

cool temperatures, and as moisture was abundant a vigorous and healthful growth in crops occurred and the month closed under generally favorable circumstances. Winter wheat ripened and harvest was begun in the month. Yields were, for the most part, inferior in quantity and quality. Winter oats were also cut, and the crop was a poor one. Gardens, pastures and mowing meadows were in good order at the close of the month.

**July.**—Throughout the entire month the general weather conditions prevailing were favorable for crop growth and for all lines of farm work. The forepart of the month found winter wheat and oats harvest completed in all sections except portions of the Valley division, and subsequent work in connection with these crops consisted of stacking, hauling to barns and threshing. Spring oats matured, and their harvest was begun and practically finished by the close of the month. Corn made excellent progress, early plantings earing freely and late plantings growing fast. Much of the crop was laid by, and its condition at the close of the month was quite promising. Tobacco set out early began to top towards the 10th. There was quite an acreage of this crop that was somewhat late at the beginning of the month, but the favorable weather caused a rapid advance in most localities, so that by the closing days a nearly normal seasonal condition prevailed. All minor crops did well. Excellent haying weather was had, and much of the work of the month consisted of securing the crop.

**August.**—The general weather conditions prevailing over the State during the month were more than ordinarily favorable for the progress of all outstanding crops, and, as a rule, for field work also, though, as to this, there were some localities where rain was too frequent and heavy to admit of much being accomplished in this direction. Preparation for fall seeding was somewhat late owing to excess of moisture in the ground, yet this was more than offset by the excellent growth of vegetation due to the plentiful rainfall, particularly in the line of pastures, which were unusually good, and mowing meadows, which will yield a second crop of hay. Corn was a little backward at the beginning of the month, but came on rapidly under the influence of seasonable temperatures and rainfall. Tobacco made excellent progress. In some of the Southside counties early fields ripened and cutting and curing were begun, while topping and priming were general elsewhere. A very satisfactory yield was secured from the first planting of Irish potatoes, and the second planting of this crop was well along in the Tidewater division by the close of the month. Apple orchards were bearing a full average crop of fruit, and good returns were indicated.

**September.**—There was an unusual amount of clear and cool weather during the month, which was, for the most part, favorable for the carrying on of farm work. The month opened with rather droughty conditions prevailing in the western counties, which were not relieved until the 16th and 17th, and then only partially so. The effect of the drought was especially noticeable in the deterioration of corn and pastures, and it also delayed the preparation of the ground for fall seeding. Plowing was actively carried on throughout the month in most sections, and much grain was sown during the latter half of the month. A good second growth of grass on the meadows and pasture lands started early in the month, making excellent grazing and resulting in a thriving and healthy condition of stock. Fodder pulling and corn cutting was commenced the first week, and was practically completed by the last week. In the Tidewater and Middle divisions the corn crop was virtually all matured by the 15th; in the Valley division it was not quite so forward, but was far enough advanced to be safe from injury by frost. Tobacco cutting and

housing was carried on generally up to about the 20th. The weather was exceptionally favorable for the ripening of the apple crop, although considerable dropping occurred in western counties and some rotting in Tidewater. Picking and shipping was begun about the 10th. Reports indicate a rather unfavorable condition of the late potato crop in Eastern Shore districts, due to excessive moisture, which caused rotting.

The issue of the Weekly Crop Bulletin was suspended for the season on September 22, 1903.

Throughout the subsequent months of the year crops were, for the most part, retarded by adverse conditions of weather, first from want of sufficient moisture and later by deficient moisture and temperature. The latter condition was especially decided. Early-sown winter wheat and oats, though much injured, were not winter-killed, but the later seedings of these crops suffered extensively. There was practically no snow protection throughout the fall and up to the close of the year.

### KILLING FROSTS.

Table of Dates of Last Killing Frost in the Spring and the First Killing Frost in the Autumn.

Station.	Last killing frost in Spring.	First killing frost in Autumn.	Station.	Last killing frost in Spring.	First killing frost in Autumn.
<b>TIDEWATER VIRGINIA.</b>			<b>MIDDLE VIRGINIA—Continued.</b>		
Ashland .....	Apr. 6	Oct. 19	Lynchburg .....	Apr. 5	Oct. 27
Cape Henry .....	Feb. 26	Nov. 9	Manassas .....	Apr. 6	Oct. 27
Hampton .....	Apr. 2	Oct. 27	Quantico .....	Apr. 5	Nov. 7
Newport News .....	Mar. 29	Nov. 7	Rocky Mount .....	Apr. 6	Oct. 27
Norfolk .....	Apr. 3	Oct. 28	Saxe .....	May 1	Oct. 27
Petersburg .....	Mar. 8	Oct. 27	Stanardsville .....	Apr. 7	Oct. 25
Richmond .....	Apr. 5	Nov. 7	Washington .....	Apr. 6	Oct. 28
Spotsville (near) .....	Apr. 22	Oct. 19			
Warsaw .....	Apr. 6	Oct. 27	<b>THE GREAT VALLEY.</b>		
West Point .....	Apr. 7	Oct. 27	Big Stone Gap .....	Apr. 24	Oct. 19
Wilkesons .....	Apr. 6	Oct. 27	Blacksburg .....	May 2	Sept. 29
Williamsburg .....	Mar. 4	Oct. 27	Bristol .....	Apr. 24	Oct. 19
			Burkes Garden .....	May 5	Sept. 19
			Dale Enterprise .....	May 7	Sept. 25
			Elk Knob .....		Oct. 24
			Grabbins Forge .....	May 2	
			Hot Springs .....	Apr. 27	Oct. 18
			Lexington .....	May 2	Oct. 19
			Marion .....	Apr. 29	Oct. 13
			McDowell .....		Oct. 14
			Rounoke .....	Apr. 24	Oct. 25
			Seaton .....	May 2	Oct. 25
			Stephens City .....	Apr. 6	Oct. 25
			Woodstock .....	May 2	Oct. 19
			Wytheville a .....	Apr. 5	Sept. 19
			Wytheville a .....	Apr. 5	Oct. 19
<b>MIDDLE VIRGINIA.</b>					
Alexandria .....	Apr. 5	Oct. 27			
Bachorsville .....	Apr. 5	Oct. 27			
Bedford City .....	Apr. 5	Oct. 27			
Buckingham .....	May 1	Oct. 18			
Culaville .....	Apr. 5	Oct. 27			
Charlottesville .....	Apr. 6	Oct. 27			
Columbia .....	May 5	Oct. 19			
Farmville .....	May 3	Oct. 26			
Fredericksburg .....	Apr. 7	Oct. 27			
Lacrosse .....	Apr. 6	Oct. 26			
Lincoln .....	May 2	Oct. 25			

**ERRATA.**—Annual for 1902: June, Rocky Mount, mean temperature, p. 8, 69.2, should be 67.0; February, Fredericksburg, mean temperature, p. 8, 31.3, should be 31.0; May, Blacksburg, mean temperature, 63.9, should be 64.2; Blacksburg annual mean temperature, pp. 7 and 8, 52.3, should be 52.4; May, Woodstock, mean temperature, p. 8, 66.0, should be 66.5; December, Ashland, monthly precipitation, p. 11, 5.94, should be 5.74; Ashland, annual precipitation, pp. 7 and 11, 45.53, should be 45.33; November, Buckingham, monthly precipitation, p. 11, 3.26, should be 3.66; December, Buckingham, monthly precipitation, 3.56, should be 2.86; November, Lacrosse, monthly precipitation, p. 11, 2.40, should be 0.24; Big Stone Gap, annual precipitation, p. 7 and 11, 48.07, should be 48.05; April, Salem, monthly precipitation, p. 11, omitted, should be 1.76; Speers Ferry, monthly precipitation, p. 11, 4.34, should be 7.34; Speers Ferry, annual precipitation, pp. 7 and 11, 46.95, should be 49.95; November, Wytheville (s), monthly precipitation, p. 11, 2.68, should be 2.58; Wytheville (s), annual precipitation, pp. 7 and 11, 34.14, should be 34.04.

## GENERAL SUMMARY FOR THE YEAR 1903.

**January.**—Temperatures during the month were rather variable, though on the whole the changes towards colder were more decided. Notwithstanding the occurrence of the "January thaws" usual in this section during the month, the mean temperature was 0.1 degree below normal. In the opening days the weather was moderate, but beginning with the 4th a change towards colder set in, and the period 6th to 14th gave temperatures low enough to produce good ice for skating and harvesting in all parts of the State. Moderately cold weather again prevailed on the 19th and 20th and the 24th to 26th. The periods intervening between these dates of cold weather were marked by rising temperatures more or less decided in energy. The closing days of the month gave the absolute maximum temperature at nearly all stations. Precipitation during the month coincided quite closely with the advent of temperature changes toward warmer, and continued well into the warm periods. Less than the usual amount of snow fell, and that occurring came, as a rule, in the first and last decades. The average monthly amount for the State, 3.63 inches, was 0.54 inch above the normal, and has been exceeded but twice since record has been kept by the Bureau, viz., in 1892 and 1895.

Some increase in river stages resulted from the rain of the 2d, warning of which was duly issued.

Prevailing wind direction, W.

**February.**—Notwithstanding the occurrence of some rather cold weather during the latter part of the second decade of the month, the temperatures, as a whole, averaged considerably above the normal, the excess being 3.8 degrees. From the 1st to the 3d the weather was mild, maximums ranging from 50 to 68 degrees being had. On the 6th cooler weather set in, which continued until the 11th, when a period of moderate temperatures obtained. This in turn was followed by the coldest weather of the month, culminating on the 18-19th in minimum readings below zero in portions of the Middle and Valley divisions. Thereafter a reaction towards warmer set in, and the month closed with temperatures above normal, the 28th being the warmest day. Precipitation during the month was considerably greater than the normal, the excess being 1.30 inches. Showers occurred during the 1st to 4th, 11th, 16-17th and 27-28th. The average monthly total, 4.79 inches, was above the record for February of all years except 1897 and 1899. Snow fell in Middle and Tidewater Virginia immediately preceding the cold weather of the 18-19th, and in the Great Valley division on several dates in the first and second decades. Moderate freshet conditions were had consequent upon the rain of the 16-17th, timely warning of which was issued.

Prevailing wind direction, W.

**March.**—The temperatures prevailing throughout the month were unusually mild. Not since the record has been kept by the Bureau has the mean, 51.8 degrees, been equaled. In the opening days the daily maximums reported ranged, with few exceptions, above 60 degrees, with relatively high minimums, while after the 14th daily maximums of 70 degrees, or more, were common until the three last days of the month, when cooler weather set in. A wonderful advance in vegetation resulted. Precipitation was, as a rule, uniform and well distributed in each section. The average monthly amount, 5.79 inches, was notably above the normal, the excess being 2.06 inches. Only one other March of record, that of 1899, exceeds it. Light snows occurred in all sections on the 28th. The streams of the State carried more than the usual volume of water, and during the 21-23d James river was in flood, a maximum stage of 13.9 feet being re-

corded at Richmond. The usual warnings were duly issued covering this rise.

Prevailing wind direction, NE.

**April.**—The month had considerable cloudy weather. There were two periods during which the temperatures were decidedly lower than normally, but the mean for the month was normal. In the first week there were five days having temperatures at the frost line, and during this period much damage was done to vegetation, particularly early fruit bloom. On the morning of the 5th killing frost was had quite generally, except along the coast. On the other hand, from the 7th to the 12th the weather was warm, maximum readings of 80, or more, degrees being recorded. Again, on the 29-30th, the weather was warm, and the highest readings of the month were observed. Excepting for some light snow in the western portions of the State and local instances of sleet and hail, precipitation came as rain. There were five rain periods in the month. Compared with the normal, the average quantity received was 1.03 inches in excess, and the month was the fourth consecutive one in which a more than normal amount of precipitation was had.

Prevailing wind direction, W.

**May.**—Throughout the month the weather was generally bright and pleasant until early in the last decade, when a period of gloomy weather set in that continued until the end of the month. Moderate temperatures obtained daily until about the 18th, when a period of warm weather set in that lasted nearly a week. Subsequently nearly normal temperatures were had. The coolest weather was generally observed in all districts between the 1st and 5th, and during this period light to killing frosts occurred in various localities in the Middle and Great Valley sections. Precipitation was deficient. During the first and second decades only one rain of consequence, that of the 3d, occurred. On the 23d a rainy spell set in that lasted uninterruptedly until the close of the month. The amounts, however, were light, and the average total for the month for the State, 2.39 inches, was nearly 2 inches below the normal, and about half an inch lower than any that had previously been recorded in the month.

Prevailing wind direction, SE.

**June.**—In respect to temperature, the month was much cooler than ordinarily, the deficiency averaging 5.7 degrees. Compared with the records on file for June of other years, the mean temperature, 67.4 degrees, was 4.0 degrees below the lowest previously reported. The maximum and minimum extremes, however, were well within the record. Heavy and frequent precipitation was had during the month. On the 1st general rain fell, followed by showers until the 4th. From the 5th to 9th, inclusive, heavy and general rains fell, and thereafter either general or local rains occurred in the State every day until the close of the month. Some notable monthly amounts were had, there being six stations reporting over 10 inches, and one, Charlottesville, having the phenomenal total (for this section) of 15.82 inches, constituting a record breaker for the State for the month. Decided freshet conditions obtained in James river as a result of the rains of the 5th to 7th, warnings of which were duly issued.

Prevailing wind direction, W.

**July.**—A deficiency in the mean temperature of the month of 1.0 degree was had. This deficiency was not the result of any decided periods of cool weather, but rather of the prevalence of temperatures slightly lower than normally during the major part of the month. There were, however, some days on which the temperature reached the 100 degree mark, while on others the minimum went as low as 43 degrees, but in these respects the conditions were within the record for July. General and decided rains occurred in three periods,

viz., 4th to 6th, 12-13th and 30-31st. Rains more or less local also fell on various other dates. The average monthly amount was below normal by 0.72 inch. No flood rises of importance occurred in any of the rivers of the State.

Prevailing wind direction, SW.

**August.**—Cool weather obtained during the opening days of the month, but by the 5th a change towards warmer set in that lasted with but temporary intermissions during the ensuing six days. An extended period of weather cooler than normally then set in, continuing until the 21st. This was then followed by rising temperature, during which the maximums for the month were had in all sections of the State. The coolest weather prevailed generally early in the month. The distribution of rainfall over the State was unequal, the Great Valley division having amounts less than the normal, while the Middle and Tidewater divisions had more. For the most part the rainfall was in the nature of local showers. The usual midsummer river stages obtained in all the streams of the State.

Prevailing wind direction, W.

**September.**—A rather uniform condition of temperatures prevailed throughout the month, the first half being slightly above the normal steadily and the last half slightly below. The absolute maximum and minimum values were well within the record. The rainfall for the month was deficient by 1.49 inches, but that occurring was well-distributed both as to dates of occurrence and area. These rainy periods were the 1-2d, 8-11th, 16-18th and 27-28th. The rivers remained at low-water stages throughout the month.

Prevailing wind direction, W.

**October.**—Nearly normal temperatures were had at the beginning of the month, but warmer weather at once set in and the thermal conditions ranged above the normal until the 9th, when a period of moderately cool weather began, which lasted practically until the 24th. On this date there was a drop in the temperatures, and the ensuing five days were much colder than normally. The minimum temperatures of the month were observed at nearly all stations at this time, and the lowest of these, 13 degrees, is lower than any previous

October minimum of record. Precipitation was slightly above normal. It came, for the most part, with storms occurring on the 8th and the 17th, but in the Tidewater division there were several other dates when moderate to heavy precipitation was had. Except for a trace of snow and a light fall of sleet (first of the autumn) occurring at several stations on the 17-18th, all precipitation came as rain. Fogs were prevalent in the lowlands morning and evening. Low-water stages in the rivers obtained generally during the month.

Prevailing wind direction, NW.

**November.**—The weather of the month was bright and decidedly colder than normally. The deficiency, 4.5 degrees, was, however, not due to any unusually cold weather, but rather to a uniform condition of temperatures lower than the average. The monthly mean, 42.3 degrees, was the lowest on record for November, except in the year 1901, while the lowest minimum temperature for the month, zero, was unprecedented. Precipitation occurring during the month was below normal, and, for the most part, was deposited during three storm periods, viz., 4th to 6th, 16th to 18th and 28-29th, the latter storm giving general snow, which was heavy in the Great Valley division.

There were no freshets in James river during the month.

Prevailing wind direction, NW.

**December.**—The month was abnormally cold, the deficiency in temperature being 5.7 degrees daily. Not since record has been kept by the Bureau has there been a December in which there was so much and so decided cold weather. Ice formed on ponds, lakes and small streams early in the month and remained until its close, attaining unusual thickness for the time of year. A great deal of it was cut and stored by farmers. The average total precipitation for the month was over an inch below normal. Comparison with December of other years of record shows that only once has there been a smaller monthly average total. Snow occurred on several dates, and was heavy locally in the Great Valley section. The bulk of precipitation came as rain, however. James river remained at a low-water stage throughout the month.

Prevailing wind direction, W.

### HYDROGRAPH OF JAMES RIVER AT RICHMOND, VA., YEAR 1903.

