TABLE 1.—*Amount of rainfall, mean daily miles of wind and mean barometric pressure during the combined months of May, June, and July 1903 to 1934*

Year	Combined total rainfall for 3 months	Combined mean daily miles of wind for 3 months	Mean daily barometric pressure for 3 month
	Normal for 60 years 20.05 inches	Normal for 25 years 225 miles	Normal for 33 years, 29.934 inches
	Inches	*Miles*	*Inches*
1903 (*a*)	20.93	220	29.919
1907 (*b*)	15.34	196	29.945
1908	20.74	194	29.958
1909	18.78	183	29.943
1910	16.54	178	29.960
1911	17.34	238	29.953
1912	11.33	267	29.951
1913	16.34	225	29.956
1914	14.80	249	29.951
1915 (*a*)	24.16	220	29.910
1916 (*a*)	29.44	191	29.907
1917	20.88	207	29.944
1918	21.22	210	29.927
1919	22.30	243	29.927
1920 (*b*)	15.74	240	29.937
1921	22.17	225	29.929
1922 (*b*)	11.79	263	29.947
1923	14.54	273	29.930
1924	16.17	222	29.939
1925	14.78	230	29.941
1926	13.76	213	29.928
1927	19.20	220	29.953
1928	14.64	241	29.930
1929 (*b*)	12.32	257	29.958
1930	15.47	244	29.938
1931	33.03	187	29.903
1932 (*a*)	22.54	213	29.903
1933 (*a*)	31.46	207	29.908
1934 (*b*)	15.69	237	29.936

NOTE.—The years denoted by (*a*) in this table are reproduced in table 2, so as to group together the periods of abnormal hurricane activity; and those denoted by (*b*), years of no hurricanes or but few, table 3.

The above table is derived from (1) the publication entitled "The Rainfall of Jamaica" 60-year period, page 30, and subsequent Jamaica Weather Reports years 1930 to 1934, (2) the Jamaica Weather Report No. 689, Table (C) p. 9, giving the Kingston daily mean total miles of Wind, and (3) the mean barometric pressures from the 7 a. m. and 3. p. m. daily observations, as shown in the respective printed Jamaica Weather Reports, 1903 to 1934.

TABLE 2.—*5 years of instances (during the period from 1903 to 1934) when the months of May, June, and July indicate abnormal conditions of rainfall, surface wind, and barometric pressure, favorable to hurricane activity during the months of August and September, in the Caribbean region*

Year	Combined total rainfall for 3 months	Combined mean daily miles of wind for 3 months	Mean daily barometric pressure for 3 months
	Normal for 60 years, 20.05 inches	Normal for 25 years, 225 miles	Normal for 33 years, 29.934 inches
	Inches	*Miles*	*Inches*
1903	20.93	220	29.919
1915	24.16	220	29.910
1916	29.44	191	29.907
1932	22.54	213	29.903
1933	31.46	207	29.908

TABLE 3.—*5 years of instances (during the period from 1903 to 1934) when the months of May, June, and July indicate abnormal conditions of rainfall, surface wind, and barometric pressure, favorable to the absence of hurricane activity, during the months of August and September, in the Caribbean region*

Year	Combined total rainfall for 3 months	Combined mean daily miles of wind for 3 months	Mean daily barometric pressure for 3 months
	Normal for 60 years, 20.05 inches	Normal for 25 years, 225 miles	Normal for 33 years, 29.934 inches
	Inches	*Miles*	*Inches*
1907	15.34		29.945
1920	15.74	240	29.937
1922	11.79	263	29.947
1929	12.32	257	29.958
1934	15.69	237	29.936

THE DROUGHT OF 1933–34 IN NEW MEXICO

By MARSHALL J. CHAMBERS

[Weather Bureau, Albuquerque, N. Mex., January 1935]

One definition of drought is: "A continued lack of rainfall so long as to very seriously affect vegetation in a region where the average rainfall and its seasonal distribution normally are sufficient to sustain plant growth and produce crops." Various other definitions of drought have been used, but none of these covers the situation in New Mexico quite so well as the one just given.

The normal course of precipitation in New Mexico is a gradual increase from a minimum in January to a maximum in July and August, followed by a gradual decrease to November. This is considerably modified, however, by the heavy snowfall which occurs at higher mountain elevations during winter and spring months. The amount of snowfall shows a fairly uniform rate of increase with altitude, being about 30 inches annually at 7,000 feet; 50 inches from 8,000 to 9,000 feet; 100 inches at 10,000 feet; and, at a few stations at the crest of the Sangre de Cristo range, more than 200 inches. Normally much of this snow accumulates at the high levels, where it melts in late spring and early summer and furnishes water used for irrigation of the fertile lower-valley lands.

The 1933–34 drought was by far the most severe of any in the history of the State. There have been periods when less precipitation was received but never before a drought when tempeartures remained so consistently high for so long a time. It is difficult to exactly date the beginning of this drought, but in terms of whole months, deficient precipitation began with September 1933.

During the following winter and spring there was but slight snowfall. February received the largest fall, 80 percent of its average amount, while December, commonly the month of greatest depth, had but 35 percent, and the entire season only 52 percent, of the normal. The scant snow cover was further reduced by the prevalence of unusually high temperatures, which caused excessive melting that resulted in a greatly reduced depth of stored snow at the close of the season.

Precipitation closely approximated the seasonal trend to the close of January 1934, although the amounts were considerably lower than usual. Of the following months, only May gave precipitation that averaged slightly above the normal, and this was due to the occurrence of thunder showers in the last decade. These showers were very local in character and of brief duration, and the little moisture absorbed by the soil was soon dissipated by the excessive heat of the last 4 days of the month. June gave 42 percent and July 52 percent of the normal precipitation.

Average monthly mean temperatures were well above the normal from the beginning of June 1933 through August 1934. During this period, the months of September and October 1933 and May and July 1934 were the warmest of record, The latter gave the highest average mean temperature ever observed in the State.

Some 20 individual station records of heat were broken, and the extreme heat record for the State (116°) was equaled.

Water, impounded in reservoirs for irrigation, became increasingly low. Early in August 1934 Elephant Butte Reservoir reached its lowest known level, while Lake Avalon, Carlsbad Lake, and Bluewater Lake became dry. The Canadian, Pecos, and Rio Grande were dry a few miles below their source, and for the first time within the memory of the oldest inhabitants many mountain streams and springs failed to provide water for stock.

Stream flow, in the largest streams of the State, was the second lowest of record, that of 1903–04 (the water year is Oct. 1 to Sept. 30) being slightly less. Records of only three key stations are available, but these closely approximate conditions at other points within the State.

The average annual run-off of the Canadian River at Logan is about 175,000 acre-feet. Normally about 100,000 acre-feet pass this point during the spring season, April 1 to June 30. The total run-off for the year 1933–34 was 49,298 acre-feet, and of this amount only 3,370 acre-feet passed during the spring season. The river was dry at this point from March 10 to August 20, except for a few periods of short duration following rains. The greatest monthly run-off was 21,600 acre-feet in September; and the least, none, in April.

The average annual run-off of the Rio Grande at Embudo is about 800,000 acre-feet. Some 60 percent of this amount, or nearly 500,000 acre-feet, normally passes between April 1 and June 30. The spring run-off in 1934 was 30,785 acre-feet, and the total for the year 282,090. The greatest monthly amount was 38,960, in February; and the least, 12,840, in July.

The average annual run-off of the Rio Grande at the Otowi Bridge, near San Ildefonso, is about 1,500,000 acre-feet, and the spring run-off average about 900,000. The total for the year 1933–34 at this point was 413,990 and for the spring 129,780. The greatest monthly flow was 70,080 in April, and the least 13,550 in July.

A unique and interesting circumstance in providing water for irrigation of fields in the Middle Rio Grande Valley was the use of drainage water from lands adjacent to the Rio Grande.

The Middle Rio Grande Conservancy District has 344 miles of drainage canals, which normally develop from 800 to 1,250 second-feet of water. This water is conveyed in drains to the river, and picked up (less losses) in the various headings of the irrigation canals below. At five points in the valley, direct diversion of the drain water is made into irrigation canals. This involves checking up the drains from 2 to 5 feet to raise the water high enough to reach the elevation of the irrigation ditches, and in some cases the building of a section of canal to make the connection. At two points approximately 50 second-feet can be diverted in this manner with normal flows in the drains, and at other points less amounts. Owing to the drought this season the flow was somewhat diminished and the low point was reached in the middle of August when it dropped to about 250 second-feet. During the first half of May a small amount of water passed down the river. After about May 15 no water passed Los Lunas; after June 1 none passed Albuquerque. From that date all the water used from Isleta south to Elephant Butte Reservoir was returned drain water, until the August rains.

All the lands south of Isleta would have been without water for 2½ months had it not been for the drain water; and between Isleta and Bernalillo a large percentage of the irrigation depended upon the drain flow. The county agent for Bernalillo County states that the crops this fall are about 75 percent of the normal. If there had been no water available from the drains the crops would have been only 25 percent of normal or less.

The most conservative methods possible were followed in using the water for irrigation. Each farm was allotted a certain number of second-feet, determined by the amount of water available and the number of acres under cultivation. The flow was maintained for a specified number of hours, after which it was allotted to the next farm under the system. Farmers were notified in advance as to the exact time water would be turned into their ditches, the amount, and the number of hours it would be available. This gave opportunity to acquire extra help, if necessary, to use the water most advantageously.

No attempt has been made to estimate the cost of the drought. Millions of acres of land remained idle. Many other millions of acres were planted but failed to make a crop. In the eastern plains section of the State, top soil was blown from fields and carried until some obstruction, usually a fence, was reached. There the soil was deposited, gradually piling up, until it reached a depth of 4 to 10 feet. Thousands of miles of fences in this section were buried until not a trace remained visible. It will require many years of hard work to bring these farms back to their predrought status.

Figures compiled by the Director of Drought Relief show that 400,000 head of cattle were purchased before the end of October. Purchases were to be continued throughout the winter, although on a smaller scale. A program for the purchase of sheep and goats was also gotten under way in early autumn. Many thousands of both cattle and sheep perished before the purchasing program was inaugurated.

Ranges have reached the worst condition of record, and while heavy rains or snows will cause them to revive in most sections, there are large areas, notably in eastern counties, where the grass roots are dead and the passage of several seasons probably will be required to fully restore new growth.