

with the greatest deficiency over Kauai and Oahu * * *. The means for the groups was 4.52 inches, against a 17-year mean of 7.81 inches, or only 58 per cent of the territorial 17-year mean * * *.

The mean temperature for the section exceeded the March normal over all islands of the territory, being 69.7 degrees, against a 17-year mean of 68.7 degrees. * * *—*Honolulu Times, Apr. 16, 1921.*

Peru.—The year 1920 was remarkable for its unusual rainfall. Not only was the curve for the depth of the Amazon at Iquitos higher throughout April and May than for many years, but also throughout the dry season. The lowest stage reached was some 7 feet higher than the mean minimum depth.

The exceptional inundation of April and May had destroyed much of the crops. There was a serious

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DETAILS OF THE WEATHER OF THE MONTH OF THE UNITED STATES.

CYCLONES AND ANTICYCLONES.

By W. P. DAY, OBSERVER.

Lows were much above the normal in number and well distributed by type. Secondary developments were numerous, particularly of the Colorado and Texas types.

HIGHS were also in excess of the average, but about normal as to type. However, five of the Alberta HIGHS moved far to the north of the normal path and their effect was only marked along the northern border. Of the remaining two, the HIGH of the 27-30th, produced the only general cold wave.

Tables showing the number of HIGHS and LOWS by types follow:

Lows.

	Al-ber-ta.	North Pa-cific.	South Pa-cific.	North-ern Rocky Moun-tain.	Colo-rado.	Texas.	East Gulf.	South At-lantic.	Central.	Total.
March, 1921.....	6.0	2.0	1.0	1.0	5.0	3.0	1.0	2.0	21.0
Average number, 1892-1912, in-clusive.....	3.6	2.1	1.1	0.3	1.9	1.3	0.4	0.3	0.7	11.8

Higs.

	North Pacific.	South Pacific.	Al-ber-ta.	Plateau and Rocky Moun-tain region.	Hudson Bay.	Total.
March, 1921.....	2.0	1.0	7.0	1.0	1.0	12.0
Average number, 1892-1912, inclusive	0.9	0.7	5.6	0.9	0.5	8.5

THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

[Weather Bureau, Washington, D. C., May 2, 1921.]

PRESSURE AND WINDS.

The absence of frequent and strong pressure variations that characterized the weather during much of the past winter persisted to an unusual extent during the first spring month. As a result the weather of March, 1921, lacked much of the blustery and changeable character so commonly attributed to that month, and in many portions of the country it took on the character of the mid-spring season.

shortage of all staples (plaintains, beans, yucca, rice, etc.) and considerable hardship among the improvident. At no time were the sand bars of the Marañon or Amazon exposed. This of course affected the fishing industry. Seining was made much more difficult, while throw-net fishing was probably increased, due to the concentration of the mijanos, schools of fish.—*W. R. Allen in Science, Apr. 22, 1921, p. 378.*

Australia.—At the beginning of the month torrential rains fell in South Australia, causing such serious floods that ports had to be closed and traffic on the Trans-continental Railway suspended. At the same time good rain fell throughout practically the whole of New South Wales. A message received on the 17th stated that heavy rain had put out the fires in South Gippsland (Victoria).¹

An examination of the charts showing the average sea-level pressure and its departure from the normal discloses, as during several months preceding, a preponderance of pressure over southern districts and a consequent flow of air from southerly into northerly regions. Likewise a review of the daily weather charts shows a marked absence of strong projections from the Polar Front, and few of the HIGHS entering the northern boundaries of the United States penetrated extensively into the interior portions.

About the end of the first decade pressure had increased greatly in Alaska and the Canadian Northwest Provinces, and indications pointed to an extensive invasion of cold weather into the Northwest and interior districts of the United States. The full development of this high-pressure area was apparently obstructed by the appearance of cloudy, rainy weather in the central valleys, and it passed eastward over the more northern districts with only moderate decreases in temperature.

About the end of the second decade another high-pressure area of considerable magnitude entered the northwestern districts, and, while its influence extended farther southward into the Great Plains than that of the preceding decade, its extension eastward was likewise retarded by the development of cloudy, rainy weather, and it, too, passed along the northern border without large temperature changes, save over the more northern districts.

A third invasion of cold from the Polar Front occurred near the end of the last decade, and coming later in the month and after a long period of unusual warmth was, in a comparative way the severest of the month over the greater part of the country east of the Rocky Mountains, and actually so in the Mississippi and Ohio Valleys and portions of adjacent regions. This high pressure area first appeared in the Canadian Northwest on the morning of the 26th and by the following morning it had advanced into the upper Missouri Valley, and sharp changes to colder weather had occurred over the Great Plains as far south as the Texas Panhandle. During the following 24 hours the center of highest pressure moved to the lower Missouri Valley and the lowest temperatures of the month prevailed from central Texas and the lower Mississippi Valley northward to the Canadian border, with indications that during the following 24 hours it would advance farther southward and the attending cold seriously threaten the great early-fruit and vegetable districts of the South, where the continued warm weather had advanced vegetation far ahead of the usual condition so early in the spring. This was not fully accomplished, however, as the center of high pressure changed its course to the northeastward.

Areas of low pressure, as in several previous months, were mainly ill-defined, and pursued irregular courses and lacked the strong features usually expected in March. Few extensive low areas entered the Pacific Coast States during the latter half of the month and none appear to have maintained their identity sufficiently to cross the western mountains as distinctive storms.

In the absence of cyclones or anticyclones of marked strength, the winds were correspondingly moderate, and high winds were infrequent over extensive areas. Along the Atlantic coast the winds were highest about the 28th, and over the central valleys winds exceeding 50 miles per hour were reported locally on the 26th and 27th. On the Pacific coast winds were comparatively light, only a few exposed points reporting as much as 50 miles per hour.

Over practically all the country east of the Rocky Mountains southerly winds predominated, extending to the extreme northern portions of New England and into the region of the Great Lakes and portions of the upper Mississippi Valley. They were likewise southerly over many portions of the far western districts, extending northward to the Canadian boundary.

TEMPERATURE.

Over the greater part of the central and eastern districts, in fact from the Rocky Mountains eastward, March, 1921, temperatures partook more nearly of those expected in April than those usually existing in the first spring month. Temperatures were also more uniform than usual, few abrupt changes occurring until near the close, when unusually high temperatures for March were quickly followed by the lowest temperatures of the month, due to the rapid advance of a severe cold wave for the season into the central and northeastern districts from the 27th to 29th.

For the month as a whole, the temperature averages were above normal in all parts of the country, but more particularly in the central and eastern districts, where the average excess ranged from 6 to 12° per day, and the monthly averages were in many cases the highest ever known for March, and in some cases higher than the normals for April. This excess was not the result of periods of extreme heat, but rather of daily temperatures continuously higher than normal; in some cases this excess was almost continuous save for two or three days near the end of the month.

The principal periods of maximum heat were near the end of the second and at the beginning of the third decades, when temperatures of 90° F. or slightly higher were recorded over much of the country from the Rocky Mountains eastward, and near the end of the month on the Pacific coast. The highest temperature recorded, 100° F., was reported from a point in Texas.

The principal periods of low temperature were near the first of the month over the Southeastern States, about the end of the first decade in the central and southern portions of the Great Plains and Rocky Mountains, and over the central valleys and middle eastern districts near the end of the month. The lowest temperature, -34° F., occurred in Montana, and temperatures between 20° and 30° below zero were reported from several other Rocky Mountain States, and generally along the northern border from Lake Superior westward to the mountains. Minimum temperatures reached the freezing point in portions of all the Southern States except in Florida, where the lowest observed temperature was 33° F.

The cold wave near the end of the month, while not so severe as others that have occurred in March of pre-

vious years, was exceedingly destructive to early vegetation in the central districts from the southern plains northeastward, due to the great advance made on account of the long period of unusual warmth preceding. A more complete statement concerning damage to vegetation by the cold of this period will be found in another portion of this REVIEW.

PRECIPITATION.

On account of the prevailing general warmth of the month, the precipitation distribution more nearly resembled that common to the warmer months of the year, thunderstorms being frequent and wide variations occurring in the total monthly falls at near-by points.

Precipitation was frequent and comparatively heavy over the Mississippi and Ohio Valleys, and the amounts from the eastern plains to the Atlantic coast were usually sufficient for current needs, although the East Gulf and Atlantic Coast States had considerably less than usually falls in March, the deficiency being large in Georgia and portions of adjoining States.

West of the Rocky Mountains the precipitation for the month was less than usually falls save over the more northern districts, where there was a slight excess.

SNOWFALL.

Over the districts from the Great Plains eastward, the snowfall was usually light and its distribution was confined mainly to central and northern districts. In the Rocky Mountains and portions of the adjacent plains to the eastward considerable snow occurred during the month, and smaller amounts occurred generally in the mountains from central California northward.

The outlook for water during the coming summer from the accumulated snow in the high mountains continues good in the northern districts, where irrigation water is needed, and moderately so in most central districts, but continues poor over the southern sections.

RELATIVE HUMIDITY.

In the lower Lake region and southward throughout the Appalachian Mountain district, in the Missouri Valley, and westward over the Great Plains from Kansas northward, and in the Rocky Mountain and Plateau regions, the relative humidity was, as a rule, below the seasonal average; elsewhere there was relatively more moisture in the atmosphere than is usual for March.

LOCAL STORMS.

March 9: About 2 a. m. a violent local storm, probably a tornado, developed east of Macon, Miss., and moved northeastward through Prairie Point, and probably disappeared near Reform, Ala. Its path was about one-eighth mile in width and 38 miles long. According to the Macon Beacon of March 11, 1921, the winds dislodged many granite monuments in the Odd Fellows Cemetery near Macon. Some of the blocks moved were in the shape of 3-foot cubes, or larger. Many old cedar, magnolia, and live-oak trees were twisted and broken off. The damage reported, estimated at \$10,000, was 5 houses partially destroyed near Macon, 3 stores, 3 dwellings, and a number of cabins blown down at Prairie Point, and 2 dwellings badly damaged at Reform. No lives were lost and only two or three persons were slightly injured.

Between about 4 and 4.45 p. m. the same day, a local storm did great damage in a strip of territory about