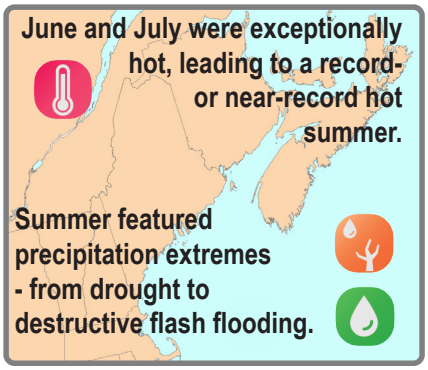
Quarterly Climate Impacts and Outlook

Gulf of Maine Region

September 2024

Gulf of Maine Significant Events – *June–August 2024*



June

June ranked as the **hottest June on record** for Caribou, ME, and among the 10 hottest for multiple sites including Boston, MA; Portland, ME; Fredericton, N.B.; Halifax, N.S.; and Charlottetown, P.E.I. The region experienced a period of exceptionally hot weather from **June 18 to 20**. High temperatures reached up to 38°C (100°F), with Caribou and a few Maritimes sites seeing their **all-time hottest temperatures** on record. In fact, a high of 37.6°C (100°F) in Bathurst on June 19 was the **hottest temperature ever in June for New Brunswick**. Similarly, North Cape recorded **P.E.I.'s warmest-ever June temperature** at 34.9°C (95°F) on June 19. Unusually high humidity levels made it feel as hot as 49°C (120°F) in some spots, with the humidex reaching **record ratings** in the Maritimes. The humidex (in Canada) and heat index (in the U.S.) **reached record levels**, with the National Weather Service in Caribou issuing its **first-ever Excessive Heat Warning**. Excessively warm overnight lows of up to 24°C (75°F) provided little relief from the daytime heat. Caribou tied its **all-time warmest low temperature** of 22°C (71°F) on June 19. It was the **only time on record** that Caribou had a low of at least 21°C (70°F) in June and it was its **earliest occurrence** in a calendar year. The extreme heat led to some closures of schools, restaurants, and fishing spots. Results from Canada's new Rapid Extreme Weather Event Attribution system indicated that climate change made this heat wave much more likely.

July

July ranked among the **three all-time hottest months** on record for Concord, NH, and Portland and Caribou, ME. It was the **hottest July on record** for Charlo and Bas-Caraquet, N.B., and among the five hottest for multiple Maritimes sites. Two of Concord's 10 all-time hottest low temperatures were recorded this July with 23°C (74°F) on July 6 and 24°C (75°F) on July 11. Warm water temperatures in the Miramichi River in New Brunswick caused salmon pools to be closed to fishing for the second time in two weeks. July precipitation was highly variable, with some areas in **drought or abnormally dry** and other areas seeing flash flooding. For instance, heavy rain from the **remnants of Hurricane Beryl** produced flash flooding in parts of New England and Nova Scotia from July 10 to 12.

August

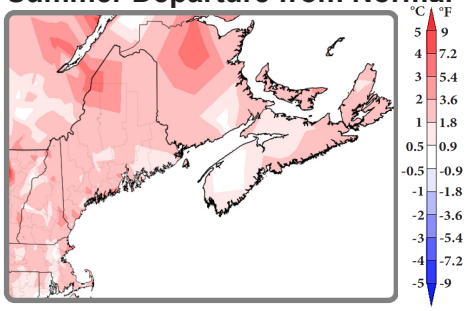
While August temperatures were closer to normal than the previous two months of summer, this August still ranked among the **10 hottest** for Caribou, ME, and a few New Brunswick sites. Drier-than-normal conditions prevailed in northeastern Nova Scotia and P.E.I., where Summerside had its fourth-driest August. This allowed **abnormal dryness to expand** in these areas. However, much of New England was wet due to multiple storms including the remnants of Hurricane Debby, allowing **moderate drought to ease**.

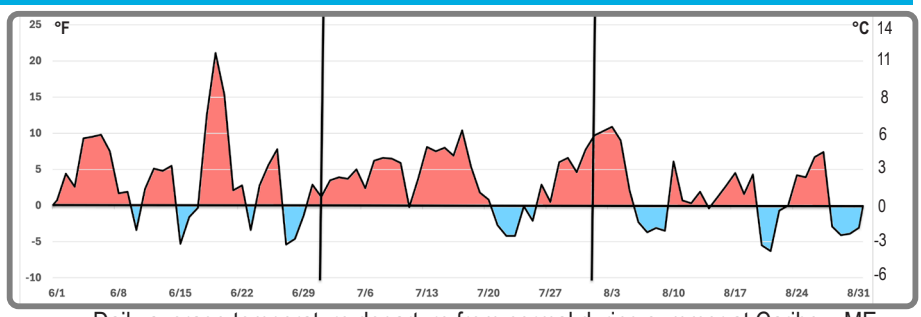
Summer 2024 was **record hot** for Caribou, ME, and a few Maritimes sites including Halifax (Airport), N.S., Fredericton, N.B., and Saint John, N.B. It was among the 10 hottest summers for multiple other sites in the region.

Regional Climate Overview – *June–August 2024*

Temperature

Summer Departure from Normal





Daily average temperature departure from normal during summer at Caribou, ME. Warmer-than-normal days are shaded red and colder-than-normal days are shaded blue.

Summer (averaged over June, July, and August) was up to 4°C (7°F) **warmer than normal***. It was **record hot** for some sites like Caribou, ME, and Fredericton, N.B., and among the 10 hottest for others. **June** and **July** were both up to 3°C (5°F) **warmer than normal**. It was the **hottest June** for Caribou and the **hottest July** for Charlo and Bas-Caraquet, N.B., with other sites having one of their 10 hottest Junes and/or Julys. **August** was within 1°C (2°F) of normal for most areas, with P.E.I. and northeastern Nova Scotia up to 2°C (4°F) above normal. It was among the 10 hottest Augusts for Caribou and a few New Brunswick sites. *Normals based on 1991–2020 data.

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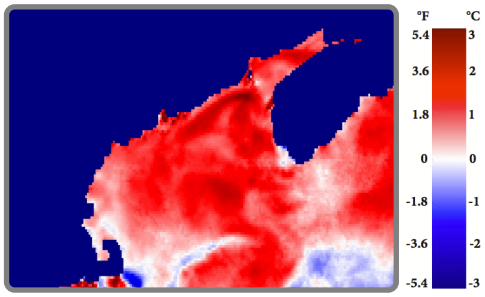
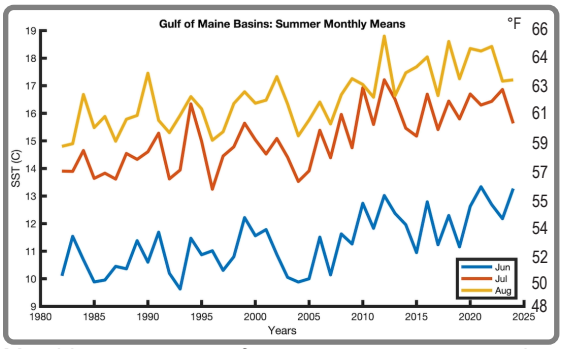
Regional Climate Overview – *June–August 2024*

Sea Surface Temperature

Summer Departure from Normal



Summer sea surface temperature anomalies were above normal for most of the Gulf of Maine. Anomalies were strongest in the eastern Gulf at greater than 1°C (2°F), with patches of greater than 2.5°C (4.5°F). Warm anomalies were around 1.5°C (2.5°F) over the Scotian Shelf but weaker at up to 0.5°C (1°F) in the far western Gulf.



Monthly mean sea surface temperature averaged over the Gulf of Maine for June, July, and August (1985 to 2024). Credit: University of Maine School of Marine Sciences

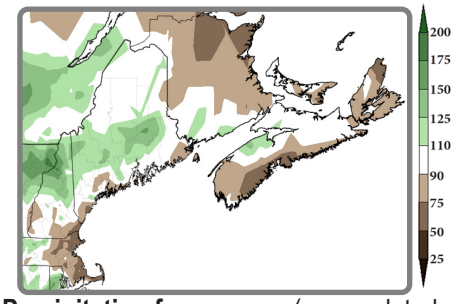
*SST normals based on 1991–2020 data.

Summer monthly mean sea surface temperatures, averaged over the Gulf of Maine deep basins, showed June to be second warmest in the 43-year time series, July to be 14th warmest, and August to be 13th warmest. The global average sea surface temperature was record warm in June, second warmest in July, and second warmest in August, making it the second warmest summer.

Marine heatwaves in the Gulf of Maine are likely delaying breeding cycles and lowering reproductive success rates of Atlantic puffins.

Precipitation

Summer Percent of Normal



Precipitation for summer (accumulated from June to August) ranged from 50% of normal* to 175% of normal. **June** precipitation ranged from 50% of normal in places like southern New Hampshire and southern New Brunswick to 175% of normal in places like northern Maine and western P.E.I. **July** precipitation ranged from 25% of normal in areas such as southern New Hampshire and southwestern Nova Scotia to over 200% of normal in areas such as central Maine and central Nova Scotia. **August** precipitation ranged from 25% of normal in places like P.E.I., where Summerside had its fourth-driest August, to more than 200% of normal in parts of New England.

*Precipitation normals based on 1991–2020 data.

Regional Impacts – *June–August 2024*

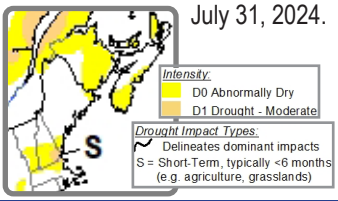
Damage from a tornado in New Hampshire in June. Credit: NWS GYX

Summer Conditions

In addition to the significant heat event from June 18 to 20, the second half of the month also featured some **severe weather** including an unconfirmed microburst in P.E.I. on June 20, an EF-1 tornado in southern New Hampshire on June 23, and straight-line winds of up to 70 mph in northern Maine on June 30. A few areas also received notable rainfall such as Caribou, ME, which saw its **eighth-wettest June day**, and western P.E.I., which picked up **more than a month's worth of rain over a three-day period**. Abnormal dryness eased in northern Maine, developed in southern New Hampshire and northeastern Massachusetts, and persisted in the Maritimes during June.

The **remnants of Hurricane Beryl** deposited over 75 mm (3 in.) of rain on parts of the region including northern New Hampshire, central Maine, and central Nova Scotia from July 10 to 12. For instance, a site in northern New Hampshire saw a daily rain total of 115 mm (4.52 in.), qualifying as a **100-year storm event** with a 1% chance of occurring in any given year. Roads were impassable as heavy rain washed them out, stranding people and leading to multiple water rescues. Floodwaters entered buildings in Nova Scotia, where there was a flood-related fatality. On July 16, parts of the region saw strong to severe thunderstorms, some of which produced torrential rain that caused localized flooding. An **EF-1 tornado** in Grafton County, NH, snapped or uprooted as many as 1,000 trees, some of which caused minor damage to several homes. Vehicles and homes were damaged when straight-line winds of up to 153 km/h (95 mph) felled trees in Hillsborough County, NH. New Brunswick saw its **lowest number** of cloud-to-ground lightning strokes for any July since records began in 2002. Areas that had notable rainfall saw abnormal dryness improve; however, runoff led to **elevated bacteria levels** in some waterways that resulted in dozens of beach closures in Massachusetts. Meanwhile, **moderate drought** developed in July in southern New Hampshire and northeastern Massachusetts and abnormal dryness expanded or persisted in those areas plus some Maritimes locations like Cape Breton, N.S.

Above: Flash flooding caused by Hurricane Beryl's remnants destroyed a road in Nova Scotia. Credit: Brian Taylor; Below: North American Drought Monitor from July 31, 2024.



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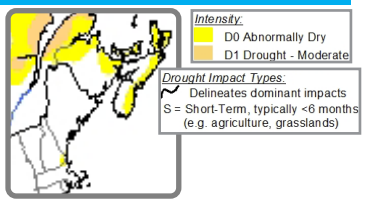
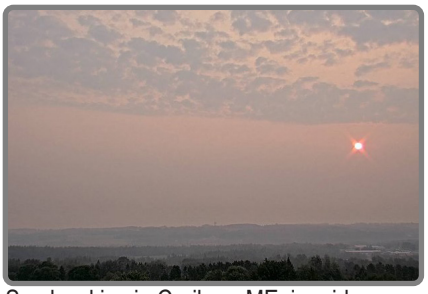
Regional Impacts – *June–August 2024*

Summer Conditions Continued

One of the notable precipitation events in August occurred when a frontal system merged with the **remnants of Hurricane Debby** and moved through the region from **August 9 to 10**. Most places saw up to 70 mm (3 in.) of rain, with higher totals of up to 120 mm (5 in.) in coastal areas near the Bay of Fundy. The rainfall **eased moderate drought** in New England and allowed abnormal dryness to contract. Gusty winds accompanied the storm, leading to some downed trees and scattered power outages. In mid-August, **Hurricane Ernesto** produced rough surf and rip currents along the coast as it traveled well offshore in the Atlantic. Ferry service was temporarily halted between Nova Scotia and Newfoundland. By month's end, northeastern Nova Scotia and P.E.I. had missed out on much of the precipitation, with Summerside, P.E.I., having its **fourth-driest August**. The potato growing season in P.E.I. started off well, but the dry August conditions caused water stress in some fields, leading to increased use of irrigation.



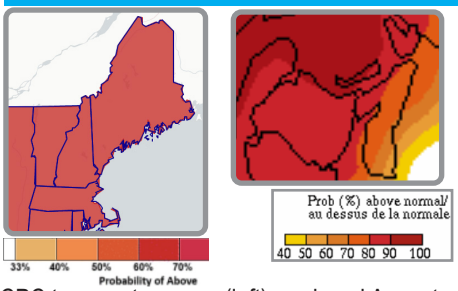
North American Drought Monitor from August 31, 2024.



Smoky skies in Caribou, ME, in mid-August. Credit: FAA

Periodic rounds of heavy rain during summer contributed to algal blooms and increased bacteria in waterways in New England, particularly Massachusetts where dozens of beaches were closed. **Wildfire smoke** from the western U.S. and Canada crossed the Gulf of Maine region occasionally during summer. Smoke was higher in the atmosphere, creating hazy skies that led to slightly reduced temperatures but generally limiting health concerns. However, in mid-August, wildfire smoke closer to the ground caused air quality issues in parts of Maine and New Hampshire. In addition, the smoke wrapped into the circulation of Hurricane Ernesto, likely helping to weaken the storm.

Regional Outlook – *Autumn 2024*

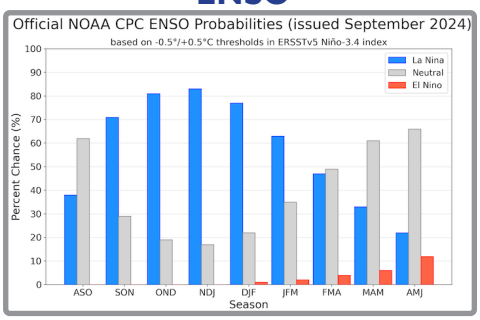


CPC temperature map (left) produced August 15. ECCC temperature map (right) produced August 31.

Temperature and Precipitation

For **September–November**, NOAA's Climate Prediction Center (CPC) and Environment and Climate Change Canada (ECCC) favor **above-normal temperatures** for the entire region. ECCC favors **below-normal precipitation** for autumn in the Maritimes, while CPC favors **above-normal precipitation** for New England.

ENSO



ENSO-neutral conditions were present in the equatorial Pacific Ocean during August. NOAA's Climate Prediction Center indicates there is a 71% chance that **La Niña conditions** will **emerge** during the September–November period. **La Niña** is expected to persist through January–March 2025.

Atlantic Hurricane Season

NOAA's updated 2024 Atlantic hurricane season outlook continues to favor an **above-normal season**. This is due to factors like exceptionally warm sea surface temperatures and a developing La Niña leading to reduced wind shear. Through September 1, there have been **five named storms** this hurricane season. Hurricane Beryl formed on June 28 and rapidly intensified as ocean conditions in the tropics/Caribbean region were more typical of early September. Beryl set multiple records including the earliest Category 5 storm in the Atlantic region and the farthest-east formation for such a storm in June. On August 4, Debby became the season's second hurricane, roughly three weeks early than usual. There was an unusual lull in tropical activity from mid-August (when Ernesto formed) through mid-September (when Francine formed). The Atlantic hurricane season runs from June 1–November 30, peaking from mid-August to late October. NOAA Eastern Region Climate Services webinar in August 2024 focused on the updated hurricane outlook.

	Updated 2024 Atlantic Season Outlook	1991-2020 Average Season
Number of Named Storms	17-24	14
Number of Hurricanes	8-13	7
Number of Major Hurricanes	4-7	3

Contacts

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Environment and Climate Change Canada

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Gulf of Maine Council on the Marine Environment
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