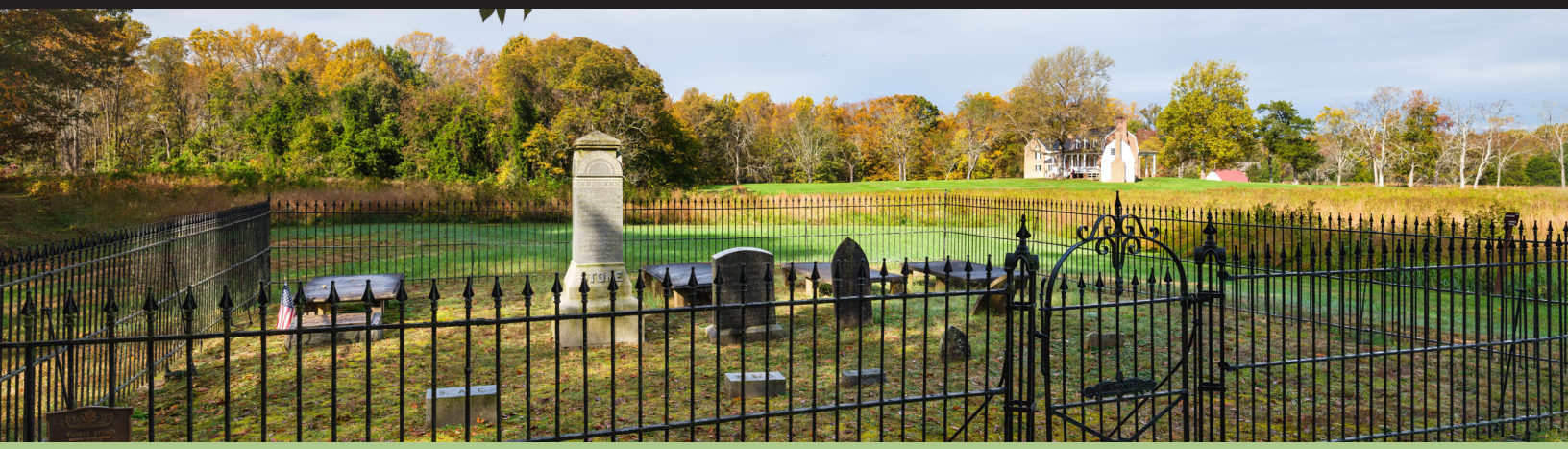


2021 Weather in Review: Thomas Stone National Historic Site

Weather and climate play significant roles in driving both physical and ecological processes. For example, forest stand dynamics and ecology are affected by meteorological and climatological events such as wind, ice storms, and drought. For research and long-term ecological monitoring, weather and climate data provide the potential for correlations to be made with observed physical and ecological pattern data. This resource brief provides a summary of both historic and current (2021) weather data for Thomas Stone National Historic Site, Maryland (MD).

Temperature

Overall, 2021 was the 3rd warmest year on record, with an average temperature of 59.2°F — 3.2 degrees above the average annual temperature (Table 1). Only two months, May and November, had temperatures fall slightly below the average. 2021 had 3rd warmest autumn on record, and December had the greatest increase in temperature — 9.4 degrees above average. Seasonally, summer and autumn fell with "much above normal" temperatures, while winter and spring fell within "above normal" temperatures (Figure 1).

Table 1. Charles County, Maryland average monthly, average annual, and departures from long-term average temperatures. Departures from average are based on a comparison of 2021 average temperatures to relevant averages from 1895-2020. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

Month (2021)	Average temperature (°F)	Departure from long-term average temperature (°F)
January	37.9	+3.1
February	37.4	+1.0
March	49.9	+4.9
April	57.2	+2.5
May	64.3	-0.1
June	75.0	+2.3
July	79.0	+1.9
August	78.7	+3.3
September	71.6	+2.6
October	65.1	+7.4
November	46.6	-0.2
December	47.1	+9.4
Annual	**59.2**	**+3.2**

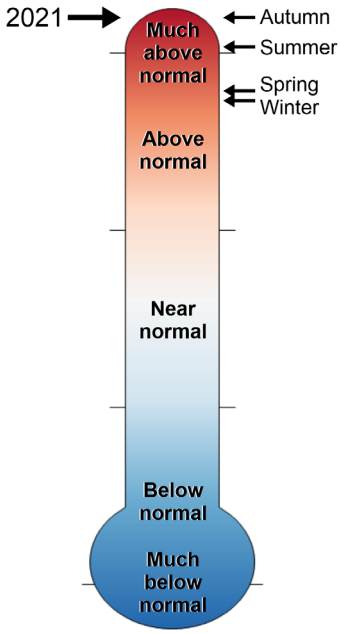


Figure 1. Charles County, Maryland annual and seasonal temperature rankings from 1895-2021. Of the 127 records, 2021 was the 3rd warmest year. Seasonally, it was the 20th warmest autumn and winter, 18th warmest spring, 9th warmest summer, and 3rd warmest autumn. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

Precipitation

Overall, 2021 was the 50th driest year on record with a total of 39.81 inches of precipitation — 2.62 inches below average (Table 2). More than half of the months had lower than average monthly precipitation. August was the wettest month with 7.51 inches — 3.13 inches above average, and December was the driest month with 0.75 inches — 2.50 inches below average. Seasonally, summer fell within "above normal" precipitation levels, while winter fell within "near normal" levels. Spring and autumn fell to "below normal" levels of precipitation (Figure 2).

Table 2. Charles County, Maryland monthly and annual total precipitation and departures from long-term average totals. Departures from average are based on a comparison of 2021 precipitation levels to relevant averages from 1895-2020. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

Month (2021)	Total precipitation (in)	Departure from long-term average precipitation (in)
January	1.79	-1.38
February	4.09	+1.26
March	3.03	-0.54
April	2.81	-0.55
May	2.87	-1.00
June	4.25	+0.31
July	4.49	+0.20
August	7.51	+3.13
September	3.42	-0.24
October	3.97	+0.73
November	0.83	-2.04
December	0.75	-2.50
Annual	**39.81**	**-2.62**

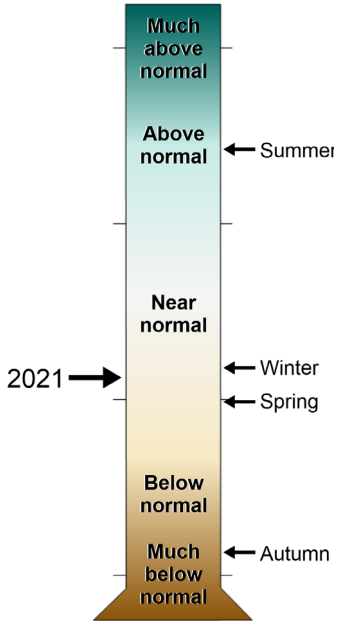


Figure 2. Charles County, Maryland annual and seasonal precipitation rankings from 1895-2021. Of the 127 records, 2021 was the 50th driest year. Seasonally, it was the 52nd driest winter, 45th driest spring, 31st wettest summer, and 14th driest autumn. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

Temperature and Precipitation Trends (1895–2021)

Temperature and precipitation data are gathered from the U.S. Climate Divisional Database, which stores data from January 1895 to the present, and can be accessed via the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) website (Figure 3).

Users can choose different geographic scales (i.e., global, national, statewide), different temporal scales, and display them in various types of graphical formats. Temperature and precipitation data presented in this brief are for Charles County, MD.

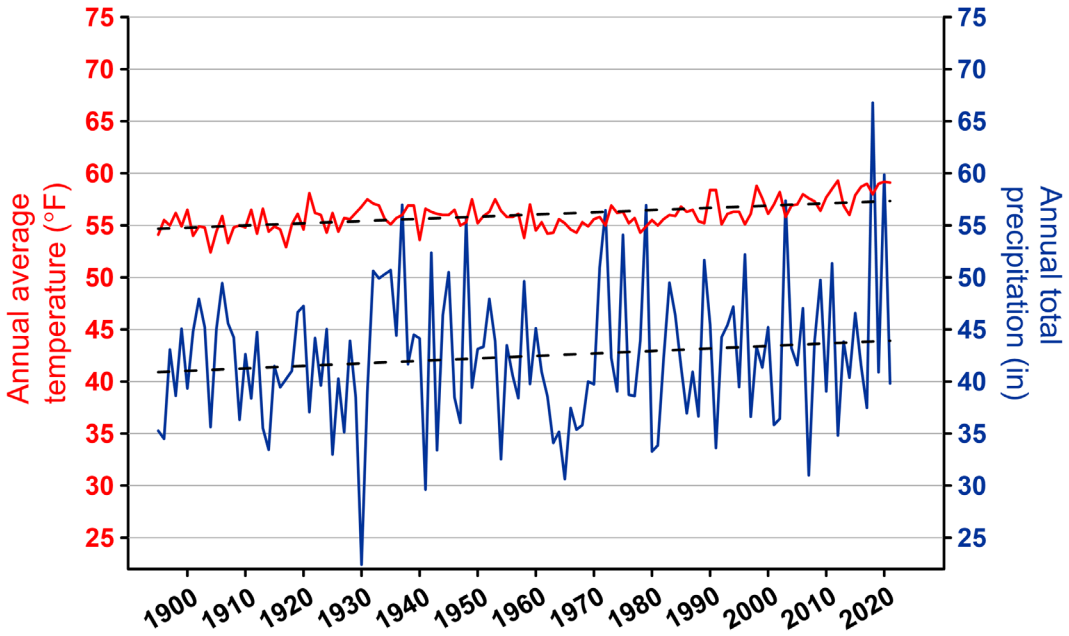


Figure 3. Charles County, Maryland yearly average temperature and precipitation levels from 1895 to 2021. Dashed lines represent the 1895-2021 trend for each parameter; +0.2°F/decade increase for temperature and +0.02 in/decade increase for precipitation. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

Wind

Wind can impact forest conditions differently depending on wind speed (blow-overs, breakage, root damage) and direction (physiological processes, growth). Wind data are collected from the NOAA National Water Level Observation Network (NWLON) station 8635027 in Upper Machodoc Creek, Virginia. Located at Dahlgren, this station has records dating back to 1970 and made available through the NOAA Tides and Currents website.

Each direction is divided up into categories called bins that are color coated to represent the frequency of a certain wind speed. The length of the bin represents the number of times wind comes from a given direction as well as the speed of the wind. The longer the length of the bin, the more frequent the given speed was recorded (Figure 4).

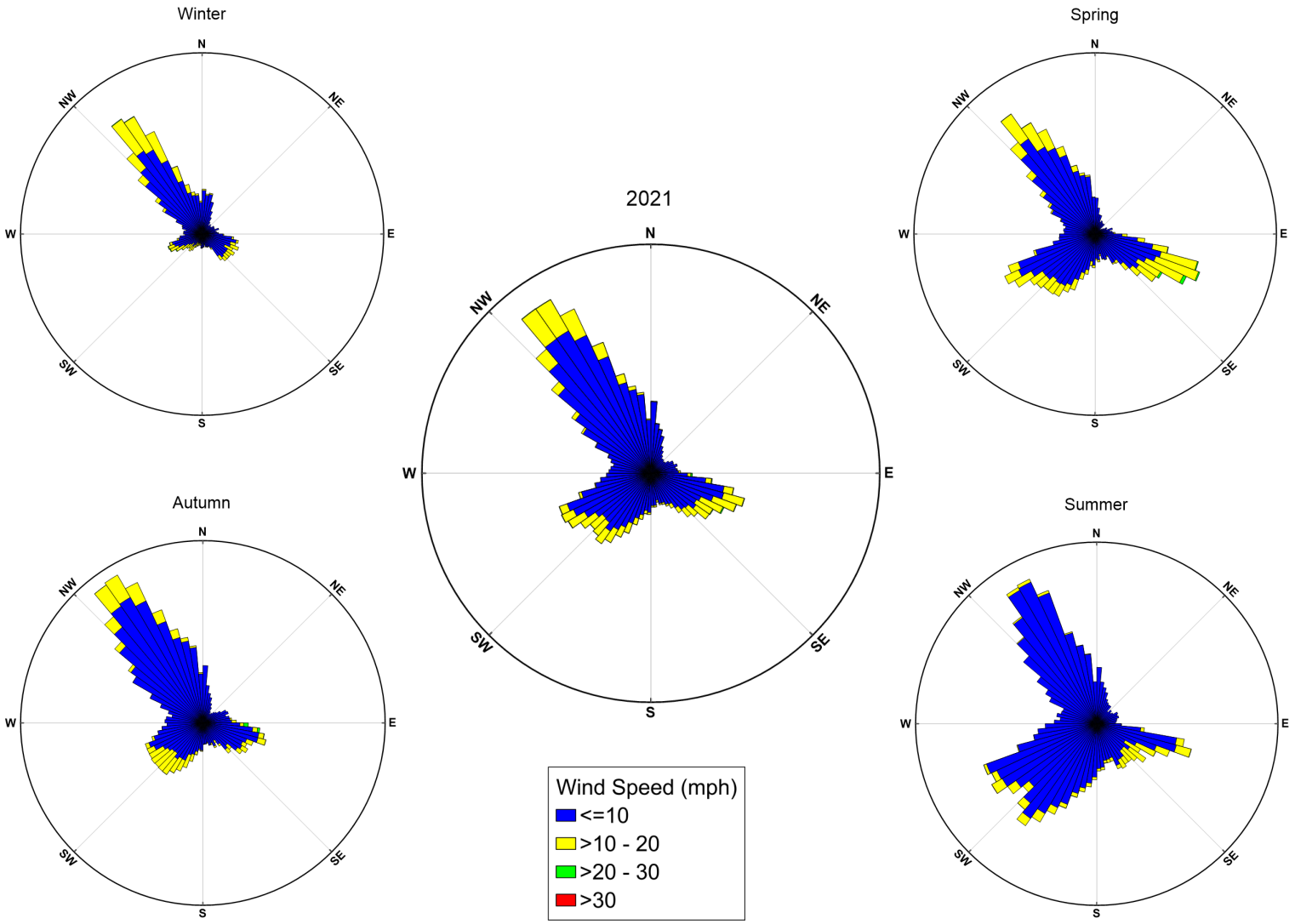


Figure 4. Wind charts reflecting both the seasonal and annual wind direction and speed at the NOAA NWLON station 8635027 at Dahlgren, Virginia during 2021. Each direction is divided up into categories called bins that are color coated to represent the frequency of a certain wind speed. The length of the bin represents the number of times wind comes from a given direction as well as the speed of the wind. The longer the length of the bin, the more frequent the given speed was recorded. Data are available at the NOAA Tides & Currents website.

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