DENVER FORECAST DISTRICT

The month was cold and stormy in Montana, northern Wyoming, and northern Utah. Temperatures above normal, with a deficiency in precipitation, prevailed in southeastern Wyoming, Colorado, southern Utah, Arizona, and New Mexico.

In addition to the usual LOWS from the North Pacific a number of disturbances advanced eastward from the southern Rocky Mountain and Plateau regions, several of which attained unusual intensity. The first of these advanced to eastern Colorado on the evening of the 7th. At 8 a. m. of the 8th the barometer at Pueblo had fallen to 28.92 inches (sea level), with precipitation in nearly all portions of the district. Heavy rain or snow fell during the day in central and eastern Colorado, eastern Wyoming, and eastern Montana, and gales were experienced from New Mexico northward to Wyoming during the slow northeastward movement of the storm. This disturbance was followed by freezing temperatures in Montana, Wyoming, northern and western Colorado, north-central and northeastern Arizona, and southern and eastern Utah.

Another storm of marked intensity advanced eastward across the district from the southern portion of the Rocky Mountain region during the period from the 18th to the 22d. General rain or snow fell in Montana, Wyoming, and Utah, with gales in the southeastern portion of the district. Freezing temperatures again occurred on the southern portion of the Plateau from the 22d to the 25th and in western Colorado on the 23d and 24th.

Rain or snow in the northern portion of the district also resulted from the final notable storm of the month which moved across the district from the 25th to the 29th. Freezing temperatures occurred on the 29th and 30th in portions of western Colorado, north-central and northeastern Arizona, and Utah.

Special wind forecasts, principally in the interest of aviation, were issued for Colorado and Wyoming, or portions of these two States, on the evenings of the 1st, 6th, 19th, 20th, and 21st, and on the mornings of the 8th, 17th, and 20th. These were generally verified.

Frost or freezing temperature warnings, which received general verification, were issued on the 2d, 3d, 8th, 9th, 10th, 14th, 18th, 20th, 21st, 22d, 23d, 24th, 28th, 29th, and 30th for those portions of the district where they were needed.—*J. M. Sherrier.*

SAN FRANCISCO FORECAST DISTRICT

Except for several days of unusual warmth about the middle of May, temperatures over the district as a whole were below normal for the greater part of the month, and numerous warnings of light to moderately heavy frost were required for the elevated regions lying to the eastward of the Cascade and Sierra Nevada Mountains. On a few of these occasions, early in the month, conditions were extreme enough to require protective measures in the orchard sections of eastern Washington and light firing was done in the Rogue River Valley of western Oregon on one occasion.

Storm warnings were issued for north coast points on two dates, the 1st and 11th, when disturbances of rather unusual intensity for so late a month approached from the Gulf of Alaska. The first of these passed directly inland attended by winds of gale force north of Cape Blanco. The behavior of the second was more characteristic of the month of May; it halted upon reaching the coast, to redevelop later in milder form over the interior of Canada. Strong winds along the Washington coast, however, accompanied its approach, and gales were undoubtedly experienced at sea.—*E. H. Bowie.*

RIVERS AND FLOODS

By H. C. FRANKENFIELD

The great Mississippi flood continued during the month and, as has been stated before, a complete report thereon will be made at a later date.

Atlantic and east Gulf drainage.—The only flood reported was a very moderate local one in the upper Tombigbee River of Mississippi. It lasted only two days, only a few acres of the lowest river bottoms were covered, and the damage was negligible.

Ohio drainage.—The interior rivers of Ohio, Indiana, and Kentucky were high during the last decade of the month, with a great flood in the extreme upper Kentucky River, and another but somewhat less severe one in the Wabash River of Indiana. The Kentucky River flood was caused by excessive rains during the night of May 29–30, the amount ranging from 4 to 4.5 inches and probaably more in some places. At times the rate of fall was from 1 to 1.5 inches per hour, with the heaviest fall, greatest loss of life, and most destructive flood conditions along the North Fork of the Kentucky River. The number of persons missing or known to have been drowned was 89, and incomplete reports indicated a loss and damage total of between $6,000,000 and $7,000,000. At Hazard, Ky., alone the losses amounted to $2,000,000, of which perhaps 75 per cent were railroad losses. Both highway bridges were swept away as the river reached a stage of 36.98 feet, 15.98 feet above flood stage, at 11 a. m. May 30, and the Louisville & Nashville Railroad Co. lost 15 bridges, mainly on branch lines in Letcher County. The flooded area covered the district from Morgan County on the north to Harlan County on the south and thence eastward to the State line. As the flood began during the night, many homes were surrounded by water before the inmates became aware of the danger, and for many there was no possibility of escape. Ten or fifteen thousand people were made homeless, and perhaps 20,000 idle through enforced suspension of business, mostly coal mining, and to the reported losses there must also be added a few millions on account of loss of wages. The river at Hazard according to old residents was about 1 foot higher than in 1862, the highest known water previous to 1927.

The Wabash River flood was still in progress at the end of the month, and report thereon will be made later. Prospective losses will be considerable as the delay in spring planting may mean the loss of an entire crop in the river bottoms.

The floods in the interior rivers of Ohio were very moderate. Warnings were issued promptly and there were no losses of consequence. There were also moderate floods in the Ohio River between Evansville, Ind., and Shawneetown, Ill., and in the Green River of Kentucky. These floods caused no material damage and they subsided during the first week in June. Their principal effect was to further delay farming operations in the bottom cornlands.

A very severe rain and hailstorm during the early morning of May 30 in Johnson, Carter, Sullivan, and Greene Counties, Tenn., and Lee, Scott, Washington, and Smith Counties of southwestern Virginia caused a decided rise in the three forks of the Holston River, the drowning

of five persons, and much property damage. For a time the rains were torrential, and the rapid rise in the waters was followed by an equally rapid recession. It was impossible to issue warnings for the floods that occurred, and the losses amounted to about $75,000, of which about $25,000 were in crops.

Mississippi drainage.—Moderate floods during the fourth week of May in the Mississippi River between Quincy, Ill., and Louisiana, Mo., and in the lower Des Moines River of Iowa were well forecast, and actual damage was about $14,000 only. There was further delay in farming operations and some business inconvenience.

Missouri drainage. There was a flood in the Missouri River beginning on May 10 at Pierre, S. Dak., and ending at Kansas City, Mo., on May 18. From the mouth of the Cheyenne River in South Dakota to Sioux City, Iowa, the rise was the greatest of record for the month of May, and the stages reached were the highest since July, 1905. Heavy precipitation for six weeks over South Dakota, beginning with March 31, had thoroughly saturated the soil, and when on May 5 heavy rains set in over the drainage areas of the Cheyenne, Bad, White, and Niobrara Rivers, all, especially the Cheyenne and Bad, were soon in flood. At Fort Pierre, on Bad River, the flood was very serious, with losses amounting to $174,250. Total reported losses from Pierre to Sioux City, Iowa, were $353,750, of which $197,250 represented losses of prospective crops. Value of property saved through warnings given by the Weather Bureau, $99,000. No estimate could be made of losses of fine farmlands that were taken up by the changing river channel, a phenomenon peculiar to the Missouri River. Probably several thousand acres were lost.

In the Omaha, Nebr., district the flood was more moderate, and, while there was much inconvenience, reported losses were only about $45,000, excluding, however, that which will ultimately result from losses of prospective crops. Reports indicate that between 40,000 and 50,000 acres of farmlands were affected, which at a conservative estimate of $12 an acre would make the prospective losses between $500,000 and $600,000. Money value of property saved through the warnings was given as more than $250,000.

In the Kansas City, Mo., district the flood was very moderate and the losses were almost entirely prospective.

Arkansas drainage.—Rains between May 5 and 7 over eastern Kansas caused rapid rises in the rivers and a few unimportant floods in the Osage and upper Neosho, Cottonwood, and Ninescah Rivers. Warnings were issued as soon as possible, with resulting crop damage amounting to about $7,000, and minor losses of about $400. Property valued at $2,000 was reported as having been saved through the warnings.

West Gulf drainage.—The upper Trinity River of Texas was in rather high flood early in May. It was not especially dangerous, however, and apparently loss and damage were very small.

The Rio Grande remained above flood stage at San Marcial, N. Mex., throughout the month. Thus far no damage has been reported.

Pacific drainage.—The Colorado River was in moderate flood at Fruita, Colo., and below Grand Canyon, Ariz., for a few days only at Fruita, but quite generally below Grand Canyon. While the floods were not serious, heavy rains with high temperatures could easily make them so, and special forecasts and warnings for the lower river were distributed twice each week, as well as on several other occasions when important changes were indicated. There were also important rises in the tributary streams in the State of Colorado and in the San Juan River of New Mexico. Warnings were issued at the proper time, and no reports of loss or damage were received.

The annual rise of the Columbia River began during the month, but no flood stages had been reached by the end of the month except at Vancouver, Wash., and also in the Willamette River at Portland, Oreg., where the flood stage of 15 feet was passed on May 20. A report on this rise will be made at a later date.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
Atlantic drainage	*Feet*			*Feet*	
Susquehanna: Oneonta, N. Y.	12	25	25	12.1	May 27
East Gulf drainage					
Tombigbee: Aberdeen, Miss.	33	9	9	34.3	10
Mississippi drainage					
Ohio:					
Shawneetown, Ill.	35	31	(2)	----	----
Cairo, Ill.	45	(1)	5	56.4	Apr. 20
Tuscarawas:					
Gnadenhutten, Ohio	9	20	21	11.3	May 21
Coshocton, Ohio	8	20	21	9.0	20
Walhonding: Walhonding, Ohio	8	20	20	11.5	20
Scioto:					
Larue, Ohio	11	19	20	14.6	19
Prospect, Ohio	10	20	21	12.8	21
Bellpoint, Ohio	9	20	20	9.1	20
Circleville, Ohio	10	20	22	12.2	21
Chillicothe, Ohio	16	22	22	16.1	22
Kentucky:					
Hazard, Ky.	21	30	30	37.0	30
Beattyville, Ky.	30	31	(2)	34.8	31
Wabash:					
Bluffton, Ind.	11	20	22	13.5	21
Lafayette, Ind.	11	19	28	20.2	20
Covington, Ind.	16	19	(2)	24.1	21–22
Terre Haute, Ind.	16	21	(2)	20.9	30
Vincennes, Ind.	14	24	(2)	22.0	30
Mount Carmel, Ill.	16	22	(2)	----	----
Tippecanoe: Norway, Ind.	6	(1)	12	6.5	3–5
		18	(2)	6.5	19
White: Decker, Ind.	18	24	(2)	----	----
White, West Fork:					
Anderson, Ind.	12	19	20	15.2	20
Noblesville, Ind.	14	19	21	16.8	20
Indianapolis, Ind.	18	20	20	18.1	20
Elliston, Ind.	19	21	31	23.1	24
Edwardsport, Ind.	15	20	(2)	18.4	26 and 30
Holston: Rogersville, Tenn.	14	31	(2)	17.2	31
Holston, North Fork: Mendota, Va.	8	31	31	8.0	31
Mississippi:					
Quincy, Ill.	14	25	(2)	15.3	26
Hannibal, Mo.	13	20	21	14.1	20
		25	(2)	15.7	26
Louisiana, Mo.	12	25	(2)	14.7	27
Grafton, Ill.	18	(1)	4	25.8	Apr. 25
		10	13	19.2	May 11
		25	(2)	21.1	30
Alton, Ill.	21	(1)	4	31.2	Apr. 25
		9	13	23.6	May 11
		26	(2)	23.9	29
St. Louis, Mo.	30	(2)	1	36.1	Apr. 26
		11	11	30.3	May 11
Chester, Ill.	27	(1)	3	34.5	Apr. 26
		29	(2)	27.8	May 30
Cape Girardeau, Mo.	30	(1)	6	40.0	Apr. 20–21
		10	(2)	32.8	May 12
New Madrid, Mo.	34	(1)	16	43.5	Apr. 21–22
Memphis, Tenn.	35	(1)	19	46.0	23
Helena, Ark.	44	(1)	23	56.8	26–27
Arkansas City, Ark.	48	(1)	10	60.5	21
Greenville, Miss.	42	(1)	10	54.7	21
Vicksburg, Miss.	45	(1)	(2)	58.7	May 4
Natchez, Miss.	46	(1)	(2)	56.5	1 and 4
Angola, La.	45	(1)	(2)	57.5	15–17
Baton Rouge, La.	35	(1)	(2)	47.8	15
Donaldsonville, La.	28	(1)	(2)	37.1	15–17
New Orleans, La.	17	(1)	(2)	21.0	Apr. 25

[1] Continued from last month.
[2] Continued at end of month.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
Mississippi drainage—Continued					
Illinois:	*Feet*			*Feet*	
Morris, Ill	13	(1)	1	14.4	Apr. 30
		21	29	17.9	May 25
Peru, Ill	14	(1)	(2)	23.2	Apr. 21
				22.8	May 26
Henry, Ill	10	(1)	(2)	17.9	Apr. 23-24
				17.4	May 28
Peoria, Ill	18	(1)	(2)	24.6	Apr. 23-24
				23.9	May 28
Havana, Ill	14	(1)	(2)	22.3	Apr. 26
				21.4	May 30-31
Beardstown, Ill	14	(1)	(2)	25.2	Apr. 26
Pearl, Ill	12	(1)	(2)	22.7	26-27
Meramec:					
Steelville, Mo	12	25	25	17.7	May 25
Pacific, Mo	11	26	29	18.3	27
		31	(2)		
Valley Park, Mo	14	10	10	15.6	10
		26	(2)	21.0	28
St. Francis:					
St. Francis, Ark	17	(1)	(2)	26.4	Apr. 18
Marked Tree, Ark	17	(1)	(2)	20.1	May 10
Missouri:					
Pierre, S. Dak	13	10	10	14.7	10
Chamberlain, S. Dak	14	11	11	15.0	11
Yankton, S. Dak	12	11	13	13.5	12
Blair, Nebr	16	12	17	19.2	14
Omaha, Nebr	19	14	16	19.9	15
St. Joseph, Mo	12	16	17	12.1	16
Hermann, Mo	21	10	10	21.3	10
St. Charles, Mo	25	9	11	27.1	10
Floyd: Merrill, Iowa	13				
Arkansas:					
Pine Bluff, Ark	25	(1)	3	32.4	Apr. 21
Yancopin, Ark	29	(1)	(2)	48.5	20
Neosho: Oswego, Kans	17	8	10	17.6	May 8
Cottonwood: Emporia, Kans	20	8	10	22.7	9
White:					
Georgetown, Ark	22	(1)	4	30.3	Apr. 17
Clarendon, Ark	30	(1)	12	43.3	23
Black:					
Leeper, Mo	11	25	25	11.9	May 25
Williamsville, Mo	11			14.5	25
Poplar Bluff, Mo	14	7	8	14.5	7
		26	28	17.2	27
Corning, Ark	11	(1)	(2)	16.2	Apr. 18
Petit Jean: Danville, Ark	20	11	11	20.3	May 11
		21	21	20.3	21
Cache: Patterson, Ark	9	(1)	8	16.0	Apr. 19
		18	19	9.0	May 18-19
Yazoo: Yazoo City, Miss	25	(1)	(2)	37.4	5
Tallahatchie: Swan Lake, Miss	25	(1)	(2)	31.8	Mar. 22
				31.1	Apr. 26-May 1
Red:					
Fulton, Ark	28	(1)	1	35.0	Apr. 24
Springbank, Ark	37	(1)	2	30.2	27-28
Ouachita: Monroe, La	40	(1)	(2)	48.2	May 4
Atchafalaya:					
Melville, La	37	(1)	(2)	46.8	14-16
Morgan City, La	8	26	(2)		
West Gulf drainage					
Sabine: Logansport, La	25	(1)	7	29.2	Apr. 19
Trinity:					
Dallas, Tex	25	(1)	1	33.1	21
		9	9	26.4	May 9
Trinidad, Tex	28	(1)	6	36.7	Apr. 29
Liberty, Tex	25	(1)	11	27.4	21
Rio Grande: San Marcial, N. Mex	2	(1)	(2)	3.8	May 9, 10, 21
Pacific drainage					
Colorado:					
Fruita, Colo	12	19	23	12.2	19-21
Topock, Ariz				19.6	27
Parker, Ariz	7	1	(2)	10.0	28
Gunnison: Delta, Colo	9	(1)	8	9.9	1
		14	28	10.8	17-18
Gunnison, North Fork: Paonia, Colo	9	(1)	(2)		
		18	21	9.1	18
San Joaquin: Friant, Calif	12	14	18	12.9	17
Kings, Piedra, Calif	12	5	5	12.0	5
		14	19	13.3	17
Columbia: Vancouver, Wash	15	20	24	16.2	21-22
		28	(2)		
Williamette: Portland, Oreg	15	20	(2)		
Clearwater: Kamiah, Idaho	14	17	17	14.6	17

[1] Continued from last month.
[2] Continued at end of month.
[3] Below flood stage at 8 a. m. May 1, 1927.

MEAN LAKE LEVELS DURING MAY, 1927

By UNITED STATES LAKE SURVEY

[Detroit, Mich., June 4, 1927]

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

Data	Lakes [1]			
	Superior	Michigan and Huron	Erie	Ontario
Mean level during May, 1927:	*Feet*	*Feet*	*Feet*	*Feet*
Above mean sea level at New York	601.96	579.14	571.95	245.95
Above or below—				
Mean stage of April, 1927	+0.55	+0.36	+0.20	−0.02
Mean stage of May, 1926	+1.78	+0.98	+0.78	+0.58
Average stage for May, last 10 years	+0.32	−0.99	−0.39	−0.30
Highest recorded May stage	−1.09	−4.38	−2.47	−3.00
Lowest recorded May stage	+1.78	+0.98	+0.78	+0.99
Average departure (since 1860) of the May level from the April level	+0.31	+0.30	+0.34	+0.33

[1] Lake St. Clair's level: In May, 1927, 574.40 feet.

EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS, MAY, 1927

By J. B. KINCER

General summary.—During the first decade rains interrupted field work in most of the interior valley States, although considerable was accomplished the first part. Lowlands continued too wet for good growth of crops, with further complaint of grains yellowing, while conditions in the Northwest were rather unfavorable. In the central and southern Great Plains the weather was rather favorable, and in the South mostly ideal conditions prevailed for field work; but it continued too dry in the Southeast and in parts of the Southwest, with a general, soaking rain needed in the former area and in parts of Texas, Oklahoma, and sections to the westward. There was further delay to field work during the second decade, due to wet soil and further rainfall, and spring planting was much behind an average season in much of the Ohio Valley and central Mississippi areas. Vegetation made slow progress, due to cool weather, in the East, but good advance was reported in the West wherever there was sufficient soil moisture. A continuation of rains kept the soil too wet for working in the Ohio and middle Mississippi Valleys during the latter part of the month, and the continued absence of rain in the Southeast and Southwest was unfavorable, with moisture urgently needed in much of these areas.

Small grains.—It was rather unfavorable for wheat during the first part of the month. The winter crop continued to make fair to very good progress in some sections, but further rains were detrimental in many interior valley districts, especially on lowlands, and there were further complaints of yellowing. Little seeding could be accomplished in the Spring Wheat Belt, but the early seeded grain made satisfactory progress. Winter wheat continued to make good to excellent advance in most of the Great Plains during the second decade, but was poor in Oklahoma due to rust, insect infestation, and scanty