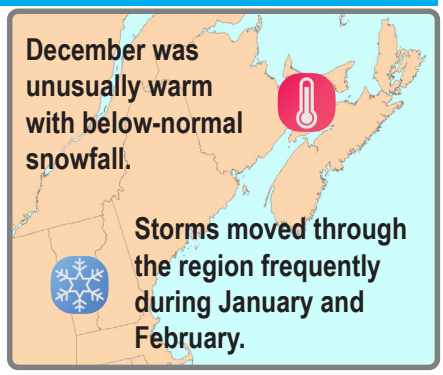
Quarterly Climate Impacts and Outlook

Gulf of Maine Region

March 2022

Gulf of Maine Significant Events – *December 2021–February 2022*

Drought conditions persisted in New England during winter. Several **notable storms** affected the region, as well. See Regional Impacts for details.



December

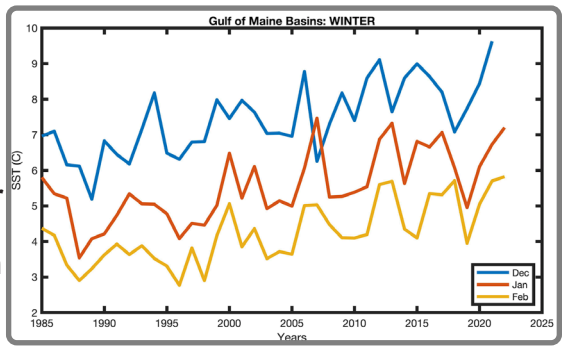
Several storms produced **strong winds** in the region. From **December 6 to 7**, wind gusts of up to 130 km/h (81 mph) downed trees/wires, causing power outages. Coastal areas of the Maritimes saw the highest wind gusts and **elevated water levels**, a scenario that is expected to be amplified by climate change. A storm brought mixed precipitation and wind gusts of up to 97 km/h (60 mph) from **December 11 to 12**. Parts of New Brunswick and Maine saw **freezing rain**, while parts of New Hampshire and Nova Scotia saw **thunderstorms**. Snowmelt and mild temperatures caused localized flooding. Downed trees/wires led to power outages. Data from Environment Canada shows P.E.I. has seen an increase in windy days in recent years.

January

After a **warm December, January** was **colder than normal** for most areas. There were a few notable **cold periods**, including January 26 to 27 when low temperatures in northern Maine and New Brunswick fell to -30°C (-22°F) or lower, setting daily temperatures records. **Multiple storms** affected the region during January, including a **late-month blizzard** that dropped up to 76 cm (30 in.) of snow on New England. Boston, MA, accumulated 59.9 cm (23.6 in.) of snow on January 29, tying as the site's **all-time snowiest day** on record. Boston, MA; Moncton, N.B.; Greenwood, N.S.; and Charlottetown, P.E.I.; had one of their **five snowiest Januaries** on record. Sydney and Eskasoni, N.S., had their **wettest January** on record.

February

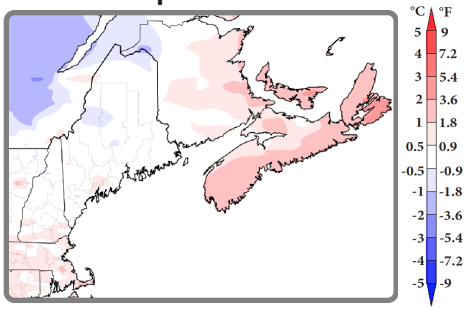
February featured **large temperature swings**, with multiple storms producing a **mix of precipitation types**. For instance, during an early-month storm, western/central Nova Scotia saw **over 20 hours of freezing rain**, causing around 120,000 customers to lose power. Some sites set daily temperature records from February 17 to 18 and February 22 to 23. Bangor, ME, had its **warmest low temperature for February** at 5.6°C (42°F) on February 17, while the high of 19.6°C (67°F) at St. Stephen, N.B., on February 23 was the **second highest February temperature** on record for New Brunswick. There was an increase in pothole complaints in Maine.

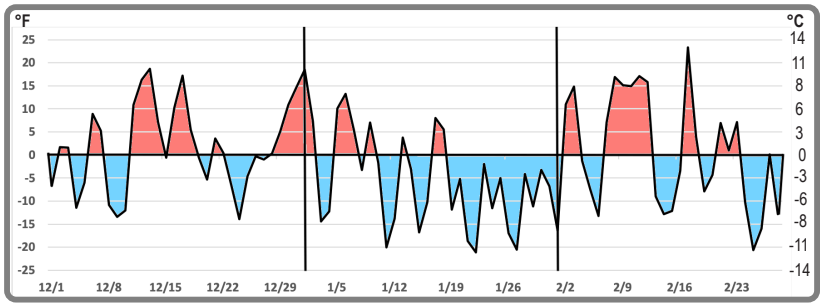


December and February mean sea surface temperatures, averaged over the Gulf of Maine deep basins, were the **warmest on record** in the high-resolution satellite data (1985 to 2022), while January was third warmest (graph right). Several days of **record warm sea surface temperatures** were observed in the Gulf of Maine during winter.

Regional Climate Overview – *December 2021–February 2022*

Temperature
Winter Departure from Normal





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

Winter (averaged over December, January, and February) ranged from 1°C (2°F) **below normal*** in parts of Maine to 3°C (5°F) **above normal** in Cape Breton, N.S. Warm winter temperatures are a concern for Nova Scotia's Christmas tree industry. **December** was up to 3°C (5°F) **warmer than normal**, with Massachusetts having its fourth warmest December and New Hampshire having its ninth warmest. **January** temperatures ranged from 4°C (7°F) **below normal** to **near normal** for most areas, with Edmundston, N.B., having its fifth coldest January. However, Cape Breton, N.S. was up to 2°C (4°F) warmer than normal. **February** was as much as 2°C (4°F) **warmer than normal**.

*U.S. normals based on 1991–2020 data; Canadian normals based on 1981–2010 data

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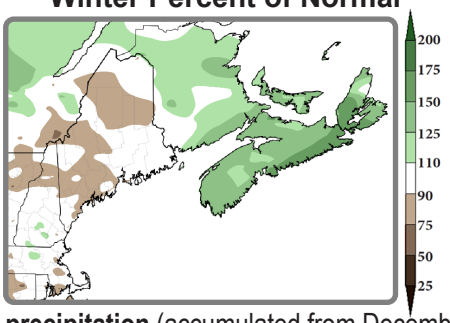
NOAA

Regional Climate Overview – *December 2021–February 2022*

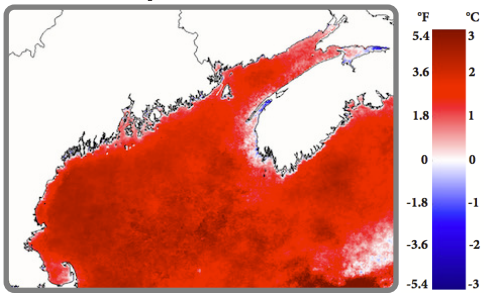
Precipitation
Winter Percent of Normal



U.S. precipitation normals based on 1991–2020 data; Canadian precipitation averages based on 1991–2020 data.

*SST normals based on 1985–2014 data

Sea Surface Temperature
Winter Departure from Normal



Winter precipitation (accumulated from December to February) ranged from 75% of normal to 175% of normal. **December precipitation** ranged from 25% of normal to near normal for most areas, with parts of New Hampshire, Maine, and Cape Breton, N.S., being wetter. **January precipitation** ranged from 25% of normal in parts of Maine and New Hampshire to more than 200% normal in parts of Nova Scotia, with two sites being **record wet**. **February precipitation** ranged from near normal to more than 200% of normal for most areas, with Caribou, ME, having its sixth wettest February.

Winter sea surface temperature anomalies over the Gulf of Maine were **strongly above normal*** (greater than 2°C [4°F]), strongest in the western Gulf (around 2.5°C [4.5°F]) and over parts of the southeastern Scotian Shelf (greater than 2.5°C [4.5°F]). Monthly anomalies were **strongest in December**, with values greater than 3°C (5°F) over much of the western Gulf and the southeastern Scotian Shelf. Moderate **flooding** from **high tides** in the Northeast U.S. is expected to occur, on average, **10 times as often** by 2050 as it does today due to **sea level rise**.

Regional Impacts – *December 2021–February 2022*

Winter Conditions

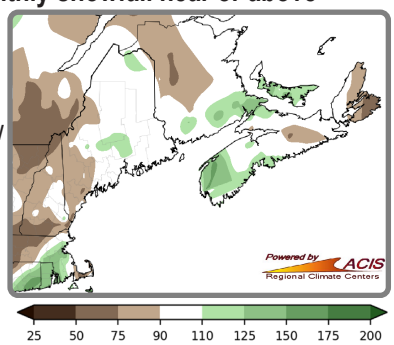
During **December**, there were above-normal temperatures and few snowstorms. **December snowfall** was **below** to **near normal** for most areas. Snow depth at the end of December in the Maritimes was below normal.

A **cold, stormy January** pushed **snowfall** totals **near** to **much above normal**, with some sites having one of their five snowiest Januaries. Frequent storms led to temporary grocery shortages in parts of New Brunswick and eroded up to 2 m (6.5 ft.) of shoreline, a year's worth of erosion, at P.E.I. National Park.

- **January 6 to 7:** Up to 45 cm (18 in.) of **snow** fell, with the greatest totals in P.E.I. **Winds** gusted up to 110 km/h (68 mph) in Nova Scotia and P.E.I. Maine had its first **Blizzard Warning** since March 2018. Impacts included difficult travel and power outages.
- **January 14 to 15:** A **nor'easter** brought up to 45 cm (18 in.) of **snow** and **wind gusts** of up to 121 km/h (75 mph) to the Maritimes. Up to 95 mm (4 in.) of mostly rain fell in Cape Breton, N.S., where **flooding** caused road closures on the Cabot Trail. The storm resulted in power outages, flight cancellations, and unsafe driving conditions.
- **January 16 to 18**: A storm brought up to 33 cm (13 in.) of **snow** to New England and up to 57 mm (2 in.) of precipitation to the Maritimes. **Wind gusts** of up to 110 km/h (68 mph) accompanied the storm, with a peak gust of 170 km/h (105 mph) in Cape Breton, N.S., where localized flooding occurred. The gusts downed trees and wires, led to power outages, and contributed to coastal flooding.
- **January 29 to 30**: A **rapidly strengthening nor'easter** dropped heavy snow on the region. The greatest totals of 61 to 76 cm (24 to 30 in.) were in Massachusetts where Boston tied its **all-time snowiest day**. Cape Breton saw up to 95 mm (4 in.) of **rain**. Winds gusted up to 105 km/h (65 mph), with gusts of up to 130 km/h (80 mph) in Nova Scotia and Cape Cod, MA. Many New England sites experienced **blizzard conditions**, while blizzard-like conditions in the Maritimes led to business and road closures. There were numerous power outages, including for more than 100,000 customers in Massachusetts. Cape Cod, MA, experienced coastal flooding.

February had **large temperature swings** and storms that produced **mixed precipitation**, with **monthly snowfall near or above normal**. Storm impacts in parts of the Maritimes included slowed sales and difficult snow removal.

- **February 3 to 5**: Most of the region saw **snow and sleet**, with the greatest totals up to 57 cm (22 in.). Massachusetts and Nova Scotia saw up to 65 mm (2.50 in.) of **rain/freezing rain** with some sleet and snow. The storm closed businesses/schools, contributed to the collapse of a roof in New Brunswick, and caused power outages.
- **February 17 to 18**: Some sites **warmed** by as much as 22°C (40°F) in 24 hours. **Rain** fell in most areas, with up to 105 mm (4 in.) in southern New Brunswick. Northern New Brunswick and northern Maine saw up to 20 cm (8 in.) of **snow**. Temperatures dropped rapidly behind the storm, with a **flash freeze** and flooding causing road closures in Nova Scotia. Wind gusts of up to 100 km/h (62 mph), with higher gusts in parts of Nova Scotia and Massachusetts, downed trees/wires, led to power outages, caused whiteouts, and contributed to a natural landmark falling over.



Winter snowfall ranged from 50% of normal to 150% of normal.

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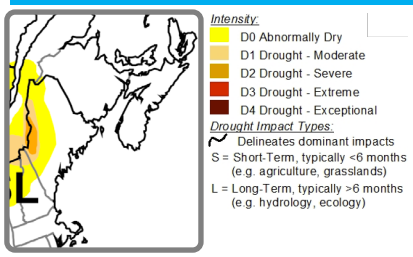
Regional Impacts – *December 2021–February 2022*



North American Drought Monitor from February 28, 2022.

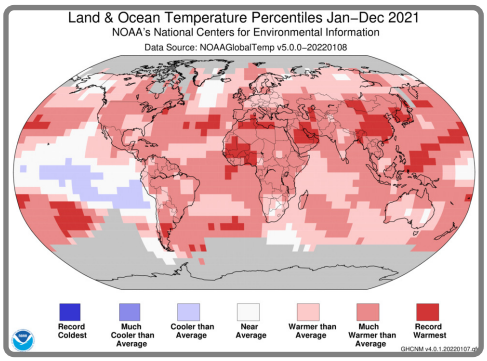
Drought Conditions

During **December**, **drought** and **abnormal dryness persisted** in western Maine and northern New Hampshire and two small areas of **abnormal dryness** were **introduced** in New Brunswick. **Dryness lingered** in western Maine, northern New Hampshire, and parts of New Brunswick during **January**. In **February**, **drought persisted** and **abnormal dryness expanded** in Maine and New Hampshire. However, above-normal precipitation in the Maritimes **eased** the small area of **abnormal dryness** in central New Brunswick. The main **impacts of the dryness** in New England were below-normal streamflow and groundwater levels.

2021 Warmth

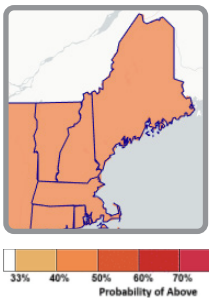
2021 ranked among the **three warmest years** on record for each province/state in the Gulf of Maine region. Boston, MA, had its **warmest year on record**, while 2021 ranked as the second warmest year on record for Caribou, ME, and Halifax and Yarmouth, N.S., and among the four warmest years on record for Concord, NH; Portland, ME; Fredericton, N.B.; Charlottetown, P.E.I.; and Sydney, N.S. It was the globe's sixth warmest year on record.

Ocean temperatures were also **exceptionally warm**. Warmer-than-normal sea surface temperatures persisted in the **Gulf of Maine** during 2021, with **record-setting temperatures** during fall. The Gulf had one of its **warmest**, if not the warmest, **year** on record, with **marine heat wave** conditions most of the year. The Gulf of St. Lawrence also experienced record-setting ocean temperatures. Warm ocean temperatures in the Atlantic Ocean contributed to an above-average 2021 Atlantic hurricane season.

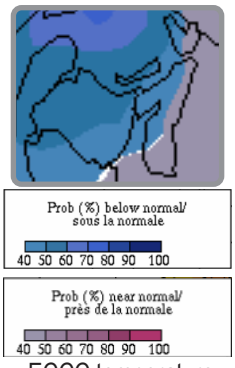


Regional Outlook – *Spring 2022*

Temperature and Precipitation



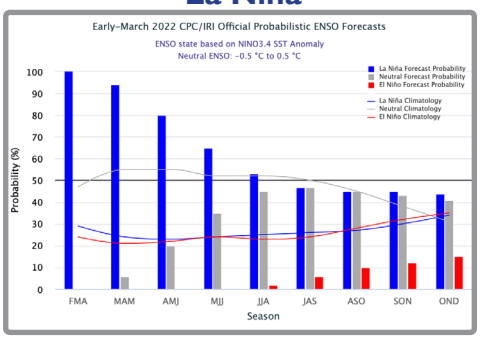
CPC temperature map (above) produced February 17.



ECCC temperature map (above) produced February 28.

For **March–May**, NOAA's Climate Prediction Center (CPC) favors **above-normal temperatures** for New England, driven by long-term trends. Environment and Climate Change Canada (ECCC) favors **below-normal temperatures** for much of the Maritimes, except portions of Nova Scotia where **near-normal temperatures** are favored. **Equal chances** of below-, near-, or above-normal **precipitation** are forecast for the entire region.

La Niña



During February, **La Niña conditions continued** in the equatorial Pacific Ocean. NOAA's Climate Prediction Center indicates there is a 94% chance **La Niña will continue** through **spring** and a 53% chance of La Niña conditions during summer. After that, there is a 40% to 50% chance of La Niña or **ENSO-neutral conditions**.

Spring Flood Potential

The river and ice jam **flood risk** during spring is **near or above normal** for northern New Hampshire and northern/western Maine and **below or near normal** for the rest of New England. Very heavy rain can cause flooding at any time of the year, even in areas that have little to no snow cover.

New Brunswick's River Watch program, which monitors water levels along the St. John River and its tributaries, launched on March 11. The New Brunswick Flood Hazard Viewer allows users to view flood maps and future changes due to climate change.

Flood potential outlook for March 17 to 31, 2022 from NOAA National Weather Service Northeast River Forecast Center

Contacts

National Oceanic and Atmospheric Administration

Environment and Climate Change Canada

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