

Serious damage was done by hail of large size in several counties in Ohio. In Harrison County some were picked up that measured 7 inches in circumference, and in Guernsey County they were as large as goose eggs. One of the most destructive hailstorms occurred in the south end of Columbus, Ohio, and the country just to the south of the city. In some parts of the area covered by the storm the hailstones ranged in size from hickory nuts to nearly 3 inches in diameter. One stone that struck and broke the arm of a man who was endeavoring to control his team of horses measured $2\frac{7}{8}$ inches in diameter 15 minutes after it was picked up. At the city sewage disposal plant a stone was found that weighed 2.6 ounces. Garden truck in that vicinity was almost completely destroyed, and fruit and shade trees were badly damaged. There are a large number of greenhouses in that part of the city, and they suffered severely. About 80 per cent of the glass in the seven large greenhouses of the Columbus Floral Co. was broken and the tender flowering plants inside nearly destroyed, the loss of this company being estimated at \$20,000. The total loss in that vicinity is placed at \$150,000.

July 10.—At Albion, Ill., three barns were struck by lightning and burned. A destructive storm occurred in Ballard County, Ky. Many stock barns, outbuildings, and several residences were struck by lightning. Losses in stock, buildings, fences, and crops were heavy. Also a Mrs. Watson was killed by lightning. A severe electric storm caused considerable damage near Rockport, Ind., several barns being struck by lightning and destroyed. One of the barns contained a mule, 15 tons of hay, and a crop of unthrashed wheat, all of which were destroyed.

July 13, 14, 15.—Severe storms occurred in Ohio, attended by excessive rains, lightning, and hail. (See special article by J. M. Kirk, local forecaster, Columbus, Ohio, herein.)

July 17.—There were three deaths and two prostrations in Louisville, Ky., from heat, and much suffering in the congested districts.

July 18.—There were 13 deaths and 10 prostrations in Louisville, Ky., on account of heat, the temperature reaching 104°, the third highest on record.

July 19.—High winds and heavy rains caused considerable damage in many localities in West Virginia. Also there were severe storms in northern and eastern Kentucky. The wind reached a velocity of 60 miles per hour at Louisville, attended by heavy rain, hail, and unusual darkness. Trees were blown down and inter-urban service interrupted. A horse was killed and two negroes injured by lightning. Damage amounting to about \$75,000 was done in and about Paris, Ky., and about \$50,000 at Frankfort, Franklin County, Ky. In the latter section many farm houses, silos, outbuildings, and fences were wrecked. A tornadic funnel-shaped cloud was observed by several.

July 20.—A destructive hailstorm swept across Ashland and southeastern Wayne Counties, Ohio. The width of the hailstorm was about three-fourths of a mile. A large amount of damage was done to crops, in some instances farmers losing entire crops of corn and oats. Two persons were killed in a church by lightning near Highlands, N. C.

July 22.—A large barn near Fayetteville, Tenn., was struck by lightning and totally destroyed, together with three head of stock and a quantity of grain and hay.

July 27.—A large barn containing 20 tons of hay and a large amount of farming implements was destroyed by lightning in Trumbull County, Ohio.

July 29.—A man was killed and two other persons severely injured by lightning in Knox County, Ohio, and

a barn and contents were destroyed in Trumbull County, Ohio.

July 30.—Lloyd Whaley was killed by lightning in Ritchie County, W. Va. Four deaths and five prostrations from heat occurred in Louisville, Ky.

July 31.—Several violent storms swept through central Indiana, and a large amount of damage was done to buildings and shade trees in Indianapolis. Plate-glass windows were blown out in the business section of the city and business houses were unroofed. Street-car service and telegraph and telephone communication were interrupted. At Red Hill, near Livingstone, Ky., lightning struck four men who were sitting on a porch. One was killed outright and two others were seriously injured. A wind storm passed over the fair grounds at Nashville, causing damage of at least \$20,000 to buildings and grounds.

RIVERS.

Streams throughout Pennsylvania and West Virginia, the headwaters of the Ohio, were at normal stages during the month and the water supply was ample for all needs. There was a marked rise in the Little Kanawha in West Virginia, caused by the heavy rains of the 10th. Floods were caused by the excessive rains of the 13th-15th in the streams of southeastern Ohio, especially in the Muskingum drainage area. These rains and freshets caused a sharp rise in the Ohio River and good stages all the way down. In some of the reaches below the mouth of the Muskingum the Ohio overflowed the bottoms and damaged crops. The Cumberland River was too low for navigation, except where made navigable by artificial means. The Tennessee River in its entire length was at low stages all the month and navigation was suspended after the 9th.

DESTRUCTIVE STORMS OF JULY 13-14 IN OHIO.

[J. M. Kirk, Local Forecaster.]

During the afternoon and night of July 13 unusually severe storms passed across middle and eastern Ohio, which destroyed property to the extent of many thousands of dollars. A brisk to high wind had prevailed during the most of the day, and this, in some of the northern and middle-eastern counties, had already done considerable damage. During the afternoon light showers occurred in some localities, and in the late afternoon hail fell in about two-thirds of the northern and several of the middle-eastern counties. In parts of Ashland, Coshocton, Huron, Medina, Richland, Stark, and Wayne Counties the hailstones were unusually large and caused a great amount of damage to growing crops and, in some instances, to buildings. At Burbank, Wayne County, 32 panes of glass were broken in one house and 30 in another. At Lodi, Medina County, the stones were as large as hens' eggs, and a large greenhouse there lost every glass.

The lightning during the storm was unusually severe. Some observers reported the thunder and lightning to have been almost continuous throughout the night. A large number of buildings were struck and many barns destroyed, together with their contents, which in most cases included the season's crop of hay. In the 5 counties of Crawford, Hardin, Huron, Marion, and Wyandot 23 barns were reported to have been destroyed, while in Knox County alone 6 barns were destroyed and several other buildings damaged. The telephone and telegraph service was almost completely paralyzed for a short time in that part of the State.

The most noteworthy feature of this storm period was the almost unprecedented rainfall that occurred in some of the southeastern counties. The following table gives

the amounts that fell during the afternoon and night of the 13th at stations in middle-northern and southeastern Ohio. The most of these stations are in the Muskingum watershed, and the principal part of the rain fell during the night in less than 12 hours.

Station.	County.	Amount.	Length of period.
Ashland.....	Ashland.....	2.00	2 hours.
Bladensburg.....	Knox.....	3.35	3 1/2 hours.
Bucyrus.....	Crawford.....	2.40	Less than 24 hours.
Cambridge.....	Guernsey.....	4.46	12 hours or less.
Clarington.....	Monroe.....	3.50	Do.
Delaware.....	Delaware.....	2.62	9 hours.
Gratiot.....	Licking.....	3.98	8 hours.
Killbuck.....	Holmes.....	3.50	12 hours or less.
Lima.....	Allen.....	2.35	Less than 24 hours.
McConnellsville.....	Morgan.....	3.24	12 hours or less.
Millfordton.....	Knox.....	2.90	Do.
Milligan.....	Ferry.....	3.56	6 1/2 hours.
Philo (1).....	Muskingum.....	6.45	12 hours or less.
Philo (2).....	do.....	7.17	8 hours 42 minutes.
Summerfield.....	Noble.....	4.51	12 hours or less.
Toboso.....	Licking.....	7.40	Do.
Upper Sandusky.....	Wyandot.....	3.08	Do.
Zanesville.....	Muskingum.....	6.70	Do.

The rainfall was heaviest in Muskingum, eastern Licking, and western Guernsey and Noble Counties. All the streams in southeastern and middle-northern Ohio rose rapidly and by Monday morning many of the smaller ones had overflowed their banks and were sweeping over the lowlands. In the southeastern counties small creeks became raging torrents, carrying fences, crops, and light buildings along in their swift currents.

The Muskingum rose 14.7 feet at Zanesville to the 23-foot stage, or 2 feet below flood stage. At McConnellsville it reached 20.8, or 5.8 feet above the flood stage. At Beverly it reached 29, or 4 feet above the flood stage.

The damage along the Muskingum was not extensive, however, except at Marietta, where the new Baltimore & Ohio Railroad bridge and a temporary pontoon bridge constructed by the city were washed out, and a man was carried over the dam in the river and drowned.

The destruction was much greater in the valleys of the smaller tributaries than along the main stream. In many of these the water was higher than it was during the great flood of last March, and in some it was higher than ever before known. In the hilly country of southeastern Ohio the towns are usually situated in the narrow valleys, and when the flood came upon them hundreds of the inhabitants were compelled to flee for their lives to the neighboring hills. On Monday, the 14th, the valley of the East Fork of Duck Creek for a distance of 45 miles, and of the West Fork for a distance of 25 miles, in Noble and Washington Counties, were reported to have been under 10 to 25 feet of water.

CONDITIONS BY COUNTIES.

Ashland.—Points along the streams never before reached were water covered, and bridges that withstood the March flood were washed away. Crops were destroyed or badly damaged by the wind, rain, and hail. One farmer lost 20 sheep by lightning.

Coshocton.—The storm lasted from Sunday until after daylight Monday morning. It was accompanied by high winds, which leveled orchards, corn, and grain, and considerable damage was done by hail and lightning.

Guernsey.—All streams were reported to have been out of their banks. Wills Creek was higher than shown by any previous record, and many houses in that valley were flooded. Water from this stream reached the Derwent mine of the O'Gara Coal Co. and flooded the entire workings. The machinery was badly damaged and 17 mules, caught in the mine, were drowned. The total loss to the company was estimated at \$65,000. Several other mines

were flooded also, but the losses were not so great. Telephones and railroads were badly crippled and the damage to crops by rain and hail was heavy.

Knox.—The thunderstorms during the night were severe. Six barns were destroyed, several houses and barns were damaged, and a number of farm animals killed. Wheat and hay were scattered about by the wind and damaged by the rain, and corn and oats were blown down.

Licking.—In addition to the heavy loss to crops about 50 bridges were washed away, causing a loss of \$100,000.

Morgan.—The damage in this county was greatest along the Olive Green and Meigs Creeks, to the east of the Muskingum. Many bridges along these streams were washed away or badly damaged. On Meigs Creek alone the loss in bridges was \$42,000. The fences and crops in the bottom lands were nearly all lost, while on the higher ground the crops were damaged by wind and rain. Meigs Creek was said to be 4 or 5 feet higher than any previous record. The Muskingum reached several buildings in both McConnellsville and Malta, but the damage from the high water was not large.

Muskingum.—This county was in the center of the heavy rainfall area. Thousands of acres in the lowlands were inundated and the damage to crops was probably heavier than in any other county. There were 34 county bridges damaged or washed out, with a loss estimated at \$50,000. Railroad traffic was demoralized for a day or two on all roads. On the Ohio River & Western it did not get back to normal conditions for two weeks. In a distance of 40 miles east of Zanesville that railroad lost 26 bridges. The Muskingum did not reach flood stage at Zanesville, and the damage in that city was slight.

Noble.—The loss to property in this county was heavy, especially along the branches of Duck Creek. The following estimates of losses have been furnished: Highways, bridges, and buildings, \$300,000; crops, \$500,000; live stock, \$2,000; loss due to suspension of business, \$10,000. At Dexter City the water was 6 feet deep in the depot, and several buildings were washed away. At Belle Valley two houses were flooded to their second story and one was carried out upon the railroad track. Seven houses were washed away at Harrietsville. A passenger train on the Ohio River & Western Railroad ran into a washout and the engineer and three passengers were injured.

Richland.—A high wind prevailed all day on Sunday, and the rainstorm began about 6 p. m. The thunderstorms during the night were unusually severe. Telephone service throughout the county was badly crippled. Hail fell in extreme northern and southern parts of the county, doing considerable damage in those localities. Some of the streets and basements in Mansfield were flooded to some extent.

Stark.—Much damage was done to crops by wind, rain, and hail. The rainfall in this county was not excessive and there was no loss by high water. In the southwestern part a severe hailstorm occurred which nearly destroyed the growing crops in a path about two miles wide. Electric railways in that vicinity and telephone lines throughout the country were out of commission for several hours.

Washington.—Many bridges were lost, and crops in the lowlands were almost ruined. Several villages on Duck Creek were badly wrecked by the high water. In some instances stores with their stocks of goods were said to have been completely submerged. At Lower Salem 2 bridges were washed out and 5 stores and 10 houses were destroyed. A passenger train was caught in the flood of Duck Creek at Stanleyville and the passengers were taken out in a small boat. Within a few hours the water was running 3 feet over the top of the coaches.