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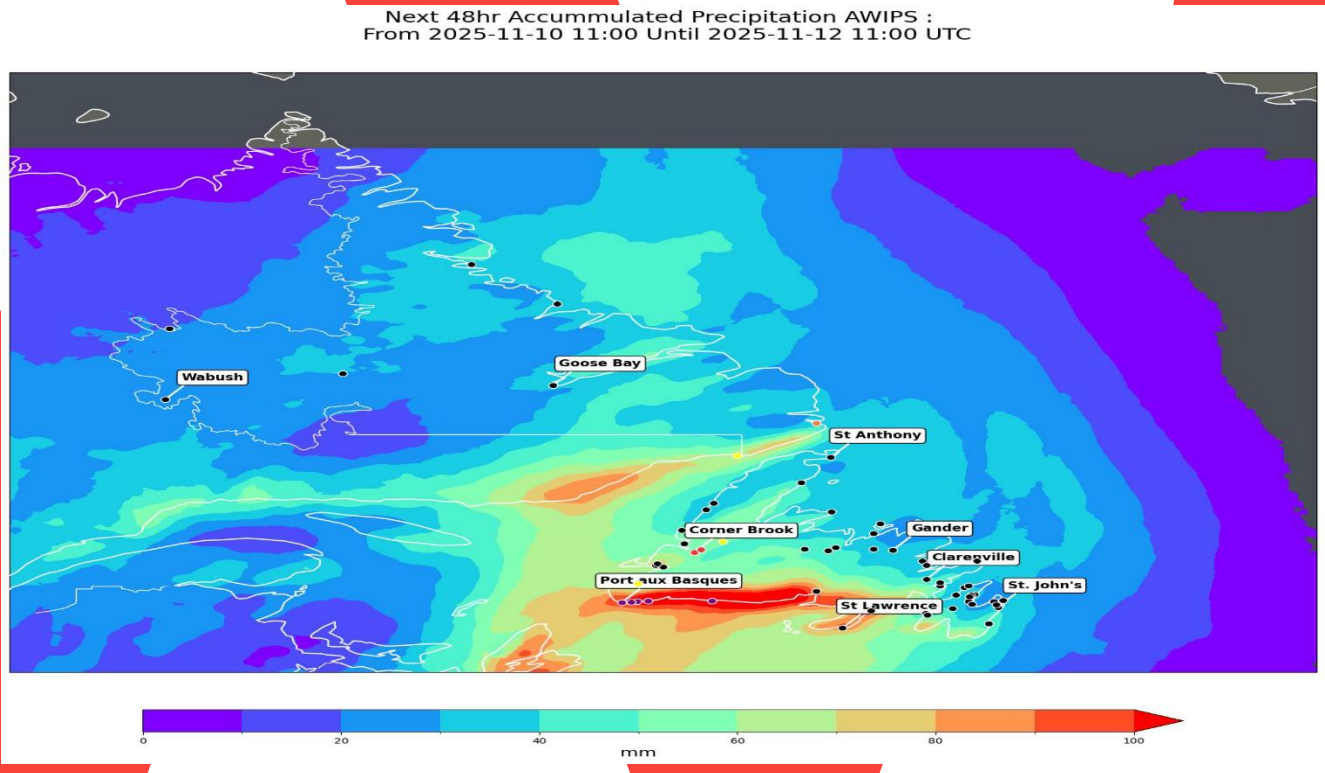
NL WRMD

WRMD 2025 Hurricane Season Forecasting

END-OF-SEASON REPORT

January 19, 2026

CA005514.1288



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NL Weather Resource Management Division

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Prepared for

Water Resources Management Division, Department of Environment and Climate Change

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1. Flood Alerts Summary

The WSP Hurricane Season Flood Alert System (HSFAS) Product is the combination of professionally trained meteorologists applying their full knowledge of atmospheric science to Newfoundland and Labrador's weather patterns and combining these patterns with existing trends, known observations, and weather prediction models. Examining maximum precipitation predictions from many different dynamic models, allows forecasters to produce a better forecast of the maximum precipitation potential, based on the strength of different models in handling the atmospheric physics of differing weather patterns.

From June 2025 to December 2025, alerts were issued 50 times for 18 separate sites. 27 of these alerts had a 12-h and a 24-h alert issued during the same forecast. In the table below, each column is highlighted in the worst alert category exceeded. If both 12-h and 24-h limits were exceeded, we used the 12-h colour. Nine alerts were exceeded for 100-year 12-h limits, which matches last year. 16 of the sites alerted for exceeded 100-year 24-h limits, which was 12 more than last year.

Table 1 Summary of Flood Alerts

	Site location	Issue Date	12-hourly Precipitation Forecast (mm)	24-hourly Precipitation Forecast (mm)
1	Happy Valley-Goose Bay	2025-06-19	52.2	67.6
2	Mary's Harbour	2025-06-19	61.5	75.9
3	Battle Harbour (Battle Harbour Lor)	2025-06-19	63.2	77.0
4	Happy Valley-Goose Bay	2025-06-19	52.2	82.8
5	Happy Valley-Goose Bay	2025-06-20	46.1	78.9
6	Happy Valley-Goose Bay	2025-06-20	45.3	78.9
7	Happy Valley-Goose Bay	2025-07-16	69.4	73.1
8	Hopedale	2025-07-16	49.0	59.8
9	Churchill Falls	2025-07-16	45.4	53.0
10	Happy Valley-Goose Bay	2025-07-16	59.3	64.4
11	Hopedale	2025-07-16	50.0	69.5
12	Happy Valley-Goose Bay	2025-07-17	59.2	79.3
13	Happy Valley-Goose Bay	2025-07-17	52.3	94.7
14	Nain	2025-08-09	51.3	51.4
15	Churchill Falls	2025-08-24	48.2	49.0
16	Happy Valley-Goose Bay	2025-08-25	68.5	72.2
17	Happy Valley-Goose Bay	2025-08-25	60.5	63.4
18	Nain	2025-09-15	55.3	55.8
19	Mary's Harbour	2025-10-29	70.5	71.3
20	Battle Harbour (Battle Harbour Lor)	2025-10-29	61.6	62.2

	Site location	Issue Date	12-hourly Precipitation Forecast (mm)	24-hourly Precipitation Forecast (mm)
21	Rose Blanche	2025-11-02	85.1	89.3
22	Corner Brook	2025-11-04	48.6	64.2
23	Nain	2025-11-05	52.1	76.9
24	Channel-Port aux Basques	2025-11-09	112.5	172.9
25	Isle aux Morts	2025-11-09	112.5	172.9
26	Burnt Islands	2025-11-09	112.5	172.9
27	Great Codroy (Codroy Valley)	2025-11-09	71.3	114.9
28	Rose Blanche	2025-11-09	112.5	183.0
29	Corner Brook	2025-11-09	57.8	96.8
30	Steady Brook	2025-11-09	57.8	96.8
31	Burgeo	2025-11-09	120.6	206.3
32	Deer Lake	2025-11-09	43.5	73.9
33	Blanc Sablon, L'Anse au Clair	2025-11-09	58.2	86.1
34	Mary's Harbour	2025-11-09	64.2	83.2
35	Battle Harbour (Battle Harbour Lor)	2025-11-09	53.5	69.1
36	Channel-Port aux Basques	2025-11-10	79.5	133.2
37	Isle aux Morts	2025-11-10	78.5	133.2
38	Burnt Islands	2025-11-10	78.5	133.2
39	Rose Blanche	2025-11-10	104.4	164.3
40	Cox's Cove	2025-11-10	56.5	70.9
41	Corner Brook	2025-11-10	56.5	82.9
42	Steady Brook	2025-11-10	53.0	82.9
43	Burgeo	2025-11-10	85.3	147.7
44	Blanc Sablon, L'Anse au Clair	2025-11-10	47.8	74.8
45	St. Lawrence	2025-11-11	102.6	117.9
46	Blanc Sablon, L'Anse au Clair	2025-12-18	60.6	75.5
47	Churchill Falls	2025-12-19	44.7	76.3
48	Blanc Sablon, L'Anse au Clair	2025-12-19	65.9	72.2
49	Churchill Falls	2025-12-19	49.0	60.7
50	Blanc Sablon, L'Anse au Clair	2025-12-19	61.5	67.7

Legend (WRMD or EC Exceeded flood limit)

Exceeded 12-Hourly 20-yr flood limit
Exceeded 12-Hourly 100-yr flood limit
Exceeded 24-Hourly 20-yr flood limit
Exceeded 24-Hourly 100-yr flood limit

When not double-counting events where a site was alerted for two different thresholds at the same time, this season saw 50 alerts (if we count all occurrences, the alerts totaled 77). The 2025 season was less active than the 2024 season with 50 vs 77 sites alerted. However, the number of alerts issued for 100-year exceedance was 12 more than last year. Most of the alerts were associated with 4 rainfall events through the season. The June and July rainfall events most affected Labrador. The November 10-11 rainfall event most affected Southern Regions. The December rainfall event most affected Labrador.

Table 2 Monthly Analysis of Flood Alerts

Month	Total Alerts	12-hourly 20-yr alerts	12-hourly 100-yr alerts	24-hourly 20-yr alerts	24-hourly 100-yr alerts	Env. Can. & WRMD Obs.
June	10	3	1	3	3	0
July	12	6	1	3	2	0
August	6	3	1	2	0	0
September	1	1	0	0	0	0
October	3	2	0	1	0	0
November	37	9	6	12	10	0
December	8	5	0	2	1	0
Total:	77	29	9	23	16	0

Of the total 77 alerts issued, 29 were 12-hourly 20-year alerts, 9 were 12-hourly 100-year alerts, 23 were 24-hourly 20-year alerts, and 16 were 24-hourly 100-year alerts. The greatest plurality of alerts (37) were issued in November. To not double count alerts in the table, any time both 20-year and 100-year limits were exceeded, only the 100-year limit was used.

Table 3 Regional Analysis of Flood Alerts – Communities with two or more alerts (note that this table does not include all events, just those sites that included at least two alerts)

Community	Region	Total Number of Alerts
Happy Valley-Goose Bay	Labrador	5
Blanc Sablon, L'Anse au Clair	Labrador	5
Mary's Harbour	Labrador	3
Battle Harbour (Battle Harbour Lor)	Labrador	3
Nain	Labrador	3
Churchill Falls	Labrador	3
Corner Brook	Western	3
Rose Blanche	Southern	3
Steady Brook	Western	2
Hopedale	Labrador	2
Port aux Basques	Southern	2

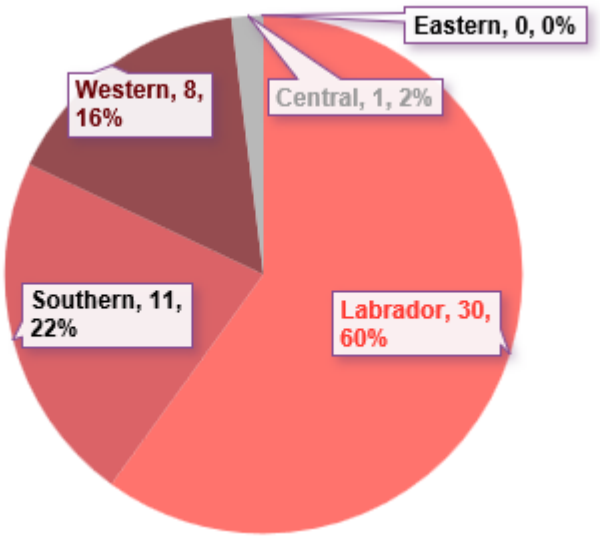
Community	Region	Total Number of Alerts
Burgeo	Southern	2
Isle aux Morts	Southern	2

From a geographic perspective when not double-counting:

- 8 alerts were issued for the Western Region
- 0 alerts were issued for the Eastern Region
- 1 alert were issued for the Central Region
- 11 alerts were raised for the Southern Region
- 30 alerts were issued for Labrador

For this section and the table above, we only discuss the sites that were alerted. If a site was alerted for both 12-h and 24-h rainfall, it was only counted a single alert. This year the Eastern region saw no alerts issued whereas last year it was the most alerted region (24). The Western Region saw far fewer alerts than last year, 8 v. 13. Labrador received more alerts than last year,30 v. 18.

Figure 1. Alerts by Region



2. Verification of Alerts

The flood alerts were verified using three data sources/methods to compare with the forecasted values. These data sources include: ECCC rain gauge data, WRMD rain gauge data, and qualitative community-based reports. However, there remains some significant challenges with verification. Rainfall has very high spatial variability, meaning that stations only a few kilometres apart may record vastly different values. Nearby gauge comparison is a limited verification method due to the intense variability of precipitation over the changing terrain and within small (meso-) scale atmospheric features. Specifically, we find many of the heavy rain events forecasted in Burgeo will fall over the higher terrain north of the town while the town reports lower totals.

Also, due to the risk involved with missed alerts, the implemented forecasting approach represents a worst-case scenario. The forecast is essentially the highest possible rainfall based on the current conditions instead of the most likely scenario rainfall. In 2024, we added an additional forecast parameter: the most likely precipitation amount. However, since alerts are more easily triggered based on the maximum precipitation amount, every season, by design, there are many alerts issued that are not required. As such, any issued alert will generally overestimate what is observed, creating alerts that will not verify. The system was designed to avoid missing an alert, as the consequence for missed alerts is very serious for the people and resources involved.

- The November 10-11 Rainfall Event Alerts were supported by ECCC station data in St. Lawrence with 98.1 mm recorded and by an unofficial station in Boat Harbour with 109.2 mm recorded. It's likely that the rainfall was over-forecasted in Port aux Basques and Burgeo as the stations there recorded significantly less than the totals in the alerts.
- Mary's Harbour received 63.4 mm of rainfall between October 31 and November 2. This is consistent with the alert issued on October 29.
- Goose Bay received 78.1 mm of rainfall between June 20 and June 21. This is consistent with the alerts issued on June 19 and June 20.
- Goose Bay received 55.7 mm of rainfall on July 18. This is consistent with the alert issued on July 16 and July 17.

2.1 Hurricane Outlook Verification

Last May, WSP issued a Hurricane Season Outlook for NL WRMD. The basin forecasts issued by NOAA, Colorado State University (CSU), and Tropical Storm Risk, and referenced by WSP, were excellent with both the total number of tropical storms and the total number of major hurricanes (Table 2). All three agencies over-forecasted the number of hurricanes. The season had a particularly interesting nature of very high-end hurricanes but not a high number of hurricanes where only five (5) hurricanes formed, but four (4) become major hurricanes and all four (4) major hurricanes became category five hurricanes.

For Newfoundland and Labrador, the season was less busy than we anticipated (Figures 2, 3, 4). A persistent blocking ridge was present over central and eastern Canada through much of the peak of

hurricane season (Figure 5) with warmer and drier than normal conditions over Newfoundland which caused the active fire season. This also contributed to Newfoundland being drier than normal through the NL WRMD Forecast Season, a smaller number of alerts than last year, and zero alerts in Eastern Region.

Table 4 2025 Agency Forecasts v. 2025 Atlantic Hurricane Season Actuals

	NOAA	CSU	TSR	Actual
Tropical Storms	13-19	17	14	13
Hurricanes	6-10	9	7	5
Major Hurricanes	3-5	4	3	4

Figure 2 Newfoundland Hurricane Season Risk Map

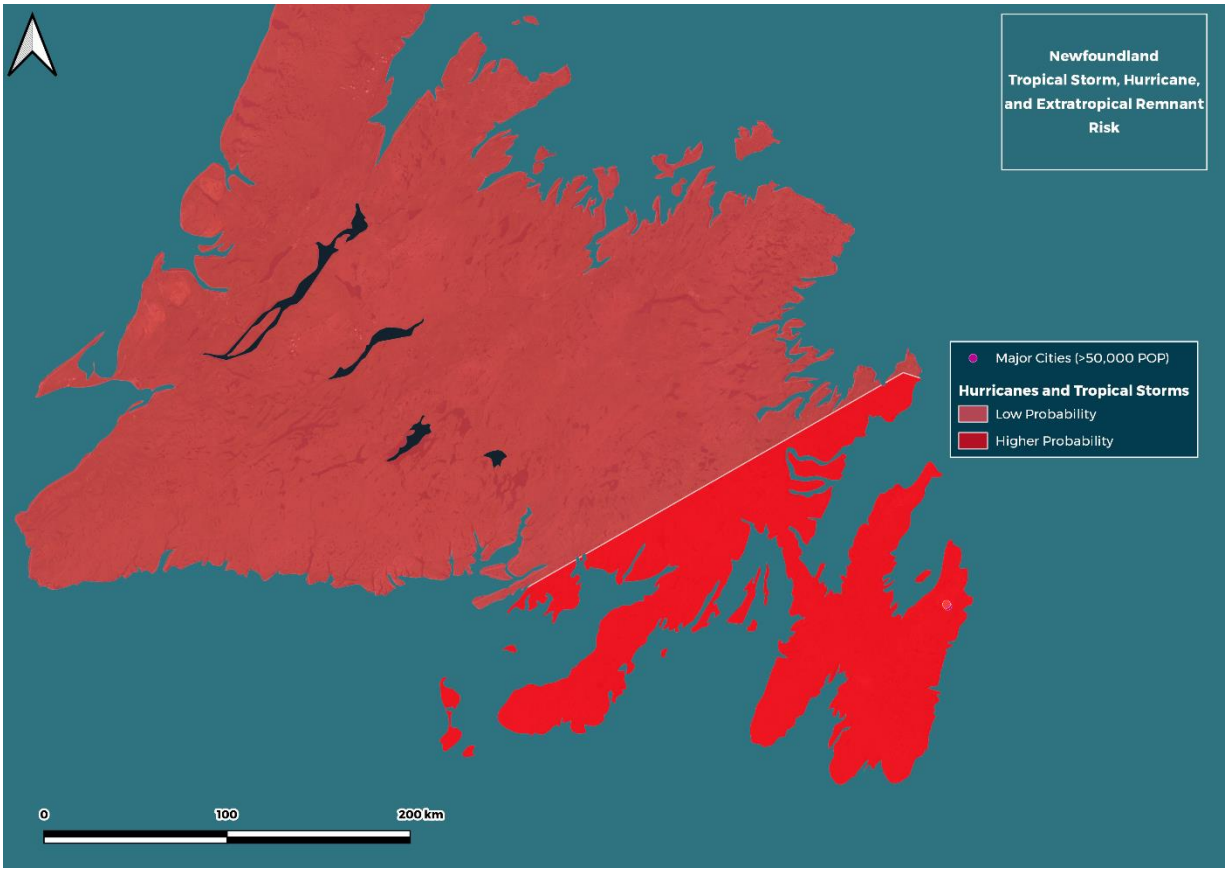


Figure 3. Labrador and Great Northern Peninsula Hurricane Season Risk Map

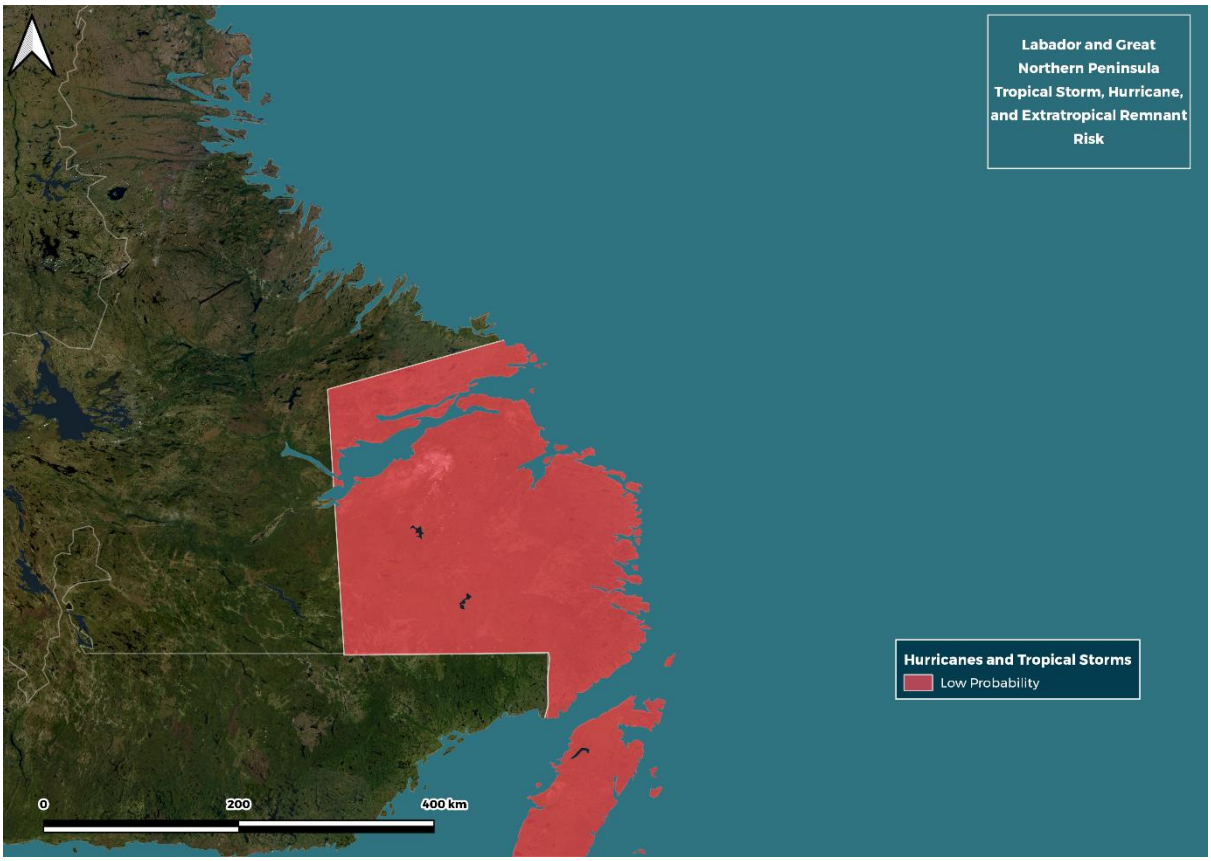


Figure 4 2025 NHC Atlantic Hurricane Season Tracking Map

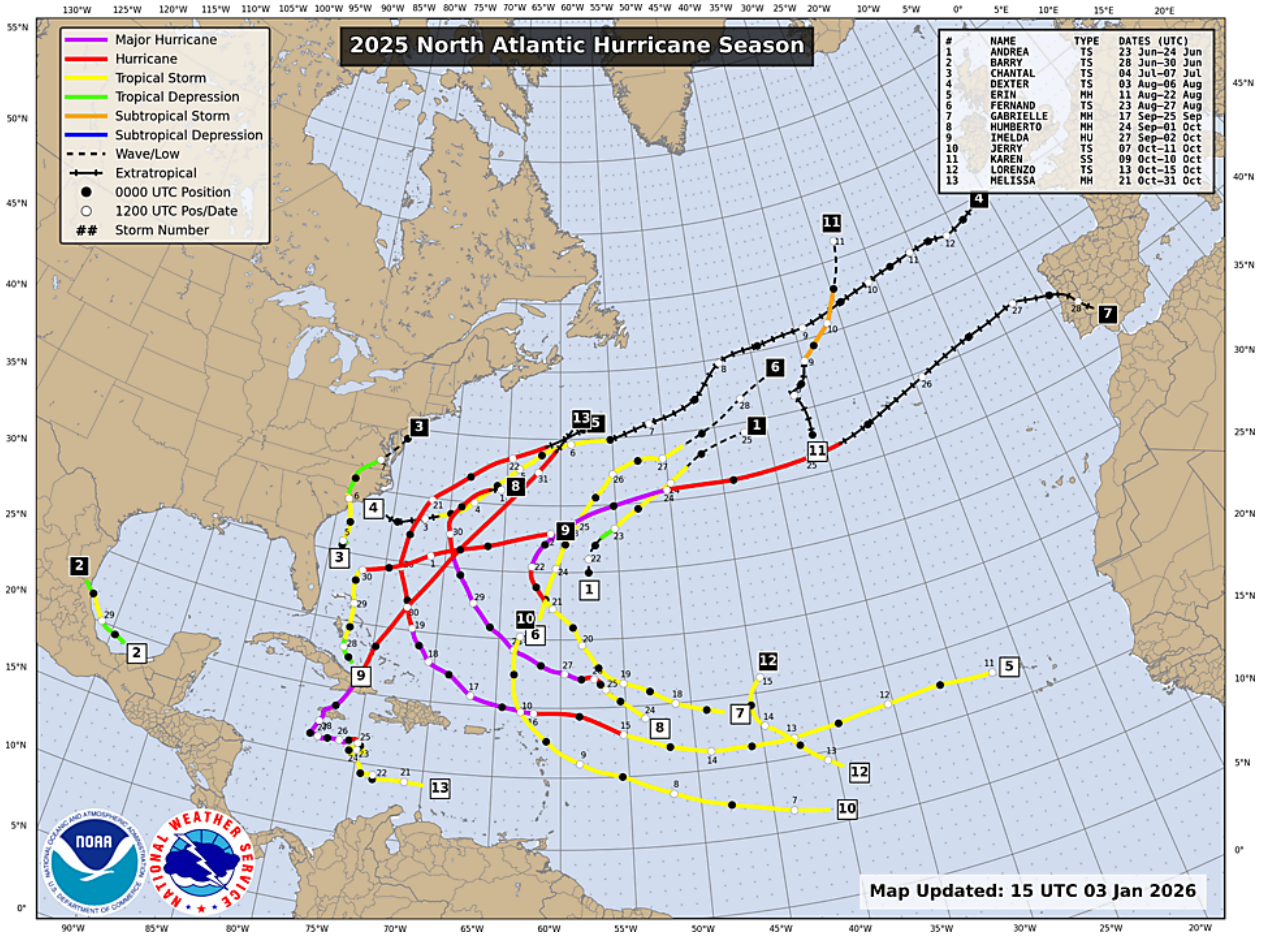
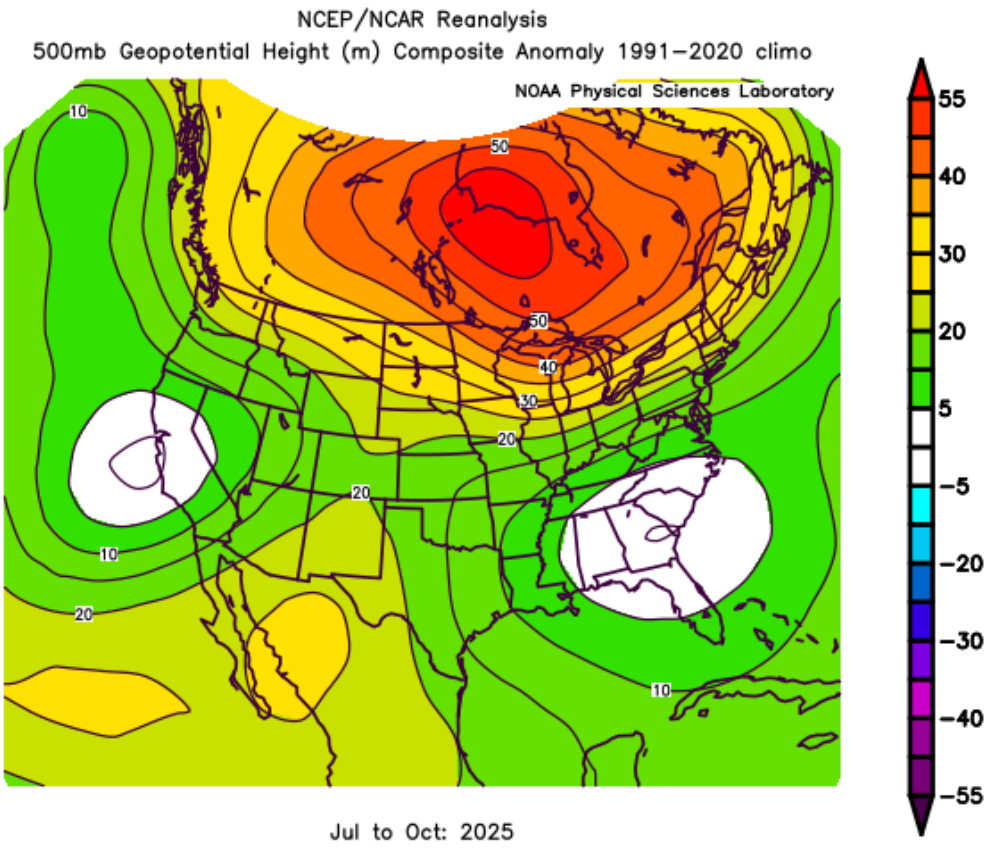


Figure 5 July to October 2025 500 hPa (Steering Level) Geopotential Heights



2.2 Community-Based Flood Reports

WSP works with Fire & Emergency Services – NL (FES-NL) whenever there are reports of flooding that may not have been forecasted. The concept was to create a qualitative field verification measurement that could further validate the statistical methods. Following a forecasted flood event, the intention was for local officials to classify the event as having no, minor, or catastrophic flooding, and these eyewitness reports would be noted on the verification. In the absence of community accounts, local newspapers and social media were scanned to verify the alerts qualitatively.

Some videos of flooding were circulated via social media from the November 10-11 rainfall event on the Burin Peninsula.

2.3 Potential Missed Alerts

- 74.9 mm of rain was recorded in L'Anse-au-Clair at an unofficial weather station between October 31 and November 2. We are not sure how much fell within a 12-h or 24-h period. The 12-h 20-year threshold is 59 mm and the 24-h 20-year threshold is 73 mm.
- 109.7 mm of rain was recorded in Point Leamington at an unofficial weather station between August 18, and August 20. The 12-h 20-year limit for Bishops Falls is 69 mm and the 100-year limit is 88 mm. The 24-h 20-year limit is 92 mm and the 100-year limit is 120 mm. Badger has similar limits with a 12-h 20-year limit of 81 mm, a 12-h 100-year limit of 104 mm. For 24-h limits, the 20-year is 98 mm with a 100-year limit of 126 mm.
- While the rainfall would not have met 12-h or 24-h alert criteria, heavy convective rain fell in southwest Newfoundland on July 21, with 28.1 mm in Stephenville recorded in one hour and a total of 62.3 mm. This could have been covered in a storm report.
- The 109.2 mm recorded in Boat Harbour between November 10, and November 11 could have been enough for a missed alert, but we do not know if 97 mm of that rain fell within 12 hours of time, which is the 20-year threshold. The 24-h 20-year threshold is 119 mm.

2.4 Storm Reports

A storm report was issued to NL WRMD for potential heavy rainfall on July 5 (Figure 6). These were issued in the hopes to bridge the gap between more easily predicted widespread heavy rainfall and harder-to-predict localized heavy rainfall seen in showers and thunderstorms, especially over central and western Newfoundland that can cause flash flooding and road washouts.

12.3 mm of rainfall was recorded in Badger. Per the HRDPA Analysis from in the 48 hours up until July 7 0000 UTC (July 6 830 PM NDT), isolated rainfall of 30 to 50 mm was seen in the area covered by the map and report, verifying the issuance and prediction of the report (Figure 7).

Figure 6 Storm Report Map for July 5, 2025, issued July 4

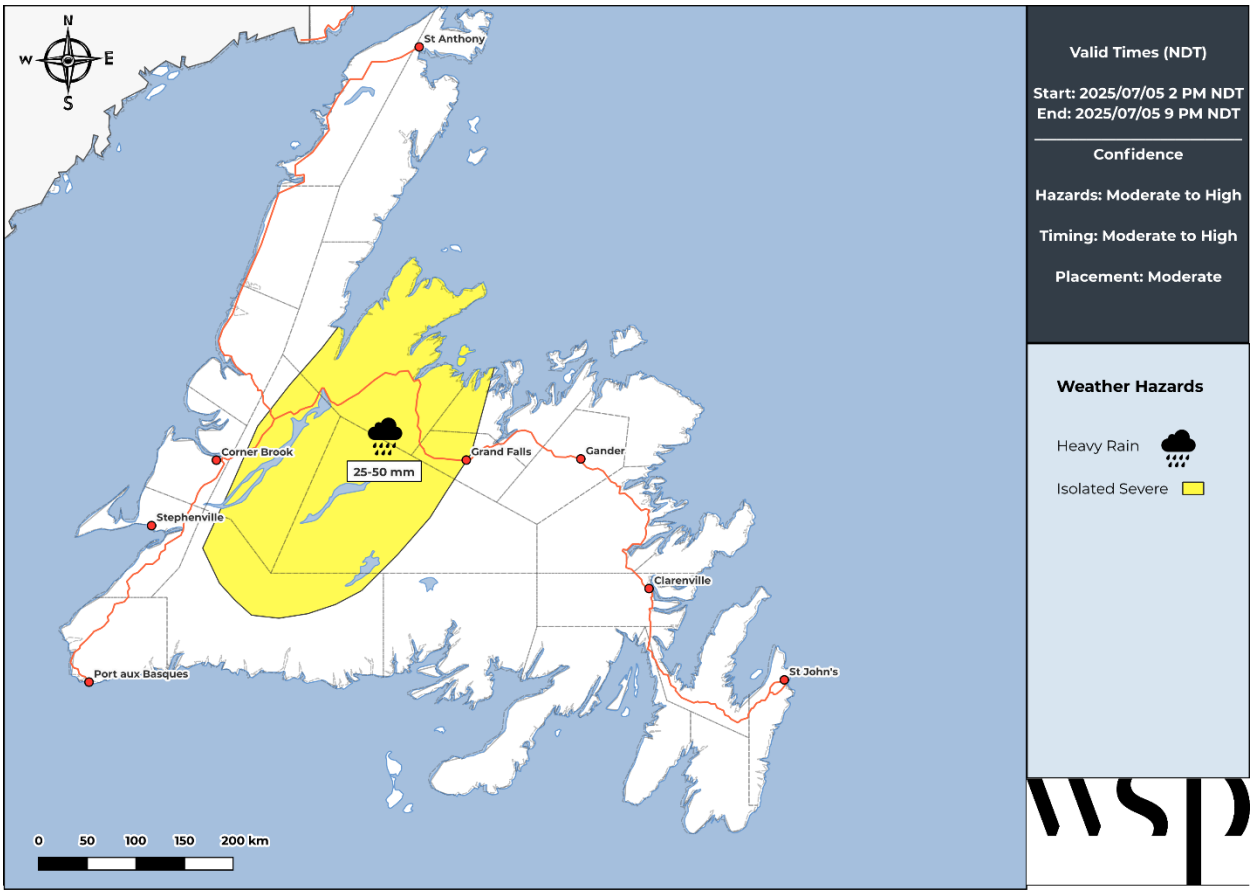
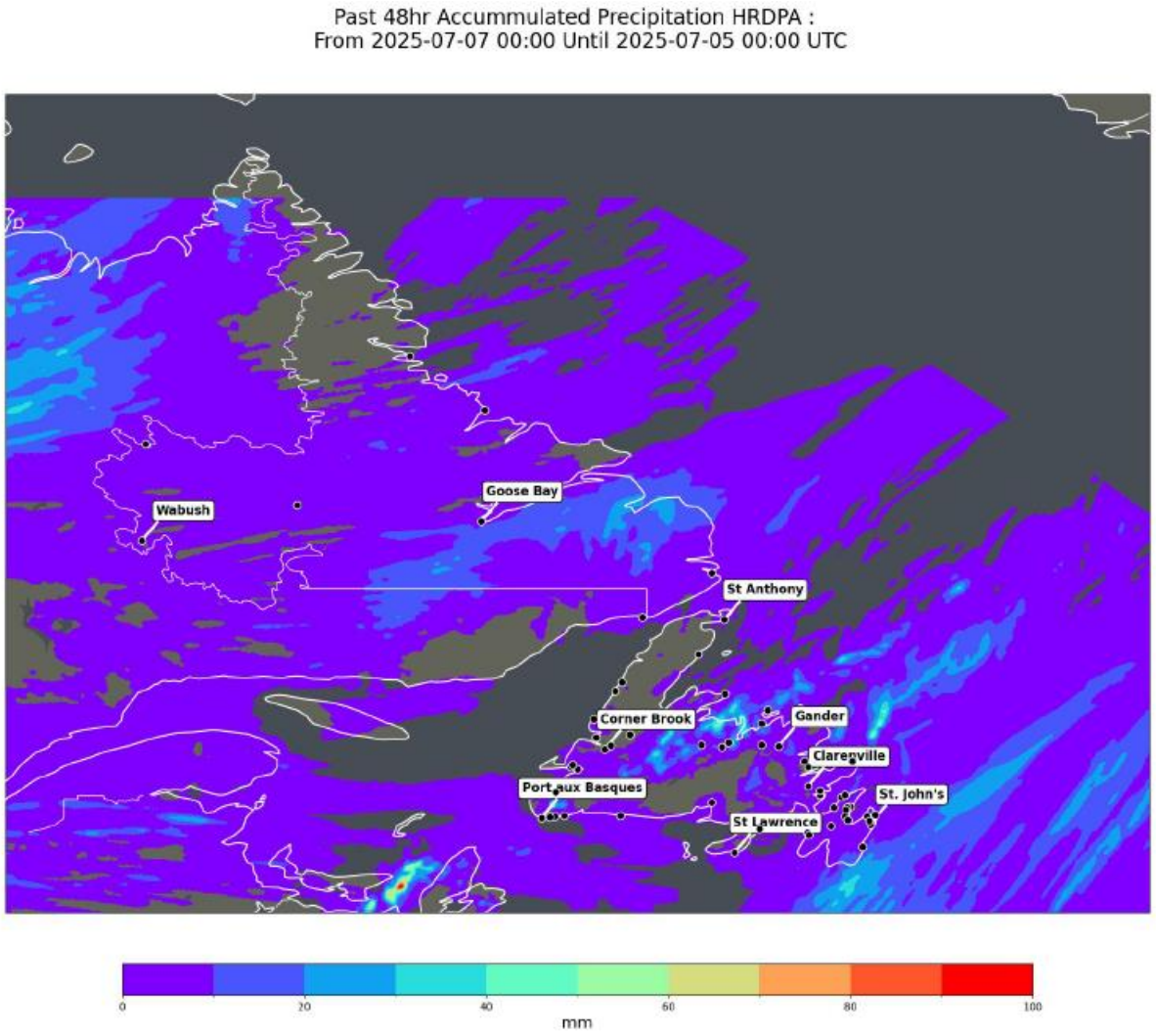


Figure 7 HRDPA 48-h Accumulated Precipitation (mm) Analysis, ending July 7 0000Z (July 6 930 PM NDT)



Another storm report was issued to NL WRMD for potential heavy rainfall on August 26 (Figure 8). The HRDPA Analysis in the 48 hours up until August 27 0000Z (August 26 930 PM NDT) validated the issuance of the report (Figure 9). Localized areas of even higher amounts were analyzed north-northwest of Goose Bay, where 80-100 mm was shown. Much of this fell on August 26 as the moderate rain event on August 25 did not affect that area. Rainfall amounts for the South Coast and for eastern Newfoundland were also supported by official and unofficial rain gauge data (Figure 10). A general 10 to 45 mm fell across Eastern Region while up to 62 mm fell in Southern Region.

Figure 8 Storm Report Map for August 26, 2025, issued August 25

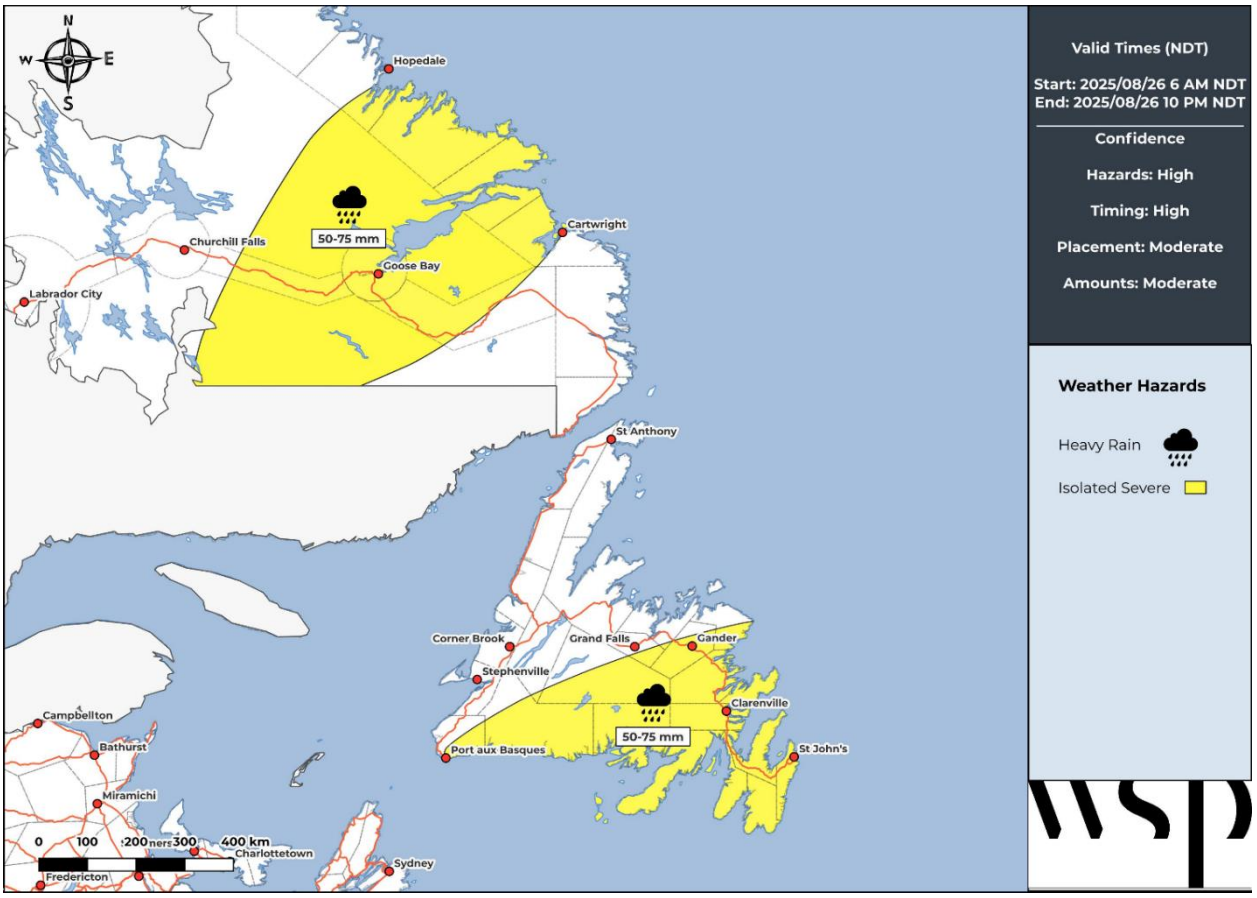


Figure 9 HRDPA 48-h Accumulated Precipitation (mm) Analysis, ending August 27 0000Z (August 26 930 PM NDT)

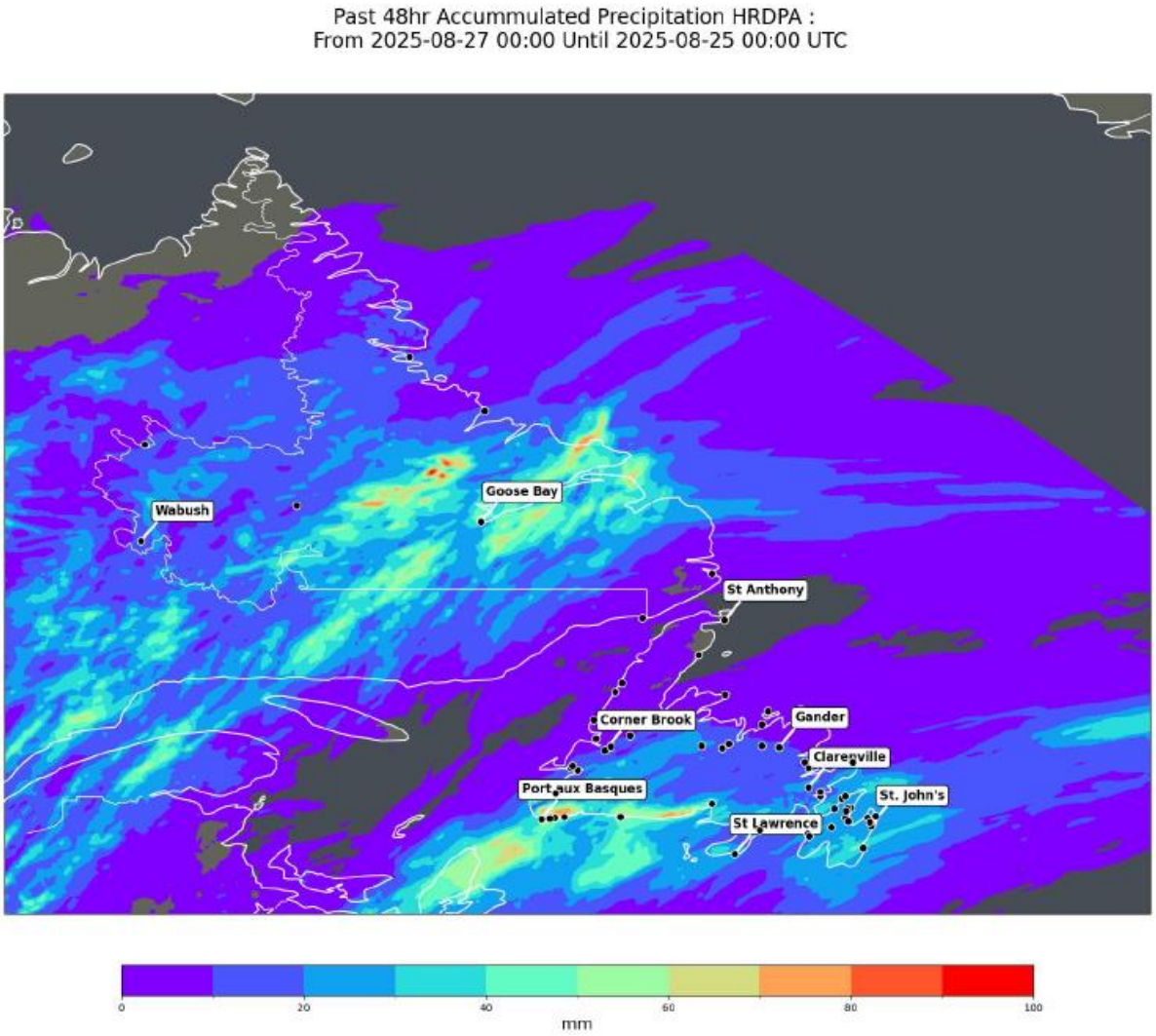


Figure 10 24-h Rainfall Reports from various NL stations ending August 26 530 PM NDT (Rodney Barney/X)

Rodney Barney
@rcbstormpost

Beneficial rains over the past 24 hours across southern and eastern Newfoundland. Lesser amounts into Central, but every bit helps. #nlwx

Rainfall Amounts
24 hours ending 5:30 PM NDT Tuesday 26-Aug-2025

Pool's Cove (Fortune Bay)[1]	61.7 mm	St. Mary's[1]	27.7 mm
Burgeo	49.8 mm	Heart's Desire[1]	27.4 mm
Port aux Basques	46.5 mm	Brigus[1]	26.4 mm
Salmonier Nature Park[1]	43.6 mm	St. John's Int'l A.	25.8 mm
St. Joseph's[1]	41.4 mm	St. John's West	23.9 mm
St. Alban's	39.3 mm	St. Lawrence	23.2 mm
Grey River[1]	37.8 mm	Argentia	22.9 mm
Head of Bay d'Espoir[1]	35.8 mm	Cape Race	19.5 mm
Conception Bay South[1]	34.8 mm	Millertown	17.0 mm
Carbonear[1]	34.3 mm	Grand Falls-Windsor[1]	14.2 mm
Lord's Cove[1]	29.7 mm	Gander West[1]	11.5 mm

[1] unofficial weather station

6:07 PM · Aug 26, 2025 · **1,679** Views

3 14

2.5 Climate Normals

Airport reports of rainfall across NL were examined to determine how the 2025 HSFAS season compared to the climatological normals. The 2025 months are colour-coded in red if they were substantially above normal and blue if they were substantially below normal. Much of Newfoundland was drier-than-normal from June through October then wetter-than normal in November and December. Goose Bay had above normal rainfall in June, October, and November and below normal rainfall in

September. Rainfall in Labrador during June to December was more typical with respect to climatology compared to the island which was drier-than-normal.

Table 5 June and July Monthly Rainfall Totals (in millimetres) compared to 1991-2020 climate normals

Location	June 2025	June Normal	July 2025	July Normal
St. John's	47.1	88.1	54.0	100.1
Gander	64.9	89.8	71.9	107.2
Deer Lake	79.8	72.9	66.3	106.6
Goose Bay	161.2	86.9	100.4	111.8

Table 6. Same as above except August and September

Location	August 2025	August Normal	September 2025	September Normal
St. John's	96.2	99.8	40.5	125.8
Gander	50.6	106.5	35.0	121.1
Deer Lake	71.8	108.5	80.0	98.3
Goose Bay	107.4	107.2	53.2	85.8

Table 7 Same as above except October and November

Location	October 2025	October Normal	November 2025	November Normal
St. John's	120.2	155.7	241.9	132.4
Gander	41.2	116.0	113.8	80.4
Deer Lake	54.7	90.2	128.5	66.8
Goose Bay	85.9	67.2	73.1	26.3

Table 8 Same as above except December

Location	December 2025	December Normal
St. John's	115.5	102.9
Gander	158.5	54.7
Deer Lake	20.9	34.5
Goose Bay	6.0	6.6

2.6 Summary

Both Eastern and Central Region had below normal rainfall in 5 of the 7 months. Abundant rainfall in November and December made up for a particularly dry summer and early fall season. Western and Southern Regions also saw below normal rainfall from June through October. Above normal precipitation was recorded in November with near-normal precipitation in December. Labrador saw above normal precipitation in June and November with near-normal precipitation in August, October, and December. Below normal precipitation was only observed in September. This is consistent with Labrador being the most alerted region in 2025.

Table 9 Forecast Regions and Rainfall Observed Compared to Normals

Month	Eastern Region	Central Region	Western Region	Southern Region	Labrador
June	Below normal	Below normal	Below normal	Below normal	Above normal
July	Below normal	Below normal	Below normal	Below normal	Below normal
August	Below normal	Below normal	Below normal	Below normal	Near normal
September	Below normal	Below normal	Below normal	Below normal	Below normal
October	Below normal	Below normal	Below normal	Below normal	Near normal
November	Above normal	Above normal	Above normal	Above normal	Above normal
December	Above normal	Above normal	Near normal	Near normal	Near normal
*Rainfall from climate sites and spatial rainfall anomaly data from the NCEP/NCAR Reanalysis were used to categorize					

3. Lessons Learned

Labrador and Southern Region received the bulk of the anomalous rainfall events this season. As individual seasons continue to depart from climate normals, customized alerting services such as this become more critical. Record-breaking dry or wet spells emphasize the growing importance of nowcasting and advanced weather monitoring on a very local scale.

Flooding is a complex phenomenon and can occur with amounts significantly less than the 20-year or 100-year thresholds and vice versa – no flooding may occur with amounts significantly higher than those. The HSFAS product, along with the services provided by WRMD, such as water level monitoring and reporting, are key components that work well together to help provide advance warnings to communities to better prepare for potential flooding.

Validation and incremental improvements to the HSFAS service are aided by having a network of observations. While a product such as the ECCC High Resolution Deterministic Precipitation Analysis (HRDPA) helps, this still represents a precipitation model which could vary significantly from true observations. As we have indicated in the past, the best solution would be to fill the gaps in the available monitoring networks. Using only the ECCC and WRMD gauge data limits our ability to verify the forecasts in some areas. Many communities require additional measurements, access, and/or studies. Without adequate instrumentation for measuring precipitation, it can be almost impossible to know for certain in high terrain areas whether the forecasted precipitation was accurate. Attempts have been made to fill these gaps through community-based flood reports and the use of local media sources to try to collaborate sparse gauge data. The verification analysis maps for both events show multiple isolated “bull’s eyes” that can be challenging to precisely place ahead of time, and thus a more generic area that contains them is the preferred method.

4. Conclusion

It would be beneficial to pursue additional improvements to the data sources and available forecast products, as follows:

1. Additional rain gauges could be installed, particularly in the regions that generated significant alerts.
2. Flood Risk Mapping Studies could be considered for the communities that triggered alerts based on Intensity-Duration-Frequency (IDF) curves.
3. Continue to monitor situations where summer isolated convective rainfall is likely. The July 21 southwest Newfoundland event did not cause any known flooding, but it was a missed event from a storm report implementation perspective. Both the July 4 north-central Newfoundland rainfall event and the August 26 South Coast, Eastern, and Labrador rainfall event are proof positive of the benefits of storm-reports for localized, but very heavy convective rainfall. Such events can be challenging to communicate using the traditional deterministic maximum-precipitation forecast and are much more effectively conveyed using a probabilistic spatial format.

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