



Environment and Climate Change Canada

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Newfoundland and Labrador Quarterly Climate Summary: Fall 2019

Summary & significant weather events (September—November):

The fall season started out with a bang, as <u>Post Tropical Storm Dorian</u> made its way towards western Newfoundland early in September. After this, a relatively quiet period ensued across the province, including a generally dry, warm October. The quiet period did not last as we moved later into October, however, as the fall storm tracks made their way across the province. Wet (snowy conditions for some places) and windy weather was the order of the day through the month of November, though the <u>month started out with</u> unseasonably mild temperatures.

After Dorian, another system brought significant rainfall later in the month of September, concluding a near to slightly wetter than average month. Temperatures were generally warmer than normal in Labrador, while being a touch cooler than the average in Newfoundland.

A relatively benign month of weather was experienced in October, with generally warm and dry conditions being the story. There were exceptions to these conditions, particularly right at the end of the month as a rain storm caused flooding issues in the Stephenville area.

The wild end to October set the table for a stormy November, as the typical train of systems made their way to the province. All told, it was a relatively wet (or snowy) month for Newfoundland and Labrador before transitioning to the winter.

Here is a description of the most significant events:

September 8: Hurricane Dorian became post-tropical before it tracked west of Newfoundland (more on Dorian later in this bulletin).

• Wind: Wreckhouse hit 157 km/h, Green Island (Fortune Bay) peaked at 143 km/h, and Port aux Basques topped out at 128 km/h. Stations elsewhere across the island, as well as southeastern Labrador, reported peak wind gusts in the 80-120 km/h range.

September 25-26: A low pressure system approached Newfoundland from the west-southwest, and a second low tracked east of the Avalon Peninsula, tapping into tropical moisture.

- Rainfall: Millertown received the most rain with these systems, picking up 70.9 mm. St. Lawrence, Burgeo, and Winterland/Branch Hill received 50-57 mm over the two-day period. Stations elsewhere across the island received 33-50 mm of rain.
- Wind: Wreckhouse peaked at 111 km/h.

October 17-18: A deep low pressure system brought strong southeasterly winds to western Newfoundland.

• Wind: Wreckhouse wind gusts peaked at 144 km/h, while Stephenville reported a peak of 87 km/h.

October 31-November 2: An elongated warm front approached the province on Halloween. This brought heavy rain, strong winds and unseasonably mild temperatures to Newfoundland, and significant early-season snowfall to Labrador.

- Rainfall: 82 mm of rain was observed at Cow Head. Stations elsewhere in western Newfoundland and along the Labrador Strait received 40-75 mm of rain with this storm.
- **Snowfall:** Wabush Airport received 29 cm of snow with this event, while Goose Bay Airport reported 24 cm.
- Wind: Wreckhouse winds peaked at 107 km/h, while St. John's and Pool's Island hit peak wind gusts of 100 km/h exactly. Stations islandwide recorded peak wind gusts in the 78-97 km/h range.

November 6-7: Another deepening low pressure system tracked across Labrador, then slowly across the southern Labrador Sea. Strong winds occurred over parts of the province with this system.

- Wind: St. Anthony reported a peak wind gust of 109 km/h, Port aux Basques hit 102 km/h, and Ferolle Point peaked at 98 km/h. Goose Bay hit 93 km/h and Blanc Sablon hit 91 km/h, while several stations along the Labrador coast peaked in the mid to high 80's.
- Snowfall: 14 cm was reported at Makkovik.

November 8-9: A deepening low tracked across central Newfoundland, bringing a good shot of early-season snowfall to parts of the island.

- Rainfall: 41.1 mm was received at Burgeo.
- Snowfall: An estimated 23 cm of snow fell at Millertown and 21 cm fell at La Scie. Corner Brook, Stephenville, Deer Lake, and Cormack each received snowfall amounts estimated in the 10-20 cm range.

November 12-14: Another low pressure system tracked across southeastern Labrador, bringing rain to the island and winter storm conditions to much of Labrador.

- Rainfall: Wreckhouse station reported 82.7 mm of rain. 60-67 mm was reported at Port aux Basques, along with several stations in the Bay St. George region. Corner Brook, Burgeo, Cormack, and the Labrador Strait received 40-50 mm.
- Snowfall: Roughly 25 cm (estimated) fell in Hopedale, while Makkovik picked up 24 cm. Goose Bay Airport ended up gaining 18 cm of snow with this system.
- Wind: A peak wind gust of 107 km/h was observed at both Hopedale and Wreckhouse. Gusts to 106 km/h were reported at Makkovik and Nain, while 100 km/h gusts were noted at Port aux Basques and Bonavista.

November 15-17: More snow for northern Labrador, rain for southwest Newfoundland and strong westerly winds.

• Wind: Bonavista reported a peak gust of 108 km/h, Nain hit 106 km/h, Wreckhouse wind peaked at 102 km/h, and Pool's Island hit 96 km/h.

November 19-20: Freezing rain event for western Newfoundland, snowfall for the Northern Peninsula and the Labrador Strait.

• **Snowfall:** Nearly 10 cm was reported along the Labrador Strait.

November 21-22: An intense low pressure system brought significant rainfall and strong winds to eastern Newfoundland, as well as wet snow to parts of the Avalon and northeast.

- Rainfall: St. John's Airport and Portugal Cove-St. Philip's each received 92 mm of rain with this storm. Elsewhere on the Avalon and Bonavista Peninsulas, 50-70 mm of rain was reported.
- Wind: Stations across the Avalon and Bonavista Peninsulas reported peak wind gusts in the 95-111 km/h range, with Heart's Delight peaking at 118 km/h.

November 29-December 1: Winter storm for much of Newfoundland and coastal Labrador.

- Wind: Red Bay reported a peak wind gust of 132 km/h, while Black Tickle received a 125 km/h peak gust. Elsewhere in Labrador and on the Northern Peninsula, gusts in the 90-114 km/h range were observed.
- **Snowfall:** 32 cm was reported at Gander Airport over the two-day period, and a private station in Gander reported 20.8 cm.
- **Rainfall:** Several private stations in St. John's, Mount Pearl, and Whitbourne reported rainfall totals in the 20-35 mm range.

Provincial Climate Overview (September—November):

Temperature (Departure from Normal):

Fall temperatures averaged out to a little more than a degree above normal for the Labrador coast, while central Labrador and the Northern Peninsula were about a half degree above normal. Temperatures were about 0.5-1 degree below normal in extreme western Labrador and southwestern Newfoundland, while temperatures elsewhere in the province were near normal for the Fall.

September average temperatures were near normal across most of the province, except for much of southern and western Newfoundland. There, temperatures were roughly 1-2 degrees below normal.

October temperatures were near normal across the island, except for the extreme northern tip of the Northern Peninsula. Temperatures in this area were about a degree above normal. This warmer than normal trend continued north into Labrador, with a south to north range of 1 to 3 degrees above normal. Nain had its warmest October on record, while Mary's Harbour tied for its second warmest on record.

For **November**, temperatures of about a degree above normal were noted along the Labrador coast and in the Northern Peninsula. L'Anse au Loup actually had its 6th warmest November on record. Elsewhere, monthly temperatures were near normal, except in extreme western Labrador where temperatures were about a degree below normal.

Right: Temperature anomalies based on observations for Newfoundland and Labrador for (from top) September-November combined, September, October, November



Precipitation (Percent above/below Normal):

Fall was wetter than normal for western Newfoundland and the Labrador coast. Drier than normal conditions were experienced in western Labrador, while the remainder of the province received near normal seasonal precipitation.

For **September**, most of the island reported 10-50% above normal precipitation. There were exceptions, as pockets of southern and northeastern Newfoundland came in at about 10-25% below normal. A mix of conditions were also noted in Labrador. Much of the coast, as well as central Labrador, got about 10-50% above normal precipitation, while western Labrador received 10-25% below normal precipitation.

While the previous month produced a mix of wetter and drier than normal conditions, **October** told only one story. Though extreme southwestern Newfoundland recorded near normal precipitation, the rest of the province had well below normal precipitation, ranging from 25-80% below normal. Bonavista and L'Anse au Loup had their driest Octobers on record, and Terra Nova had its 3rd driest.

In **November**, the script got flipped as a steady stream of storms brought plenty of precipitation to Newfoundland and Labrador. The island received about 25-75% above normal precipitation, with parts of White Bay and the Strait of Belle Isle getting nearly 100% above normal precipitation. Much wetter than normal conditions were also experienced along most of the Labrador coast, where 50-100% above normal precipitation was reported. The Makkovik area ended up with 125% above normal precipitation for the month. All told, L'Anse au Loup, Mary's Harbour, Port au Choix, and Stephenville each recorded their wettest November. Buchans and Daniel's Harbour had their 3rd wettest November on record. Central Labrador saw 10-50% above normal precipitation, and western Labrador contradicted the trend of the rest of the province, coming in at near to 10% below normal.

Right: Precipitation anomalies for Newfoundland and Labrador for (from top) September-November combined, September, October, November.









Total Snowfall and Snow Depth

For the fall season, interior and northern Labrador received an estimated 100-250 cm of snow. In southeastern Labrador, as well as western Newfoundland, roughly 40-100 cm of snow was estimated to have fallen by the end of November, with an estimated 150 cm over a portion of the Long Range Mountains. Eslewhere on the island, 20-40 cm fell through central and the northeast, along with inland areas of southern Newfoundland. The remainder of the south coast, as well as the Avalon Peninsula, received negligible snowfall for the fall season.

At the end of November, most of Labrador had some snow on the ground. Estimated snow depths ranged from about 10-20 cm in parts of the southeast and along parts of the coast to about 30-50 cm in the west and along parts of the mid coast. An estimated 60+ cm of snow was thought to be down on the Mealy Mountains. Snow depths in the Long Range Mountains were estimated at 10-30 cm. Elsewhere in Newfound-land, some areas of the west and central had about 10 cm or so on the ground, while there was virtually none in other areas.



Left: Total snowfall (estimated) for September, October, and November combined. Right: Snow depth (estimated) for Newfoundland and Labrador as of 8:30 am NST November 30, 2019

Sea Surface Temperature (Departure from Normal):

Note: We are excluding the area over the southern Grand Banks where the Labrador Current and the Gulf Stream meet. This area is extremely variable even in normal conditions. Grey areas may represent either gaps in data or presence of sea ice.

September sea surface temperatures were generally about 1 to 3 °C warmer than average over much of the Labrador Sea, off the northern Labrador coast, and over offshore waters east and southeast of Newfoundland. The warm waters southeast of Newfoundland were especially problematic, contributing to a <u>considerable salmon die off in the area</u>. Sea surface temperatures northeast of Newfoundland were roughly normal for the month, while temperatures off the remainder of the Labrador coast were a shade below normal. 1-3 °C colder than normal sea surface temperatures were noted off Newfoundland's southwest coast, as well as Gulf of St. Lawrence waters.

In **October**, 1-4 °C warmer than normal sea surface temperature anomalies existed across the majority of Labrador waters, as well as marine areas well offshore of Newfoundland. Surface temperatures surrounding Newfoundland were near normal to about a degree above normal.

For **November**, sea surface temperatures continued to run warmer than normal, as all Newfoundland and Labrador waters were about 1-4 °C above normal for the month.



NOAA monthly mean SST anomaly map (based on 1981-2010 Normals) for Sep 2019 (left), Oct 2019 (middle), and Nov 2019 (right) - https://www.nnvl.noaa.gov/view/globaldata.html#SSTA

2019 Hurricane Season:

The 2019 Atlantic Hurricane season produced 18 named storms, 3 of which formed into major hurricanes. One of those major hurricanes was <u>Dorian</u>, which made its way into Atlantic Canada early in September while it was still a powerful storm. Aside from Dorian, a few storms meandered near or just inside the Canadian Hurricane Centre's response zone, including Humberto. But these storms brought little impact to Newfoundland and Labrador over land. Overall the 2019 season ended up well above average in terms of named storms (coming in slightly above the upper limit of NOAA's 2019 August updated forecast), with near average number of hurricanes and major hurricanes.



Storm numbers and averages as of November 30th 2019

	Atlantic Hurricane Season Progress	Named Storms	Hurricanes	Major Hurricanes
35°	This year	18	6	3
30°	2018	17	10	6
	Average by this date (1980-2010)	12.0	6.4	2.7
25°	Average by this date (last 50 years)	11.2	6.1	2.3
20°	Most by this date (last 50 years)	27	14	8
	Fewest by this date (last 50 years)	4	2	0

Left: NOAA Preliminary Atlantic Tropical Cyclone tracks for the 2019 season (<u>https://www.nhc.noaa.gov/</u>) Right: CHC Tropical Cyclone season summary.

Provincial Impacts (September—November):

Post Tropical Storm Dorian:

As noted on the previous page, it was a very active Atlantic Hurricane season in 2019. The most significant storm of the season for folks in Atlantic Canada was certainly <u>Dorian</u>, which made its way across Nova Scotia as a very intense post-tropical storm on September 7. The storm made its way through the Strait of Belle Isle the next day, and brought very strong winds to Newfoundland and southeastern Labrador. Additionally, a <u>100-foot rogue wave was recorded by a Marine Institute buoy just south of Port aux Basques</u>. Storm impacts included several sewer outfalls and culverts damaged in the Port aux Basques area, uprooted trees, power outages, and a shed washed away in Woody Point.

Warm and dry from late September through most of October:

Though September as a whole was relatively cool for the island, sea surface temperatures off Newfoundland's south coast were considerably warm. These warm water temperatures were linked to a <u>massive salmon die-off</u> at an aquaculture site in southern Newfoundland. Warm, dry conditions were responsible for a <u>mixed bag growing season in 2019 for Newfoundland</u>. While some crops thrived, near-drought conditions made for an especially tough farming season, especially in western Newfoundland. Warm conditions extended into the first days of November, as many sites across the island set new high temperature records on November 1, some of which reaching or exceeding 20 degrees.

A stormy November concludes another rough season for ferry traffic:

In addition to the aforementioned impacts of Dorian, there were also <u>ferry cancellations for the Cabot Strait ferry route</u>. This was a precursor to another rough fall season on ferry traffic to and from the island. November on its own brought 8 storms to the province, many of which produced strong winds. And several of those systems triggered <u>ferry cancellations and delays</u> for Newfoundland's link to Nova Scotia. But the Cabot Strait route was not the only voyage to experience delays and cancellations, nor were these impediments isolated to the month of November. Poor weather conditions meant that the <u>Kamutik W remained tied up for long periods in October and November</u>, causing <u>significant delays and backlogs for supplies to Labrador's north coast</u>. The Qajak W also experienced cancellations during the fall, though this provided <u>a unique opportunity for adventure for one individual</u>.

Provincial Impacts (September—November):

Early winter for some, while western Newfoundland experiences flooding:

As is customary with November's cavalcade of storms, many of these brought a mix of conditions, including early winter conditions to various parts of the province. One of these storms arrived shortly after Remembrance Day, bringing a stark contrast of conditions to the province. Parts of Labrador experienced heavy snowfall and cold temperatures, while the island received mild temperatures and heavy rainfall. The heavy rainfall, in particular, was a big problem as localized flooding caused road closures and damage in parts of western Newfoundland. This marked the second time in two weeks that flooding caused road closures and washouts in the Bay St. George area. Another mix of precipitation arrived on the island November 21-22, providing heavy rain for the Avalon Peninsula, and early season snowfall to parts of central and the northeast. This was not the end of November snow, as another storm capped off the month. A fresh batch of snow fell in central and northeastern Newfoundland, as well as parts of Labrador, while the Avalon had its first wintry morning commute. This storm also produced several power outages in southern and western Newfoundland.

End of the forest fire season:

<u>2019 marked three consecutive years of below average forested land burned by wildfires</u>. The island maintained some areas of moderate to high fire danger at times through the first half of September, with occasional times at very high risk. Newfoundland and Labrador had an estimated 97 wildland fires up to September 30, slightly below the 10-year average (114).

River Flows / Drought Conditions:

Monthly river flows tended to echo the story told by the precipitation anomaly maps. By the end of **September**, most rivers across the province were near to above normal for flow rates, with Eagle River in Labrador reporting excessive flow. Only a couple of rivers were running below normal. Despite most rivers showing normal flow rates, Gander and Isle aux Morts Rivers had deficient flow for the month.

By the end of **October**, conditions were quite different in Newfoundland and Labrador. Most rivers were running below normal, with many showing deficient flow. Many rivers in western Newfoundland seemed to buck this trend, as these ran above normal for flow rates by the end of the month thanks to a heavy rainfall event near Halloween.

A wetter than normal **November** gave rise to river flows which were above normal over much of Newfoundland and parts of Labrador. Both Isle aux Morts River and the Upper Humber River recorded excessive mean flow rates for the month. Many rivers in western Newfoundland and interior Labrador had flow rates which were normal.



North America WaterWatch map of real-time streamflow compared to historical streamflow for the day of year: as of September 30 (left), November 1 (middle) & December 2 (right), 2019 - <u>https://watermonitor.gov/naww/index.php</u>

Drier than normal conditions were noted in September for parts of western and northeastern Newfoundland, as well as western Labrador. This continued to be the case for October thanks to well below normal precipitation, as abnormally dry conditions expanded into central Newfoundland, as well as the Avalon and Great Northern Peninsulas. By the end of November, dry conditions were not analyzed, except in extreme western Labrador.



Canadian Drought Monitor Map for September 30, 2019 (left), October 31, 2019 (middle), and November 30, 2019 (right). Drought maps courtesy of Agriculture and Agri-Food Canada- <u>http://www.agr.gc.ca/eng/programs-and-services/list-of-programs-and-services/drought-watchcanadian-drought-monitor/?</u> id=1463575104513 Fall Season (Period: September-October-November) Temperature Outlook Performance: For the most part, fall across the province was expected to be warmer than normal.



Left: Probability of above, below and near normal: Produced August 31, 2019 – Right: Forecast Temperature Anomaly: Produced August 31, 2019

The temperature outlook worked out fine for a large portion of Labrador. Otherwise, fall temperatures ended up being below normal for southwestern Newfoundland, and near normal across the rest of the province.



Above: Observed Temperature Anomaly – Issued on December 1, 2019

Winter Season (Period: December-January-February) Temperature / Precipitation Outlook:

Newfoundland and Labrador, along with most of the remainder of the country, is predicted to have a milder than normal winter. The probability of such conditions falls in the moderate range for our province. Exceptions to this prediction are the Avalon and Burin Peninsulas, as well as part of western Labrador. These areas have a moderate chance of having a near normal winter in terms of temperature.

The precipitation forecast (not shown) shows a moderate chance of a drier than normal winter in northern and central Labrador. Otherwise there is no clear signal in terms of precipitation. The seasonal precipitation forecast typically does not perform as well as the seasonal temperature forecast, so the graphics are not included.



Left: Probability of above, below and near normal temperature: Produced November 30, 2019 – Right: Temperature Anomaly Outlook: Produced November 30, 2019 https://weather.gc.ca/saisons/index_e.html

Temperature Outlook: Next 4 Weeks

Newfoundland had an above normal start to December in terms of temperature. Labrador started closer to normal before western Labrador dropped to colder than normal. Overall, the result was decently captured by the Global Ensemble Prediction System. Here are the predictions for the next 4 weeks.

Week 1 (December 16 to 23):

Temperatures into the first few days of Winter are expected to be near normal on the island, with the exception of southwestern Newfoundland. There, temperatures have a moderate to high probability of being below normal. Western Labrador is expected to be near normal to colder than normal, with a moderate chance. Elsewhere in Labrador, temperatures have a moderate to high chance of being warmer than normal, with a very high chance of above normal temperatures for northern areas.

Week 2 (December 23 to 30):

Near normal temperatures are expected as we head into Christmas week. A couple of exceptions for Santa's visit are noted in part of western Labrador (moderate to high chance of below normal) and the northeast coast of Newfoundland (moderate chance of above normal).

Right: Forecast probability of above or below normal temperature from the Canadian Global Ensemble Prediction System for week 1 (top) & week 2 (bottom): Produced December 12, 2019



Week 3 (December 30 to January 6):

Newfoundland and Labrador are anticipated to ring in the New Year with generally near normal temperatures. Parts of the northeast coast of Newfoundland, as well as northern Labrador, have a moderate chance of warmer than normal temperatures into the first days of 2020.

Week 4 (January 6 to 13):

Again, near normal temperatures are expected, with the exception of northern Labrador. This area shows a moderate to high chance of warmer than normal temperatures.

Right: Forecast probability of above or below normal temperature from the Canadian Global Ensemble Prediction System for week 3 (top) & week 4 (bottom): Produced December 12, 2019



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