

2021 Weather in Review: Gateway National Recreation Area

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 (2021) weather data for Gateway National Recreation Area (GATE) units in Kings County, New York (NY) and Monmouth County, New Jersey (NJ). Because tide levels and wind can be significant for coastal parks, the annual water level and wind data are included.

Temperature

Kings County, NY

Overall, 2021 was the 4th warmest year on record with an average temperature of 57°F — 3.6 degrees above the normal average (Table 1). 2021 had the 2nd warmest autumn on record. Every month in 2021 had higher than average monthly temperatures. Seasonally, autumn, spring, and summer fell within "much above normal" temperatures, while winter fell within "above normal" temperatures (Figure 1).

Table 1. Kings County, New York 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	35.3	+3.7
February	33.7	+1.4
March	44.9	+4.6
April	53.4	+3.1
May	62.3	+1.5
June	73.7	+3.5
July	77.2	+1.5
August	78.2	+4.1
September	71.4	+3.9
October	63.4	+6.8
November	46.5	+0.8
December	43.8	+8.1
Annual	**57.0**	**+3.6**

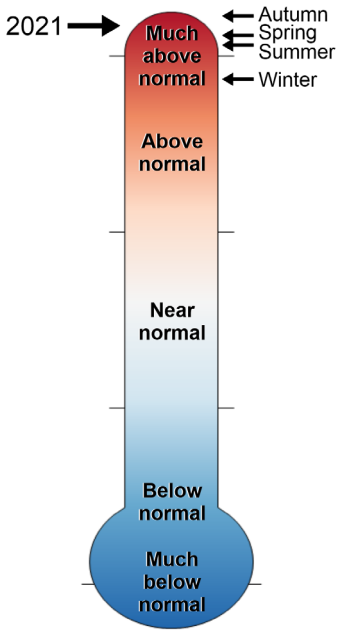


Figure 1. Kings County, New York annual and seasonal temperature rankings from 1895-2021. Of the 127 records, 2021 was the 4th warmest year. Seasonally, it was the 15th warmest winter, 6th warmest spring, 8th warmest summer, and the 2nd warmest autumn. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

Monmouth County, NJ

Overall, 2021 was the 3rd warmest year on record with an average temperature of 56.2°F — 3.8 degrees above the normal average (Table 2). 2021 also had the 2nd warmest autumn on record. Every month in 2021 had higher than average monthly temperatures. Seasonally, spring, summer, and autumn fell within "much above normal" temperatures, while winter fell within "above normal" temperatures (Figure 2).

Table 2. Monmouth County, New Jersey 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	34.6	+3.9
February	33.2	+1.5
March	44.2	+4.3
April	53.0	+3.2
May	61.9	+1.6
June	73.1	+3.8
July	77.2	+2.7
August	77.3	+4.6
September	70.2	+4.1
October	62.2	+7.2
November	45.0	+0.7
December	42.4	+7.9
Annual	**56.2**	**+3.8**

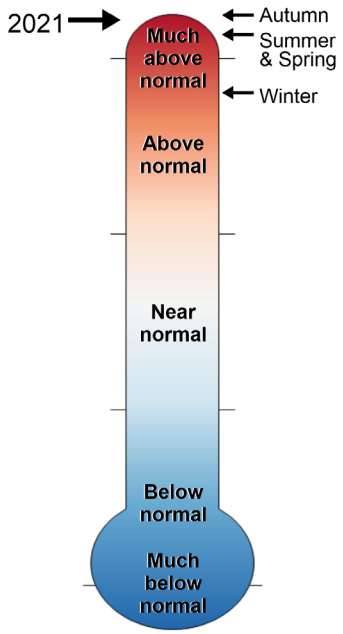


Figure 2. Monmouth County, New Jersey annual and seasonal temperature rankings from 1895-2021. Of the 127 records, 2021 was the 3rd warmest year. Seasonally, it was the 18th warmest winter, 6th warmest spring, 6th warmest summer, and the 2nd warmest autumn. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

NPS photo/ B. Ye



Precipitation

Kings County, NY

Overall, 2021 was the 14th wettest year on record with a total of 52.87 inches of precipitation (Table 3). July had the greatest amount of precipitation in 2021 at 8.58 inches — 4.15 inches above average. November had the lowest amount at 0.88 inches — 2.58 inches below average. Seasonally, summer fell within "much above normal" levels, while winter and spring fell within "near normal" levels, and autumn fell to "below normal" levels (Figure 3).

Table 3. Kings County, New York 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	2.38	-1.03
February	4.67	+1.42
March	3.24	-0.80
April	2.56	-1.23
May	4.52	+0.67
June	2.92	-0.73
July	8.58	+4.15
August	8.02	+3.72
September	8.47	+4.83
October	5.17	+1.63
November	0.88	-2.58
December	1.46	-2.26
Annual	**52.87**	**+7.79**

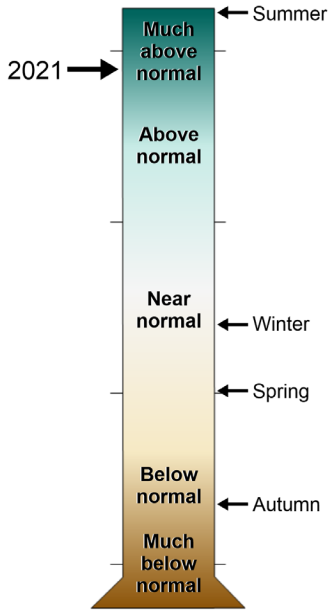


Figure 3. Kings County, New York annual and seasonal precipitation rankings from 1895-2021. Of the 127 records, 2021 was the 14th wettest year. Seasonally, it was the 60th driest winter, 46th driest spring, 2nd wettest summer, and 22nd driest autumn. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

Monmouth County, NJ

Overall, 2021 was the 30th wettest year on record with a total of 50.60 inches of precipitation (Table 4). August had the greatest amount of precipitation in 2021 at 7.93 inches — 3.28 inches above average. November had the lowest amount at 0.88 inches — 2.60 inches below average. Seasonally, summer fell within "much above normal" levels, while winter and spring fell within "near normal" levels, and autumn fell to "below normal" levels (Figure 4).

Table 4. Monmouth County, New Jersey 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	2.19	-1.32
February	5.23	+2.02
March	3.41	-0.61
April	3.24	-0.48
May	4.08	+0.26
June	3.84	+0.10
July	7.93	+3.28
August	7.39	+2.82
September	5.36	+1.74
October	5.61	+2.06
November	0.88	-2.60
December	1.44	-2.34
Annual	**50.60**	**+4.92**

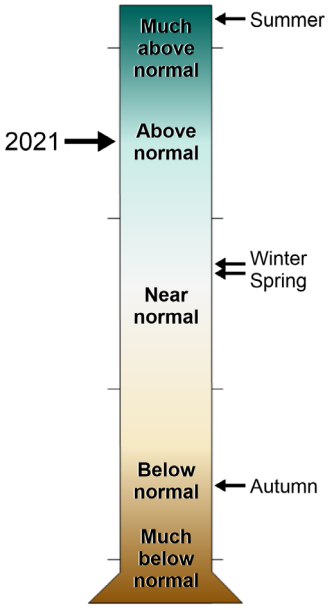


Figure 4. Monmouth County, New Jersey annual and seasonal precipitation rankings from 1895-2021. Of the 127 records, 2021 was the 30th wettest year. Seasonally, it was the 56th wettest winter, 58th wettest spring, 4th wettest summer, and 25th driest autumn. Data are available at the NOAA National Centers 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's (NOAA) National Centers for Environmental Information (NCEI) website (Figures 5 and 6). 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 Kings County, NY, and Monmouth County, NJ.

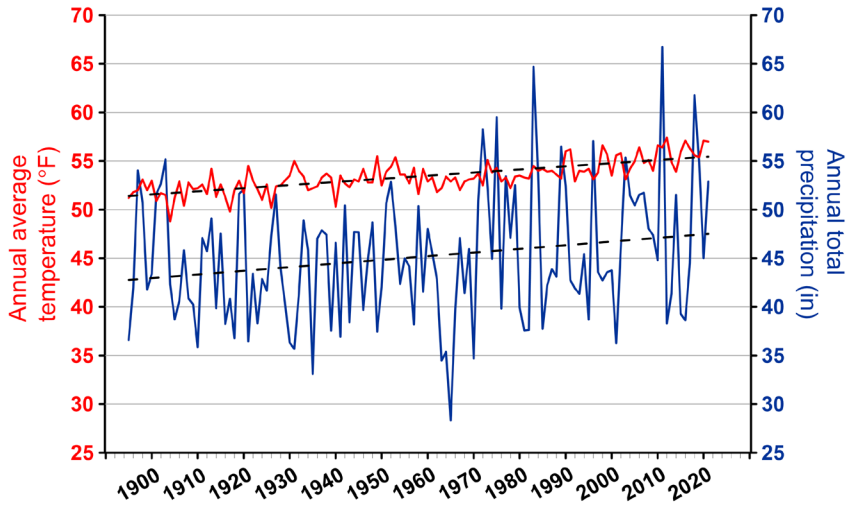


Figure 5. Kings County, New York yearly average temperature and precipitation levels from 1895 to 2021. Dashed lines represent the 1895-2021 trend for each parameter; +0.3°F/decade increase for temperature and +0.38 in/decade increase for precipitation. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.

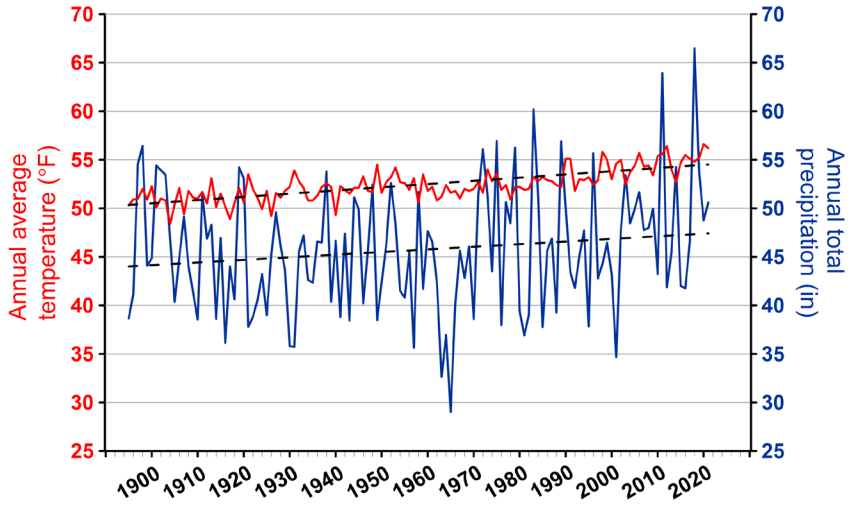


Figure 6. Monmouth County, New Jersey yearly average temperature and precipitation levels from 1895 to 2021. Dashed lines represent the 1895-2021 trend for each parameter; +0.3°F/decade increase for temperature and +0.27 in/decade increase for precipitation. Data are available at the NOAA National Centers for Environmental Information, Climate at a Glance: County Time Series website.



Wind

Wind data (wind speed and direction) was collected from the NOAA National Water Level Observation Network (NWLON) station 8531680, located at Sandy Hook, NJ. Each direction is divided 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 7).

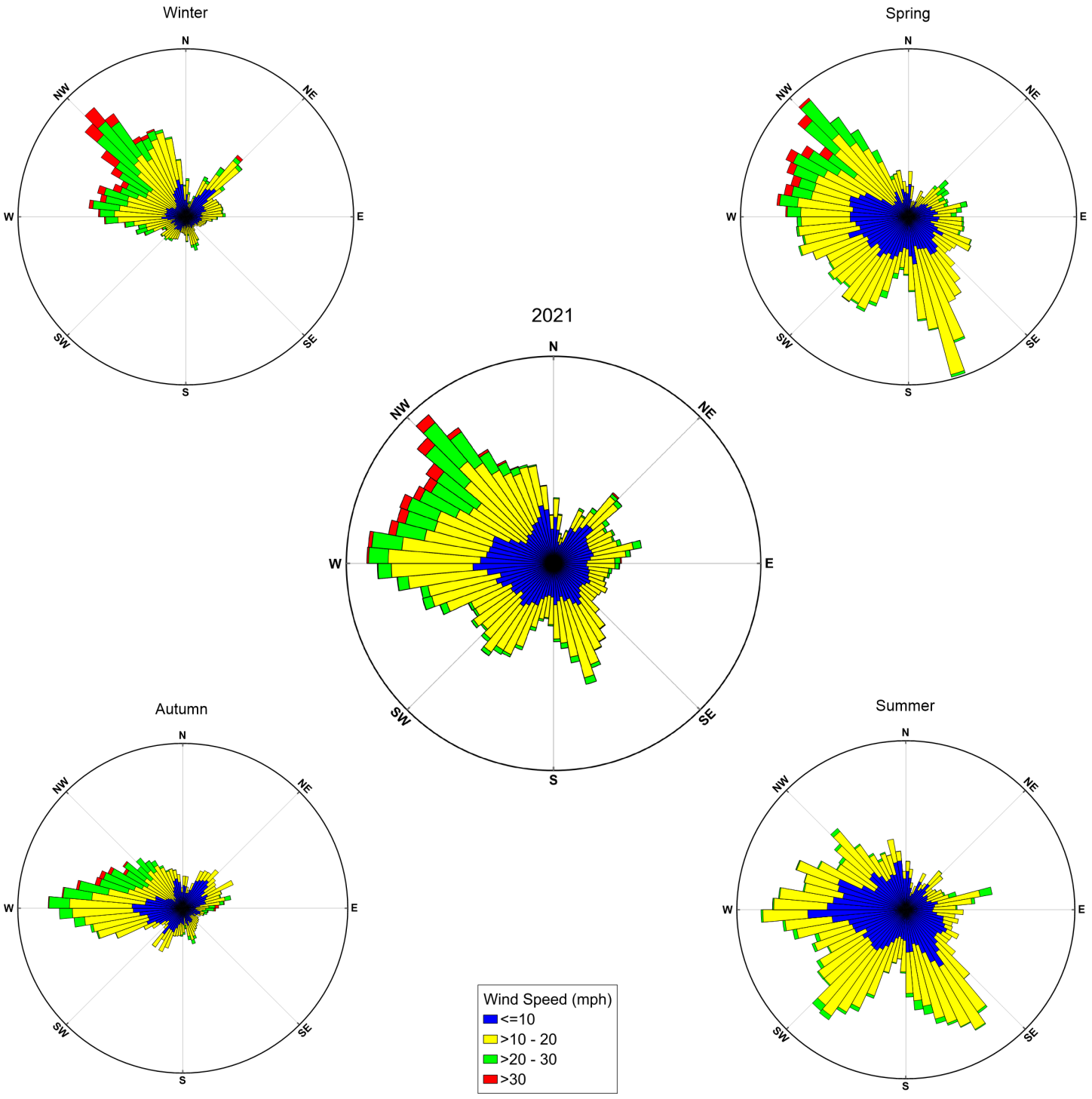


Figure 7. Wind charts reflecting both the seasonal and annual wind direction and speed at the NOAA NWLON station 8531680 in Sandy Hook, New Jersey during 2021. Each direction is divided into categories called bins that are color coated to represent the frequency of a certain wind speed. The length of 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.

Tide Levels

Water level data is also collected from the NOAA NWLON station 8531680 located at Sandy Hook, NJ. The data is graphed to show the difference in the predicted tide level verses what was observed (Figure 8). The offsets in height reflect the effect from storm surge on the normal, astronomically driven tide level.

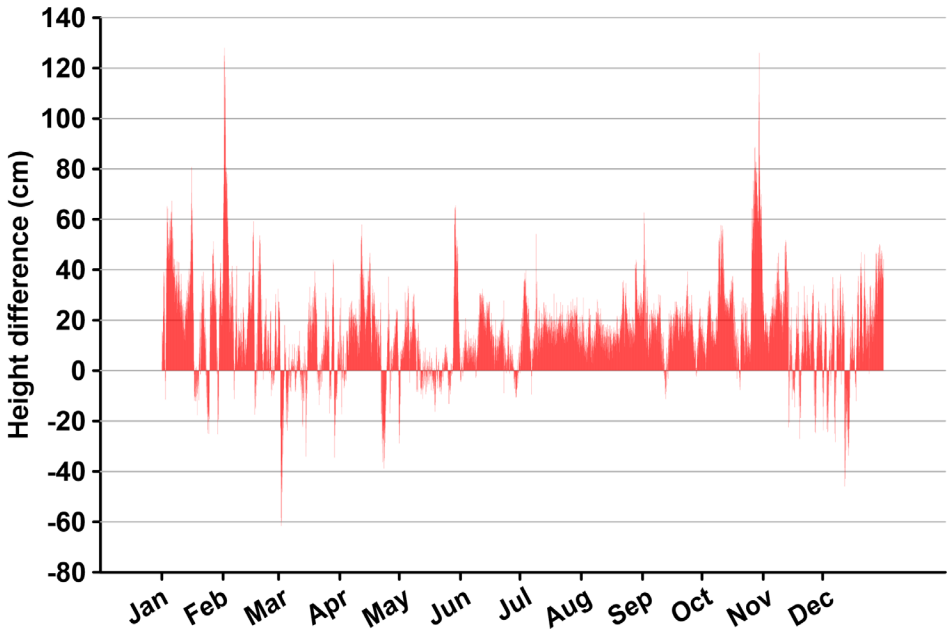


Figure 8. The predicted and observed tide levels at the NOAA NWLON station 8531680 in Sandy Hook, New Jersey during 2021. Data are available at the NOAA Tides & Currents website.

NPS photo/ B. Ye



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https://www.nps.gov/im/ncbn/index.htm