

seaports along the coast and they were generally verified. Warnings for heavy frost were sent to southeastern Idaho and northern Nevada on the 1st, which were verified in southeastern Idaho, but not in northern Nevada; and warnings of light frost were issued for

eastern Oregon on the 5th and 23d, and both were verified. Fire-weather warnings were issued for California on the 1st and 24th and for northern California on the 18th. These were justified and it is believed did much good.—E. A. Beals.

FLOODS DURING JUNE, 1920.

By ALFRED J. HENRY, Meteorologist.

At the close of May the Mississippi below Arkansas City, Ark., the Red, Ouachita and Atchafalaya of Louisiana, the Tallahatchie of Mississippi, the White of Arkansas, the Rio Grande in New Mexico, the lower Trinity of Texas and a few others were in flood. These streams passed below the flood stage during the month (see Table I).

A report on the Mississippi flood in the New Orleans district will be found below; see also this Review, p. 366.

The snow flood in the Rio Grande was unusually severe in New Mexico between Albuquerque and Socorro. The Santa Fe Railroad, which parallels the river in this section, suffered numerous washouts and other interruption to traffic. Considerable damage was also done by overflow water at various places in the stretch above mentioned. Floods also prevailed in the San Juan basin in northwestern New Mexico, and in other tributaries of the Colorado in western Colorado. The crest of the flood on the Colorado passed Yuma, Ariz., on the 8th at a stage of 30.5 feet.

The annual rise in the Columbia, which is also due to melting snow, was one of the least in many years by reason of deficient snowfall.

Torrential rains in central Montana on the 5th caused a flood wave of water from the adjacent canyons to descend upon Lewistown, Fergus County, on the evening and night of the 5th. Loss to business properties, residences, and railroads in the city will reach close to \$150,000.

FLOODS IN THE MISSISSIPPI RIVER AND TRIBUTARIES BELOW VICKSBURG MISS., EXCEPT THE UPPER RED RIVER.

The flood in the lower Mississippi River, while it has not equaled previous floods in volume, has been of longer duration than any flood since 1908.

Number of days above present flood stage.

Station.	Year.					Flood stage.
	1903	1908	1912	1913	1920	
Natchez.....	54	104	63	37	68	46
Baton Rouge.....	65	111	69	41	74	35
Donaldsonville.....	66	107	66	37	71	28
New Orleans.....	62	95	60	37	68	18
Simmesport.....	.....	87	69	39	70	41
Melville.....	45	98	81	48	81	37

Warnings issued in March and April have been discussed in flood warning reports for those months.

There were two distinct floods. The first flood crested generally during the latter part of April. The following warning was distributed to all interests, May 3, 1920:

"The Mississippi River below Vicksburg and the Atchafalaya will change very little or fall slowly until between May 8 and 12, when another rise will set in. Water now in sight indicates between 50.5 and 51.5 at Natchez, May 20 to 24; between 39.2 and 40.2 at Baton Rouge, 35.0 to 36.0 at Plaquemine, 30.5 to 31.5 at Donaldsonville, and 18.7 to 19.6 (depending on the winds) at New Orleans, 43.8 to 44.8 at Simmesport, and 40.6 to 41.6 at Melville, May 25 to 28".

The stages changed very little during the first eight days of May, and the following warning was issued May 8:

"The Mississippi River below Vicksburg and the Atchafalaya will change very little for a few days, when a rise will set in. Water now

in sight indicates between 51.0 and 52.0 at Natchez, May 20 to 24; between 40.6 and 41.6 at Baton Rouge, 36.4 to 37.2 at Plaquemine, 32.0 to 32.8 at Donaldsonville, 20.0 to 20.6 at New Orleans (depending upon the winds), 46.0 to 46.5 at Simmesport, and 42.5 to 43.0 at Melville, May 25 to 28."

The rivers continued to rise and crest stages occurred as follows, verifying the warnings as to stages and time of occurrence:

Station.	Stage.	Dates of occurrence.
Natchez.....	51.2	May 18. ¹
Baton Rouge.....	41.5	May 22. ¹
Plaquemine.....	37.2	May 22.
Donaldsonville.....	32.6	May 13. ¹
New Orleans.....	20.4	May 17, 18.
Simmesport.....	46.7	May 21. ¹
Melville.....	42.5	May 20. ¹

¹ And other dates.

The warnings caused levees to be strengthened and carefully watched to prevent breaks, and live stock and perishable goods subject to damage were moved to places of safety.

The following advisory flood warning was issued May 24, 1920:

"The Mississippi River below Vicksburg and the Atchafalaya will change very little except there will be a slight fall at Natchez. High water will continue until after the middle of June."

Only two crevasses occurred, both on the Mississippi River below New Orleans. On April 17, 1920, the batture and levee on the right bank below Buras, 50 miles below New Orleans, slid into the river and caused a crevasse which threatened considerable damage. Prompt action on the part of the engineers enabled them to close the break within a week and no great damage resulted.

May 27, 1920, a crevasse occurred in the levee on the left bank of the Mississippi River, 16 miles below New Orleans. The crevasse was closed May 30, and no serious damage resulted.

Back water from the Mississippi River into the Red, Ouachita, and Little Black Rivers caused damaging overflows in Avoyelles, Catahoula, Concordia and Tensas Parishes, La.

Floods prevailed in the Red River below Shreveport from May 29 to June 6; in the Ouachita, flood stages reached in May continued at Monroe until June 12. The Atchafalaya was also in flood at Simmesport and Melville throughout May and until June 24 and 27, respectively. Warnings of these floods were issued in each case as the necessity therefor arose.—I. M. Gline.

Estimated loss by flood.

River and district.	Farm buildings, machinery, live stock, etc.	Suspension of business.	Value of warnings.	Tangible property, roads, bridges, etc.	Crops.	
					Matured.	Prospective.
Mississippi: New Orleans.....	\$12,500	\$50,000	\$45,000	\$250	\$51,500	\$460,000
Red: New Orleans.....	.....	.....	25,000	.....	.....	120,000
Total.....	12,500	50,000	70,000	250	51,500	580,000

TABLE I.—Flood stages for the month of June, 1920.

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
ATLANTIC DRAINAGE.					
Santee: Rimini, S. C.....	Feet. 12	10	10	Feet. 12.0	10
Saluda: Pelzer, S. C.....	7	6	6	8.0	6

TABLE I.—Flood stages for the month of June, 1920—Continued.

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
EAST GULF DRAINAGE.					
<i>Apalachicola:</i> River Junction, Fla.....	Feet. 12	9	9	Feet. 12.0	9
MISSISSIPPI DRAINAGE.					
<i>Kiskiminetas:</i> Saltsburg, Pa.....	8	17	18	10.5	17
<i>Tuscarawas:</i> Coshocton, Ohio.....	8	20	20	8.5	20
<i>Mississippi:</i> Arkansas City, Ark.....	42	(1)	13	54.0	3 11
Vicksburg, Miss.....	45	(1)	13	50.8	3 19-23
Donaldsonville, La.....	28	(1)	23	32.6	{ 18, 19 23-25
New Orleans, La.....	18	(1)	22	20.4	{ 17, 18
<i>Illinois:</i> Henry, Ill.....	7	(1)	7	16.2	3 24
Havana, Ill.....	14	(1)	5	19.7	3 26-28
Beardstown, Ill.....	12	(1)	16	21.3	3 27
Pearl, Ill.....	12	(1)	11	19.1	3 27
<i>Missouri:</i> Running Water, S. Dak.....	16	24	24	16.0	24
<i>Grand:</i> Brunswick, Mo.....	10	(1)	1	13.1	4 22
Do.....	10	6	6	10.0	6
Do.....	10	9	9	10.3	9
Do.....	10	27	(2)	11.7	30
<i>Tallahatchie:</i> Swan Lake, Miss.....	25	(1)	22	29.1	4 3-7
<i>Red:</i> Alexandria, La.....	36	(1)	6	37.1	2, 3
<i>Ouachita:</i> Monroe, La.....	40	(1)	12	41.0	5
<i>Atchafalaya:</i> Stimmesport, La.....	41.0	(1)	24	46.7	{ 21, 22 24-28
Melville, La.....	37	(1)	27	42.5	{ 20-26
<i>White:</i> Georgetown, Ark.....	22	(1)	9	23.0	4 28
<i>Cache:</i> Patterson, Ark.....	9	(1)	9	10.2	4 18-20
WEST GULF DRAINAGE.					
<i>Trinity:</i> Dallas, Tex.....	25	20	26	32.1	21
Trinidad, Tex.....	28	28	(2)	29.4	29
Liberty, Tex.....	25	(1)	16	27.2	9-12
<i>Rio Grande:</i> San Marcial, N. Mex.....	14	(1)	4	16.1	4 27-4
<i>Colorado:</i> Topock, Ariz.....	14	(1)	20	24.4	2
Yuma, Ariz.....	25	(1)	22	30.5	8
<i>Grand:</i> State Bridge, Colo.....	9	(1)	21	11.4	1, 10, 11
Do.....	9	23	26	9.4	25
Do.....	9	28	(2)	9.2	29

1 Continued from May. 2 Continued into July. 3 April. 4 May.

TABLE I.—Flood stages for the month of June, 1920—Continued.

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
WEST GULF DRAINAGE—continued.					
<i>Grand—Continued.</i> Grand Junction, Colo.....	Feet. 11	(1)	3	Feet. 11.4	2
Fruita, Colo.....	12	(1)	16	15.0	4 23
<i>Eagle:</i> Eagle, Colo.....	5	(1)	1	5.0	4 31, 1
Do.....	5	9	9	5.0	9
<i>Gunnison:</i> Sapinero, Colo.....	16	(1)	30	20.2	1
Do.....	16	20	20	16.0	20
Do.....	16	22	24	16.2	22
Do.....	16	26	(2)	16.5	28-29
Delta, Colo.....	9	(1)	11	10.3	4 22
<i>North Fork Gunnison:</i> Paonia, Colo.....	8	(1)	16	9.9	4 22
<i>Green:</i> Green River, Colo.....	9	(1)	3	9.8	1
Do.....	9	8	28	10.9	12
Elgin, Utah.....	13	(1)	5	14.0	3
<i>San Juan:</i> Farmington, N. Mex.....	8	28	28	8.0	28
PACIFIC DRAINAGE.					
<i>Columbia:</i> Marcus, Wash.....	24	18	(2)	26.6	26, 27
Vancouver, Wash.....	15	20	28	15.2	26, 27

1 Continued from May. 2 Continued into July. 3 April. 4 May.

MEAN LAKE LEVELS DURING JUNE, 1920.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., July 7, 1920.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.*			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during June, 1920:	Feet. 602.75	Feet. 580.86	Feet. 572.49	Feet. 245.56
Above mean sea level at New York.....				
Above or below—				
Mean stage of May, 1920.....	+0.35	+0.13	+0.18	-0.04
Mean stage of June, 1919.....	+0.31	-0.62	-1.28	-2.39
Average stage for June, last 10 years.....	+0.49	0.00	-0.42	-1.37
Highest recorded June stage.....	-0.68	-2.74	-2.03	-3.07
Lowest recorded June stage.....	+1.51	+0.96	+0.92	+0.67
Average relation of the June level to:				
May level.....		+0.30	+0.20	+0.20
July level.....		-0.10	+0.10	+0.10

*Lake St. Clair's level: In June, 575.42 feet.

EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS, JUNE, 1920.

By J. WARREN SMITH, Meteorologist in Charge.

The weather during June was, on the whole, very favorable for farming operations and the development of vegetation in nearly all sections of the country. Rainfall occurred mostly in the form of local showers, was fairly well distributed through the month, and the monthly totals were moderate in most districts east of the Rocky Mountains, except that they were large in the central Gulf area, some north-central border States and locally in the Northeast; the June temperatures averaged generally near the normal in all sections of the country. These conditions permitted rapid progress in seasonal farm operations; good cultivation of row crops was accomplished while generally favorable weather the latter part of the month permitted rapid progress in harvesting winter wheat in the central and southern portions of the belt.

The first week of the month was generally too cool for corn in most central and northern districts and there was some further delay in planting in some interior localities on account of wet soil, but thereafter the weather was more favorable, especially the higher temperatures and more sunshine, and corn made mostly satisfactory advance. Much better weather prevailed during June than during the preceding month throughout the cotton belt, with resulting steady, and in some cases rather pronounced, improvement in the cotton crop. The im-

provement continued throughout the month and was such as to bring the condition of the crop up to nearly an average for the season in some States, particularly in South Carolina, Louisiana, and Oklahoma, but in the southeastern portion of the belt the crop was still in rather poor condition, especially in Alabama, Mississippi, and Georgia.

Both winter and spring wheat made satisfactory development during the month, spring wheat especially showing steady, and in some cases substantial, improvement, and at the close of the month this crop was considerably better than the average, although too much moisture somewhat unfavorably affected it in some of the eastern districts of the belt, particularly in Minnesota. Oats, barley, and other small grains made satisfactory advancement quite generally.

Potatoes and truck crops did well as a rule, although there was some frost damage in the far Northwest during the last decade of the month, and there was too much moisture in some north-central districts, while it was rather cool for best results in some central sections during part of the month. Meadows, pastures, and stock continued in satisfactory condition throughout the month and at its close stock were reported to be in good to excellent condition in all the range States; the cutting of alfalfa and other hay and forage crops progressed well.