

RIVERS AND FLOODS.

The extreme low water season of the year 1899 has passed, and during the month of November rising rivers were the rule, except in the case of the Missouri. The Mississippi above Cairo averaged about two feet higher than during October. Below Cairo the increase was not marked, and from Vicksburg south the rise was just about to begin at the close of the month.

Changes in the Missouri were slight, the extreme range at any one place having been but one foot.

The Ohio over its middle portion averaged about three feet higher than during October, but in the upper and lower portions the changes were not so decided.

In the Southwest the excessive rainfall from November 17-22, particularly in Oklahoma and the Indian Territory, caused a rapid rise in the rivers in that section, especially in the Red and Washita. All large streams in the southern portion of the Indian Territory were out of their banks. Several thousand acres of valuable farm land were submerged and many families were compelled to flee to higher ground for safety. At Arthur City, Tex., the river reached a stage of 28.6 feet, 1.6 feet above the danger line, and a portion of the river gage was torn from its fastenings on the railroad bridge and carried away.

It is not believed that any lives were lost in this flood.

The rivers of the Pacific coast were also rising quite rapidly at the close of the month, but with no indications of reaching high stages.

The highest and lowest water, mean stage, and monthly range at 123 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—H. C. Frankenfield, *Forecast Official.*

Heights of rivers referred to zeros of gages, November, 1899.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Mississippi River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
St. Paul, Minn.	1,954	14	7.2	1	4.8	29.30	5.8	2.4
Reads Landing, Minn.	1,884	12	6.1	1	2.8	29.30	5.8	3.3
La Crosse, Wis.	1,819	12	7.7	1	4.0	30	5.4	3.7
North McGregor, Iowa.	1,759	18	7.1	4-6	3.9	27-30	5.3	3.2
Dubuque, Iowa.	1,699	15	6.8	6-8	3.8	28-30	5.2	3.0
Leclaire, Iowa.	1,609	10	4.3	8,9	2.2	28,30	3.2	2.1
Davenport, Iowa.	1,598	15	5.3	8-10	3.2	30	4.3	2.1
Muscatine, Iowa.	1,562	16	6.6	9,10	4.1	30	5.4	2.5
Galland, Iowa.	1,472	8	2.8	10-14	1.6	30	2.3	1.2
Keokuk, Iowa.	1,463	15	4.6	12	2.4	1,28-30	3.5	2.2
Hannibal, Mo.	1,402	18	5.5	12,13	3.0	1	4.5	2.5
Grafton, Ill.	1,306	23	6.5	16	3.6	1	5.5	2.9
St. Louis, Mo.	1,264	30	6.6	15,24	3.9	1.2	5.8	2.7
Chester, Ill.	1,189	36	4.5	25,26	2.4	3	3.8	2.1
Memphis, Tenn.	848	38	3.2	26	0.5	1.2	1.8	2.7
Helena, Ark.	767	42	5.4	25,30	1.7	1-3	3.4	3.7
Arkansas City, Ark.	635	42	6.4	30	1.0	2-5	2.9	5.4
Greenville, Miss.	595	42	4.8	30	1.2	2-6	3.4	3.6
Vicksburg, Miss.	474	45	2.2	30	1.6	5-7	2.4	3.8
New Orleans, La.	108	16	4.0	22,24	2.5	3.4	0.3	1.5
<i>Missouri River.</i>								
Bismarck, N. Dak.	1,309	14	2.2	5-12	1.9	21-25	2.1	0.8
Pierre, S. Dak.	1,114	14	2.7	10-16	2.4	27-30	2.5	0.3
Sioux City, Iowa.	784	19	5.7	25	5.0	1.2	5.3	0.7
Omaha, Nebr.	669	18	6.9	22-27	6.4	4-6	6.6	0.5
Plattsmouth, Nebr.	641							
St. Joseph, Mo.	481	10	1.7	23-30	0.8	5-13	1.1	0.9
Kansas City, Mo.	388	21	6.5	23-29	5.5	13	5.9	1.0
Boonville, Mo.	199	30	5.5	30	4.8	19-16	5.0	0.7
Hermann, Mo.	103	24	5.0	21,27-29	4.4	14-17,19,20	4.7	0.6
<i>Illinois River.</i>								
Peoria, Ill.	185	14	5.1	19	4.4	4	4.8	0.7
<i>Youghiogheny River.</i>								
Confluence, Pa.	59	10	3.9	24	0.8	18	1.9	3.1
West Newton, Pa.	15	28	4.0	2	0.6	11	1.4	3.4

Heights of rivers referred to zeros of gages—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Allegheny River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Warren, Pa.	177	14	2.3	17,18	0.0	1	1.2	2.3
Oil City, Pa.	123	13	3.4	17	1.3	29,30	2.1	2.1
Parker, Pa.	73	30	3.2	17	1.1	30	1.9	2.1
<i>Monongahela River.</i>								
Weston, W. Va.	161	18	0.0	1-4	-0.8	14-20	-0.5	0.8
Fairmont, W. Va.	119	25	2.2	21	0.2	1	1.0	2.0
Greensboro, Pa.	81	18	8.2	3,21	6.5	1	7.4	1.7
Look No. 4, Pa.	40	28	10.0	3,21	6.1	1	8.9	3.9
<i>Conemaugh River.</i>								
Johnstown, Pa.	64	7	3.8	2	1.6	10,11,17,18	2.1	2.2
<i>Red Bank Creek.</i>								
Brookville, Pa.	35	6	1.6	12	1.0	3-11,28-30	1.2	0.6
<i>Beaver River.</i>								
Ellwood Junction, Pa.	10	14	0.7	15-17	0.4	{ 1,2,14, } { 23-30 }	0.5	0.3
<i>Great Kanawha River.</i>								
Charleston, W. Va.	61	30	6.9	3-5,28	5.0	9	6.5	1.9
<i>New River.</i>								
Hinton, W. Va.	95	14	1.7	3	1.1	11-28	1.2	0.6
<i>Cheat River.</i>								
Rowlesburg, W. Va.	36	14	3.3	3	-1.2	1	2.0	4.5
<i>Ohio River.</i>								
Pittsburg, Pa.	966	22	7.1	3	4.5	8	6.0	2.6
Davis Island Dam, Pa.	960	25	6.5	3,4	2.8	1	4.8	3.7
Wheeling, W. Va.	875	36	7.3	4	1.8	1	5.3	5.5
Parkersburg, W. Va.	785	36	7.8	6	2.2	1	5.9	5.6
Point Pleasant, W. Va.	708	39	6.5	7	1.2	1,2	4.0	5.3
Catlettsburg, Ky.	651	50	8.8	8	0.8	1	4.7	8.0
Portsmouth, Ohio	612	50	8.8	9	2.2	1	5.6	6.6
Cincinnati, Ohio	499	50	9.3	10,26	3.4	2	6.4	5.9
Louisville, Ky.	367	28	5.8	12	3.5	21-22	4.4	2.3
Evansville, Ind.	184	35	5.3	16	1.6	1	3.4	3.7
Paducah, Ky.	47	40	2.5	30	0.5	5-10	1.4	2.0
Cairo, Ill.	1,073	45	7.3	27,28	3.6	3-5	5.6	3.7
<i>Muskingum River.</i>								
Zanesville, Ohio.	70	20	6.3	19	6.0	4-7,11-17	6.1	0.3
<i>Miami River.</i>								
Dayton, Ohio.	69	18	1.1	5,26	0.5	30	0.8	0.6
<i>Wabash River.</i>								
Mount Carmel, Ill.	50	15	2.7	23	0.9	1	1.7	1.8
<i>Licking River.</i>								
Falmouth, Ky.	30	25	1.8	24,25	1.0	17-22	1.3	0.8
<i>Clinch River.</i>								
Speers Ferry, Va.	156	20	0.1	6	-0.7	26	-0.3	0.8
Clinton, Tenn.	46	25	2.6	3,4	1.4	21,22	2.0	1.2
<i>Tennessee River.</i>								
Knoxville, Tenn.	614	28	-0.1	3-5	-1.3	21-28	-0.8	1.2
Kingston, Tenn.	534	25	1.0	4,5	0.6	15,16	0.8	0.4
Chattanooga, Tenn.	430	33	1.9	23	0.8	22	1.2	1.1
Bridgeport, Ala.	390	24	0.7	27-29	0.1	1,14-24	0.3	0.6
Florence, Ala.	230	16	0.8	29,30	-0.1	1-6	0.1	0.9
Riverton, Ala.	190	25	-0.1	30	-2.0	2,3	-1.5	1.9
Johnsonville, Tenn.	94	21	1.3	30	0.0	3-7	0.3	1.3
<i>Cumberland River.</i>								
Burnside, Ky.	494	50	0.1	27-30	-0.4	1,2,5-11	-0.2	0.5
Carthage, Tenn.	175	40	0.7	28-30	0.2	{ 6-9,13, } { 14,19,21 }	0.3	0.5
Nashville, Tenn.	257	40	1.1	30	0.7	14	0.8	0.4
<i>Arkansas River.</i>								
Wichita, Kans.	726	10	2.3	1	1.9	6,17-19	2.0	0.4
Webbers Falls, Ind. T.	413	23	4.5	26	1.4	18-17,19	2.2	3.1
Fort Smith, Ark.	351	23	6.8	27,28	2.1	20	3.5	4.7
Dardanelle, Ark.	256	21	7.0	24	1.5	16-19	2.9	5.5
Little Rock, Ark.	176	23	7.5	26	2.3	1	3.7	5.2
<i>White River.</i>								
Newport, Ark.	150	26	5.5	26	1.2	1,17,18	2.7	4.3
<i>Yazoo River.</i>								
Yazoo City, Miss.	80	25	-1.9	30	-2.6	14-24	-2.5	0.7
<i>Red River.</i>								
Arthur City, Tex.	80	25	28.6	25	5.5	20	11.1	28.1
Fulton, Ark.	682	27	26.0	27,28	3.8	21	11.2	22.2
Shreveport, La.	565	28	13.3	30	-0.7	1-3	4.4	14.0
Alexandria, La.	449	29	9.2	30	-2.6	3	0.1	11.8
<i>Ouachita River.</i>								
Camden, Ark.	340	39	5.2	25	2.9	2-4,18	3.4	2.3
Monroe, La.	100	40	1.4	30	0.0	1-27	0.1	1.4
<i>Atchafalaya River.</i>								
Melville, La.	100*	31	7.3	30	1.6	6,7	3.7	5.7
<i>Susquehanna River.</i>								
Wilkesbarre, Pa.	178	14	5.0	5,6	-2.0	1	1.5	7.0
Harrisburg, Pa.	70	17	4.5	5	0.5	1	2.5	4.0
<i>W. Br. of Susquehanna.</i>								
Williamsport, Pa.	35	20	3.8	2-4	0.4	1	2.6	3.4
<i>Juniata River.</i>								
Huntingdon, Pa.	80	24	4.8	2	3.0	5-23,29,30	3.2	1.8
<i>Potomac River.</i>								
Harpers Ferry, W. Va.	170	16	2.7	4	0.3	1	1.6	2.4
<i>James River.</i>								
Lynchburg, Va.	257	18	2.2	3	0.1	19-23,27-30	0.4	2.1
Richmond, Va.	110	12	0.6	24	-2.8	12	-1.1	3.4
<i>Roanoke River.</i>								
Weldon, N. C.	90	40	13.8	5	7.8	21,22	8.8	6.0
<i>Cape Fear River.</i>								
Fayetteville, N. C.	100	38	21.4	3	3.3	22,23	6.5	18.1
<i>Lumber River.</i>								
Fairbluff, N. C.	10	6	4.5	13,14	2.0	5	3.2	2.5
<i>Edisto River.</i>								
Edisto, S. C.	75	17	5.3	6,7	3.3	23-25	4.2	2.0
<i>Pedee River.</i>								
Cheraw, S. C.	145	27	10.2	1	1.1	22,23	3.0	9.1

Heights of rivers referred to zeros of gages—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Santee River.</i>	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
St. Stephens, S. C.	50	12	7.0	5, 6	0.3	25	3.2	6.7
<i>Congaree River.</i>								
Columbia, S. C.	37	15	2.5	1	-0.2	12	0.6	2.7
<i>Watauga River.</i>								
Camden, S. C.	45	24	14.0	1	2.9	21	5.1	12.1
<i>Waccamaw River.</i>								
Conway, S. C.	40	7	2.8	9, 10, 27	1.6	2, 30	2.3	1.2
<i>Savannah River.</i>								
Calhoun Falls, S. C.	347	4.0	26	2.0	14, 17-20	2.4	2.0
Augusta, Ga.	298	32	11.3	27	4.9	13	6.2	6.4
<i>Broad River.</i>								
Carlton, Ga.	30	3.7	27	2.0	5-14, 17-22	2.3	1.7
<i>Flint River.</i>								
Albany, Ga.	80	90	2.6	30	0.2	13	0.9	2.4
<i>Chattahoochee River.</i>								
West Point, Ga.	239	20	4.2	30	1.9	3-14, 22	2.3	2.3
<i>Cosa River.</i>								
Rome, Ga.	225	30	3.0	27	0.3	7-13	0.9	2.7
<i>Gadsden, Ala.</i>	144	18	3.0	27, 28	-0.8	12-15, 18-22	0.1	3.8

Heights of rivers referred to zeros of gages—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Alabama River.</i>	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Montgomery, Ala.	265	35	4.0	28	-0.1	7-16	0.6	4.1
Selma, Ala.	212	35	4.8	30	-1.3	16-18	-0.2	6.1
<i>Tombigbee River.</i>								
Columbus, Miss.	285	38	-0.2	30	-3.7	2, 5, 6, 18	-2.9	3.5
Demopolis, Ala.	155	35	5.6	30	-3.6	10-21	-2.5	9.2
<i>Black Warrior River.</i>								
Tuscaloosa, Ala.	90	43	10.5	28	-1.0	1-20	0.3	11.2
<i>Columbia River.</i>								
Umatilla, Ore.	270	25	6.1	24	4.0	7, 8	4.9	2.1
The Dalles, Ore.	166	40	9.9	30	5.4	8	6.9	4.5
<i>Willamette River.</i>								
Albany, Ore.	99	20	14.9	30	2.6	6, 7	3.7	12.3
Portland, Ore.	10	15	12.5	30	3.2	1, 2	5.6	9.3
<i>Sacramento River.</i>								
Red Bluff, Cal.	241	23	13.0	28	0.0	1	4.8	13.0
Sacramento, Cal.	70	20	19.4	13	10.4	8, 9	15.6	9.0

* Distance to Gulf of Mexico.

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.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 55.8°, or 2.1° above normal; the highest was 83°, at Healing Springs on the 16th, and the lowest, 18°, at Hamilton on the 4th. The average precipitation was 3.04, or 0.06 below normal; the greatest monthly amount, 6.55, occurred at Wilson, and the least, 1.01, at Highland Home.—*F. P. Chaffee.*

Arizona.—The mean temperature was 54.5°, or 2.2° above normal; the highest was 97°, at Arivaca on the 7th, and the lowest, 14°, at Flagstaff on the 21st. The average precipitation was 0.65, or 0.49 below normal; the greatest monthly amount, 2.07, occurred at Yarnell, while none fell at several stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 54.3°, or 3.8° above normal; the highest was 87°, at Prescott on the 7th, and the lowest, 17°, at Pond on the 3d. The average precipitation was 2.61, or 1.51 below normal; the greatest monthly amount, 5.86, occurred at Hardy, and the least, 1.40, at Lee Brand.

The wheat crop is in fine condition for this season of the year, and reports indicate a larger acreage has been sown than usual.—*E. B. Richards.*

California.—The mean temperature for the State, obtained by weighting the reports from 293 stations, so that equal areas have about the same weight, was 52.1°, which was 0.8° above the November normal for the State, as determined from 209 records; the highest was 105°, at Ogilby, San Diego County, on the 11th; the lowest, 7°, at Bodie, Mono County, on the 16th. The average precipitation for the State, as determined by the records of 309 stations, was 3.82; the excess, as indicated by reports from 217 stations, which have normals, was 2.00; the greatest monthly amount, 32.85, occurred at Upper Mattole, Humboldt County, while none fell at Ogilby, San Diego County.—*Alexander G. McAfee.*

Colorado.—The mean temperature was 38.9°, or 5.2° above normal; the highest was 78°, at Lamar on the 9th and at Wray on the 14th, and the lowest, 11° below zero, at Troutvæe on the 19th. The average precipitation was 0.77, or practically normal; the greatest monthly amount, 3.72, occurred at Santa Clara, while none fell at Laporte, Waterdale, Moraine, and Gypsum.—*F. L. Brandenburg.*

Florida.—The mean temperature was 65.7°, or 0.5° above normal; the highest was 87°, at Ocala on the 2d, and the lowest, 34°, at Dalketh and De Funiak Springs on the 4th. The average precipitation was 0.82, or 1.91 below normal; the greatest monthly amount, 4.99, occurred at Pensacola, and the least, trace, at New Smyrna.—*A. J. Mitchell.*

Georgia.—The mean temperature was 55.9°, or 1.6° above normal; the highest was 86°, at Morgan on the 1st, and the lowest, 24°, at Greenbush and Ramsey on the 5th. The average precipitation was 2.04, or 0.74 below normal; the greatest monthly amount, 4.05, occurred at Greenbush, and the least, 0.37, at Albany.—*J. B. Marbury.*

Idaho.—The mean temperature was 40.6°, or 7.8° above normal; the highest was 85°, at American Falls on the 6th, and the lowest, 8°, at

Chesterfield on the 26th. The average precipitation was 2.12, or 0.30 below normal; the greatest monthly amount, 10.42, occurred at Priest River, and the least, 0.21, at Hagerman.—*S. M. Blandford.*

Illinois.—The mean temperature was 46.7°, or 6.5° above normal; the highest was 80°, at Centralia on the 11th, and the lowest, 13°, at Scales Mound on the 4th. The average precipitation was 1.83, or 1.02 below normal; the greatest monthly amount, 3.59, occurred at Paris, and the least, 0.56, at Dixon.

Winter wheat throughout the central and southern districts is generally in splendid condition; it has good root growth and in some instances too heavy top growth, requiring pasturing. In the northern district little wheat was sown, but that is in good condition.—*C. E. Linney.*

Indiana.—The mean temperature was 46.0°, or 4.8° above normal; the highest was 75°, at Connersville and Vevay on the 10th and at Washington on the 17th, and the lowest, 19°, at Fairmount and Winamac on the 6th. The average precipitation was 2.54, or 1.25 below normal; the greatest monthly amount, 4.41, occurred at Paoli, and the least, 0.78, at Culver.

Warm weather and good local rains were very favorable for all crops. Wheat grew rapidly; it is in good condition for wintering, being deep rooted and healthy. Farm work progressed with very few interruptions.—*C. F. E. Wappenhans.*

Iowa.—The mean temperature was 43.9°, or about 10.0° above normal; the highest was 86°, at Burlington on the 17th, and the lowest, 8°, at Pringhar on the 2d. The average precipitation was 1.20, or below normal; the greatest monthly amount, 2.97, occurred at Belle Plaine, and the least, 0.13, at Estherville.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

Kansas.—The mean temperature was 48.4°, or about 7.0 above normal; the highest was 81°, at Englewood on the 9th, at Fallriver on the 10th, and at Chanute on the 15th, and the lowest, 1°, at Colby on the 2d. The average precipitation was 1.34, or about 0.40 above normal; the greatest monthly amount, 2.75, occurred at Columbus, and the least, 0.21, at Campbell.—*T. B. Jennings.*

Kentucky.—The mean temperature was 49.8°, or about 4.0° above normal; the highest was 79°, at Princeton on the 13th, and the lowest, 20°, at Loretto on the 3d. The average precipitation was 2.12, or 1.50 below normal; the greatest monthly amount, 3.97, occurred at Henderson, and the least, 0.88, at Alpha.

Owing to the droughty conditions that prevailed in the early autumn, plowing was badly delayed and the bulk of the wheat crop was sown later than usual. It was feared by many that it would not get sufficiently well rooted to stand severe winter weather, but it made splendid progress during November and is in excellent condition.—*H. B. Hervey.*

Louisiana.—The mean temperature was 60.0°, or 1.9° above normal; the highest was 90°, at White Sulphur Springs on the 1st, and the lowest, 21°, at Alexandria, Oxford, and Plain Dealing on the 4th. The average precipitation was 2.30, or 1.84 below normal; the greatest monthly amount, 5.67, occurred at Oak Ridge, and the least, 1.17, at Houma.—*W. T. Blythe.*

Maryland and Delaware.—The mean temperature was 45.3°, or 0.2° above normal; the highest was 75°, at Milford, Del., on the 1st, and the lowest, 12°, at Sunnyside, Md., on the 7th, 27th, and 28th. The average precipitation was 1.98, or 1.31 below normal; the greatest monthly amount, 3.65, occurred at Bachmans Valley, Md., and the least, 0.63, at Princess Anne, Md.