



Gulf of Maine Significant Events – September–November 2021

Abnormal dryness and **drought** persisted in northern New England during **autumn**. A few **notable storms** impacted the region, as well. See Regional Impacts for details.

September

September was **wet and warm** for most areas. Several significant storms impacted the region, including the **remnants of Hurricane Ida** from **September 1 to 3**, which brought heavy rain. Parts of Massachusetts, Maine, New Brunswick, and P.E.I. saw two to three times their normal September precipitation. This September was the **wettest on record** for Bas-Caraquet and Woodstock, N.B., and among the three wettest for Charlottetown and Summerside, P.E.I. In the Maritimes, the **excessive rainfall** in September made some harvesting more difficult due to wet fields but was [good for apple growers](#). From **September 23 to 26**, high temperatures of up to 26°C (79°F) resulted in many daily **temperatures records being set** in the Maritimes. Low temperatures ranging from 13°C to 19°C (55°F to 66°F) set new records for high minimums in the Maritimes and New England.

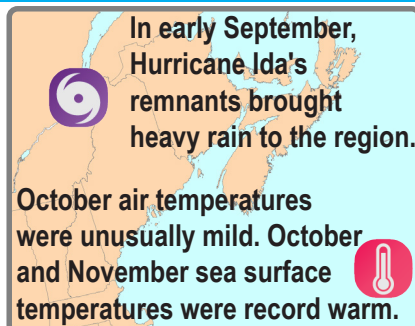
October

A **series of high-pressure areas** remained over the region for the first half of the month, maintaining **mild and dry conditions**. Much of the Maritimes and Maine saw less than 5 mm (0.20 in.) of rain, with some sites reporting no precipitation. In fact, Caribou, ME, had its **driest October 1-15 period** on record. During the second half of the month, **several storms** dropped heavy rain on parts of the region, with Portland, ME, having its 10th-wettest October. This October was the **warmest on record** for Charlo, N.B., and among the 10 warmest for many sites across the region. The extreme minimum temperature for October in Fredericton, N.B., was 0.8°C (33.4°F), making it the **first October since 1872** that the site remained above 0°C (32°F). Caribou, ME, did not have its first fall frost until October 25, the **latest date on record**. The first fall occurrence of a temperature less than 10°C (50°F) was the **latest on record** for Boston, MA. Maritimes weather conditions were favorable for [soybeans](#), potatoes, [apples](#), and [corn](#).

November

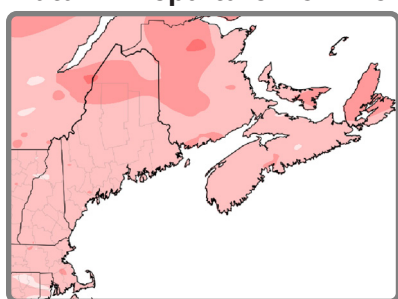
Similar to October, high pressure led to **little precipitation** during the first half of November. The second half was wetter, with a storm from **November 21 to 24** setting **all-time single day rainfall records** for at least two stations in Nova Scotia. From **November 12 to 14**, **high temperatures** of up to 21°C (70°F) set records at multiple Maritimes sites. Caribou, ME, did not see its **first measurable snow** until November 15, the **fifth latest date** on record. The extreme minimum temperature for November in Charlo, N.B., was -5.4°C (22.3°F) and in Bathurst, N.B., was -6.5°C (20.3°F), the sites' **warmest low temperatures on record for November**. With near- or above-normal temperatures and below-normal precipitation, **November snowfall was below normal** for many sites.

Autumn was among the **three warmest** on record for a few sites in the region. Gulf of Maine **autumn sea surface temperatures** were extremely warm, with **October and November** being the **warmest on record** in the high-resolution satellite data (1985 to 2021).

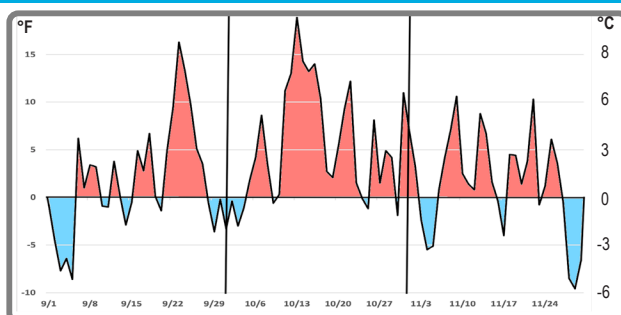


Regional Climate Overview – September–November 2021

Temperature Autumn Departure from Normal



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



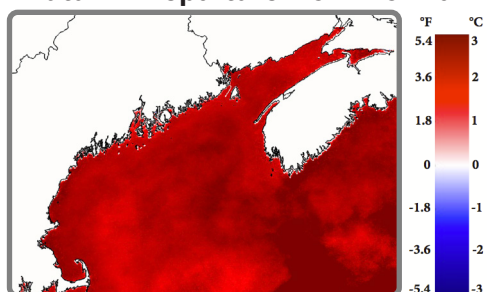
Daily average temperature departure from normal during autumn at Caribou, ME. Warmer-than-normal days are shaded red and colder-than-normal days are shaded blue.

Autumn (averaged over September, October, and November) was as much as 3°C (5°F) **warmer than normal***. This autumn was among the three warmest on record for a few New England sites. **September** was up to 3°C (5°F) **warmer than normal**, ranking among the 10 warmest Septembers for a few New England sites. **October** was up to 4°C (7°F) **warmer than normal**. This October was near-record or record warm for many sites in the region. **November** temperatures ranged near normal to 2°C (4°F) above normal for most areas, except parts of Massachusetts which were as much as 1°C (2°F) cooler than normal. A [recent climate change report](#) indicates the **greatest increases in temperature** in Nova Scotia occurred in the [autumn months](#), pushing back the date of **first frost**.

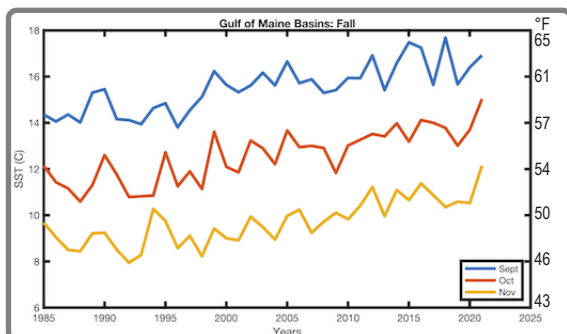
Regional Climate Overview – September–November 2021

Sea Surface Temperature

Autumn Departure from Normal



Autumn sea surface temperature anomalies over the Gulf of Maine were **strongly above normal*** everywhere (greater than 2.0°C [4°F]), strongest in the western Gulf (greater than 2.5°C [4.5°F]) and over parts of the eastern Gulf and the southern Scotian Shelf (greater than 3.0°C [5.5°F]).



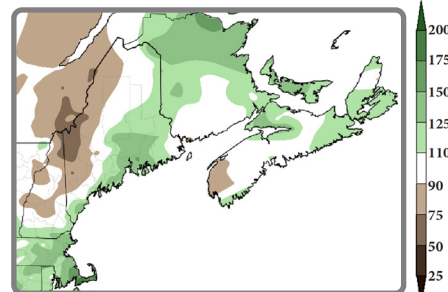
Monthly mean sea surface temperature, averaged over the Gulf of Maine deep basins, for September, October, and November (1985 to 2021). Credit: University of Maine School of Marine Sciences

Monthly anomalies were strongest in **October** and **November**, with both months the **warmest on record** in the high-resolution satellite data (1985 to 2021).

*SST normals based on 1985–2014 data

Precipitation

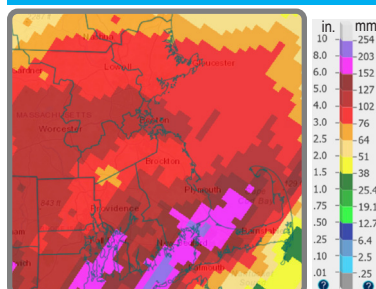
Autumn Percent of Normal



Autumn precipitation (accumulated from September to November) ranged from 50% of normal to 175% of normal*. **September precipitation** ranged from near normal to more than 200% of normal for most areas, with some sites being record or near-record wet. Western Maine and northern New Hampshire were drier. **October precipitation** ranged from 25% of normal to near normal in the Maritimes to more than 200% of normal in southeastern Massachusetts. **November precipitation** ranged from 25% of normal in parts of New England to more than 200% of normal in Cape Breton, N.S.

*U.S. precipitation normals based on 1991–2020 data; Canadian precipitation averages based on 2002–2020 data.

Regional Impacts – September–November 2021



September 2 rainfall in eastern Massachusetts from the remnants of Hurricane Ida. Credit: NOAA

Autumn Storms

There were several storm events during autumn. The **remnants of Hurricane Ida** affected the region from **September 1 to 3**. Rainfall totals ranged from less than 25 mm (1 in.) to 175 mm (7 in.), with the greatest amounts in P.E.I. and southeastern Massachusetts. Brier Island, N.S., and Summerside and Stanhope, P.E.I., had their **all-time wettest day on record**, while Charlottetown and St. Peters, P.E.I., had their third wettest. **Localized flooding** resulted in closed/washed out roads, stranded vehicles, and a few homes with significant basement flooding. Heavy rain also caused much of P.E.I.'s shoreline to be closed to shellfishing. **Maximum wind gusts** reached 80 to 120 km/h (50 to 75 mph) in the Maritimes, particularly in P.E.I., resulting in power outages. An EF-0 tornado and straight-line winds of up to 130 km/h (80 mph) blew down trees and caused minor damage to homes in southeastern Massachusetts. **Severe thunderstorms** in New England on **September 15 and 16** produced a funnel cloud, hail, and strong winds that flipped over a few small sailboats. A frontal system and moisture from **Post-Tropical Storm Odette** dropped up to 65 mm (2.50 in.) of rain on eastern Nova Scotia from **September 18 to 19**. From **September 25 to 26**, a slow moving storm brought up to 150 mm (6 in.) of rain to the region. The greatest amounts were in Maine and central/northwestern New Brunswick, where localized flooding and road washouts occurred.

A **series of disturbances** from **October 13 to 18** brought 40 to 130 mm (2 to 5 in.) of rain to northern Maine and the Maritimes, with Doyleville, N.B., reporting 80 mm (3 in.) in a day, leading to localized flooding. From **October 25 to 28**, a **nor'easter rapidly intensified** along the New England coast then moved south of the Maritimes, dropping as much as 95 mm (4 in.) of rain and producing wind gusts of 50 to 80 km/h (30 to 50 mph). Wind gusts of 110 to 145 km/h (70 to 90 mph) in Massachusetts downed trees and wires, leaving **more than 485,000 customers without power**, in some cases for several days. From **October 29 to 31**, a storm dropped 100 to 175 mm (4 to 7 in.) of rain in Maine, where localized flooding led to road closures. Southern Nova Scotia saw wind gusts of up to 95 km/h (60 mph).

From **November 21 to 24**, an intense storm system brought torrential rain, strong winds, and some coastal flooding to the Maritimes. At least two Nova Scotia sites set **all-time daily rainfall records**. The greatest storm rainfall totals were 150 to 290 mm (6 to 11 in.) in Cape Breton, N.S., and 50 to 125 mm (2 to 5 in.) in the rest of the Maritimes. Winds gusted above 100 km/h (62 mph) in eastern Nova Scotia, with max gusts of 140 km/h (87 mph) in Cape Breton. Storm impacts included power outages, widespread flooding, and washouts.

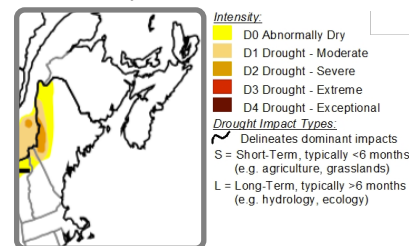
Regional Impacts – September–November 2021

Warm Water Temperatures

Unusually warm water temperatures in Cape Cod Bay, MA, [delayed the start](#) of turtle stranding season by two weeks and [have been implicated](#) in the formation of [low-oxygen zones](#). Low water levels and warm water temperatures have led to an increase in **fish diseases** and deaths at a [Nova Scotia fish hatchery](#). **Warm water temperatures** in P.E.I.'s West River have been linked to **fish deaths** from [fungal infections](#), with the problem possibly becoming more common due to **climate change**. A [recent report](#) indicates that **future sea level rise** could threaten more than 3,500 parcels of land valued at more than \$645 million in York County, ME.

Drought and Abnormal Dryness

During **September** and **October**, **dryness eased** in Massachusetts but **lingered** in Maine, New Hampshire, and northwestern New Brunswick. In Nova Scotia, dryness eased in September but was reintroduced in October. During **November**, **drought and dryness persisted** in western Maine and northern New Hampshire; however, **abnormal dryness eased** in the Maritimes. Impacts in New England included **below-normal streamflow** and/or **groundwater** levels, some dry wells, and pine trees [dropping more needles](#) than usual.



[North American Drought Monitor](#) from November 30, 2021.



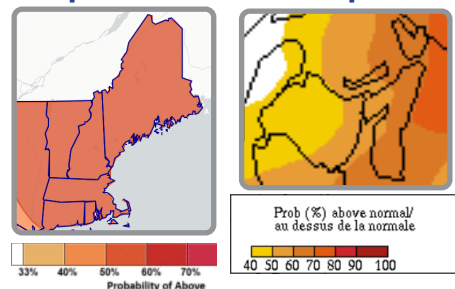
Ida's remnants over the Northeast U.S. on September 1. Credit: [NASA](#)

Hurricane Season

Eight named storms formed in September. After more than three weeks of no tropical activity in October, Subtropical Storm Wanda formed on the last day of the month. Wanda was the last name on the list for 2021, making it the third time ever the full list of names was used. In addition, it was the **first time on record** that all 21 storm names were used in consecutive hurricane seasons. No tropical systems formed in November. Overall, the [Atlantic hurricane season wrapped up](#) on November 30 with 21 named storms of which seven became hurricanes including four major hurricanes. An average season produces 14 named storms of which seven become hurricanes including three major hurricanes. This was the third most active season in terms of named storms. It was the **sixth consecutive year** with **above-normal tropical activity** in the Atlantic Ocean. Eight named storms entered the Canadian Hurricane Centre's Response Zone this season. However, only six storms had **impacts on land**: Elsa, Fred, and Henri [during summer](#) and Ida, Larry, and Odette during autumn.

Regional Outlook – Winter 2021

Temperature and Precipitation



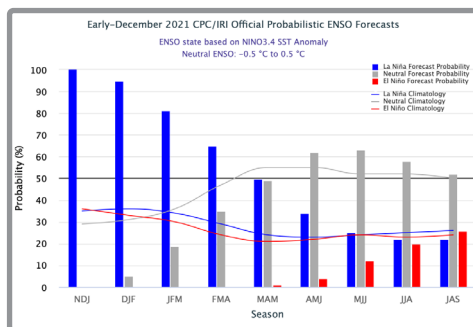
CPC temperature map (above left) produced November 18.

ECCC temperature map (above right) November 30.

For **December–February**, [NOAA's Climate Prediction Center \(CPC\)](#) and [Environment and Climate Change Canada \(ECCC\)](#) favor **above-normal temperatures** for the Gulf of Maine region, with **long-term climate trends** strongly influencing the outlook for New England. **Equal chances** of below-, near-, or above-normal **precipitation** were predicted for the entire region.

ENSO

During November, **La Niña conditions** continued in the equatorial Pacific Ocean. NOAA's [Climate Prediction Center indicates](#) there is a 95% chance **La Niña** conditions will **continue through winter 2021–22**, with a 60% chance of a transition to **ENSO-neutral** conditions during spring 2022 (graph below). A **moderate strength** La Niña



is favored for the November through January period. For more information on potential impacts from La Niña in the Northeast U.S., see the NOAA Northeast Winter Climate Patterns and Outlook [from November 2021](#) and the NOAA Eastern Region Climate Services [webinar recording](#) from November 2021.

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