

Bermuda on the 20th, and north of the Azores on the 24th, with barometer 29.48 inches at Horta, Fayal; it advanced thence south of east to a position north of Lisbon by the 27th, with barometer 29.40 inches at Lisbon, after which it disappeared over southern Europe.

In the interest of eastward bound transatlantic steamers forecasts of weather and the direction and force of the wind from the American coast to the Banks of Newfoundland were issued twice daily from Washington. Ample and timely warnings were given of gales that visited the Atlantic, Pacific, and Gulf coasts, and the Great Lakes.

The following extract from the Portland, Oreg., Telegram, of April 30, comments on the storm that visited that section the night of the 28th and during the 29th, and the warnings that were issued in advance of its arrival:

The alertness of the Weather Bureau in anticipating a severe storm by sending out warnings and the good accomplished by these warnings was given a practical demonstration Monday, when the local office telegraphed its marine stations up and down the coast to be on the watch for a southwest gale, and in less than eight hours after the warnings were issued the storm swept over the coast in all its fury; but for the fact that fishermen and others were prepared for it, much damage and probably loss of life would have resulted.

In the central and northern districts vegetation was not sufficiently advanced to be seriously affected by the cold and frost of the month, and the occurrence of frost in the Southern States was anticipated by the forecasts and warnings.

The display of storm warnings on the Great Lakes and on Lake Pepin was resumed for the season April 1.

BOSTON FORECAST DISTRICT.

Severe northeast gales prevailed during the 8th and 9th, and high winds and gales from the 26th to the 30th, for which timely warnings were given. There were no gales without warnings.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

No severe weather conditions occurred in any part of the district during the month.—*I. M. Cline, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The severest storms occurred during the third decade of the month when a great deal of damage was done to vessels on the lakes, and to buildings and property in the upper Mississippi and lower Missouri valleys. Shipping on the Great Lakes was warned of the approach of these storms. Remarkably high temperatures, with high winds, prevailed in Nebraska, Kansas, and northwest Missouri on the 20th. Frost warnings were issued for parts of the middle-western States on the 16th, 22d, 23d, and 26th.—*F. J. Wals, Local Forecast Official.*

DENVER FORECAST DISTRICT.

Light frost occurred on a number of dates and was, as a rule, accurately forecast.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month was one of frequent but not very heavy rainfall, and was unusually free from frost injurious to budding fruit.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

Light to moderately heavy frost was of frequent occurrence, and was, as a rule, accurately forecast. Notable storms, for which timely warnings were issued, occurred in the first and third decades of the month.—*E. A. Beals, Forecast Official.*

HAVANA FORECAST DISTRICT.

No special forecasts or warnings were issued during the month.—*W. B. Stockman, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I	*31, p. m.	50	107	3, p. m.	32	65	Miles. 2,975	Days. 3.0	Miles. 992	Miles. 41.2
II	3, a. m.	51	104	5, a. m.	36	87	1,550	2.0	775	32.3
III	6, a. m.	53	108	8, a. m.	48	96	2,100	2.0	1,050	43.8
IV	6, p. m.	34	118	16, a. m.	39	75	1,175	2.0	588	24.5
V	11, a. m.	37	122	13, a. m.	46	118	3,825	9.5	403	16.8
VI	21, a. m.	53	108	26, p. m.	46	60	900	2.0	450	18.8
VII	26, a. m.	37	100	30, a. m.	48	54	3,400	5.5	618	25.8
Sums							18,650	30.0	5,557	231.7
Mean of 8 paths							2,331		695	29.0
Mean of 30 days									623	26.0
Low areas.										
I	1, a. m.	45	123	7, a. m.	47	54	4,250	6.0	708	29.5
II	3, p. m.	51	120	6, p. m.	45	83	1,975	3.0	658	27.4
III	5, p. m.	32	106	6, p. m.	38	75	2,425	3.0	808	33.3
IV	7, a. m.	51	120	11, a. m.	45	64	3,200	5.5	582	24.2
V	10, p. m.	47	97	8, p. m.	53	105	800	1.5	533	22.2
VI	17, a. m.	60	110	20, a. m.	47	71	1,400	2.0	700	29.2
VII	17, a. m.	60	110	20, a. m.	47	71	2,275	3.0	758	31.6
VIII	18, a. m.	48	124	24, a. m.	46	60	3,600	6.0	600	25.0
IX	23, p. m.	39	120	27, p. m.	43	68	2,725	4.0	681	28.4
X	26, p. m.	53	105	29, a. m.	48	89	1,250	2.5	500	20.8
	27, a. m.	38	114	30, a. m.	46	78	2,475	8.0	825	34.4
Sums							26,375	39.5	7,353	306.0
Mean of 11 paths							2,398		668	27.8
Mean of 39.5 days									668	27.8

*March.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

In the Mississippi River, above the mouth of the Ohio, the average stages were somewhat lower than during the preceding month, while in the lower river, at least below Memphis, Tenn., they were 2 to 10 feet higher, the comparatively high stages of the preceding month having been prolonged by the moderate tides in the Ohio River that passed Cairo, Ill., on the 8th, and again on the 21st. The crest of this latter rise passed down the upper Ohio from the 10th to the 15th, reaching Cincinnati on the latter date. It afforded an opportunity for the issue of a few local flood warnings, and passed off without doing any damage.

Excellent navigable stages were the rule over nearly all the rivers, and the season on the upper Mississippi was opened throughout by the arrival on the 7th, at St. Paul, Minn., of the steamer *Cyclone*, the first boat through Lake Pepin from the south.

Nothing further of particular interest occurred except the flood of March 28–April 10 in the lower Tennessee River and its tributaries. The following report on this flood was made by Mr. P. H. Smyth, Official in charge of the United States Weather Bureau office at Cairo, Ill.:

The flood in the Duck and lower Tennessee rivers, although not extensive nor of long duration, was very destructive in its effects on account of its suddenness.

The rise was almost simultaneous with the falling of phenomenally heavy rains over southwestern Tennessee and northern Alabama. The heavy rainfalls over those sections for the twenty-four hours ending at 7 a. m., March 29, 1902, were as follows: Riverton, Ala., 7.15 inches; Columbia, Tenn., 4.40; Florence, Ala., 2.07; Johnsonville, Tenn., 1.59.

The rises in the rivers for the same period were, Columbia (Duck River), 31.5 feet, from 11.5 to 43.0 feet; Riverton, 18.7 feet, from 10.3 feet to 29.0 feet; Johnsonville, Tenn., 12.0 feet, from 12.0 feet to 24.0 feet.

At Florence the river rose from 7.2 feet on the morning of March 28th to 22.5 feet, at 3 a. m., March 29th, fell to 18.0 feet by 3 p. m. 29th, then rose again to 19.0 feet by the morning of March 30. It passed below the danger line, 16 feet, during the night of April 5-6.

At Columbia the maximum stage reached was 45.6 feet, which occurred at 12 noon, Sunday, March 30. The river fell rapidly after reaching the crest.

At Johnsonville the maximum stage reached was 35.7 feet, on the evening of April 2. The danger line is 31 feet.

On account of interruption of telegraphic service, due to rain and wind storms, communication with Florence and Riverton was cut off on the morning of March 29, making it impracticable to obtain any information as to the conditions that had prevailed and were then obtaining at those points. By the time telegraphic communication was reestablished with Florence the river at that point had commenced falling.

Warning was telegraphed to Johnsonville on the morning of March 29, advising the public to prepare for a dangerous flood.

The following are extracts from reports received at this station from special river observers:

Mr. E. Yoest, Columbia, Tenn.: "The Government river gage on Duck River is graduated up to 37 feet. The stage above that point was taken from the bridge marks and contained slight errors. Accurate measurements, made after the water receded, show that the maximum stage was 45.6 feet. This is the highest stage reached here in fifty years. The estimated damage in this (Maury) county from loss of bridges, mills, and other buildings, fences, culverts, damage to plowed land, etc., has been estimated at \$300,000. There were four steel bridges over Duck River

and four flouring mills carried away. Nearly every bridge and mill on eleven turnpikes radiating from Columbia were carried away by the sudden rise of creeks. No loss of life in this county."

Miss Sallie B. Mathews, Johnsonville, Tenn.: "Highest stage of river on last rise was 35.7 feet, which occurred on April 2. Nothing lost or damaged, but a great many ties were saved above and below here by the warnings received. As before, we gave warnings and gage readings to everyone we could reach who had interests along the river. Farmers along the Tennessee and Duck rivers were able to remove stock to safe places, and in several instances saved their rail fences."

Mrs. M. E. Coburn, Florence, Ala.: "The damage done in this (Lauderdale) county by the recent flood amounted to about \$60,000. The Government canal and the aqueduct were badly damaged; land washed badly, and nearly all fencing was carried away."

The rise out of the Tennessee, together with a decided rise out of the Cumberland and a moderate rise out of the upper Ohio, gave a high stage to the lower Ohio at Paducah and Cairo, but the crest stages reached were several feet below the danger lines.

The highest and lowest water, mean stage, and monthly range at 137 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau:

[Temperature is expressed in degrees Fahrenheit and precipitation in inches and hundredths.]

Alabama.—The mean temperature was 61.8°, or 1.6° below normal; the highest was 92°, at Newbern on the 30th, and the lowest, 27°, at Valley Head on the 2d. The average precipitation was 2.34, or 2.02 below normal; the greatest monthly amount, 4.88, occurred at Hamilton, and the least, 0.60, at Dothan.

Conditions quite favorable for planting staple crops, and generally favorable for growth; light to heavy frosts did slight damage in middle and northern counties during first decade; some damage by hail in few localities on 29th.—*F. P. Chaffee.*

Arizona.—The mean temperature was 60.1°, or 2.1° above normal; the highest was 107°, at Aztec on the 14th, and the lowest, 13°, at Flagstaff on the 23d. The average precipitation was 0.04, or 0.32 below normal; the greatest monthly amount, 0.50, occurred at Prescott, while none fell at a great number of stations.

Unseasonably cold weather, lack of precipitation, and insufficient water for irrigation, during March, greatly retarded the growth of vegetation, and the season was estimated to be backward from two to three weeks by April 1. During the first decade of the month, under the influence of warmer weather and bright sunshine, grain and alfalfa made rapid development, and in some localities of the lower agricultural valleys, the first crop of hay was ready to cut and grain was heading out. A recurrence of low temperature, and a continuation of arid conditions prevailed through the latter part of the month, and vegetation made little growth. The matured crops of alfalfa yielded below the average.—*W. G. Burns.*

Arkansas.—The mean temperature was 61.0°, or 0.9° below normal; the highest was 96°, at Fayetteville on the 9th, and the lowest, 25°, at Pond on the 1st. The average precipitation was 2.87, or 1.37 below normal; the greatest monthly amount, 5.58, occurred at Wiggs, and the least, 1.17, at Jonesboro.

Cold, wet weather during the first part of the month delayed planting and all kinds of farm work; more favorable conditions prevailed during the latter half and, as a consequence, farming operations were considerably advanced. By the close of the month corn planting was progressing rapidly, and in many localities was about completed; the first planted was coming up to good stands generally. Cotton planting was being vigorously pushed, some of the early planted was coming up, but the growth was not far enough advanced to judge the stand. Wheat and oats were considerably improved toward the close of the month and the stands were generally good. Irish potatoes were coming up in good condition, some damage by bugs was reported, but it appears to be slight. Prospects for fruit were favorable in all sections.—*Edward B. Richards.*

California.—The mean temperature was 56.2°, or 1.5° below normal; the highest was 109°, at Imperial on the 19th, and the lowest, 2° below zero, at Bodie on the 2d. The average precipitation was 1.88, or 0.08 above normal; the greatest monthly amount, 10.26, occurred at Crescent City, while none fell at seven stations.

Nearly normal weather conditions prevailed during the month and all crops made good growth. There were no injurious frosts. Grain is in excellent condition north of the Tehachapi. Haying commenced about the middle of the month. Deciduous fruits gave indications of a heavy yield.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 46.1°, or 1.4° above normal; the highest was 93°, at Lamar on the 20th, and the lowest, 5° below zero, at Breckenridge on the 15th. The average precipitation was 0.78, or 1.14 below normal; the greatest monthly amount, 3.40, occurred at Ruby, while none fell at Buena Vista.

During April normal advancement in seeding, planting, germination, and growth was the exception. While temperature was unusually favorable, the precipitation was less than normal and the beneficial effects of the showers were minimized by a very dry subsoil and desiccating winds. A shortage of water for irrigation was general in San Luis Park and east of the mountains; in these districts only the older ditches were supplied. Where irrigation water was available winter grains and early seedings made satisfactory advancement. The ranges were backward and fair pasturage was confined principally to the eastern border counties. There were several frosts, but no serious damage resulted. Fruit trees kept abreast of the season and give promise of a large crop.—*F. H. Brandenburg.*

Cuba.—The mean temperature was 76.7°; the highest was 101°, at Banaguises on the 14th, and the lowest, 53°, at Aguacate on the 4th. The average precipitation was 3.30; the greatest monthly amount, 7.27, occurred at La Magdalena (Cayamas), and the least, 0.51, at Manzanillo.

The temperature throughout the month was fairly uniform and seasonal. The rainfall was very unevenly distributed, but the monthly mean for the island was about normal. The tobacco harvest was finished during the first few days of the month; heaping progressed in Pinar del Rio and Havana provinces until about the 20th; after that date the weather was too dry for the continuation of the work. But very little tobacco has been selected in any part of the island; and in Santa Clara Province a very small part of the crop has been placed in heap. New canes and ratoons look very well, although in most places they did not receive sufficient rain. Cultivating, preparing land, and some planting progressed, but on a reduced scale. Grinding is almost finished.—*William B. Stockman.*

Florida.—The mean temperature was 68.3°, or 1.1° below normal; the highest was 94°, at Rockwell on the 30th, and the lowest, 34°, at Middleburg on the 2d. The average precipitation was 1.45, or 1.08 below normal; the greatest monthly amount, 2.85, occurred at Orange City, and the least, 0.25, at Quincy.

The progress of farm work during the month was very satisfactory and at its close all crops were free of grass. The absence of rain, however,