

Annex 1

Climate Change

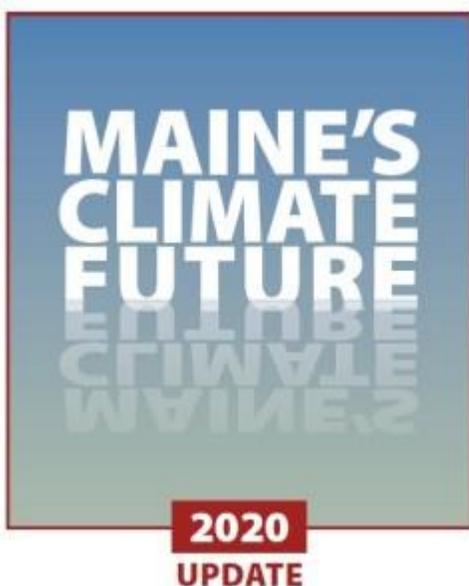
Introduction

Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates. These changes have a broad range of observed effects that are synonymous with the term. [NASA](#)

Early breakups of ice on rivers, shifting plant and animal ranges (e.g., increased tick and other public health pest intrusion in to the state), accelerated sea level rise, and more heat waves and drought are among the effects being felt in Cumberland County. While they cannot be controlled on a local level, proactive mitigation measures can alleviate some of the effects.

Laying aside arguments concerning the causes of the climate changes the world is seeing, it is still necessary to recognize and adapt to the changes being wrought, especially in hazard mitigation planning. However, one must take care not to attribute every event to climate change. For instance, it is not possible to blame the multiple tornadoes in one day in the Bridgton Maine area (2017) to the effect of climate change, but it is probable that warming weather may contribute to more such events. It is possible to attribute multiple nuisance street flooding events in Portland to rising sea levels, which are caused by melting glaciers and ice sheets, and thermal expansion.

Predicted Climate Changes for Maine

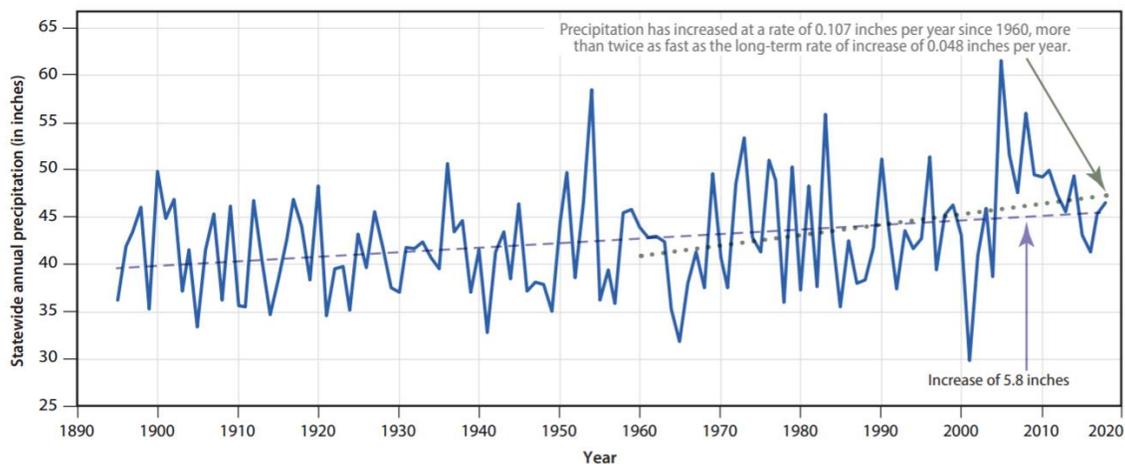


The University of Maine's updates its Maine's Climate Future publication approximately every five years. The 2020 Update is the latest version and much of the information CCEMA uses comes from this document, along with the Intergovernmental Panel on Climate Change (IPCC) special reports. The University of Maine report identifies current and projected changes. Those that have the greatest impact on Cumberland County are summarized below:

- Temperatures are increasing statewide and the increases have been greatest in the coastal division which includes much of Cumberland County.

- Local emergency managers are now opening cooling centers routinely during long hot periods each summer.
 - The County has experienced some degree of drought for several years, with the drought of 2020 reaching the proportions of the 2002 multi-year drought. CCEMA participates in the Maine Drought Task Force.
 - During a drought, it is mostly agriculture that suffers, but Cumberland County also has large areas that are not served by municipal water supplies, but rely on wells. State, County, and local emergency management agencies are involved in tracking and assisting those with water needs.
 - According to the Maine Climate Future, “there is considerable uncertainty whether droughts will become more frequent in the future.
- Conversely, precipitation is increasing in storm precipitation intensity. Overall, rainfall has increased 15%, but snowfall has decreased. The trend that is emerging, from local observations, is that there are more high precipitation storms, followed by prolonged periods of no precipitation.

Maine Annual Precipitation, 1895–2018



Total annual precipitation, 1895–2018, averaged across Maine based on monthly data from the NOAA U.S. Climate Division Database (NOAA CAAG). Linear trends are depicted for the entire record (dashed) and since 1960 (dotted).

[Maine's Climate Future](#)

- Increased local runoff to streams and rivers is increasing the mitigation projects each municipality must consider,
- Some of these storms include strong winds which create power outages that number in the hundreds of thousands for multiple days (October 2017, 2 storms October 2109, 2 storms April 2020 and in December 2020, to name a few recent storms)
- Winter snow accumulations have decreased by about 17% over the past century, and the coastal areas experience more rain events in winter. With unseasonal thaws and freezes, Maine’s agriculture can be stressed.
 - Crop losses, like Maine’s blueberry losses in 2020 bring significant social vulnerability to regions heavily skewed to specialty crops.

- Longer summers and warmer winters permit insect pests to continue their activities, including those that carry diseases like Lyme Disease, anaplasmosis and babesiosis from ticks and Eastern Equine Encephalitis and other diseases through mosquitos. Hazard Mitigation planning must take these variables into account by providing continuing education on mitigation activities.
- Rising sea levels will lead to more frequent flooding. “At Portland, the station with the longest record, the edge of the water has risen 7.5” since record keeping began.” Since 1990, the rate has accelerated. Storms and astronomical high tides can push water farther inland. In 2018 water levels in Portland reached 13.8 feet, one of the three highest tides ever recorded.” (Maine’s Climate Future)

Cumberland County’s coastal communities (Scarborough, Cape Elizabeth, South Portland, Portland, Falmouth, Cumberland, Yarmouth, Freeport, Brunswick, Harpswell, Chebeague Island, and Long Island) are all vulnerable to sea level rise, and most have done studies on what mitigation measures they will need to implement. Many of the recommendations from these studies suggest measures that can cost millions of dollars, a price far beyond some of the smaller towns. Even providing a 25% match to government funding is beyond many towns, so these projects are put off, sometimes for years, due to lack of funding. For the islands, ferry landings are critical to life safety, as they provide the primary means for emergency medical services to reach them. Increasing sea levels are threatening several of the island landings.

The City of Portland has experienced multiple flooding events when storm waves and high tides combine.



During the January 4, 2018 Nor'easter, powerful storm waves occurred at the same time as high tide. Water levels in Portland reached 13.8 feet, one of the three highest tides ever recorded. The tide remained above flood stage for nearly three hours, causing millions of dollars in damage statewide (Schmitt and Uteuova 2018).

Inland areas are faced with different challenges related to climate change. Intense storms bring 2-3” of rain have increased, leading to flooding and failing culverts. The disparity between weather patterns in interior and coastal Cumberland County led the National Weather Service to add a third forecast zone to address the differences. The Presumpscot River and Royal River are the primary rivers in the county, but there are numerous smaller rivers, like the Crooked River that runs through Harrison, Naples and Casco. These rivers have a few repetitive loss homes built in the floodplain before stricter codes were in effect.

Mitigation Planning Challenges

Mitigation activities can be time consuming and costly. CCEMA regularly seeks out new funding opportunities and provides information to municipalities based on their mitigation projects.

Many local EMA directors are either part time or are assigned the position as secondary or even a tertiary responsibility. Mitigation planning must be prioritized along with more immediate needs. CCEMA supports education and training via monthly meetings, offering courses and supporting grant applications. One new objective for the 2022 plan is to provide asynchronous training and in-person trainings to local municipal administrators on the importance of mitigation and how it can be incorporated into policies, plans, and budgets

More specific information on each municipality’s specific hazards is contained in the Risk Assessment section of the Plan.

For more information, please visit the following links:

- [Cape Elizabeth: Sawyer Road Preliminary Design Report](#)
- [Greater Portland Landmarks- Preparing Historic Resources for Climate Change](#)
- [Scarborough: Higgins Beach Dune Genealogy](#)