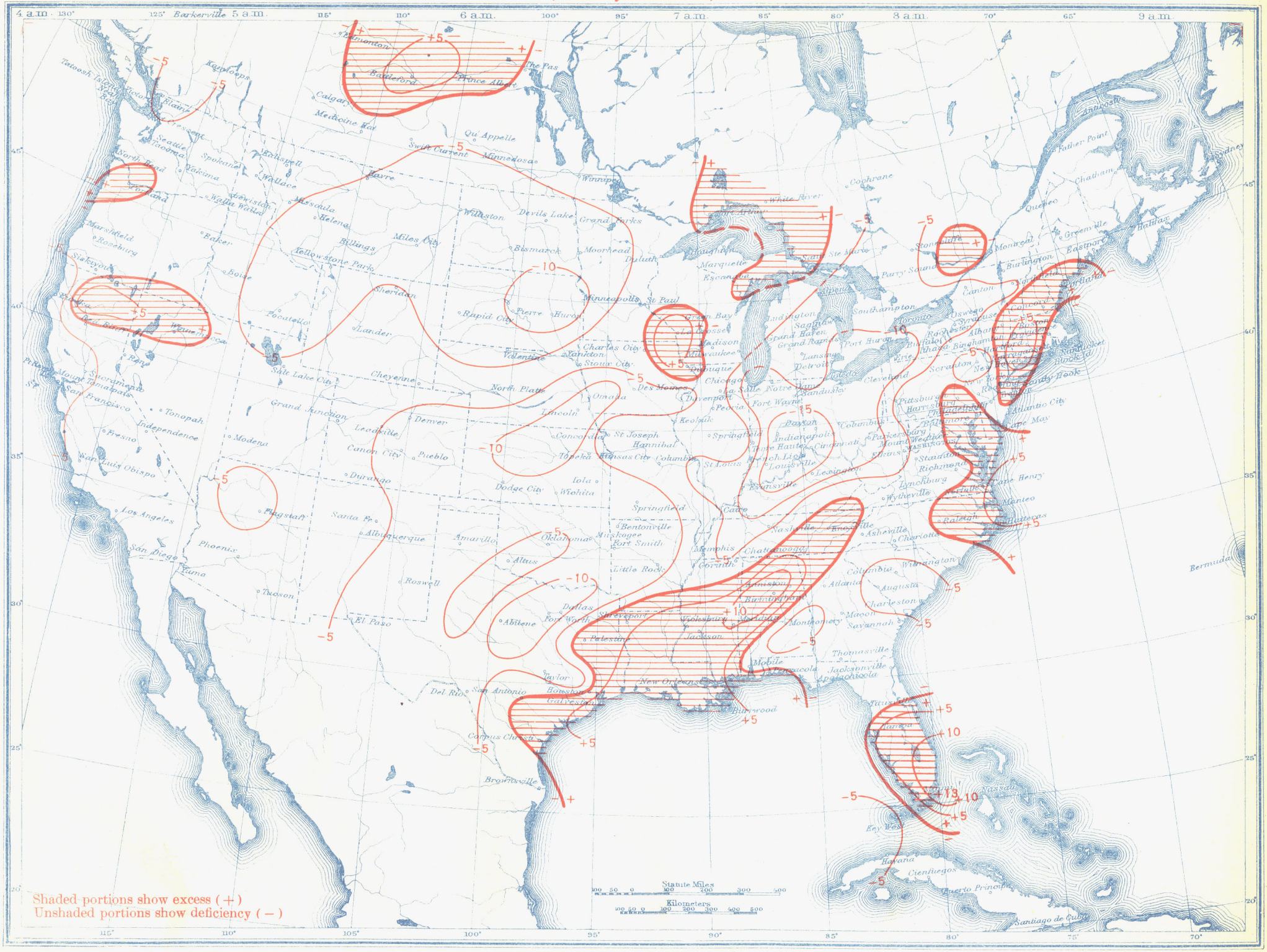

TABLE 2.—*Precipitation departures, monthly and annual, 1934*

District	January	February	March	April	May	June	July	August	September	October	November	December	Sum
New England	−0.2	+0.3	−0.2	+0.6	−0.5	+0.3	−1.2	−1.7	+2.1	−0.7	−0.4	−0.4	−2.0
Middle Atlantic	−1.0	−.1	+.7	−.4	+.6	−.3	−.3	−.5	+5.1	−1.7	+.4	−.8	+1.7
South Atlantic	−1.7	−.2	−.1	−.1	+2.2	.0	−1.7	−.4	+.8	−.2	+.8	−1.0	−1.6
Florida Peninsula	−.7	+1.5	−.2	+1.5	+4.0	+2.6	+1.2	−2.5	+.9	−2.6	−.7	−1.1	+3.9
East Gulf	−1.1	−.4	+.2	−.9	+.7	+.2	+.5	+.9	−1.9	+3.4	+.6	−1.0	+.3
West Gulf	+2.4	−.6	+2.1	+.5	−2.1	−2.9	−.7	−1.2	+1.0	−2.7	+2.3	−.2	−2.1
Ohio Valley and Tennessee	−1.6	−1.9	−.4	−1.7	−2.0	+.4	−.7	+.9	+1.2	−1.4	+.1	−1.2	−8.3
Lower Lakes	−.8	−1.3	.0	+.2	−2.5	−1.0	−1.2	−.8	+.5	−1.4	−.5	−.6	−9.4
Upper Lakes	−.4	−1.1	−.3	−.3	−1.8	−.8	−1.4	−.5	+.5	−.7	+2.5	−.4	−4.7
North Dakota	−.2	−.4	−.2	−1.1	−1.8	−.4	−1.5	−1.2	−.7	.0	−.5	−.2	−8.2
Upper Mississippi Valley	−.6	−.9	−.4	−1.6	−3.3	−1.2	+.4	−.4	+2.7	−.2	+3.6	−.4	−2.3
Missouri Valley	−.5	−.6	−.6	−1.5	−1.9	−1.1	−2.0	−1.0	+1.5	−.6	+1.8	−.6	−7.1
Northern Slope	−.5	−.3	+.1	−.3	−1.7	.0	−.8	−.4	+.1	−.1	−.3	−.2	−4.4
Middle Slope	.0	+.5	−.5	−1.1	−1.1	−1.5	−1.9	−.8	+.5	−.7	+.7	−.4	−6.3
Southern Slope	−.4	−.4	+1.1	−.6	−.8	−1.6	−1.6	−1.5	−1.1	−1.2	+.3	−.5	−8.3
Southern Plateau	−.3	−.2	−.4	−.2	+.3	−.2	−.6	.0	−.2	−.4	+.2	+.1	−1.9
Middle Plateau	−.4	+.2	−.7	−.3	−.3	+.1	−.2	+.2	−.2	.0	+.4	.0	−1.2
Northern Plateau	−.5	−.6	−.1	−.6	−1.1	+.1	−.3	−.2	−.3	+.4	+.4	−.4	−3.2
North Pacific	+.5	−3.7	.0	−1.1	+.3	−.9	+.2	.0	−.6	+1.4	+2.2	+.6	−1.1
Middle Pacific	−3.3	−1.1	−2.3	−1.1	−.5	.0	.0	−.1	−.4	+.3	+1.8	−.5	−7.2
South Pacific	−1.0	−.3	−2.0	−.9	−.4	+.2	.0	.0	.0	+.9	+1.4	+1.0	−1.1
United States	−.6	−.6	−.2	−.5	−.7	−.4	−.7	−.5	+.5	−.4	+.8	−.4	−3.7

TROPICAL STORMS OF 1934

By G. E. DUNN

Eleven tropical disturbances were reported this year in the Atlantic, Caribbean Sea, and the Gulf of Mexico. While six of these probably reached hurricane intensity, no especially intense hurricane reached the coast of the United States. Two storms either crossed or reached the Texas coast and one crossed the Louisiana coastline, all of which were barely of hurricane intensity. An examination of the storm paths on the following page reveals some unusual tracks. Storms 2 and 5 were especially erratic and no. 3 started as an extratropical storm off the coast of South Carolina.

Monthly frequency of West Indian hurricanes and other tropical storms of the North Atlantic Ocean in 1934

	Hurricane intensity	Doubtful	Not of hurricane intensity	Total
May	0	0	1	1
June	1	0	0	1
July	0	1	0	1
August	1	0	1	2
September	1	0	1	2
October	1	0	2	3
November	1	0	0	1
Total	5	1	5	11

Synopsis of tropical storms of 1934 (number of storm in table corresponds with number of track on accompanying chart)

Storm	Date	Place where first reported	Coast lines crossed	Maximum wind velocity reported	Lowest barometer reported	Place of dissipation	Intensity	Remarks
1	May 27–30	Southeastern Gulf of Mexico.[1]	Between Charleston, S. C., and Savannah, Ga.	53–SE., Charleston.	29.17, Savannah	Northwestern South Carolina.	Not of hurricane intensity.	Damage $155,000.
2	June 4–23	Gulf of Honduras [1]	British Honduras (probably twice) and Louisiana.	Steamship *Belfast Maru*, 70–SSE.	28.52, Jeanerette, La.	Passed beyond field of observation.	Hurricane	(A).
3	July 21–25	On South Carolina coast.[1]	Between Corpus Christi and Freeport, Tex.	52–S., Corpus Christi.	29.12, Corpus Christi	Northern Mexico	Doubtful, but near hurricane intensity.	(B).
4	Aug. 20–22	East of Dominica [1]	None			South of Santo Domingo.	Very minor	
5	Aug. 26–Sept. 1.	Middle Gulf [1]	Mexico, north of Tampico.	Steamships *Clare* and *Simon von Utrecht*, hurricane.	29.34, steamship *Simon von Utrecht*.	Mexico	Barely hurricane intensity short period.	(C).
6	Sept. 5–9	Eastern Bahamas [1]	Touched Cape Hatteras and passed over Long Island Sound.	Hurricane force from many ships.	28.56, steamship *Albert Watts*.	Northern New England.	Hurricane	
7	Sept. 15–21	Short distance east of Windward Islands.[1]	None	50 NE., steamship *Selene*.		Off Middle Atlantic coast.	Not of hurricane intensity.	
8	Oct. 1	Latitude 28:40, longitude 42:20.[2]	None	Steamship *Selene*, Hurricane.	29.06, steamship *Selene*.	North Atlantic	Hurricane	Recurved east of longitude 50.
9	Oct. 3–5	Southeastern Gulf of Mexico.[1]	Near Pensacola, Fla.	38–S., Pensacola	29.65, steamship *Del Sud*.	Northwestern Florida.	Minor	Record rain, Pensacola.
10	Oct. 19–23	South of Jamaica [1]	Eastern Cuba			Near Bermuda	Very minor	
11	Nov. 21–28	North of Leeward Islands.	None	Steamship *Malacca*, hurricane.	28.20, steamship *Malacca*.	Haiti	Hurricane	

[1] Approximate place of origin.
[2] Well developed when first appeared in field of observation.

(A) More complete report M. W. R., 62:202-203. June 1934.
(B) More complete report M. W. R., 62:251. July 1934.
(C) More complete report M. W. R., 62:344. September 1934.