

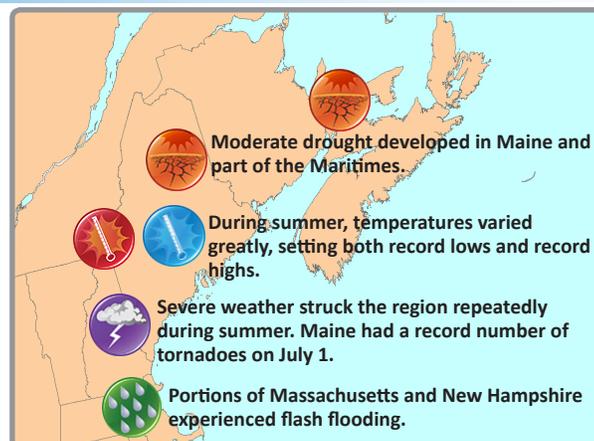


Gulf of Maine Significant Events - June–August 2017

Summer was characterized by **high variability** in temperature, rainfall, and weather events. **Moderate drought** developed in portions of Maine and the Maritimes, while parts of Massachusetts and New Hampshire had several **heavy rain** events.

There were multiple severe thunderstorm and flash flooding events throughout the summer.

- **June 27:** In New Brunswick, golf ball-sized **hail and wind gusts** near 100 km/h occurred in the Plaster Rock area. A tornado warning was issued for the Doaktown to Blackville area. Some stations saw more than 25 mm (1 in.) of rain in an hour.
- **July 1:** In Maine, a state that averages only two tornadoes a year, the Gray National Weather Service office issued seven tornado warnings, their greatest number in recorded history. Five weak (EF-0 or EF-1) **tornadoes touched down**, the most Maine has had in a single day. The **tornadoes** snapped or uprooted dozens of trees, damaging buildings, vehicles, and other structures. In New Hampshire, straight-line winds of up to 137 km/h (85 mph), a funnel cloud, and golf-ball-sized hail were reported. Flash flooding damaged dozens of roads in the two states, with damage in New Hampshire **exceeding \$4 million**.
- **July 7, July 12, August 2:** Heavy rain caused **significant street flooding** in parts of eastern Massachusetts. The **downpours** left some roads impassable and numerous vehicles stuck, with several having water up to their windows or hoods.
- **July 20–21:** A strong cold front produced **severe thunderstorms** in the region. Hail damaged crops, including over 200 acres of **corn in Maine** and around 100 acres of **potatoes in P.E.I.** In Aroostook County, ME, wind gusts of up to 97 km/h (60 mph) downed trees and damaged a few outbuildings. In P.E.I., heavy rain caused localized flooding, and **20,000 homes and business were left without power**. Charlottetown received 45.2 mm (1.78 in.) of rain, a daily record. Behind the system, from July 22 to 26, temperatures dropped as low as -0.6°C (31°F), with several sites setting **record lows**. Edmundston, NB, had a low of 1.3°C (34°F) on the 23rd, which was its all-time coldest July temperature since 1918.



- **August 5:** Two **tornadoes** damaged more than 1,000 trees and several structures in northern Maine.
- **August 19:** Up to 209.6 mm (8.25 in.) of rain led to numerous **flooded basements and roads** in Cape Cod, MA. A **car fell into a sinkhole** after a dune eroded beneath it.

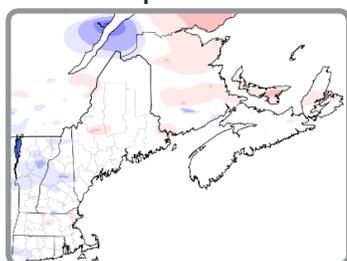
In mid-August, **Hurricane Gert** caused **high waves**, rough surf, and **rip currents** along several coastlines in the region.

Cold temperatures and frequent storms in May and early June **reduced lobster landings** in the Maritimes. Due to weather conditions and high demand, Canadian **lobster** prices were at an **all-time high** for late May and early June.

Regional Climate Overview - June–August 2017

Temperature

Departure from Normal

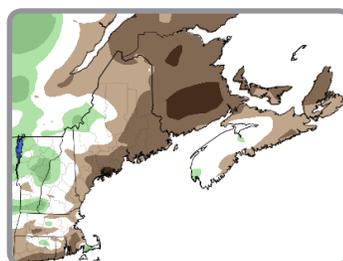


Summer temperatures (averaged over June, July, and August) ranged from 1°C (2°F) below normal in central New Hampshire to 1°C (2°F) above normal in parts of New Brunswick and P.E.I. **June** temperatures ranged from normal to 2°C (4°F) above normal. On June 6, highs near 10°C (50°F) ranked among the top five coldest for summer at Concord, NH, and Boston, MA. On June 8 and June 11–13, high temperatures ranging from 27° to 36°C (81° to 97°F) set records at several sites across the region. On June 19, Caribou, ME, tied its all-time warmest low temperature for June with a low of 21°C (69°F). **July** temperatures ranged from 1°C (2°F) below normal to near normal in the region. **August** temperatures ranged from 2°C (4°F) below normal in parts of Maine and New Hampshire to 1°C (2°F) above normal in parts of the Maritimes.

Temp and precip normals based on 1981–2010 data.

Precipitation

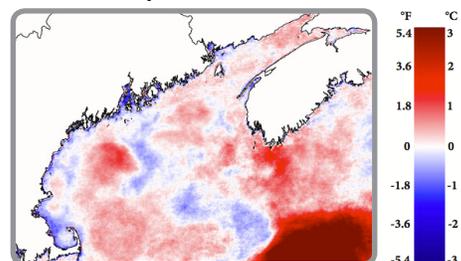
Percent of Normal



Summer precipitation (accumulated from June to August) ranged from 25% of normal in central New Brunswick and coastal Maine to 150% of normal in western Maine and Cape Cod, MA. At four sites in New Brunswick, the summer was one of the top three driest on record. **June** precipitation ranged from 25% of normal in Cape Breton, N.S., to 150% of normal in western Nova Scotia and parts of New England. In **July**, many areas received 25%–110% of normal precipitation, with central New Brunswick seeing less than 25% of normal. July ranked among the top 10 driest on record for more than a dozen sites. The wetter-than-normal areas in July included central Nova Scotia, western Maine, and central New Hampshire. **August** precipitation was 25%–110% of normal for much of the region. However, Cape Cod, MA, and parts of Nova Scotia, were wetter than normal.

Sea Surface Temperatures

Departure from Normal

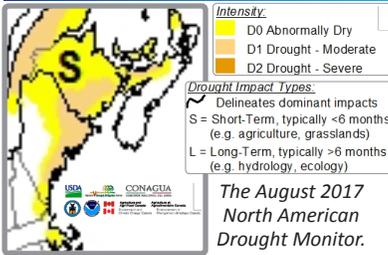


Summer sea surface temperature anomalies were highly location-dependent in the Gulf of Maine. Over most near-coastal regions in shallower water, temperatures were about 0.5°C (1°F) cooler than normal. These cool anomalies were also present over parts of the central Gulf of Maine south of Penobscot Bay, north of Georges Bank, and in the Northeast Channel region. Temperatures were 0.5°–1°C (1°–2°F) warmer than normal over the deeper basins of the Gulf of Maine, over Georges Bank, in the Bay of Fundy, and the southern Nova Scotia shelf.

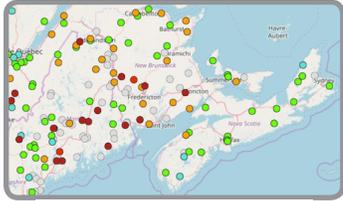
Sea surface temperature anomalies based on 1985–2017. Mean SST anomalies from NOAA AVHRR data. Credit: University of Maine School of Marine Sciences and NERACOOS



Regional Impacts - June–August 2017



The August 2017 North American Drought Monitor.



Above: Sep. 5 streamflow compared to historical values. Credit: USGS. Below: Drought conditions in Fredericton, NB, on August 12, 2017. Credit: Rick Fleetwood.



Summer Dryness

Much of the Gulf of Maine region was drier than normal during summer, with moderate drought developing in parts of coastal Maine, central P.E.I., northern Nova Scotia, and the southern half of New Brunswick. Drought conditions eased in P.E.I. in August due to increased precipitation. Some farmers in New Brunswick and Maine had to [increase their reliance on irrigation](#). The Maine Potato Board expected [reduced potato yields](#) compared to previous years due to the dry conditions, a concern shared by [P.E.I. potato growers](#). Pastures and hay fields were [dry, brittle, and slow-growing](#) in parts of Maine and P.E.I., with some farmers [giving their cattle supplemental feed](#). Below-normal rainfall reduced crop yields of berries. Growers in New Brunswick and P.E.I. reported fewer and smaller [raspberries](#), [strawberries](#), and [blueberries](#), and Maine blueberry growers reported [some shriveled berries](#). Grapes were also smaller in size, giving them a higher sugar concentration, which could [result in better wine](#) according to winemakers. Southwestern Nova Scotia was one of the few places in the Maritimes that was wetter than normal in June, which [boosted the strawberry crop](#); however, a dry July combined with long-term precipitation deficits contributed to [some wells going dry](#). Residents of Cornwall, P.E.I., were asked to [reduce their water usage](#). New Brunswick officials expect this tourist season to be [one of the best](#) in years due in part to the dry, sunny weather.

A forest fire on Miscou Island, NB, in late July forced residents of [25 homes to evacuate](#). According to the fire chief, the fire grew due to dry conditions and trees downed by the January ice storm. In early August, the fire danger in New Brunswick was the highest it has been [in more than 20 years](#), leading the province to restrict forestry operations during the day. Fire danger was also high in Nova Scotia and P.E.I., with the latter province [limiting burning](#) in some parks. Sporadic rainfall from late July through mid-August helped keep drought conditions from worsening. With the fire hazard reduced, restrictions on forestry operations in New Brunswick [were lifted](#) in mid-August.

Localized Heavy Precipitation

In contrast, fields were soggy and rutted in parts of New Hampshire. Farmers had [difficulty harvesting hay](#) and were concerned about [declining quality](#). There was also an [increase in diseases](#) in fruit. However, the conditions were [good for berry crops](#) and boosted grass growth in the state. Runoff from the heavy rain likely contributed to [high bacteria levels](#) in the water at 12 Massachusetts beaches, with some beaches closed for a few days.

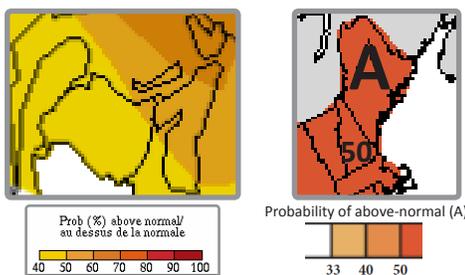
Regional Outlook - Autumn 2017

Temperature and Precipitation

As of mid- to late August, [Environment and Climate Change Canada \(ECCC\)](#) and [NOAA's Climate Prediction Center \(CPC\)](#) were calling for an increased chance of above-normal September–November temperatures for the entire region. ECCC was predicting an increased chance of above-normal September–November precipitation for P.E.I. and parts of New Brunswick and Nova Scotia, while CPC was forecasting equal chances of below-, near-, or above-normal precipitation for New England.

While ENSO-neutral conditions were in place as of mid-September, CPC indicated there is an [increasing chance \(55–60%\) of La Niña](#) during autumn and winter 2017–18.

According to the [U.S. Seasonal Drought Outlook](#), drought conditions are expected to ease in Maine.



ECCC temperature map (left) produced on August 31. CPC temperature map (right) produced on August 17.

Atlantic Hurricane Season

	Through Sep. 20	Aug. 9 Outlook	Average Season
Number of Named Storms	13	14-19	12
Number of Hurricanes	6	5-9	6
Number of Major Hurricanes	4	2-5	3

NOAA's 2017 [Atlantic hurricane season outlook](#) called for an active season. Already by mid-September, there have been 13 named storms, close to the season average. The outlook updated on August 9 calls for 14–19 named storms, including 2–5 major hurricanes, slightly more than the May outlook. Factors contributing to the updated forecast include storm activity through early August, the decreased likelihood of El Niño, warmer-than-normal waters in the tropical Atlantic Ocean, and computer model forecasts. The Atlantic hurricane season runs from June 1 to November 30, with the peak of the season from mid-August to late October.

In mid-August, Hurricane Gert caused high waves, rough surf, and rip currents along the Northeast coastline. Two of the major hurricanes, Harvey and Irma, were record-setting. Based on preliminary data, Hurricane Harvey dumped up to 1317.8 mm (51.88 in.) of rain on southeastern Texas in late August, which could become the [all-time greatest rain total](#) from a single storm in the continental United States. In early September, Hurricane Irma maintained max winds of 298 km/h (185 mph) for 37 hours, longer than any other cyclone across the globe according to [a report from Colorado State University](#). These two storms did not significantly impact the Gulf of Maine region.

Gulf of Maine Region Partners

- Environment and Climate Change 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.ncei.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.ncep.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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