Environment Canada Environnement Canada

# Climatic Perspectives

*Monthly Review* **December – 1991** *Vol. 13*

# CLIMATIC HIGHLIGHTS

*December 1991 was one of the mildest ever recorded in Ontario. Also, the Canadian Prairies were basking in one of the warmest winters on record. The Christmas season, between December 22 and 31, was the fourth warmest in Winnipeg's history, with a mean temperature of minus 4.6° C. By the end of the month, all of the western provinces were enjoying temperatures that would be more common in early November.*

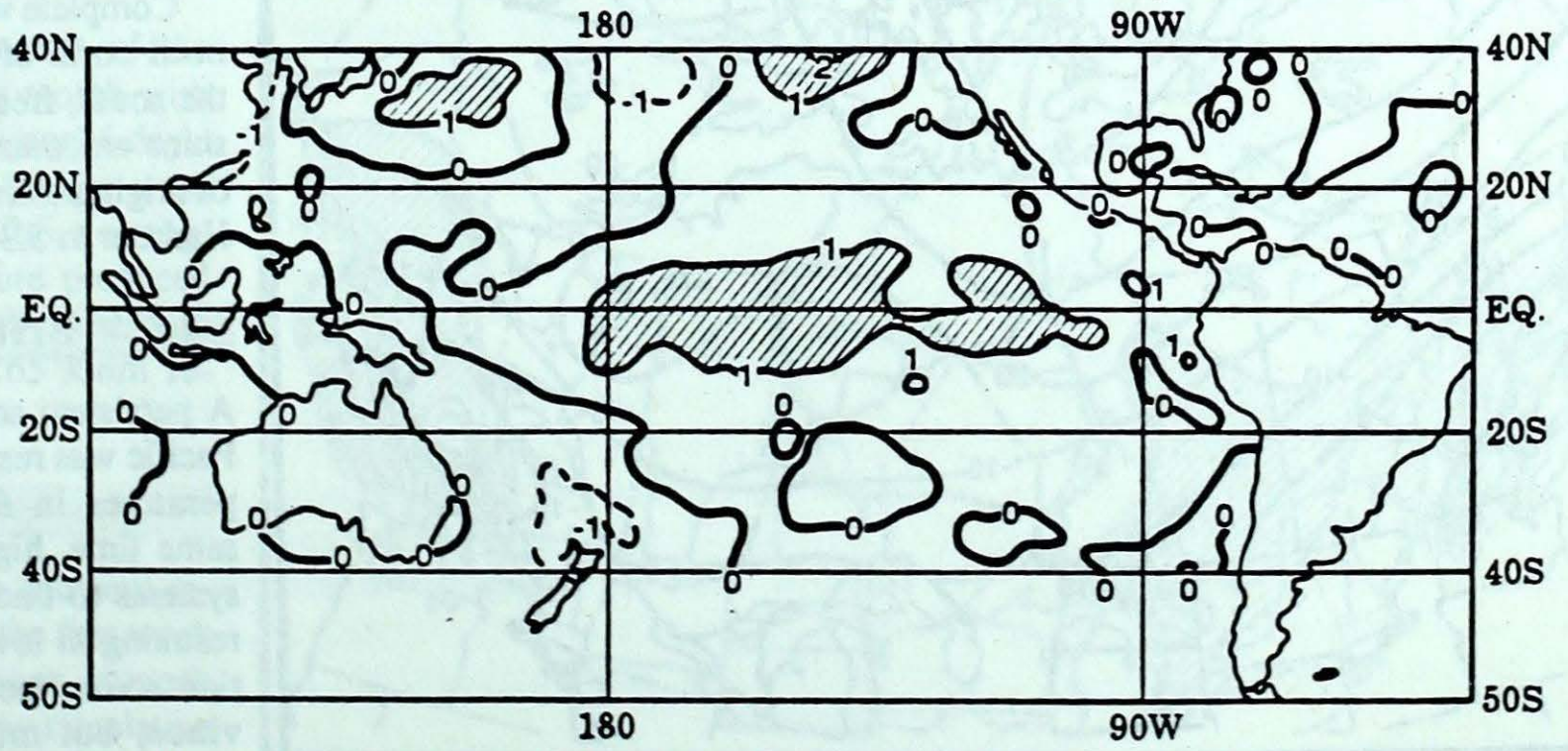
The warm spell, which began in the west, spread eastward, and by the end of the month, almost all of Canada, with the exception of the Atlantic Provinces was experiencing above normal temperatures.

This climatic condition may be attributed, at least partly, to the El Nino-Southern Oscillation (ENSO) phenomenon in the tropical Pacific. An extensive anomaly of warm water has pooled from the Dateline eastward to the coast of Peru/Ecuador, and is associated with atmospheric disturbances, and transfers of heat and moisture to the mid-latitudes. The effects of previous ENSO episodes in Canada have been mainly in the west, where some warm, dry winters have led to spring droughts (1987), unless precipitation intervened (1977). Warm conditions have also occurred in some ENSO years over the Atlantic Provinces and eastern Quebec. During the 1982-83 warm episode, the strongest in the last century, warm winds blew across the Prairies and northwestern Ontario into the Ottawa Valley, but in 1986-87 and in 1976-77, east-central Canada was close to normal. While the cross-country outlook for the next month calls for above-normal temperatures, on average, (except in the far north and northeast), there may be occasions when cold Arctic outbreaks will occur in various parts of southern Canada.

## Winds lash the West Coast.

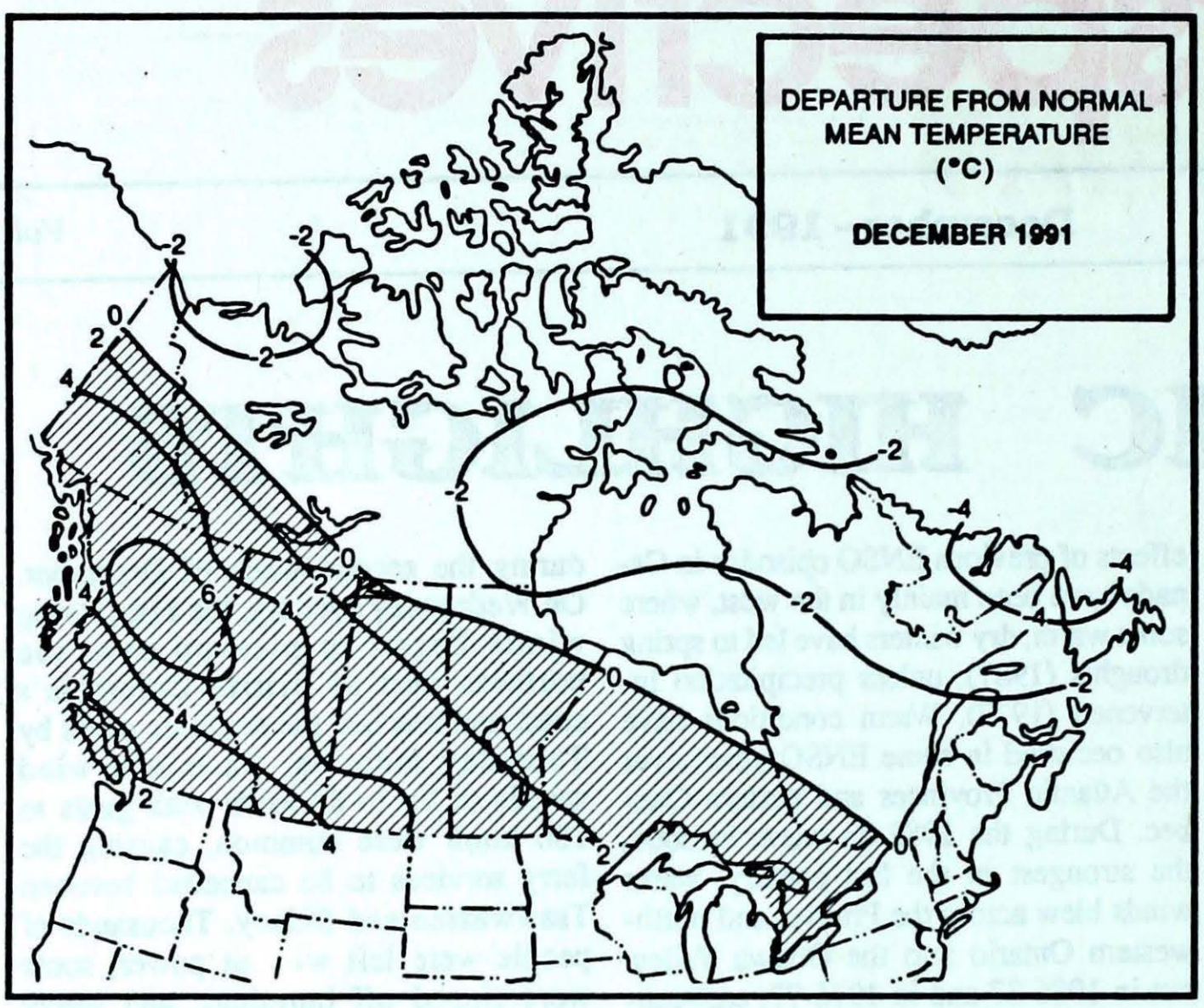
Although it was warm, windy conditions were prevalent along the West Coast during the second week of December. On Wednesday evening, the 11th, strong winds began to pick-up over the northern part of British Columbia's coast and reached the southern areas by Thursday morning. Sustained wind speeds of 75 to 85 km/h with gusts to 100 km/h were common, causing the ferry services to be cancelled between Tsawwassen and Sidney. Thousands of people were left without power, roofs were ripped off buildings, and heavy machinery was pushed over.

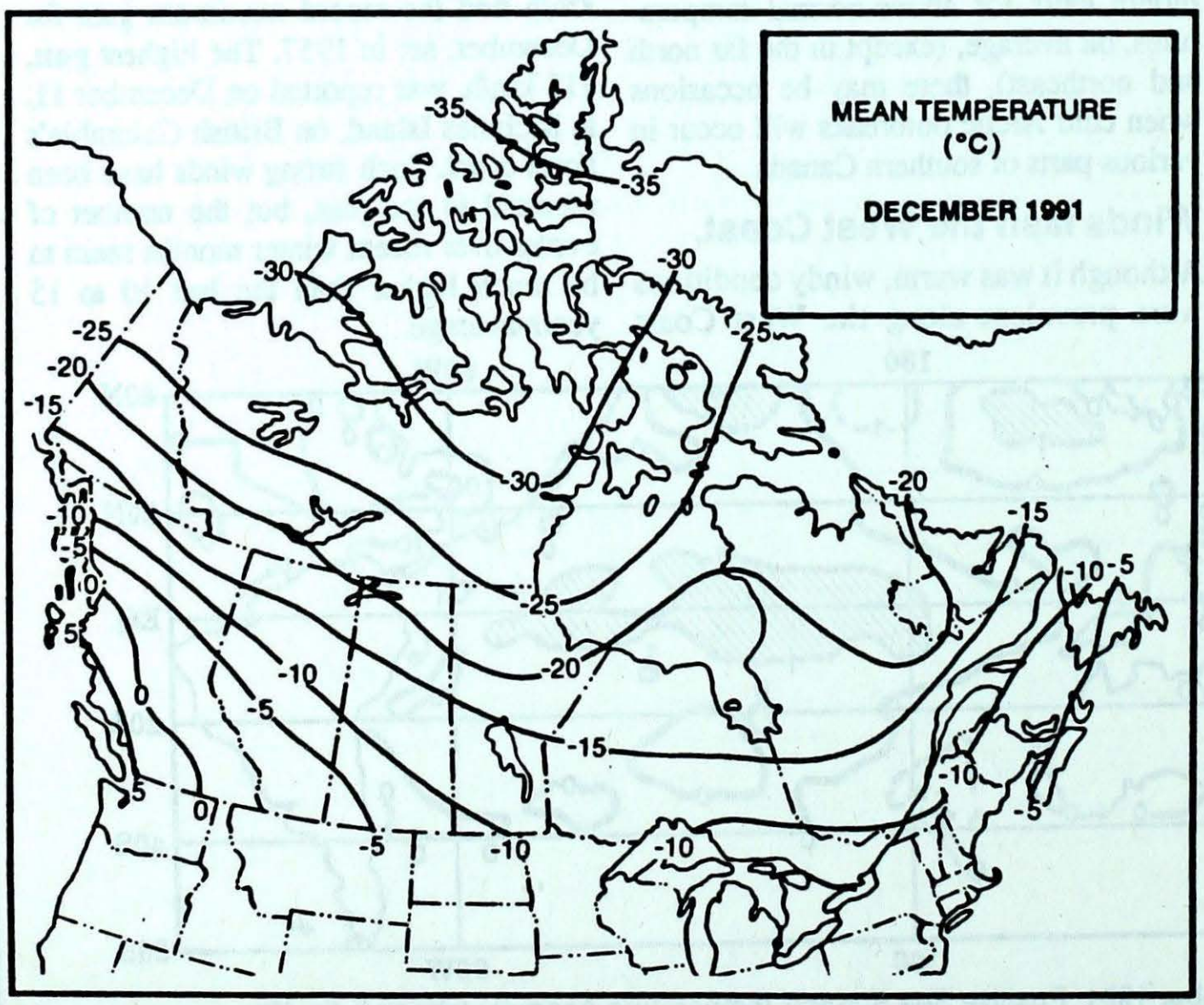
At Vancouver Airport, a gust of 100 km/h tied the record maximum gust for December, set in 1957. The highest gust, 115 km/h, was reported on December 11, at McInnes Island, on British Columbia's north coast. Such strong winds have been reported in the past, but the number of events over recent winter months seem to be much higher than the last 10 to 15 years-average.




November 1991 Positive Sea Surface Temperature Anomaly (shaded) (in °C)

Canada




# Across the country

## Yukon and Northwest Territories

Mean monthly temperatures averaged up to 5 to 6 degrees above their expected normals, whereas the northern communities were 4 to 5 degrees below normal. The cloud blanket that protected the south also produced abundant snowfalls. The community with the greatest snowfall, 93 cm, was Swift River situated on the Alaska Highway. This is almost twice the December normal. The coastal passes received the greatest amounts of snow again this month, with Fraser recording 281 cm. Pleasant Camp measured 201 cm of fresh snow, and in the last two days wet it all down with 7 mm of rain.

In the central part of the N.W.T. mean temperatures were below normal in all areas. Most sites saw minimum temperatures fall to -40° C at least once during the month, although Coral Harbour and Rankin Inlet were holdouts with low minima of only -32.0° C and -39.4° C, respectively. The coldest temperature this month was -44.8° C at Mould Bay. By month's end, mild air spread into the southern Keewatin District and allowed temperatures to moderate to -3.5° C and -5.0° C at Baker Lake and Rankin Inlet, respectively.

Precipitation totals in the N.W.T.were very close to the monthly average in all areas, ranging from 13.2 mm at Baker Lake to 3.2 mm at Mould Bay.

Complete winter season darkness continued north of the Arctic Circle while, in the south, frequent cloudy days kept sunshine amounts below normal. Total hours of bright sunshine ranged from 2.2 at Coral Harbour to 5.3 at Baker Lake.

## British Columbia

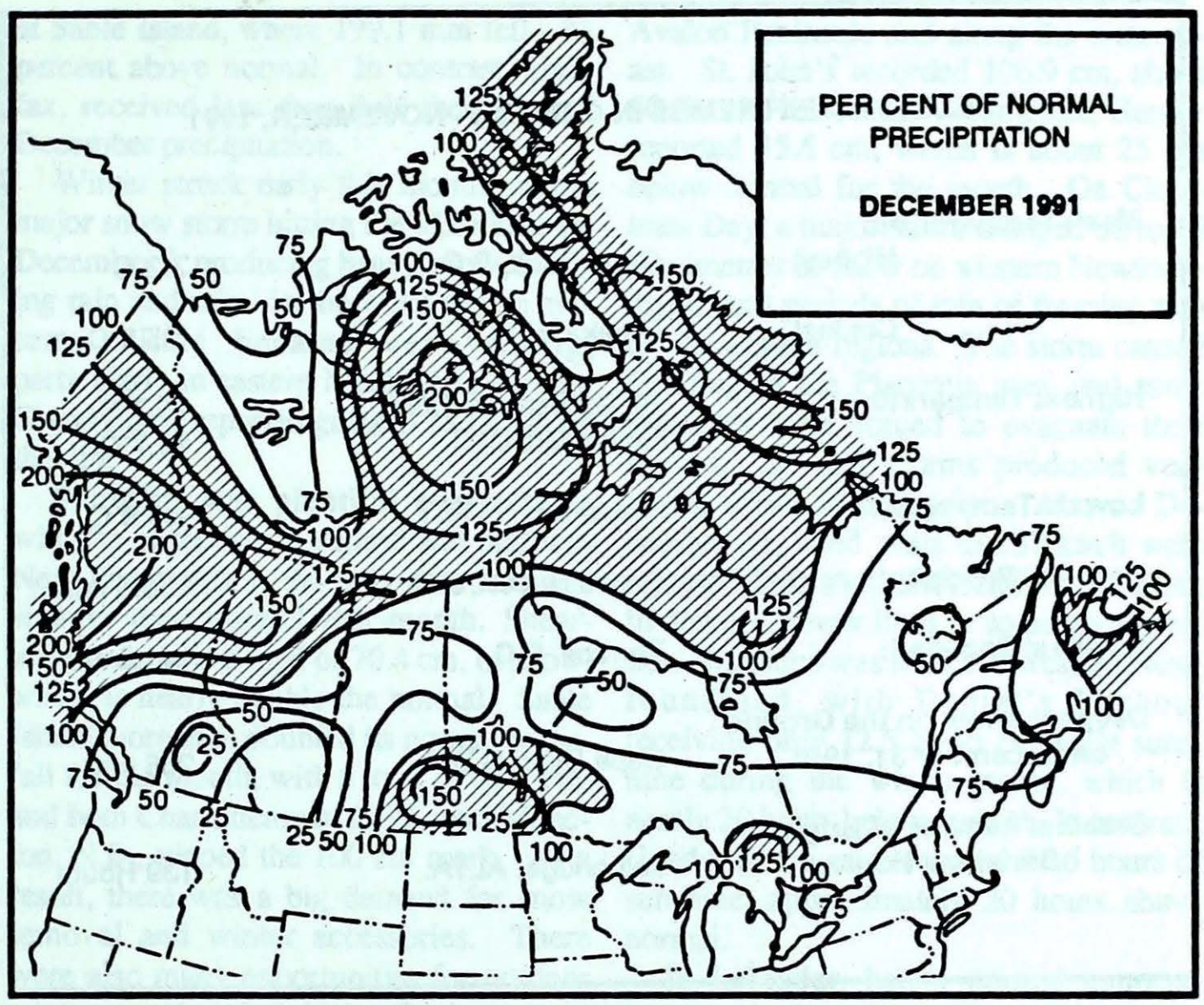
A persistent southwesterly flow from the Pacific was responsible for very mild temperatures in British Columbia. At the same time, high pressure forced weather systems to track further north than usual, resulting in lower than average precipitation across the southern half of the province, but much greater than normal amounts along the north part of the coast.

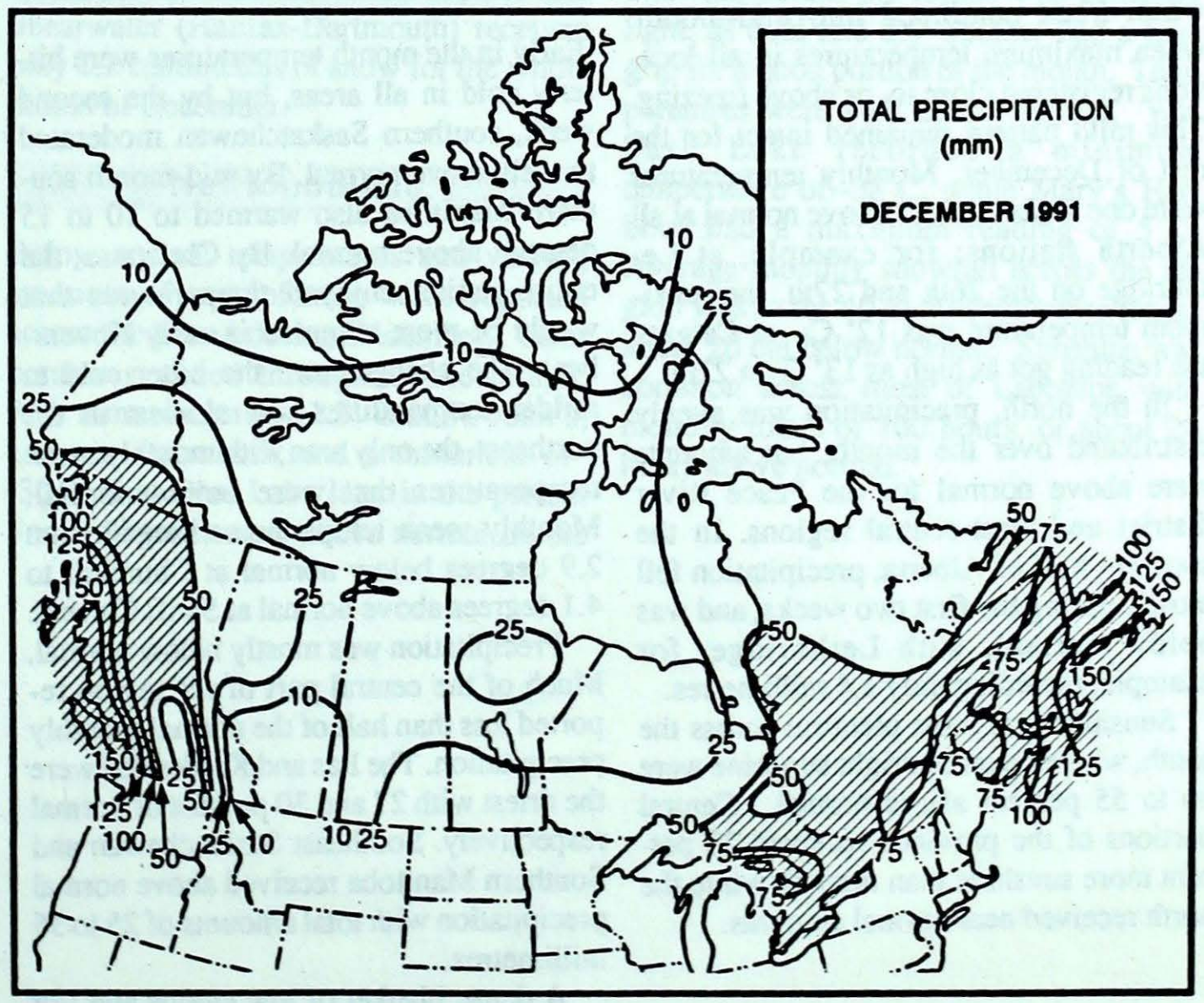
Above normal temperatures were recorded throughout the province. New record high monthly mean temperatures were established at: Germansen Landing, Prince George, Kelowna, Mackenzie, Revelstoke, Smithers, Terrace and Williams Lake.

Precipitation in the southern interior was unusually light, but a succession of weather systems brought a plentiful supply of moisture to the north coastal area. In fact, precipitation totals were more than double normal. Terrace had already exceeded their normal December precipitation by the 10th of the month, and as in November, they set a new monthly precipitation record of 441.1 mm. Also on the 10th, Terrace established a new one day maximum precipitation record of 159.0 mm, breaking the old one of 114.8 mm set in October 1978. New high precipitation records were established at: Cape Scott, 509.5 mm; Cape St James, 387.7; Germansen Landing, 103.3mm;, Mackenzie 132.4 mm; and Prince George 550.6. Little or no snow fell along the coast and in the southern interior valleys. Only the northern half of the province had well above average snowfalls.

It was a cloudier than normal month across most of the region. In the northern half of the province, hours of bright sunshine were as low as 15 to 40 percent of normal. New record low sunshine totals were reported at Blue River - 12.0 hours, breaking the old record of 12.8 in 1989 and Revelstoke - 9.5 hours, breaking the old record of 10.4 in 1969.

Gales affected the north part of the coast on at least 11 days this month with local strong winds on an additional 6 days. On the central coast general gales were reported on 15 days. On the 12th, a strengthening ridge of high pressure produced very strong winds on the south coast, with maximum gusts of up to 165 km/h reported.




## Alberta

Arctic air covered all but the southern regions of the province during the first week of December. In the second week, chinook winds and a prevalent westerly circulation pushed a mild Pacific air mass further northward into central districts, resulting in

**CLIMATIC EXTREMES IN CANADA - NOVEMBER, 1991**

| | | |
|---|---|---|
| **Mean Temperature:** | | |
| Highest | Cape Scott, B.C. | 7.2°C |
| Coldest | Eureka, N.W.T. | -35.5°C |
| **Highest Temperature:** | St. Catharines, ONT. | 15.7°C |
| | Smithfield, ONT. | 15.7°C |
| **Lowest Temperature:** | Mould Bay, N.W.T. | -44.8°C |
| **Heaviest Precipitation:** | Prince Rupert, B.C. | 550.6 mm |
| **Heaviest Snowfall:** | Terrace, B.C. | 141.6 cm |
| **Deepest Snow on the Ground on December 31, 1991** | Cape Dyer, N.W.T. | 266 cm |
| **Greatest number of Bright Sunshine Hours:** | Lethbridge, ALTA. | 139 Hours |

above-freezing daytime temperatures. The warm trend continued into mid-month, when maximum temperatures in all locations registered close to, or above freezing. This mild pattern remained intact for the rest of December. Monthly temperatures were one to six degrees above normal at all Alberta stations; for example, at Lethbridge on the 26th and 27th, the maximum temperature was 12° C; at Calgary the reading got as high as 13° C on 27th.

In the north, precipitation was evenly distributed over the month, but amounts were above normal for the Peace River district and west-central regions. In the southern half of Alberta, precipitation fell mostly during the first two weeks, and was below normal, with Lethbridge, for example, recording only 1.4 millimetres.

Sunshine was most plentiful across the south, where hours of bright sunshine were up to 55 percent above normal. Central portions of the province received 20 percent more sunshine than normal, while the north received near normal amounts.

## Saskatchewan and Manitoba

Early in the month temperatures were bitterly cold in all areas, but by the second week, southern Saskatchewan moderated to well above normal. By mid-month southern Manitoba also warmed to 10 to 15 degrees above normal. By Christmas, the entire region enjoyed temperatures that would be more common in early November. The change from the bitter cold to milder temperatures was slowest in the northeast, the only area with monthly mean temperatures that were below normal. Monthly mean temperatures ranged from 2.9 degrees below normal at Churchill to 4.1 degrees above normal at Swift Current.

Precipitation was mostly below normal. Much of the central part of the region reported less than half of the normal monthly precipitation. The Pas and Kindersley were the driest with 27 and 30 percent of normal respectively. Southeast Saskatchewan and Southern Manitoba received above normal precipitation with total amounts of 25 to 35 millimetres.

A dense blanket of low clouds and fog covered much of the region during the latter part of December which kept sunshine totals below average in parts of the region. Sunshine totals were below normal throughout the northern and in the eastern half of Manitoba. However, in the southwest and throughout southern Saskatchewan the sun's rays were felt more often than usual. In fact, at Swift Current the total of 121.6 hours was 43% more than the normal of 85.1 hours.

## Ontario

In southern Ontario, December was the eleventh month this year featuring milder than normal temperatures. The month also helped usher 1991 into the record books as one of the warmest years ever recorded in the province.

With a couple of exceptions, mean temperatures were several degrees warmer than normal in northern Ontario, making this the mildest December since the record-setter of 1987, but in the southern part of the province, monthly mean temperatures fell shy of last year's exceptionally mild December.

Despite two early outbreaks of frigid Arctic air covering the region, there were several days during the middle of the month that were surprisingly balmy. For example, from December 9 to 13, the thermometer climbed to the record teens from Windsor to Manitoulin Island.

Most major storms occurred during the first half of December, with two widespread snowstorms dumping the bulk of the December snow. The second half of the month provided more tranquil weather conditions especially over the holiday period, which was good news for travellers, but less acceptable for winter sports enthusiats, as the snow cover slowly dwindled.

Precipitation-wise, the month was slightly drier than usual, but surprisingly, despite the relatively mild temperatures, snowfall totals were relatively close to normal. The driest region was the far north. Big Trout Lake received only 10 mm of precipitation this month - a record dry December. The Wawa area received 59 mm of precipitation compared to a normal 104 mm. Snowfall totals ranged from 28 cm at Windsor to a high of 129 cm at Wiarton,

which is 36 cm more than normal. Peterborough's 53 cm made this their snowiest December since 1977.

## Quebec

During December, temperatures were below normal over the entire province, with anomalies ranging from -0.4° C in southwestern regions to - 7.4° C at Blanc- Sablon in the far east. Over northern Quebec, anomalies ranged from minus one on the shores of Hudson Bay to -3.0 °C near Ungava Bay. On the average, the warmest area was on Iles de la Madeleine (-3.5 °C) and the coldest occurred at Schefferville (-22.4° C).

Precipitation was light and below seasonal values, except in the northwestern part of the province. A band receiving less than 75 percent normal extended from near Montreal to Saguenay-Lac St-Jean, and this area got less than 50 cm of new snow over the month. Snowfalls was also less than 50 cm in the far north, but in the east, along the North Shore, Sept-Iles measured 100.8 cm.

Total hours of bright sunshine were lower than seasonal values in western Quebec (except the Ottawa Valley) from Montreal to Quebec City and all the way north to Kuujjuarapik. East of Quebec City, bright sunshine was above normal, reaching up to 150 percent of the December mean value at Mont-Joli.

## Maritimes

December was a cold month with below normal temperatures and total precipitaion, but on the other hand, some snowfalls were heavy. Heaviest precipitation was reported at Sable Island, where 199.1 mm fell - 38 percent above normal. In contrast, Halifax, received less than half their normal December precipitation.

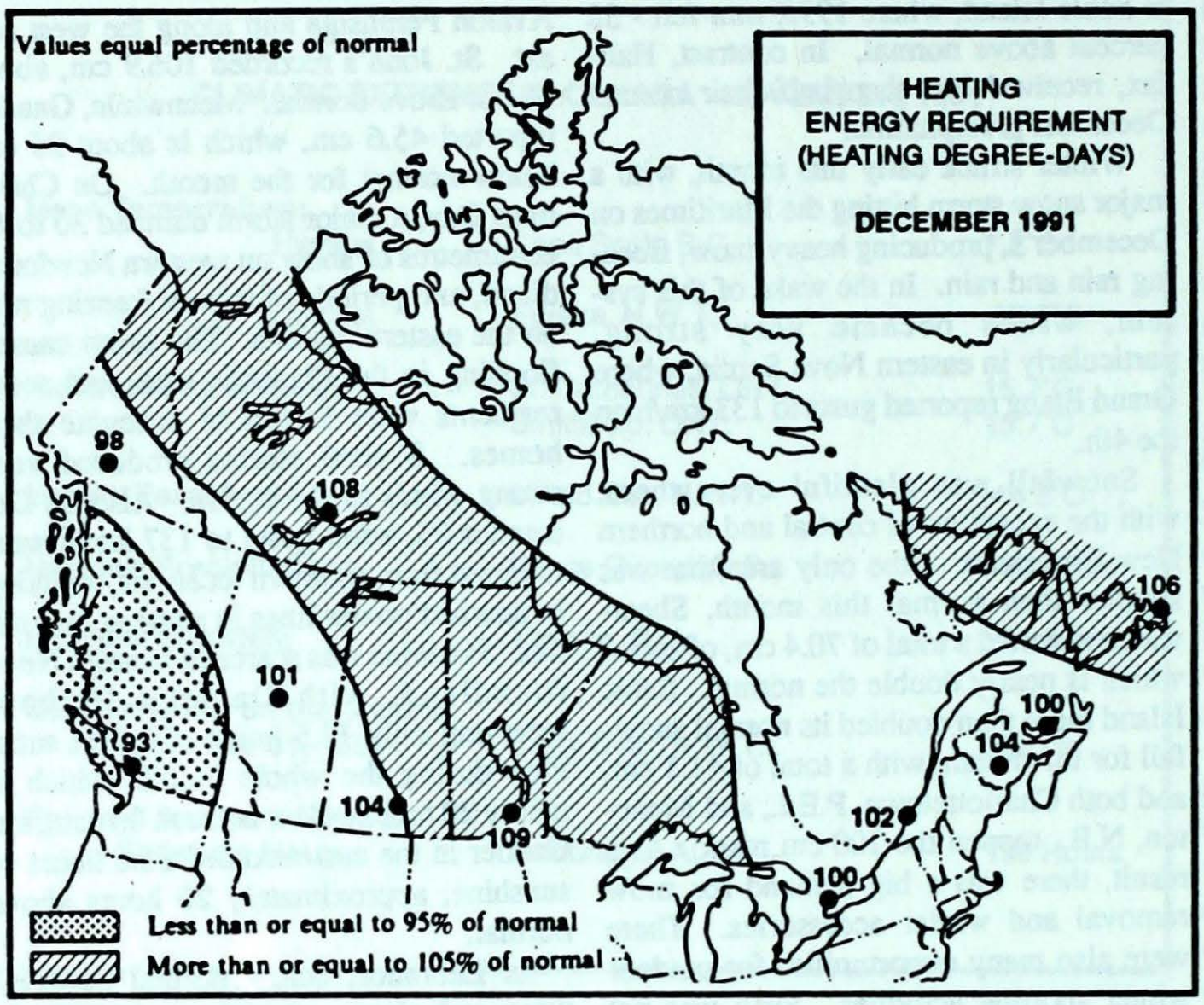
Winter struck early this month, with a major snow storm hitting the Maritimes on December 3, producing heavy snow, freezing rain and rain. In the wake of this system, winds became very strong, particularly in eastern Nova Scotia, where Grand Etang reported gusts to 133 km/h on the 4th.

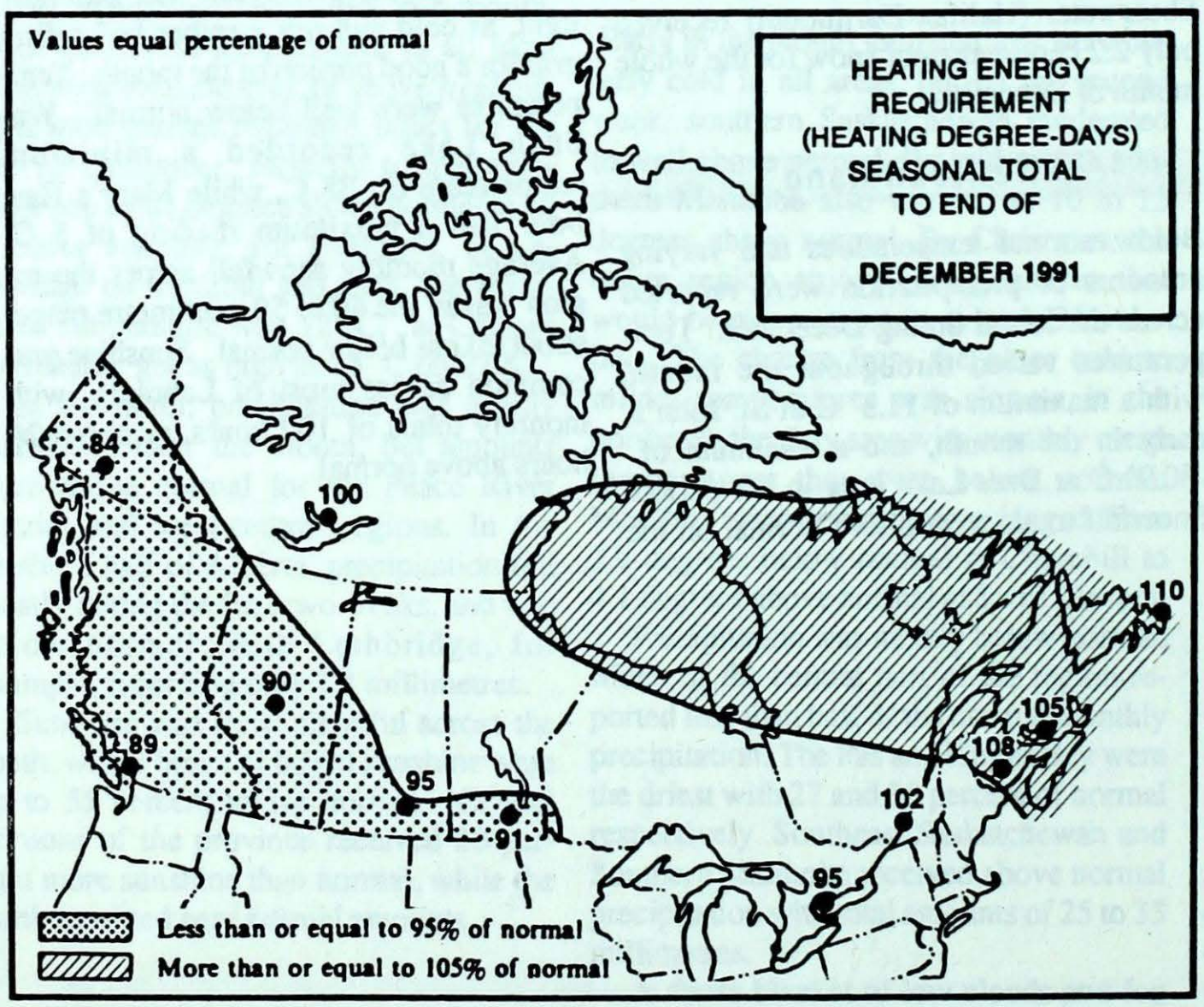
Snowfall was plentiful everywhere, with the exception of central and northern New Brunswick - the only area that was sunnier than normal this month. Shearwater, reported a total of 70.4 cm, of snow, which is nearly double the normal. Sable Island more than doubled its normal snowfall for the month, with a total of 41.1 cm, and both Charlottetown, P.E.I., and Moncton, N.B., topped the 100 cm mark. As a result, there was a big demand for snow removal and winter accessories. There were also many opportunities for outdoor winter sporting activities. Such was not the case last December, particularly in Nova Scotia, where snowfalls at place like Shearwater (Halifax-Dartmouth) received only 2.2 centimetres of snow for the whole month of December.

## Newfoundland

Below normal temperatures and varying amounts of precipitation were reported across the Island during December. Temperatures varied throughout the month, with a maximum of 11.3° C at St. John's, early in the month, and a minimum of -30.9° C at Deer Lake later in the period. Snowfall totals were above normal on the Avalon Peninsula and along the west coast. St. John's recorded 106.9 cm, about 40 cm above normal. Meanwhile, Gander reported 45.6 cm, which is about 25 cm below normal for the month. On Christmas Day, a major storm dumped 30 to 40 centimetres of snow on western Newfoundland, and periods of rain or freezing rain on the eastern regions. The storm caused flooding in the Placentia area, and some residents were forced to evacuate their homes. Several storms produced very strong winds in the region. Also on December 25, wind gusts to 137 km/h were reported from southern locations, resulting in downed power lines in some communities. Sunshine was scarce in western Newfoundland, with Daniel's Harbour receiving only 12.5 hours of bright sunshine during the whole month, which is nearly 20 hours below normal. In contrast, Gander in the east recorded 85.6 hours of sunshine, approximately 20 hours above normal.

In Labrador, below normal temperatures and above normal sunshine highlighted the monthly weather regime. Snowfall across the region was generally light, as cold and dry weather had a firm grip for a good portion of the month. Temperatures were well below normal. Wabush Lake recorded a minimum temperature of -38 C, while Mary's Harbour had a maximum reading of 5 C. Average monthly snowfall across the region was in the 40 to 50-centimetre range, about 20 cm below normal. Sunshine was common across most of Labrador, with monthly totals of 100 hours, or about 20 hours above normal.



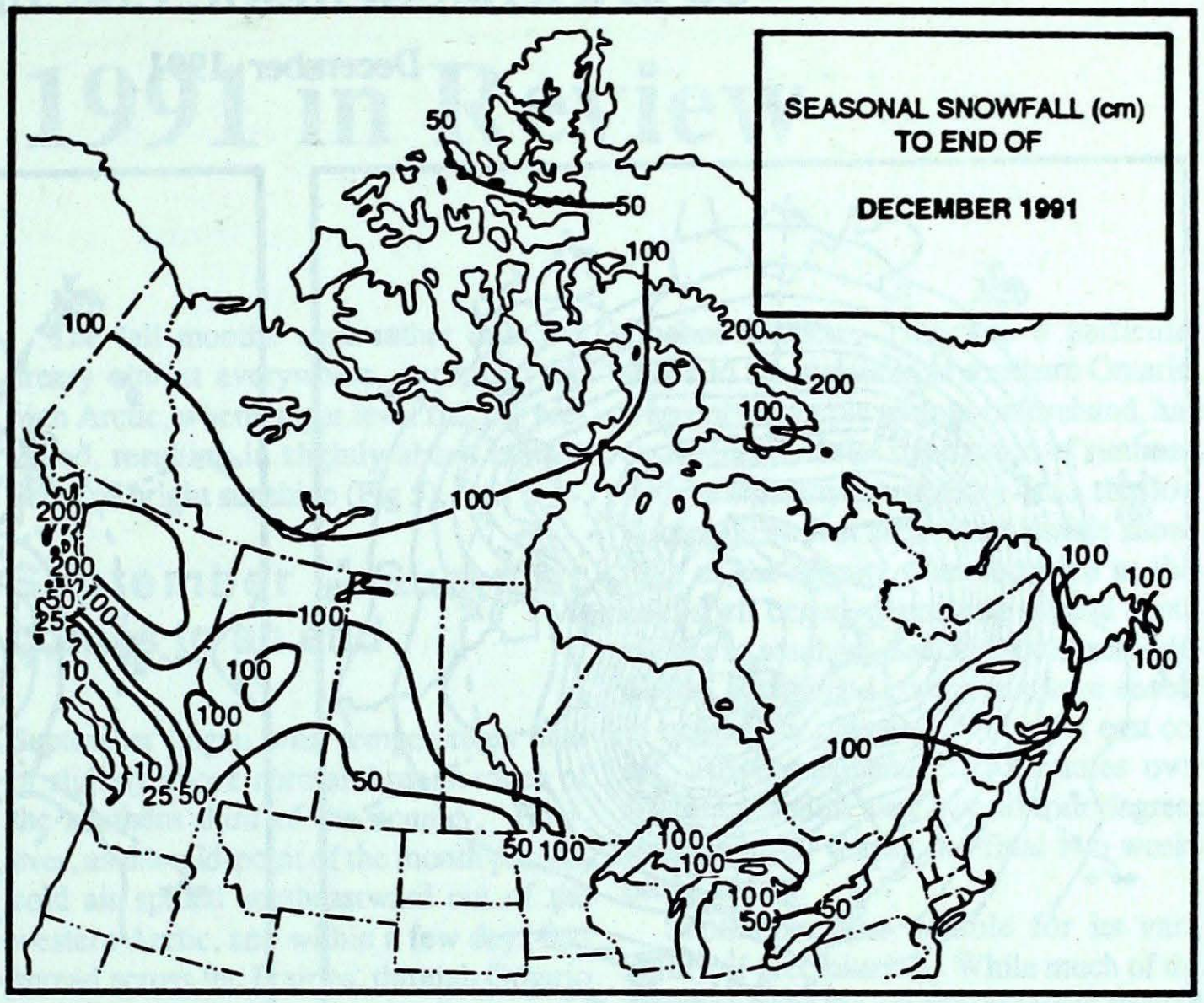



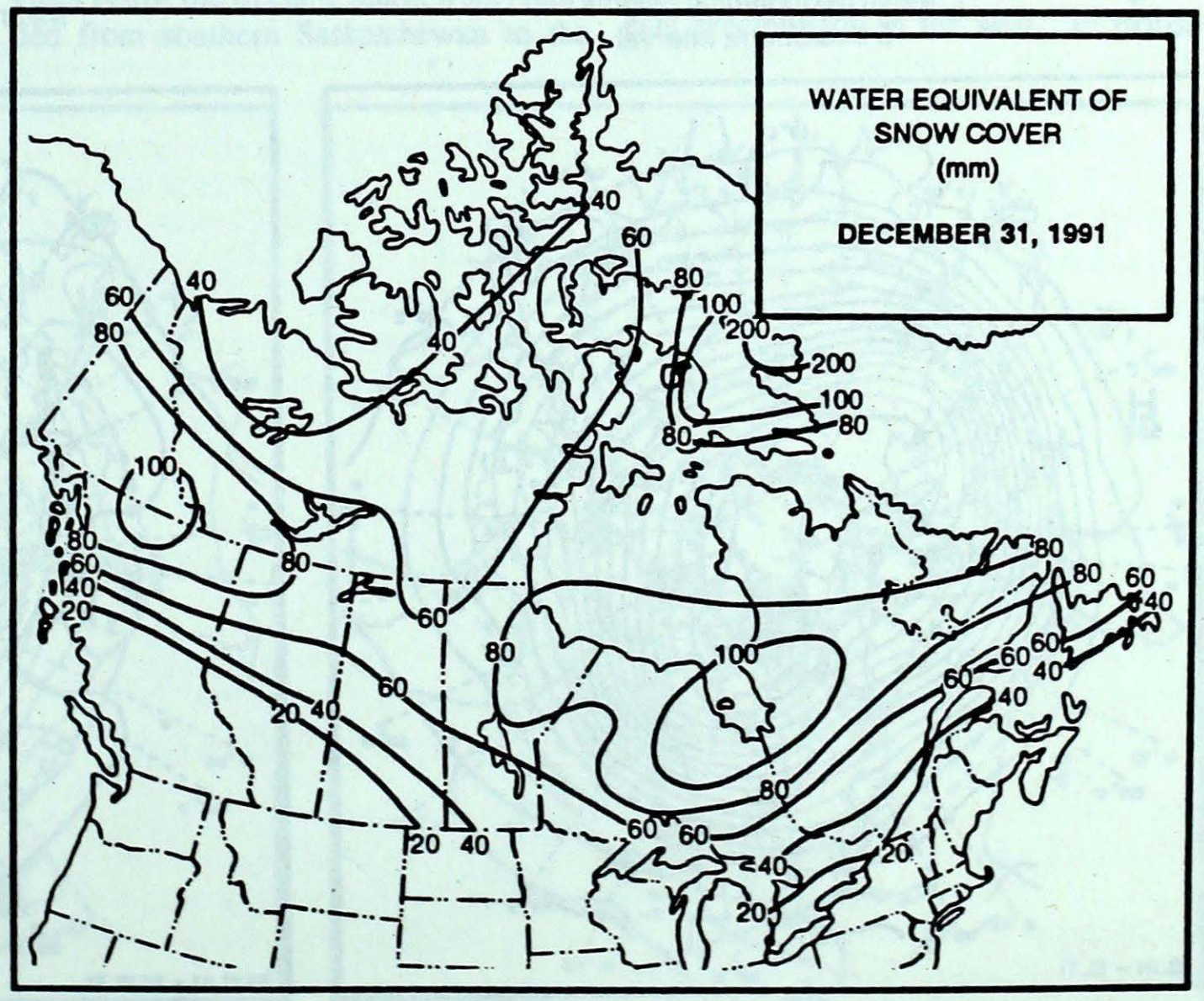

**SEASONAL TOTAL OF HEATING DEGREE-DAYS TO END OF DECEMBER**

| | 1991 | 1990 | NORMAL |
|---|---|---|---|
| **BRITISH COLUMBIA** | | | |
| Kamloops | 1438 | 1607 | 1533 |
| Penticton | 1328 | 1507 | 1414 |
| Prince George | 2037 | 2383 | 2303 |
| Vancouver | 1139 | 1206 | 1218 |
| Victoria | 1219 | 1313 | 1280 |
| **YUKON TERRITORY** | | | |
| Whitehorse | 2978 | 3322 | 3025 |
| **NORTHWEST TERRITORIES** | | | |
| Iqaluit | 3847 | 4190 | 4010 |
| Inuvik | 4384 | 4391 | 4188 |
| Yellowknife | 3638 | 3835 | 3382 |
| **ALBERTA** | | | |
| Calgary | 2027 | 2218 | 2168 |
| Edmonton Mun. | 2212 | 2363 | 2197 |
| Grande Prairie | 2529 | 2791 | 2536 |
| **SASKATCHEWAN** | | | |
| Estevan | 2247 | 2328 | 2085 |
| Regina | 2351 | 2411 | 2257 |
| Saskatoon | 2489 | 2611 | 2352 |
| **MANITOBA** | | | |
| Brandon | 2633 | 2553 | 2337 |
| Churchill | 3736 | 3753 | 3534 |
| The Pas | 2850 | 2850 | 2637 |
| Winnipeg | 2407 | 2299 | 2214 |
| **ONTARIO** | | | |
| Kapuskasing | 2536 | 2535 | 2468 |
| London | 1489 | 1407 | 1461 |
| Ottawa | 1732 | 1682 | 1721 |
| Sudbury | 2066 | 2004 | 2015 |
| Thunder Bay | 2391 | 2250 | 2176 |
| Toronto | 1466 | 1389 | 1459 |
| Windsor | 1281 | 1191 | 1274 |
| **QUÉBEC** | | | |
| Baie Comeau | 2370 | 2315 | 2318 |
| Montréal | 1676 | 1591 | 1642 |
| Québec | 1993 | 1884 | 1942 |
| Sept-Îles | 2498 | 2425 | 2429 |
| Sherbrooke | 1965 | 1815 | 1981 |
| Val d'Or | 2434 | 2414 | 2361 |
| **NEW BRUNSWICK** | | | |
| Chatham | 1849 | * | 1794 |
| Fredericton | 1800 | 1609 | 1739 |
| Moncton | 1770 | 1651 | 1708 |
| **NOVA SCOTIA** | | | |
| Sydney | 1553 | 1432 | 1510 |
| Yarmouth | 1423 | 1279 | 1454 |
| **PRINCE EDWARD ISLAND** | | | |
| Charlottetown | 1610 | 1529 | 1603 |
| **NEWFOUNDLAND** | | | |
| Gander | 2053 | 1825 | 1854 |
| St. John's | 2728 | 1679 | 1746 |

**SEASONAL SNOWFALL TOTALS (cm)**
**TO END OF DECEMBER**

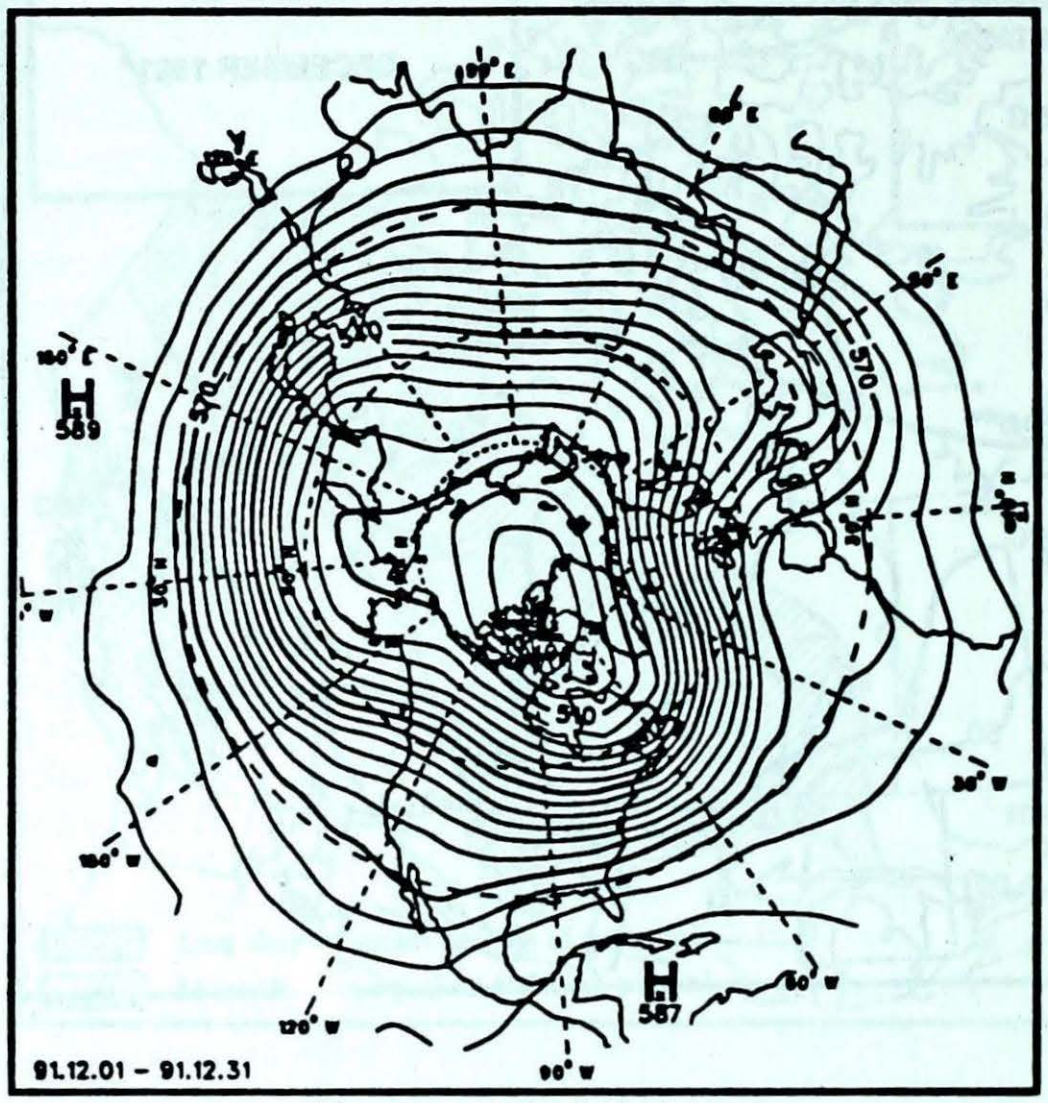
| | 1991 | 1990 | NORMAL |
|---|---|---|---|
| **BRITISH COLUMBIA** | | | |
| Kamloops | 21 | 58 | 42 |
| Port Hardy | 1 | 49 | 20 |
| Prince George | 128 | 247 | 103 |
| Vancouver | 2 | 53 | 20 |
| Victoria | 5 | 23 | 15 |
| **YUKON TERRITORY** | | | |
| Whitehorse | 143 | 113 | 69 |
| **NORTHWEST TERRITORIES** | | | |
| Clyde | 104 | 69 | 106 |
| Inuvik | 76 | 54 | 96 |
| Yellowknife | 88 | 94 | 79 |
| **ALBERTA** | | | |
| Calgary | 40 | 59 | 57 |
| Edmonton Namao | 65 | 65 | 54 |
| Grande Prairie | 98 | 174 | 77 |
| **SASKATCHEWAN** | | | |
| Estevan | 47 | 37 | 43 |
| Regina | 47 | 23 | 45 |
| Saskatoon | 66 | 42 | 45 |
| **MANITOBA** | | | |
| Brandon | 99 | 52 | 49 |
| Churchill | 139 | 178 | 100 |
| The Pas | 119 | 55 | 72 |
| Winnipeg | 48 | 36 | 48 |
| **ONTARIO** | | | |
| Kapuskasing | 143 | 114 | 139 |
| London | 85 | 59 | 78 |
| Ottawa | 68 | 56 | 82 |
| Sudbury | 81 | 105 | 96 |
| Thunder Bay | 130 | 98 | 80 |
| Toronto | 52 | 23 | 47 |
| Windsor | 31 | 36 | 40 |
| **QUÉBEC** | | | |
| Baie Comeau | 131 | 209 | 134 |
| Montréal | 55 | 57 | 82 |
| Québec | 71 | 121 | 124 |
| Sept-Îles | 146 | 223 | 151 |
| Sherbrooke | 94 | 77 | 112 |
| Val d'Or | 99 | 125 | 129 |
| **NEW BRUNSWICK** | | | |
| Charlo | 125 | 161 | 147 |
| Fredericton | 61 | 52 | 92 |
| Moncton | 107 | 56 | 97 |
| **NOVA SCOTIA** | | | |
| Sydney | 85 | 33 | 80 |
| Yarmouth | 56 | 6 | 52 |
| **PRINCE EDWARD ISLAND** | | | |
| Charlottetown | 124 | 46 | 97 |
| **NEWFOUNDLAND** | | | |
| Gander | 98 | 101 | 115 |
| St. John's | 120 | 41 | 91 |



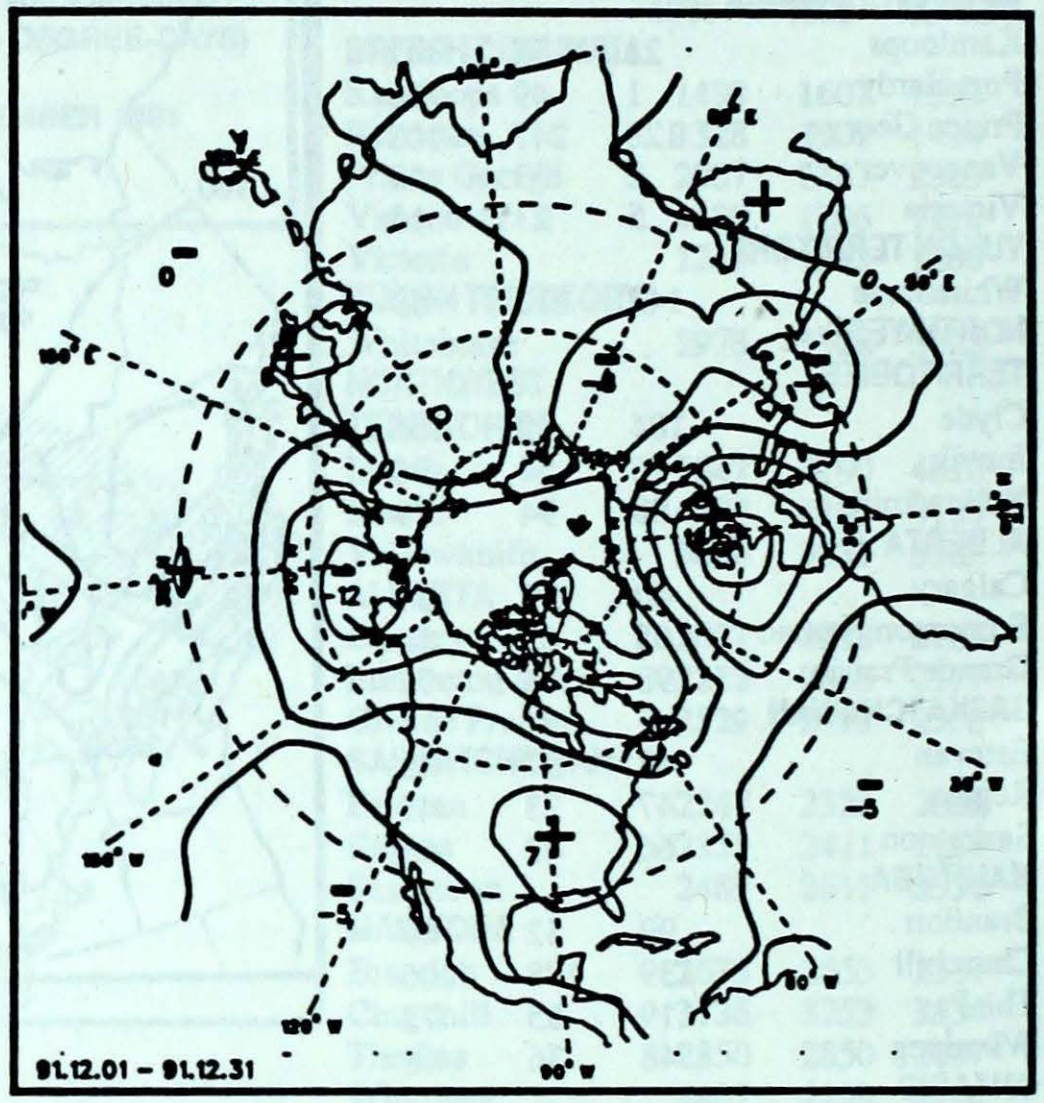



# 50-kPa ATMOSPHERIC CIRCULATION

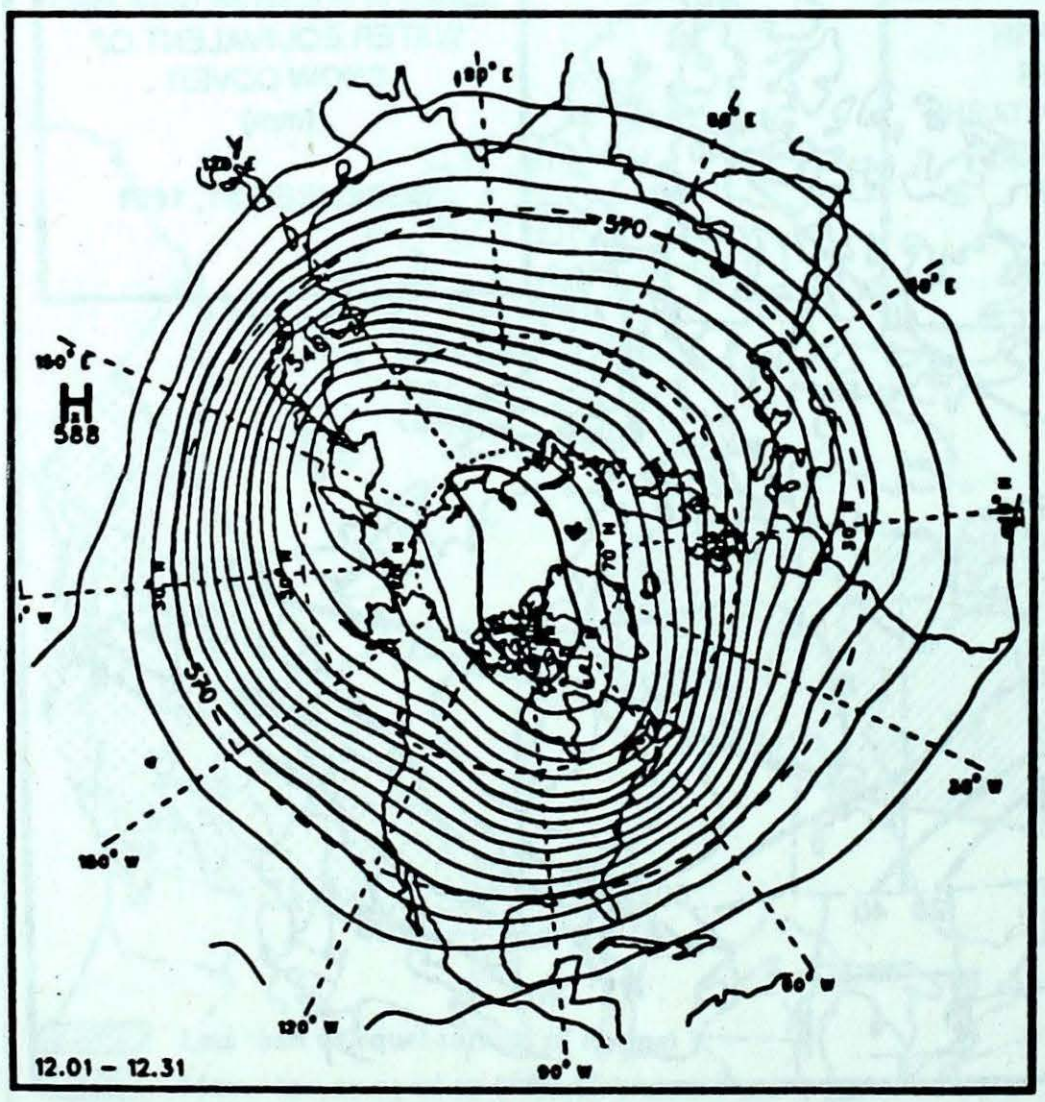
**December 1991**



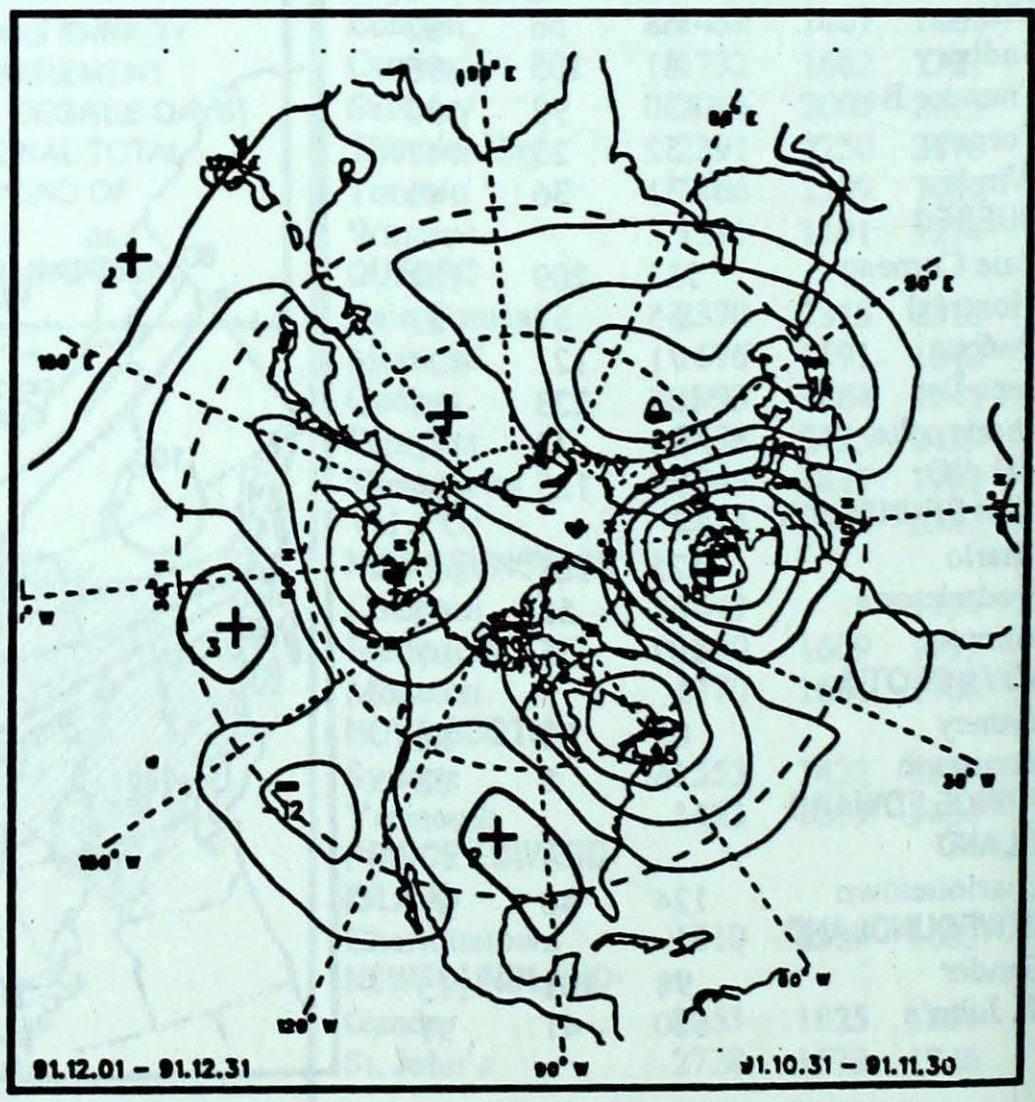

Mean geopotential heights
- 5 decametre interval -




Mean geopotential height anomaly
- 5 decametre interval-




Normal geopotential heights for the month
- 5 decametre interval -




Mean heights difference w/r to previous month
- 5 decametre interval -

# Fall 1991 in Review

During the fall of 1991 (September, October, November), the Northern Hemisphere average 50 kPa flow and the associated anomaly pattern (Fig.1, Fig.2) were essentially a reversal of the summer scenario.

The stronger than normal west coast ridge, characterized by a positive height anomaly of 5 dam over Vancouver Island, together with a pronounced mid-continental trough through Manitoba, produced a pattern associated with a flow of frigid air masses from the Arctic southward. Almost the entire country was enveloped by temperatures well below (as much as three celsius degrees) or close to normal. (Fig 3).

Pacific disturbances over northern British Columbia and Alberta, as well as areas of storm genesis in the base of the broad mid-continental trough, explicitly denoted the region of abve normal precipitation as shown on Fig.4.

The fall months were rather dull and dreary almost everywhere, except in the high Arctic, where upper level ridging prevailed, resulting in slightly above normal hours of bright sunshine (Fig 5).

## September - Summer comes to an end

September began with temperatures near or slightly above normal through much of the southern third of the country. However, as the mid-point of the month passed, cold air spilled southeastward out of the western Arctic, and within a few days had spread across the Prairies, through Ontario and into the St. Lawrence Valley. As a result, record low temperatures, several degrees below the freezing mark, were recorded from southern Saskatchewan to the Quebec border. This was a particular shock to the residents of southern Ontario, who only a couple of days beforehand, had experienced a brief resurgence of summer, with temperatures reaching into the low thirties. The first significant Prairie snowfalls of the season were recorded as this cold spell began, depositing several centimetres in southern Saskatchewan and Manitoba. The frigid conditions were unable to make their presence felt on the east coast, and consequently temperatures over Atlantic Canada were two to four degrees above normal during the final two weeks of the month.

September was notable for its variability of precipitation. While much of the eastern half of the country received rainfall amounts ranging from 50 mm to 150 mm, there were only isolated pockets of significant precipitation in the west. In British

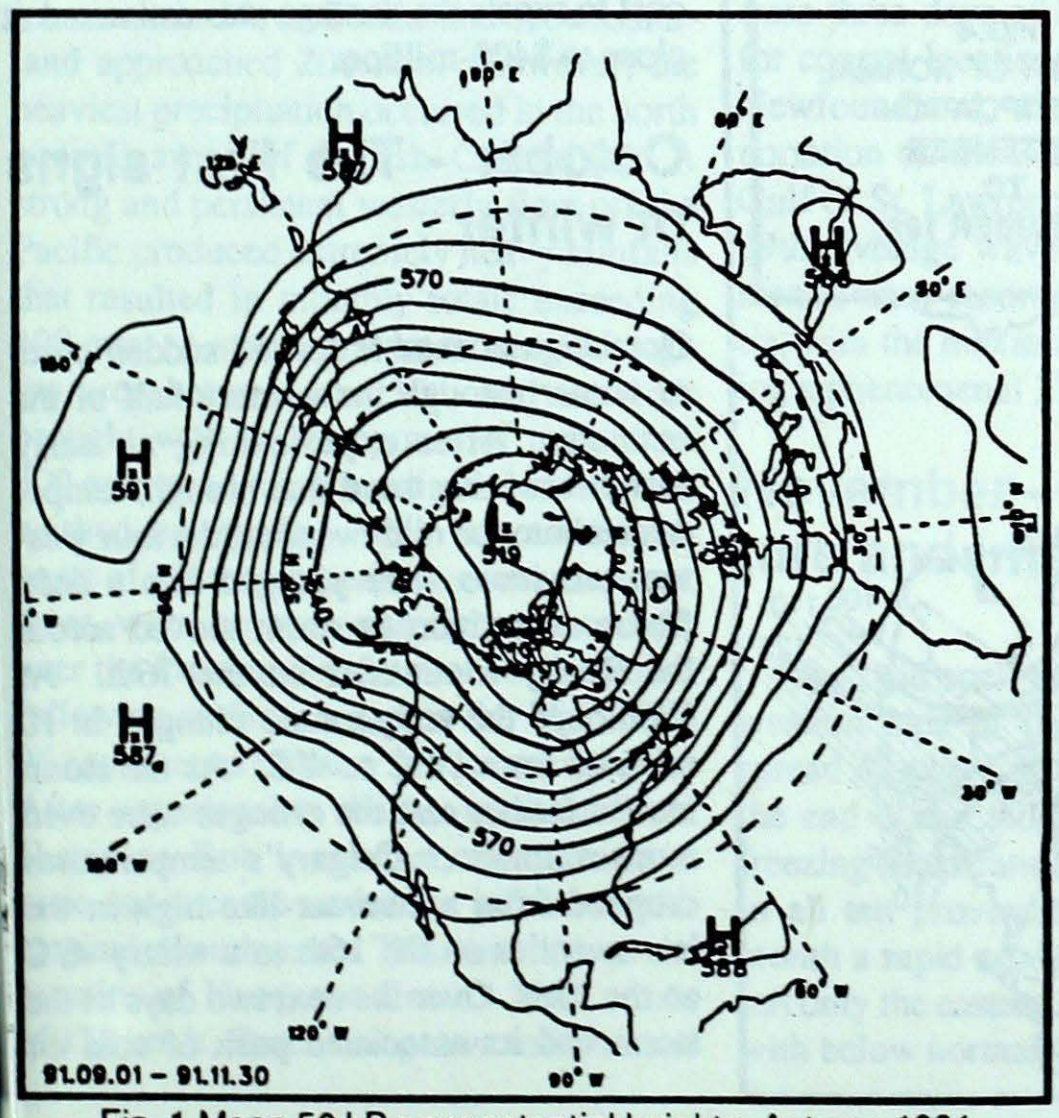



Fig. 1 Mean 50 kPa geopotential heights. Autumn 1991
- 5 decametre interval -

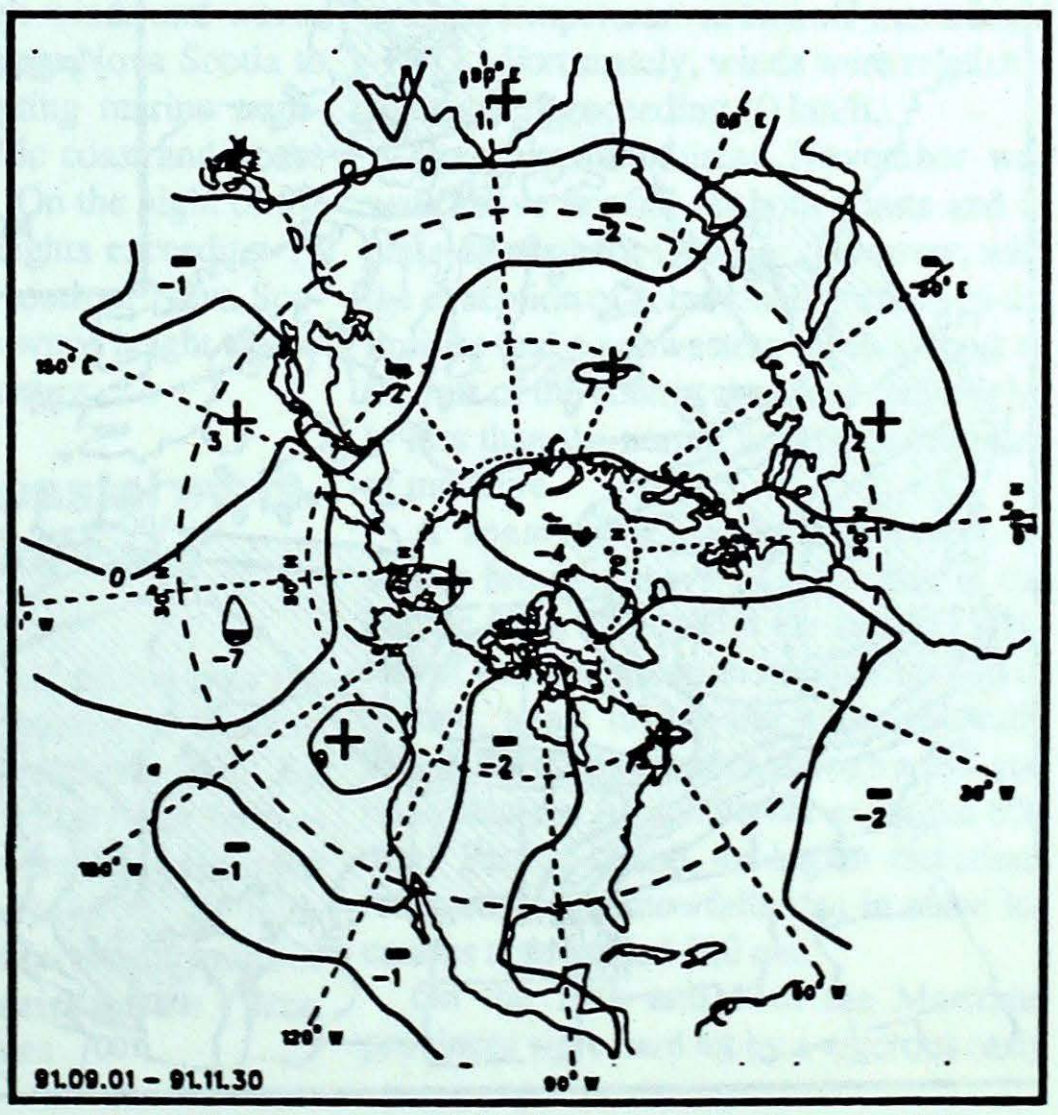
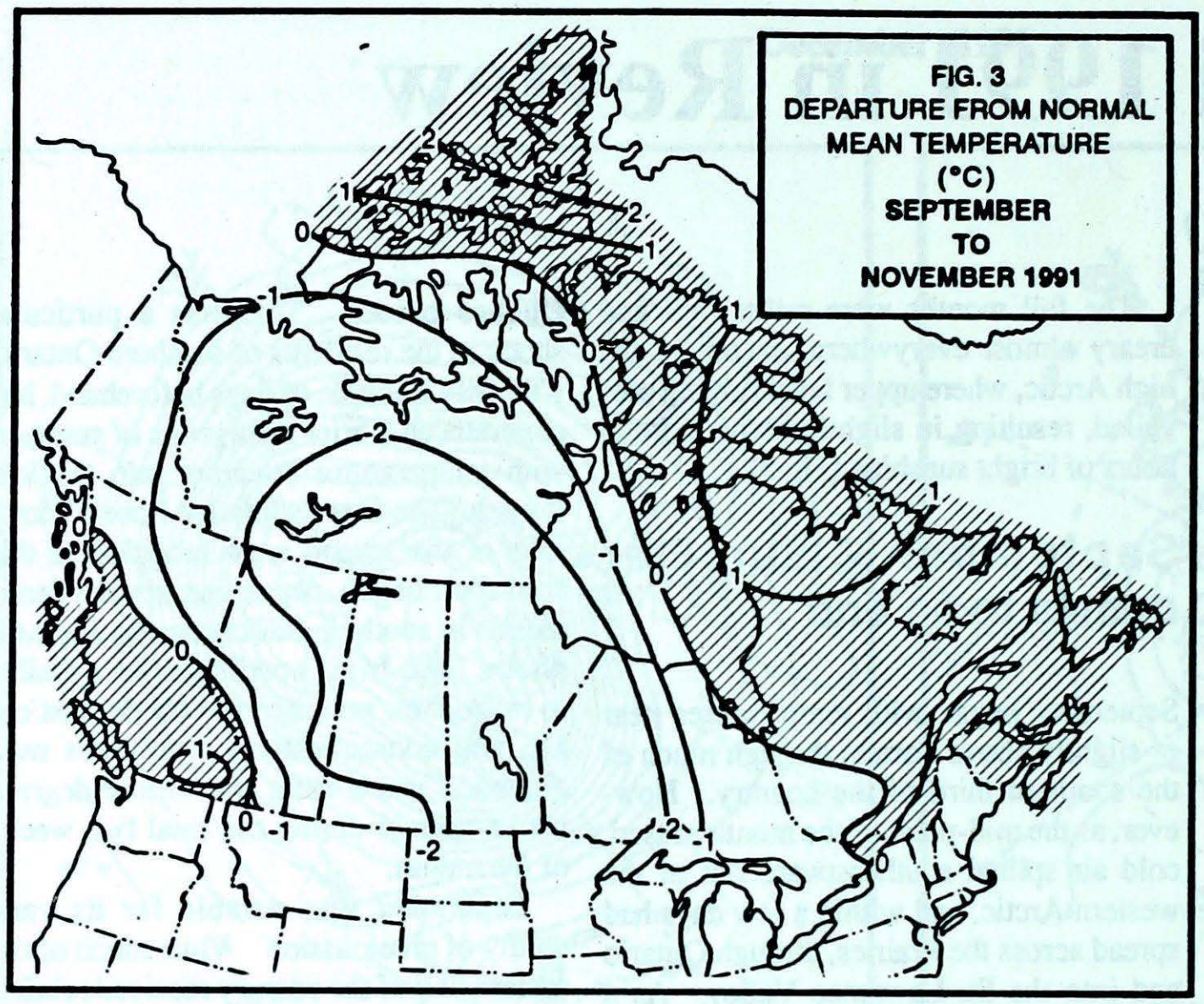
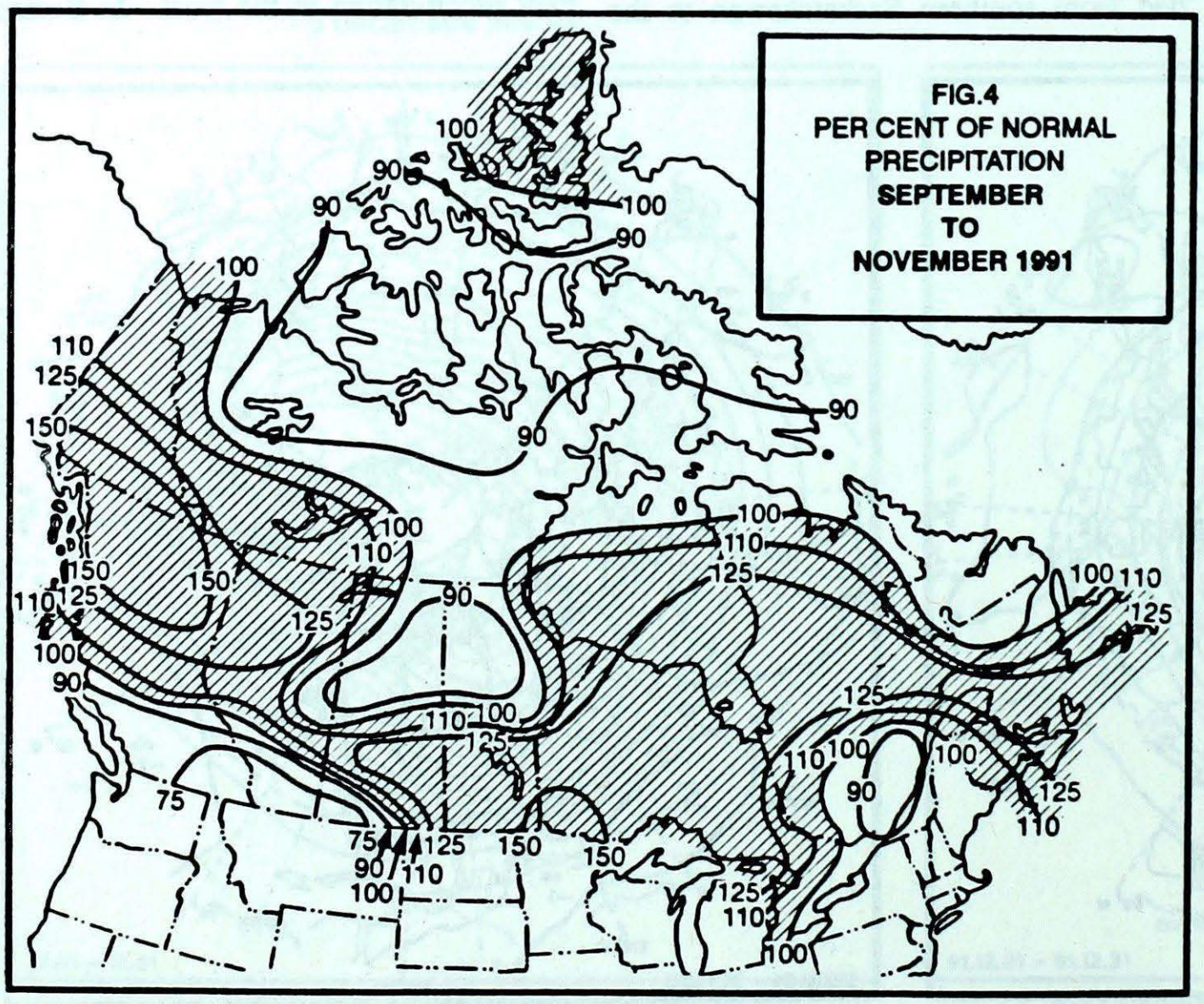



Fig. 2 Mean geopotential height anomaly. Autumn 1991
- 5 decametre interval-




Columbia, where rainfall was particularly low, several new records for dryness were set. Victoria was the most arid, with no measurable precipitation at all.

Across the Prairies, although there was more rainfall, values were still only about half the normal. Although this lack of precipitation was welcomed for the completion of the grain harvest, it has produced some concern that soil moisture levels will be inadequate for next year's crop. With the exception of a corridor stretching from Lake Erie, through southern Quebec and central Labrador, precipitation values were significantly above normal in the east.

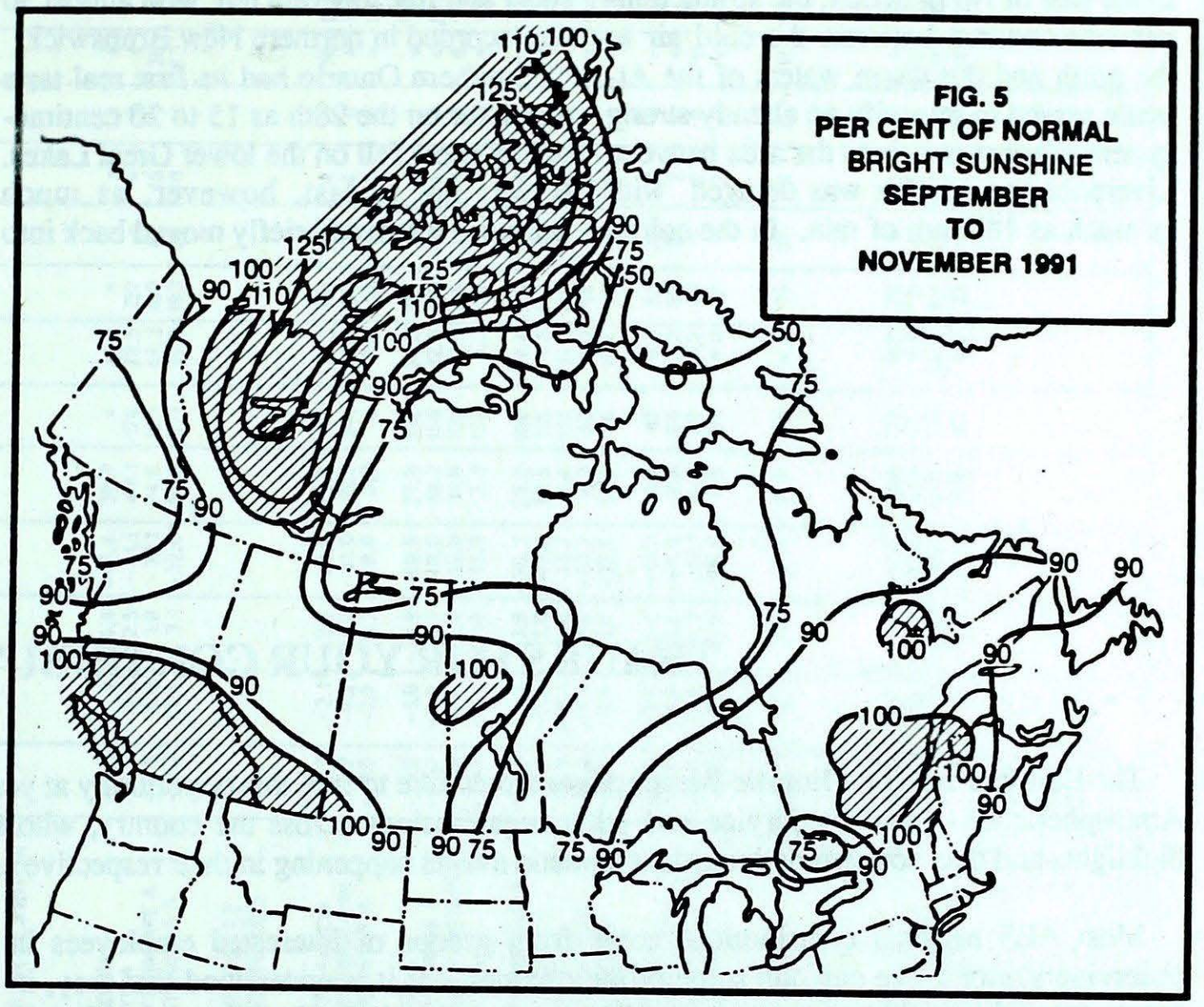
The year's most costly weather event took place on the 7th of the month, as a severe thunderstorm struck Calgary. Lasting only thirty minutes, the storm brought with it high winds, downpours of rain, and an unwanted abundance of golf-ball sized hail. When the storm was over, basements were flooded, roofs and siding damaged, and greenhouses and windows were smashed. In addition, motorists were stranded in flooded underpasses, and hundreds of cars were damaged. Even a flock of migrating birds was crushed by the hail. With over 80,000 insurance claims, the cost to repair the damage was estimated at close to $400-million.

## October - The first signs of winter

October was notable for the sudden onset of winter through the western half of the country. After experiencing an early month warming trend that brought temperatures into the mid twenties, the four western provinces were plunged into a deep freeze as a vigorous storm moved across the Rocky Mountains on the 16th. At Kamloops the temperature plunged in 10 minutes from 14°C to 4°C. As the storm moved farther east the changes were even more dramatic. Calgary's temperatures dropped from a summer-like high in the low twenties on the 16th to a wintry -6°C on the 17th. Over the next two days as the storm and its associated push of cold air

continued their rapid eastward advancement, temperatures in many parts of British Columbia and the Prairies were more than ten degrees below normal, with overnight minimums falling as low as -28°C in Alberta. As the month progressed, and a large area of high pressure became firmly entrenched over the Prairies, there was no sign of a quick end to this cold snap. Indeed, at month's end temperatures were still about five degrees below normal in British Columbia and fifteen to twenty degrees below normal from Alberta to Manitoba.

The eastern part of the country was spared from most of the cold. Temperatures from southern Ontario to the Atlantic remained one to four degrees above the seasonal average throughout the month. The only exception to this came with a brief mid-month cool spell over the southern portions of Ontario and Quebec that saw the season's first widespread occurrence of below-freezing temperatures at screen-level.




A series of strong autumn storms ensured that October would be a moist month across the country. Precipitation amounts exceeded 100 mm over much of the country east of Lake Superior, and in a few locations in Nova Scotia and Newfoundland approached 200 mm. However, the heaviest precipitation occurred in the north coastal areas of British Columbia. A strong and persistent westerly flow off the Pacific produced extremely heavy rainfalls that resulted in monthly totals exceeding 400 mm. A storm system moving through the area between the 10th and the 13th brought with it downpours of more than 300 mm, producing localised flooding and washed out roads. With the mid-month onset of winter temperatures over the west, there were several significant snowfalls over the Prairies. In the two weeks period following summer's end on the 16th, 50 to 95 centimetres of snow fell across the area. After experiencing the heavy rainfalls of Hurricane Bob in August, the Maritimes once again came under the influence of a tropical disturbance. This time it was the remains of Hurricane Grace. With winds of 130 km/h, Grace had grown to hurricane strength on October 27 and then moved somewhat erratically in the Atlantic for the next few days. After joining up with a cold front moving offshore, it managed to produce three days of high winds and waves for coastal locations from Nova Scotia to Newfoundland, disrupting marine transportation on the Atlantic coast and in the Gulf of St. Lawrence. On the night of the 29th, average wave heights exceeding 17 metres were recorded south of Nova Scotia, with the maximum wave height reaching a phenomenal 31 metres.

## November - Coastal moisture and interior cold

The cold spell that had settled over the western half of the country in October spread eastward as November began. By the end of the month's first week below-freezing temperatures were being recorded in all ten provinces. However, by mid-month a rapid moderation in temperatures left only the eastern Prairies and the Yukon with below normal values.

The cold conditions over the Prairies gave this year's Grey Cup game in Winnipeg a true Canadian feel. Ranking as one of the coldest championship games on record, the temperature at kickoff was a frigid -18°C. Fortunately, winds were relatively light, rarely exceeding 10 km/h.

Precipitation during November was well above normal on both coasts and in parts of northern Ontario. However, with the exception of some small portions of the Prairies and southwestern Quebec most of the rest of the country received only slightly less than the normally expected amount of moisture.

A seemingly continuous series of storms brought heavy rains to most of the Pacific coast throughout the month. With mst of this precipitation falling in the form of rain, totals in the area were generally 200 to 300 millimetres, although a few stations near the Alaska border exceeded 600 mm. Farther inland, the higher elevations reseived heavy snowfalls that in some locations approached 300 cm.

On the 10th and 11th the Maritime provinces were hard hit by a vigorous early

winter storm. As the storm moved by just to the east of Nova Scotia, the strong temperature contrast between the cold air to the north and the warm waters of the Atlantic served to intensify an already strong system. In just two days the area between Liverpool and Halifax was deluged with as much as 160 mm of rain. In the colder airmass to the northwest, a mixture of snow and freezing rain fell, with almost 30 cm recorded in northern New Brunswick.

Southern Ontario had its first real taste of winter on the 28th as 15 to 20 centimetres of snow fell on the lower Great Lakes. It was not to last, however, as much warmer air moved briefly moved back into the area. The last day of the month saw temperatures reaching the upper teens in the south, and approaching 10°C as far north as Lake Superior.

*Malcolm Geast*
*Anna Deptuch-Stapf*
*Canadian Climate Centre*

## THANKS FOR YOUR CONTRIBUTIONS!

The Editorial staff of **Climatic Perspectives** would like to take this opportunity at year-end to thank the many individuals with the Atmospheric Environment Service and other organizations across the country, who every week and month provide us with the highlights and data concerning important climatic events happening in their respective regions of Canada.

Most AES regional contributions come from groups of interested employees in headquarters climate centres and principal observing stations. We can cite some of their names, but it is understood that they, in turn, are supported by office colleagues and associates within their respective region. These persons include: Earl Coatta and Bob Tortorelli (Pacific), Jim Ross and Pete Kociuba (Western), Brian Fehr and Rick Raddatz (Central), Bryan Smith and Sandi Radecki (Ontario), Jacques Miron and Roger Gauthier (Quebec), Frank Amirault, Charles MacLeod and George MacMillan (Atlantic). Our friends north of the 60th parallel include: Gilles Brien and Yves Landry at Iqaluit; Don Watt at Whitehorse; and Gary Bourke and Denis Mulchuk at Yellowknife.

We collaborate with the Conservation and Protection Service, Inland Waters Directorate, the Department of Indian and Northern Affairs, and provincial water resource agencies to feature information on droughts, floods and other hydrological issues. We get valuable help on transportation issues from the AES Ice Branch, the Canadian Coast Guard, the Ministry of Transport, Marine Service, and provincial (or territorial) highways departments. For situations affecting agriculture, Agriculture Canada staff (including those with the Prairie Farm Rehabilitation Administration (PRFA)), and those working with provincial departments have obliged us on a number of occasions. Similarly, we have come to rely on information from the forestry services, and tourism services across the country.

Finally, for matters that occur close to the border, we count on United States Weather Bureau contacts in Washington and other centres who always graciously try to assist us.

Thanks, we couldn't do it without you!

## DECEMBER 1991

| STATION | Temperature C | | | | Snowfall (cm) | % of Normal Snowfall | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | % of Normal Bright Sunshine | Degree Days below 18 C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | | | |
| **BRITISH COLUMBIA** | | | | | | | | | | | | | |
| ABBOTSFORD A | 5.1 | 1.9 | 12.5 | -3.9 | 0.0 | 0 | 144.8 | 64 | 0 | 20 | 49 | 92 | 399.4 |
| ALERT BAY | 5.5 | 1.6 | 10.2 | -0.1 | 0.5 | 3 | 346.7 | 148 | 0 | 23 | * | * | 386.2 |
| AMPHITRITE POINT | 7.1 | 1.6 | 12.2 | 0.2 | 0.0 | 0 | 474.7 | 105 | 0 | 25 | * | * | 338.9 |
| BLUE RIVER A | -3.5 | 4.3 | 4.6 | -13.7 | 77.3 | 71 | 65.5 | 54 | 55 | 12 | 12 | 40 | * |
| CAPE ST JAMES | 6.9 | 1.9 | 9.7 | 2.4 | 0.2 | 2 | 387.7 | 203 | 0 | 29 | 23 | * | 344.1 |
| CAPE SCOTT | 7.2 | 2.4 | 11.2 | 3.2 | 0.6 | 5 | 509.5 | 138 | 0 | 24 | * | * | 336.0 |
| CASTLEGAR A | -0.2 | 1.8 | 8.4 | -10.5 | 16.8 | 22 | 50.3 | 47 | 8 | 10 | 26 | 84 | 562.7 |
| COMOX A | 5.1 | 1.4 | 10.8 | -2.7 | 0.0 | 0 | 154.2 | 72 | 0 | 18 | 27 | * | 389.0 |
| CRANBROOK A | -4.6 | 2.0 | 6.8 | -17.0 | 8.0 | 19 | 11.3 | 24 | 3 | 4 | 40 | 63 | 699.3 |
| DEASE LAKE | -11.0 | 5.0 | 4.1 | -24.5 | 89.7 | 216 | 68.5 | 204 | 86 | 13 | 18 | 43 | 898.5 |
| FORT NELSON A | -17.5 | 3.5 | 1.2 | -32.7 | 37.8 | 140 | 33.6 | 157 | 59 | 9 | 21 | * | 1099.6 |
| FORT ST JOHN A | -7.8 | 5.4 | 5.7 | -24.8 | 50.0 | 124 | 40.2 | 111 | 29 | 6 | 26 | * | 799.9 |
| HOPE A | 4.5 | 2.9 | 11.0 | -1.2 | 4.8 | 10 | 285.0 | 98 | 0 | 15 | 2 | 53 | 417.6 |
| KAMLOOPS A | 0.4 | 3.2 | 9.7 | -8.2 | 3.2 | 11 | 5.8 | 18 | 0 | 3 | 31 | 65 | 546.9 |
| KELOWNA A | 0.5 | 3.6 | 9.3 | -8.7 | 1.0 | 3 | 4.8 | 11 | 0 | 2 | 35 | 86 | 542.0 |
| MACKENZIE A | -3.6 | 7.1 | 5.5 | -25.6 | 132.3 | 166 | 132.4 | 155 | 72 | 19 | 13 | 36 | 665.9 |
| PENTICTON A | 1.6 | 2.0 | 10.4 | -9.0 | 7.1 | 31 | 11.4 | 37 | 0 | 4 | 28 | 72 | 510.1 |
| PORT ALBERNI A | 4.3 | 1.7 | 11.4 | -2.6 | 0.0 | 0 | 380.7 | 112 | 0 | 21 | 15 | * | 425.3 |
| PORT HARDY A | 5.5 | 2.0 | 10.7 | -1.4 | 0.0 | 0 | 394.2 | 142 | 0 | 22 | 28 | 63 | 388.7 |
| PRINCE GEORGE A | -1.1 | 6.8 | 8.0 | -13.6 | 53.8 | 102 | 56.4 | 99 | 0 | 9 | 36 | 76 | 589.9 |
| PRINCE RUPERT A | 5.3 | 3.9 | 11.2 | -2.1 | 14.4 | 40 | 550.6 | 194 | 0 | 29 | 15 | 48 | 390.7 |
| PRINCETON A | -2.9 | 2.8 | 6.8 | -13.5 | 32.4 | 72 | 30.4 | 58 | 10 | 8 | 26 | * | * |
| REVELSTOKE A | -0.5 | 3.7 | 4.4 | -9.7 | 39.4 | 28 | 61.9 | 43 | 10 | 15 | 10 | 35 | 573.1 |
| SANDSPIT A | 5.6 | 2.2 | 12.0 | -2.1 | 1.0 | 6 | 349.5 | 196 | 0 | 28 | 27 | 67 | 383.0 |
| SMITHERS A | -0.6 | 7.0 | 8.8 | -12.3 | 103.1 | 183 | 93.4 | 156 | 18 | 19 | 8 | 19 | 574.8 |
| TERRACE A | 1.6 | 5.0 | 9.2 | -5.3 | 141.6 | 134 | 441.1 | 229 | 0 | 29 | 9 | 30 | 509.0 |
| VANCOUVER INT'L A | 5.6 | 1.7 | 11.6 | -4.5 | 0.0 | 0 | 95.8 | 53 | 0 | 17 | 46 | 96 | 386.5 |
| VICTORIA INT'L A | 5.7 | 1.5 | 13.2 | -2.7 | 0.0 | 0 | 106.6 | 68 | 0 | 15 | 52 | 100 | 381.6 |
| VICTORIA MARINE | 6.4 | 1.7 | 13.6 | -1.0 | 0.8 | 10 | 151.7 | 68 | 0 | 20 | * | * | 358.3 |
| WILLIAMS LAKE A | -3.0 | 4.7 | 6.3 | -18.4 | 24.0 | 48 | 21.3 | 52 | 12 | 6 | 31 | 63 | 651.5 |

| STATION | Temperature C | | | | Snowfall (cm) | % of Normal Snowfall | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | % of Normal Bright Sunshine | Degree Days below 18 C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | | | |
| **YUKON TERRITORY** | | | | | | | | | | | | | |
| DAWSON A | -26.1 | * | -6.4 | -42.4 | 28.7 | * | 19.0 | * | * | * | * | * | * |
| MAYO A | -20.6 | 3.6 | 2.5 | -41.1 | 43.1 | 176 | 28.5 | 127 | * | * | * | * | * |
| WATSON LAKE A | -17.9 | 5.6 | 1.8 | -37.1 | 74.6 | 160 | 66.2 | 180 | 69 | 15 | 9 | 28 | 1111.0 |
| WHITEHORSE A | -11.2 | 5.4 | 3.1 | -32.8 | 65.5 | 271 | 39.0 | 193 | 24 | 10 | 12 | 53 | 903.7 |
| **NORTHWEST TERRITORIES** | | | | | | | | | | | | | |
| BAKER LAKE A | -30.3 | -2.1 | -3.5 | -43.6 | 13.6 | 156 | 13.2 | 161 | 23 | 4 | 5 | 76 | 1498.8 |
| CAMBRIDGE BAY A | -30.2 | -0.2 | -13.0 | -41.0 | 15.2 | 241 | 14.2 | 263 | 31 | 4 | 0 | * | 1493.3 |
| CAPE PARRY A | -27.5 | -2.5 | -11.2 | -38.0 | 0.8 | 8 | 0.8 | 12 | 13 | 0 | * | * | 1408.3 |
| CLYDE A | -26.2 | -1.8 | -13.9 | -40.5 | 27.8 | 352 | 24.6 | 315 | 38 | 9 | 0 | * | 1371.1 |
| COPPERMINE A | -26.7 | -0.8 | -4.2 | -40.0 | 18.2 | 158 | 12.8 | 115 | 36 | 4 | * | * | 1385.5 |
| CORAL HARBOUR A | -27.9 | -2.4 | -23.6 | -32.0 | 11.8 | 109 | 11.8 | 116 | 28 | 3 | 2 | 8 | 1421.5 |
| EUREKA | -35.5 | -0.7 | -22.4 | -42.8 | 3.3 | 132 | 3.3 | 138 | 17 | 1 | 0 | * | 1660.2 |
| FORT SIMPSON A | -23.5 | 1.3 | -1.8 | -38.3 | 23.8 | 100 | 19.4 | 105 | 45 | 8 | 4 | 12 | 1287.3 |
| FORT SMITH A | -22.2 | -0.6 | -1.8 | -40.2 | 38.5 | 155 | 23.8 | 107 | 48 | 7 | 35 | 126 | 1184.0 |
| IQALUIT | -21.9 | -0.1 | -5.6 | -33.7 | 31.4 | 127 | 31.6 | 143 | 15 | 11 | 17 | 84 | 1237.3 |
| HALL BEACH A | -29.0 | -1.6 | -12.4 | -40.7 | 8.2 | 89 | 8.2 | 94 | 21 | 4 | 0 | * | 1458.6 |
| HAY RIVER A | -19.5 | 1.4 | 1.6 | -37.6 | 14.4 | 56 | 14.4 | 59 | 48 | 6 | * | * | 1162.3 |
| INUVIK A | -29.2 | -2.0 | -11.4 | -41.2 | 9.8 | 47 | 9.3 | 53 | 26 | 2 | 0 | * | 1462.5 |
| MOULD BAY A | -31.6 | -0.4 | -16.0 | -44.8 | 3.6 | 90 | 3.2 | 89 | 15 | 2 | 0 | * | 1537.2 |
| NORMAN WELLS A | -27.9 | -1.4 | -15.3 | -42.1 | 16.0 | 83 | 11.7 | 62 | 7 | 3 | 0 | 0 | 1422.2 |
| RESOLUTE A | -30.3 | -1.0 | -19.0 | -39.4 | 5.8 | 109 | 4.8 | 98 | 8 | 2 | 0 | * | 1496.6 |
| YELLOWKNIFE A | -24.1 | -0.1 | -3.2 | -40.5 | 17.6 | 80 | 14.4 | 79 | 34 | 8 | 25 | 117 | 1305.6 |
| **ALBERTA** | | | | | | | | | | | | | |
| BANFF | -4.3 | 4.6 | 4.0 | -16.2 | 14.8 | 33 | 8.6 | 23 | 5 | 3 | * | * | 690.6 |
| CALGARY INT'L A | -2.1 | 5.7 | 13.1 | -15.6 | 2.6 | 13 | 1.8 | 11 | 0 | 0 | 127 | 130 | 620.5 |
| COLD LAKE A | -12.5 | 1.7 | 5.4 | -31.1 | 31.5 | 119 | 20.5 | 83 | 10 | 9 | 82 | 108 | 944.7 |
| CORONATION A | -9.0 | 2.8 | 3.3 | -25.4 | 6.8 | 30 | 4.2 | 21 | 9 | 2 | 99 | 118 | 837.4 |

## DECEMBER 1991

| STATION | Temperature C | | | | Snowfall (cm) | % of Normal Snowfall | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | % of Normal Bright Sunshine | Degree Days below 18 C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | | | |
| EDMONTON INT'L A | -8.3 | 4.8 | 7.2 | -24.1 | 13.8 | 53 | 12.2 | 56 | 10 | 3 | 91 | 117 | 814.4 |
| EDMONTON MUNICIPAL | -7.0 | 3.4 | 7.9 | -21.0 | 20.4 | * | 17.8 | 72 | 7 | 4 | 93 | 119 | 775.5 |
| EDMONTON NAMAO A | -8.1 | 3.7 | 6.2 | -23.5 | 17.1 | 63 | 16.4 | 63 | 10 | 3 | * | * | 805.7 |
| EDSON A | -7.9 | 5.0 | 8.0 | -21.5 | 30.5 | 137 | 21.8 | 90 | 26 | 3 | 66 | 100 | 803.4 |
| FORT CHIPEWYAN A | -19.1 | 1.4 | -1.5 | -40.0 | 31.0 | 113 | 31.0 | 148 | * | * | * | * | * |
| FORT MCMURRAY A | -14.2 | 2.8 | 6.6 | -36.5 | 25.4 | 87 | 17.2 | 69 | 22 | 7 | 58 | 94 | 997.4 |
| GRANDE PRAIRIE A | -8.8 | 4.6 | 6.6 | -22.1 | 50.6 | 148 | 40.6 | 127 | 32 | 9 | 44 | * | 830.2 |
| HIGH LEVEL A | -17.7 | 3.6 | 4.4 | -36.6 | 48.5 | 157 | 47.7 | 197 | 44 | 7 | * | * | 1106.0 |
| JASPER | -2.8 | 6.4 | 7.2 | -15.2 | 24.8 | 76 | 17.2 | 52 | 12 | 5 | 44 | * | 644.9 |
| LETHBRIDGE A | -0.4 | 5.4 | 12.4 | -15.9 | 2.2 | 9 | 1.4 | 6 | 0 | 1 | 139 | 154 | 570.3 |
| MEDICINE HAT A | -3.8 | 3.8 | 11.5 | -20.4 | 3.2 | 17 | 3.3 | 20 | 0 | 1 | 135 | 155 | 636.5 |
| PEACE RIVER A | -11.2 | 4.1 | 4.8 | -26.4 | 51.5 | 198 | 49.2 | 228 | 39 | 10 | * | * | 906.2 |
| RED DEER A | -8.6 | 2.8 | 6.5 | -19.5 | 8.6 | 40 | 6.9 | 34 | 7 | 2 | * | * | 825.3 |
| ROCKY MTN HOUSE A | -8.3 | 0.8 | 9.8 | -21.2 | 18.8 | 75 | 13.6 | 61 | 23 | 5 | * | * | 808.9 |
| SLAVE LAKE A | -9.8 | 5.0 | 8.8 | -24.4 | 51.0 | 162 | 42.2 | 129 | 7 | 9 | 67 | 116 | 863.5 |
| SUFFIELD A | -3.3 | * | 12.6 | -21.2 | 3.8 | * | 4.0 | * | 0 | 2 | 120 | * | 659.2 |
| WHITECOURT A | -7.8 | 5.3 | 9.8 | -20.7 | 48.4 | 175 | 35.9 | 134 | 23 | 7 | * | * | 800.7 |
| **SASKATCHEWAN** | | | | | | | | | | | | | |
| BROADVIEW | -10.6 | 3.4 | 4.1 | -34.1 | 38.8 | 184 | 31.6 | 159 | 13 | 16 | 105 | 110 | 893.3 |
| COLLINS BAY | * | * | * | * | * | * | * | * | * | * | * | * | * |
| ESTEVAN A | -8.9 | 2.2 | 5.4 | -31.8 | 21.4 | 109 | 18.7 | 96 | 4 | 7 | 112 | 108 | 834.6 |
| HUDSON BAY A | -13.4 | * | 5.6 | -36.2 | 18.4 | * | 9.6 | * | 20 | 3 | 101 | * | 971.6 |
| KINDERSLEY | -9.5 | 3.3 | 4.8 | -26.1 | 7.0 | 34 | 5.8 | 30 | 8 | 3 | 112 | * | 851.1 |
| LA RONGE A | -15.3 | 2.3 | 6.1 | -37.7 | 13.4 | 49 | 13.2 | 59 | 34 | 5 | * | * | 1031.6 |
| MEADOW LAKE A | -14.6 | * | 6.2 | -37.3 | 24.4 | * | 21.8 | * | 16 | 7 | 80 | * | 1011.8 |
| MOOSE JAW A | -7.6 | 3.1 | 5.7 | -28.7 | 31.3 | 124 | 26.1 | 123 | 4 | 7 | 106 | 123 | 794.5 |
| NIPAWIN A | -14.4 | * | 7.4 | -34.9 | 14.2 | * | 10.2 | * | 34 | 3 | 93 | * | 1005.0 |
| NORTH BATTLEFORD A | -12.0 | 2.1 | 5.1 | -33.8 | 14.2 | 62 | 12.8 | 61 | 16 | 5 | * | * | 933.7 |
| PRINCE ALBERT A | -14.2 | 2.3 | 6.5 | -37.2 | 19.0 | 79 | 17.5 | 80 | 25 | 4 | 80 | 113 | 1000.1 |
| REGINA A | -10.7 | 2.1 | 3.3 | -31.1 | 30.0 | 144 | 26.8 | 160 | 8 | 8 | 90 | 108 | 889.1 |
| SASKATOON A | -11.4 | 2.7 | 3.2 | -31.7 | 16.0 | 75 | 13.4 | 67 | 14 | 3 | * | * | 911.5 |
| SWIFT CURRENT A | -5.8 | 4.1 | 5.7 | -27.3 | 16.4 | 79 | 14.8 | 74 | 1 | 4 | 122 | 143 | 739.6 |
| YORKTON A | -12.5 | 2.1 | 5.2 | -33.7 | 37.0 | 155 | 35.0 | 155 | 36 | 6 | 92 | 106 | 946.9 |
| **MANITOBA** | | | | | | | | | | | | | |
| BRANDON A | -13.3 | 1.1 | 1.4 | -33.8 | 40.0 | 204 | 31.6 | 165 | 18 | 6 | 95 | * | 968.7 |
| CHURCHILL A | -25.1 | -2.9 | -5.7 | -41.5 | 26.2 | 115 | 15.0 | 72 | 64 | 4 | 41 | 75 | 1334.6 |
| DAUPHIN A | -11.6 | 2.7 | 0.0 | -33.9 | 34.7 | 133 | 27.2 | 112 | 16 | 5 | 106 | 114 | 917.1 |
| GILLAM A | -22.9 | 0.6 | -3.4 | -43.9 | 47.2 | 148 | 25.6 | 82 | 38 | 6 | * | * | 1275.2 |

| STATION | Temperature C | | | | Snowfall (cm) | % of Normal Snowfall | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | % of Normal Bright Sunshine | Degree Days below 18 C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | | | |
| ISLAND LAKE | -15.7 | 1.6 | 0.2 | -36.9 | 20.6 | 35 | 17.0 | 51 | 32 | 7 | * | * | 1039.0 |
| LYNN LAKE A | -21.1 | 0.7 | 0.9 | -43.3 | 43.2 | 130 | 24.2 | 95 | 35 | 8 | 35 | 57 | 1237.5 |
| NORWAY HOUSE A | -17.1 | * | 2.9 | -39.6 | 20.8 | * | 15.4 | * | 16 | 4 | * | * | 1106.0 |
| PORTAGE LA PRAIRIE | -10.3 | 2.8 | 5.4 | -31.4 | 46.2 | 196 | 34.1 | 156 | 16 | 6 | * | * | 876.1 |
| THE PAS A | -15.7 | 1.9 | 4.2 | -37.6 | 10.0 | 35 | 6.0 | 27 | 26 | 3 | 78 | 106 | 1043.4 |
| THOMPSON A | -21.2 | 0.8 | -0.1 | -41.2 | 39.8 | 90 | 36.9 | 115 | 38 | 10 | 48 | 70 | 1212.6 |
| WINNIPEG INT'L A | -10.9 | 3.1 | 3.0 | -30.8 | 31.2 | 151 | 32.0 | 167 | 11 | 6 | 85 | 91 | 896.2 |
| **ONTARIO** | | | | | | | | | | | | | |
| BIG TROUT LAKE | -18.3 | 1.6 | 0.5 | -37.3 | 10.4 | 33 | 10.2 | 35 | 19 | 3 | 78 | * | 1125.1 |
| EARLTON A | -12.1 | 0.5 | 4.1 | -29.6 | 41.1 | 77 | 42.2 | 75 | 10 | 10 | * | * | 933.2 |
| GERALDTON A | -14.5 | * | 2.6 | -36.7 | 38.2 | * | 28.2 | * | 31 | 9 | * | * | 1007.7 |
| GORE BAY A | -4.8 | 0.7 | 8.7 | -21.0 | 109.2 | 188 | 93.2 | 125 | 40 | 11 | * | * | 706.8 |
| HAMILTON RBG | -1.1 | * | 14.0 | -18.5 | 15.5 | * | 55.3 | * | 0 | 8 | 68 | * | * |
| HAMILTON A | -1.9 | 1.5 | 13.5 | -19.5 | 30.8 | 90 | 57.2 | 73 | * | 14 | * | * | 615.2 |
| KAPUSKASING A | -13.5 | 1.2 | 2.6 | -34.7 | 46.9 | 88 | 47.7 | 89 | 62 | 14 | * | * | 976.6 |
| KENORA A | -12.1 | 2.0 | 1.4 | -31.7 | 30.4 | 99 | 30.7 | 98 | 28 | 11 | * | * | 932.1 |
| KINGSTON A | -4.2 | 0.8 | 10.4 | -22.1 | 40.0 | 84 | 91.2 | 81 | 2 | 13 | 82 | 107 | 687.9 |
| LONDON A | -2.7 | 0.8 | 13.1 | -21.4 | 68.2 | 133 | 73.6 | 84 | 5 | 14 | 48 | 85 | 640.2 |
| MOOSONEE | -16.8 | -0.8 | 2.3 | -36.9 | 29.0 | 73 | 26.6 | 66 | 38 | 7 | 70 | 119 | 1078.6 |
| MUSKOKA A | -6.1 | 1.0 | 11.0 | -28.1 | 81.3 | 111 | 89.5 | 92 | 19 | 15 | * | * | 750.9 |
| NORTH BAY A | -9.3 | 0.4 | 7.5 | -27.4 | 55.4 | 91 | 72.9 | 97 | 15 | 15 | 93 | 120 | 847.4 |
| OTTAWA INT'L A | -7.7 | 0.0 | 9.7 | -24.1 | 66.0 | 117 | 70.0 | 87 | 17 | 10 | * | * | 796.5 |
| PETAWAWA A | -9.6 | 0.1 | 9.0 | -27.5 | 50.9 | 94 | 52.0 | 80 | 5 | 11 | * | * | 854.2 |
| PETERBOROUGH A | -6.0 | 0.4 | 11.1 | -25.7 | 52.7 | 137 | 71.0 | 89 | 10 | 13 | * | * | 745.1 |
| PICKLE LAKE | -15.9 | 1.8 | -0.2 | -39.9 | 25.4 | 62 | 22.2 | 60 | 31 | 8 | * | * | 1049.7 |
| RED LAKE A | -14.8 | 1.3 | 1.2 | -35.8 | 36.8 | 116 | 32.8 | 103 | 28 | 12 | 62 | * | 1018.6 |
| ST CATHARINES A | -0.1 | 1.4 | 15.7 | -13.2 | 30.4 | 106 | 60.6 | 76 | 0 | 11 | 61 | * | 561.1 |
| SARNIA A | -1.7 | 0.9 | 13.6 | -17.9 | 37.0 | 97 | 54.8 | 76 | * | 7 | 60 | 92 | 610.2 |
| SAULT STE MARIE A | -6.1 | 0.6 | 4.8 | -23.6 | 5.8 | 8 | 5.8 | 7 | 8 | 10 | 66 | 107 | 746.1 |
| SIOUX LOOKOUT A | -13.7 | 1.4 | 1.6 | -36.4 | 40.4 | 118 | 35.8 | 106 | 42 | 9 | * | * | 983.4 |
| SUDBURY A | -9.5 | 0.7 | 6.4 | -26.7 | 56.2 | 99 | 73.5 | 113 | 12 | 12 | 85 | 100 | 851.8 |
| THUNDER BAY A | -10.3 | 0.8 | 5.5 | -31.6 | 53.6 | 116 | 35.6 | 85 | 30 | 8 | 80 | 86 | 875.9 |
| TIMMINS A | -12.8 | 1.2 | 3.3 | -33.7 | 48.7 | 68 | 56.3 | 88 | 22 | 13 | * | * | 949.6 |
| TORONTO | -0.5 | * | 13.1 | -14.9 | 38.6 | * | 55.2 | * | 0 | 11 | * | * | 573.8 |
| TORONTO INT'L A | -2.4 | 1.1 | 13.3 | -17.9 | 34.0 | 105 | 44.7 | 69 | * | 9 | * | * | 631.0 |
| TORONTO ISLAND A | -0.9 | * | 10.0 | -14.5 | 35.2 | 122 | 44.2 | * | 0 | 12 | * | * | 590.6 |
| TRENTON A | -4.6 | -0.1 | 11.8 | -18.0 | 41.6 | 89 | 69.4 | 84 | * | 13 | * | * | 699.4 |
| WATERLOO WELLINGTON | -3.2 | 1.1 | 12.1 | -18.3 | 32.4 | 87 | 48.7 | 63 | 2 | 10 | * | * | 656.5 |
| WAWA A | -9.3 | * | 3.8 | -31.0 | 64.2 | * | 58.9 | * | 25 | 12 | * | * | 845.7 |
| WIARTON A | -3.0 | 0.7 | 13.8 | -21.2 | 128.5 | 139 | 103.9 | 97 | 8 | 14 | 65 | 141 | 653.3 |
| WINDSOR A | -0.1 | 1.8 | 14.0 | -12.8 | 28.0 | 98 | 53.4 | 74 | 2 | 12 | * | * | 562.0 |

## DECEMBER 1991

| STATION | Temperature C | | | | Snowfall (cm) | % of Normal Snowfall | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | % of Normal Bright Sunshine | Degree Days below 18 C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | | | |
| **QUEBEC** | | | | | | | | | | | | | |
| BAGOTVILLE A | -13.2 | -1.1 | 8.2 | -30.1 | 51.4 | 61 | 50.7 | 64 | 26 | 12 | * | * | 966.8 |
| BAIE COMEAU A | -12.1 | -1.8 | 4.7 | -27.9 | 84.0 | 109 | 72.0 | 69 | 26 | 15 | 107 | 128 | 934.7 |
| BLANC SABLON A | -14.5 | -6.9 | 2.7 | -27.3 | 95.2 | 114 | 97.0 | 65 | 18 | 12 | 107 | * | 1007.2 |
| CHIBOUGAMAU CHAPAIS | -17.2 | * | 3.0 | -36.1 | 73.4 | * | 66.6 | * | 45 | 15 | 77 | 98 | 1090.5 |
| GASPE A | -9.8 | * | 6.4 | -23.8 | 62.6 | * | 61.2 | * | 6 | 10 | 88 | * | 863.7 |
| INUKJUAK A | -18.6 | -0.7 | -6.1 | -28.2 | 28.8 | 124 | 26.2 | 116 | 16 | 11 | 38 | 141 | 1133.5 |
| KUUJJUAQ A | -20.6 | -2.2 | -6.1 | -29.4 | 37.4 | 95 | 37.4 | 98 | 23 | 11 | 59 | 110 | 1198.0 |
| KUUJJUARAPIK A | -17.7 | -1.8 | -0.9 | -33.8 | 62.0 | 148 | 55.2 | 131 | 24 | 13 | 26 | 50 | 1107.9 |
| LA GRANDE IV A | * | * | * | * | 58.4 | * | 41.2 | * | 24 | 12 | 50 | * | * |
| LA GRANDE RIVIERE A | -18.9 | * | -0.6 | -32.0 | 59.6 | * | 54.0 | * | 45 | *** | * | * | 1143.4 |
| MANIWAKI | -10.4 | -0.4 | 8.8 | -28.5 | 47.2 | 82 | 65.0 | 91 | 13 | 10 | * | * | 881.2 |
| MONT JOLI A | -10.0 | -1.7 | 8.0 | -25.0 | 77.0 | 86 | 79.0 | 84 | 16 | 14 | 89 | 150 | 863.0 |
| MONTREAL INT'L A | -7.3 | -0.4 | 10.8 | -22.4 | 47.7 | 81 | 75.7 | 87 | 6 | 11 | 78 | 98 | 785.2 |
| MONTREAL MIRABEL I/ | -9.3 | * | 8.1 | -28.2 | 59.4 | * | 86.2 | * | 14 | 12 | 95 | * | 846.2 |
| NATASHQUAN A | -14.3 | -5.1 | 4.8 | -31.1 | 70.0 | 104 | 71.0 | 65 | 8 | 11 | 107 | 122 | 981.9 |
| QUEBEC A | -10.0 | -1.0 | 6.2 | -25.7 | 61.8 | 72 | 80.6 | 71 | 28 | 13 | 65 | 86 | 867.0 |
| ROBERVAL A | -12.8 | -0.1 | -7.6 | -27.9 | 40.3 | 51 | 40.0 | 50 | 10 | 13 | 71 | * | 922.9 |
| SCHEFFERVILLE A | -22.4 | -3.4 | -0.4 | -35.6 | 35.8 | 71 | 30.2 | 62 | 38 | 10 | 80 | 133 | 1251.0 |
| SEPT-ILES A | -14.4 | -3.4 | 1.5 | -31.2 | 100.8 | 113 | 77.6 | 74 | 39 | 12 | 10 | 11 | 1010.6 |
| SHERBROOKE A | -9.1 | -0.5 | 8.8 | -27.2 | 72.0 | 96 | 84.6 | 87 | 26 | 13 | 65 | * | 840.3 |
| STE AGATHE DES MONT | -10.7 | -0.1 | 7.7 | -30.9 | 62.6 | 68 | 80.4 | 66 | 23 | 15 | 63 | 82 | 888.8 |
| ST HUBERT A | -7.3 | -0.3 | 10.2 | -22.3 | 52.6 | * | 85.6 | 86 | 7 | 11 | 76 | * | 784.0 |
| VAL D'OR A | -13.7 | -0.5 | 5.0 | -31.2 | 55.8 | 87 | 56.6 | 81 | 21 | 12 | 73 | 86 | 982.4 |
| **NEW BRUNSWICK** | | | | | | | | | | | | | |
| CHARLO A | -10.4 | -1.7 | 8.0 | -24.4 | 88.9 | 96 | 86.0 | 74 | 30 | 13 | 11 | 12 | 869.5 |
| FREDERICTON A | -8.3 | -1.8 | 12.7 | -24.5 | 59.3 | 86 | 72.9 | 62 | 20 | 9 | 103 | * | 815.4 |
| MONCTON A | -7.6 | -2.2 | 11.4 | -21.6 | 104.5 | 145 | 95.4 | 79 | 24 | 15 | 77 | 85 | 791.9 |
| SAINT JOHN A | -6.6 | -1.8 | 10.2 | -20.3 | 75.2 | 118 | 92.8 | 56 | 27 | 13 | 87 | 94 | 762.6 |

| STATION | Temperature C | | | | Snowfall (cm) | % of Normal Snowfall | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | % of Normal Bright Sunshine | Degree Days below 18 C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | | | |
| **NOVA SCOTIA** | | | | | | | | | | | | | |
| GREENWOOD A | -3.9 | -1.6 | 14.9 | -16.3 | 96.0 | 156 | 89.9 | 75 | 42 | 16 | * | * | 677.5 |
| HALIFAX INT'L A | -4.0 | -1.1 | 12.3 | -17.2 | 74.2 | 138 | 85.9 | 48 | 24 | 14 | * | * | 605.5 |
| SABLE ISLAND | 2.3 | -0.3 | 13.0 | -6.1 | 46.1 | 245 | 199.1 | 138 | 0 | 21 | 45 | 82 | 487.6 |
| SHEARWATER A | -2.3 | -0.8 | 12.3 | -15.2 | 70.4 | 187 | 120.6 | 82 | 7 | 17 | 93 | 100 | 628.2 |
| SYDNEY A | -3.0 | -1.2 | 13.4 | -14.0 | 79.3 | 121 | 129.7 | 79 | 21 | 20 | 66 | 98 | 650.7 |
| YARMOUTH A | -1.2 | -0.9 | 11.9 | -11.2 | 44.1 | 101 | 125.7 | 88 | 0 | 18 | 59 | 96 | 594.8 |
| **PRINCE EDWARD ISLAND** | | | | | | | | | | | | | |
| CHARLOTTETOWN A | -5.1 | -1.2 | 10.6 | -17.5 | 116.2 | 160 | 109.8 | 85 | 30 | 18 | * | * | 718.1 |
| **NEWFOUNDLAND** | | | | | | | | | | | | | |
| BONAVISTA | -3.3 | -1.8 | 8.1 | -13.7 | 78.6 | 202 | 111.8 | 116 | 51 | 14 | * | * | 660.4 |
| BURGEO | -4.2 | -2.4 | 8.1 | -17.8 | 53.6 | 105 | 137.8 | 74 | 16 | 17 | * | * | 685.9 |
| CARTWRIGHT | -14.7 | -5.6 | 0.4 | -27.0 | 53.8 | 79 | 53.8 | 72 | 59 | 8 | 65 | 107 | 1019.0 |
| CHURCHILL FALLS A | -21.3 | -2.5 | 0.0 | -36.5 | 37.4 | 60 | 37.0 | 51 | 51 | 8 | 101 | 121 | 1229.4 |
| COMFORT COVE | -7.0 | -2.9 | 7.5 | -19.4 | 40.4 | 56 | 63.5 | 59 | 14 | 17 | * | * | 775.5 |
| DANIELS HARBOUR | -7.9 | -4.0 | 5.6 | -20.0 | 80.0 | 115 | 99.2 | 109 | 25 | 21 | 13 | 42 | 808.4 |
| DEER LAKE A | -9.4 | -4.2 | 7.2 | -30.9 | 12.6 | 15 | 108.2 | 96 | 54 | 22 | * | * | 848.0 |
| GANDER INT'L A | -6.7 | -2.9 | 7.6 | -18.0 | 45.6 | 64 | 63.4 | 59 | 12 | 16 | 86 | 124 | 765.1 |
| GOOSE A | -18.1 | -5.1 | 3.7 | -31.2 | 56.2 | 76 | 40.8 | 56 | 35 | 6 | 99 | 136 | 1120.5 |
| MARY'S HARBOUR | -14.0 | -6.9 | 5.0 | -29.1 | 77.6 | 120 | 78.4 | 95 | 46 | 9 | * | * | 988.5 |
| PORT AUX BASQUES | -3.7 | -2.0 | 9.0 | -13.4 | 77.2 | 142 | 155.3 | 100 | 29 | 23 | 57 | * | 432.1 |
| ST ANTHONY | -11.7 | -4.0 | 4.0 | -21.0 | 112.6 | 180 | 108.6 | 99 | 52 | 12 | * | * | 923.7 |
| ST JOHN'S A | -3.7 | -2.2 | 11.3 | -17.3 | 106.9 | 164 | 155.6 | 97 | 40 | 18 | 61 | 107 | 672.7 |
| ST LAWRENCE | -3.3 | -2.3 | 9.0 | -16.2 | 71.1 | 217 | 154.5 | 124 | 24 | 19 | * | * | 641.3 |
| STEPHENVILLE A | -5.5 | -2.9 | 8.0 | -16.0 | 111.0 | 138 | 118.5 | 104 | 42 | 25 | 29 | 88 | 724.6 |
| WABUSH LAKE A | -21.1 | -2.5 | 0.7 | -38.1 | 54.0 | 68 | 34.7 | 48 | 42 | 9 | 83 | 122 | 1211.7 |

AGROCLIMATOLOGICAL STATIONS — DECEMBER 1991

| STATION | Temperature C | | | | Snowfall (cm) | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | Degree days above 5 C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | This month | Since jan. 1st |
| **BRITISH COLUMBIA** | | | | | | | | | | | | |
| AGASSIZ | 5.5 | 2.5 | 11.5 | -2.0 | 0.0 | 184.1 | 32 | 0 | 17 | 42 | 32.5 | 2329.4 |
| SUMMERLAND | 0.5 | 1.6 | 10.0 | -9.0 | 1.4 | 7.4 | 23 | 0 | 3 | 39 | 0.0 | 2191.9 |
| **ALBERTA** | | | | | | | | | | | | |
| BEAVERLODGE | -7.0 | 4.6 | 6.0 | -23.5 | 43.0 | 47.0 | 146 | 16 | 10 | 37 | 0.0 | 1446.3 |
| LACOMBE | -8.0 | 3.5 | 4.0 | -21.0 | 5.7 | 5.2 | 28 | 9 | 2 | 83 | 0.0 | 1408.3 |
| **SASKATCHWAN** | | | | | | | | | | | | |
| MELFORT | -12.9 | 3.6 | 3.5 | -35.0 | 14.6 | 14.6 | 58 | 42 | 6 | 69 | 0.0 | 1657.5 |
| REGINA | -11.8 | 1.2 | 4.5 | -32.0 | 23.0 | 23.2 | 128 | 12 | 5 | * | 0.0 | 1816.3 |
| SCOTT | -11.5 | 2.7 | 3.0 | -30.0 | 13.1 | 12.3 | 60 | 6 | 4 | 84 | 0.0 | 1652.2 |
| SWIFT CURRENT | -5.6 | 4.7 | 6.0 | -26.0 | 12.4 | 11.2 | 70 | 0 | 4 | 111 | 0.0 | 1812.9 |
| **MANITOBA** | | | | | | | | | | | | |
| BRANDON | -13.5 | 0.6 | 2.2 | -35.6 | 35.5 | 35.5 | 176 | 35 | 7 | * | 0.0 | 1981.2 |
| MORDEN | -9.6 | 4.8 | 4.0 | -31.0 | 28.0 | 29.2 | 126 | 12 | 8 | 101 | 0.0 | 2108.0 |
| GLENLEA | -12.0 | 0.3 | 1.5 | -34.0 | 35.0 | 35.0 | 157 | 34 | 7 | 83 | 0.0 | 1998.4 |
| **ONTARIO** | | | | | | | | | | | | |
| DELHI | -1.5 | 1.4 | 13.0 | -24.5 | 31.8 | 73.8 | 87 | 2 | 12 | ** | 4.8 | 2507.1 |
| ELORA | -3.9 | 1.3 | 12.0 | -22.3 | *.* | 56.8 | 79 | 12 | 0 | ** | 1.5 | 2125.5 |
| GUELPH | -3.1 | 1.0 | 11.9 | -23.1 | *.* | 59.8 | 84 | 6 | 10 | 70 | 3.9 | 2284.1 |
| HARROW | 0.3 | 2.0 | 13.0 | -12.0 | 14.2 | 66.4 | 90 | 3 | 8 | 40 | 6.6 | 2889.8 |
| KAPUSKASING | -14.0 | 0.7 | 2.5 | -38.0 | 39.4 | 46.4 | 91 | 38 | 10 | 72 | 0.0 | 1507.1 |
| OTTAWA | -7.4 | 0.1 | 9.6 | -24.2 | 55.7 | 55.4 | 76 | 11 | 10 | 94 | 0.0 | 2343.0 |
| SMITHFIELD | -2.8 | 1.7 | 15.7 | -20.7 | 59.1 | 108.3 | 9 | 7 | 10 | ** | 9.8 | 2742.6 |

Courtesy of Agriculture Canada

| STATION | Temperature C | | | | Snowfall (cm) | Total Precipitation (mm) | % of Normal Precipitation | Snow on ground at end of month (cm) | No. of days with Precip 1.0 mm or more | Bright Sunshine (hours) | Degree days above 5 C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | This month | Since jan. 1st |
| **QUEBEC** | | | | | | | | | | | | |
| LA POCATIERE | -8.7 | -0.5 | 8.0 | -23.5 | 45.2 | 48.0 | 53 | 10 | 9 | 93 | 0.0 | 1701.9 |
| L'ASSOMPTION | -8.3 | 0.1 | 9.0 | -31.0 | 65.0 | 86.9 | 95 | 11 | 10 | 77 | 0.5 | 1876.5 |
| NORMANDIN | -15.1 | -1.0 | 6.0 | -36.0 | 56.2 | 41.2 | 58 | 6 | 7 | 86 | 0.0 | 1428.5 |
| **NEW BRUNSWICK** | | | | | | | | | | | | |
| FREDERICTON | -7.4 | -1.0 | 9.0 | -21.0 | 50.2 | 74.8 | 61 | 7 | 11 | 103 | 0.0 | 2032.3 |
| **NOVA SCOTIA** | | | | | | | | | | | | |
| KENTVILLE | -3.1 | -0.7 | 13.5 | -15.0 | 71.6 | 98.4 | 76 | 23 | 16 | 52 | 2.8 | 2066.8 |
| NAPPAN | -4.7 | -0.7 | 11.0 | -20.0 | 78.5 | 76.8 | 65 | 18 | 10 | 64 | 1.0 | 1763.3 |
| **PRINCE EDWARD ISLAND** | | | | | | | | | | | | |
| CHARLOTTETWN | -4.1 | -0.6 | 10.5 | -16.5 | 97.0 | 95.9 | 87 | 0 | 17 | 63 | 1.3 | 1834.2 |
| **NEWFOUNDLAND** | | | | | | | | | | | | |
| ST.JOHN'S WEST | 1.6 | 3.0 | 11.0 | -19.0 | 92.3 | 170.5 | 40 | 44 | 19 | 50 | 0.0 | 1214.3 |

Courtesy of Agriculture Canada