September

Hurricane Dorian affected the region from September 6 to 8. The storm passed off the New England coast then transitioned into a post-tropical storm (with hurricane-force winds) as it approached the Maritimes. It made landfall near Halifax, N.S., then moved across P.E.I. and into the Gulf of St. Lawrence. Dorian had a major impact on the Maritimes due to intense rainfall, extreme winds, and storm surge. See Regional Impacts for details.

On September 18, temperatures as low as -2.8°C (27°F) set daily records and brought the first frost to some New Brunswick and Maine sites. A few days later, on September 22 and 23, some areas experienced daily record high temperatures of up to 32°C (89°F).

October

A coastal storm, which strengthened into Tropical Storm Melissa, stalled off the Northeast U.S. coast then moved south of Nova Scotia from October 9 to 13. The storm brought rough surf, up to 90 mm (3.50 in.) of rain, and damaging wind gusts of up to 97 km/h (60 mph) to eastern Massachusetts and the Atlantic coast of Nova Scotia.

A rapidly intensifying storm moved through the region from October 16 to 18. New lowest sea level pressure records for October were set at Boston, MA, Concord, NH, and Portland, ME. Wind gusts of up to 145 km/h (90 mph) downed trees and limbs, which blocked roads and damaged buildings and vehicles. More than 200,000 customers in Massachusetts, more than 180,000 customers in Maine, and more than 60,000 customers in the Maritimes lost power, some for several days. Many schools were closed. The greatest rain totals of up to 100 mm (4 in.) were reported in Nova Scotia where localized flooding occurred.

Another significant storm affected the region from October 31 to November 1. Wind gusts of up to 110 km/h (70 mph) downed numerous trees, which disrupted transportation, closed schools, and caused over 245,000 customers in the region to lose power. The greatest rain totals of up to 90 mm (3.50 in.) were reported in New Brunswick and northern Maine. On November 1, high temperatures of up to 23°C (73°F) set dozens of records in the region, with Caribou, ME, having its warmest November day on record.

November

Several intense storms moved through the region in November. Storms from November 11 to 13 and from November 24 to 25 brought mixed precipitation. The greatest totals included 25 to 45 cm (10 to 18 in.) of snow in northern New Brunswick and Maine, up to 85 mm (3 in.) of rain in the Maritimes, and up to 1 cm (0.5 in.) ice accumulation in Maine. A storm from November 28 to 30 dropped up to 30 cm (12 in.) of snow on Maine and the Maritimes and up to 90 mm (3.50 in.) of rain on Nova Scotia. Wind gusts were up to 100 km/h (62 mph). In Nova Scotia, a sports dome collapsed due to high winds and snow load. Thousands of customers lost power and transportation was impacted, including U.S. Thanksgiving travel. November snowfall was well below normal in coastal Nova Scotia but above to well above normal in much of the Maritimes, northern/western Maine, and northern New Hampshire.
Autumn temperatures (averaged over September, October, and November) ranged from 2°C (4°F) below normal to near normal in most areas, with eastern Massachusetts up to 1°C (2°F) above normal. September temperatures were as much as 3°C (5°F) below normal for most of the region. This September was among the five coldest for some Maritimes sites but was Boston’s 10th warmest. October temperatures were up to 2°C (4°F) above normal in most areas. November temperatures were as much as 3°C (5°F) below normal. On November 17, Caribou had its earliest occurrence of a temperature below -18°C (0°F).

Dorian grazed New England, bringing high surf, tropical storm-force winds, and up to 76 mm (3 in.) of rain. The storm made landfall in Nova Scotia, with extreme impacts in all three Maritimes provinces. The hardest hit areas of southeastern New Brunswick, eastern P.E.I., and western Nova Scotia received up to 160 mm (6.30 in.) of rain, with the greatest total of 164 mm (6.46 in.) at Mahone Bay, N.S. For most locations, the heaviest rain fell in less than 12 hours, which qualified this as a 100-year storm event with a 1% chance of occurring in a given year. Hourly rainfall rates peaked at more than 30 mm/hr (1 in./hr) at several stations. The heavy rain caused most shellfish harvesting areas in the Maritimes to be closed.

The greatest impact from Dorian was the extreme winds. The highest gusts of up to 145 km/h (90 mph) occurred in Nova Scotia and P.E.I. and were the strongest or among the top five strongest gusts on record at those locations for the warm season (May to October). Several locations near the track of the storm showed two distinctive peaks in wind speed/gusts corresponding with the passage of the storm’s eyewall. Dorian’s strong winds also led to deep mixing and a rapid 2°C (4°F) cooling of sea surface temperatures in the middle of the Gulf of Maine.

The Atlantic coast of Nova Scotia and areas along the Northumberland Strait experienced high water levels due to Dorian. For instance, the water level at Halifax, N.S., reached 2.9 m (9.5 ft.), and the water level at Escuminac, N.B., reached a record-setting 2.6 m (8.5 ft.). In P.E.I., high water eroded dunes along parts of the North Shore and broke the seawall at the West Point Lighthouse. Wave heights were up to 15 m (49 ft.) in the deeper waters off the coast of Nova Scotia.

The storm resulted in over $100 million in insured damage as a result of localized flooding, downed trees and power/communication lines, structural damage to buildings and marinas, and disruption to transportation (roads, ferries, and airports). The federal government deployed the Canadian Armed Forces to assist with recovery efforts. More than 400,000 customers lost power (80% of customers) in Nova Scotia, and nearly 65,000 customers lost power (75% of customers) in P.E.I. Dorian was the costliest storm in the history of NS Power at $39 million and Maritime Electric at $3.5 million. In New Brunswick, more than 80,000 customers were affected by power outages. Power restoration took more than a week for many customers in the three provinces. In Halifax, a tower crane buckled, crashing down on a high-rise building under construction. The cost of removing the crane was estimated to be at least $2 million. Following the storm, schools were closed for a few days in some areas.

Damage to agricultural crops occurred in all three provinces. Dorian’s strong winds felled apple trees and knocked down apples, stripped blueberries from their bushes, leveled corn fields, and tore leaves off potato plants. The storm damaged up to 80% of the trees in the Cavendish area of P.E.I. National Park, closing trails and roads for several weeks and forcing the Cavendish Campground to close for the season earlier than usual. Dorian also affected wildlife, with exotic birds swept into the Maritimes by the storm.

SST normals based on 1985–2014 data
Regional Impacts – September–November 2019

Atlantic Hurricane Season
It was the fourth consecutive year of above-normal tropical activity in the Atlantic Ocean. The 2019 season produced 18 named storms, of which six became hurricanes, including three major hurricanes. An average season produces 12 named storms, of which six become hurricanes, including three major hurricanes. According to NOAA, “The above-normal activity is consistent with the ongoing high-activity era, driven largely by the Atlantic Multidecadal Oscillation, which entered a warm phase in 1995. Conditions that favored more, stronger, and longer-lasting storms this year included a stronger West African monsoon, warmer Atlantic waters, and weak vertical wind shear across the western Atlantic and Gulf of Mexico.” This season, six tropical or post-tropical systems entered the Canadian Hurricane Centre Response Zone: Chantal, Dorian, Erin, Gabrielle, Humberto, and Melissa. While Dorian, Erin, and Melissa had impacts on land in the Gulf of Maine region, the others remained offshore.

Climate Change in the Gulf of Maine
Between 2004 and 2013, the Gulf of Maine warmed faster than 99% of the global ocean. Warming ocean temperatures have been linked to a decline in the New England shrimp population and a shift in the feeding locations of right whales. More impacts are expected as the warming continues. Over the next decade, lobster landings are expected to decline in Maine as shallow coastal waters become less habitable. A recent study indicated that while parts of the Bay of Fundy could also become less favorable, the deeper offshore waters of the Scotian Shelf are expected to remain a suitable habitat for lobsters in the coming decades. The Gulf of Maine 2050 International Symposium was held in Portland, ME, in early November. The goals of the event were to explore how climate change will affect the Gulf of Maine during the next 30 years, impacts from those changes, and ideas and actions for building resilience, as well as to create partnerships to propel those actions forward.

Regional Outlook – Winter 2019–2020

Temperature and Precipitation

For December–February, NOAA’s Climate Prediction Center (CPC) and Environment and Climate Change Canada (ECCC) favor increased chances of above-normal temperatures for New England and the Maritimes. ECCC predicts an increased likelihood of below-normal precipitation for the northern half of New Brunswick for December–February. Equal chances of below-, near-, or above-normal precipitation were forecast for the rest of the Gulf of Maine region. The seasonal outlooks combine many factors including dynamical models, the effects of long-term trends, soil moisture, and ENSO.

CPC temperature map (above left) produced November 21.
ECCC temperature map (above right) produced November 30.

During November, El Niño-Southern Oscillation (ENSO)-neutral conditions were observed in the equatorial Pacific Ocean. NOAA’s Climate Prediction Center indicates that ENSO-neutral conditions are expected to persist, with a 70% chance they will continue through winter 2019–20 and a 65% chance they will continue through spring 2020.

Gulf of Maine Partners

Gulf of Maine Council on the Marine Environment, Climate Network
University of Maine, School of Marine Sciences
State Climatologists
National Integrated Drought Information System
Northeast Regional Association of Coastal Ocean Observing Systems

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Gulf of Maine Region Quarterly Climate Impacts and Outlook | Dec. 2019
https://www.drought.gov/drought/resources/reports
Quarterly bulletins: climate impacts and outlook - online at Canada.ca