

RIVERS AND FLOODS.

Water stages entirely satisfactory to the navigation interests were general during July, with more than the usual amount of water for the time of year in the Mississippi and Missouri rivers, although the tendency in the former was toward a steady decline.

The numerous and frequently heavy showers of the early days of the month in the Missouri Valley, particularly over the lower portion, caused a rise in the lower river which occasioned danger-line stages at St. Joseph and Kansas City, lasting at the latter place from the 6th to the 12th, inclusive, with a maximum stage of 22.2 feet on the 9th, 1.2 foot above the danger line. The only effect in the Mississippi of this rise was a temporary retardation of the fall from Alton southward.

In another portion of this REVIEW will be found a full report of the great Brazos River flood of June and July, 1899, from the pen of Dr. I. M. Cline, Official in Charge of the Weather Bureau Office at Galveston, Tex.

The highest and lowest water, mean stage, and monthly range at 125 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on the accompanying chart. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, Vicksburg, and New Orleans on the Mississippi; Cincinnati, 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.—F. W. Krichelt, Weather Bureau.

Heights of rivers referred to zeros of gages, July, 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>								
St. Paul, Minn.	1,957	14	8.7	1, 2	4.0	31	6.0	4.7
Reads Landing, Minn.	1,887	12	6.5	1	2.4	31	4.2	4.1
La Crosse, Wis.	1,832	13	8.9	1	3.9	30, 31	6.2	5.0
North McGregor, Iowa	1,782	18	10.7	1	3.4	31	6.8	7.3
Dubuque, Iowa	1,732	15	11.7	1	3.6	31	7.2	8.1
LeClaire, Iowa	1,619	20	8.5	1	2.5	31	5.1	6.2
Davenport, Iowa	1,596	15	11.0	1	3.4	31	6.4	7.8
Muscatine, Iowa	1,565	16	12.8	1	4.4	31	8.1	8.4
Keokuk, Iowa	1,478	8	6.5	1	2.0	31	4.1	4.5
Galland, Iowa	1,468	14	11.8	1	3.3	31	7.8	6.5
Hannibal, Mo.	1,405	17	13.3	1	4.8	31	8.9	6.5
Grafton, Ill.	1,307	23	14.6	5, 6	6.3	31	11.0	8.3
St. Louis, Mo.	1,264	30	23.9	12	14.1	31	20.3	9.8
Chester, Ill.	1,189	36	18.9	13	10.9	31	15.9	8.0
Memphis, Tenn.	843	33	16.5	11	11.8	31	14.8	4.7
Helena, Ark.	787	42	23.3	1, 17	18.0	31	21.7	5.3
Arkansas City, Ark.	685	42	26.2	1	22.5	27, 31	24.0	3.7
Greenville, Miss.	595	42	22.0	1	18.4	28, 31	19.7	3.6
Vicksburg, Miss.	474	45	26.7	1	20.7	29	22.4	6.0
New Orleans, La.	108	16	10.0	1	5.8	31	6.9	4.2
<i>Missouri River.</i>								
Bismarck, N. Dak.	1,201	14	11.9	7, 8	6.8	31	9.8	5.1
Pierre, S. Dak.	1,006	14	10.3	4, 7-9	7.3	31	9.6	3.6
Sioux City, Iowa	678	19	14.0	1	10.7	31	12.6	3.3
Omaha, Nebr.	561	18	14.2	2, 3	11.1	31	13.0	3.1
Plattsmouth, Nebr.	533	17	11.1	3	7.8	31	9.6	3.3
St. Joseph, Mo.	373	10	10.1	3	7.0	31	8.3	3.1
Kansas City, Mo.	290	21	22.2	9	16.1	29	19.4	6.1
Boonville, Mo.	191	20	18.1	10	13.3	30	15.9	4.8
Hermann, Mo.	95	24	17.8	11	13.5	31	15.5	5.3
<i>Des Moines River.</i>								
Des Moines, Iowa	150	19	5.3	1	3.6	30, 31	4.1	1.6
<i>Illinois River.</i>								
Peoria, Ill.	135	14	6.3	20, 21	3.8	2, 3	4.9	2.4
<i>Youghiogheny River.</i>								
Confuence, Pa.	59	10	4.0	9	1.0	25	1.8	3.0
West Newton, Pa.	15	28	3.9	18	0.5	6, 26	1.3	3.4
<i>Allegheny River.</i>								
Warren, Pa.	177	7	1.0	17, 19	0.3	9-12	0.6	0.7
Oil City, Pa.	123	13	2.3	18	0.5	7, 8	1.2	1.8
Parkers Landing, Pa.	73	20	3.0	18	1.0	8, 11, 15	1.4	2.0
<i>Monongahela River.</i>								
Weston, W. Va.	161	18	0.0	1, 19	-0.9	11-16, 23	-0.5	0.9
Fairmont, W. Va.	119	25	3.0	21	0.5	13, 14	1.1	2.5
Greensboro, Pa.	81	18	8.7	18	6.7	26-30	7.4	2.0
Look No. 4, Pa.	40	28	10.5	18, 19	6.2	13	8.2	4.3
<i>Conasaugh River.</i>								
Johnstown, Pa.	64	7	2.1	1	1-3	26	1.7	0.8
<i>Red Bank Creek.</i>								
Brookville, Pa.	35	8	1.8	17	0.2	27	0.7	1.6
<i>Beaver River.</i>								
Ellwood Junction, Pa.	10	14	0.9	1	-0.2	28, 31	0.1	1.1
<i>Great Kanawha River.</i>								
Charleston, W. Va.	61	30	7.0	1, 4, 20, 30	6.5	7, 25	6.8	0.5

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>New River.</i>								
Hinton, W. Va.	95	14	2.1	29	1.3	17	1.6	0.8
<i>Cheat River.</i>								
Rowlesburg, W. Va.	36	14	3.5	18	0.8	29, 30	3.3	2.7
<i>Ohio River.</i>								
Pittsburg, Pa.	966	23	6.8	18	2.3	22, 23	5.3	4.0
Davis Island Dam, Pa.	960	25	7.9	19	2.6	16	4.1	5.3
Wheeling, W. Va.	875	36	8.4	20	2.8	16, 17	4.7	5.6
Parkersburg, W. Va.	785	36	8.8	21	4.2	10	6.0	4.6
Point Pleasant, W. Va.	708	39	7.6	22	3.2	10-13	4.5	4.4
Catlettsburg, Ky.	651	50	9.4	22	3.4	14	5.5	6.0
Portsmouth, Ohio	612	50	10.1	23	4.9	13	6.8	5.2
Cincinnati, Ohio	499	50	11.0	1	6.5	14, 15	8.4	4.5
Louisville, Ky.	367	28	5.8	1	3.8	16, 18	4.8	3.0
Evansville, Ind.	184	35	8.3	1	4.3	20, 20	6.2	4.0
Paducah, Ky.	47	40	3.4	8	4.7	24	7.0	3.7
Cairo, Ill.	1,073	45	22.5	9, 14	17.1	31	20.4	5.4
<i>Muskingum River.</i>								
Zanesville, Ohio	70	20	8.1	17	5.9	6, 7, 25	6.5	2.2
<i>Miami River.</i>								
Dayton, Ohio	69	18	1.5	17, 26, 29	0.7	5-7	1.1	0.8
<i>Wabash River.</i>								
Mount Carmel, Ill.	50	15	2.3	1, 2	1.0	16, 17	1.6	1.3
<i>Licking River.</i>								
Falmouth, Ky.	30	25	1.7	1	0.8	14-16	1.2	0.9
<i>Clack River.</i>								
Speers Ferry, Va.	156	30	1.5	27	0.0	16	0.4	1.5
Clinton, Tenn.	46	25	5.5	29	3.3	10, 11, 17, 18	3.9	2.2
<i>Tennessee River.</i>								
Knoxville, Tenn.	614	28	2.1	29	-0.6	16, 17	0.0	2.7
Kingston, Tenn.	584	25	1.6	1	0.3	15, 16	0.8	1.3
Chattanooga, Tenn.	480	33	5.2	31	1.8	18	2.8	3.4
Bridgeport, Ala.	390	24	2.5	30, 31	0.1	16	1.2	2.4
Florence, Ala.	220	16	2.2	28	0.5	19-21	1.2	1.7
Riverton, Ala.	190	25	2.1	28	-0.7	21	0.5	2.8
Johnsonville, Tenn.	94	21	3.6	30	1.3	21-23	2.2	2.3
<i>Cumberland River.</i>								
Burnside, Ky.	484	50	3.0	25	0.9	16	1.5	2.1
Carthage, Tenn.	275	30	4.5	28	0.6	17, 18, 30	1.7	3.9
Nashville, Tenn.	157	40	6.7	26, 27, 31	1.1	19-20	2.8	5.6
<i>Arkansas River.</i>								
Wichita, Kans.	730	10	5.5	24	1.0	16-19	2.9	3.6
Webbers Falls, Ind. T.	407	23	12.7	13, 13	4.2	4, 5, 7	7.9	8.5
Fort Smith, Ark.	345	22	13.6	25	5.4	6, 7	9.1	8.2
Dardanelle, Ark.	250	21	13.8	26	4.4	9	8.5	9.4
Little Rock, Ark.	170	23	14.4	27	5.4	10, 11	9.3	9.0
<i>White River.</i>								
Newport, Ark.	150	26	15.9	25	2.3	20, 21	5.4	13.6
<i>Yazoo River.</i>								
Yazoo City, Miss.	80	25	6.2	31	-0.5	25	0.9	6.7
<i>Red River.</i>								
Arthur City, Tex.	688	27	22.0	24	8.5	7, 30	12.0	13.5
Fulton, Ark.	565	28	22.7	25	6.4	7	11.8	16.3
Shreveport, La.	449	39	22.2	27	6.1	23	8.4	16.1
Alexandria, La.	139	33	10.0	1	3.4	16, 17	5.9	6.6
<i>Ouachita River.</i>								
Camden, Ark.	340	39	5.5	1	3.7	25	4.4	1.8
Monroe, La.	100	40	7.1	1	1.9	23, 24	3.3	5.2
<i>Atchafalaya Bayou.</i>								
Melville, La.	100+	31	25.9	1	20.0	16, 17	21.7	5.9
<i>Susquehanna River.</i>								
Wilkesbarre, Pa.	178	14	1.0	6, 7	0.0	4, 31	0.2	1.0
Harrisburg, Pa.	70	17	1.8	1	0.8	30, 31	1.2	1.0
<i>W. Br. of Susquehanna.</i>								
Williamsport, Pa.	35	20	1.7	21	0.3	29	0.3	1.4
<i>Juniata River.</i>								
Huntington, Pa.	80	24	3.9	7	3.0	1, 31	3.1	0.9
<i>Potomac River.</i>								
Harpers Ferry, W. Va.	170	16	1.9	16	0.8	29, 31	1.4	1.1
<i>James River.</i>								
Lynchburg, Va.	257	18	0.6	9	0.0	15-24	0.2	0.1
Richmond, Va.	110	12	0.3	26	-1.5	23	-0.6	1.8
<i>Roanoke River.</i>								
Clarksville, Va.	155	12	4.6	7	1.1	17	2.4	3.5
Weldon, N. C.	90	40	13.1	29	7.4	17	8.7	5.7
<i>Cape Fear River.</i>								
Fayetteville, N. C.	100	38	12.8	28	2.3	3, 4, 23	5.1	10.5
<i>Lumber River.</i>								
Fairbluff, N. C.	10	6	6.0	31	0.9	4	3.1	5.1
<i>Edisto River.</i>								
Edisto, S. C.	75	6	3.5	10	1.0	23	2.3	2.5
<i>Pee Dee River.</i>								
Cheraw, S. C.	145	27	7.0	28	1.0	15, 24	2.3	6.0
<i>Black River.</i>								
Kingstree, S. C.	60	12	1.5	4-6	0.6	22-30	0.9	0.9
<i>Lynch Creek.</i>								
Effingham, S. C.	35	12	3.7	10	2.0	23-25	2.6	1.7
<i>Santee River.</i>								
St. Stephens, S. C.	50	12	5.8	31	-0.1	22	1.6	5.9
<i>Congaree River.</i>								
Columbia, S. C.	37	15	2.0	28	-0.3	15	0.3	3.3
<i>Watauga River.</i>								
Camden, S. C.	45	24	8.0	28	3.4	25	4.6	4.6
<i>Waccamaw River.</i>								
Conway, S. C.	40	7	5.3	31	1.9	30	2.9	3.4
<i>Savannah River.</i>								
Calhoun Falls, S. C.			5.0	28	2.2	21	2.8	2.8
Augusta, Ga.	130	32	12.7	28	5.3	22, 23	6.8	7.4
<i>Broad River.</i>								
Carlton, Ga.			6.5	27	2.1	15-17, 19, 20, 22, 25	2.5	4.4

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>Flint River.</i>	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Albany, Ga.....	80	30	4.1	31	0.5	16-18	1.4	3.6
<i>Chattahoochee River.</i>								
West Point, Ga.....	289	20	5.9	28	2.1	10-16	2.9	3.8
<i>Coosa River.</i>								
Rome, Ga.....	225	30	8.0	22	2.7	24	2.4	5.3
Gadsden, Ala.....	144	18	7.0	20	0.2	16-20	1.6	6.8
<i>Alabama River.</i>								
Montgomery, Ala.....	265	35	16.0	25	0.9	17-19	4.3	15.1
Selma, Ala.....	212	35	17.0	26, 27	0.6	19, 20	4.8	16.4
<i>Tombigbee River.</i>								
Columbus, Miss.....	288	38	0.9	29	-8.0	{15-17 10-12 19, 20 }	-2.1	3.9

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>Tombigbee River—Con.</i>	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Demopolis, Ala.....	155	35	12.1	29	-2.7	20, 21	-0.1	14.8
<i>Black Warrior River.</i>								
Tuscaloosa, Ala.....	90	38	9.5	29	-0.7	15-20	1.5	10.2
<i>Columbia River.</i>								
Umatilla, Oreg.....	270	25	23.1	1	16.5	31	20.5	7.1
The Dalles, Oreg.....	166	40	40.4	2, 3	27.3	31	38.5	13.1
<i>Willamette River.</i>								
Albany, Oreg.....	99	20	5.0	1	2.2	31	3.8	2.8
Portland, Oreg.....	10	15	23.4	8	15.5	31	20.3	7.9
<i>Sacramento River.</i>								
Red Bluff, Cal.....	241	23	0.8	1	-0.8	30, 31	-0.1	1.6
Sacramento, Cal.....	70	25	11.8	1	8.6	31	9.8	8.2

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 80.4°, or 0.4° above normal; the highest was 103°, at Decatur on the 14th and at Goodwater and Wetumpka on the 16th, and the lowest, 52°, at Gadsden on the 2d. The average precipitation was 6.76, or 1.51 above normal; the greatest monthly amount, 13.42, occurred at Montgomery, and the least, 3.05, at Riverton.—*F. P. Chaffee.*

Arizona.—The mean temperature was 83.7°, or slightly below normal; the highest was 122°, at Fort Mohave on the 25th, and the lowest, 40°, at Fort Apache on the 23d. The average precipitation was 2.39, or 0.38 above normal; the greatest monthly amount, 8.04, occurred at Fort Huachuca, and the least, trace, at a number of stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 79.0°, or 1.1° below normal; the highest was 100°, occurring at several stations on different dates, and the lowest, 52°, at Keesees Ferry and Witts Springs on the 10th. The average precipitation was 5.14, or 1.97 above normal; the greatest monthly amount, 10.12, occurred at Lonoke, and the least, 0.97, at Warren.—*E. B. Richards.*

California.—The mean temperature for the State, obtained by weighting the reports from 234 stations, so that equal areas have about the same weight, was 77.9°, or 1.1° below the normal for the State, as determined from 202 records; the highest was 123°, at Volcano Springs on the 2d, and the lowest, 25°, at Bodie on the 31st. The average precipitation for the State, as determined by the records of 300 stations, was trace; the deficiency, as indicated by reports from 202 stations which have normals, was 0.04 of an inch; the greatest monthly precipitation was 1.00, at Needles, while none fell at many stations.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 66.7°, or 1.3° below normal; the highest was 105°, at Lamar on the 5th, and the lowest, 29°, at Troutvale on the 5th. The average precipitation was 3.01, or 0.71 above normal; the greatest monthly amount, 7.06, occurred at Santa Clara, and the least, 0.18, at Grand Junction.—*F. H. Brandenburg.*

Florida.—The mean temperature was 80.9°, or about normal; the highest was 102°, at De Funiak Springs on the 18th, and the lowest, 61°, at Wausau on the 3d. The average precipitation was 8.88, or 2.28 above normal; the greatest monthly amount, 24.45, occurred at Manatee, and the least, 3.21, at Tallahassee.—*A. J. Mitchell.*

Georgia.—The mean temperature was 80.2°, or about normal; the highest was 106°, at Albany on the 17th, and the lowest, 50°, at Clayton on the 2d. The average precipitation was 4.53, or 1.34 below normal; the greatest monthly amount, 8.05, occurred at Tallapoosa, and the least, 1.88, at Camak.—*J. B. Marbury.*

Idaho.—The mean temperature was 68.2°, or 1.8° above normal; the highest was 111°, at Hagerman on the 18th, and the lowest, 26°, at Swan Valley on the 1st. The average precipitation was 0.35, or 0.38 below normal; the greatest monthly amount, 1.36, occurred at Burnside, while none fell at Idaho City.—*S. M. Blandford.*

Illinois.—The mean temperature was 75.3°, or about normal; the highest was 101°, at Alexander on the 26th, and the lowest, 40°, at Chemung and Lanark on the 30th. The average precipitation was 3.74,

or 0.20 above normal; the greatest monthly amount, 9.84, occurred at Equality, and the least, 0.71, at Charleston.—*C. E. Linney.*

Indiana.—The mean temperature was 75.0°, or about normal; the highest was 101°, at Fairmount on the 23d, and the lowest, 42°, at Columbia City, Hector, and Salem on the 9th. The average precipitation was 3.28, or 0.15 above normal; the greatest monthly amount, 6.00, occurred at Scottsburg, and the least, 0.55, at Vevay.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 73.1°, or about normal; the highest was 101°, at De Soto on the 23d, and the lowest, 38°, at Mason City on the 30th. The average precipitation was 3.07, or about 0.50 below normal; the greatest monthly amount, 8.66, occurred at Lenox, and the least, 0.42, at Whitten.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

Kansas.—The mean temperature was 76.2°, or 1.8° below normal; the highest was 106°, at Ulysses on the 7th, and the lowest, 45°, at Fanning on the 8th. The average precipitation was 5.32, or 1.70 above normal; the greatest monthly amount, 11.44, occurred at Independence, and the least, 1.21, at Medicine Lodge.—*T. B. Jennings.*

Kentucky.—The mean temperature was 77.3°, or about normal; the highest was 100°, at Princeton and Shelbyville on the 15th, at Paducah and Williamsburg on the 16th, and at Bardstown on the 17th; the lowest, 47°, at Loretto on the 10th. The average precipitation was 3.78, or 0.72 below normal; the greatest monthly amount, 7.41, occurred at Russellville, and the least, 0.97, at Lexington.—*H. B. Hersey.*

Louisiana.—The mean temperature was 82.7°, or 0.6° above normal; the highest was 105°, at Liberty Hill on the 31st, and the lowest, 54°, at North Louisiana Experiment Station, Calhoun, on the 5th. The average precipitation was 3.54, or 1.94 below normal; the greatest monthly amount, 7.30, occurred at Sugar Experiment Station, and the least, 0.37, at Minden.—*W. T. Blythe.*

Maryland and Delaware.—The mean temperature was 76.2°, or about normal; the highest was 100°, at Boettcherville, Boonsboro, and Hancock, Md., on the 23d, and the lowest, 37°, at Deepark, Md., on the 2d. The average precipitation was 4.23, or 0.07 below normal; the greatest monthly amount, 8.37, occurred at Seaford, Del., and the least, 0.92, at Smithsburg, Md.—*F. J. Wals.*

Michigan.—The mean temperature was 68.4°, or 1.2° below normal; the highest was 100°, at Battle Creek on the 24th, and the lowest, 30°, at Rockland on the 31st. The average precipitation was 3.62, or 1.12 above normal; the greatest monthly amount, 10.62, occurred at Big Rapids, and the least, 0.80, at Newberry.—*C. F. Schneider.*

Minnesota.—The mean temperature was 70.2°, or about normal; the highest was 100°, at Milaca on the 12th and at Beardsley on the 19th, and the lowest, 36°, at Tower on the 16th, at Mount Iron on the 29th, and at Roseau on the 30th. The average precipitation was 2.84, or about 0.50 below normal; the greatest monthly amount, 9.63, occurred at New Falden, and the least, 0.47, at New Ulm.—*T. S. Outram.*

Mississippi.—The mean temperature was 81.3°, or about normal; the highest was 103°, at Westpoint on the 14th, 17th, and 18th, and the lowest, 52°, at Okolona on the 31st. The average precipitation was 4.89, or about 1.00 above normal; the greatest monthly amount, 10.49, occurred at Batesville, and the least, 1.72, at Briers.—*H. E. Wilkinson.*

Missouri.—The mean temperature was 76.1°, or about 1.0° below normal; the highest was 102°, at Princeton on the 25th and at Vichy on the 27th, and the lowest, 43°, at Potosi on the 1st. The average precipitation was 4.66, or slightly above normal; the greatest monthly amount, 9.39, occurred at Conception, and the least, 1.69, at Springfield.—*G. J. O'Connor.*

Montana.—The mean temperature was 66.7°, or 0.2° above normal;