

Current Climate of the New England Region
NEW ENGLAND REGIONAL ASSESSMENT

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New England weather and climate is arguably one of the most varied in the world. It includes extremes of both hot and cold temperatures, droughts, heavy rainfall, hurricanes, tornadoes, blizzards, and more. These great variations in New England weather are influenced by many factors which relate to its physical geographical setting, including its latitude and coastal orientation.

The four components that dominate New England climate include, 1) its latitude, 2) its coastal orientation, 3) its position within the zone of the westerlies, and 4) its great changes in elevation. First, the area is located about half-way between the equator and the north pole, which is why it serves as a battleground for warm-moist air from the south and cold-dry air to the north. The surface airmass boundaries are made up of warm, cold, and stationary fronts, which frequently traverse the region bringing us from one airmass to another in rapid succession. Second, the region is dominated by a cold water current along its east coast, and a warm water current along the south shore. These currents, and corresponding water temperatures impact summer recreation, swimming comfort, etc, and also create a notable sea breeze in spring and summer. The sea breeze circulation, particularly along the New England average annual temperature ranges from approximately 40°F to the north, and about 50°F along the south shore of Connecticut and Rhode Island. However, when we factor in elevation, temperatures are generally cooler, whereas Mount Washington has an annual average temperature of 26°F. The range in temperature at both diurnal and seasonal scales is smaller along the coastal zone and larger inland, away from the stabilizing influence of the ocean. Absolute extreme tem-

peratures in New England have been as high as 107°F and down to -50°F (Ludlum 1976). The 107°F high is hotter than the all-time high temperature ever recorded in Miami, Florida, and the -50°F low is colder than the record coldest in Anchorage, Alaska or International Falls, Minnesota - which is commonly the coldest location in the conterminous United States. The region is also plagued with a great abundance of freeze-thaw cycles. Furthermore, there is general trend toward increasing annual

east coast, tends to mitigate frequencies and intensities of thunderstorms in the coastal zone while bringing relief in the form of mild temperatures in the peak summer heat . In winter, these waters remain warm relative to land areas, thereby influencing snow-rain boundaries, which are difficult for forecasters to predict. Third, since New England falls primarily in the zone of the westerlies, the area is dominated by drier continental airflow from various areas across North America, rather than having a prevailing flow from off of the Atlantic Ocean. So despite the coastal orientation of New England, it is not a maritime climate like those found on the west coast of the United States. Fourth, New England has mountainous topography which also influences weather patterns. Mountains can enhance precipitation on the windward side, and create drier conditions on the downwind slopes, known as the rainshadow. Increases in elevation also lead to cooler air temperatures. As a result of New England's geographical location, its continental climate type, its coastal orientation, and the mountainous topography, the region's weather is notorious. It is known for its diversity over short distances and changeability in the matter of minutes.

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temperatures along the coastal zone of the region over the past 100 years, but the interior of the region shows little change over this same time period.

New England average annual precipitation ranges from approximately 35 inches in the northern reaches of the region, with higher values, up to near 55 inches, along the southern coastal zone. Also, elevation tends to enhance precipitation totals, i.e., Mount Washington averages near 99 inches of liquid equivalent precipitation per year. Across New England, there are subtle shifts in the seasonal distribution of rainfall. For example, Burlington, Vermont has its seasonal peak in rainfall in summer with minimal values found in winter. Portland, Maine displays the exact opposite seasonality with peak rainfall in late autumn and winter, with minimal precipitation in summer. The region as a whole also has rainstorms that would rival those in the Southeast. Similar to the patterns with temperature, there is a suggestion that precipitation has increased in most of the coastal zone over the past century, with little indication of long-term change in the interior.

Snowfall is highly variable in New England both spatially and temporally. Southern New England receives the lowest snowfall totals on

the average with near 35 inches per year. Northern New England receives substantially more snowfall, with large regions in and near the White and Green mountains averaging well over a 100 inches per year. Again, elevation enhances snowfall totals and Mount Washington averages 254 inches of snowfall per year.

Extreme events in the region show great variety, while coming in the form of snowstorms, hurricanes, tornadoes, heavy rains, high winds, ice storms and more. Time series of these extreme over the past 100 years suggest subtle changes, but a signal is not clear. Hurricane and tropical storm frequencies in New England show almost no change over the past century, with the most powerful landfalling hurricanes occurring in the middle part of the 20th century. Tornado frequencies are difficult to interpret because of changing population densities and overall public awareness and reporting, but it does seem clear that the past couple of decades have seen a reduction in frequency as compared to the 1950s, 1960s, and the early 1970s. However, there appears to be a suggestion of an increase in heavy rainfalls in the east coastal region, where three events with greater than 50-year return period have occurred between October 1996 and October 1998.