

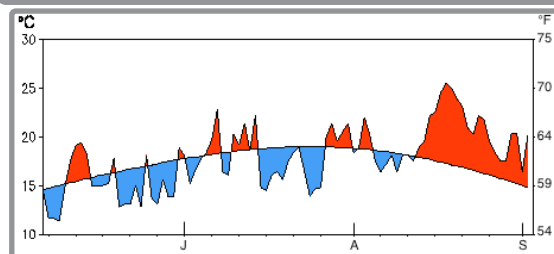
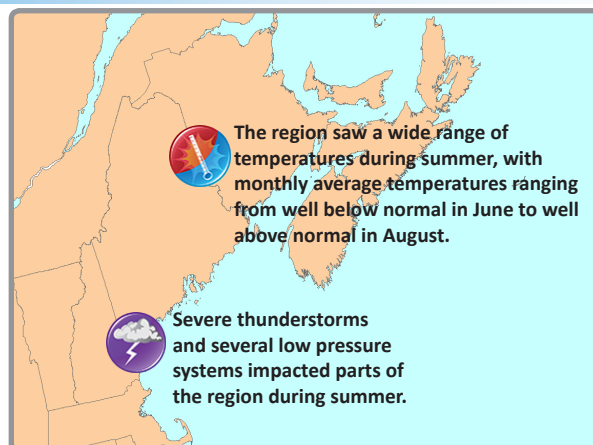


Gulf of Maine Significant Events - June–August 2015

Severe thunderstorms affected parts of the region during summer. Two EF-0 tornadoes touched down in Massachusetts on June 23. A microburst in Albion, ME on July 28 damaged buildings, trees, and crops. Two days later, an EF-0 tornado touched down in Warner, NH. On August 4, a waterspout was reported in Boston Harbor and an unconfirmed EF-0 tornado in Five Islands, NS caused property damage. On the same day, large hail fell in New Brunswick and the three states, including a 6.4 cm (2.5 in.) hailstone near Waterboro, ME. Lightning knocked out power to tens of thousands of customers in Halifax, NS on August 22 and 23. Also on the 22nd, 40.8 mm (1.61 in.) of rain fell in one hour at Cheticamp, NS, leading to flash flooding and the evacuation of a campground in Cape Breton Highlands National Park. For more details, see the Regional Impacts section.

Low pressure systems also brought heavy rain to some areas. On June 21–22, coastal Maine and the southern half of New Brunswick received up to 150 mm (6 in.) of rain due to remnant moisture from Tropical Storm Bill. The heavy rain flooded roads in some communities. Another storm on August 8–9 brought up to 100 mm (4 in.) of rain to Nova Scotia, with the greatest amounts in Cape Breton. From August 26–27, a series of thunderstorms along a trough of low pressure brought up to 170 mm (7 in.) of rain to Charlotte County, NB and up to 216 mm (8.50 in.) of rain to Washington County, ME.

With a high of 9.4°C (49°F) on June 1 and 2, Boston, MA, tied its coolest maximum temperature for any given June day. In July, the region experienced a wide range of above-normal and below-normal temperatures. During a cold stretch from July 19–25, several Maritime communities were more than 5°C (9°F) below normal, with records set for lowest maximum temperature. This was followed by a warm August. Caribou, ME, was record-warm at 2.6°C (4.6°F) above normal. The site set a record for greatest number of consecutive days with a maximum temperature of 27°C (80°F) or higher from August 14–23. During the same time period, New Brunswick experienced a heat wave, with humidex values near 40°C (104°F). See figure to the right.

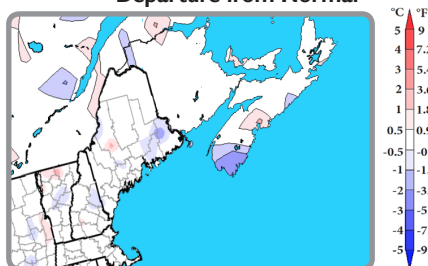


Daily average temperature compared to normal at Caribou, ME. Red indicates above-normal temperatures and blue indicates below-normal temperatures. Credit: U.S. Climate Prediction Center.

Regional Climate Overview - June–August 2015

Temperature

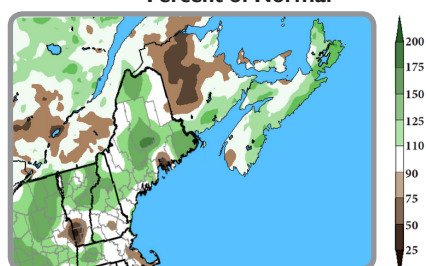
Departure from Normal



June was quite cool regionwide, with monthly average temperatures generally 1°C (1.8°F) to 3°C (5.4°F) below normal. Maine had its 15th coolest June on record. **July** temperatures ranged from near normal to 2°C (3.6°F) below normal. The coolest areas were in parts of Maine and the Maritimes. **August** was very warm, with temperatures up to 4°C (7.2°F) above normal. The warmest areas were in central New Brunswick and western Prince Edward Island. The three states ranked this August among their top 11 warmest. With a cool June, variable July, and warm August, **summer** temperatures averaged out to be near normal for most of the Gulf of Maine region.

Precipitation

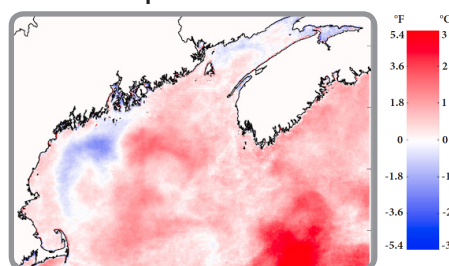
Percent of Normal



June precipitation ranged from near normal to more than 200% of normal, with the wettest areas in southern New Brunswick and parts of Nova Scotia. The three states ranked this June among their top 16 wettest. **July** was generally a dry month, with precipitation ranging from 25% to 90% of normal. Parts of western Maine were the wet exception, with up to 175% of normal. **August** precipitation ranged widely from 25% up to 200% of normal. The driest areas were in parts of New Brunswick and western Nova Scotia while the wettest areas were in central Maine. **Summer** precipitation (accumulated during June, July, and August) ranged from 50% of normal in much of New Brunswick to 150% of normal in parts of Maine and Nova Scotia. Maine and New Hampshire ranked this summer among their top 18 wettest.

Sea Surface Temperatures

Departure from Normal



Summer sea surface temperature anomalies in the Gulf of Maine reflect both summer circulation processes and residual warm water masses from previous time periods. Temperatures over most regions were up to 1°C (1.8°F) above normal, most strongly over the deeper basins offshore and the Scotian Shelf. These reflect continuing warm water masses from the spring and previous summer. A distinct region of cold anomalies (up to 1°C (1.8°F)) from Penobscot Bay to Cape Cod reflects anomalously strong flow of water out of the cold Eastern Maine Coastal Current into the western Gulf. This flow is separated from the coast by warmer temperatures in shallow regions. Cooler anomalies were also present in much of the Bay of Fundy.

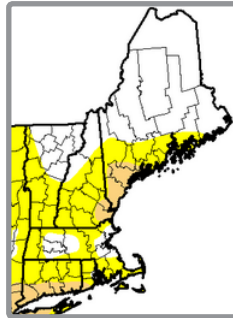
Sea surface temperature anomalies based on 1985–2014. Mean SST anomalies from NOAA AVHRR data. Credit: University of Maine School of Marine Sciences and NERACOOS

Temperature and precipitation normals based on 1981–2010. Canada and ocean precip data: [Canadian Precipitation Analysis](#). U.S. precipitation data: interpolated station data.

Regional Impacts - June–August 2015

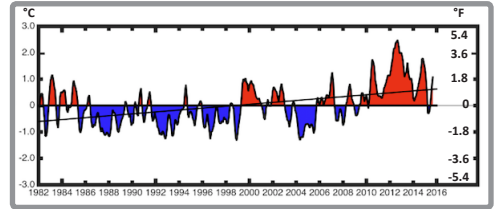


Left: Large hail fell in Brighton, MA, on August 4. (Credit: Rachel Rumely) Above: Damage from a microburst on July 28 in Albion, ME. (Credit: John Jensenius)



Intensity
 D0 Abnormally Dry
 D1 Moderate Drought
 D2 Severe Drought
 D3 Extreme Drought
 D4 Exceptional Drought

The *U.S. Drought Monitor* from September 17 shows abnormally dry and moderate drought conditions in parts of Maine, New Hampshire, and Massachusetts.



Monthly sea surface temperature anomalies, averaged over the whole Gulf of Maine, for the 34-year period since accurate satellite measurements began in 1982. Credit: University of Maine School of Marine Sciences

Summer Severe Weather

New Brunswick had nine severe thunderstorm events this summer, compared to the average six events (based on 1989–2006). The province also had six large hail events, which is more than double the average. Severe weather activity varied by location and by month in the rest of the Maritimes. In the three states, [overall severe weather activity](#) was below average in June, varied by area in July, and was above average in August. Massachusetts had two tornadoes in June, which was [above average](#), while Maine had none, which was below average. New Hampshire does not usually see any tornadoes in July, but had one this year. The other states saw below average activity. No tornadoes were reported in August, which is normal.

Summer Precipitation

The three states entered the summer season with areas of abnormal dryness and moderate drought already in place. The region's precipitation pattern during summer consisted of heavy bursts of rain with extended periods of dryness in between. While the rain in June helped ease dryness for some areas, dry conditions lingered for Cape Cod, southeastern New Hampshire, and parts of southern Maine. With the region receiving spotty rainfall in August, abnormal dryness and moderate drought were expanded in parts of the three states by early September. According to U.S. Department of Agriculture crop reports, farmers had to irrigate crops in areas that received little rainfall.

Sea Surface Temperatures

Data show that since 2009, with the exception of the cold winter of 2015, the region has experienced almost continuous positive monthly anomalies, with a peak in 2012. Anomalies turn positive again in the summer of 2015. The positive peaks in 2010, 2012, and 2014 are the largest departures from average over the 34-year period. The sloped line in the figure above shows the average trend, which is +0.36°C (0.64°F) per decade. The recently released [Northwest Atlantic Regional Climatology](#), which covers the Gulf of Maine, includes long-term annual, seasonal, and monthly mean temperature and salinity fields on different depth levels with three resolution options.

Regional Outlook - Autumn 2015

Temperature



Prob (%) above normal/
au dessus de la normale

Environment Canada map (left) produced on August 31.

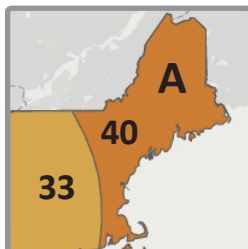
For September through November, [Environment Canada](#) is calling

for an increased chance of above-normal temperatures for the Maritimes. With several dynamical climate models in agreement, the [U.S. Climate Prediction Center](#) is also predicting an increased chance of above-normal temperatures for the three states for autumn.

A: Above-normal
33/40: Probability of above-normal

Probability of above-normal

U.S. Climate Prediction Center map (right) produced on August 20.



Precipitation

Environment Canada is predicting equal chances of above-, near, or below-normal precipitation. The U.S. Climate Prediction Center is calling for an increased chance of below-normal precipitation for September through November for Maine, New Hampshire, and Massachusetts.

El Niño

Issued: September 10, 2015

Atmospheric and oceanic conditions during August reflected a strong El Niño. The Climate Prediction Center said there is a [95% chance](#) of El Niño continuing through winter. Models predict one of the strongest El Niños on record, peaking in late fall or early winter, then gradually weakening through spring 2016. El Niño's impacts during autumn in the Gulf of Maine region are not strong.

Updated 2015 Atlantic Hurricane Season

According to the Climate Prediction Center's [updated outlook issued in early August](#), there is a 90% chance of a below-normal 2015 Atlantic hurricane season. The increased confidence level, the highest since hurricane outlooks began in 1998, is based on a strengthening El Niño and cooler-than-average tropical Atlantic sea surface temperatures. The outlook calls for 6-10 named storms, with 1-4 of those becoming hurricanes, and 0-1 of those becoming major hurricanes. In comparison, a normal hurricane season averages 12 named storms, including 6 hurricanes, with 3 of those becoming major hurricanes. As of mid-September, there have been eight named tropical systems in the Atlantic basin. Three of those entered the Canadian Hurricane Centre (CHC) Response Zone, although they remained well east of the Gulf of Maine region. [On average](#), four named tropical systems per year enter the CHC Response Zone.

Gulf of Maine Region Partners

Environment Canada

www.ec.gc.ca

Northeast Regional Climate Center

www.nrcc.cornell.edu

National Oceanic and Atmospheric Administration

www.noaa.gov

National Centers for Environmental Information

www.ncel.noaa.gov

National Operational Hydrologic Remote Sensing Center

www.nohrsc.noaa.gov

NOAA Sea Grant Network

www.seagrant.noaa.gov

Northeast River Forecast Center

www.erh.noaa.gov/nerfc

Climate Prediction Center

www.cpc.noaa.gov

Regional Climate Services

www.ncdc.noaa.gov/rcsd

Gulf of Maine Research Institute

www.gmri.org

State Climatologists

www.stateclimate.org

National Integrated Drought Information System

www.drought.gov

Cooperative Institute for the North Atlantic Region

www.cinar.org

Gulf of Maine Council on the Marine Environment, Climate Network

www.gulfofmaine.org/climatenetwork

Northeastern Regional Association of Coastal and Ocean Systems

www.neracoos.org

University of Maine, School of Marine Sciences

www.umaine.edu/marine

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www.drought.gov/drought/content/resources/reports

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