

have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 12th to the 20th, inclusive. On the remaining nineteen days of this month 129 reports were received, or an average of about 7 per day. The dates on which the number of reports for the whole country especially exceeded this average were: 2d, 30; 25th, 23; 26th, 25, and 27th, 16.

Auroras were reported most frequently in: Michigan, 15; North Dakota, 31.

The number of reports was a large percentage of the num-

ber of observers in: North Dakota, 80; South Dakota, 20.

#### CANADIAN REPORTS.

No thunderstorms were reported.

Auroras were reported as follows: Grand Manan, 26th; Yarmouth, 3d, 26th; St. Andrews, 25th; Father Point, 3d, 5th, 20th, 24th, 26th; Quebec, 3d, 9th, 10th, 24th, 25th; Montreal, 3d, 9th, 25th; Kingston, 26th; Winnipeg, 1st, 10th, 20th, 22d to 27th; Minnedosa, 1st, 8th, 22d to 28th; Medicine Hat, 3d; Calgary, 1st, 3d, 4th, 13th; Banff, 25th; Battleford, 1st, 7th, 14th.

## CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

**Alabama.**—The mean temperature was 51.0°, or 1.8° above normal; the highest was 85°, at Elba on the 23d, and the lowest, 12°, at Valleyhead on the 27th. The average precipitation was 6.32, or 1.65 above normal; the greatest monthly amount, 13.53, occurred at Alco, and the least, 2.82, at Newburg. The wet weather has delayed farming operations somewhat, while the continued warm weather of the greater part of the month caused fruit trees to bloom in the southern and central portions of the State.—*F. P. Chaffee.*

**Arizona.**—The mean temperature was 47.3°, or 1.0° below normal; the highest was 83°, at Parker and Yuma on the 25th, and the lowest, 10° below zero, at Flagstaff on the 22d. The average precipitation was 0.69, or 0.51 below normal; the greatest monthly amount, 2.82, occurred at Pinal Ranch, while none fell at several stations.—*W. T. Blythe.*

**Arkansas.**—The mean temperature was 46.8°, or 3.4° above normal; the highest was 89°, at Elon on the 18th, and the lowest, 7°, at Silver Springs on the 27th. The average precipitation was 2.59, or 1.91 below normal; the greatest monthly amount, 5.80, occurred at Blackton, and the least, 0.45, at Fort Smith.—*F. H. Clarke.*

**California.**—The mean temperature was 48.0°, or 0.8° below normal; the highest was 97°, at Volcano Springs on the 28th, and the lowest, 24° below zero, at Bodie on the 23d. The greatest monthly precipitation was 20.14, at Morses House, while none fell at several stations.—*J. A. Barwick.*

**Colorado.**—The mean temperature was 25.0°, or about normal; the highest was 69°, at Lamar on the 27th, and the lowest, 34° below zero, at Hot Sulphur Springs on the 14th. The average precipitation was 1.72, or 0.67 above normal; the greatest monthly amount, 23.28, occurred at Ruby, where the total snowfall was nearly 20 feet; the least amount was 0.10, at Fort Morgan.—*F. H. Brandenburg.*

**Florida.**—The mean temperature was 63.0°, or 2.0° below normal; the highest was 90°, at Archer on the 21st, and the lowest, 27°, at De Funiak Springs on the 27th. The average precipitation was 6.57, which is 3.42 in excess of the normal; the greatest monthly amount, 13.23, occurred at Milton, and the least, 1.00, at Orange Park.—*A. J. Mitchell.*

**Georgia.**—The mean temperature was 51.3°, or 1.1° above normal; the highest was 8.3°, at Morgan on the 22d and Jesup on the 23d, and the lowest, 10° at Gainesville on the 4th. The average precipitation was 7.98, or 3.49 above normal; the greatest monthly amount, 12.43, occurred at Jesup, and the least, 4.29, at Marietta.—*J. B. Marbury.*

**Idaho.**—The mean temperature was 27.6°; the highest was 67°, at Lewiston on the 28th, and the lowest, 22° below zero, at Chesterfield on the 18th. The average precipitation was 2.11; the greatest monthly amount, 3.80, occurred at Ola, and the least, 0.20, at Oakley.—*D. P. McCallum.*

**Illinois.**—The mean temperature was 31.2°, or 2.2° above normal; the highest was 73°, at McLeansboro on the 20th, and the lowest, 12° below zero, at Scale Mound on the 27th. The average precipitation was 1.99, or 1.02 below normal; the greatest monthly amount, 5.13, occurred at Golconda, and the least, 0.69, at Bushnell.—*C. E. Linney.*

**Indiana.**—The mean temperature was 32.7°, or 0.8°, above normal; the highest was 71°, at Mount Vernon on the 21st, and the lowest, 5° below zero, at Angola and South Bend on the 27th. The average precipitation was 2.92, or 0.31 below normal; the greatest monthly amount, 6.25, occurred at Vevay, and the least, 1.16, at Warsaw. The weather was not favorable to growing crops, and wheat and clover are not in a

very good condition at the end of the winter, except in a few favorably located fields. Fruit buds seem to be safe so far, except peach buds, which were possibly injured much during the extended cold nights. Stock is in good condition.—*C. F. R. Wappenhans.*

**Iowa.**—The mean temperature was 24.6°, or 2.4° above normal; the highest was 61°, at Council Bluffs on the 16th, and the lowest, 24° below zero, at Algona and Spirit Lake on the 26th. The average precipitation was 0.88, or 0.54 below normal; the greatest monthly amount, 1.90, occurred at Hawkeye, and the least, 0.22, at Ames.—*G. M. Chappel.*

**Kansas.**—The mean temperature was 33.5°, or 1.7° above normal; the highest was 77°, at Hutchinson on the 21st, and the lowest, 8° below zero, at Garden City on the 15th. The average precipitation was 1.16, or 0.13 above normal; the greatest monthly amount, 3.45, occurred at Columbus, and the least, "trace," at White Rock. Much of the precipitation was in the form of snow, which was very wet, and falling with but little wind, no drifting occurred; this wet snow, lying as it fell, melting and soaking into the ground, very nearly produced a mud blockade, but was of incalculable value to the State, putting the ground in better condition for the time of year than it has been for some years.—*T. B. Jennings.*

**Kentucky.**—The mean temperature was 39.8°, or 2.0° above normal; the highest was 76°, at Middlesboro and Williamsburg on the 22d, and the lowest, 8°, at Blandville and Mount Sterling on the 27th. The average precipitation was 5.75, or 1.79 above normal; the greatest monthly amount, 8.86, occurred at Southfork, and the least, 3.02, at Pilot Oak. During the greater portion of the month conditions were favorable for all agricultural interests at this season, and some early plowing for spring work was begun.—*Frank Buske.*

**Louisiana.**—The mean temperature was 55.1°, or 0.6° above normal; the highest was 89°, at Cheneyville on the 20th and 21st, and the lowest, 24°, at Robeline on the 2d. The average precipitation was 4.25, or 0.40 below normal; the greatest monthly amount, 9.92, occurred at Donaldsonville, and the least, 0.43, at Shreveport. The month lacked sunshine, cloudy weather and easterly winds prevailed during a goodly period; despite this important drawback the close of the month shows farm work progressing over the greater portion of the State, with peach and plum trees in bloom, and the forest trees putting on their spring verdure.—*R. E. Kerkam.*

**Maryland.**—The mean temperature was 34.8°, or 2.0° above normal; the highest was 63°, at Charlotte Hall on the 17th, and the lowest, zero, at Flintstone on the 1st. The average precipitation was 5.43, or 2.32 above normal; the greatest monthly amount, 9.17, occurred at Sunnyside, and the least, 3.53, at Mount St. Marys.—*G. E. Hunt.*

**Michigan.**—The mean temperature was 23.6°, or 2.0° above normal; the highest was 54°, at Midland on the 20th, and the lowest, 43° below zero, at Humboldt on the 26th. The average precipitation was 1.26, or 0.69 below normal; the greatest monthly amount, 3.23, occurred at Benton Harbor, and the least, 0.29, at Iona. So far as can be determined, fall-sown crops and fruit buds are in good condition.—*C. F. Schneider.*

**Minnesota.**—The average temperature was 15.3°, or 2.8° above normal; the highest was 48°, at Luverne on the 3d, and the lowest, 50° below zero, at Leech Lake Dam on the 25th and Pokegama on the 28th. The average precipitation was 1.21, or 0.52 above normal; the greatest monthly amount, 3.00, occurred at Mount Iron, and the least, 0.10, at St. Peter. It is probable that over the whole State the average depth of snow on the ground ranges from 9 to 30 inches, but in the forests it is said to lie fully 4 feet deep. Railroad traffic has been very seriously hindered, especially in western portions of the State, where the roads have been blocked for days at a time.—*T. S. Outram.*

**Mississippi.**—The mean temperature was 52.4°, or 2.0° above normal; the highest was 87°, at French Camp on the 7th, and the lowest, 18°, at Columbus, Fulton, and Holly Springs on the 27th. The average precipitation was 4.17, or 1.14 below normal; the greatest monthly amount, 8.05, occurred at Mossport, and the least, 1.24, at Thornton. The absence of any decided cold waves during the month encouraged

truck farmers and agriculturists in general to push farming operations, and good progress in this direction was the result. Early market gardeners in the middle and southern counties were induced by the early and rapid germination of plants to take some of the more hardy ones from the cold frames and set them permanently in the soil, and the close of the month found these well advanced for the season. Early tomatoes, especially, have made a good start. Some corn was planted in the middle and southern counties, while preparations for planting of both cotton and corn were general over the State at the close of the month. Agricultural, as well as all kindred interests, were affected in the Delta and other river counties by the rapid rise in the Mississippi River which marked the closing days of the month. The public and press were kept constantly informed of the river stages by this office, and timely warnings were issued of the approaching flood, and it was only regretted that these warnings could not be of a more encouraging nature.—*R. J. Hyatt.*

**Missouri.**—The mean temperature was 34.7°, or 2.4° above normal; the highest was 74° at Mineral Springs on the 21st, Sikeston and St. Charles on the 20th, and Willow Springs on the 17th; the lowest was 15° below zero at Potosi on the 27th. The average precipitation was 2.35, or 0.20 below normal; the greatest monthly amount, 7.88, occurred at Hastain, and the least, 0.54, at Bolckow. Although over the greater portion of the State considerable snow fell during the month, it remained on the ground but a short time, and winter wheat received little or no protection.—*A. E. Hackett.*

**Montana.**—The mean temperature was 22.0°, or 7.0° above normal; the highest was 65°, at Billings on the 2d, and the lowest, 31° below zero, at Fort Keogh on the 23d. The average precipitation was 0.99, or 0.42 above normal; the greatest monthly amount, 2.53, occurred at Marysville, and the least, 0.08, at Fort Custer.—*R. M. Crawford.*

**Nebraska.**—The mean temperature was 27.2°, or 3.2° above normal; the highest was 74°, at Curtis on the 17th, and the lowest, 20° below zero, at Hartington and Norfolk on the 26th. The average precipitation was 0.59, or 0.12 above normal; the greatest monthly amount, 1.94, occurred at Valentine, and the least, "trace," at Fort Robinson, Haigler, and Ough.—*G. A. Loveland.*

**Nevada.**—The mean temperature was 29.6°, or 1.8° below normal; the highest was 67°, at Downeyville on the 27th, and St. Thomas on the 1st, and the lowest, 22° below zero, at Ely on the 22d. The average precipitation was 2.09, or 0.93 above normal; the greatest monthly amount, 5.35, occurred at Lewers Ranch, and the least, 0.07, at Tecoma.—*R. F. Young.*

**New England.**—The mean temperature was 25.1°, or 2.2° above normal; the highest was 53°, at Middletown, Conn., on the 21st, and the lowest, 29° below zero, at Berlin Mills, N. H., on the 27th. The average precipitation was 2.47, or 1.06 below normal; the greatest monthly amount, 4.51, occurred at North Grosvenor Dale, Conn., and the least, 1.00, at Fairfield, Me.—*J. W. Smith.*

**New Jersey.**—The mean temperature was 32.5°, or 2.0° above normal; the highest was 59°, at Egg Harbor City on the 21st, and the lowest, 6° below zero, at Rivervale on the 1st. The average precipitation was 3.61, or 0.63 below normal; the greatest monthly amount, 6.37, occurred at Cape May City, and the least, 2.38, at Deckertown.—*H. W. McGann.*

**New Mexico.**—The mean temperature was considerably below normal; the highest was 79° at Boswell, and the lowest, 22° below zero, at Buckmans. The average precipitation was below normal; the greatest monthly amount, 4.90, occurred at Chama, while several stations report no precipitation.—*H. B. Hersey.*

**New York.**—The mean temperature was 25.1°, or 2.4° above normal; the highest was 56°, at Primrose on the 21st, and the lowest, 28° below zero, at Saranac Lake on the 25th. The average precipitation was 2.01, or 0.63 below normal; the greatest monthly amount, 4.68, occurred at Willets Point Barracks, and the least, 0.63, at Haskinville.—*R. M. Harding.*

**North Carolina.**—The mean temperature was 45.1°, or 1.5° below normal; the highest was 80°, at Rockingham on the 18th, and the lowest, 9°, at Highlands and Linville on the 28th. The average precipitation was 5.90, or 1.63 above normal; the greatest monthly amount, 10.23, occurred at Linville, and the least, 3.40, at Spring Hope.—*C. F. von Herrmann.*

**North Dakota.**—The mean temperature was 6.1°, or 1.6° below normal; the highest was 51°, at New England City on the 5th, and the lowest, 40° below zero, at Gallatin on the 26th. The average precipitation was 1.15, or 0.66 above normal; the greatest monthly amount, 2.87, occurred at Berlin, and the least, 0.30, at Larimore. Railroads suffered considerable inconvenience from blockades; travel along the highways was greatly retarded at times by snow drifts. Cattle and horses which have wintered on the prairies have suffered to a great extent from exposure and shortage of grass, and many head of sheep have been killed or died from exposure, owing to the heavy snow breaking down the scant roofing over the sheds in which they were sheltered. A vast amount of snow remained solidly packed upon the ground at the close of the month, which closed with exceedingly cold weather and no signs of a thaw.—*B. H. Bronson.*

**Ohio.**—The mean temperature was 32.4°, or 2.1° above normal; the highest was 72°, at Portsmouth on the 17th, and the lowest, 9° below

zero, at Green Hill on the 27th. The average precipitation was 36.4, or 0.11 above normal; the greatest monthly amount, 8.70, occurred at Portsmouth, and the least, 0.35, at Celina. During the first half of the month wheat was fairly well protected by snow, most of which had fallen during January.—*H. W. Richardson.*

**Oklahoma.**—The mean temperature was 42.7°; the highest was 90°, at Pond Creek on the 20th, and the lowest, 10°, at Waukomis on the 27th. The average precipitation was 0.96; the greatest monthly amount, 2.11, occurred at Guthrie, while none fell at South McAlester. The month was favorable to winter wheat, which is in fine condition.—*J. I. Widmeyer.*

**Oregon.**—The mean temperature was 39.7°, or 2.6° above normal; the highest was 71°, at Grants Pass on the 26th, and the lowest, 11° below zero, at Burns on the 20th. The average precipitation was 6.87, or 1.87 above normal; the greatest monthly amount, 20.90, occurred at Glenora, and the least, 0.35, at Silver Lake. The mild weather of February enabled the farmers to do considerable plowing and seeding. While more snow than usual fell in the eastern portion, yet the temperatures following snowfalls were comparatively high, so that ranges were bared rapidly and stock wintered well. So far the weather has been very propitious to the farming interests of the State.—*B. S. Pague.*

**Pennsylvania.**—The mean temperature was 30.6°, or 2.1° above normal; the highest was 67°, at Indiana on the 22d. The average precipitation was 3.23, or 0.20 above normal; the greatest monthly amount, 6.67, occurred at Somerset, and the least, 1.04, at Indiana.—*T. F. Townsend.*

**South Carolina.**—The mean temperature was 50.0°, or normal; the highest was 83°, at Gillisonville on the 22d and 23d, and the lowest, 15° at Walhalla on the 28th. The average precipitation was 7.89, or 4.23 above normal; the greatest monthly amount, 10.50, occurred at Georgetown, and the least, 6.08, at Spartanburg. While the heavy rains hindered and impeded plowing, and the preparation of lands and seeding, they were nevertheless beneficial by filling basins of water supply and thoroughly saturating the soil.—*J. W. Bauer.*

**Tennessee.**—The mean temperature was 44.5°, or 1.8° above normal; the highest was 79°, at Newport on the 22d, and the lowest, 9°, at Hohenwald on the 27th. The average precipitation was 5.20, or 0.10 below normal; the greatest monthly amount, 9.20, occurred at Bristol, and the least, 1.02, at Pope. The heavy rains of 19th to 23d, especially in the eastern section, raised all creeks and rivers to flood height and did much damage in various ways.—*H. C. Bate.*

**Texas.**—The mean temperature for the State was 1.6° above the normal; there was a general excess throughout the State, except over the east coast district and the extreme eastern portion of north Texas, where there was a deficiency ranging from 0.6° to 4.8° with the greatest deficit in the vicinity of Huntsville; the highest temperature was 96°, at Camp Eagle Pass on the 18th, and the lowest was 11°, at Roby on the 27th. The average precipitation for the State was 1.40 below the normal; it was not well distributed throughout the State, there being none or only a small amount in many sections. No excessive precipitation occurred during the month. The weather during the month was generally favorable for outdoor work and farming operations made rapid progress.—*I. M. Cline.*

**Utah.**—The mean temperature was 27.0°, or about 6.0° below normal; the highest was 63°, at Fillmore on the 28th, and the lowest, 21° below zero, at Loa on the 22d. The average precipitation was 2.35, or about 1.00 above normal; the greatest monthly amount, 5.50, occurred at Mammoth, and the least, 0.30, at Frisco.—*J. H. Smith.*

**Virginia.**—The mean temperature was 39.5°, or 1.9° below normal; the highest was 74°, at Salem and Swords Creek on the 18th, and the lowest, 2° below zero, at Buckingham on the 1st. The average precipitation was 6.49, or 2.50 above normal; the greatest monthly amount, 9.71, occurred at Marion, and the least, 3.98, at Guinea. The month was largely characterized by damp, raw, and cloudy weather, with frequent precipitation. Spring work was retarded to some extent thereby and very little done toward preparing tobacco plant beds. Wheat and oats have done well during the month.—*E. A. Evans.*

**Washington.**—The mean temperature was 37.2°, or 1.2° above normal; the highest was 70°, at Elma on the 26th, and the lowest, 5° below zero, at Waterville on the 22d. The average precipitation was 4.86, or 0.94 above normal; the greatest monthly amount, 11.16, occurred at Tatoosh Island, and the least, 0.85, at Moxee.—*G. N. Salisbury.*

**West Virginia.**—The mean temperature was 36.8°, or about normal; the highest was 70°, at Beverly on the 21st, and at Buckhannon, Elkhorn, and Philippi on the 22d; the lowest was 3°, at Hinton and Huntington on the 1st. The average precipitation was 5.95, or nearly 3.00 above normal; the greatest monthly amount, 8.18, occurred at Point Pleasant, and the least, 3.00, at Wheeling (river station); winter grain is reported in good condition, except where flooded in river valleys.—*H. L. Ball.*

**Wisconsin.**—The mean temperature was 21.9°, or 4.1° above normal; the highest was 59°, at Prairie du Chien on the 21st, and the lowest, 35° below zero, at Hayward on the 26th. The average precipitation was 1.17, or 0.20 above normal; the greatest monthly amount, 2.75, occurred at Eau Claire, and the least, 0.45, at Lancaster. The protection afforded winter grain during the month should be of benefit,

although wheat was in poor condition at the end of January.—*W. M. Wilson.*

*Wyoming.*—The mean temperature was 22.2°, or 0.8° below normal; the highest was 54°, at Fort Laramie on the 28th, and the lowest, 12° below zero, at Sheridan on the 23d. The average precipitation was 0.82, or 0.20 above normal; the greatest monthly amount, 2.30, occurred at Sundance, and the least, 0.35, at Laramie.—*M. G. Reno.*

JANUARY REPORT.

*Missouri.*—The mean temperature was 28.2°, or 1.1° above normal; the highest was 72°, at Mineralspring on the 1st, and the lowest, 16° below zero, at Steffenville on the 25th. The average precipitation was 5.19, or 3.34 above normal; the greatest monthly amount, 10.37, occurred at Grovedale, and the least, 1.05, at Bethany.

## RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The *extreme and average stages of water* in the rivers for the current month are given in the following table. Increased precipitation and higher rivers are reported in all sections. The basins of the Missouri and Upper Mississippi are heavily covered with snow and ice, presenting conditions similar to those of the great flood year of 1881.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

*Hudson River.* (Reported by A. F. Sims, Albany, N. Y.)—On February 1 an average of 6 inches of snow covered the Hudson watershed, and, in the Adirondack section, at the headwaters of the Hudson, 15 inches of snow remained on the ground. The ice in the river ranged from 18 inches at Glens Falls to 9 inches at Poughkeepsie. Ice harvesting became general on the 2d, the ice being excellent in quality but very uneven. Heavy rains on the 7th melted all the snow over the watershed, except drifts in the woods, leaving most of the ground bare. On the 8th the ice in the river was covered with water and much honeycombed, in fact it was even dangerous to venture upon. The ice in the Catskill Creek came down on the night of the 7th, and gorged at the mouth of the creek. The river rose at Albany at the rate of 3 inches an hour from 9 a. m. to noon on the 8th, and then fell 14 inches by the morning of the 9th. During the first week of the month the large ice harvesters in the Catskill district secured about half a crop. The quality of the ice improved toward the middle of the month; it became firmer, but was uneven on the upriver side; all harvesters prepared to resume cutting after more than a week's delay caused by mild weather. The high temperatures of the week ending February 23 again softened the ice, and the turbid water cut it on the bottom, so that the harvesting of ice had to be suspended again. The close of the month finds the ice in the Hudson not in condition to harvest; many small holes which made their appearance refuse to freeze over notwithstanding the last cold wave.

*Susquehanna River and branches.* (Reported by E. R. Demain, Harrisburg, Pa.)—No floods of importance occurred during the month. The greatest rise reported was 8 feet at Mifflin, on the Juniata, where the river rose from 5 feet on the 22d to 13 feet on the 23d. On the West Branch, the river was closed at Karthaus from the 1st to the 21st. Driftwood Creek was frozen up at Cameron from the 1st to the 22d, and closed again on the 27th. Keating had a closed river from the 1st to the 18th, and during the rest of the month there was more or less floating ice. At Renovo the river was closed until 10.30 p. m. of the 22d, when the ice broke up and began to move out on a rise of about 4 feet. The river was frozen over at Farrandsville until the 24th when the ice broke up and moved out, and in doing so became jammed about the gauge in such a manner as to prevent readings being made the remainder of the month. The ice broke up at Lock Haven at 9.45 p. m. on the 23d, and moved out on a rise of 6½ feet. The river closed with ice for the second time this season on the 28th. At Williamsport the ice began running out on the 24th with a rise of 4 feet, and the river remained open the rest of the month, but its surface was covered, or partly covered, with floating ice. On the North Branch the river was closed at Towanda until the 23d, when the ice broke up and moved away from the gauge, but did not flow out. The river was frozen over at Wilkesbarre till the 20th, when the ice moved out quietly without doing any damage. At Harrisburg the Susquehanna was closed from 4 a. m., January 27, till 2 p. m., February 7. The ice moved out on a rise of about 4 feet from about two-thirds of the channel, but on the Harrisburg side it remained unbroken from the shore to the third pier of the bridge, and for a short distance up the river for several days longer. The river rose 2.2 feet within half an hour after the ice began to move, due, probably, to a gorge below the city. A wall of ice from 20 to 30 feet high, extending from the Wrightsville shore to a point over half a mile out into the Susquehanna, rested on the dam below Wrightsville. Old residents state that they never before saw the ice left in such a condition. It had been piled up by the back water, and after the river fell the ice remained, and it is the opinion of river men

that unless moved out by a flood it will stay there until melted away by the warm weather of spring. Two breaks are reported in the dam between Wrightsville and Columbia since the breaking up of the ice. Near the Wrightsville side the dam has been completely gutted for a space of 206 feet, allowing shad to pass up and down the river. The other break reported is on the Columbia side and is fully 150 feet long. A sudden fall of about a foot in the river was thought to be owing to this break.

*Rivers of South Atlantic States.* (Reported by E. A. Evans, Richmond, Va.; C. F. von Herrmann, Raleigh, N. C.; L. N. Jesunofsky, Charleston, S. C.; D. Fisher, Augusta, Ga., and J. B. Marbury, Atlanta, Ga.)—The low water in the James River which characterized the month of January continued until the 5th of February, when a rise occurred. The immediate effect of the increasing volume of water was to break up the ice which had formed during the cold snap in the last decade of January in the upper portion of the river. This was brought down to the falls of the James at Richmond and banked there until the water pressure was sufficient to carry it down the rapids. At a narrow bend in the river just below the city it again jammed, causing a decided rise. The stream left its banks and overflowed the adjacent lowlands and portions of the city along the docks. The jam was broken by the city tugs, and the rushing water carried away considerable material which had been caught unprotected, and broke vessels from their moorings. The damage to shipping property was, however, slight. After the back water had passed down, the river continued rising until the 8th, when it attained its maximum height of 11.9 feet. It then receded slowly until near the zero of gauge, where it fluctuated, under the influence of moderate rains, until the 21st. At this time heavy rains fell over the entire basin, and on the 22d the river again began to rise. The highest water of the month, 15.0 feet, was reached on the 24th, after which it slowly subsided. Considerable damage was done, especially in the low portions of the city. Shockoe Creek, a small tributary of the river, backed up, filling cellars and in many cases the lower floors of houses, while along the wharves the lower floors of steamship storage houses and sheds were from 3 to 6 feet under water. Streets near the docks were impassable except in boats and street-car service on Lester street had to be abandoned. The damage, though large, was not so extensive as it would have been had not information of the approaching high water been sent out. The various shipping lines had ample warning and had large gangs of men at work getting freight and other movable material out of the way. All the business interests whose places are liable to invasion from the waters of the river were kept fully posted. The damage was confined mainly to the tenants of dwellings who were unable to move to other quarters. The river was back in its banks on the 27th.

The rivers of North Carolina were low at the beginning of the month, but general light rains caused much higher stages by the end of the first week. Heavier rains on the 6th necessitated the first river warning of this season, and all the rivers, especially those in the eastern part of the State, rose sufficiently high to overflow lowlands by the 8th and 9th. The Roanoke reached a stage of 35.5 feet at Weldon, this being 8 feet above the danger line, and the Cape Fear at Fayetteville reached a stage of 36 feet, only 2 feet below the danger line. The warning issued by the Weather Bureau was of value in the saving of stock pastured on the low islands of the Roanoke. The rivers maintained relatively high stages throughout the rest of the month, which was generally rainy, though not excessively so. A secondary flood stage was reached on the 23d to 25th, overflowing some lowlands, but no damage has so far been reported. River beds continued fairly full of water at the end of the month, making further floods by moderate rains an easy possibility.

General and heavy rainfalls, with but few intervals of dry weather, produced two distinct freshets in the streams of South Carolina in February. The precipitation of the 5th and 6th swelled all of the streams to immense volumes. The rivers remained at high stages, and were navigable during the entire month. Considerable merchandise, which was delayed for the want of navigable water, was shipped upon the occurrence of this rise. The Wateree at Camden rose from 16.1 feet on the 6th to 29.7 feet on the 8th, reaching the danger line, 24 feet, early on the morning of the 8th. It again rose from 13.5 feet on the 24th to 22.1 feet on the 26th, remaining at a high stage the balance of