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Climate Change Canada

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Newfoundland and Labrador Quarterly Climate Summary: Fall 2022

Summary & significant weather events (September-November):

It took a while for the Atlantic Hurricane Season to get into full swing, but it turned out to be a memorable one for Newfoundland with Earl and Fiona impacting the island. There was calm after the storms, as many areas of the province went on to have record (or near-record) warmth. But the proverbial calm before the storm was true as well, with a steady stream of storms to conclude the autumn with an early taste of winter.

The story of September was the impact of the tropical cyclone season on the island. First Earl spilled torrential rain on the Avalon Peninsula, then the powerful Fiona produced a record high water level and catastrophic flooding in southwestern Newfoundland. For

much of the remainder of the province, September was relatively warm and dry.

These warm, dry conditions not only continued into October, but they were the story for fall's middle month. Many areas of the province experienced their warmest or second-warmest Octobers on record. A relative dearth of storms also meant a lack of precipitation across the island, with several zones experiencing drought conditions.

Temperatures stayed fairly warm and dry into early November, but then a bevy of storms provided winter-like conditions at times across the province, Newfoundland especially. Most of Newfoundland and Labrador had measurable snow on the ground at the end of November.

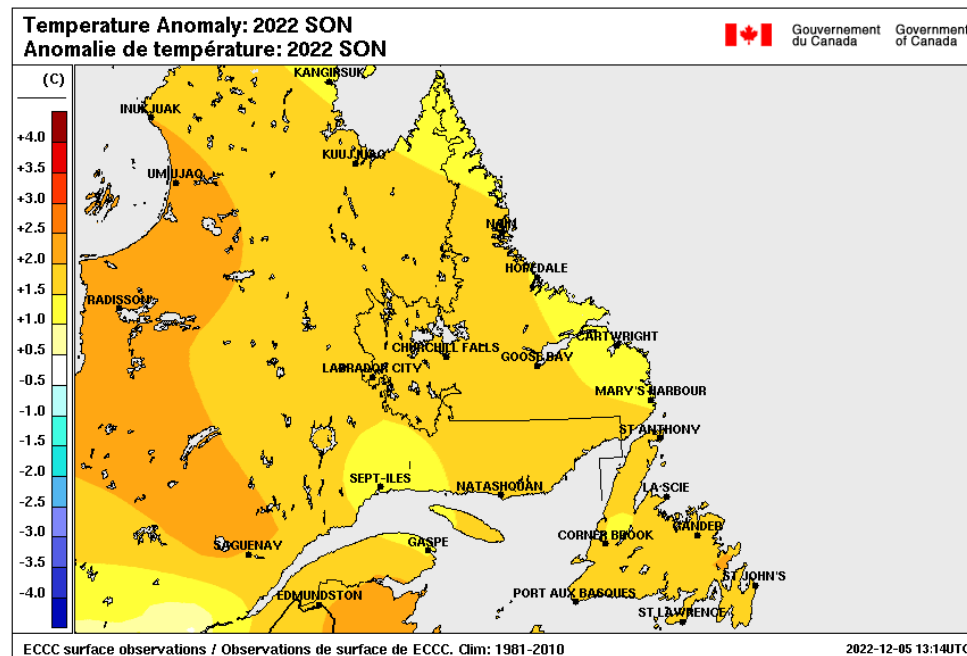
Provincial Climate Overview (September-November):

Temperature (Departure from Normal):

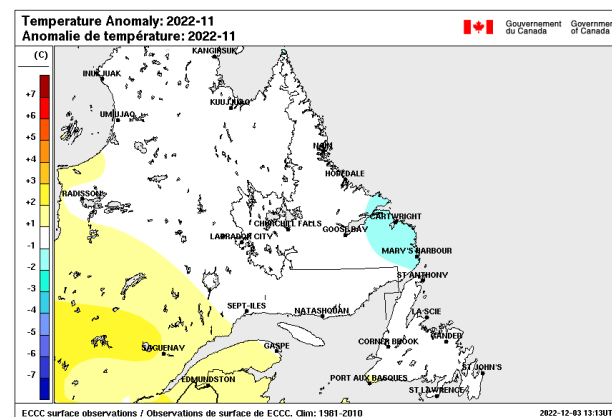
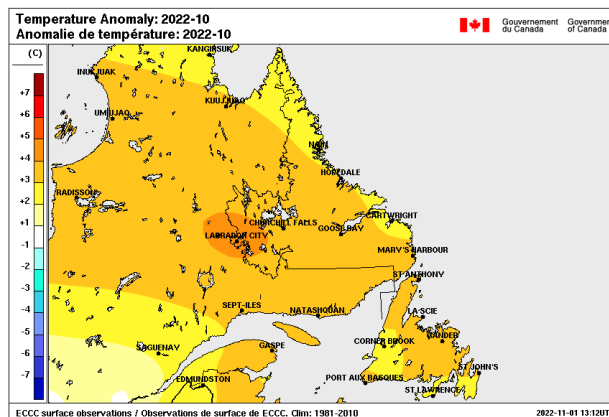
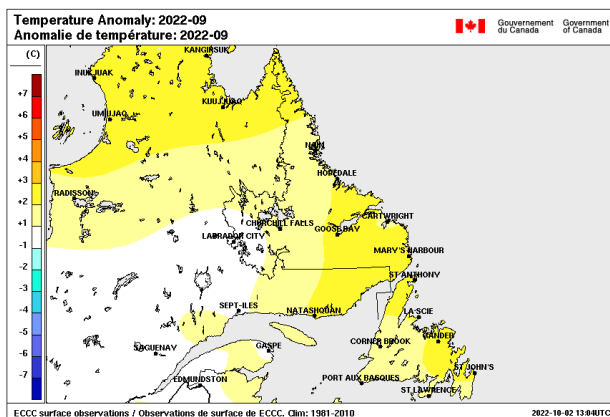
Temperatures for this Fall (averaged over September, October, November) were above normal across the province (1 to 2 C).

Highlights:

- 3rd warmest fall on record for Bonavista, L'Anse au Loup, Port aux Basques, and St. John's
- Warmest September on record for St. Lawrence, and 2nd warmest for L'Anse au Loup
- Warmest October on record for Cartwright, Happy Valley-Goose Bay, Hopedale, L'Anse au Loup, and Wabush
- 2nd warmest October on record for Bonavista, Port aux Basques, Gander, Nain, St. John's, St. Lawrence, and Terra Nova.



above: Temperature anomalies for Newfoundland and Labrador for September-November combined.



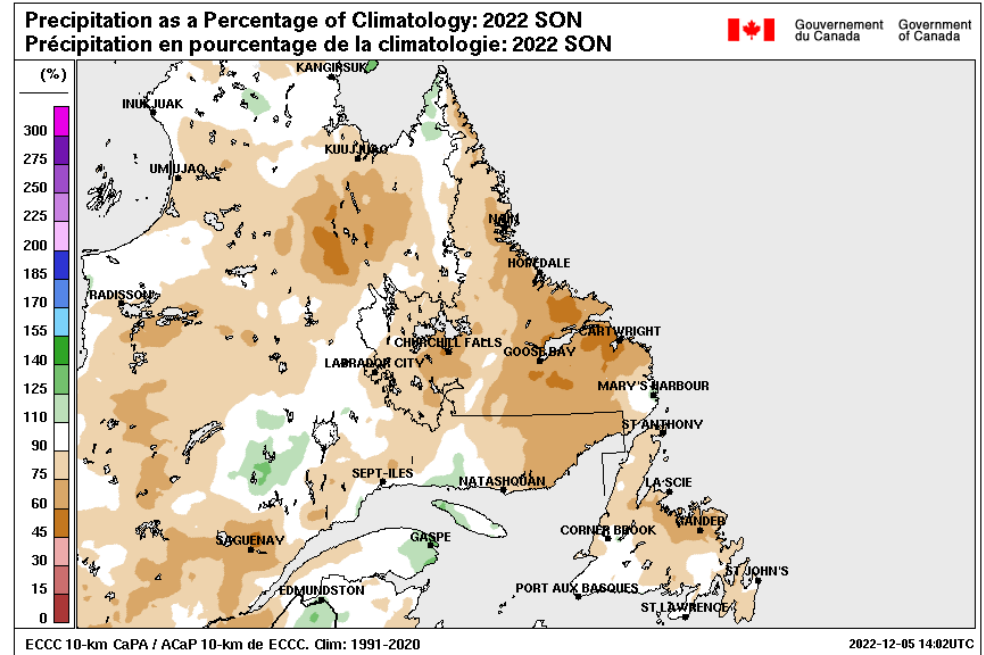
left to right: Temperature anomalies for Newfoundland and Labrador for September, October, November

Precipitation (Percent of 1991-2020 average):

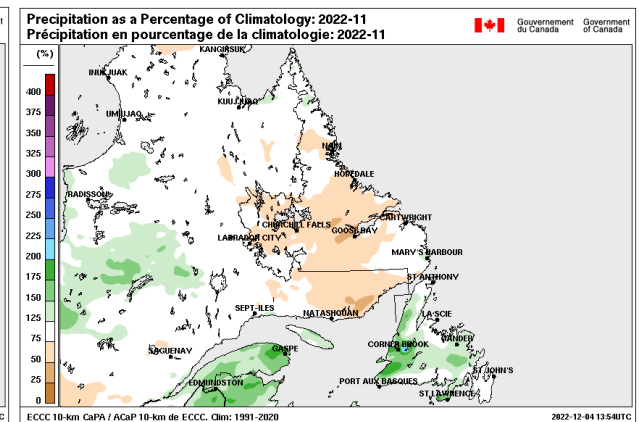
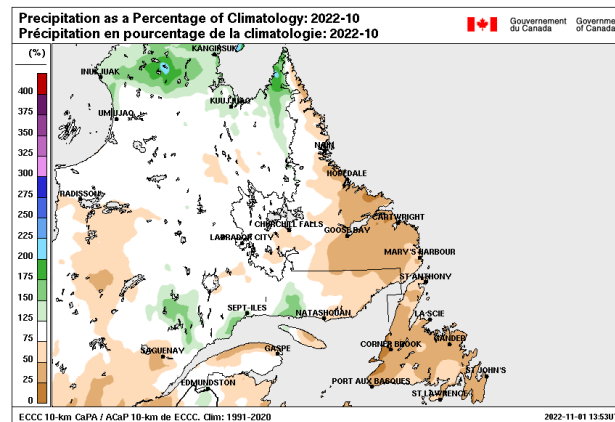
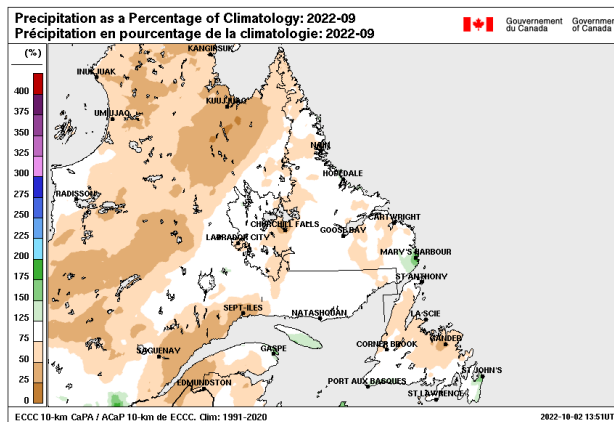
Precipitation this Fall (totaled over September, October, November) was near normal to below normal across the province. A few areas of Labrador received only around half of their typical precipitation for the season.

Highlights:

- Gander only received about half of its normal monthly precipitation in September
- Many stations across the province received 50% or less of their normal precipitation in October
- Happy Valley-Goose Bay only received about half of its normal monthly precipitation in November



Above: Precipitation as a percentage of 1991-2020 average for Newfoundland and Labrador for September-November combined.



Above left to right: Precipitation anomalies for Newfoundland and Labrador for September, October, November.

Seasonal Temperature and Precipitation Tables:

Seasonal temperature averages and precipitation totals compared to seasonal normals for September to November 2022, for selected locations in Newfoundland and Labrador

	Mean Temperature (°C)				Total Precipitation (mm)		
Location	Seasonal Mean	Average of Monthly Normal Means	Diff.	Rank (Warmest)	Seasonal Total	Total of Monthly Normals	Seasonal Total as % of Normal
Bonavista	9.6	7.3	2.2	3	239.4	327.4	73
Channel-Port aux Basques	9.4	7.4	2.0	3	N/A	N/A	N/A
Corner Brook	9.4	7.6	1.8	N/A	334.6	340.2	98
Gander	8.2	6.5	1.6	6	212.6	341.9	62
St. John's	9.4	7.6	1.9	3	445.7	433.8	103
St. Lawrence	10.0	7.6	2.4	4	402.4	487.1	83
Stephenville	9.2	7.6	1.5	8	340.2	373.0	91
Terra Nova Nat Park	8.5	6.8	1.7	7	269.8	322.2	84
Cartwright	4.5	3.6	0.9	10	N/A	N/A	N/A
Happy Valley-Goose Bay (Goose A)	4.8	3.1	1.8	4	209.0	244.4	86
Hopedale	4.2	2.9	1.3	4	N/A	N/A	N/A
L'anse au Loup (Lourdes de Blanc Sablon)	5.4	3.7	1.7	3	265.0	251.4	105
Nain	3.3	1.7	1.6	6	N/A	N/A	N/A
Wabush	1.5	0.0	1.6	8	N/A	N/A	N/A

Above: Temperature difference: cells shaded pink if $\geq 1^\circ\text{C}$, blue if $\leq -1^\circ\text{C}$. Precipitation as a percent of normal: cells shaded green if $\geq 125\%$ of normal, yellow if $\leq 75\%$ of normal

Significant Weather events:

September

September 1-2: A trough of low pressure tapped into tropical moisture well south of the island, allowing for heavy rainfall in southwestern Newfoundland. Burgeo picked up 55 mm of rain with this system. Wreckhouse winds peaked at 82 km/h.

September 10-12: Post-Tropical Storm Earl brought torrential rainfall and strong winds to the Avalon Peninsula. Stations in Paradise and Pippy Park reported 208 mm and 200 mm of rain respectively. Elsewhere on the Avalon, mainly the eastern and northern parts of the peninsula, amounts varied widely from 49 mm to 194 mm. Peak wind gusts were generally in the 77-114 km/h range across eastern Newfoundland.

ECCC Weather summary: [Newfoundland](#)

[Heavy Downpour Overflowing Riverbanks, Flooding Streets in St. John's Area | CBC News](#)

[Earl Dumps Nearly 200 mm of Rain on Parts of Avalon Peninsula | VOCM News](#)

[Complete "Devastation" in Trepassey Following Damage from Earl, says Area MHA | VOCM News](#)

September 14-16: A low pressure system deepened as it tracked slowly south of Labrador. Prolonged moderate to heavy rainfall occurred in western Labrador due to this system. Stations across western Labrador (as well as Schefferville, QC) received rainfall totals in the 44-105 mm range, with two stations in the Wabush area reporting estimated totals of 142 mm and 133 mm.

September 23-25: Hurricane Fiona approached Atlantic Canada as a powerful hurricane before transitioning to a Post-Tropical Storm as it moved into the Gulf of St. Lawrence. Record-breaking water levels along the southwest coast caused catastrophic flooding in several communities. Wreckhouse hit a peak wind gust of 177 km/h, and stations across the island recorded peak gusts in the 80-158 km/h range, leading to scattered utility outages. Rainfall totals were highest in western and southwestern Newfoundland, as well as central Labrador, where amounts of 30-77 mm fell.

ECCC Weather summary: [Newfoundland](#)

CHC Information statement: [Atlantic Canada](#)

[Fiona, a Record-Setting Storm, Leaves Path of Destruction in Eastern Canada | Globalnews.ca](#)

[Fiona Damage: Atlantic Canada, Eastern Quebec Taking Stock | CTV News](#)

[Hurricane Fiona: Canada Hit by 'Historic, Extreme Event' | BBC News](#)

['It is Surreal': Canada's Atlantic Coast Residents Describe Devastation as Fiona Wipes Away Homes and Knocks Out Power for Thousands | CNN](#)

[Canada Mobilizes Military to Help Towns Slammed by Fiona | The New York Times](#)

Significant Weather events:

October

October 6-8: A couple of systems brought accumulating snowfall to parts of Labrador. Nain picked up 5 cm of snow with the October 6 system, while Wabush reported roughly 7 cm of snow with a second system October 7-8. (Note: Nain and Wabush normally receive their first 5+ cm snowfalls in the second half of October.)

October 16-17: A low pressure system tracked southwest to northeast across the island. Periods of heavy rainfall resulted across much of the island due to this low, with rainfall totals ranging from 30-70 mm across parts of central, southern and eastern Newfoundland. Bishop's Falls and St. Alban's recorded 83 mm and 72 mm respectively. Wreckhouse winds peaked at 96 km/h.

October 19-27: A lengthy warm spell occurred across the province. Daily maximum temperature records were broken for at least one station in each of Newfoundland and Labrador nearly every day during this period. A couple of systems during this period also produced strong winds at times. Nain had a peak gust of 105 km/h, Makkovik hit 96 km/h, and Wreckhouse winds peaked at 95 km/h.

ECCC Weather summaries: Newfoundland – October [19](#), [20](#), [22](#), [23](#), [24](#), [25](#), [26](#), [27](#), [28](#)

ECCC Weather summaries: Labrador – October [19](#), [20](#), [21](#), [22](#), [23](#), [24](#), [25](#), [26](#), [27](#)

[Unseasonable Weather Breaks 13 Temperature Records Across NL | VOCM News](#)

Significant Weather events:

November

November 7-9: A deepening low pressure system tracked across Labrador and continued deepening offshore. Strong west to northwesterly winds were observed across the island and parts of the Labrador coast. Peak wind gusts in the 70-110 km/h range were observed in many areas of Newfoundland (especially coastal areas) and along the Labrador coast, with Green Island (Fortune Bay) recording a max gust of 117 km/h.

November 12-13: Remnants of Post-Tropical Storm Nicole gave a mix of wintry precipitation to the island, with heavy rainfall occurring across southern Newfoundland. Rainfall amounts of 86 mm and 79 mm were recorded in Port aux Basques and Burgeo respectively. Totals in the 38-77 mm range occurred elsewhere in southern Newfoundland and the Avalon Peninsula. Gander reported a snowfall amount near 15 cm, while mixed precipitation amounts were in the 27-51 mm range in central Newfoundland. Wreckhouse wind gusts reached 120 km/h, and gusts in the 70-95 km/h range were reported across parts of the south, east and northeast coasts.

[N.L. Hit with Mixed Bag of Winter-like Weather from Post-Tropical Storm Nicole | CBC News](#)

[Port aux Basques Fights Floods Just Weeks after Devastation from Post-Tropical Storm Fiona | CBC News](#)

November 14: Another wintry mix of precipitation and strong southeasterly winds followed quickly behind Nicole thanks to another low pressure system crossing the island. L'Anse au Clair reported 19 cm of snow, La Scie picked up an estimated 16 cm, and both L'Anse au Loup and Blanc Sablon received 15 cm. Wreckhouse winds were strong once again, peaking at 133 km/h. Many stations elsewhere along the south and east coasts recorded peak wind gusts in the 70-117 km/h range.

November 16-17: A near carbon copy of the previous storm tracked across the island, providing another dose of winter and strong winds. Blanc Sablon reported 31 cm of snow, and L'Anse au Loup received 19 cm. Snowfall observations from Gander and Kippens were in the 8-9 cm range. Gusts at Wreckhouse once again peaked at 120 km/h while stations scattered elsewhere on the island and the Labrador Strait had peak gusts in the 70-109 km/h range.

Significant Weather events:

November

November 20-21: An intensifying low pressure system tracked across the island, spreading very strong winds across Newfoundland and south-eastern Labrador. Widespread peak wind gusts were in the 90-130 km/h range along the south, east and northeast coasts. Green Island (Fortune Bay) peaked at 150 km/h during the event. Additionally, this system produced more heavy snowfall across the Northern Peninsula and southeastern Labrador, causing blizzard-like conditions at times. L'Anse au Loup reported 30 cm of snow and L'Anse au Clair 25 cm. Snowfall amounts in the 14-21 cm range were observed at Blanc Sablon, Deer Lake and Gander.

[Strong Winds, Stormy Weather Hits Island | VOCM News](#)

[Power Outage in Englee Due to Downed Pole | VOCM News](#)

November 22: A vigorous, fast-moving system traversed the island, giving a brief blast of heavy snowfall to parts of the island. Snowfall amounts of 5-11 cm fell in a very short time in Deer Lake, Gander, and St. John's. Strong west-northwesterly winds gusting 79-114 km/h also resulted from this system along parts of the east and south coasts.

[Equipment Failure Leaves 17000 Customers without Power in St. John's Snowfall | CBC News](#)

[Thousands without Power, Multiple Accidents Reported as November Snow Hits Avalon | VOCM News](#)

November 23-25: An area of low pressure over the Labrador Sea tracked westward along the Labrador coast, then eventually southward along the northeast coast of the island. Strong winds and fresh snowfall caused poor visibilities at times in northern Labrador and parts of Newfoundland. Max gusts near 105 km/h were recorded at both Nain and Makkovik, with the former receiving 33 cm of snow and the latter receiving 14 cm. Deer Lake picked up a two-day snowfall total of 31 cm, and two snowfall reports from Gander stated accumulations of 21 cm and 17 cm. Peak wind gusts across much of the south, east and northeast coasts of Newfoundland ranged from 85-142 km/h. Winds howled at Fogo Island in particular, hitting a peak gust of 169 km/h.

November 26-27: Continuing the busy month of weather was a deep low pressure system which tracked slowly south of Newfoundland. Precipitation fell mainly as rain across the island, and strong easterly winds spread across much of southern Newfoundland. Select stations across southern and eastern Newfoundland reported rainfall totals of 26-55 mm, with St. Lawrence and Winterland picking up 57-58 mm. Peak wind gusts ranged from 70-122 km/h over the same areas, with Green Island (Fortune Bay) peaking at 139 km/h. Deer Lake reported 19 cm of snow.

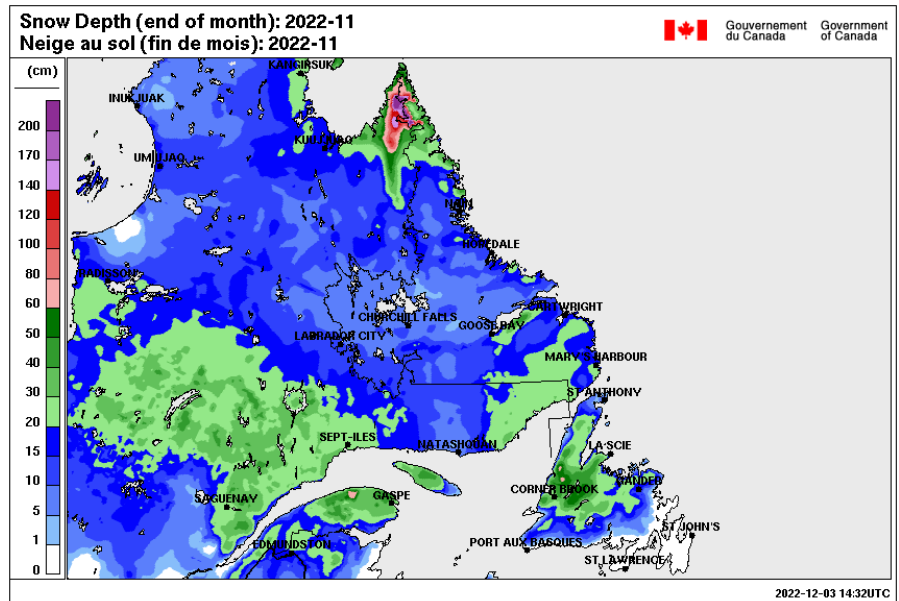
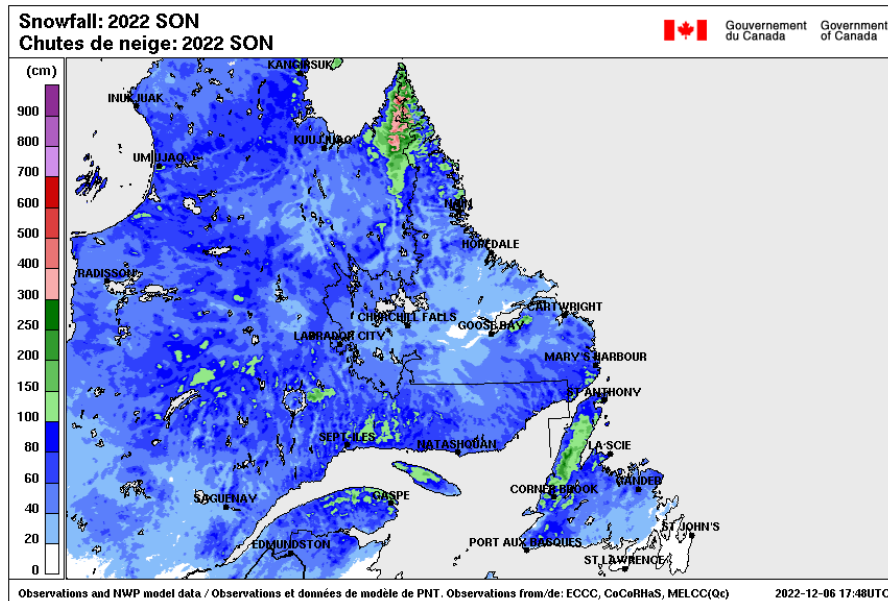
[Emergency Access Restored After Trepassey Residents Cut Off by Flooding | VOCM](#)

Total Snowfall and Snow Depth:

A stormy November provided many instances of accumulating snowfall for the province, especially Newfoundland.

Most areas of the province received some amount of accumulating snowfall during the season. Higher elevations in western Newfoundland ended up receiving the most snow. Newfoundland, along with southeastern Labrador, received near normal to above normal snowfall for the autumn months, while the remainder of Labrador received less snowfall than the norm.

Much of eastern Newfoundland, as well as the immediate coast in the south, had little to no snow on the ground at the end of November. Elsewhere in the province, there was some snow down when the calendar turned to December. Portions of western Newfoundland had roughly 50-60 cm or more on the ground moving into the winter season. Interior and extreme northern Labrador had lower snow depths than normal for the end of the fall, while the Humber Valley area had well above normal snow down. The remainder of the province had either near normal or above normal snow depths for November's end.



Left: Total snowfall (estimated) for September, October, and November 2022 combined.

Right: Snow depth (estimated) for Newfoundland and Labrador at the end of November 2022

Sea Surface Temperature (SST) (Departure from Normal—last week of each month):

September

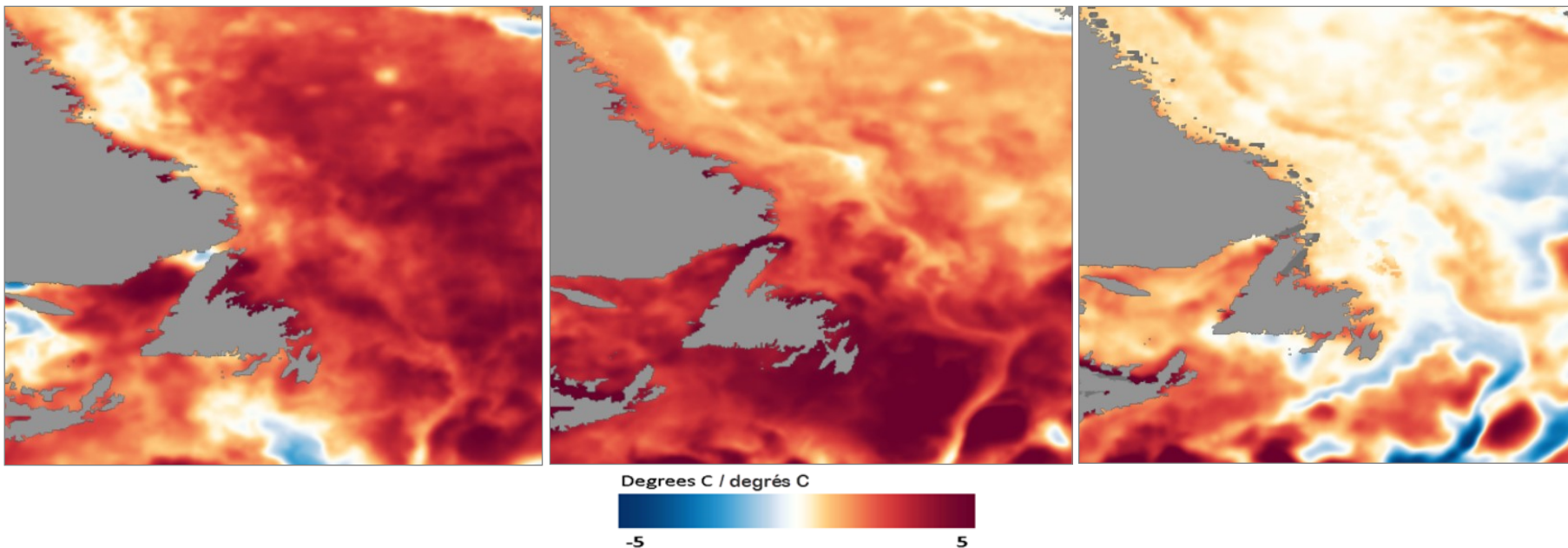
- * Most SST warmer than normal by 2-5 C
- * Areas of 1-2 C below normal in Strait of Belle Isle and off south coast of Newfoundland
- * Area just off northern Labrador coast near normal.

October

- * Temperatures well above normal (3-5 C) offshore of Newfoundland.
- * SST 1-3 C above normal for most Labrador waters

November

- * Temperatures near to slightly above normal (up to 2 C) over most offshore waters, except 1-2 C below normal off eastern Newfoundland
- * SST 2-4 C above normal along the Newfoundland coast, except 1-2 C below normal along parts of the south coast



NOAA weekly mean SST anomaly map (based on 1981-2010 Normals) for the last week of September 2022 (left), October 2022 (middle), and November 2022 (right)
<https://www.nnvl.noaa.gov/view/globaldata.html#SSTA>

Note: Grey areas along much of the coast may represent either gaps in data or presence of sea ice.

Sea Ice Outlook:

Overall, sea ice is expected to be near to below normal this year due to warmer than normal temperatures forecast this winter.

December

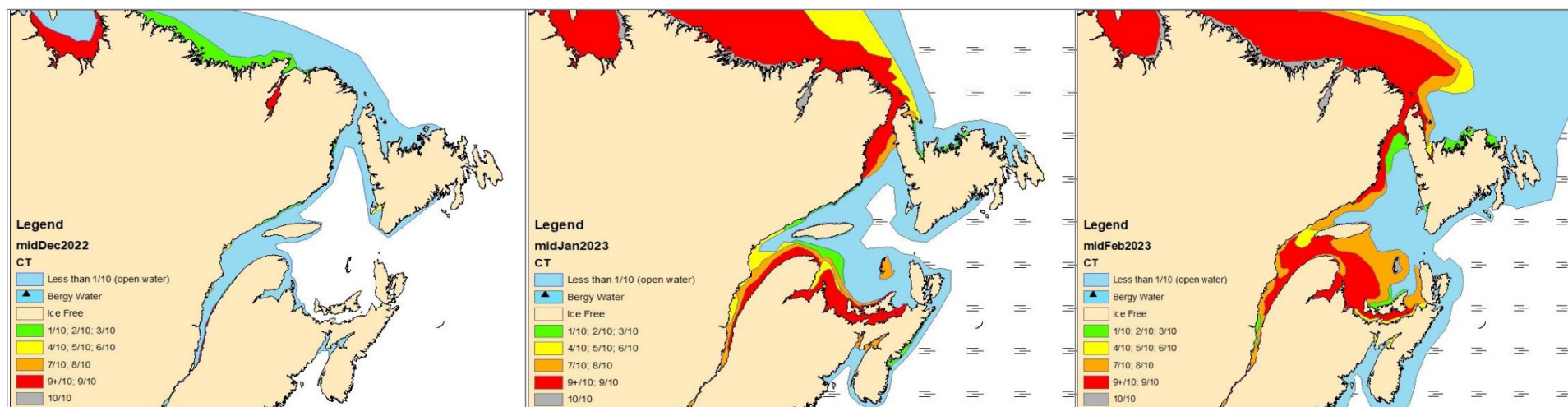
- * Ice will begin to expand down along the Labrador coast.
- * Lake Melville to fully freeze over by the end of December.
- * Ice may also reach the Strait of Belle Isle by the end of the month.

January

- * Ice along the Lab coast and in Lake Melville will likely fully freeze in early January as ice thickens along the Labrador coast.
- * Strait of Belle Isle to become mainly ice covered.
- * Ice to begin forming in sheltered bays along Newfoundland's northeast coast.

February

- * Ice along the whole Labrador coast and into the Strait of Belle Isle and eastern side of Great Northern Peninsula.
- * Sea ice will expand right along the northeast coast of Newfoundland, as well as into the Northeast Gulf.



Forecast ice concentrations based on current long range seasonal guidance and ice coverage in recent years for the mid point of December 2022 (left), January 2023 (middle), and February 2023 (right), as per Canadian Ice Services. A full report can be accessed at [20221201_OTLKGUE_WINTER2022.pdf \(canada.ca\)](#).


River Flows:

In **September**, excessive flow was reported for Isle aux Morts River, likely aided by rainfall from Fiona. Conversely, deficient flow was observed in Gander River, as drought conditions continued into a second straight month in northeastern Newfoundland. Elsewhere flow rates were near median values, except Rocky River had flow rates that were a bit higher.

The extremely dry conditions in **October** were felt across many of the province's rivers. All of the rivers specified had flow rates below median values, with four of the five listed as having deficient flow.

Even though there was above normal precipitation in Newfoundland in **November**, the Upper Humber and Gander Rivers continued to run at deficit levels, with the former at record deficit. The other two sites had flow rates near normal. Precipitation continued to be below normal in central Labrador, hence Eagle River was also at deficit flow rates for the month.

All rivers listed reported cumulative run-off below median values. This was especially pronounced at the Gander and Upper Humber Rivers, with cumulative run-off well below half of the median.

River Flow Station		September 2022		October 2022		November 2022		Cumulative Run-off from Oct 1	<div>Atlantic Region River Flow Stations Stations d'écoulement fluvial de la région de L'Atlantique</div> <div></div>
Station Number	Drainage Area (km ²)	Mean Flow (m ³ /s)	% of Median	Mean Flow (m ³ /s)	% of Median	Mean Flow (m ³ /s)	% of Median	% of Median	
EAGLE RIVER ABOVE FALLS 03QC001	10900	206	110	177	85	112	60	73	
GANDER RIVER AT BIG CHUTE 02YQ001	4400	15.4 D	19	25.6 D	22	62.6 D	43	34	
ISLE AUX MORTS RIVER BELOW HIGHWAY BRIDGE 02ZB001	205	16 E	143	6.21 D	45	16.8	93	72	
ROCKY RIVER NEAR COLINET 02ZK001	301	10.6	157	5.7 D	56	14.5	107	85	
UPPER HUMBER RIVER NEAR REIDVILLE 02YL001	2110	39.6	79	27 D	38	23.6 DR	27	32	
* Runoff accumulates from October 1st									
E - Excessive (> 75th percentile (based on 30-years, 1981-2010))									
D - Deficient (< 25th percentile (based on 30-years, 1981-2010))									
R - Record (provisional new extreme (preliminary data subject to review), compared to period of record up to 2010)									

Preliminary monthly runoff summary for selected River sites in Newfoundland and Labrador (location map above) for September, October, November courtesy of ECCC Water Survey of Canada. Note: Record values provisional and may change after the data is reviewed.

Preliminary monthly runoff summary for selected River sites in Newfoundland and Labrador (location map above) for September, October, November courtesy of ECCC Water Survey of Canada. Note: Record values provisional and may change after the data is reviewed.

Canadian Drought Monitor (produced by Agriculture and Agri-Food Canada):

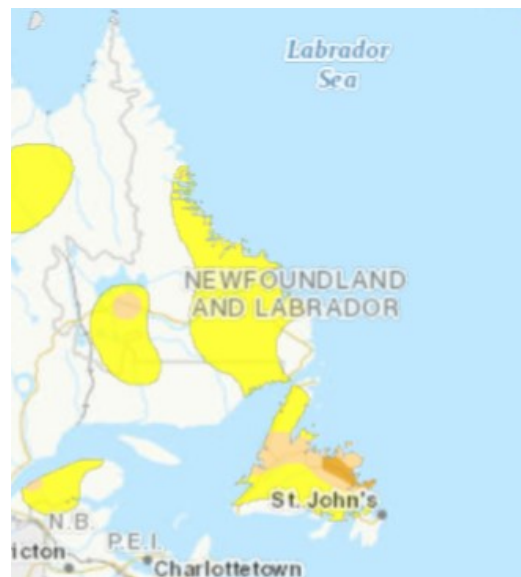
September

- * Abnormally dry conditions in central and northeastern Newfoundland, with a small area of moderate drought, for a second consecutive month
- * Abnormally dry conditions in portion of western Labrador
- * No drought conditions elsewhere



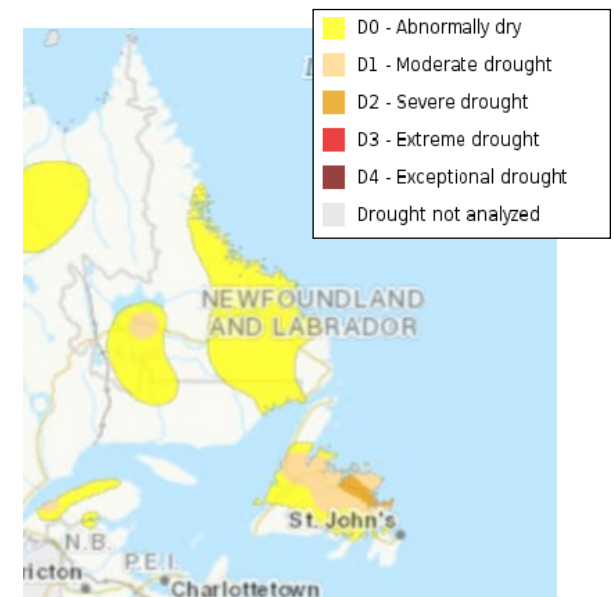
October

- * Abnormally dry conditions across majority of Newfoundland and Labrador
- * Moderate drought extending from portion of Newfoundland's west coast to the Bonavista Peninsula, with area of severe drought in the northeast
- * Small area of moderate drought in western Labrador



November

- * Abnormally dry conditions across majority of Newfoundland and Labrador
- * Moderate drought extending from portion of Newfoundland's west coast to the Bonavista Peninsula, with area of severe drought in the northeast
- * Small area of moderate drought in western Labrador



Canadian Drought Monitor Map for September 2022 (left), October 2022 (middle), and November 2022 (right). Drought maps courtesy of Agriculture and Agri-Food Canada- <https://agriculture.canada.ca/en/agriculture-and-environment/drought-watch-and-agroclimate/canadian-drought-monitor>

Provincial Impacts (September-November):

Hurricane/Post-Tropical Storm Fiona

Easily the most impactful storm of the fall, and one of the most impactful in Newfoundland's history, was Post-Tropical Storm Fiona. The storm became one of two major hurricanes for the 2022 season as it approached Atlantic Canada towards the last week of September. Fiona was still a very powerful storm as it became post-tropical, making landfall in eastern Nova Scotia early on the morning of September 24. Very high waves and storm surge created widespread [damage](#) and [destruction](#) across the southwest coast of Newfoundland, with many [coastal homes and buildings in Port aux Basques being completely destroyed](#) or irreparably damaged. Scattered power and utility outages also occurred across sections of the island during the event.

(Not to be forgotten) Post-Tropical Storm Earl

The Atlantic Hurricane season started out rather slowly, with several weeks of no activity in the Atlantic Basin. But things did eventually start to pick up, and as we moved along into September, Hurricane Earl started to make its way towards eastern Newfoundland. Initially, it did not appear that Earl would produce any major impacts over the island. But as it continued its approach, it became apparent that Earl would bring significant rainfall to the Avalon Peninsula. The torrential rainfall caused roads and basements to [flood in the St. John's area](#). The rainfall, along with high waves, caused [significant damage to the breakwater in Trepassey](#), cutting off a portion of the community.

Record heat followed by an immediate switch to winter

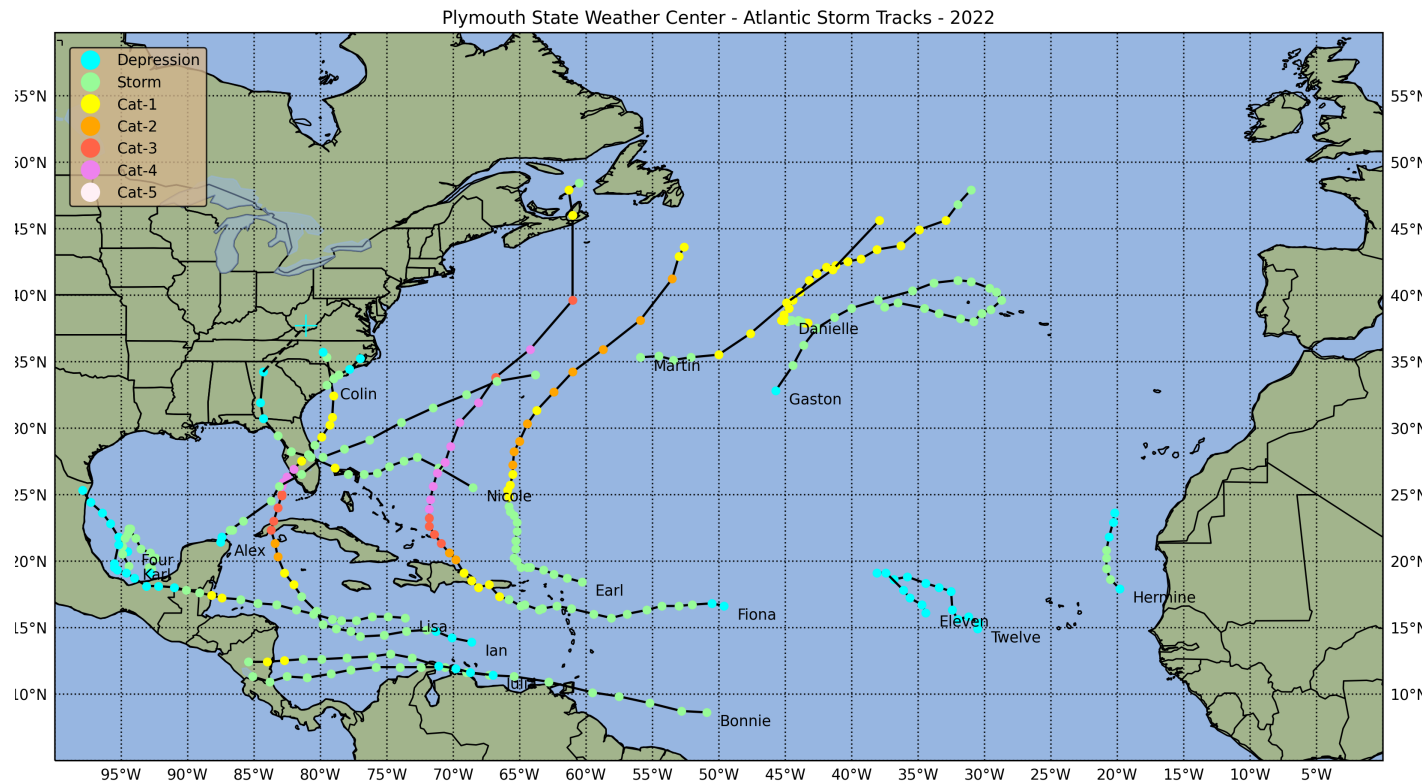
After a very busy and impactful September, not only did things calm down in October, but a mid-fall heat wave occurred across the province. The situation reached its apex in the latter half of the month, as many [daily high temperature records were broken](#) over a roughly one-week period. Much of Labrador experienced its warmest October in recorded history, while areas of Newfoundland placed second all-time for warmest October in 2022.

It appeared that the sultry fall would continue through November. Temperatures remained well above normal into the early days of the month. But then winter opted to announce its arrival early, and a string of storms went on to bring [wintry conditions](#) and above-normal precipitation to the island. Continuing the theme established in September, one of these storms was the [remnants of Tropical Storm Nicole](#), which ended up bringing less than tropical conditions to parts of the island.

Atlantic Hurricane Season Summary

The 2022 Atlantic Hurricane Season was a memorable one for Newfoundland and Labrador. Earl and Fiona had major impacts in September on eastern and southwestern Newfoundland, respectively. In November, the remnants of Nicole produced wintry conditions in parts of the province. The Atlantic season overall was near normal in terms of the number of named storms and hurricanes. However, accumulated cyclone energy, which accounts for intensity, size and age of the storms, was only about 80% of the long-term mean.

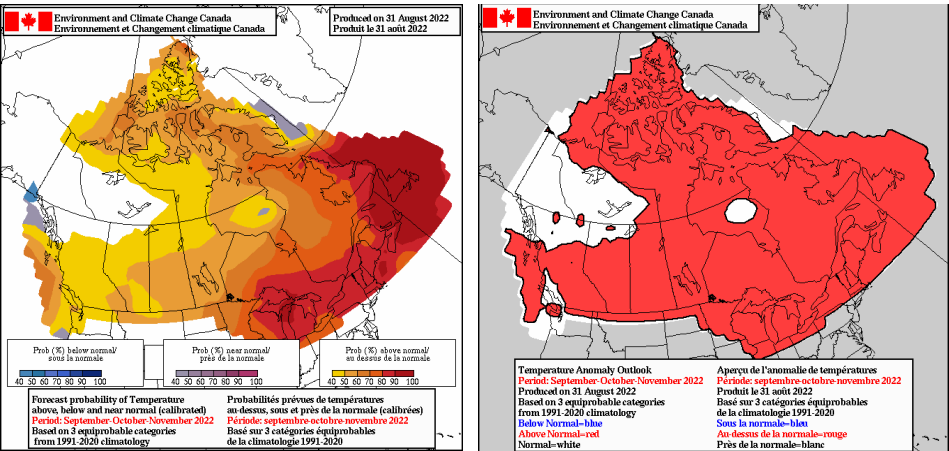
A preliminary summary of the 2022 season can be found at the National Oceanographic and Atmospheric Administration (NOAA) [website](#).



2022 Atlantic seasonal summary map of Tropical Cyclone tracks (courtesy of Plymouth State University: <https://vortex.plymouth.edu/tropical/AL/2022/summary.html>)

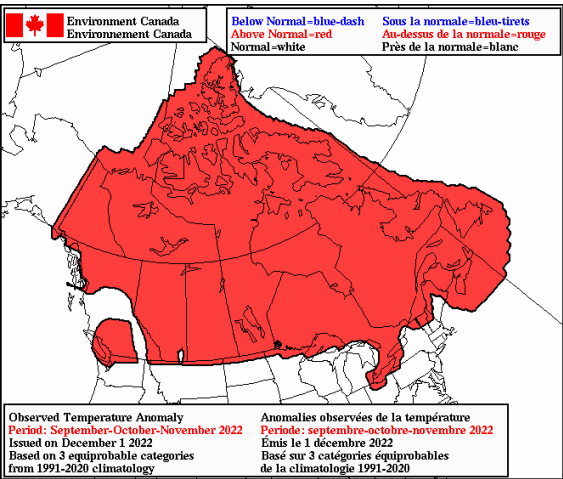
Fall Season (Period: September-October-November) Temperature Outlook Performance:

The fall temperature forecast called for a moderate to high probability of warmer than normal temperatures across all of Newfoundland and Labrador.



Left: Probability of above, below and near normal: Produced August 31, 2022 – Right: Forecast Temperature Anomaly: Produced August 31, 2022

Indeed the forecast worked out very well as Newfoundland and Labrador, along with the majority of the country, experienced a warmer than normal fall.

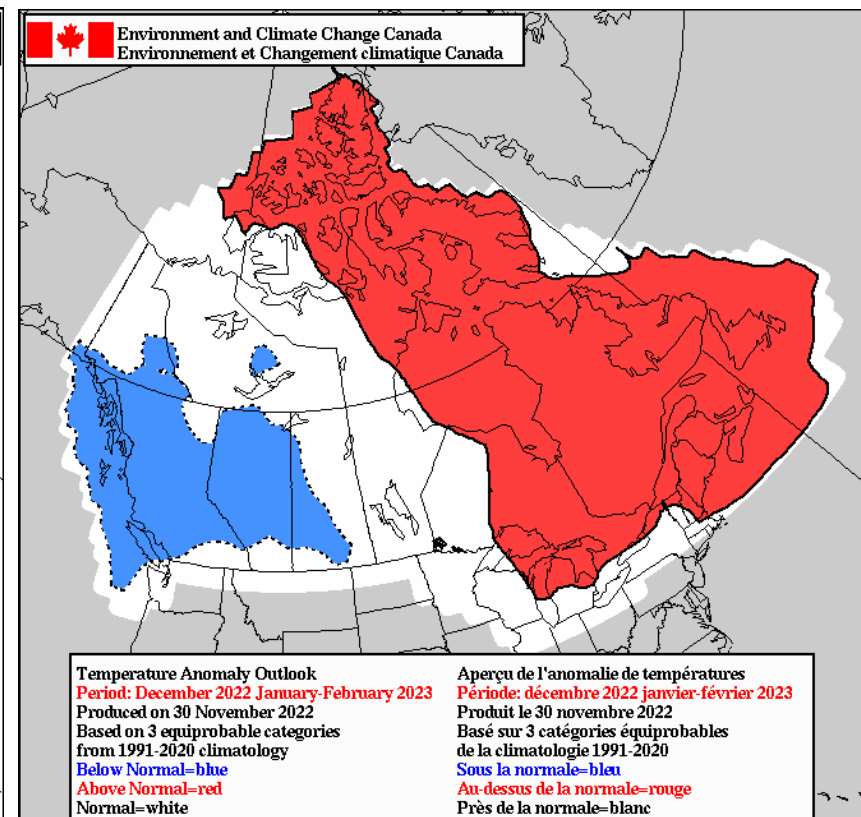
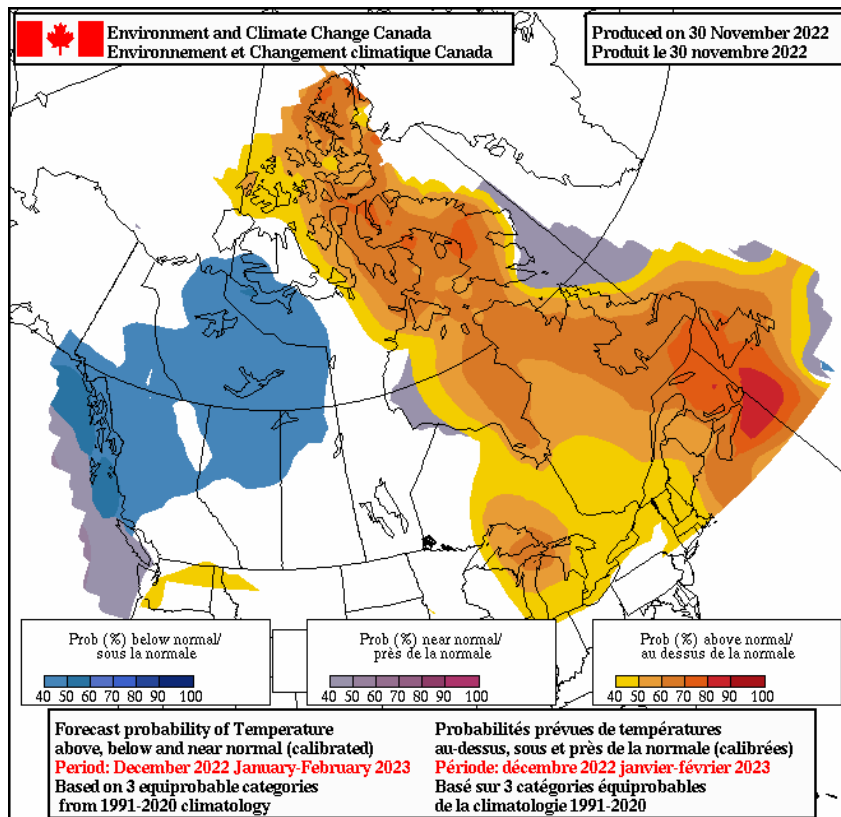


Above: Observed Temperature Anomaly – Issued on December 1, 2022

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

For the Winter season, there is once again a moderate to high chance of above normal temperatures across the province.

With regards to precipitation, guidance shows a low to moderate chance of above normal precipitation for Labrador. For Newfoundland, there is no clear signal in terms of precipitation. Once again, we are excluding the precipitation maps as they typically verify less than 40% of the time.



Left: Probability of above, below and near normal temperature: Produced November 30, 2022 – Right: Temperature Anomaly Outlook: Produced November 30, 2022

https://weather.gc.ca/saisons/index_e.html

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