



2020 Weather in Review: Cape Cod National Seashore

Weather and climate play significant roles in driving both physical and ecological processes. For example, the active processes that shape the North Atlantic coastline are largely the result of meteorological events such as wind-driven waves. 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 (2020) weather data for [Cape Cod National Seashore](#) (CACO), Massachusetts (MA). Because tide levels and wind can be significant for coastal parks, the annual water level and wind data are included.

Temperature

Overall, 2020 was the 2nd warmest year on record with an average temperature of 52.9 °F — 3.7 degrees above average (Figure 1). Spring fell within “near normal” temperatures, while summer, autumn, and winter seasons fell within “much above normal” temperatures. 2020 had the 2nd warmest winter on record. The warmest month was July with an average of 73.6 degrees — 3.7 degrees over the monthly average (Table 1). Eleven out of twelve months had a higher than average temperature, with only April falling below average.

Table 1. Barnstable County, Massachusetts average monthly, average annual, and departures from long-term average temperatures. Departures from average are based on a comparison of 2020 average temperatures to relevant averages from 1895-2019. Data are available at NOAA NCEI, Climate at a Glance (<https://www.ncdc.noaa.gov/cag/county/time-series/MA-001/tavg/all/12/2020-2020>).

Month (2020)	Average temperature (°F)	Departure from long-term average temperature (°F)
January	35.9	+6.0
February	37.0	+7.2
March	41.5	+5.0
April	43.5	-1.4
May	54.8	+0.2
June	66.3	+2.7
July	73.6	+3.7
August	73.2	+4.5
September	64.9	+2.5
October	56.0	+2.9
November	49.0	+5.5
December	38.7	+4.6
Annual	52.9	+3.7

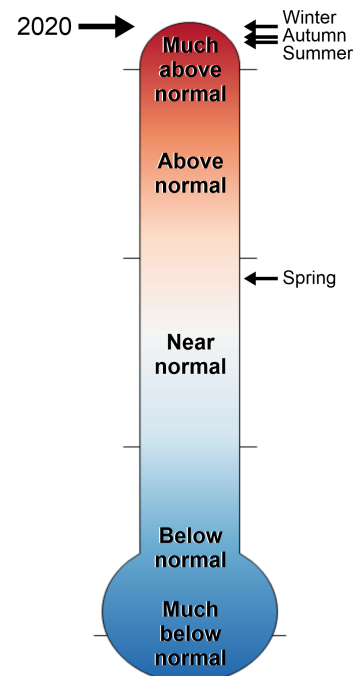


Figure 1. Barnstable County, Massachusetts annual and seasonal temperature rankings from 1895-2020. Of the 126 records, 2020 was the 2nd warmest year. Seasonally, it was the 2nd warmest winter, 50th warmest spring, 5th warmest summer, and the 4th warmest autumn. Data are available at NOAA NCEI, Climate at a Glance (<https://www.ncdc.noaa.gov/cag/county/rankings/MA-001/tavg/202012>).

Precipitation

Overall, 2020 was the 15th driest year on record with a total level of 37.21 inches of precipitation (Figure 2, Table 2). Seasonally, autumn fell within “above normal” ammounts, winter fell to “below normal” amounts, and spring fell to “near normal” amounts. Summer fell to “much below normal” amounts and was the driest summer on record. Eight months had lower than average amount of precipitation. December had the greatest amount of precipitation in 2020 at 6.84 inches — 2.73 inches over the average December precipitation. July had the lowest amount at only 0.88 inches — 1.96 inches below average.

Table 2. Barnstable County, Massachusetts monthly and annual total precipitation and departures from long-term average totals. Departures from average are based on a comparison of 2020 precipitation levels to relevant averages from 1895-2019. Data are available at NOAA NCEI, Climate at a Glance (<https://www.ncdc.noaa.gov/cag/county/time-series/MA-001/pcp/all/12/2020-2020>).

Month (2020)	Total precipitation (in)	Departure from long-term average precipitation (in)
January	1.72	-2.21
February	3.67	+0.20
March	3.58	-0.56
April	6.23	+2.26
May	2.52	-0.80
June	1.62	-1.59
July	0.88	-1.96
August	1.25	-2.49
September	1.31	-2.23
October	4.35	+0.47
November	3.24	-0.90
December	6.84	+2.73
Annual	37.21	-7.10

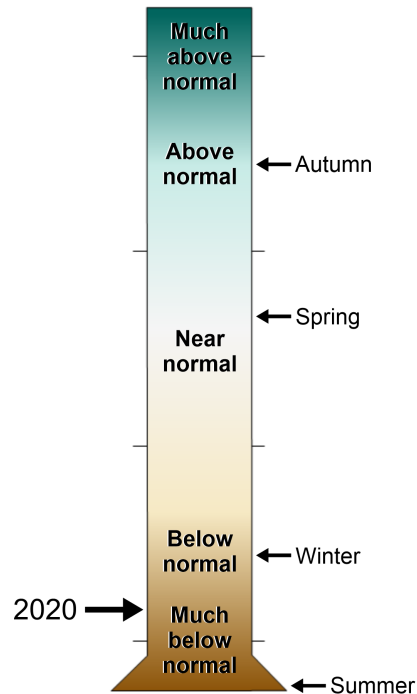


Figure 2. Barnstable County, Massachusetts annual and seasonal precipitation rankings from 1895-2020. Of the 126 records, 2020 was the 15th driest year on record. Seasonally, it was the 25th driest winter, 58th wettest spring, the driest summer, and 30th wettest autumn. Data are available at NOAA NCEI, Climate at a Glance (<https://www.ncdc.noaa.gov/cag/county/rankings/MA-001/pcp/202012>).



Temperature and Precipitation Trends (1895–2020)

Temperature and precipitation data are gathered from the [U.S. Climate Division Database](#), which stores data from January 1895 to the present, and can be accessed via the National Oceanic and Atmospheric Administration's (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 Barnstable County, MA.

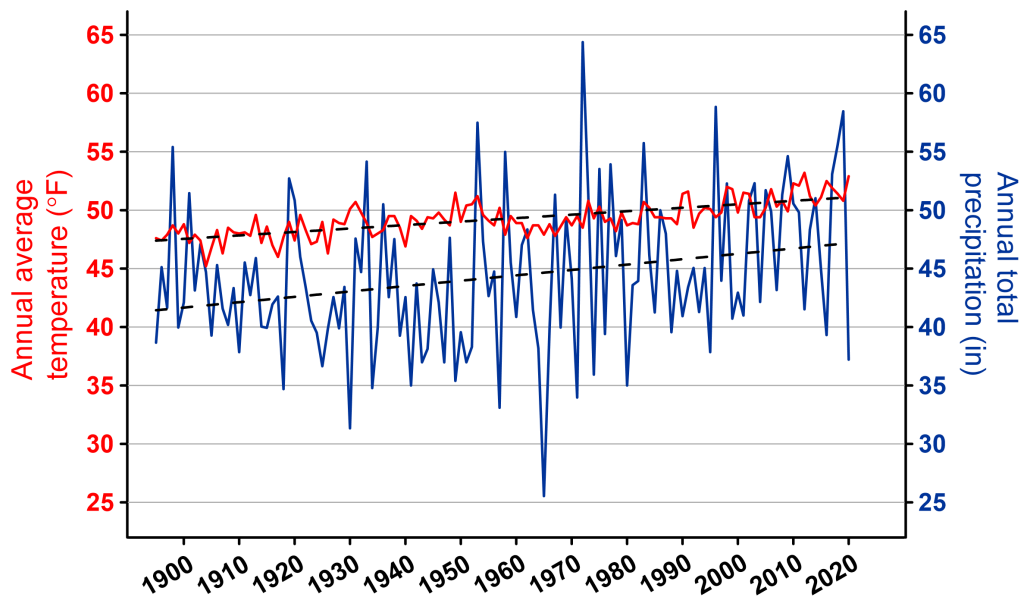


Figure 3. Barnstable County, Massachusetts yearly average temperature and precipitation from 1895 to 2020. Dashed lines represent the 1895–2020 trend for each parameter; $+0.3^{\circ}\text{F}/\text{decade}$ for temperature and $+0.46\text{ in}/\text{decade}$ for precipitation. Data are available at <https://www.ncdc.noaa.gov/cag/county/time-series/>.

Tide Levels

Water level data is collected from the NOAA National Water Level Observation Network (NWLON) station 8443970. Located in Boston, MA, this station has records dating back to 1921.

The data is graphed to show the difference in the predicted tide level verses what was observed (Figure 4). The offsets in height reflect the effect from storm surge on the normal, astronomically driven tide level.

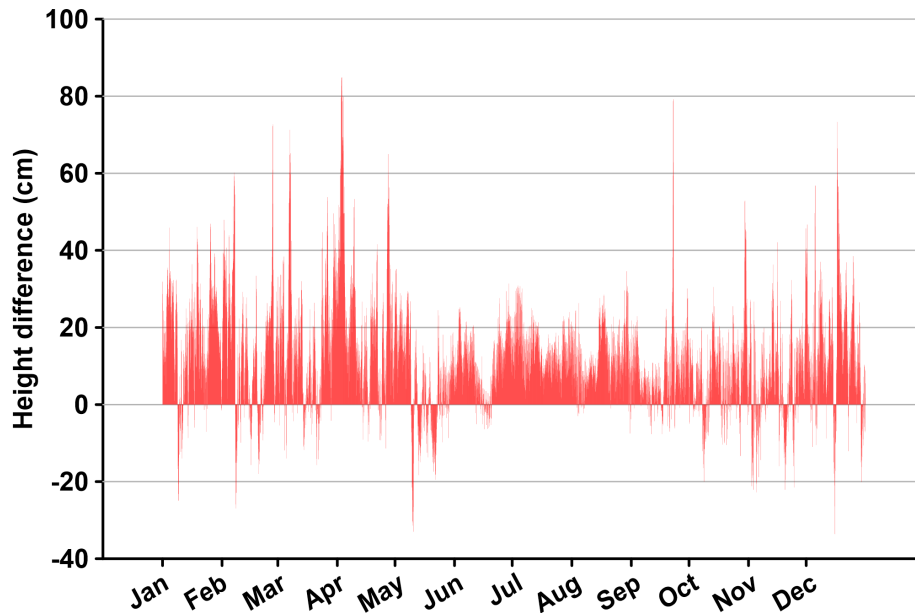


Figure 4. This bar graph (right) depicts the difference in the predicted and observed tide levels at NOAA NWLON station 8443970 in Boston, Massachusetts for 2020. Data available at <https://tidesandcurrents.noaa.gov/waterlevels.html?id=8443970>.

Wind

Wind data (wind speed and direction) was not available from the NOAA NWLON station 8443970 in Boston, MA in 2020, so it was collected from Provincetown Municipal Airport located at the northern tip of Cape Cod. 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 5).

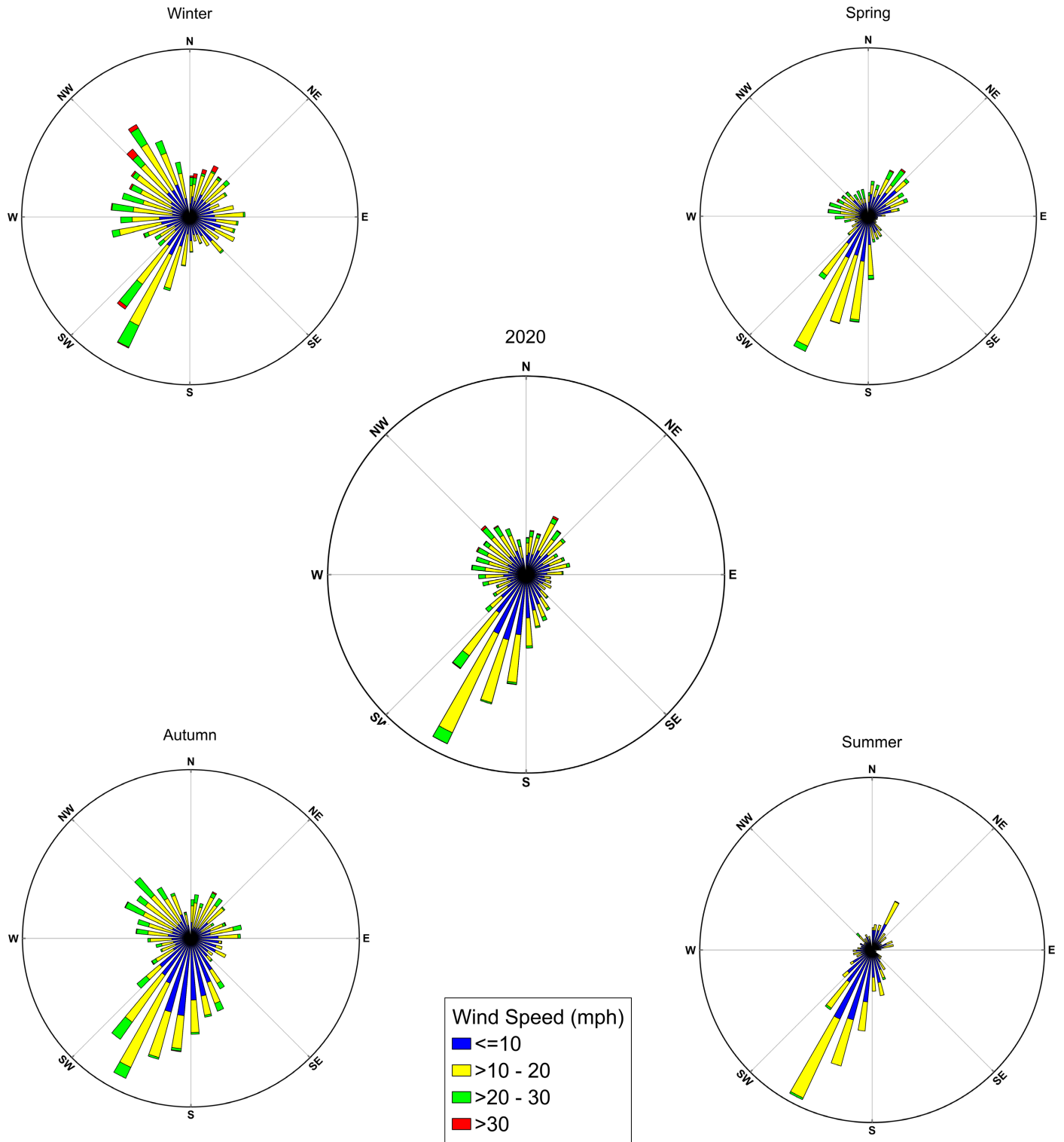


Figure 5. Wind charts reflecting both the seasonal and annual wind direction and speed at Provincetown Municipal Airport, Massachusetts during 2020. Each direction is divided up into categories called bins that are color coated to represent the frequency of a certain wind speed. The length of the bin 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 available at <https://www.ncdc.noaa.gov/cdo-web/datasets/LCD/stations/WBAN:64708/detail>.



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