south side of low pressure area No. XV, which was then central in Manitoba.

AREAS OF 20° FALL IN TWENTY-FOUR HOURS.

A fall of temperature of 20°, or more, in twenty-four hours is not called a cold wave by the Weather Bureau unless the temperature falls below 40°, and is, therefore, likely to cause a frost injurious to vegetation, but all falls of 20° are indicated on the Daily Weather Map by inclosing the areas within which they occur by heavy dotted lines, and the following list enumerates those regions for the month of August (the dimensions of the principal axes of the areas are stated in miles):

(A) 1st, 8 p. m., 100 by 100, eastern North Dakota.

(B) 9th, 8 p. m., 200 by 100, southern portion of Lake Michigan.

(C) 13th, 8 p. m., 500 by 300, Manitoba, Assiniboia, and North Dakota. 14th, 8 p. m., 300 by 150, Lake Superior and Upper Michigan.

(D) 20th, 8 p. m. 200 by 100, Upper Michigan. 27th, 8 a. m., 200 by 100, Manitoba. This small area may be considered as largely a simple return to normal conditions following the unusual rise of temperature on the preceding day.

(E) 27th, 8 p. m., 500 by 300, Alberta and Saskatchewan. This area of falling temperature represented the advancing front of an extensive area of high pressure. 28th, 8 p. m., 400 by 200, Idaho and western Montana.

FROSTS.

Notwithstanding the high temperatures of August, a few reports of frosts have been received. During the spring months a minimum temperature of 40° in the shelters of the Weather Bureau is likely to be accompanied by frost on the ground in the open air, but it has been noticed on several occasions that this temperature limit is rather low; thus, Mr. A. E. Ackworth, of Mardela Springs, Md., writes that the records at his station, as kept by himself and Dr. Ker, show that "out of 74 frosts 33 occurred when the temperature was above 40° in April, and 1 when the minimum temperature was as high as 52°, and that ice and snow occurred in several of these instances, and 24 are marked as heavy frosts; the frost limit should therefore be raised to at least 44.5°."

During the 3d and 4th of the current August frost was quite general in Colorado, Minnesota, Iowa, Wisconsin, Michigan Indiana, and Ohio, although the minimum temperatures on those dates in Weather Bureau shelters were as high as 48° and 50° in northern Indiana, Ohio, and southern Michigan.

On the 27th at Saratoga, Wyo., and on the 22d, near Leeds, Mass., frost occurred, although in both cases the minimum air temperatures were as high as 47°.

The following table shows the dates of the occurrence of the first light and first heavy frost of the season at the respective stations:

Dates of first light and heavy frosts, August, 1894.

State and station.	First frost. Light.	First frost. Heavy.
California.		
Greenville	17	
Colorado.		
Downing	3	
Gold Hill	3	
Connecticut.		
Thompson	22	
Voluntown	11	
Indiana.		
Angola	4	
Cambridge City	4	
Columbia City	3	
Delphi	4	
Huntington	4	
Kokomo	4	
Logansport		4
Iowa.		
Audubon	4	
Cresco	3	
Fayette	3	
Forest City	3	
Logan	24	
Maine.		
Belfast	10	
Calais	10	
Massachusetts.		
Adams	17	
Amherst	22	
Brockton	20	
Concord	22	
East Templeton	11	
Groton	22	
Hadley	22	
Leeds	22	
Middleboro	22	
North Billerica	22	
Taunton	11	
Michigan.		
Alma	17	
Arbela	3	
Bronson	4	
Howell	5	
Lansing	3	
Lathrop	21	
Lodi	4	
Thornville	16	
Minnesota.		
Alexandria	3	
Fergus Falls	3	
Granite Falls	3	
Maple Plain	3	
Medford	3	
Rolling Green	3	
Rush City	3	
St. Charles	3	
St. Peter	3	
Sunrise City	3	
New Hampshire.		
Alstead	22	
Berlin Mills	17	
Bethlehem	11	
Brookline	22	
Concord	22	
Grafton	22	
Lancaster	22	
Littleton	22	
New Hampshire—Continued.		
Peterboro	22	
Stratford	27	
West Milan	11	27
New York.		
Angelica	11	
Hyndsville	27	
Malone	21	
South Canisteo	11	
North Dakota.		
McKinney	3	
Woodbridge	2	
Ohio.		
Annapolis	4	
Clifton	4	
Hedges	4	
Kenton	22	
Leipsic	4	
Montpelier		4
Northwood	4	
Orangeville	5	
Warren	17	
Wauseon	4	
Weymouth	17	
Pennsylvania		
Cassandra	5	
Dyberry	10	
Lock Haven	12	
Shinglehouse	11	
Somerset	4	
Wellsboro	6	
Wilkesbarre	21	
Rhode Island.		
Kingston	22	
Pawtucket	21	
South Dakota.		
De Smet	2	
Vermont.		
Cornwall	26	
Hartland	22	
Northfield		27
Norwich	22	
Strafford	10	
Vernon	22	
Wells	22	
West Virginia.		
Pleasant Hill	5	
Wisconsin.		
Antigo	21	
Black River Falls	5	
Crandon	3	
Florence		20
Grantsburg		2
Hillsboro	3	
Koepenick	20	
Milwaukee	3	
Neillsville	3	
Osceola	4	
Reedsburg	3	
Valley Junction		3
Viroqua	3	
Weston	3	
West Salem	3	
Wyoming.		
Saratoga		27

PRECIPITATION.

[*In inches and hundredths.*]

The distribution of precipitation for the month of August, 1894, as determined by reports from about 2,000 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III; the first of these also gives the average departures from the normal for each district, whereas the average departure for each State is given in Table XII.

NORMAL PRECIPITATION FOR AUGUST.

The normal precipitation for the month of August is less than 1 inch in the middle and northern plateau, middle and south Pacific regions; it is between 1 and 2 inches in the north Pacific and northern and southern slopes; from 2 to 3 inches usually falls over the southern plateau, middle slope, North Dakota, and the lower and upper Lake regions; from 3 to 4 inches in the upper Mississippi and the Missouri valleys, the Ohio Valley and Tennessee, and the west Gulf States; from 4 to 6 inches throughout the Atlantic and east Gulf States.

PRECIPITATION FOR CURRENT MONTH.

The precipitation for the current August was heaviest in the south Atlantic States, where it ranged from 3 inches in the interior mountainous regions up to 12 inches on the coast of South Carolina and 11 in southern Georgia. A number of cases of extreme local rainfalls, exceeding 13 inches, are reported. A region of heavy precipitation, viz, above 8 inches,

also occurs in southwestern Texas, and apparently still heavier rains fell on the Mexican side of the Rio Grande. The precipitation was less than 1 inch throughout the Pacific coast and Rocky Mountain regions and the greater part of the Missouri watershed, as also in Lower Michigan, constituting a continuance of the drought mentioned in the REVIEW for July.

CURRENT DEPARTURES FROM NORMAL PRECIPITATION.

The precipitation for August was in excess over a small portion of Tennessee, the south Atlantic and Gulf States, as also in Colorado and Mexico, but was deficient in nearly all other regions.

The principal departures from the normal at Weather Bureau stations were as follows:

Excesses.—Abilene, 5.2; San Antonio and Pensacola, 4.9; Charleston, 4.8; Corpus Christi, 4.1; Galveston, 4.0.

Deficits.—Jupiter and Topeka, 4.8; Leavenworth, 4.3; New Haven, 3.8; Columbia, Kans., 3.6; La Crosse, 3.4; Nantucket, 3.3; New York and Sandusky, 3.2; Baltimore and St. Paul, 3.1.

Considered by districts, the precipitation for August, 1894, when compared with the normal for the month, furnishes the departures given in Table I, as expressed in inches. By dividing those departures by the normal precipitation for August we obtain the following corresponding percentages (precipitation is in excess when the percentage of the normal exceeds 100):

Below the normal: New England, 52; middle Atlantic States, 71; Key West, 90; Ohio Valley and Tennessee, 77; lower Lake region, 20; upper Lake region, 44; North Dakota (extreme northwest), 52; upper Mississippi Valley, 40; Missouri Valley, 16; northern slope, 72; middle slope, 43; southern plateau, 42; northern plateau, 31; north Pacific, 21.

Normal: Middle plateau, 100; middle Pacific, 100; south Pacific, 100.

Above the normal: south Atlantic, 105; east Gulf States, 107; west Gulf States, 190; southern slope (Abilene), 427.

For certain voluntary stations of rather long periods of observation the normal and extreme monthly precipitations and the departures are shown in detail in Table X *b*, which is now placed among the meteorological tables instead of being inserted in the text as heretofore.

ACCUMULATED PRECIPITATION.

The total accumulated monthly departures from normal precipitation from the beginning of the year to the end of the current month are given in the second column of the following table; the third column gives the ratio of this current accumulated precipitation to its normal value:

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures	Accumulated precipitation.
	Inch.	*Per ct.*		*Inch.*	*Per ct.*
New England	−10.10	67	West Gulf	+ 1.20	104
Middle Atlantic	− 6.20	80	Southern slope (Abilene)	+ 4.00	122
South Atlantic	− 4.80	87	Middle plateau	+ 0.70	109
Key West	− 6.30	73	Northern plateau	+ 2.00	137
East Gulf	− 2.90	93	North Pacific	+ 9.50	128
Ohio Valley and Tennessee	− 6.90	80			
Lower Lake	− 4.50	81			
Upper Lake	− 1.70	92			
North Dakota (Ex. NW.)	− 0.70	95			
Upper Mississippi	− 9.50	63			
Missouri Valley	− 8.24	66			
Northern slope	− 1.10	90			
Middle slope	− 0.20	99			
Southern plateau	− 2.90	65			
Middle Pacific	− 2.10	89			
South Pacific	− 4.60	49			

DIURNAL VARIATION.

Table IV*b* gives the total precipitation for each hour of seventy-fifth meridian time, as deduced from self-registering gauges kept at about 43 regular stations of the Weather Bureau; of these 27 are float guages and 6 are weighing guages.

YEARS OF GREATEST PRECIPITATION FOR AUGUST.

The precipitation for the current month was the greatest on record for the month of August at regular Weather Bureau stations, as shown in the following table:

Station.	Current precipitation.		Previous maximum.	
	Amount.	Departure.	Amount.	Year.
Sault Ste. Marie, Mich	5.72	+ 2.0	4.11	1890
Titusville, Fla	5.33	+ 1.8	4.40	1888
Abilene, Tex	6.79	+ 5.2	4.08	1888
Palestine, Tex	5.45	+ 3.0	5.32	1882
Corpus Christi, Tex	7.65	+ 4.1	6.31	1891

YEARS OF LEAST PRECIPITATION FOR AUGUST.

The precipitation for the current month was the least on record for the month of August at regular Weather Bureau stations, as shown in the following table:

Station.	Current precipitation.		Previous minimum.	
	Amount.	Departure.	Amount.	Year.
Jupiter, Fla	1.54	−4.8	2.80	1892
Charlotte, N. C	3.03	−2.3	4.05	1888
Pittsburg, Pa	0.43	−3.0	0.88	1881
Erie, Pa	0.54	−2.8	0.98	1876
Sandusky, Ohio	0.23	−3.2	0.96	1881
Toledo, Ohio	0.60	−2.2	0.88	1881
Detroit, Mich	0.16	−2.8	0.19	1889
Port Huron, Mich	0.07	−2.5	0.14	1889
Milwaukee, Wis	0.29	−2.6	0.76	1889
Green Bay, Wis	1.34	−1.7	1.36	1889
St. Paul, Minn	0.36	−2.1	1.22	1883
La Crosse, Wis	0.35	−3.4	1.30	1893
Keokuk, Iowa	0.51	−2.5	0.54	1673
Laramie, Wyo	0.11	−0.6	0.25	1882
Valentine, Nebr	0.33	−1.1	0.34	1889
Omaha, Nebr	0.36	−3.5	0.95	1882
Kansas City, Mo	0.13	−4.3	1.55	1892
Topeka, Kans	0.42	−4.8	2.31	1891
Columbia, Kans	0.44	−3.6	0.69	1891
Dodge City, Kans	0.15	−3.0	1.03	1876

EXCESSIVE PRECIPITATION.

The following tables for August, 1894, show, by States, the number of stations reporting total precipitation to equal or exceed 10.00 inches during this month, 2.50 in 24 hours, and 1.00 in 1 hour:

Monthly precipitation to equal or exceed 10.00 *inches.*

State.	Number of stations.	State.	Number of stations.
Georgia	10	North Carolina	7
South Carolina	9	Florida	5
Alabama	7	Texas	2
Louisiana	7	Arkansas	1

Daily precipitation to equal or exceed 2.50 *in* 24 *hours.*

State.	Number of stations.	Dates.	State.	Number of stations.	Dates.
Texas	26	3-4, 4, 4-5, 5, 5-6, 6, 6-7, 8, 9, 10, 14, 14-15, 21, 23, 24, 24-25, 29-30, 30, 30-31.	Georgia	11	3-4, 5, 5-6, 17, 17-18, 18-19, 24.
South Carolina	18	4, 4-5, 4-6, 5, 5-6, 6, 11, 20, 26-27, 27, 27-28.	Mississippi	11	8, 13, 21-22, 22, 22-23, 23-24.
Alabama	14	1-2, 2, 3, 17-18, 22, 22-23, 24, 28-29.	Florida	6	2, 3-4, 7-8, 29, 31.
Louisiana	13	8-9, 9, 9-10, 10, 12-13, 13, 14, 16-17, 18, 21, 26.	Tennessee	4	17, 22-23, 23-24, 25-26.
North Carolina	13	3, 3-4, 3-5, 4-5, 4-6, 5, 5-6, 6, 11-12, 26, 26-27.	Minnesota	3	9-10, 13.
Arkansas	12	1-2, 2, 11, 11-12, 12, 15, 16, 17, 20-21, 26, 30.	Missouri	3	10, 20-21.
			Virginia	3	3-4, 11-12, 18.
			Ohio	2	1-2.
			South Dakota	2	13, 15.
			Arizona	1	21-22, 23-24.
			Delaware	1	18.
			Iowa	1	13.
			Kentucky	1	13.
			Maine	1	3.
			New Jersey	1	3-4.
			Pennsylvania	1	2-3.

Hourly precipitation to equal or exceed 1.00 *inch.*

State.	Number of stations.	Dates.	State.	Number of stations.	Dates.
Louisiana	12	1, 3, 11, 13, 16, 18, 21, 26, 29, 30.	South Dakota	3	9, 13, 15.
Ohio	10	2, 11, 12, 18, 19, 25.	Virginia	3	10, 13, 15.
Georgia	9	1, 2, 3, 8, 12, 17, 17–18, 18, 19, 21, 23, 24, 27, 31.	Kentucky	2	10, 13.
Florida	7	4, 9, 10, 22, 24, 27, 28, 29, 31.	Mississippi	2	13, 30.
South Carolina	7	11, 13, 15, 24, 27, 30.	New Jersey	2	15, 18.
Alabama	6	3, 12, 16, 17, 19.	Pennsylvania	2	2.
Arkansas	6	1, 11, 12, 26.	Connecticut	1	3.
Missouri	6	1, 10, 17, 25.	Illinois	1	26.
North Carolina	6	3, 4, 11, 15, 27.	Indiana	1	25.
Texas	6	1, 2, 3, 10, 20, 31.	Kansas	1	21.
Tennessee	4	17, 25.	Maine	1	3.
Arizona	3	22, 30.	Maryland	1	15.
Massachusetts	3	3, 20.	New Mexico	1	10.
			New York	1	15.
			West Virginia	1	13.
			Wisconsin	1	24.

Excessive precipitation, by stations, for August, 1894.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Carrollton	10.43					
Clanton		3.98	22-23			
Cordova		3.57	17-18			
Decatur *b*				1.85	1 50	12
Eufaula *a*				1.43	1 05	3
Eufaula *c*				1.30	1 05	3
Florence *a*	10.36			2.10	2 05	16
Florence *b*	10.60	2.66	3			
Greensboro		3.00	22			
Marion	12.47	7.00	22			
Newbern	12.00	4.80	22			
Opelika		3.55	22-23			
Selma	13.13	7.10	22			
Talladega		2.60	24	1.70	1 00	17
Tallassee Falls		5.09	22-23			
Tuscumbia		2.88	2			
Union		2.60	22			
Union Springs		4.96	22-23			
Wilsonville	17.35	3.18	1-2	1.30	0 30	19
Do		5.25	22-23			
Do		2.50	28-29			
Arizona.						
Bisbee		2.59	21-22	2.15	1 00	22
Do		3.16	23-24			
Red Rock				2.00	1 30	30
San Carlos				1.02	0 50	22
Arkansas.						
Bee Branch		3.45	1-2	2.00	2 00	1
Brinkley		5.30	11-12			
Cassville		2.57	20-21			
Corning				1.95	0 30	1
Dardanelle		3.50	12			
Fort Smith				1.41	0 40	11
Hamburg		2.64	15			
Helena *a*		4.80	12	4.80	4 00	12
Helena *b*		4.95	11-12			
Hindsville		3.05	17			
Kirby				1.10	1 00	26
Mount Ida		2.90	11			
Mount Nebo		3.38	11			
New Gascony		3.21	16			
Pocahontas				1.55	1 30	1
Prescott	18.01	3.70	2			
Do		3.10	12			
Do		3.99	26			
Do		2.50	30			
Connecticut.						
New London				1.53	1 00	3
Delaware.						
Milford		2.78	18			
Florida.						
Clermont	10.64			2.00	0 45	24
Do		3.10	31	3.00	1 15	31
Homeland	10.13	3.12	29			
Jacksonville				1.25	1 00	10
Do				1.48	1 00	24
Key West		2.74	3-4	1.13	1 00	4
Kissimmee				1.64	0 30	22
Merritts Island		2.58	2			
Orange Park	11.20			2.10	1 55	9
Do				1.00	0 45	29
Orlando				2.00	0 30	28
Pensacola	13.67	5.95	7-8			
Plant City				1.75	1 00	27
Tarpon Springs	10.36	2.64	31			
Georgia.						
Alapaha	11.08	4.25	5-6			
Albany	10.92	6.02	5-6			
Canton				1.88	1 15	1
Do				1.54	1 20	3
Cordele		3.65	5-6	1.15	0 30	19
Do				1.15	1 00	31

Excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Georgia—Continued.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Eastman	11.17	4.89	5-6			
Fleming	11.45	2.70	17			
Fort Gaines				1.03	0 40	2
Do				1.22	1 00	23
Hawkinsville	10.31	3.79	5			
Macon *b*		2.70	5-6			
Millen	10.48					
Monticello	10.30	5.50	17-18			
Poulan	10.55	3.39	5-6			
Quitman				1.10	0 35	8
Reynolds				1.68	1 00	17-18
Rome				1.52	1 00	18
Do				1.80	1 00	21
Savannah				1.56	1 00	17
Way Cross	11.54	4.06	18-19	1.55	1 10	27
Waynesboro	13.70	3.47	3-4	1.60	0 50	12
Do		2.65	24	2.25	0 45	24
Illinois.						
Palestine				2.15	2 00	26
Indiana.						
Mount Vernon				1.19	1 00	25
Iowa.						
Sac City		2.50	13			
Kansas.						
Olathe				1.00	1 00	21
Kentucky.						
Harrodsburg						
Hendricks		2.90	13	2.90	1 00	13
Princeton				1.36	0 40	10
Louisiana.						
Cameron	11.90	2.75	13			
Coushatta *a*		3.27	16-17			
Covington		2.57	12-13			
Davis				2.07	1 40	16
Do		3.25	18	3.25	1 30	18
Emilie	10.52			1.99	1 25	3
Franklin	11.11			1.12	1 05	1
Do		5.23	14	1.00	0 40	11
Girard		2.63	26			
Lafayette				1.18	0 20	3
Lake Charles	10.50			2.00	0 30	29
Lawrence		5.27	9			
Liberty Hill				2.10	1 05	21
Many	12.46	2.85	21			
Monroe				1.15	0 25	26
New Orleans		2.58	13	1.70	1 00	13
Do				1.13	0 50	18
Oberlin				2.00	1 30	18
Paincourtville				1.40	1 00	16
Port Eads		4.31	8-9			
Rayne		2.55	9-10			
Schriever				1.94	1 45	30
Shell Beach	10.33					
Sugar Ex. Station		4.06	10			
Thibodeaux				1.00	1 00	29
West End	10.03	3.26	13			
Maine.						
Belfast		3.03	3			
Portland				1.08	1 00	3
Maryland.						
Chestertown				1.85	0 30	15
Massachusetts.						
Boston (W. B.)				1.68	1 00	20
Roxbury				1.25	0 50	20
Westboro				3.00	2 00	3
Do				2.00	1 00	20
Minnesota.						
Airlie		2.74	13			
Bird Island		2.50	9-10			
Campbell				1.57	1 30	10
Do				1.06	1 00	22
Milan		3.24	9-10			
Mississippi.						
Aberdeen		3.75	23-24			
Biloxi		3.05	22			
Clarksdale		5.07	13	5.07	5 00	13
Columbus		3.18	22-23			
Hattiesburg		3.20	13			
Jackson		4.80	21-22			
Louisville		2.51	22			
Macon		3.00	22-23			
Moss Point		3.00	8			
Waynesboro *a*		3.90	13			
Waynesboro *b*		3.15	13			
Woodville				2.24	1 10	30
Missouri.						
Birch Tree				2.03	2 00	1
Fox Creek				1.18	1 00	1
Half Way		2.50	20-21			
Nevada		3.07	20-21			
New Madrid				1.59	0 20	25
Oakfield				1.21	0 57	1
Panacea				1.13	1 00	17
Whiteside		2.70	10	2.70	1 00	10
New Jersey.						
Beach Haven		5.56	3-4			
Egg Harbor City				2.20	2 00	18
River Vale				1.72	1 30	15
New Mexico.						
Eddy				1.78	1 30	10

Excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
	Inches.	Inches.		Inches.	h. m.	
New York.						
West Point				1.10	1 05	15
North Carolina.						
Auburn		2.96	3			
Bakersville		2.57	11-12			
Charlotte				1.14	0 50	11
Fair Bluff		5.60	4-6			
Falkland	19.25	13.55	3-5			
Fayetteville	13.45	10.25	4-6			
Goldsboro		4.40	5-6			
Greenville	11.40					
Hatteras		2.52	4-5	1.87	1 00	27
Horse Cove				1.65	0 35	4
Lumberton		4.47	4-5			
Mocksville				2.31	1 56	3
Pantego	14.99	5.19	4-5	1.60	1 30	3
Do		3.00	26			
Selma	13.71	8.20	3-4			
Sloan	11.54	2.51	5	2.19	1 10	15
Southport		3.46	5			
Tarboro	13.32	2.98	6			
Do		4.48	26-27			
Ohio.						
Bangorville				1.16	1 00	18
Cincinnati				1.17	1 00	11
Coalton		2.75	1-2			
Dupont				1.08	1 00	18
Frankfort		3.25	1-2			
McConnellsville				2.10	2 00	19
North Lewisburg				2.00	2 00	2
Northwood				1.26	1 08	25
Pataskala				1.03	0 30	12
Portsmouth *a*				1.36	1 00	12
Vickery				1.33	0 45	12
Waverly				1.38	1 10	2
Pennsylvania.						
Harrisburg		2.51	2-3	1.20	1 00	2
Smethport				1.25	0 30	2
South Carolina.						
Allendale		4.26	4-5			
Batesburg		2.85	4-5			
Blenheim	12.24	6.22	4-5			
Do		3.40	11			
Branchville				1.11	1 00	24
Central		2.99	27			
Cheraw *a*		2.57	4			
Cheraw *b*		4.55	4-5			
Charleston	11.12					
Effingham	11.14	5.77	4-6			
Flint Hill				2.15	2 00	11
Florence	11.89	8.01	4-6			
Greenwood		2.85	27-28			
Kingstree *a*		2.94	4-5			
Little Mountain		4.00	4-5			
McCormick		2.60	4			
Port Royal	10.97	2.83	20			
Do		3.50	27	3.50	2 00	27
St. Georges	10.43	2.96	5	1.30	0 30	30
St. Matthews	10.27	3.07	5-6			
Do		3.35	26-27	1.35	1 15	27
Santuck				1.13	0 50	15
Society Hill	12.26	7.17	4-5			
Statesburg	11.85	3.75	4-5			
Watts		2.84	6	1.45	1 00	13
South Dakota.						
Alexandria		3.10	15	2.65	0 40	15
Cross				2.18	1 40	9
Flandreau		2.85	13	2.85	1 35	13
Tennessee.						
Carthage		4.10	17	4.10	2 40	17
Franklin				1.80	1 30	17
Lynnville		4.14	23-24			
Memphis				1.40	0 40	17
Rugby		3.76	25-26	2.98	2 00	25
Waynesboro		2.90	22-23			
Texas.						
Abilene				1.15	0 40	1
Do				1.10	0 30	3
Alice		4.00	6			
Beaumont		3.04	14			
Do		3.08	21			
Bellville		4.00	4			
Boerne		3.86	29-30			
Brazoria	11.50	3.94	6 7			
Brenham		3.31	4-5			
Camp Eagle Pass		4.72	30-31			
Coleman		2.67	10			
Corpus Christi		5.13	5-6			
Dallas		3.36	3-4			
Devine		2.56	24			
Eastland		2.50	9			
Estelle				1.52	1 30	20
Flower Bluff		4.45	6-7			
Do		3.25	24-25			
Fort Clark		3.06	3-4			
Fredericksburg		2.51	29-30			
Galveston		3.56	14-15			
Hallettsville		4.47	6			
Jefferson				1.75	1 00	10
Lampasas				1.25	1 00	3
Leaky		4.10	30			
Llano		2.90	23			

Excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Texas—Continued.	Inches.	Inches.		Inches	h. m.	
Longview		2.94	4			
Luling		3.09	5			
New Braunfels				1.66	0 55	31
Orange	11.64					
Roby		3.76	10			
Rock Springs		2.70	29-30			
San Antonio (W. B.)		2.55	8			
Silver Falls				1.02	1 00	2
Waco		4.75	29-30			
Weatherford		4.76	3-4			
Virginia.						
Birdsnest		2.75	11-12			
Hampton		2.60	18			
Norfolk				1.00	1 00	13
Spottsville		2.63	3-4			
Warrenton				1.12	0 45	15
Whittles Depot				1.27	0 30	10
West Virginia.						
Beverly				1.20	0 30	13
Wisconsin.						
City Point				1.06	1 00	24

Excessive precipitation in July, 1894, received too late for publication.

Florida.						
St. Francis Barracks		2.60	10			
Kentucky.						
Alpha				1.00	0 20	15
Catlettsburg				1.04	0 25	16
Massachusetts.						
Springfield Armory				1.03	0 57	21

The following tables show the number of years for which monthly precipitation to equal or exceed 10.00 inches, daily precipitation to equal or exceed 2.50 inches, and hourly precipitation to equal or exceed 1.00 inch has been reported in the several States and Territories for August during the last twenty-four years:

Frequency of excessive monthly precipitation.

State.	No. years noted.	State.	No. years noted.
Florida	21	Wisconsin	3
North Carolina	19	Kentucky	3
Georgia	18	Mississippi	3
South Carolina	12	Arkansas	3
Alabama	12	Delaware	2
New York	10	Maine	2
Virginia	9	West Virginia	2
Texas	9	Arizona	1
Louisiana	9	Colorado	1
Kansas	7	North and South Dakota	1
New Hampshire	7	District of Columbia	1
New Jersey	7	Minnesota	1
Illinois	6	New Mexico	1
Indiana	6	Vermont	1
Iowa	6	California	1
Massachusetts	6	Indian Territory	1
Connecticut	5	Idaho	0
Ohio	5	Montana	0
Pennsylvania	5	Nevada	0
Missouri	5	Oregon	0
Tennessee	5	Rhode Island	0
Maryland	4	Utah	0
Michigan	3	Washington	0
Nebraska	3	Wyoming	0

Frequency of excessive daily precipitation.

Georgia	23	Arkansas	14
Texas	22	Louisiana	14
Florida	21	Virginia	14
North Carolina	21	Connecticut	13
South Carolina	20	Minnesota	13
Pennsylvania	18	New Jersey	13
Iowa	17	Michigan	12
Missouri	17	Nebraska	11
Tennessee	17	Indiana	10
New York	10	Maryland	9
Massachusetts	15	New Hampshire	9
Illinois	15	Indian Territory	8
Mississippi	15	West Virginia	7
Alabama	15	Arizona	7
Ohio	15	Delaware	6
Kansas	14	Kentucky	6
Wisconsin	14	Rhode Island	4
North and South Dakota	14	Vermont	4

Frequency of excessive daily precipitation—Continued.

State.	No. years noted.	State.	No. years noted.
Maine	4	Idaho	0
Montana	2	Nevada	0
Colorado	2	Oregon	0
California	1	Utah	0
New Mexico	1	Washington	0
District of Columbia	0	Wyoming	0

Frequency of excessive hourly precipitation.

Texas	19	Alabama	7
Florida	17	Kentucky	6
Georgia	17	Massachusetts	6
Tennessee	16	Colorado	5
Pennsylvania	15	New Hampshire	5
Kansas	15	Wisconsin	5
Ohio	15	New Mexico	5
North Carolina	14	Connecticut	4
South Carolina	13	Minnesota	4
Virginia	13	Maine	3
Iowa	12	Indian Territory	3
Michigan	11	West Virginia	3
Nebraska	11	Montana	2
North and South Dakota	11	Rhode Island	2
Illinois	11	Delaware	2
Indiana	10	District of Columbia	1
New York	10	Vermont	1
Mississippi	10	California	1
New Jersey	10	Washington	1
Maryland	9	Idaho	0
Louisiana	9	Nevada	0
Arkansas	8	Oregon	0
Missouri	8	Utah	0
Arizona	7	Wyoming	0

MAXIMUM RAINFALL FROM SELF-REGISTERING GAUGES.

The following table gives the heaviest rainfall during August, 1894, for periods of 5, 10, and 60 minutes, as re-recorded on self-registering rain gauges at regular stations of the Weather Bureau. This record refers strictly to rainfall. About 37 stations are furnished with self-registering-float-rain gauges and 6 with the self-registering-weighing-rain-and-snow gauge. The float gauge does not record snowfall, and both forms are liable to be interrupted by snow and ice:

Maximum rainfall in one hour or less.

Station.	Maximum rainfall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		*Inch.*		*Inch.*	
Atlanta, Ga.*	0.23	28	0.31	28	0.53	24
Baltimore, Md	0.05	19	0.06	19	0.22	19
Bismarck, N. Dak	0.02	7, 13	0.04	7, 13	0.13	7
Boston, Mass	0.56	20	0.83	20	1.68	20
Buffalo, N. Y	0.12	2	0.18	2	0.20	2
Cincinnati, Ohio	0.38	11	0.70	11	1.03	11
Chicago, Ill	0.16	10	0.16	10	0.24	10
Cleveland, Ohio	0.20	1	0.21	1, 19	0.31	19
Denver, Colo	0.29	2	0.50	2	0.76	2
Detroit, Mich	0.03	9	0.05	9	0.08	9
Dodge City, Kans	0.01	20, 21	0.02	20, 24	0.05	20
Duluth, Minn	0.27	22	0.32	22	0.42	22
Eastport, Me	0.12	20	0.21	20	0.32	20
Galveston, Tex	0.22	21	0.35	21	0.80	14
Indianapolis, Ind	0.25	10	0.47	10	0.93	10
Jacksonville, Fla	0.45	24	0.70	24	1.48	24
Jupiter, Fla	0.20	21	0.25	21	0.45	21
Kansas City, Mo	0.01	20	0.01	20	0.05	21
Key West, Fla	0.45	4	0.80	4	1.13	4
Marquette, Mich	0.40	28	0.55	28	0.80	28
Memphis, Tenn	0.30	23	0.40	17	1.40	17
Milwaukee, Wis	0.30	14, 20	0.05	14, 20	0.11	14
Nantucket, Mass	0.06	4	0.08	4	0.19	4
Nashville, Tenn	0.30	25	0.45	25	0.75	17
New Orleans, La	0.32					
New York, N. Y	0.25	3	0.46	3	0.69	3
Norfolk, Va	0.06	12, 13	0.45	13	1.00	13
Omaha, Nebr	0.06	12	0.09	12	0.11	12
Philadelphia, Pa	0.25	2	0.45	2	0.69	2
Pittsburg, Pa	0.10	19	0.10	19	0.15	19, 20
Portland, Me	0.18	3	0.33	3	1.08	3
Portland, Oreg.†						
Rochester, N. Y	0.10	29	0.14	29	0.25	29
St. Louis, Mo	0.15	1	0.25	1	0.57	1
St. Paul, Minn	0.08	11	0.10	11	0.18	11
Salt Lake City, Utah	0.06	31	0.08	31	0.23	31
San Diego, Cal.†						
San Francisco, Cal.†						
Savannah, Ga	0.33	17	0.62	17	1.56	17
Seattle, Wash.†						
Vicksburg, Miss	0.18	22	0.33	28	0.45	22
Washington, D. C	0.14	26	0.25	26	0.64	26
Wilmington, N. C	0.35	5	0.52	5	0.78	5

* Record incomplete. † Less than 0.05 in 1 hour.

EXCEPTIONAL PRECIPITATION.

The following tables give exceptionally heavy monthly, daily, and hourly precipitation reported for August, by any station, regular or voluntary, and in any year since 1871:

Exceptional monthly precipitation.

Station and state.	Amt.	Year.	Station and state.	Amt.	Year.
	Inches.			*Inches.*	
Fort Barrancas, Fla	30.73	1878	Charleston, Ill	23.04	1882
Asheville, N. C	28.65	1887	New Smyrna, Fla	23.00	1871
Ellsworth, N. C	28.33	1880	New Orleans, La	22.74	1888
Fort Barrancas, Fla	25.07	1879	Tarboro, N. C	22.73	1887
Hardeeville, S. C	24.67	1893	St. Augustine, Fla	21.50	1871
Maurepas, La	23.44	1888	Fairview, Fla	21.35	1871
Newport, Fla	23.25	1872	St. Georges, S. C.*	20.45	1893

* Estimated, gauge blown down.

Exceptional daily precipitation.

Station and state.	Amount.	Date.	Station and state.	Amount.	Date.
	Inches.			*Inches.*	
Falkland, N. C	13.55	3-5, 1894	Pinopolis, S. C	6.00	27-28, 1893
Manning, S. C	13.22	27-28, 1893	Hazlehurst, Miss	6.00	27, 1890
Connors, S. C	12.40	27-28, 1893	Phillips, Wis	6.00	8, 1890
Campo, Cal.*	11.50	12, 1891	Pensacola, Fla	5.95	7-8, 1894
Griffin, Ga	10.38	8, 1883	Hampton, S. C	5.95	27-28, 1893
Fayetteville, N. C	10.25	4-6, 1894	Clarksville, Tenn	5.90	20, 1891
St. Georges, S. C.†	10.15	26-27, 1893	Hamburg, S. C	5.81	12, 1893
Granbury, Tex	10.15	26, 1888	Table Rock, Nebr	5.81	14-15, 1893
Fort Barrancas, Fla	9.75	29, 1878	Columbia, S. C	5.75	28, 1890
Hatteras, N. C	9.14	23, 1880	Batesburg, S. C	5.70	27-28, 1893
Tecumseh, Nebr	9.00	12, 1889	Yorkville, S. C	5.68	27-28, 1893
Ellsworth, N. C	9.00	4, 1880	Darien, Ga	5.67	27-28, 1893
New Orleans, La	8.90	20, 1888	Savannah, Ga	5.61	27-28, 1893
Mandeville, La	8.54	8, 1888	Clarinda, Iowa	5.60	14-15, 1893
Cape May, N. J	8.40	18, 1879	Tillers Ferry, S. C.*b*	5.59	27-28, 1893
Wateree, S. C	8.45	27-28, 1893	Beach Haven, N. J	5.56	3-4, 1894
Riddleton, Tenn	8.35	3, 1893	Birdsnest, Va	5.55	21-22, 1892
Stephens, S. C	8.28	27-28, 1893	Camp Eagle Pass, Tex.	5.50	2, 1891
Selma, N. C	8.20	3-4, 1894	Monticello, Ga	5.50	17-18, 1894
Kittyhawk, N. C	8.14	15, 1883	Sugar Ex. Station, La	5.48	15, 1892
Vesper, Kans	8.10	19, 1890	Washington, Ga	5.40	20, 1891
Florence, S. C	8.01	4-6, 1894	Highlands, N. C	5.34	13-14, 1893
Grantsburg, Wis	7.75	19-20, 1889	Tillers Ferry, S. C.*a*	5.33	2-3, 1893
Johnstown, Va	7.70	18, 1879	Brinkley, Ark	5.30	11-12, 1894
Marshall, Mo	7.48	18-19, 1891	Lawrence, La	5.27	9, 1894
Belvidere, N. J	7.39	19-20, 1893	Wilsonville, Ala	5.25	22-23, 1894
Society Hill, S. C	7.17	4-5, 1894	Franklin, La	5.23	14, 1894
Selma, S. C	7.10	22, 1894	Madison B'ks, N. Y	5.25	28-29, 1893
Davis Bridge, S. C	7.02	27-28, 1893	Beatrice, Nebr	5.22	14-15, 1893
Central City, Ky	7.02	22, 1891	Ashland, Nebr	5.21	14-15, 1893
Marion, Ala	7.00	22, 1894	Brewer Mine, S. C	5.20	28, 1893
Trial, S. C	6.96	27-28, 1893	Martins, S. C	5.20	27-28, 1893
Blackville, S. C	6.86	27-28, 1893	Pantego, S. C	5.19	4-5, 1894
Statesburg, S. C	6.74	27-28, 1893	Deckertown, N. J	5.17	23-24, 1893
Union Point, Ga	6.60	26-27, 1891	Corpus Christi, Tex	5.13	5-6, 1894
Carson, Iowa	6.50	9, 1889	Fort Smith, Ark	5.10	19-20, 1890
Effingham, S. C	6.45	27-28, 1893	Buckhannon, W. Va	5.10	28, 1893
Hardeeville, S. C	6.40	27-28, 1893	Clarksdale, Miss	5.07	13, 1894
North Hammond, N. Y.	6.40	26, 1892	Cheraw, S. C	5.00	23-24, 1893
Laredo, Tex	6.38	9, 1893	Lillington, N. C	5.02	22-23, 1891
Chicago, Ill	6.33	2-3, 1885	Thomasville, Ga	5.02	15-16, 1892
Blenheim, S. C	6.22	4-5, 1894	State Farm, Nebr	5.01	14-15, 1893
Trenton, S. C	6.07	27-28, 1893	Rea, Mo	5.00	14-15, 1893
Albany, Ga	6.02	5-6, 1894			

* Cloudburst; rainfall not all measured.
† Estimated; gauge blown down.

Exceptional precipitation for one hour or less.

Station and state.	Amount.	Time.	Date.
	Inches.	*h. m.*	
Boston, Mass	0.56	0 05	20, 1894
Jupiter, Fla	0.50	0 05	21, 1893
Omaha, Nebr	0.50	0 05	14, 1893
St. Paul, Minn	0.50	0 05	23, 1893
Boston, Mass	0.50	0 05	12, 1892
Savannah, Ga	0.50	0 05	28, 1891
Atlanta, Ga	0.45	0 05	1, 1892
Indianapolis, Ind	0.45	0 05	19, 1891
Jacksonville, Fla	0.45	0 05	19, 1892
Do	0.45	0 05	24, 1894
Key West, Fla	0.45	0 05	4, 1894
Wilmington, N. C	0.43	0 05	18, 1887
New York, N. Y	0.43	0 05	18, 1887
Galveston, Tex	0.40	0 05	4, 1891
Kansas City, Mo	0.40	0 05	15, 1891
Eastport, Me	0.40	0 05	12, 1891
St. Louis, Mo	0.40	0 05	7, 1892
Marquette, Mich	0.40	0 05	28, 1894
Tampa, Fla	0.40	0 05	9, 1892
Galveston, Tex	0.39	0 05	22, 1891
Norfolk, Va	0.38	0 05	31, 1892
Cincinnati, Ohio	0.38	0 05	11, 1894

Exceptional precipitation for one hour or less—Continued.

Station and state.	Amount.	Time.	Date.
	Inches.	*h. m.*	
Savannah, Ga.*	0.37	0 05	20, 1893
Boston, Mass	0.37	0 05	6, 1893
Philadelphia, Pa	0.36	0 05	28, 1891
Cleveland, Ohio	0.35	0 05	19, 1892
Dodge City, Kans	0.35	0 05	23, 1892
New York, N. Y.*	0.35	0 05	19, 1893
Jupiter, Fla	0.35	0 05	2, 1890
St. Louis, Mo	0.35	0 05	11, 1891
St. Paul, Minn	0.35	0 05	20, 1891
Wilmington, N. C	0.35	0 05	5, 1894
Atlanta, Ga	0.35	0 05	18, 1891
Dodge City, Kans	0.34	0 05	12, 1891
Savannah, Ga	0.33	0 05	10, 1892
Do	0.33	0 05	17, 1894
New York, N. Y	0.32	0 05	3, 1894
Memphis, Tenn	0.32	0 05	26, 1890
Norfolk, Va	0.32	0 05	28, 1893
Galveston, Tex	0.31	0 05	9, 1892
Bismarck, N. Dak	0.30	0 05	27, 1892
Buffalo, N. Y	0.30	0 05	19, 1892
Jupiter, Fla	0.30	0 05	14, 1892
New York, N. Y	0.30	0 05	23, 1891
Memphis, Tenn	0.30	0 05	25, 1894
Nashville, Tenn	0.30	0 05	25, 1894
Buffalo, N. Y	0.30	0 05	28, 1893
Washington, D. C	0.30	0 05	1, 1890
Norfolk, Va	0.30	0 05	26, 1891
Galveston, Tex	0.29	0 05	25, 1893
Denver, Colo	0.29	0 05	2, 1894
Duluth, Minn	0.27	0 05	22, 1894
Eastport, Me	0.27	0 05	5, 1892
Indianapolis, Ind	0.25	0 05	19, 1892
Baltimore, Md	0.25	0 05	29, 1893
Jacksonville, Fla	0.25	0 05	6, 1893
Do	0.25	0 05	9, 1893
Wilmington, N. C	0.25	0 05	30, 1892
Indianapolis, Ind	0.25	0 05	10, 1894
Norfolk, Va	0.25	0 05	12, 1894
Do	0.25	0 05	13, 1894
Philadelphia, Pa	0.25	0 05	2, 1894
Jupiter, Fla	0.95	0 10	21, 1893
Boston, Mass	0.83	0 10	20, 1894
Key West, Fla	0.80	0 10	4, 1891
Boston, Mass	0.80	0 10	12, 1892
Jacksonville, Fla	0.80	0 10	31, 1892
Tampa, Fla	0.80	0 10	9, 1892
Omaha, Nebr	0.80	0 10	14, 1893
Galveston, Tex	0.75	0 10	4, 1890
Cincinnati, Ohio	0.70	0 10	11, 1894
Boston, Mass	0.70	0 10	6, 1893
Jacksonville, Fla	0.70	0 10	24, 1894
St. Paul, Minn	0.70	0 10	23, 1893
Atlanta, Ga	0.65	0 10	1, 1892
Savannah, Ga	0.62	0 10	17, 1894
Dodge City, Kans	0.60	0 10	9, 1892
Key West, Fla	0.60	0 10	30, 1891
New York, N. Y	0.59	0 10	4, 1888
Savannah, Ga.*	0.56	0 10	14, 1893
Norfolk, Va	0.57	0 10	31, 1892
Bismarck, N. Dak	0.56	0 10	27, 1892
Cleveland, Ohio	0.56	0 10	19, 1892
Marquette, Mich	0.55	0 10	28, 1894
Wilmington, N. C	0.52	0 10	5, 1894
St. Louis, Mo	0.51	0 10	7, 1892
Jupiter, Fla	0.50	0 10	14, 1892
New York, N. Y.*	0.50	0 10	19, 1893
Salisbury, N. C	0.50	0 10	13, 1888
Denver, Colo	0.50	0 10	2, 1894
Franklin Furnace, N. J	0.99	0 15	19, 1893
Charleston, S. C	1.41	0 18	9, 1890
Lead Hill, Ark	1.00	0 18	2, 1882
Jupiter, Fla	2.12	0 20	21, 1893
New Madrid, Mo	1.59	0 20	25, 1894
Trenton, S. C	1.42	0 20	18, 1893
Brooksville, Fla	1.40	0 20	1 1893
Escanaba, Mich	1.27	0 20	11, 1877
Marksville, La	1.25	0 20	27, 1892
Albany, N. Y	1.20	0 20	2, 1878
Lafayette, La	1.18	0 20	3, 1894
Fox Creek, Mo	1.15	0 20	25, 1893
Glenville, W. Va	1.14	0 20	12, 1892
Nashville, Tenn	1.10	0 20	17, 1891
Emporium, Pa	1.05	0 20	5, 1893
Parkersburg, W. Va	1.01	0 20	1, 1890
Mossing Ford, Va	1.00	0 20	2, 1890
Abilene, Tex	1.00	0 20	29, 1892
Louisville, Ky	1.26	0 23	20, 1878
Hardin, Colo	1.52	0 24	13, 1890
Galveston, Tex	1.55	0 25	17, 1871
Ithaca, N. Y	1.47	0 25	4, 1892
Colorado Springs, Colo	2.75	0 30	14, 1890
Mesquite, Tex	2.50	0 30	10, 1875
Jupiter, Fla	2.35	0 30	20, 1893
Stella, Tex	2.05	0 30	4, 1893
Lebo, Kans	2.01	0 30	22, 1892
Lake Charles, La	2.00	0 30	29, 1894
Orlando, Fla	2.00	0 30	28, 1894
Somerville, N. J	2.00	0 30	19, 1893
Wellsboro, Pa	1.95	0 30	21, 1885
Corning, Ark	1.95	0 30	1, 1894
Montevideo, Minn	1.95	0 30	19, 1893
Vevay, Ind	1.90	0 30	13, 1879
Grantsburg, Wis	1.88	0 30	7, 1889
Chestertown, Md	1.85	0 30	15, 1894
Manistee, Mich	1.67	0 30	8, 1892

Exceptional precipitation for one hour or less—Continued.

Station and state.	Amount.	Time.	Date.
	Inches.	*h. m.*	
Kissimmee, Fla	1.64	0 30	22, 1894
Emile, La	1.62	0 30	7, 1893
Queensbury, N. Y	1.56	0 30	14, 1890
Mount Auburn, Ohio	1.52	0 30	26, 1880
Providence, R. I	3.50	0 35	6, 1878
Auburn, N. H	3.00	0 35	27, 1877
Hulmeville, Pa	2.20	0 35	25, 1880
Pittsburg, Pa	1.85	0 35	16, 1884
Cincinnati, Ohio	1.85	0 35	27, 1882
Silver Falls, Tex	1.82	0 35	20, 1893
Alexandria, S. Dak	2.65	0 40	15, 1894
Quitman, Ga	2.30	0 40	30, 1893
Sharon Springs, Kans	2.00	0 40	20, 1892
Jacksonville, Fla	3.72	0 41	20, 1873
Philo, Ill	2.63	0 45	5, 1892
Hudson, Wis	2.50	0 45	11, 1891
Detroit, Mich	2.48	0 45	31, 1878
Sandusky, Ohio	0.25	0 45	24, 1892
Charlotte, N. C	2.01	0 45	3, 1890
Weldon, N. C	3.43	0 50	22, 1892
Fort Union, N. Mex	2.34	0 50	12, 1883
Bushnell, Ill	4.02	1 00	5, 1893
Princeton, Mo	4.00	1 05	15, 1891
Campo, Cal	11.50	1 20	12, 1891
Plover, Wis	4.50	1 30	3, 1890

* Record incomplete.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 7. Arkansas, 1, 16, 26. California, 26, 27, 28. Colorado, 1, 2, 4 to 9, 11, 15, 16, 17, 19, 22, 23, 24, 27. Connecticut, 3, 9. Georgia, 18, 19. Idaho, 6, 7, 10, 21. Illinois, 1, 11, 12, 18, 25. Indiana, 10, 18. Iowa, 13, 16. Kansas, 23. Kentucky, 1, 10, 12, 14, 15, 17, 19, 26. Louisiana, 25. Maine, 21. Maryland, 15, 26. Massachusetts, 9, 15, 19, 20. Michigan, 28. Minnesota, 13, 15, 22. Mississippi, 15. Missouri, 10, 13, 17, 20. Montana, 6, 7, 14, 15, 28, 30. Nebraska, 16, 17, 24. Nevada, 9. New Hampshire, 25. New Jersey, 1, 13, 15. New Mexico, 10, 12, 15, 19, 29. New York, 3, 9, 15, 19, 25. North Carolina, 15, 19. North Dakota, 13, 14, 15, 22. Ohio, 12, 13, 18, 19. Oregon, 5, 11. Pennsylvania, 1, 2, 13, 15, 19. South Carolina, 13, 20. South Dakota, 9, 13, 14, 15, 20. Tennessee, 15. Texas, 25. Utah, 6, 28, 30, 31. Vermont, 19, 25. Virginia, 10, 11, 15. West Virginia, 2, 10, 11. Wisconsin, 1, 17, 20, 22. Wyoming, 3.

DROUGHT.

During August the country generally experienced a continuation of the drought that had begun in July, the only notable exception being in portions of the south Atlantic and Gulf States, and especially in western Texas, where excessive rainfall occurred.

From an agricultural point of view a drought is not merely a deficiency of rainfall, but a deficiency of water available for the use of the growing crops, whether grass, grain, fruit, or forest trees. As the water supply stored up in the soil is often sufficient to tide the plant over a long interval without rain, therefore the contents and nature of the soil are important features. Again, as the dryness of the air, the velocity of the wind, and the temperature are the principal factors in the evaporation of water from the soil, as well as from the surface of the leaves, these features must be considered. Finally, the character of the plant, especially the extent of its roots and the ease of evaporation from the leaves, determines whether it will suffer more or less as compared with other plants. Thus a drought affecting agriculture is a complex result of many considerations. The droughts that affect the water supply for cities, navigation of rivers, and irrigation depend upon a similar complexity of considerations, among which is the direct influence of the consumption of water by the vegetation growing on the soil.

Evidently, therefore, both from an agricultural and engi-

neering point of view, it is impracticable to define the intensity of a drought in general and exact terms. On the other hand, from a purely meteorological point of view, the term drought is usually considered as referring only to the quantity and distribution of the rainfall, omitting all consideration of the humidity of the air, the amount of cloudiness, the strength of the wind, but taking full account of the normal quantity and distribution of rain for the given locality; thus, no rainfall in June, July, and August on the southern Pacific slope would not constitute a drought for that region at that season, although it would do so in January and February. The interval of time elapsing between successive rainfalls is a good method of defining the severity of a drought at any one station, but when the area of a whole State is to be considered, it is necessary to recognize the fact that local rainfalls occur frequently, thus breaking up the continuity of the meteorological drought without materially alleviating the agricultural drought.

The great drought of 1894, so far as it concerns agriculture, has been but the culmination of a long period of deficient rainfall. The tables of accumulated precipitation, published monthly, show that the whole of the region in which crops have suffered during August reports a steady and generally an increasing deficiency in the accumulated rainfall since the first of January. This drought is, therefore, not merely the drought of July and August, but that of at least seven months, if not more; several of these sections reported an accumulated deficiency during the whole of the preceding year. By referring to Table VI, p. 390, of the WEATHER REVIEW for 1893, it will be seen that at the close of that year and the beginning of 1894 the following accumulated deficits were reported: New England, 3.6; middle Atlantic States, 1.3; Ohio Valley and Tennessee, 2.9; lower Lake region, 2.1; upper Lake region, 2.6; extreme northwest, 1.0; upper Mississippi valley, 4.4; Missouri Valley, 4.5; northern slope, 2.5; middle slope, 7.5.

As stated in that REVIEW, p. 379, there had been almost everywhere a steady movement from month to month toward a greater deficit, and as this movement has continued up to the present time in 1894 it is proper to call attention to the general principle that the droughts which are of importance to agriculture are not those of short duration, since such are largely compensated for by the moisture retained in the lower layers of the soil, but are those of long duration, by virtue of which the entire subsoil (from which the arable soil by capillarity draws a portion of its moisture) is appreciably desiccated.

The preceding paragraph prepares us for a better insight into the cause of the important droughts; evidently, they must be due to temporary changes in the general circulation of the atmosphere by reason of which drier air or descending currents become more frequent. Such changes are purely hydrodynamic phenomena produced by the special combinations of motions that are always combining and recombining in the atmosphere. The same special combinations will undoubtedly produce unusual winds, temperatures, or rains in other, and it may be far distant, portions of the globe.

From this point of view the special areas of heat and cold, rain and drought, cloudy sky and clear sky, stormy winds and light winds that continually recur all over the globe and are spoken of as exceptional features of the weather in the respective localities and seasons, all constitute but one grand system of compensation, geographical and chronological, such that, taking the earth as a whole, the sum of the thermal and mechanical energies, represented by the meteorological phenomena, remains appreciably constant. The principal agencies disturbing this constancy are the vulcanic heat of eruptions proceeding from the interior of the earth and the suggested possible, but not yet demonstrated, changes in the solar heat; but neither of these sources of irregularity in climatic phenomena is likely to be comparable in importance with the changes deducible by the application to the earth's atmosphere of the simple principles of mechanics of gases.

The mechanics of the earth's atmosphere is not yet understood sufficiently well to justify any attempt at very definite, long-range predictions of dry and wet seasons based on deductive theories, and our power of making predictions based on pure induction is limited by the fragmentary nature of our data, since the greater part of the earth's surface must be considered in making any such attempt. The moderate success attending the efforts in this direction made by the Weather Bureau of India is said to depend upon the fact that the cold weather rains in that country are due to cold air that descends from the snow covered regions of the Himalayas. Very different conditions prevail in the United States, but the droughts that are here experienced apparently depend also upon what is going on in the upper layers of air, i. e., those that descend from the high pressure areas of the Atlantic and Pacific oceans.

The study of droughts extending over large regions and long periods of time can not be satisfactorily pursued without a daily map of the weather over the whole globe similar to the International Map of the Northern Hemisphere.

The following interesting items relative to the present drought are extracted from the monthly reports of the respective State Weather Services:

Arkansas.—Drought conditions prevailed over a great portion of the northwest and southeast sections of the State until the latter part of the month, when general rains fell in all sections.

Arizona.—The average precipitation for the State was 1.46 inch, being 0.29 inch below the August normal. It was most deficient in the eastern and northwestern portions, where it was about one-half the usual amount.

Florida.—The greatest deficiency of rainfall occurred in the lower Indian River section.

Illinois.—The monthly precipitation was 1.32 inch below the normal of the past ten years.

Indiana.—The average deficiency of rainfall for the State is 1.18 inch; the greatest deficiency, 1.56 inch, is noted in the central portion, where the deficiencies at different stations of observation extended from 0.31 to 2.15 inches. The almost continuous drought in some localities was disastrous; stock water got scarce, wells became dry, and water had to be hauled long distances.

Iowa.—The average rainfall was 2.02 inches below the normal amount. Drought reported from Clinton until about the 17th. College Springs: The driest month ever known in Page County, the rainfall not being sufficient to measure. Not a cloudy day in the month.

Kansas.—This has been one of the driest Augusts in the history of the State. The rainfall this month is deficient over the entire State, except in Greeley and the extreme west portion of Wallace. The greatest deficiency occurs in Leavenworth, Wyandotte, Johnson, and Douglas, where it is over 4.00 inches.

Maryland.—Average rainfall was 1.42 inch below the normal. There was not more than half the usual rainfall, and although some sections received the usual quota, yet considering the entire area covered by the observations, the month must be rated as very dry.

Michigan.—The average rainfall in the State during August was 2.55 inches below the normal. There was no rain at all, or no more than a trace on twenty-three days in the southern counties, twenty-two days in the central counties, and eighteen days in the northern counties.

Minnesota.—Minnesota City: The driest August for forty-two years. Campbell: 10th, drought broken by copious rain.

Missouri.—The average precipitation for the month of August was considerably less than the normal, the greatest departure being a deficiency of 3.45 inches.

New England.—Except at Cornish, Me., and Westboro, Mass., there was a great deficiency of rainfall over all New England.

New Jersey.—The average precipitation for the month is 2.16 inches below the normal.

North Dakota.—The amount of precipitation in these sections was probably smaller on the average in August than for the past twenty years.

Oklahoma.—The average precipitation was 2.07 inches below the normal.

South Dakota.—The monthly mean precipitation was about 1.19 inch below the normal.

Tennessee.—Dry weather prevailed during the first two weeks of August.

Utah.—Showers during this month were better distributed than usual in this State and there was little complaint of drought.

West Virginia.—The drought conditions prevailing throughout the month of July continued to the end of August. Less rain fell during the month of August, 1894, than in any corresponding month since records have been kept. Stations in the counties of Vernon, Jackson, and Dodge report no rainfall during the month, and several report an occasional sprinkle only.