

severe; stock water and wells are failing and the range is almost destitute of grass. Brazoria and Burnet, the month was very dry. At Hallettsville the month was the driest on record. At Sulphur Springs water is very scarce and wells are failing for the first time in years.

WET SEASONS.

In connection with the regions of heavy rain shown on

Chart III the following reports affecting the crops have been received:

Oregon.—Langlois, excessive and continuous rains damaged the late grain. At Mount Angel the month was the wettest October on record, the excess being 3.08 above the normal, and was very unfavorable to all crops.

Washington.—Colfax, this month is the wettest October in many years; two-thirds of the grain is ruined.

WIND.

The prevailing winds in October, 1893, viz., those that were recorded the most frequently, are shown on Chart II by arrows flying with the wind. Northeasterly winds prevailed in the south Atlantic and Gulf states; southeasterly winds in the Ohio Valley, Lakes Michigan and Huron, Missouri, and central Texas; northwest winds in Nebraska, North and South Dakota, Manitoba, Assiniboia, and Saskatchewan; southwest and northwest winds at the Rocky Mountain and Pacific coast stations, New York, and New England.

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:

2d, 72, se., at Mobile, Ala.; 66, sw., at Pensacola, Fla. 3d, 51, nw., at Huron, S. Dak. 4th, 55, ne., at Kittyhawk, N. C.; 54, n., at Hatteras, N. C. 5th, 60, nw., at Shreveport, La.; 60, s., at Fort Canby, Wash.; 56, n., at Amarillo, Tex. 6th, 60, sw., at Chicago, Ill. 7th, 70, s., at Fort Canby, Wash. 11th, 90, s., at Fort Canby, Wash.; 72, w., at Jupiter, Fla.; 70, n., at Titusville, Fla.; 61, se., at Tatoosh Island, Wash.; 60, n., at Amarillo, Tex. 12th, 60, ne., at Charleston, S. C. 13th, 94, se., at Southport, N. C.; 58, se., at Kittyhawk, N. C.; 56, se., at Wilmington, N. C.; 56, e., at Charleston, S. C.; 55, se., at Philadelphia, Pa. 14th, 63, se., at New London, Conn.; 61, sw., at Buffalo, N. Y.; 60, s., at Northfield, Vt.; 56, se., at Oswego, N. Y.; 50, se., at Woods Holl, Mass., and New Haven, Conn.; 50, nw., at Grand Haven and Sault Ste. Marie, Mich. 15th, 59, sw., at Buffalo, N. Y. 22d, 54, se., at Kittyhawk, N. C.; 23d, 80, w., at Pikes Peak, Colo.; 55, nw., at Colorado Springs, Colo. 26th, 56, s., at Chicago, Ill. 28th, 52, nw., at Cleveland, Ohio.

LOCAL STORMS.

1st.—(For some account of the damage to property and loss of life by the Gulf hurricane of October 1st–3d, see "low area" No. III, p. 272.)

2d.—Thunderstorms prevailed in Lower Michigan, Wisconsin, and Iowa. A man and a horse were killed by lightning at Stockton, Wis.; a barn was struck by lightning and burned at Caledonia, Wis.; a house was struck by lightning at Davenport, Iowa, in the early morning and damaged to the extent of \$1,500 (estimated).

4th.—Heavy rains and high winds occurred along the North Carolina and Virginia coasts. The Weather Bureau observer at Norfolk, Va., reports that 2 vessels went ashore near Virginia Beach, vessels a total loss. High southeast backing to northeast winds prevailed at Kittyhawk, N. C., during the forenoon and afternoon, with a maximum velocity of 55 miles per hour; a vessel was wrecked near that point.

During a high south wind at Hatteras, N. C., 2 men were drowned in the Sound near by.

High winds and heavy surf prevailed along the Washington and Oregon coasts. A vessel was wrecked 30 miles south of Tatoosh Island, and 6 persons were drowned. The vessel, valued at \$15,000, was a total loss.

5th.—A violent thunderstorm passed over Shreveport, La.,

between 8.15 and 9.40 p. m. The wind reached a maximum velocity of 60 miles per hour. A house was struck by lightning, and considerable damage was done by high wind.

6–7th.—Severe gales prevailed over the Great Lakes and the Mississippi Valley. High winds at Toledo, Ohio, on the 6th caused the water in the river to run out to such an extent that a barge went aground; above the city the water was said to be the lowest on record.

Three schooners were reported wrecked, and a number of accidents to shipping of a minor character were reported.

9th.—During a heavy thunderstorm which passed over Gardiner, Me., 4 houses were struck by lightning, one in Gardiner, and 3 in adjoining towns.

11th.—Severe gales and heavy rain prevailed over northwest Washington. At Tatoosh Island the wind attained a maximum velocity of 61 miles per hour from the southeast, accompanied by rain and a very heavy sea swell.

The following notes are supplementary to the general report of the storm of October 11–14, p. 273:

At Saint Augustine, Fla., the waters of the Matanzas and the San Sebastian rivers were united, a phenomenon that has not occurred since the great flood of 22 years ago. The tide rose about 12 inches over the sea wall. All telegraph and telephone lines were prostrated, many houses flooded, the cypress blocks of the street pavement floated away, and railroad traffic totally suspended. The tide during this storm rose higher than any known since 1824, and as the city was not guarded by a sea wall the present high water must be considered as the highest known. At Jacksonville, Fla., a high wind prevailed, with rain, all day of the 12th, causing damage to some cottages and bringing up the water of the Saint Johns River higher than known for years.

Savannah, Ga., reported damage of a minor character, wind reached 40 miles and sea ran heaviest for years.

At Charleston, S. C., the wind reached 60 miles, but no damage done to shipping interests.

Georgetown, S. C., was probably the worst sufferer of all stations along the coast. The wind is estimated to have reached a velocity of about 90 miles from the northeast at 9 a. m. of the 13th; died to calm at 10 a. m., and rose to about 60 miles from west by 11 a. m., gradually falling as the day passed. The high tide exceeded that of the great storm of August of this year by from 10 to 28 inches, and although the reports of lives lost are somewhat conflicting a conservative estimate places the total at fifteen.

At Southport, N. C., the wind reached a maximum velocity of 94 miles from the south on 13th, wharves were damaged, and a three-masted schooner went ashore.

At Louisburg, N. C., one life was lost.

At Wilmington, N. C., a heavy gale set in early on the 13th and rain continued throughout the day, maximum velocity of wind being 56 miles. The tide was highest ever recorded, exceeding previous highest tide by 16 inches. Some vessels were lost and much damage done; all low lands submerged.

At Raleigh, N. C., large trees were uprooted and cotton damaged severely. Hatteras, N. C., reports barkentine "Ravenscraft" went ashore. At Norfolk, Va., wires blown down. At Spottsville and Ashland, Va., crops were damaged. At Washington, D. C., the wall of a church in course of erection was blown down.

In Baltimore, Md., the rain began in the forenoon continuing to fall heavily in intervals until the early morning of the 14th. The wind reached a high velocity blowing the wire of the Brush Electric Co., in contact with the wooden portion of the building and causing a loss by fire of \$125,000 and the death of two prisoners in the city jail, an adjoining building, by suffocation. Tide in harbor higher than for a number of years and many wharves and bridges were swept away. Solomons and Woodstock, Md., also report great damage to property.

At Philadelphia, Pa., the wind reached a velocity of 50 miles, with gusts of 60 miles during the afternoon of the 13th, continuing to early morning of the 14th. Some slight damage done by wind; tide unusually high.

The storm was felt at Chester, Stroudsburg, Westtown, Lewisburg, Kil-

mer, Mifflington, Bethlehem, Carlisle, Chambersburg, Reading, Huntington, Norristown, Easton, Columbia, Pine Grove, Harrisburg, West Chester, Pittsburg, and Erie, Pa., where trees were blown down, houses unroofed, telegraphic communication interrupted, and railroad traffic delayed. While the center of this storm passed nearly as far west as Pittsburg the damage along the New Jersey coast was much greater than might have been expected. Several branch lines of the West Jersey Railroad were washed out, telegraph wires were blown down, and many small vessels were washed ashore.

The storm in New York state began about midnight of the 13th and did little damage except in the western portion and on the Lakes. On Lake Erie, off Dunkirk, the "Dean Richmond" foundered with 18 persons. Smaller vessels were reported as being wrecked all along the coast. The total known loss on the Lakes is 13 vessels, 54 lives, and \$676,000; this is the greatest loss ever known in proportion to the number of vessels out. At Manistique, Mich., a raft of logs valued at \$50,000 was lost. At New London, Conn., the wind reached a maximum velocity of 63 miles at 2.23 a. m., the 14th, all boats from New York delayed, and Light Ship "Martha Emma" wrecked. At New Haven, Conn., the wind reached 50 miles. Telephone lines over Vermont, near Montpelier, were damaged.

In Massachusetts the storm visited North Billerica, Hadley, Mansfield, and Boston, but no greater damage done than uprooting trees. The gales attending this storm were felt as far east as Portland, Me., and west as far as Duluth, Minn., during the 15th, as the storm center passed off in the direction of Labrador.

17th.—Hail fell at Fort Buford, N. Dak., at intervals,

from noon until 2.30 p. m. Twenty miles to the southwest, in Montana, a small number of cattle were killed by lightning.

20th.—During a severe thunderstorm near Uniontown, Pa., a large mill was struck by lightning; estimated loss about \$5,000. Four sheep were killed by lightning at Tiffin, Ohio.

24th.—A heavy gale prevailed on Lakes Superior, Huron, and Erie, and stopped navigation at the Straits of Mackinac. A schooner was wrecked 7 miles from Grand Island in Lake Superior. The crew were rescued, but the vessel, valued at \$25,000, was a total loss. A number of other accidents occurred. A report from Los Angeles, Cal., states that the heavy rains of the past two days, in the San Bernardino and Santa Ana valleys have damaged raisins and grains.

28th.—Severe gales prevailed over the Lake region. On Lake Superior the gale was accompanied by a heavy fall of snow, and snow squalls marked its progress across lower Lake Michigan, upper Lake Huron, and Georgian Bay. A number of wrecks were reported.

29th.—At Palermo, N. Y., a severe storm blew down buildings.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS.

The following table shows 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, 1893.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>
Shreveport, La.	29.2	5.4	10	—2.6	1, 2	8.0
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	12.0	4	—1.0	25, 28-31	13.0
Little Rock, Ark.	23.0	13.0	6	3.5	29, 31	9.5
<i>Missouri River.</i>						
Fort Buford, N. Dak.	25.0	7.3	17	6.3	1, 2	1.0
Bismarck, N. Dak.	75.0	2.7	23, 30	2.1	1-4, 17, 18	0.6
Pierre, S. Dak.	13.0	—3.8	3, 7, 11-14	—4.0	5, 6, 20-27	0.2
Sioux City, Iowa.	18.7	6.1	22-31	5.5	1, 4-8	0.6
Omaha, Nebr.	18.0					
Kansas City, Mo.	21.0	7.3	5	5.4	17-19	1.9
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	3.1	7, 8	2.7	4	0.4
La Crosse, Wis.	10.0	3.1	16	2.1	1-3	1.0
Dubuque, Iowa.	16.0	3.1	27	2.0	1, 2	1.1
Davenport, Iowa.	15.0	2.0	29	1.2	1-4	0.8
Keokuk, Iowa.	14.0	1.4	11, 19, 24-26	0.7	1	0.7
Hannibal, Mo.	17.0	1.9	23-26, 31	1.3	1, 2	0.6
Saint Louis, Mo.	30.0	4.2	7, 11-13	3.3	31	0.9
Cairo, Ill.	40.0	10.3	26	5.0	6-8, 22	5.3
Memphis, Tenn.	33.0	5.8	28	2.7	9, 10, 24	3.1
Vicksburg, Miss.	41.0	4.0	11	0.3	29	3.7
New Orleans, La.	13.0	4.9	2	2.8	26	2.1
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	9.0	15	1.2	1, 2, 13	7.8
Cincinnati, Ohio.	45.0	19.5	18	5.0	3	14.5
Louisville, Ky.	24.0	8.0	20	3.0	1	5.0
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	3.2	14	0.8	31	2.4
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	9.6	17	1.7	16	7.9
Knoxville, Tenn.	29.0					
<i>Monongahela River.</i>						
Pittsburg, Pa.	22.0	6.8	16	5.3	20	1.5
<i>Savannah River.</i>						
Augusta, Ga.	32.6	18.8	14	6.0	31	12.8

Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Willamette River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>
Portland, Oregon.	15.0	9.8	9, 10, 12	2.0	3	7.8
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	5.3	16	1.2	13	4.1
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	3.9	5	0.1	31	3.8
<i>James River.</i>						
Lynchburg, Va.	18.0	7.3	15	0.8	1, 2	6.5
<i>Sacramento River.</i>						
Red Bluff, Cal.	22.0					
Sacramento, Cal.	25.0	8.5	13	7.7	6-9, 30, 31	0.8
<i>Des Moines River.</i>						
Des Moines, Iowa.	19.0	3.2	27-31	2.7	9-24	0.5

FLOODS.

The column giving the highest stages of water during October shows that none of the rivers there mentioned rose to the danger point during this month; the following reports as to other rivers have been received:

New Mexico.—The Hondo River rose on the 5th and 6th 8 feet higher than was ever known before, and considerable damage was done.

South Carolina.—The Wateree River rose from the 22d-24th, reaching 31 feet at Camden bridge, being the highest rise since 1886.

Virginia.—On the 15th and again on the 23d the James River overflowed its banks at Irwin.

CLOSING OF NAVIGATION.

Lakes and rivers continued open to navigation during October, excepting local interruptions, due to low water in the upper Missouri and Mississippi rivers.

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS AND AURORAS.

The following table shows in detail for October, 1893, (1) the number of stations from which meteorological reports

were received; (2) the number of such stations reporting thunderstorms (T) and auroras (A), respectively, in each state and on each day of the month on which the phenomena were observed: