

10. *Nevada*.—Elko, 6.5. *New Hampshire*.—Manchester, 25.8; Nashua, 25.5; Belmont, 25.1; West Milan, 23; Berlin Mills, Concord, and North Conway, 22; Littleton, 21; Newton and Plymouth, 20; Antrim and Hanover (1), 17; Lake Village, 15.3; Hanover, (2), 15; East Canterbury, 14.6; Stratford, 14; Wolfborough, 11.1; Walpole, 11. *New Jersey*.—Freehold, 12; South Orange, 10.2. *New Mexico*.—Nogal, 32; Cuba, 30; Chama, 24; Embudo, 18; Fort Marcy, 16.5; Monero, 13.4; Los Lunas, 13; Santa Fé, 12.3; Springer, 11.5; Antelope Springs, 11.3; Gallinas Spring, 11; Bernalillo, 10.

New York.—Brookfield, 36; Utica, 34; Cooperstown, 28.2; Quaker Street, 26.5; Albany, 26; New Lisbon, 25.3; Boyd's Corners and Middleburgh, 25; Rondout, 24; Oxford, 23.4; Wappinger Falls, 23; Deposit, 22.5; Honeymead Brook, 21.9; Schodack Depot, 21; Ampersand and Liberty, 20; Malone, 19.5; Turin, 18.4; Middletown, 17.5; Poughkeepsie and Southeast Reservoir, 16.8; Rochester, 16.1; Watervliet Arsenal, 16; Easton, 15.5; Galway, 15.1; North Hammond, 15; Constableville, 13.9; Lyon Mountain (2), De Kalb Junction, and Ogdensburgh, 13.5; Syracuse, 13; White Plains, 12.8; Binghamton and Newark Valley, 12.5; Number Four, 12.4; Fort Schuyler and Canton, 12.2; New York City, 11.9; Perry City and Plattsburgh Barracks, 11.1; Queensbury, 11; Oswego, 10.6; Humphrey, 10.5. *North Carolina*.—Asheville, 13; Hendersonville, 11. *North Dakota*.—Fort Pembina, 8.8. *Ohio*.—Findlay, 15.3; Greenville, 15; Ashland, 11.5; Oberlin, 11; Cleveland and North Lewisburgh, 10.5. *Oklahoma Territory*.—Oklahoma City, 10. *Oregon*.—Joseph, 13.8; Baker City, 16. *Pennsylvania*.—Somerset, 40.5; Blue Knob, 34; Salem Corners, 30.1; Blooming Grove, 23; Girardville, 22; Honesdale, 20; Eagle's Mere, 19; Dyberry, 17; Huntingdon, 15.2; Charlesville, McConnellsburgh, and Wilkes Barre, 15; State College, 13.8; Catawissa and Le Roy, 13; Wysox, 12.5; Lewisburgh and Lock Haven, 12; Kilmer, 11.9; Meshoppen and South Eaton, 11; Quakertown, 10. *Rhode Island*.—Pawtucket, 13; Lonsdale, 12; Kingston (1), 10.2. *South Carolina*.—Spartanburgh (1), trace. *South Dakota*.—Oelrichs, 13.5. *Tennessee*.—Lewisburgh and Sharps, 12; Franklin, 11. *Texas*.—Childress, 12. *Utah*.—Alta, 58; Nephi and Parowan, 18; Levan, 17.3; Mount Pleasant, 16; Ogden (2), 14.5; Snowville, 13.8; Promontory, 13; Provo City, 10.5. *Vermont*.—Strafford, 31; East Berkshire, 25.9; Chelsea, 24; Burlington, 23; Lunenburg, 21; Vernon, 20; Brattleborough (1) and Cornwall, 18; Hartland, 15; Jacksonville, 14; Northfield, 12. *Virginia*.—Dale Enterprise, 21.2; Staunton, 20; Bolar and Woodstock, 12.5. *Washington*.—Spokane Falls, 3.4. *West Virginia*.—Ella, 3.2. *Wisconsin*.—Embarrass, 21; Peshtigo, 19.9; Green Bay, 19.7; Greenwood and Medford (2), 18.5; Chippewa Falls and Weston, 17.5; La Crosse, 17.1; Oconto,

17; Amherst and Menomonie, 16; De Pere, Neillsville, and Portage, 15; Butternut, 14.5; Plover, 14; Bayfield, 13; Centralia and Rhinelander, 12; Hayward and Manitowoc, 11.5. *Wyoming*.—Cheyenne, 20; Camp Pilot Butte, 19.4; Fort Washakie, 19.1; Wheatland, 13; Fort D. A. Russell, 12; Fort McKinney, 11.6; Fort Fetterman, 10.

DEPTH OF SNOW ON GROUND AT CLOSE OF MONTH.

Chart IV shows the depth of snow reported on the ground at the close of the month. The greatest depth of snow, 60.0, was reported at Cumbres, Colo.; it exceeded 30.0 in north and south Vt., central N. Y., south-central Pa., and central Colo.; 20.0 in parts of N. H., Vt., northeast N. Y., at elevated stations in Pa., and in north upper Mich.; and exceeded 10.0 over a greater part of New England, N. Y., north Pa., from upper Mich. southeastward to east-central Nebr., in west Nebr., in south Colo. and the adjoining part of N. Mex., in central Utah, and west-central Idaho. Trace of snowfall was reported in north Va., extreme northwest S. C., east-central Ill., central Mo., in the plateau region to south-central Ariz., in central Nev., extreme north-central Cal., and northeast Oregon.

HAIL.

Hail was reported as follows: 1st, Ark. 5th, Cal. 6th, Cal., Wash. 7th, Tex. 8th, Ala., Miss., Tenn. 9th, Ky., N. C., Tenn. 11th, Tenn. 13th, Tenn. 15th, Miss. 17th, N. C., Pa. 23d, Tex. 24th, Fla., Ga., La., Nev., N. C. 26th, Wash. 27th, R. I. 28th, Ky., Tex. 29th, Ind., La., Miss., N. Y., Ohio, Pa. 30th, Oregon, Tex., Wash. 31st, Md., Miss., N. J., Pa., Tenn.

SLEET.

Description of the more severe sleet storms of the month is given under "Local storms." Sleet was reported as follows: 1st, Ind., Iowa, Kans., Mass., Mich., N. J., N. Y., Pa., Wis. 2d, Mass., N. Y., Ohio, Pa. 3d, Mass. 5th, Mo. 6th, Cal., Kans., Nev., Okla. T. 7th, Miss., Mo., Ohio, S. Dak. 8th, Ariz., Ga., Miss., S. C., Tenn. 9th, Ill., Ind., Ky., Miss., N. C., Ohio, S. C., Tenn. 10th, Ala., Ky., Miss. 11th, Ala., Ill., Me., Mass., N. J., N. Y., Ohio, Tenn. 12th, N. Y., Ohio. 13th, Ariz., Tenn. 14th, Ark., La., Mich., Tex. 15th, La., Miss., Tex., Wash. 16th, Ala., Wis. 17th, Conn., Me., Mass., Mich., N. J., N. Y., Ohio, Pa. 18th, Me., Mass., N. J., Va. 19th, Minn., N. Mex. 20th, Iowa, N. J., N. Mex. 21st, Ind., Iowa, Ohio, Tenn., Wis. 22d, Ill., Iowa, Ohio, S. Dak., Tenn. 23d, Ind. T., Iowa, Kans. 24th, Md., Miss., N. C., S. C., S. Dak. 25th, Idaho, Md., Mass., N. J., Wis. 26th, Nebr., S. Dak. 27th, Iowa, Kans. 28th, Ill., Iowa, Kans., Nebr., N. Y., Ohio, Wis. 29th, Ariz., Idaho, Ind., Me., Mich., N. Y., Ohio, Okla. T., Tex., Wis. 30th, Ariz., Ark., Mich., Nebr., Okla. T. 31st, Iowa, Md., Mass., Mich., Miss., N. J., N. Y., Ohio, Utah, Wash.

WINDS.

The prevailing winds during January, 1891, are shown on Chart II by arrows flying with the wind. In New England, the middle Atlantic and east Gulf states, the extreme northwest, the Missouri Valley, the southern plateau, and on the south Pacific coast the winds were generally from west to north; in the south Atlantic states, the lower lake region, the upper Mississippi valley, and on the northeast and middle-eastern slopes of the Rocky Mountains, from southwest to northwest; over the Florida Peninsula, from the northwest, except at Key West, northeast; in the west Gulf states and over the middle plateau, from northwest to northeast; in the Rio Grande Valley, from north to northeast; in the Ohio Valley, from south to west; on the southeast slope of the Rocky Mountains and on the middle Pacific coast, from northwest to north; over the northern plateau, from south to southwest; on the middle Pacific coast, from east to south; and in Tennessee and the upper lake region, variable.

HIGH WINDS (in miles per hour).

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Signal Service, as follows: 1st, 51, nw., at Chicago, Ill.; 60, sw., at Lexington, Ky.; 50, n., at Milwaukee, Wis. 2d, 64, se., at Fort Canby, Wash.; 54, ne., at Chicago, Ill. 4th, 54, e., at Fort Canby, Wash. 5th, 60, e., at Fort Canby, Wash. 12th, 58, sw., at Block Island, R. I.; 72, w., at Wood's Holl, Mass. 13th, 59, sw., at Buffalo, N. Y.; 50, w., at Red Wing, Minn. 15th, 70, se., at Fort Canby, Wash. 16th, 60, se., at Fort Canby, Wash. 17th, 57, s., at Fort Canby, Wash. 21st, 50, sw., at Pensacola, Fla. 22d, 60, sw., at Wood's Holl, Mass.; 50, se., at Portland, Me.; 54, se., at New London, Conn.; 54, sw., at Southport, N. C. 25th, 54, nw., at Wood's Holl, Mass.; 50, n., at Nantucket, Mass.; 72, ne., at Block Island, R. I.; 54, nw., at Atlantic City, N. J.; 52, w., at Hatteras, N. C. 29th, 52, w., at Chicago, Ill. 30th, 52, nw., at Wood's Holl, Mass.

LOCAL STORMS.

December **31st.**—A gale from the nw. demolished buildings at Wichita Falls, Tex. **1st.**—2 a. m., a severe storm moved northeast over Keatchie, La., destroying property to the value of about \$10,000. At Beatrice, Nebr., a wind storm caused damage to frail buildings, etc. At Little Rock, Ark., a severe thunder-storm occurred about 2 a. m., with heavy rain and high wind. The wind reached a velocity of 34 miles per hour from the sw., and trees and fences were blown down. At Milwaukee, Wis., the heaviest storm of the season prevailed. Rain changed to sleet and sleet to snow which continued until after midnight. The wind reached a velocity of 50 miles per hour at 8.10 a. m., and an extreme velocity of 90 miles at 8.07 p. m. from the n. and ne. The water-works crib was injured, and 90 feet of the breakwater were destroyed. A heavy wind and snow storm prevailed at Green Bay, Wis. At Leavenworth, Kans., rain changed to sleet, and sleet to snow, and high n. to nw. winds prevailed. Considerable damage was caused to electric wires, and railroad traffic was interrupted. At Topeka, Kans., a heavy storm of wind, and rain changing into snow, followed a thunder-storm which occurred December 31st. The snow drifted heavily, interrupting railroad and street traffic.

The night of the 1st-2d a heavy nw. to ne. gale prevailed at Chicago, Ill., the wind reaching a velocity of 54 miles per hour from the ne. the morning of the 2d. **2d.**—A barn was struck by lightning and telegraph wires were damaged at Athol, Mass., in the afternoon. **7th.**—Between 3 and 4 p. m. a tornado moving in a southerly direction passed near Shiner and Yoakum, Tex., in a path about 100 yards in width. It appeared as a black, funnel-shaped cloud and was attended by a roaring noise. One person was killed near Shiner, 4 others were seriously injured, and several houses were reported destroyed. At Palestine, Tex., heavy rain caused damage to railroads. At New York City light rain, freezing as it fell, prevailed. Many electric wires were broken under the weight of ice. **8th.**—High wind prevailed over the west Gulf and some damage was caused to vessels and cargoes of cotton at Galveston, Tex. **9th.**—High wind and rain continued at Pensacola, Fla. Maximum velocity 42 miles per hour from the se. at 5.30 a. m. Considerable timber was lost in the bay, and a fishing smack was driven ashore and wrecked. **11th.**—A sw. gale and rain prevailed at Baltimore, Md. In the lower anchorage vessels dragged their anchors, and 2 vessels were reported aground. A large quantity of drift ice was brought up to the city by the wind and high tide. A heavy gale prevailed off Cape Hatteras, and great damage was caused to property along the middle Atlantic and south New England coasts by high wind and heavy rain. The rainfall was especially heavy in central and east Pennsylvania, where streams flooded their banks and submerged low lands.

12th.—Heavy rain and high wind in conjunction with exceptionally high tides caused great damage along the New Jersey and New England coasts. Ice gorges formed in many streams, causing the overflow of low lands. On the Nova

Scotia and east Maine coasts the tide was reported the highest ever known. At Eastport, Me., the wind reached a velocity of 42 miles per hour from the se. at 8.20 p. m., and the barometer, which fell to 28.91, was lower than for several years. The tide was the highest on record, exceeding the high tide of 1869 by 5 inches. Much damage was caused to wharves and to buildings along the water front. At New Brunswick, N. J., all factories were compelled to suspend work on account of an overflow from the Raritan River due to an ice gorge $\frac{1}{2}$ mile below the city. **17th.**—A severe wind, rain, and sleet storm prevailed along the Hudson River and extended over New England on the 18th. The rain froze as it fell, causing great damage to electric wires and trees. **22d.**—A heavy storm of wind and rain prevailed over the Atlantic coast states from North Carolina to Massachusetts. At Wilmington, N. C., the wind reached a velocity of 43 miles per hour from the sw. at 8.40 a. m., without causing serious damage. At Hatteras, N. C., a s. gale prevailed during the morning. Two schooners were wrecked on the North Carolina coast. A heavy rain storm swept over the Wyoming Valley, Pa., doing extensive damage in low-lying districts, and submerging a part of Wilkes Barre. Great damage was caused by heavy rain and freshets in streams in New Jersey. A severe wind and rain storm prevailed over east New York and Connecticut, causing much damage by the overflow of streams. At Birmingham, Conn., the dam used to divert the water of the Housatonic River into an artificial channel for the use of factories gave way and was damaged to the extent of about \$200,000. At Southington, Conn., factories were closed and railroads submerged. The storm was also very destructive along the Massachusetts coast.

25th.—A severe storm of wind, rain, sleet, and snow prevailed in the middle Atlantic states and New England, causing an almost entire suspension of telegraphic communication. Referring to a reported fall of fish at Nashville, Tenn., during a storm of the 26th, the observer at that place states that on the morning of that date a fire occurred, and, as the pumps of the water works were out of order, the water in the reservoir was low. Small fish in the bottom of the reservoir were brought through the pipes to the city. The firemen observing them passing through the hose while washing their engine threw a stream into the air and the fish were scattered about the street. Persons seeing them concluded that they had descended with the snow which was falling at the time.

29th.—Thunder-storms were reported in Ohio, Pennsylvania, and New York. A thunder-storm, with violent wind and hail, moved northeast over Wellsborough, Pa., between 10.30 and 11.15 a. m. **31st.**—At 3 p. m. a tornado passed northeast over Palo Alto, Miss. The cloud which was black and funnel-shaped was attended by a roaring sound and heavy rain and hail. One person was fatally and several seriously injured; and a number of buildings and a quantity of timber were levelled to the ground. The total damage to buildings in the county was estimated at \$10,000. **30th-31st.**—Heavy rain fell during the night at Memphis, Tenn., flooding streets and sewers. Thunder was heard the afternoon of the 31st.

INLAND NAVIGATION.

ICE IN RIVERS AND HARBORS.

Lake Huron.—On the 7th the lake was frozen at Port Huron, Mich. The night of the 21st an ice gorge formed at the foot of Lake Huron, and the water in the Saint Clair and Black rivers fell one foot.

Green Bay.—On the 5th the bay was frozen at Green Bay, Wis. A report from Sturgeon Bay of this date stated that the bay was free from ice at that point.

Lake Champlain was reported closed at Burlington, Vt., on the 27th.

Hudson River.—On the 3d and 5th heavy drift ice impeded navigation in the Hudson and East rivers at New York City.

Delaware River.—Navigation was resumed at Beverly, N. J., on the 19th. At Philadelphia, Pa., the Delaware and Schuylkill rivers were free from ice after the 15th.

Lake Erie.—On the 27th drift ice was noted in the Niagara River at Buffalo, N. Y., and on the 30th there was floating ice in the river and harbor.

Ohio River.—Large cakes of floating ice interfered with navigation at Parkersburgh, W. Va., on the 3d, and drift ice