

Rapids. Flood conditions prevailed until Thursday, June 15, by which time the river had fallen below the danger line.

The great value of the River and Flood Service was amply demonstrated during this flood and I believe it may be stated with perfect accuracy that hardly a dollar's worth of property was lost that could have been saved. On account of the accurate and timely warnings very many thousand dollar's worth of property was removed from basements, stores, and factories out of the reach of the high water, but a large amount of machinery and other property that could not be moved was considerably damaged, while the business of many factories was entirely suspended.

The floods in Colorado and New Mexico partook of the usual character of mountain floods and are thus described by Mr. F. H. Brandenburg, Official in Charge of the U. S. Weather Bureau office at Denver, Colo.:

During the first half of June high stages were general in all streams rising on the slopes of the Continental Divide in the central mountain region, where, owing to the cold spring, the melting of snow had not progressed gradually as usual.

The Arkansas remained high for an unusually long period. From the 2d to the 12th low bottom lands were overflowed, and considerable damage was done to farming lands in the vicinity of Canyon City and Florence. Railroads were put to considerable expense to protect their roadbeds between Pueblo and Salida.

The danger line on the Gunnison was reached at Grand Junction on the 12th, and the highest stage at midnight of June 5; this stage was four inches above the highest recorded in the last ten years. The stream fell below the danger line on the 6th, but rose nearly as high on the 9th, as a result of rains. Many bridges were washed away, and low-lying agricultural and fruit lands were considerably damaged.

A number of dams and reservoirs near the headwaters of the Grand were overtaxed and destroyed. The river was out of its banks between Rifle and New Castle.

In southwestern Colorado the Animas reached a stage equaling that reached in 1884, the highest known. Lowlands were overflowed, and two foot and five county bridges in Durango were washed away. The railroad between Durango and Telluride suffered interruption to traffic by the loss of bridges and the washing out of a large section of track along the Dolores River. The San Juan River, in southeastern Utah, was very high about the middle of the month.

In Arizona the lower Colorado was bank full at Yuma from the 12th to the 20th, and at flood stages from the 21st to the 28th, overflowing, and doing much damage to farms and crops. The river subsided rapidly after the 28th.

The streams of Wyoming carried large volumes, in some cases the largest in years, but no serious damage was done.

The disastrous flood in the Rio Grande which set in during the closing days of April, was at its maximum at different points in New Mexico on May 25 or 26, and reached the highest stage, 14.3 feet, at El Paso, Tex., on June 1.

Showers interrupted the steady and general decline that began with June, and from the 3d to the 12th destructive stages prevailed in northern New Mexico. While the resulting increase in volume in southern New Mexico was not great, it prolonged the flood stage by a week or ten days. At San Marcial the maximum stage during June, 12.7 feet, occurred on the 1st, and again on the 9th and 11th, after which there was a rapid decline; the danger line of 11 feet was passed on the 15th, 9.0 feet, on the 22d, and 8.0 feet at the close of the month. At El Paso on the 9th and 12th, the gage reading was 13.7 feet; on the 21st, 12.3 feet,

a fall of one foot in four days, and at the close of the month an additional fall of 2.5 feet was noted.

Between Rincon and El Paso the railroad tracks were repeatedly washed away and large tracts of farming lands, both above and below El Paso, were cut off and carried away by the rapid current and the changing channel.

The following report of the flood in the Red River was made by Mr. J. W. Cronk, Official in Charge of the U. S. Weather Bureau office at Shreveport, La.:

Excessive rainfalls were frequent over the upper Red River watershed during April and May, and at Shreveport the rainfall for these two months was 19.62 inches. Flood stages naturally resulted and from the middle of May until the middle of June the Red River was continuously above the danger line over the greater portion of its course in Arkansas and Louisiana. Two crests were noted at Fulton, Ark., 28.9 feet on May 18, and 31.5 feet on June 1, 2, and 3. At Shreveport the river rose to the danger stage of 29 feet on May 26, and continued to rise slowly until the crest stage of 33.6 feet was reached on June 9. There was then a gradual fall to below the danger line on June 18.

Warnings were thoroughly disseminated well in advance of the flood to all interests in Red River Valley. The first warnings for the valley from Fulton to Shreveport were distributed by mail on May 13. On May 22, owing to further heavy rainfalls, a flood warning was distributed by telegraph in Arkansas and by mail in Louisiana, advising immediate removal of all families, stock, and perishable property to places of absolute safety. Further warnings and forecasts were issued as varying conditions for different localities required. The time and height of the crest stages were accurately forecast and were amply sufficient for the needs of all interested.

The losses from the effects of the floods in Arkansas and Louisiana were probably more than \$100,000, the greater portion being attributable to the curtailment of cotton acreage on lands unprotected by State levees. The Texas and Pacific Railway from Shreveport, La., to Texarkana, Ark., also suffered severely, all train service being entirely abandoned for about one month. However, the total loss was comparatively small, as the value of property protected by State levees, and the value of stock and other movable property saved through the instrumentality of the Weather Bureau warnings has been conservatively estimated at more than \$5,000,000. Individuals here and there were nearly ruined by the breaking up of farms, caving in of banks, and breaks in private levees, but no loss of life was reported.

The floods in the Ouachita and Arkansas rivers were not unusual in any respect and were forecast at the proper times. There was some trouble with weak levees in the Shreveport district of the Red River, but they were strengthened in time to prevent crevasses.

The highest and lowest water, mean stage, and monthly range at 283 river stations are given in Table VI. 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. Frankenfeld, Professor of Meteorology.

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Division.

The following summaries relating to the general weather and crop conditions during June are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon reports from cooperative observers and crop correspondents, of whom there are 3300 and 14,000, respectively:

Alabama.—Weather generally fairly favorable for growth and work; cultivation progressed steadily, except retarded by rain in northern, western, and some southern counties; rainfall deficient in central and eastern counties. Cotton improved slowly; mostly clean at close of month; plants small, but healthy, and fruiting satisfactorily. Corn and minor crops advanced well, except some deterioration where rainfall was deficient; some corn ruined by overflow in northern counties. Wheat and oat harvest completed; oats good yield, wheat light.—F. P. Chaffee.

Arizona.—Copious rainfall first decade; droughty conditions 12th to 30th. Temperature below normal. Grain harvest continued throughout month; yield fair; quality good; some damage from rust. Crop

growth made good progress north. Fruit yielding largely in central and southern sections; drying extensive. Killing frost north section on the 16th injured fruit and vegetables slightly. Floods in the lower Colorado on the 21st to 28th washed farm lands and damaged crops. Third alfalfa cutting began on 28th. Water supply diminishing. Cattle and sheep in good condition.—L. N. Jesunofsky.

Arkansas.—The temperature was seasonable, with local showers in the first and second decades and general rains in the third. Cotton planting was practically completed; the crop made a good, healthy growth and was generally clean by the close of the month. Early corn suffered for moisture in the second decade, but improved during the third; the late planted came up to a fair stand. Oats were good and wheat poor. Apples dropped badly and a light crop was indicated; other fruits did well.—Edward B. Richards.

California.—Clear and cool weather prevailed throughout the State most of the month, and both temperature and rainfall were below normal. Thunderstorms in the northern sections and high winds in the San Francisco Bay district caused no material damage. Field fires in the San Joaquin Valley destroyed several thousand bushels of grain. Grasshop-

pers caused considerable damage to grain, alfalfa, and orchards. Crop growth was slow during the month, but grain harvest, haymaking, and fruit picking were progressing.—*G. H. Willson.*

Colorado.—Growth was rapid in north-central and eastern counties, but at close of month was retarded by droughty conditions in southern and western parts of State. Alfalfa harvest was in progress, with yield fair to good. Wheat, oats, rye, and barley made satisfactory advancement. Corn and potatoes were a good stand. Sugar beets did well; thinning out was well advanced, especially in western counties. Grasses were in fairly good condition, except in northwestern counties.—*F. H. Brandenburg.*

Florida.—The month had about normal temperature. There was a deficiency of more than two inches in rainfall. The first week was mostly dry, resulting in some damage to corn on uplands. The dry weather, however, was timely for cleaning cotton, which had become foul with grass. Rain was more frequent during the second and third decades. Late corn was benefited and a large acreage was set to sweet potatoes. Citrus trees were vigorous. The pineapple crop was short, but melons and cantaloups were abundant.—*A. J. Mitchell.*

Georgia.—The temperature was even and near normal. Very little rain fell the first half and farmers cleared the fields of grass; during the second half unevenly distributed showers occurred daily; cultivation was delayed and many fields became grassy. Cotton was generally healthy, though small, grew rapidly, and fruited well. Early corn seriously injured in many sections by drought, late varieties excellent. Oats good; wheat poor, damaged by rust. Peaches being shipped, yield variable, quality fine. Melons being marketed, large yield.—*J. B. Marbury.*

Hawaii.—Seasonable temperatures in most sections of the group, but rainfall below the normal in many leeward localities. Conditions on the whole, very favorable for growth of all cane, but some slight damage to young cane by high winds during second decade. Supply of surface water for irrigation decreased during month, necessitating resumption of pumping. Cane grinding for season nearing completion, and plantations busy planting and cultivating. Harvesting of summer pineapples general; yield heavy and of fine quality. Bulk of first rice crop in and yield generally satisfactory, although rather short in some sections. Coffee in good condition; some berries already ripening on lower lands in Kona, Hawaii. Pastures deteriorated considerably during month.—*Alex. McC. Ashley.*

Idaho.—Heaviest precipitation on record for June. Temperature lower than usual, with excessive cloudiness. Water supply continued better than was expected, but some streams were falling rapidly by the close of the month. An average hay crop was being secured as the month closed; range grass was excellent.—*Edward L. Wells.*

Illinois.—By the end of the first decade the bulk of the corn crop was in the ground, wheat was nearly ripe, barley, oats, and rye were doing well, and the mowing of clover had begun in the southern district. At the end of the month corn was in a thrifty condition, being mostly laid by in the central district, wheat harvest was well advanced, oats were turning ripe, and rye was in shock.—*Wm. G. Burns.*

Indiana.—Ground was too wet to work much of the time and the planting and cultivation of corn was greatly retarded. The crop was uneven, but generally clean and growing rapidly at the end of the month. Wheat, rye, oats, and grasses did well and the harvesting of wheat and clover was begun. Potatoes, melons, field onions, and gardens made good growth. Transplanting of tomatoes and tobacco was finished. Prospects for apples, peaches, and pears were fair, and for grapes good.—*T. Blythe.*

Iowa.—June was about normal in temperature, with an inch excess of rainfall, resulting in heavy growth of grain, grasses, and garden truck. Damage by excessive moisture was limited to lowlands and cultivated slopes in sections visited by heavy showers. At close of month corn was fairly well cultivated and nearly normal in size, spring wheat, oats, and barley were headed and filling well, and minor crops in normal condition. Apple crop declining.—*John R. Sage.*

Kansas.—Wheat harvest began the first week and thrashing began the third week, disclosing a fine berry and fair yield. The oat harvest began the third week. Corn clean, in fine condition, and grew rapidly. The first crop of alfalfa was cut by the 10th, and the second crop the fourth week, when prairie haying began. Apples were generally a fair crop.—*T. B. Jennings.*

Kentucky.—Dry first ten days; frequent showers middle and latter part of month. Wheat harvest completed, with interference by rain latter part of month; some grain damaged in shock. Oats ripening. Corn growing vigorously, but grassy in many places. Tobacco doing excellently, though cultivation was interrupted. Good gardens and potato crop. Berries abundant. Fruit doing well, with peaches beginning to ripen at close of month.—*F. J. Walz.*

Louisiana.—Although cultivation was pushed vigorously during the favorable weather of the first and second decades of the month, some parts of the cotton crop had not been cleaned, when rains during the third decade prevented further cultivation, and as a result were abandoned to grass and weeds; some crops along Red River were overflowed and the plant killed; a small amount of damage resulted from cotton boll weevil and bollworm; the crop was very irregular and fruiting poorly at close of month. Sugar cane made a healthy and substantial

growth. The rice crop suffered at intervals from dry weather and then too much rain. Truck gardens matured heavy yields.—*I. M. Cline.*

Maryland and Delaware.—The temperature was normal, the precipitation was somewhat above normal; though not evenly distributed, rainfall was sufficient in all sections. Wheat developed finely and harvest was general at close of month. Oats headed very satisfactorily. Corn obtained a good stand and grew rapidly. Haying progressed during latter portion of month, with short crop. Cherries were an average crop. Tobacco stood well and was cultivated. Gardens yielded plentifully.—*E. D. Emigh.*

Michigan.—Very wet first of month, was generally favorable for wheat, rye, meadows, and pastures, but greatly interfered with all field work and with growth of corn, beans, and potatoes. Latter part of month was generally favorable to all crops and field work. Wheat, rye, and meadows continued unusually satisfactory, while oats, corn, and potatoes were in good condition at close of month. Late potatoes, beans, and considerable buckwheat were planted during last two decades and germinated well. Haying began about the 25th. Strawberries were plentiful, but cherries scarce.—*C. F. Schneider.*

Minnesota.—Very wet all the month. Lowlands flooded, and rivers rising rapidly at close of month. Spring wheat, oats, barley, flax, timothy, and clover growing rapidly on uplands. Rye and winter wheat heading about the 10th; early oats, barley, and timothy about the 20th; spring wheat about the 25th. Some red rust on spring wheat and oats late in month. Cultivation of corn, potatoes, and gardens delayed. Fine strawberry crop, but somewhat injured by rains.—*T. S. Outram.*

Mississippi.—Favorable weather prevailed during the first half of the month, when the working of crops progressed nicely, but during the latter half daily showers hindered cultivation. Cotton, although undersized and very grassy over much of the northern half of the State, generally made a good growth; blooms were noted by the close of the month. Early corn was much improved. Oat harvest was completed with good to excellent yields. Late corn, sugar cane, and gardens generally did well.—*W. S. Belden.*

Missouri.—Month favorable for cultivation and harvesting. Moisture lacking until last week, when rains were copious and general. Corn growing fast and being laid by in good order. Wheat, rye, and oats generally satisfactory, with yield and quality quite up to the average. Cotton made fast growth. Meadows were thin as a rule, but of good quality.—*George Reeder.*

Montana.—Cool and cloudy weather prevailed the greater portion of the month; the rainfall was above normal in nearly all sections. Potatoes and garden vegetables were injured locally by frost during the last decade. The month was highly favorable for wheat, oats, range, and meadows. Cattle and sheep made steady and rapid gains. Alfalfa haying commenced the last week. Some local damage to fruit by hail.—*R. F. Young.*

Nebraska.—Winter wheat ripened rapidly under favorable weather conditions. The harvest began in southeastern counties in the last week. Early oats headed well, but with short straw and rather thin stand; late oats were in much better condition. Grass in meadows and pastures was unusually good. Corn grew slowly and continued small and backward, but in good, healthy condition.—*G. A. Loveland.*

Nevada.—Temperature and precipitation were both below normal. Warm days and cool nights. Crops backward. Range feed fine; stock in excellent condition and improved rapidly in flesh. Haying progressed throughout the month, the yield being fair to good. Grain promising. Garden truck made slow growth. Irrigation water was not as plentiful as usual.—*J. H. Smith.*

New England.—The mean temperature of the month was below normal at nearly all stations. Frosts occurred in parts of all the New England States, except Rhode Island, generally on the 2d and 9th. The rainfall was decidedly in excess of the average for June, with plus departures at nearly all stations. Crops improved in all sections and were generally in a satisfactory condition. Little damage resulted from the frosts in the early part of the month.—*J. W. Smith.*

New Jersey.—The temperature and rainfall were nearly normal, but the latter was very unequally distributed. Rainy days were frequent, but the showers were light and insufficient for crop needs, especially in portions of the central and extreme southern sections, where truck crops were greatly shortened by drought. Wheat and rye were nearly ready to cut; heads well filled, straw short.—*Edward W. McGinn.*

New Mexico.—Crops made rapid progress. Cultivation of corn began the second decade and harvest of wheat, rye, and oats the third decade, good yields being obtained. Alfalfa harvest continued during the month in higher districts and northern counties. Gardens did well, but insects and worms became destructive, damaging also alfalfa, field peas, and beans. Fruit conditions were good and early fruits abundant. Range grasses were excellent and stock advanced to prime condition, although a slight drying out occurred on the ranges toward close of the month.—*Charles E. Linney.*

New York.—The first half of the month was too cool for growing crops. From the 15th to the 21st was warm, with abundant rain, causing great improvement in all crops. The last week was quite cool. Wheat, rye, and oats did well. Grass in meadows and pastures improved. Apples

SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS, JUNE, 1905.

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

The mean temperatures for each section, the highest and

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.				Section average.	Departure from the normal.	Greatest monthly.		Least monthly.			
			Station.	Highest.	Date.	Station.			Lowest.	Date.	Station.	Amount.	Station.	Amount.
Alabama	79.0	+ 1.0	Thomasville	102	12	Anniston	49	22	Thomasville	10.70	Burkville	1.35		
Arizona	76.9	- 2.1	Aztec	118	25	Valley Head	49	22	Huachuca Reservoir	3.61	11 stations	0.00		
Arkansas	77.9	+ 1.6	Brinkley	104	17	Flaustaff	30	16	Arkadelphia	21.55	Oregon	1.28		
California	67.5	- 2.4	Russellville	104	15	Taylor	30	15	Bowmans Dam	1.72	Many of stations	0.00		
Colorado	62.3	+ 0.8	Imperial	116	11	Batesville	44	1	Burlington	4.69	Grand Junction	0.04		
Florida	80.2	+ 0.4	Volcano Springs	116	22	Boile	16	5	Orange Home	14.86	Pensacola	0.93		
Georgia	78.7	+ 0.8	Las Animas	104	27	(Lay)	23	6	Monticello	8.18	Punta Peter	1.09		
Hawaii	773.0		Lamar	104	27, 28	Whitepine	23	10	Nahiku, Maui	26.53	Kihui, Maui	T.		
Idaho	59.1					Antelope Springs	23	6, 10	Fernwood	5.62	Malad	0.20		
Illinois	72.6	+ 0.7	Orange City	101	8	Middleburg	48	6	La Harpe	12.60	Tilden	0.26		
Indiana	71.7	- 0.1	St. Marys	103	26	Clayton	41	10	Washington	7.30	Franklin	0.93		
Iowa	69.9	- 0.3	Kihui, Maui	92	4, 8	Winnae	41	8	Keosauqua	14.89	Forest City	1.80		
Kansas	75.5	+ 2.5	Waianae, Oahu	92	15	Humuula, Hawaii	31	16	Salina	13.64	Hugoton	0.57		
Kentucky	74.8	+ 0.7	Payette	96	22	Forney	25	16	Frankfort	7.65	Beaverdam	1.04		
Louisiana	81.1	+ 1.5	Chester	104	5	4 stations	38	3	Lafayette	18.52	Shreveport	2.64		
Maryland and Delaware	71.2	0.0	Salem	102	19	South Bend	41	27	Annapolis, Md	7.61	Boethcheville, Md.	1.80		
Michigan	63.2	- 0.8	Red Oak	100	9	Winnae	41	8	Mackinac Island	8.60	Gladwin	1.30		
Minnesota	63.0	- 1.8	Medicine Lodge	108	18	Washta	36	22	Long Prairie	9.89	Winnabago	2.42		
Mississippi	79.5	+ 0.7	Owenton	106	18	Achilles	42	7	Corinth	9.75	Hattiesburg	1.80		
Missouri	75.2	+ 2.1	Reserve	102	4 dates	Colby	42	6	Macon	6.88	Glasgow	0.74		
Montana	56.8	- 2.3	Boettcherville, Md.	102	19	(Manchester, Shelby City)	45	1	St. Peter	7.86	Alzada	1.12		
Nebraska	68.4	- 0.5	Owosso	100	17	West Liberty	45	9	Holdrege	11.83	2 stations	1.70		
Nevada	62.0	- 1.7	New Ulm, St. Peter	95	5	Calhoun, Opelousas	60	2	San Jacinto	1.48	10 stations	0.00		
New England*	62.3	- 2.9	Columbus	102	11	Deer Park, Md	25	9	Middleboro, Mass.	7.26	Houlton, Me.	1.50		
New Jersey	68.3	- 1.4	Magnolia	102	17	Wetmore	21	22	Woodstown	8.71	Cape May C. H.	1.67		
New Mexico	69.7	+ 0.5	Versailles	103	17	Luverne	31	1	Salado	4.37	Luna	0.05		
New York	64.3	- 1.1	Billings	94	27	Duck Hill	50	2	Blue Mountain Lake	11.59	Youngstown	2.22		
North Carolina	74.6	+ 0.3	Forsythe	94	2	Ironton	42	1	Horse Cove	9.55	Manteo	0.20		
North Dakota	59.7	- 3.5	Dawson	99	9	Wolsey	23	18	Oakdale	8.17	Fort Yates	2.38		
Ohio	69.2	- 1.9	Pioche	101	30	Kennedy	37	22	Benton Ridge	9.27	Greenville	1.82		
Oklahoma and Indian Territories	78.5	+ 1.8	Quossee, Me.	95	16	Battle Mountain	22	2	Fairland, Ind. T.	7.38	Grand, Okla.	0.58		
Oregon	59.4	- 0.4	3 stations	96	19	Patten, Me.	26	7	Government Camp	3.74	Buckhorn Farm	0.13		
Pennsylvania	68.0	- 0.4	San Marcial	110	28	Charlotteburg	35	4	Somerset	8.35	Philadelphia	1.77		
Porto Rico	78.4		Elmira	95	19	Elizabethtown	28	6, 17	Las Marias	12.43	Cidra	1.07		
South Carolina	78.9	+ 0.9	Hanover	99	19	Winnoset	28	18	Walhalla	6.30	Little Mountain	0.17		
South Dakota	64.4	- 2.3	Manati	99	3 dates	Paul Smiths	22	1	Forestburg	10.91	In the Trees Camp	2.56		
Tennessee	75.7	+ 0.9	Yorkville	101	22	Buck Springs	30	10	Jackson	12.09	McGhee	2.40		
Texas	80.5	+ 0.4	Armour	103	13	3 stations	32	20, 21	Tullahoma	15.33	Tulia	0.11		
Utah	64.7	- 0.8	Pop Springs	107	15	Erasmus	40	1	Meadowville	1.15	20 stations	0.00		
Virginia	72.2	- 0.2	Big Spring	107	15	Texline	45	1	Charlottesville	8.00	Danville	1.03		
Washington	60.3	- 0.8	Grayson	110	22	Reaver	23	5	Ashford	5.88	2 stations	0.99		
West Virginia	70.6	- 0.2	Arvon	101	19	Blacksburg	33	30	Terra Alta	7.72	Weston	1.74		
Wisconsin	64.1	- 1.2	Hatton	101	20	Cheney	27	14	Meadford	16.20	Madison	2.88		
Wyoming	56.5	- 1.8	Valley Fork	100	19	Bayard	34	4	Cambria	5.21	Green River	0.15		
			Prairie du Chien	98	4	Butternut, Prentice	32	27						
			Fort Laramie	97	27	Border	21	6						

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. † 49 stations, with an average elevation of 667 feet. ‡ 128 stations.

deteriorated, but other fruits did well. Potatoes did well, but corn was backward. Tobacco was transplanted and started well. Farm work was delayed by rain, but at the end of the month was fairly well advanced.—H. B. Hersey.

North Carolina.—Excepting cool periods about the 2d and 10th, the temperature during June was favorable for the growth of crops, especially during the last decade, which was very warm. The precipitation was below normal, giving farmers opportunity to cultivate crops. Cotton improved steadily in appearance and growth, it branched well, squares formed freely, and blooms appeared by the end of June; lice were injurious in many counties. The progress of corn was not so favorable. Tobacco grew fairly well and a little was cut and cured. Wheat and other small grains were successfully harvested, but the yields were not large. Minor crops did well.—C. F. von Herrmann.

North Dakota.—The month was generally cool and cloudy, with heavier rainfall than usual, and very favorable for most crops, except corn and flax. Some of the lowlands in the eastern and northern parts of the State were flooded by heavy rains and crops growing there were consid-

erably damaged. Planting and seeding of all grain were practically finished at the close of the month.—B. H. Bronson.

Ohio.—Wet weather retarded the growth of crops during the fore part of the month. Much replanting of corn was necessary. Wheat was ripening nicely at the end of the month. Some damage by the weevil and rust was reported. Garden crops good. Tobacco mostly transplanted and growing well. A large hay crop. Some potatoes rotting in ground and some blighting, but damage not serious.—J. Warren Smith.

Oklahoma and Indian Territories.—The driest June on record, with the exception of June, 1894. The temperature was slightly above normal. Wheat, oats, rye, barley, potatoes, hay, fruit, and berries were harvested or being secured, with poor to good yields. Corn was laid by, and silked, tasseled, and eared out well. Cotton was chopped to a fair stand, with early squaring, blooming, and fruiting well; some damaged by web worms. Minor crops did well.—C. M. Strong.

Oregon.—Fall wheat, barley, and rye headed and filled nicely. Spring wheat made good advancement and it began to head during the third decade. Spring oats made rather poor growth, owing to prevalence of

red rust. Alfalfa, vetch, and clover yields were generally above the average, and pasturage continued good. Potatoes and gardens made splendid progress, but hops did poorly, owing to the yards being badly infested with lice. The yield of strawberries and cherries was below average.—*Edward A. Beulis.*

Pennsylvania.—At the close of the month considerable hay and some wheat and rye were secured. Oats were heading rapidly and a good crop was promised. Practically all crops were well advanced. Corn, tobacco, vegetables, and pastures were in prosperous condition and garden truck and small fruits were plentiful. Apples were of excellent quality, but scarce and dropping badly. Buckwheat seeding and cultivation were progressing satisfactorily and the transplanting of tobacco plants was practically completed.—*T. F. Townsend.*

Porto Rico.—Weather favorable for growth until the last week, when it became too dry. Cane grinding nearly finished; crop generally excellent, although below normal in a few wet districts. Cane planting continued; young canes did well. Coffee maturing and a small amount picked; the berries fell badly in a few districts on account of dry weather. Corn, beans, and other small crops were harvested and planted. Mangoes and pineapples were abundant; a few alligator pears marketed. The cotton crop was badly damaged by worms in some places.—*E. C. Thompson.*

South Carolina.—Temperatures were favorable. Deficiency in precipitation gave opportunity to clean field crops of grass and weeds and give them much needed cultivation, but the long, dry spell and previous lack of cultivation had injured early corn irretrievably. Cotton improved steadily; blooms were noted during the last decade. Wheat and oat harvest was finished. The weather was unfavorable for the best development of tobacco. Early peaches were plentiful and of good quality. Minor crops needed more moisture.—*J. W. Bauer.*

South Dakota.—Month cooler than usual, with much cloudiness. Excessive rainfall over much of the State, injuring crops on lowlands. Spring wheat, oats, barley, spelt, winter and spring rye, potatoes, and flax did well, except on lowlands, though red rust appeared in considerable wheat and in some oats in the third decade. Corn was backward and cool weather and frequent rains retarded growth and cultivation. Grass was in excellent condition. By the 25th barley, spring rye, and early oats were heading and early spring wheat was beginning to head. Local damage from hail.—*S. W. Glenn.*

Tennessee.—The first ten days of the month were very favorable for farm work, which was pushed vigorously, but the cool nights were unfavorable to cotton and young corn. Rainy weather from the 12th to 30th greatly hindered cultivation and harvesting, and much grain and hay were badly damaged. The yield of oats and hay was very good, but of wheat only fair. At the end of June all crops were growing rapidly, cotton and tobacco being overgrown in many fields, and all were very much in need of cultivation. Apples and peaches were scarce and inferior.—*H. C. Bate.*

Texas.—Temperatures generally averaged above normal, but were slightly below in the southwestern district. The weather was gener-

ally favorable for crops and farm work early in the month, but showery weather later delayed work and caused some damage to grain in shock. Cotton improved decidedly early in month, but later weather was less favorable, and caused increased activity of boll weevils. Some cotton picked in extreme south by end of month. Corn improved rapidly during latter part of month. Other crops fair to good.—*M. E. Blystone.*

Utah.—The temperature was about normal. Precipitation was deficient and none was reported over portions of the southern counties. Irrigated crops were in good condition, but arid land crops deteriorated considerably. Fall and early sown spring wheat were being harvested, also the second crop of alfalfa. Insects were reported in some sections. Beets were in fine condition and gardens were doing well. Ranges deteriorated, but stock was still thriving.—*R. J. Hyatt.*

Virginia.—Cool weather prevailed over the State, with variable and poorly distributed amounts of precipitation, until the 14th. These conditions were unfavorable for crop progress, especially spring plantings. After the 15th warmer weather, with ample rainfall, prevailed and there was a general improvement in the condition of vegetation. Harvest of wheat and oats began in the month and haymaking also was undertaken, but this and other field work was interrupted considerably by frequent rains.—*Edward A. Evans.*

Washington.—The western division had nearly normal conditions, but in the eastern division there was an unusual amount of rain, the greatest amount on record in some of the central counties. The result was very beneficial for nearly all crops, especially for pastures, meadows, potatoes, oats, barley, and wheat. Winter wheat grew very rank and some was lodged by wind and rain.—*G. N. Salisbury.*

West Virginia.—Conditions were generally favorable for growth, but cultivation was retarded during the first and fourth weeks by wet weather. The third week was clear and hot and especially favorable for the rapid growth of corn. At the close of the month clover and wheat harvest was in progress, oats, gardens, millet, and sweet and Irish potatoes were doing well, and meadows and pastures were improving.—*E. C. Vose.*

Wisconsin.—The month was notable for severe local storms, excessive rainfall, and deficiency of sunshine and temperature. The storm that passed over the State on the 3d to 6th resulted in almost unprecedented rains in the central and northwestern counties, flooding lowlands and causing much damage to crops along the streams. Bridges were washed away in many places and traffic delayed. Growing crops made satisfactory progress during the month, except on lowlands, where excessive moisture interfered with growth.—*W. M. Wilson.*

Wyoming.—The heavy rainfall over the northern and eastern counties rendered irrigation unnecessary over many sections, and the streams of the State gave plenty of water for irrigation where necessary. Gardens were backward, but grain made good progress. The harvest of the first crop of alfalfa was in progress at the close of the month, and a good crop was being secured. Native meadows made good growth. Ranges continued to improve, and all stock were in excellent condition.—*W. S. Palmer.*

SPECIAL ARTICLES.

TORNADO OF JUNE 5, 1905, AT BINGHAMTON, N. Y.

By W. E. DONALDSON, Observer.

This elaborate paper contains many details of local interest and is fully illustrated by charts and photographs, for which, however, space could not be afforded here. The following paragraphs will indicate the scope of the paper, and suffice for the meteorologist.—*Ed.*

A small, local, very violent storm passed over Binghamton, N. Y., about 10:30 p. m., of June 5, 1905. The weather during the day was moderately warm, with a maximum temperature of 79°. A thunderstorm with feeble thunder and lightning and light rain occurred during the afternoon. The isobars for 8 p. m., June 5 are shown in fig. 1.

Heavy rain accompanied by frequent and extremely vivid lightning and strong gusts of wind commenced about 9:22 p. m., and continued until 10:30 p. m., when a confused rumbling roar was heard for a short time, after which comparative silence ensued. The roar is presumed to have been caused by a violent whirlwind, moving at a rate of 45 or 50 miles per hour.

The storm first struck Binghamton at the Westcott place at the extreme southwestern limit of the city within a few hundred feet of the left bank of the Susquehanna River. Here the whirlwind demolished three barns, damaged several houses and barns, and uprooted a number of large trees.

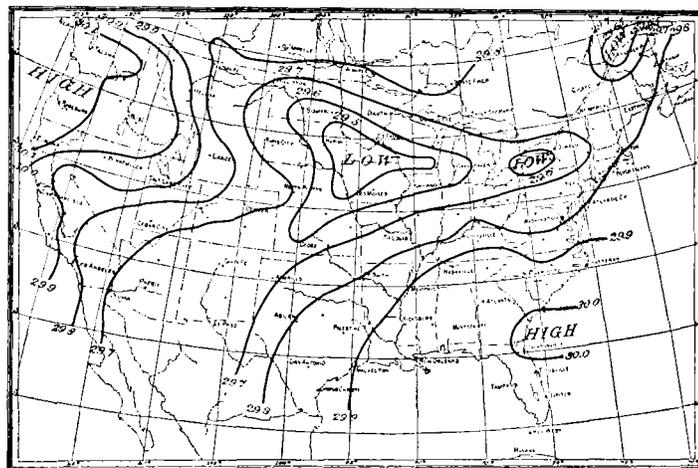


FIG. 1.—Isobars for 8 p. m., June 5, 1905.

Crossing the river the whirlwind struck a field of rye near the track of the Binghamton Driving Park. From this point it followed a path extending over the low flood plain on the right bank of the river and probably a portion of the river within a few hundred feet of the right bank, the width of the track over the flood plain being from 170 to 400 feet. Here the storm uprooted and broke off many trees ranging