

on February 25 for flood stages in the Great Pedee and Wateree rivers, and the danger lines were passed on the following day. There was a slight recession on the 27th, but additional heavy precipitation on the last two days of the month necessitated a supplementary warning on the 28th that a second flood was following close upon the first, and that a further rise might be expected by March 1. Warnings for the lower rivers were issued when necessary, including a well verified general forecast that the high water in the lower Pedee and the Santee rivers would continue until March 15.

The Savannah River flood lasted from March 1 to 3, inclusive, with a maximum stage on the 1st, at Savannah, Ga., of 34.6 feet, 2.6 feet above the danger line. Warnings of a 34-foot stage were issued on February 28. The warnings for the Chattahoochee River were also issued on this day, and the stages ranged from the danger line of 20 feet at Westpoint, Ga., to 16 feet above at Eufaula, Ala.

The first practical flood work of the new Macon, Ga., river district resulted in a saving of about \$125,000 to the various business interests along the Oconee, Ocmulgee, and Altamaha rivers. The first warnings were issued on the evening of February 27, and they were continued almost daily until the flood wave had receded. The warnings were accurate and well timed, and the service has been the subject of much favorable comment from those interested.

The first warnings for the Alabama River district were issued on February 27, and second ones on the 28th for still higher stages. That the warnings had the desired effect is evidenced from the following comment published in the Montgomery, Ala., Advertiser of March 4, 1902:

When it is remembered that the stages were quite low when the local office of the Weather Bureau issued its flood warnings, and that its estimates so well in advance of the flood crest have been so accurately verified, it increases the general confidence in this feature of the Bureau's work, which is of direct interest to various important interests along the rivers. As the milling, live stock, and lumbering interests alone that are affected by the floods in the Coosa and Alabama and tributaries approximate well up in the millions in value, the importance of such timely and well-distributed warnings can be appreciated.

Other press notices were equally commendatory.

The stages in the Tombigbee and Black Warrior rivers were several feet above the danger lines without unusual incident. Warnings were issued on February 28.

On the Pacific coast the crest of the Sacramento River flood reached the city of that name on March 1, with a stage of 28.2 feet, 3.2 feet above the river danger line. A warning of this rise was issued on February 25, and thereafter there was

a rise of about 1 foot a day until the crest was reached. The direct loss to buildings, stock, and movable property was small, as the warnings were timely and widely distributed, but the losses of crops and fruit lands caused by the escape of the waters through broken levees were very large.

There was still another flood over the southern rivers during the closing days of March, continuing into the first few days of April, and general warnings were once again in order. Over the middle portion of the Tennessee River great damage was done. At the Muscle Shoals Canal the loss to the Government works was about \$150,000, and navigation will be suspended until repairs can be made. It is estimated that the total losses in the State of Tennessee by the floods of the month were \$5,235,000, and 25 lives were reported as lost. In the south Atlantic rivers the later floods were not pronounced, but in Alabama and Mississippi they were abnormal, ranging generally from 13 to 20 feet above the danger lines. At Montgomery, Ala., the Alabama River reached a stage of 47.8 feet, 12.8 feet above the danger line, while at Tuscaloosa, Ala., the Black Warrior River reached a stage of 55.6 feet, 20.6 feet above the danger line. The damage resulting from this flood was very heavy, particularly in the central portion of the State of Alabama. Much land was badly washed and the railroads suffered severely. The estimated losses amount to over \$300,000. In eastern and southern Mississippi the destruction, as shown by press despatches, was even greater, though no reliable estimate could be obtained.

On March 10, 1902, the river and flood service of the new Knoxville, Tenn., district was inaugurated with territory comprising the Holston and French Broad rivers and their tributaries. The special river stations of the district are located at Bluff City and Rogersville, Tenn., on the Holston River, and at Marshall, N. C., and Leadvale and Sinking Springs, Tenn., on the French Broad River. In addition to these, rainfall stations are also operated at Elizabethton, Greenville, and Newport, Tenn., and Mendota, Va.

The highest and lowest water, mean stage, and monthly range at 139 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 55.1°, or about normal; the highest was 82°, at Bermuda on the 25th, and the lowest, 17°, at Valley Head on the 18th. The average precipitation was 8.76, or 2.54 above normal; the greatest monthly amount, 14.14, occurred at Livingston, and the least, 5.31, at Thomasville.

Excessive rains and damaging floods; farm work very backward; corn land about one-third prepared, very little planted; only slight preparation for cotton.—*F. P. Chaffee.*

Arizona.—The mean temperature was 50.9°, or 4.7° below normal; the highest was 92°, at Parker on the 31st, and the lowest, 8° below zero, at Flagstaff on the 26th. The average precipitation was 0.59, or 0.32 below normal; the greatest monthly amount, 2.72, occurred at Flagstaff, while none fell at Fort Mohave.

The weather was characterized by high, drying winds, abnormally low temperature, and deficient rainfall. The mean temperature as compared

with the preceding three years was low, the deficiency ranging from 3° to 8°. Vegetation was not seriously injured in the lower agricultural valleys, but plant growth was arrested by the adverse conditions. Precipitation in the form of rain or snow was general during the last decade, and there was a marked increase in the water flow in the irrigating streams.—*Wm. G. Burns.*

Arkansas.—The mean temperature was 62.6°, or 1.3° above normal; the highest was 89°, at Texarkana on the 26th, and the lowest, 14°, at Dutton, Pond, Oregon, and Winslow on the 18th. The average precipitation was 5.34, or about normal; the greatest monthly amount, 9.37, occurred at Helena, and the least, 2.35, at La Crosse.

Cold, wet weather during the first half of the month was unfavorable for farming operations and work was greatly retarded; more favorable conditions prevailed during the last half of the month and work was pushed and advanced rapidly; the ground generally was in good condition for plowing and much had been done, though farming operations were generally about two weeks late. No corn or cotton had been planted. Early sown wheat and oats had improved, but the late sown were not doing so well, especially oats, many fields of which will be plowed up and the ground prepared for spring crops. Fruit trees had commenced to bud, and up to the close of the month had suffered no damage.—*Edward B. Richards.*

California.—The mean temperature was 49.7°, or 2.1° below normal; the highest was 90°, at Tulare on the 30th and at Volcano on the 31st, and the lowest, 16° below zero, at Boca on the 23d. The average precipitation was 3.39, or 0.13 above normal, the greatest monthly amount, 13.82, occurred at Cuyamaca, and the least, 0.05, at Needles.

Conditions during the first half of the month were unfavorable for growing crops, the cool weather retarding growth of grain and grass, but no material damage occurred. During the latter part of the month warmer weather and showers were very beneficial. Grain is in excellent condition and heavy crops are almost assured. Deciduous fruits are in full bloom and have not been seriously injured by frost.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 34.3°, or about normal; the highest was 78°, at Lamar on the 19th, and the lowest, 23° below zero, at Gunnison on the 5th. The average precipitation was 1.09, or 0.12 below normal; the greatest monthly amount, 3.87, occurred at Ruby, and the least, trace, at Garnett.

The prevailing weather conditions during March were favorable for farm work, but owing to the fact that the open winter had left the soil unusually dry, operations were carried on under a great disadvantage. There was some local improvement as regards moisture during the last decade of March, and at the close of the month seeding and planting were generally as far advanced as usual, except in the south-central section and on the Arkansas-Platte Divide. The reports indicate that as a rule winter wheat is in good condition and that fruit trees sustained no serious damage during the winter. At the close of the month the majority of trees were near the normal stage of advancement.—*F. H. Brandenburg.*

Cuba.—The mean temperature was 74.4°, or about normal; the highest was 97°, at Santa Gertrudis (Banaguises) on the 30th and 31st, and the lowest, 42°, at San Antonio (Santa Clara) on the 19th. The average precipitation was 1.56; the greatest monthly amount, 9.15, occurred at Manzanillo, while none fell at Moron.

The temperature was quite variable, but the monthly mean was about normal. The rainfall was very unevenly distributed, and in most instances insufficient for young canes and ratoons, although in a few localities it was heavy enough to prevent cane carting and thereby interfered with grinding. The sugar crop will fall considerably short of estimates. Fair progress was made with cultivation of new canes and preparations for spring planting, but attention given the work was not general. Second growth of tobacco in Pinar del Rio and Havana provinces gave a very good yield, but at the end of the month the return from this crop was proving very poor in Santa Clara Province. Small crops made fair progress, but were in general need of rain at the end of the month.—*W. B. Stockman.*

Florida.—The mean temperature was 64.8°, or 0.6° below normal; the highest was 91°, at Bartow on the 12th and 14th, and the lowest, 28°, at Wausau on the 6th and at Middleburg on the 7th. The average precipitation was 4.63, or 1.55 above normal; the greatest monthly amount, 13.62, occurred at De Funiak Springs, while none fell at Flamingo and Miami.

The month was slightly cooler than the average, with precipitation (all sections considered) above the normal, although rain was decidedly light through portions of the central district, and uniformly so in the southern section of the State. The bulk of the corn crop was planted during the second decade and a large acreage was planted to cotton during the third decade. Early corn and melons made fair progress, although low temperatures during the first decade checked growth and caused some corn to turn yellow. Citrus trees are in fair condition, with good bloom in evidence. Pineapples suffered no serious drawbacks. At the close of the month vegetables from southern and central districts were being shipped in large lots. Farm work is generally well advanced.—*A. J. Mitchell.*

Georgia.—The mean temperature was 55.0°, or 0.7° below normal; the highest was 86°, at Mauzy and Waverly on the 30th, and the lowest, 13°, at Diamond on the 19th. The average precipitation was 7.91, or 2.65 above normal; the greatest monthly amount, 13.40, occurred at Blakely, and the least, 4.62, at Waynesboro.

March was the eighth consecutive month with temperatures below normal, although in this instance the departure was less than one degree. The most noteworthy feature, however, was the precipitation element, which was decidedly above normal in all sections of the State. The total monthly falls were heavy in the southwestern counties, averaging more than 10 inches, with over 13 inches recorded at two stations. The general conditions of the month were unfavorable to agricultural interests. Plowing and planting were retarded by the excessive rainfall, and at the close of the month the season was regarded as fully two to three weeks later than usual.—*J. B. Marbury.*

Idaho.—The mean temperature was 33.5°, or 0.8° below normal; the highest was 72°, at Lewiston on the 31st, and the lowest, 14° below zero, at Lake on the 30th. The average precipitation was 1.38, or 0.30 below normal; the greatest monthly amount, 3.33, occurred at Silver City, and the least, 0.20, at Blackfoot.

The weather during March was uniformly cool throughout the southern and central sections and moderately mild in the northern counties. It

was the most unfavorable month for vegetation since March, 1899; however, much plowing and some seeding of spring wheat and oats were done. Owing to frequent snowstorms in the mountains, the outlook for irrigation water during the approaching crop season is very good—better than for three years.—*S. M. Blandford.*

Illinois.—The mean temperature was 43.0°, or 4.3° above normal; the highest was 77°, at Centralia, Cisne, and Equality on the 25th, and the lowest, 4° below, at Chemung on the 17th. The average precipitation was 3.36, or 0.10 above normal; the greatest monthly amount, 5.51, occurred at Joliet, and the least, 1.30, at Effingham.

Moderately warm weather prevailed the greater part of the month, and the latter part was unseasonably warm, except a few days at its end. A cold wave crossed the State about the middle of the month. Good rains fell over most of the State. They have generally been sufficient to put the ground in excellent condition for tillage. As a result of the favorable conditions the agricultural situation at the end of the month is very promising. Wheat has made considerable improvement especially in the southern district. Grasses have also improved somewhat. Oat seeding has progressed rapidly, and some gardening and potato planting have been done. The prospects for fruit, except peaches, seem good.—*M. E. Blystone.*

Indiana.—The mean temperature was 43.6°, or 4.1° above normal; the highest was 80°, at Washington on the 25th, and the lowest, 4°, at Winamac on the 17th and 18th. The average precipitation was 3.11, or 0.88 below normal; the greatest monthly amount, 4.52, occurred at Hammond, and the least, 1.42, at Franklin.

At the end of March wheat was generally short, and in some localities on hill and clay land had been winter-killed in spots; but, as a rule, fields were green and a fair crop seemed assured. Much clover and timothy seeded in the fall failed of a good stand on account of the drought, but meadows that were in good condition in the fall look promising. Peaches suffered in all sections, and in some localities all buds were dead; other fruit is believed to be uninjured. Feed was getting scarce and cattle were reported thin, but otherwise live stock was in good condition. Plowing, sowing oats, planting potatoes, and making gardens were in progress.—*W. T. Blythe.*

Iowa.—The mean temperature was 39.1°, or 5.9° above normal; the highest was 79°, at Winterset on the 25th, and the lowest, 12° below zero, at Estherville on the 17th. The average precipitation was 1.45, or 0.30 below normal; the greatest monthly amount, 4.33, occurred at Cumberland, and the least, 0.13, at Algona.

The month was generally warm and dry, and the soil was in good condition for farm operations at an earlier date than usual in this latitude. Seeding of spring wheat was about complete at close of the month, and good progress was made in sowing oats and barley, and plowing for corn. Fall wheat wintered fairly well, but growth was retarded by dry weather.—*John R. Sage.*

Kansas.—The mean temperature was 45.7°, or 4.4° above normal; the highest was 83°, at Delphos on the 10th, and the lowest, 1° below zero, at Achilles on the 17th. The average precipitation was 1.88, or 0.35 above normal; the greatest monthly amount, 5.11, occurred at Columbus, and the least, 0.30, at Concordia.

Wheat improved rapidly the last ten days, and with few exceptions was in fair condition in the central counties and in fine condition in the eastern. Oat sowing well along in the northern counties and completed in the southern. Corn planting begun in the south. Early potatoes mostly planted. Flax sowing south. Peaches and apricots beginning to bloom south. Peach buds mostly killed north.—*T. B. Jennings.*

Kentucky.—The mean temperature was 47.2°, or 1.3° above normal; the highest was 82°, at Burnside on the 25th, and the lowest, 7°, at Loretto on the 6th. The average precipitation was 4.44, or 0.92 below normal; the greatest monthly amount, 9.68, occurred at Alpha, and the least, 1.26, at Carrollton.

Wheat greatly improved, but is very poor in many central and eastern localities. Tobacco beds were sown, but are generally late. The reports on fruit are very conflicting: some say that peaches are killed, and others claiming that while certain varieties are badly injured, there is a chance for a fair crop. Other fruits promising. Oat sowing and garden planting progressed fairly well during the latter part of the month, but farm work is somewhat backward. Many lambs were killed by the severe weather during the early part of the month, but stock is generally in fair condition.—*H. B. Hersey.*

Louisiana.—The mean temperature was 60.7°, or about normal; the highest was 89°, at Schriever on the 24th, and the lowest, 21°, at Farmerville on the 17th. The average precipitation was 5.03, or 0.60 above normal; the greatest monthly amount, 14.34, occurred at Farmerville, and the least, 1.35, at Lakeside.

Heavy rains over the northern portion of the State materially interfered with farming operations. Preparations for cotton planting made very little progress, except over the southern portion of the State, where planting was progressing in some localities. Corn planting was well advanced over the southern portion of the State and was under way over the northern portion at the close of the month. Planting of sugar cane was retarded to some extent by rain, but was completed in most sections, and both plant and stubble cane were coming up nicely. The weather was generally favorable in the rice growing section and good

progress was made with this crop. Truck gardens made good growth. Strawberries were doing well.—*I. M. Cline.*

Maryland and Delaware.—The mean temperature was 44.8°, or 4.0° above normal; the highest was 80°, at Chewsville, Md., on the 29th, and the lowest, 3°, at Sunnyside, Md., on the 18th. The average precipitation was 3.91, or 0.21 above normal; the greatest monthly amount, 5.92, occurred at Clear Spring, Md., and the least, 1.82, at Pocomoke, Md.

Wet weather prevailed during the early part of the month, with heavy snows on the 5th. Farming operations were interrupted for the most part until about the 17th, when ten days of warmth and sunshine began. During this period slight progress was made in the extreme west; in the interior much clover and some oats were sown, and in the south and east, where the season was most forward, early trucking was well advanced and tobacco beds were made and some seeded. There was a wonderful improvement in wheat and rye in all districts, although those crops were still below average condition at the close of the month. The fruit prospects are very encouraging. Farm work is generally late, as heavy and general rains followed the dry period of the 17th to 27th, again interrupting plowing and gardening.—*Oliver L. Fassig.*

Michigan.—The mean temperature was 36.3°, or 9.0° above normal; the highest was 74°, at Owosso on the 30th, and the lowest, 7° below zero, at Thomaston on the 4th, at Humboldt on the 5th, and at Gaylord on the 18th. The average precipitation was 2.54, or 0.40 above normal; the greatest monthly amount, 6.22, occurred at Vassar, and the least, 0.01, at Newberry.

March was unusually warm and quite dry in all sections until the last decade, when ample showers occurred over the greater portion of the lower peninsula; the month was dry throughout in the upper peninsula. The weather was pleasant most of the month, and at its close plowing had quite generally begun in the central and southern sections. Winter wheat made very little growth during the month, continuing small, but at the close of the month was in a healthy and generally fair condition. Fruit buds seem to have wintered well, and in nearly all sections all kinds of fruit trees were in a promising condition.—*C. F. Schneider.*

Minnesota.—The mean temperature was 34.0°, or 9.0° above normal; the highest was 72°, at Luverne on the 27th, and the lowest, 20° below zero, at Tower on the 16th. The average precipitation was 0.92, or 0.50 below normal; the greatest monthly amount, 4.85, occurred at Beardsley, and the least, 0.09, at Bird Island.

Little or no work is said to have been possible in the timber regions during the month because of the mild weather. At the close of the month the whole Red River Valley was still wet, and no work had been done; in the southern half of the State considerable preparation for seeding had been made and some wheat seeded, and in the central-southern portion wheat seeding was well advanced, a few oats sown, some gardening done, and potatoes planted in one or two cases. In the southern half the soil was in excellent condition, except in the extreme southeast, where it was too wet. Very high winds on the 26th and 27th caused soil drifting in some places. It is still too early to determine the condition of winter rye and the small area of winter wheat.—*T. S. Outram.*

Mississippi.—The mean temperature was 57.1°, or 0.6° above normal; the highest was 85°, at Waynesboro on the 25th, and the lowest, 19°, at Ripley on the 6th. The average precipitation was 9.18, or 3.53 above normal; the greatest monthly amount, 15.34, occurred at Agricultural College, and the least, 3.84, at Woodville.

Up to the 25th of March generally favorable conditions prevailed for clearing the land, plowing and truck gardening, and fair progress was made in farming operations. Oats were sown and in the southern counties were coming up to good stands. In the central and southern portions of the State corn planting was well under way. The very excessive rains on the 26th, 27th, and 28th over the northern two-thirds of the State proved very disastrous to all crops, and as a result a large part of the corn planted during the month was either washed away or covered too deep to germinate; gardens were injured, and in many counties it became necessary to replot the soil that had been prepared for planting. At the close of the month the outlook for fruit was excellent.—*W. S. Belden.*

Missouri.—The mean temperature was 45.4°, or 3.7° above normal; the highest was 85°, at Desoto on the 10th, and the lowest, 1°, at Conception and Maryville on the 17th. The average precipitation was 3.50, or about normal; the greatest monthly amount, 7.67, occurred at Mount Vernon, and the least, 0.46, at St. Joseph.

Except in some of the southern counties, where heavy rains kept the ground too wet to work, the weather was generally favorable for farming operations and for the growth of grains and grasses. In a majority of the central and northern counties the soil was in good condition, the bulk of the oat crop sown, considerable gardening done, many early potatoes were planted, and some ground prepared for corn; but in portions of the southern section the soil was so wet that little planting could be done. Winter wheat continued in good condition, as a rule, and in many counties its condition at the close of the month was much above the average.—*A. E. Hackett.*

Montana.—The mean temperature was 31.4°, or 1.5° above normal; the highest was 62°, at Crow Agency on the 8th, and the lowest, 22° below zero, at Wibaux on the 17th. The average precipitation was 0.80, or 0.38

below normal; the greatest monthly amount, 2.90, occurred at Glendive, and the least, trace, at Fort Benton and Chester.

Severe weather occurred over the east portion of the State from the 14th to the 17th, consisting of heavy snow and high winds, with the temperature below zero during the mornings. All traffic on the railroads was suspended and many sheep and cattle perished. One stockman lost 3,000 head of sheep out of a band of 7,000 in the vicinity of Wibaux, and 40 head of cattle were also lost near Wibaux.—*E. J. Glass.*

Nebraska.—The mean temperature was 39.2°, or 5.0° above normal; the highest was 84°, at Republican on the 10th, and the lowest, 12° below zero, at Madrid and Valentine on the 17th. The average precipitation was 1.18, or 0.02 above normal; the greatest monthly amount, 3.09, occurred at Hay Springs, and the least, 0.18, at Winnebago.

Warm, favorable month; considerable acreage of oats sown in southern counties and a few potatoes planted. Winter wheat continues to look well, and in the western portion of the wheat belt is in exceptionally good condition; in southeastern counties wheat has been injured slightly by dry weather and high wind.—*G. A. Loveland.*

Nevada.—The mean temperature was 35.2°, or 2.9° below normal; the highest was 69°, at Candelaria on the 16th, and the lowest, zero, at Ely on the 3d. The average precipitation was 1.47, or 0.17 above normal; the greatest monthly amount, 5.40, occurred at Eureka, while none fell at Hawthorne.

The first few days were unusually stormy, with high winds and heavy snowfall over the eastern, western, central, and northern sections of the State. At the close of the month the stock of snow in the mountain ranges was sufficient to supply a good flow of water during the summer months. In the western and southern sections of the State some plowing was done during the latter part of the month. The weather was favorable to live stock interests.—*J. H. Smith.*

New England.—The mean temperature was 38.8°, or 7.8° above normal; the highest was 69°, at Boston, Mass., on the 12th, and the lowest, 6° below zero, at Berlin Mills, N. H., on the 7th and 8th. The average precipitation was 5.87, or 2.35 above normal; the greatest monthly amount, 14.37, occurred at Bar Harbor, Me., and the least, 1.74, at Manchester, Vt.

The weather of the month was exceptionally favorable for farm operations. The frost had left the ground by the 15th to 20th, except in some of the northern sections, and plowing and planting has begun in southern sections of the district. Grass and grain have wintered well, except in parts of Connecticut. The general outlook for fruit is very encouraging. The season has been excellent for maple sugar, and the yield is large and the quality first class. The season is fully two weeks in advance of the average. The temperature was much above the normal, making the month unusually mild. The precipitation was largely in excess and chiefly in the form of rain.—*J. W. Smith.*

New Jersey.—The mean temperature was 43.9°, or 5.5° above normal; the highest was 77°, at Beverly and Salem, on the 29th, and the lowest, zero, at Layton on the 7th. The average precipitation was 4.34, or 0.45 above normal; the greatest monthly amount, 7.20, occurred at River Vale, and the least, 3.16, at New Egypt.

Farming operations were begun in the southern section about the 15th, and much seeding and planting of early truck have been done. Some oats seeded in southern and middle sections. Grain and grass fields are below the average stand.—*Edward W. McGann.*

New Mexico.—The mean temperature was 40.9°, or 3.0° below normal; the highest was 85°, at Carlsbad on the 2d, and the lowest, 1° below zero, at Winsors on the 1st. The average precipitation was 0.36, or 0.10 below normal; the greatest monthly amount, 1.62, occurred at Folsom, while none fell at Gage, Los Lunas, and San Marcial, and only a trace at Albuquerque, Deming, East Las Vegas, Lordsburg, Olio, Socorro, and Strauss.

Unusually windy and a cool, dry month. Plowing and planting somewhat backward on account of the drought. Frost on 30th killed most of the apricots and some peaches in the central Rio Grande Valley. As a rule stock is in good condition.—*R. M. Hardinge.*

New York.—The mean temperature was 37.9°, or 7.8° above normal; the highest was 71°, at Fayetteville on the 29th, and the lowest, 2° below zero, at Axton on the 5th. The average precipitation was 3.62, or 0.24 above normal; the greatest monthly amount, 9.40, occurred at Adirondack Lodge, and the least, 0.90, at Lyndonville.

March was a mild month, and snow had disappeared by the 15th. Wheat, rye, grasses, and fruit trees were reported in good condition. The season at the close of March was about ten days in advance of the average, and the conditions were favorable for maple sugar interests. Some plowing for potatoes and oats, and some gardening were done during the latter part of March.—*R. G. Allen.*

North Carolina.—The mean temperature was 50.1°, or 1.5° above normal; the highest was 87°, at Sloan on the 30th, and the lowest, 4°, at Linville on the 18th. The average precipitation was 3.81, or 0.80 below normal; the greatest monthly amount, 10.90, occurred at Highlands, and the least, 1.86, at Kittyhawk.

March did not present marked departures from the normal in temperature or precipitation. While rain in small amounts was frequent, high winds dried out the soil rapidly. There was only one severe cold wave, which culminated on the 19th in the lowest temperatures for the month, but vegetation was not sufficiently advanced to be injured, except truck

crops in the eastern part of the State, which received adequate protection. Open weather gave an impetus to farm work; plowing began actively and much was accomplished. Winter wheat improved considerably. Some upland corn was sown, gardens were prepared, Irish potatoes and truck crops planted, tobacco beds seeded, and an increased acreage sown to spring oats. At the close of March fruit trees, chiefly peaches, plums, and cherries were in bloom; the outlook for strawberries and truck crops was excellent.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 27.4°, or 9.8° above normal; the highest was 65°, at Wahpeton on the 10th and the lowest, 25° below zero, at Bottineau, McKinney, and Woodbridge on the 17th. The average precipitation was 2.73, or 1.79 above normal; the greatest monthly amount, 6.26, occurred at Edgeley, and the least, 0.51, at McKinney.

The most important feature of the month was a severe storm, usually locally termed a "blizzard," on the 14th, 15th, and 16th. During this storm three lives are known to have been lost and the damage to live stock was very great, the full extent of which is not yet known. All travel was suspended and railroads had much difficulty in opening their lines for traffic.—*B. H. Bronson.*

Ohio.—The mean temperature was 41.9°, or 3.4° above normal; the highest was 82°, at Pomeroy on the 11th, and the lowest, 4° below zero, at Cambridge on the 6th. The average precipitation was 2.76, or 0.62 below normal; the greatest monthly amount, 4.96, occurred at Wauseon, and the least, 1.47, at Cincinnati.

The temperature for the month was above the normal, the highest occurring at most stations on the 11th, 12th, or 26th, and the lowest on the 6th or 18th. The precipitation was slightly below normal, the lightest fall being recorded in the southwest and northeast counties. Heavy snow fell in the southeast portion of the State on the 5th, several stations reporting 12 inches or more. Wheat has shown a marked improvement during the month. Farm work progressed satisfactorily, much plowing and seeding being done. Fruits are in general quite promising, although peach buds have been somewhat winter killed.—*J. Warren Smith.*

Oklahoma and Indian Territories.—The mean temperature was 51.5°, or 1.8° above normal; the highest was 86°, at Ardmore, Ind. T., on the 4th, and the lowest, 11° at Beaver, Okla., on the 6th, and at Kenton, Okla., on the 16th. The average precipitation was 4.02, or 1.81 above normal; the greatest monthly amount, 7.81, occurred at Tahlequah, Ind. T., and the least, 1.05, at Beaver, Okla.

The precipitation was decidedly above the average, and, in connection with the accompanying warmth, caused the crops in the ground to rapidly revive and improve in condition. Wheat, which was in very poor condition, regained its vigor and made rapid improvement, and by the close of the month was promising from half to an average yield; many fields of early-sown, soft wheat, however, were so thin that they were plowed up and placed in oats and corn; oats were sown and coming up to a good stand; rye, barley, and grasses were doing well; corn ground was prepared and some planting done, and some early planted coming up; cotton ground was being prepared and was in excellent condition; fruit trees were blooming, with a fine prospect; stock thin, but doing well, and in some counties is out on range.—*C. M. Strong.*

Oregon.—The mean temperature was 43.2°, or 0.5° below normal; the highest was 83°, at Prineville on the 28th, and the lowest, 3°, at Bend on the 27th. The average precipitation was 5.19, or 0.71 above normal; the greatest monthly amount, 19.01, occurred at Bay City, and the least, 0.05, at Umatilla.

The month of March was wet, cold, and deficient in sunshine, and consequently unfavorable for fall-sown grain and the advancement of farm work. On poorly-drained land in the Willamette Valley fall wheat turned yellow, and at the end of the month it was spotted and not as promising as it was a month ago. On the higher and better-drained land the plant was healthy and vigorous and had stooled nicely. In southern Oregon the wheat fields were generally in a promising condition, but in eastern Oregon fall wheat was not as far advanced as usual.—*Edward A. Beals.*

Pennsylvania.—The mean temperature was 41.3°, or 5.8° above normal; the highest was 78°, at Lycippus on the 13th, and the lowest, 2°, at California on the 6th. The average precipitation was 3.98, or 0.45 above normal; the greatest monthly amount, 7.50, occurred at Somerset, and the least, 0.77, at Erie.

Grain was well protected by snow and wintered in fairly good condition. Plowing, seeding, and gardening began during the latter part of the month. Fruit buds uninjured.—*T. F. Townsend.*

Porto Rico.—The mean temperature was 74.6°, or 0.7° below normal; the highest was 95°, at Cayey on the 1st, and the lowest, 51°, at Cayey and Barros on the 4th and at Adjuntas on the 31st. The average precipitation was 2.52, or 0.50 below normal; the greatest monthly amount, 7.69, occurred at Hacienda Perla, and the least, 0.07, at Ponce.

Weather all that could be desired for sugar making, which continued without interruption; grade of juice generally satisfactory and improving. Crops suffered for want of rain, especially in southern districts where not irrigated. Dry weather retarded spring planting. Tobacco revived by showers in early part of month and good grade of leaf being cut; sowing continued to end of month. Coffee trees flowered abundantly and first blossoms considered safely fixed; outlook excellent. Some corn, beans, frijoles, and rice planted. Pastures generally dry and cattle suffering in consequence.—*E. C. Thompson.*

South Carolina.—The mean temperature was 54.0°, or 0.5° below normal; the highest was 86°, at Gillisonville on the 19th, and the lowest, 19°, at Barksdale on the 4th, Greenville on the 6th, Health Springs on the 18th, and Walhalla on the 19th. The average precipitation was 4.08, or 0.32 above normal; the greatest monthly amount, 7.19, occurred at Trenton, and the least, 1.90, at Darlington.

The temperature conditions were variable, with frequent cool periods and freezing weather that retarded growth. The rainfall was evenly distributed, but so heavy over the western portions of the State as to prevent extensive preparation of lands for spring planting and but little corn was there planted. More favorable conditions prevailed over the eastern counties, where spring planting of corn, rice, truck, sorghum, and gardens was well advanced and some cotton planted. Tobacco plants in beds remained small but healthy.—*J. W. Bauer.*

South Dakota.—The mean temperature was 34.1°, or 7.0° above normal; the highest was 77°, at Fort Randall on the 9th, and the lowest, 20° below zero, at Ashcroft on the 16th. The average precipitation was 1.80, or 0.30 above normal; the greatest monthly amount, 5.53, occurred at Fort Meade, and the least, 0.43, at Canton.

An unusually severe and prolonged cold wave for March passed over the State from the 15th to 17th, with high northerly winds, and in northern sections a snowstorm, resulting in considerable loss of unsheltered range live stock in some localities. General rains the latter part of the month, and cold and windy weather earlier, considerably interrupted and delayed farming operations, but much preparatory field work was done, and in southeastern counties some spring wheat was sown. The rains left the soil in amply moist condition generally and some lowlands too wet. Fall sown rye generally came through the winter in good condition, though in some upland fields it was injured.—*S. W. Glenn.*

Tennessee.—The mean temperature was 50.0°, or 1.2° above normal; the highest was 85°, at Decatur on the 25th, and the lowest, 9°, at Silver Lake and Rugby on the 6th. The average precipitation was 7.14, or 1.25 above normal; the greatest monthly amount, 12.50, occurred at Lewisburg, and the least, 3.55, at Elizabethton.

Conditions were generally unfavorable for farm work and for the growth of vegetation, owing to the low temperatures. Early sown wheat was much improved by the end of the month, but late sown was still very poor. Some corn, early potatoes, and spring oats were seeded, and gardening was begun. Not much plowing was done. Clover and grasses were looking well. Heavy rains on the 28th wrought great damage in the middle section, washing away soil and fencing and flooding crops.—*H. C. Bate.*

Texas.—The mean temperature was 60.1°, or 1.5° above normal; the highest was 108°, at Fort Ringgold on the 14th, and the lowest, 17°, at Mount Blanco on the 5th. The average precipitation was 1.81, or 0.21 below normal; the greatest monthly amount, 8.81, occurred at Grapevine, while none fell at El Paso, Fort Brown, Fort McIntosh, Menardville, and Laureles Ranch.

The weather conditions were generally favorable over a large portion of the east and northeast sections of the State, along the gulf coast, and in localities in the south-central section and the Panhandle, and all crops throughout these districts made satisfactory progress. Elsewhere little or no rain fell, and a drought that has continued unbroken during the greater portion of the winter months still prevails over the southern, southwestern, and Rio Grande counties. Considerable cotton was planted, and where sufficient moisture was received the early planted crop was up and growing. The bulk of the corn crop was planted, and by the close of the month many fields were up and being worked. Sugar cane was up and the seeding of sorghum was in progress. Truck farms were in excellent condition. Where rain fell a marked improvement was noted in the condition of the grain crops. Prospects for fruit continue excellent. In the drought stricken districts the planting of cotton and corn has been greatly delayed, and the early planted has failed to germinate; pastures are bare and water is extremely scarce; and in some of the southwestern counties a veritable famine prevails.—*Edward H. Bowie.*

Utah.—The mean temperature was 34.9°, or 2.7° below normal; the highest was 73°, at St. George on the 17th, and the lowest, 9° below zero, at Soldier Summit on the 30th. The average precipitation was 1.28, or 0.05 above normal; the greatest monthly amount, 6.06, occurred at Ranch, and the least, trace, at Terrace.

Cold and stormy weather held back vegetation and interfered with farm work. The month closed with the season at least ten days later than usual. Fall grain continues in good condition. Fruit buds were swelling rapidly at the close of the month, but had not opened.—*L. H. Murdock.*

Virginia.—The mean temperature was 47.2°, or 3.1° above normal; the highest was 81°, at Columbia on the 29th, and the lowest, 8°, at Burkes Garden on the 19th. The average precipitation was 2.97, or 0.86 below normal; the greatest monthly amount, 6.25, occurred at Bigstone Gap, and the least, 0.97, at Williamsburg.

Temperatures above the normal for the month combined with occasional warm rains were very helpful to fall sown crops. Winter wheat, oats, and clover are, however, still backward. Some spring plowing has been done, and the seeding of spring oats has begun. Fruit buds of the early blooming varieties of peaches began to swell about the 20th and were in full bloom by the 31st.—*Edward A. Evans.*

Washington.—The mean temperature was 41.7°, or about normal; the highest was 71°, at Hooper on the 31st, and the lowest, 13°, at Usk on the 17th. The average precipitation was 3.72, or 0.59 above normal; the greatest monthly amount, 17.28, occurred at Clearwater, and the least, 0.03, at Pasco.

Fore part of month warm, latter part cool, with frosts; spring backward, but, on that account, is thought favorable for fruit. Ground too wet for working in western section, but plowing and wheat seeding progressed steadily in eastern section. Condition of winter wheat improved; much had to be resown.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 43.4°, or 1.1° above normal; the highest was 80°, at Logan on the 11th, and the lowest, 5° below zero, at Camden on the 6th. The average precipitation was 4.30, or 0.31 above normal; the greatest monthly amount, 6.29, occurred at Williamson, and the least, 3.00, at Central Station.

Practically no farm work done until the fourth week, which was mild and pleasant. Winter wheat, rye, and oats generally below average condition, with prospect for not more than half a crop; some wheat and fall-sown grass winter-killed; fruit buds swelling and prospects excellent, except for peaches.—*E. C. Vose.*

Wisconsin.—The mean temperature was 36.0°, or 8.2° above normal;

the highest was 75°, at Knapp on the 26th, and the lowest, 10° below zero, at Hayward on the 17th and at Butternut on the 18th. The average precipitation was 1.33, or 0.60 below normal; the greatest monthly amount, 2.65, occurred at Green Bay, and the least, 0.20, at Antigo.

The month as a whole was remarkably warm, especially during the first and third decades. Considerable seeding was done during the latter part of the month, with the soil in very good condition. Winter grains are almost universally reported in good condition, but clover and meadows generally are only fair.—*W. M. Wilson.*

Wyoming.—The mean temperature was 30.7°, or 1.5° above normal; the highest was 85°, at Rock Springs on the 14th, and the lowest, 19° below zero, at Daniel on the 3d. The average precipitation was 0.99, or 0.33 below normal; the greatest monthly amount, 2.46, occurred at Fort Yellowstone, and the least, trace, at Lovell (Byron P. O.).

The month was quite favorable for stock, although some of the cold storms were trying on both sheep and cattle. The stock losses for the winter have been very light and stock is now in good condition over most sections of the State. Some plowing in Big Horn and the eastern counties and in a few of the earlier sections some seeding was done.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

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