

this is reported the earliest date on record for snow near Detroit, Mich., except that noted for 1872, when the first snow fell on September 7th. 11th, snow fell generally in north New England and northeast New York. 12th, Pueblo, Colo., and near Cumberland, Md. 13th, New Haven, Conn., Barren Creek Springs, Md., and Brunswick, Mo. 14th, Saint Vincent, Minn., Rockland, Mich., and at points in Wisconsin. 18th, Sault de Ste. Marie, Mich., and Harrodsburgh, Ky. 19th, Marquette, Mich. 20th, Linville, N. C., in the Shenandoah Valley, Virginia, in northeast West Virginia, and central Pennsylvania. 21st, western North Carolina. 22d, snow fell generally in northern New York, and at points in Massachusetts, Connecticut, Rhode Island, and in the mountains of Virginia and West Virginia. 23d, eastern New York, eastern Massachusetts, Eastport, Me., New London, Conn., and in the mountains of Pennsylvania. 24th, Northfield, Vt. 25th, Forts Mackinac and Brady, Mich. 27th, Cleveland, Ohio, Williamstown, Mass., Kennebec Arsenal, Me., and at points in Vermont. 30th, Moorhead, Minn., and at points in the Dakotas and Wisconsin. 31st, Duluth, Minn., and at points in North Dakota and Minnesota.

Chart V shows the depth of snowfall reported for the month.

The heaviest monthly snowfall was reported in northwest North Dakota, along the northeast slope of the Rocky Mountains in Montana and Wyoming, in the mountains of central Colorado, and in central Nevada, where it exceeded 5. At Helena, Mont., the total depth was 15.5, of which about 14 fell the night of the 11-12th. 14 fell at Fort Buford, N. Dak., about 13 at Fort Yellowstone, Wyo., and 6 to 8 at mountain stations in Colorado.

Snowfall of 1 inch or more was reported as follows, and in states and territories where the maximum depth was below that amount the station reporting the greatest is given: *California*.—Summit, 0.5. *Colorado*.—Box Elder and Castle Rock, 8; Gold Hill, 7.5; Smoky Hill Mine, 7; Twin Lakes, 6.8; Climax, 6.5; Breckenridge and Watervale, 6; Husted and Stamford, 5; Dumont, 4.6; Table Rock and Thou, 4; Cumbres, 2.5; Como (near), 2; Jefferson, 1.7; Georgetown, 1.5; Loveland, 1.2; Platoro, 1.1. *Connecticut*.—Mansfield, 4; Colchester and Voluntown, 3; New London, 2.5. *Iowa*.—Richland, 4. *Kansas*.—Kansas City, Morse, Norton, and Seneca, trace. *Kentucky*.—Harrodsburgh, 0.1. *Maine*.—Bar Harbor, Belfast, Calais, Farmington, Kennebec Arsenal, Lewiston, and Mayfield, trace. *Maryland*.—Barren Creek Springs, trace. *Massachusetts*.—Blue Hill Observatory and Dudley, 3; Westborough, 2.5; Ashland, Chestnut Hill, Concord, Fall River, Mansfield, and Monson, 2; Milton, 1.5; Gilbertville, Leominster, Taunton (4), and Wakefield, 1. *Michigan*.—Marquette, 2.3; Lathrop, 1. *Minnesota*.—Crookston, 2; Saint Vincent and Leech Lake, 1. *Missouri*.—Brunswick, 2. *Montana*.—Helena,

15.5; Fort Custer, 8; Glendive, 7; Camp Poplar River, 3.8; Fort Assiniboine, 3.5. *Nebraska*.—Fort Robinson, 1.5; Springfield and Whitman, 1. *Nevada*.—Austin, 5; Eureka and Stoffel, 1. *New Hampshire*.—Berlin Mills, 1. *New Jersey*.—Dover and Oceanic, trace. *New Mexico*.—Gallinas Spring, 2.5; Folsom, 1.5. *New York*.—Malone, 5.3; Fleming, 2. *North Carolina*.—Linville, trace. *North Dakota*.—Fort Buford, 14; Willow City, 5; Woodbridge, 2.4; Grafton, 1. *Ohio*.—Ashland, Bangorville, Cleveland, Demos, Garrettsville, Gratiot, Marion, New Alexandria, Orangeville, and Youngstown, trace. *Oregon*.—Beulah, 1.3; Joseph, 1. *Pennsylvania*.—Unioctown, 0.1. *Rhode Island*.—Pawtucket, 3; Providence (1), 2; Bristol, Kingston (1 and 2), Providence (2 and 3), 1. *South Dakota*.—Oelrichs, 4; Cross, 2. *Utah*.—Provo City, 4.3; Salt Lake City, 3.3; Promontory, 1. *Vermont*.—Burlington, 0.4. *Virginia*.—Marion and Wytheville, trace. *West Virginia*.—Kingwood, trace. *Wisconsin*.—Bayfield, 2. *Wyoming*.—Fort Washakie, 35; Fort Yellowstone, 12.9; Fort McKinney, 6.1; Sheridan, 4.8; Camp Pilot Butte, 2.5; Lander, 1.5; Fort Fetterman, 1.

DEPTH OF SNOW ON GROUND AT THE CLOSE OF THE MONTH.

A depth of 1 to 2 was reported at points in central Minnesota and extreme northern Wisconsin, and trace to 0.5 at stations in North Dakota and northern Montana.

HAIL.

Description of the more severe hailstorms of the month is given under "Local storms." Hail was reported as follows: 1st, Colorado and Nevada. 4th, Nebraska and South Dakota. 5th, Wisconsin. 6th, Iowa and Nebraska. 7th, Illinois. 8th, Illinois, Indiana, and Massachusetts. 11th, Colorado and Maryland. 12th, Maryland and West Virginia. 13th, Michigan. 14th, Indiana, Michigan, Ohio, and Wisconsin. 15th, Michigan, New York, Ohio, Vermont, and Wisconsin. 16th, Iowa, Minnesota, Missouri, New York, Wisconsin, and Wyoming. 17th, Illinois and Wisconsin. 18th, Illinois, Indiana, Kentucky, Ohio, and Wisconsin. 19th, North Carolina. 20th, Massachusetts. 21st, Ohio. 22d, North Carolina, Ohio, Pennsylvania, Virginia, and West Virginia. 25th, Pennsylvania. 26th, Maine, Maryland, Massachusetts, New York, Ohio, and Pennsylvania. 27th, Massachusetts, New York, Ohio, Pennsylvania, and West Virginia. 28th, Oregon. 29th, Pennsylvania and Washington. 31st, Michigan.

SLEET.

Sleet was reported as follows: 1st, Utah. 4th and 5th, South Dakota. 6th, Iowa, Kansas, and Missouri. 13th, South Dakota. 19th, South Carolina. 22d, New York, Ohio, Virginia, and West Virginia. 26th, Ohio and Pennsylvania. 27th, New York. 29th, Wyoming. 31st, North Dakota.

WINDS.

The prevailing winds in October, 1891, are shown on Chart II by arrows flying with the wind. In the Atlantic coast and east Gulf states, Florida, the Ohio Valley and Tennessee, and over the middle-eastern slope of the Rocky Mountains northwest to northeast winds were most frequently noted; over the west Gulf states they were generally from east to south; in the extreme northwest, from west to northwest; on the northeast slope of the Rocky Mountains and over the northern plateau region, from southwest to northwest; on the middle-eastern slope of the Rocky Mountains, from south to west; over the southern plateau, from northeast to southeast; on the north Pacific coast, from southeast to southwest; on the south Pacific coast, from west to northwest; in the Lake region, over the southeast slope of the Rocky Mountains, and on the middle Pacific coast, variable.

HIGH WINDS.

[In miles per hour.]

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows: 11th, 66, se., at Huron, S. Dak., 60, ne., at Block Island, R. I.; 60, ne., at Kitty Hawk, N. C.; 52, se., at Moorhead, Minn. 12th, 78, ne., at Kitty Hawk, N. C.; 72, n., at Hatteras, N. C.; 68, ne., at Block Island, R. I. 13th, 72, ne., at Block Island, R. I.; 62, ne., at Kitty Hawk, N. C.; 58, ne., at Nantucket, Mass.; 55, ne., at Woods Holl, Mass.; 50, n., at Hatteras, N. C. 14th, 61, s., at Fort Canby, Wash.; 61, ne., at Woods Holl, Mass.; 60, ne., at Block Island, R. I. 15th, 60, se., at Fort Canby, Wash. 20th, 58, e., at Block Island, R. I. 22d, 64, n., at Block Island, R. I.; 58, s., at Fort Canby, Wash.; 58, s., at Winnemucca, Nev.; 58, nw., at Hatteras, N. C. 22d, 64, n., at Block Island, R. I.; 60, s., at Fort Canby, Wash.; 60, nw., at Woods Holl, Mass.; 56, ne., at Nantucket, Mass. 28th, 50, n., at Hatteras,

N. C. 29th, 56, w., at Fort McKinney, Wyo. 30th, 54, nw., at Bismarck, N. Dak. 31st, 61, nw., at Detroit, Mich.; 54, w., at Red Wing, Minn.; 52, nw., at Huron, S. Dak.

LOCAL STORMS.

7-8th.—At Birdsnest, Va., 6.85 inches of rain fell from 9 p. m., 7th, to 1 a. m., 8th. With one exception, this was the heaviest rainfall noted at that place in 23 years. At Boston, Mass., there was a decrease of pressure of .49 inch from 8 p. m., 7th, to 8 a. m., 8th, and heavy northeast changing to northwest winds prevailed along the Massachusetts coast.

10-11th.—At Cape Henry, Va., high northeast winds prevailed. The anemometer spindle was broken by the force of the wind, and the cups were carried away. Winds of hurricane force were reported off the coast.

11-12th.—At Helena, Mont., a heavy snowstorm, with high southwest winds, continued during the night, causing damage to electric wires and trees.

11-13th.—At Vineyard Haven, Mass., a northeast storm began at 3 p. m., 11th, and continued during the 12th and 13th. Exceptionally severe gales continued off the middle Atlantic coast.

11-14th.—Unusually heavy gales along the coast from the Carolinas to Nova Scotia caused a number of marine disasters. At Hatteras, N. C., the wind reached a velocity of 72 miles per hour from the north on the 12th; the tide was very high, and all traffic was suspended. At Kitty Hawk, N. C., the wind attained a velocity of 78 miles per hour from the northeast on the 12th. High northerly winds during the 12th and 13th caused damage to seaside property along the New Jersey coast. At New Haven, Conn., high northeast winds, with heavy rain, and snow, at intervals, interfered with traffic during the 13th, and all vessels were compelled to seek shelter. At Block Island, R. I., a northeast gale continued from the 11th to 14th, the wind reaching a velocity of 72 miles per hour on the 13th. The storm was generally severe along the New England coast during this period, and a number of minor disasters to shipping were reported.

18th.—A report from Port Angeles, Wash., stated that

high west to northwest winds prevailed in the Straits, and that many trees were blown down and telegraph wires considerably damaged along the coast. At Seymour, Ind., a heavy thunderstorm of brief duration occurred in the evening, attended by wind reaching a velocity of 40 miles per hour, and a heavy fall of unusually large hailstones.

20th.—At New Haven, Conn., strong south winds in the afternoon caused high water, and wharves were flooded. The highest tide in a number of years was reported at New London, Conn. At Block Island, R. I., the wind reached a velocity of 58 miles per hour from the northeast.

22d.—During a north gale at Block Island, R. I., the wind reached a velocity of 64 miles per hour. High winds also prevailed over New York, along the New Jersey coast, and over Chesapeake Bay.

22d-25th.—High winds prevailed over Long Island Sound and along the New England coast, resulting in a number of disasters to shipping.

26th.—During a thunderstorm in the afternoon a barn near Ithaca, N. Y., was struck by lightning and burned. Heavy gales were reported over the lower lakes and the east part of the upper lake region. The Canadian propeller "Sovereign" was lost in a gale on Lake Superior. Steamers running between Cleveland, Ohio, and Detroit, Mich., were delayed by the storm. The storm was very severe in northern Ohio in the evening, and at Conneaut, Ohio, a number of buildings were blown down.

29th.—During high northeast winds on the east coast of southern Florida two schooners went ashore, one on Content Reef, 35 miles northeast of Key West, and the other near Lake North Inlet; loss estimated at \$5,000 to \$6,000.

30th.—High winds shifting to northwest, with rain changing to snow, prevailed over North Dakota, the north part of South Dakota, and northern Minnesota.

31st.—High west wind caused damage about Red Wing, Minn. Heavy gales prevailed over the Great Lakes. At Detroit, Mich., a wind velocity of 61 miles per hour, and an extreme velocity of 120 miles, was recorded at 4.11 p. m.

INLAND NAVIGATION.

LOW WATER.

On the 5th the stage of water in the Tennessee River at Chattanooga, Tenn., was 1.8 foot, and navigation was reported suspended. No decided rise occurred in the river at that point during the month, and on the 29th, 30th, and 31st it stood at 1.4 foot on the gauge, the lowest stage noted in 4 years. Except to points above Chattanooga navigation had been closed on the Tennessee River after September 18, 1891. The Ohio River continued low throughout the month, and reports of the 5th stated that a number of steamboats were grounded between Cincinnati, Ohio, and Point Pleasant, W. Va. A press report from Augusta, Me., stated that on the 5th the Kennebec River was lower than at any time during the last 38 years. On the 27th the stage of water in the Chattahoochee River was so low that all boats were taken off, except one light-draught boat plying between Columbus, Ga., and River Junction, Fla. On the 31st the stage of the Red River at Shreveport, La., was —0.6 foot, too low for navigation, and one light-draught boat, only, was running. The Mississippi River continued low, rendering navigation above Memphis, Tenn., difficult. At Saint Louis, Mo., the stage of the water varied from 4.0 feet on the 5th to 9th, to 6.4 feet on the 18th; at Cairo, Ill., from 2.0 feet from the 10th to 13th, to 3.7 feet on the 1st and 21st; and at Memphis, Tenn., from 1.3 foot on the 14th and 15th, to 3.4 feet on the 1st.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, October, 1891 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River.</i>						
Shreveport, La.	29.9	1	2.7	31	—0.6	3.3
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	3	5.2	27	0.7	4.5
Little Rock, Ark.	23.0	7	4.9	2-5	2.9	2.0
<i>Missouri River.</i>						
Fort Buford, N. Dak.		21, 22	6.4	7-17	5.2	1.2
Sioux City, Iowa	18.7	3, 30, 31	4.4	20	3.8	0.6
Kansas City, Mo.	21.0	10, 11	8.8	1	6.1	2.7
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	3, 4	1.8	24	1.2	0.6
La Crosse, Wis.	11.8	12	1.6	1	0.2	1.4
Dubuque, Iowa	16.0	17	2.6	1, 2, 3	1.0	1.6
Davenport, Iowa	15.0	18, 19	1.3	1, 2	0.0	1.3
Keokuk, Iowa	14.0	21, 22, 23	0.9	1, 2, 3	—0.5	1.4
Saint Louis, Mo.	30.0	18	6.4	5-9	4.0	2.4
Cairo, Ill.	40.0	1, 21	3.7	10-13	2.0	1.7
Memphis, Tenn.	33.0	1	3.4	14, 15	1.3	2.1
Vicksburg, Miss.	41.0	1	3.4	19, 20	—1.2	4.6
New Orleans, La.	13.0	6, 7, 8	4.0	18	2.4	1.6
<i>Ohio River.</i>						
Parkersburgh, W. Va.	38.0	14	4.0	6-9	1.8	2.2
Cincinnati, Ohio	45.0	19	6.2	10-16	4.5	1.7
Louisville, Ky.	24.0	23	3.6	13-17, 28-30	3.0	0.6
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	1	0.6	16-20	0.0	0.6
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	2, 3	1.9	29, 30, 31	1.4	0.5
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	10	6.9	28	5.0	1.9
<i>Savannah River.</i>						
Augusta, Ga.	32.0	1	6.8	24, 25, 28, 29	5.5	1.3
<i>Willamette River.</i>						
Portland, Oregon	15.0	31	2.7	13, 14	—0.7	3.4
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	24	4.8	4-7	1.7	3.1
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	1, 3	0.6	31	—0.3	0.9