Environment Canada Environnement Canada

# Climatic Perspectives

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



# CLIMATIC HIGHLIGHTS

## Flooding on the southern B.C. coast

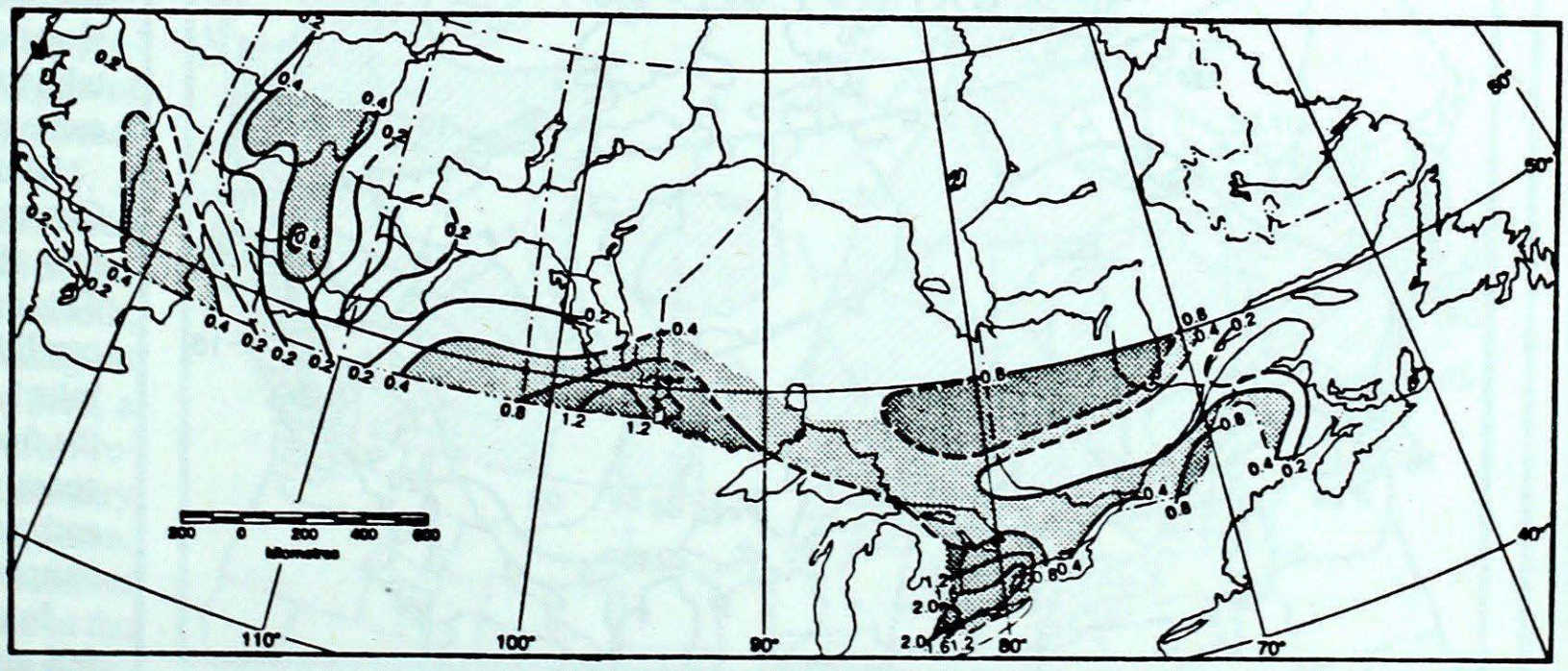
More than 130 mm of rain drenched the lower mainland the final week of the month, causing severe flooding in the Howe Sound area north of Vancouver. The Squamish Highway between Vancouver and Whistler was closed due to washouts and flooding at a number of points. At Britannia Beach, where 50 mm of rain fell in 24 hours, the highway was under 30 cm of water, as a normally tranquil creek cut a new channel through the town. Eventually the road was reopened to single lane traffic. Hundreds of people were forced to flee their homes. The B.C. Rail line was seriously undermined in the Squamish area, especially near Alta Lake, where the footings beneath the tracks were washed out. All passenger and freight traffic was halted between north Vancouver and Lillooet. During August, this region received 3 to 4 times their normal monthly rainfall of approximately 73 mm. Squamish received 126.9 mm of rain on August 29, alone. Damage estimates due to the flooding are in the $4 million dollar range.

## Severe weather hits southern Quebec

A Force 3 tornado, with estimated winds of 250 to 330 km/h, touched down in the town of Maskinongé on August 27, and cut a swath of devastation 75 to 150 metres wide and 1.5 km long. The tornado was part of a severe weather complex, which developed in a very warm, humid air mass, affecting southern Quebec the final week of the month. The storms also produced torrential downpours, as much as 80 mm, and strong gusty winds, which affected other communities in the Mauricie, Trois-Rivières and Drummondville areas during the same period. On August 30, winds gusting to 120 km/h overturned 16 aircraft at Gatineau Airport. The tornado, which hit Maskinongé, caused $17 million worth of damage. Surprisingly there were no deaths. A tornado of this magnitude can be expected to occur in this part of the country only once every 15 years, but weaker tornadoes can occur more frequently during the summer months.

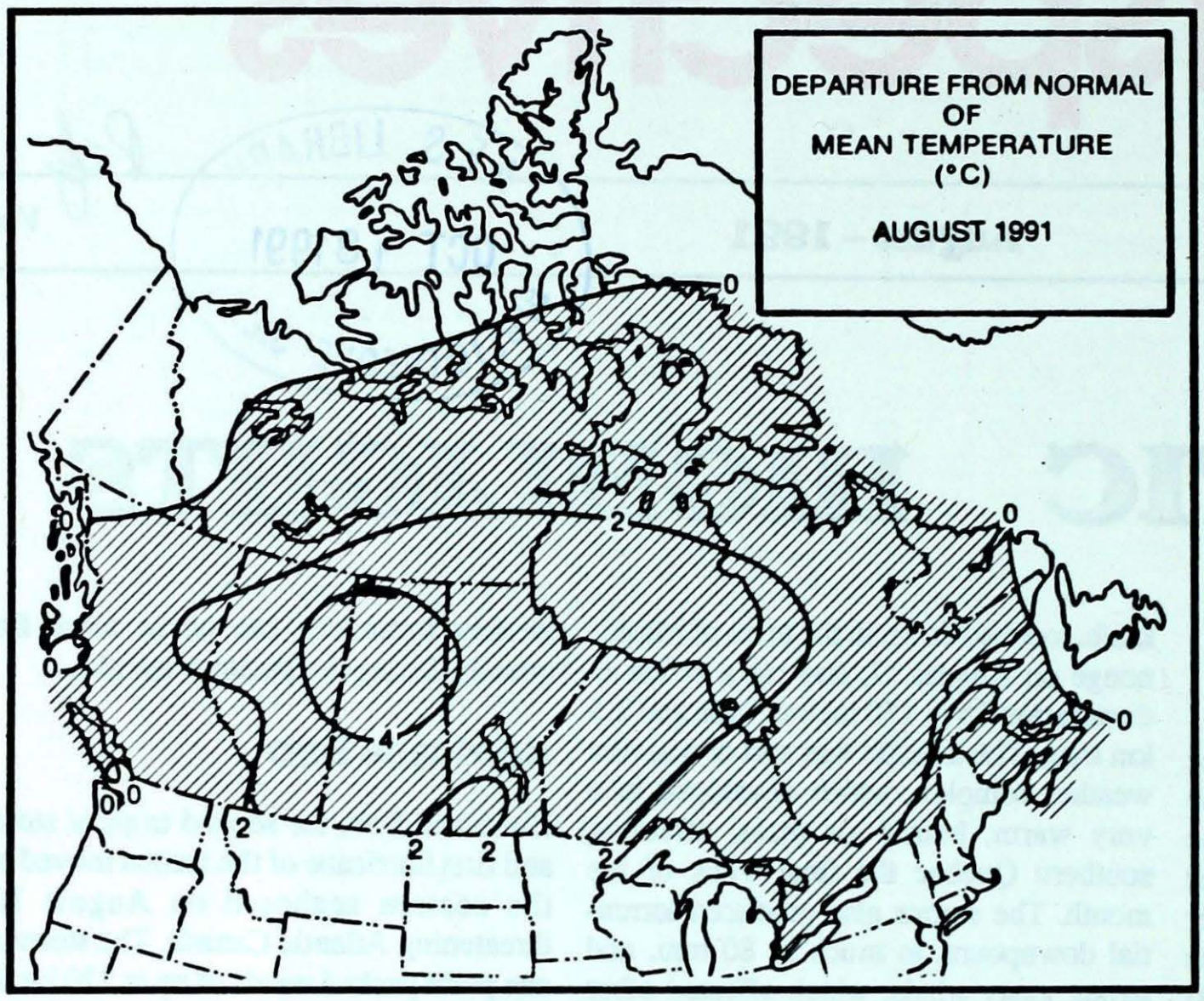
## Hurricane Bob

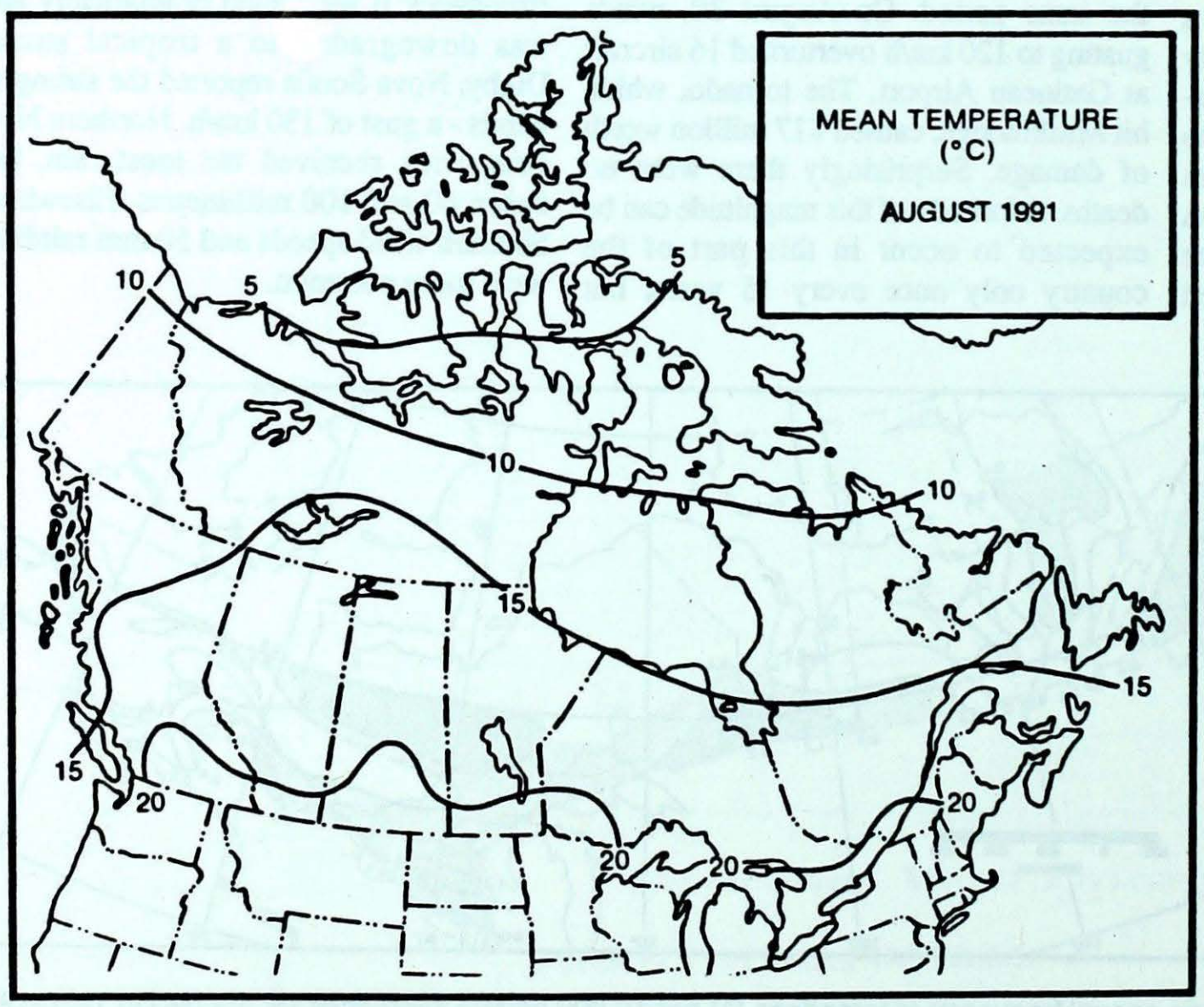
Hurricane Bob, the second tropical storm and first hurricane of the season moved up the eastern seaboard on August 19, threatening Atlantic Canada. The storm at one point packed winds of up to 220 km/h, and soaked parts of Maine with over 150 mm of rain. As the storm moved into New Brunswick it weakened dramatically and was downgraded to a tropical storm. Digby, Nova Scotia reported the strongest winds - a gust of 130 km/h. Northern New Brunswick received the most rain, between 60 and 100 millimetres. Elsewhere 50 km/h wind speeds and 50 mm rainfalls were more common.




Average annual frequency of tornadoes (1) per 10,000 square kilometres for the period 1950-1979

Canada




# Across the country

## Yukon and Northwest Territories

In the Yukon the weather pattern turned out to be cool and moist, putting a damper on outdoor activities.

Maximum temperatures in the thirties, which normally are quite common in August, did not materialize. Watson Lake was the warmest spot this month, with a 29°C reading on the 14th. The coldest temperature occurred at Dawson City, with a chilly -6.5°C, on the 26th. Whitehorse on the morning of the 7th, had a frosty reading of -0.4°C. Most locations experienced overnight lows of zero to minus 6 at some point during the month, and many new record low temperatures were recorded. There were two days when a trace of snow was recorded at Whitehorse, but thankfully this fell short of the record high amount of 19.3 cm, which occurred in 1974.

For the most part this was a wet month. The greatest amount of precipitation fell at Eagle Plains, where 131 mm was collected, compared to a monthly normal of 72 mm.

Sunshine was a scarce commodity at Whitehorse, as a new low sunshine record was established, 142.7 hours, which is significantly lower than the record high amount of 325.4 hours recorded in 1963. Normally the August sun shines for a little more than 230 hours.

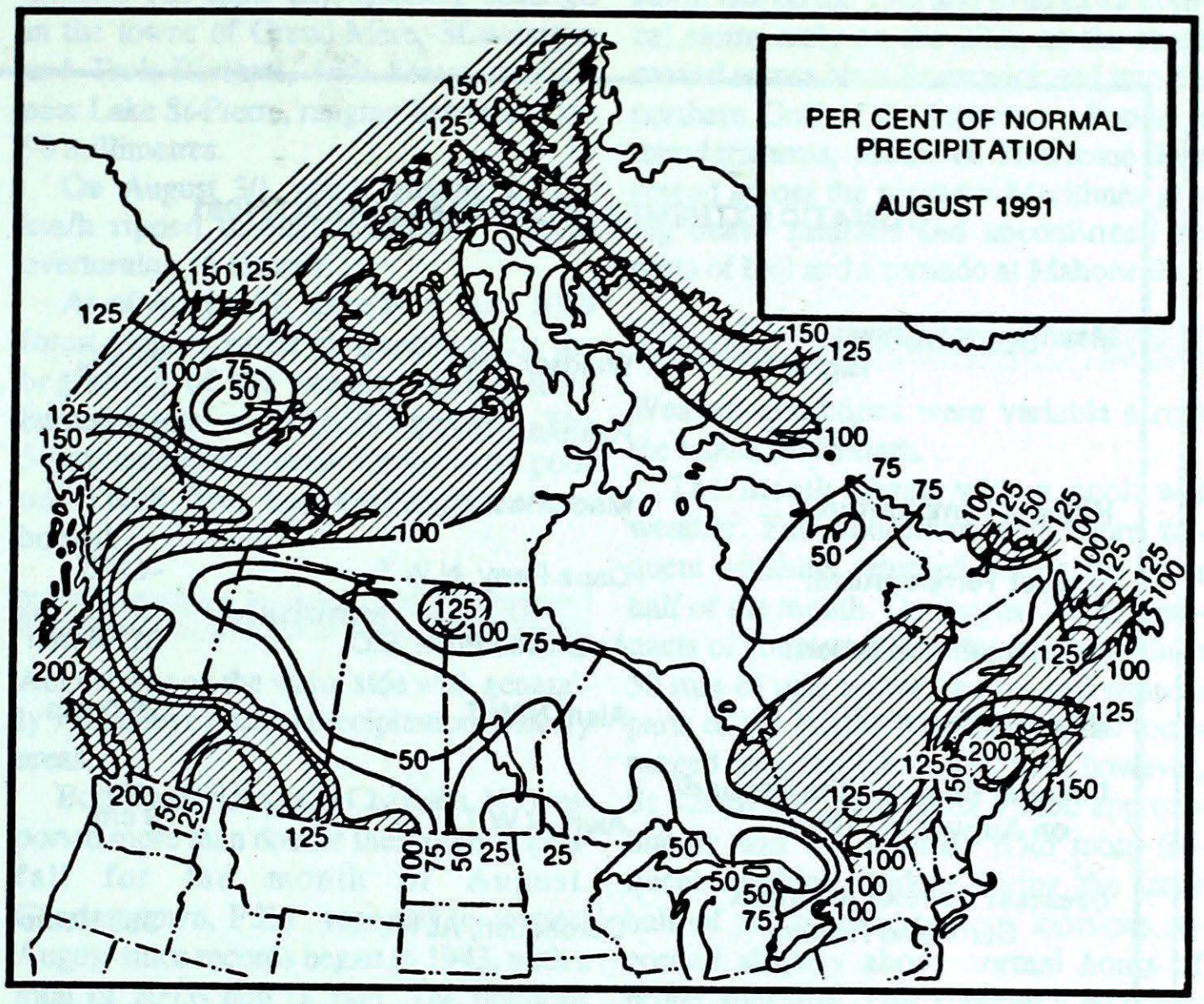
The warm dry spring coupled with last fall's dryness sparked a fast and furious beginning to the Yukon forest fire season. However, as cool and moist conditions established themselves, fighting fires became easier.

Warm weather experienced in southern Canada this month extended northwards into the southern Northwest Territories. This meant sunny, warm and relatively dry conditions in the Keewatin district. Rankin Inlet had the highest reading, 30.5°C. With the frontal zone oscillating near the Arctic coast, the Arctic Islands were cool, cloudy and wet, with Alert registering the coldest temperature of -6.4°C.

In the more southern areas precipitation fell almost exclusively as rain, with only trace amounts of snow reported; but in the high Arctic snowfalls were more common.

Baffin Island and the Great Slave Lake district had the most precipitation. Eureka recorded 26.4 mm, which is more than double their normal monthly amount of 11.6 mm. The greatest snowfall was at Alert, 25.0 cm.

Hours of bright sunshine were below normal by 40 to 80 hours in the north and 40 to 70 hours above normal in the south. Coral Harbour was the sunniest, with 292.6 hours, while Mould Bay was the most cloudy, with a mere 90.5 hours of sunlight.



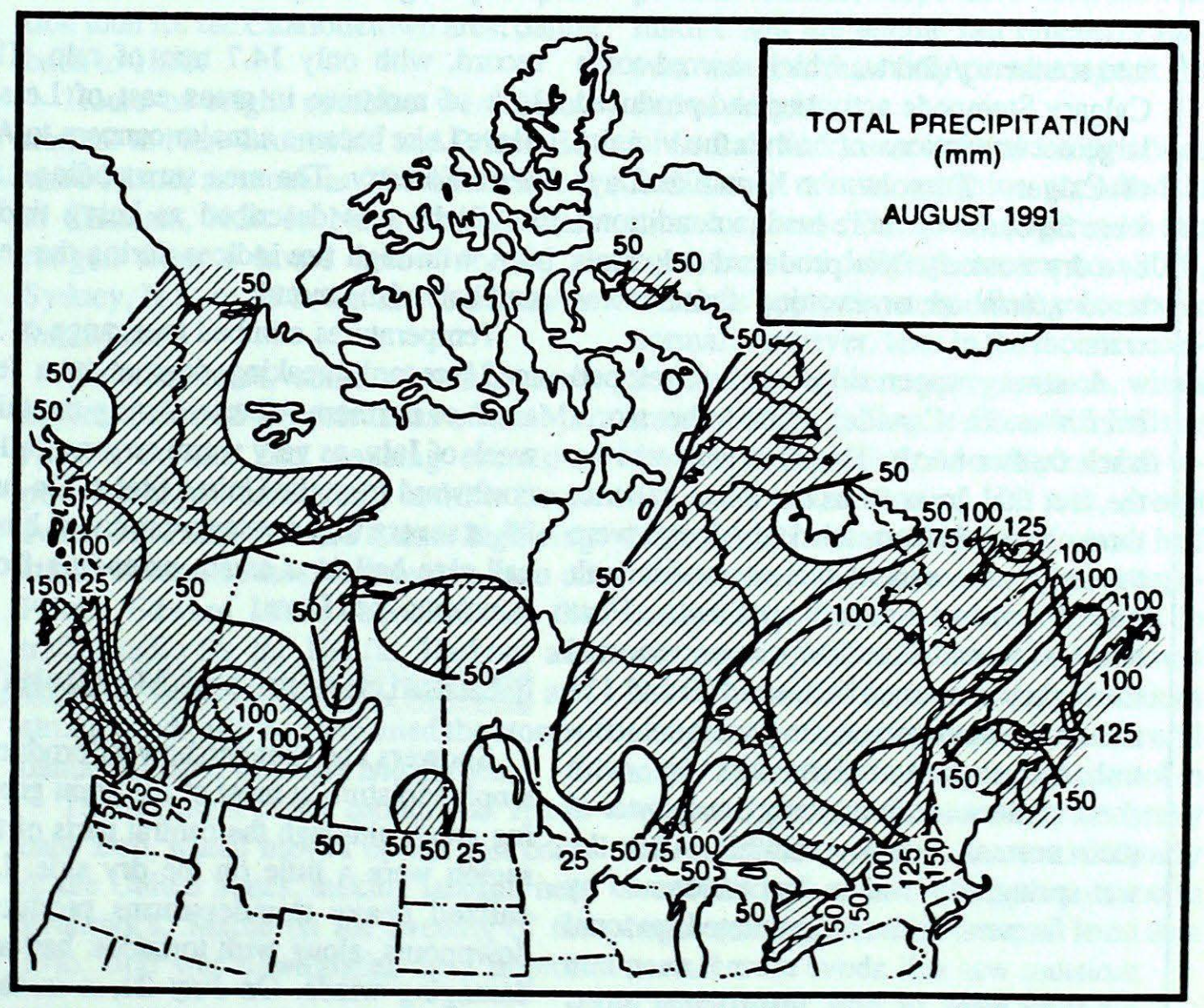

## British Columbia

August weather conditions were changeable and less than ideal. There were periods of heavy rain, particularly along the south coast. Storm-force winds, which normally occur later in the fall, affected the outer coastline. Snow made an appearance in the far north, which is a little earlier than normally would be expected. Nearly all coastal areas recorded double their normal monthly rainfall. The lower mainland and the Squamish - Whistler regions received 3 to 5 times their normal precipitation.

New August precipitation records were set at: Abbotsford, 187. 2 mm, Amphitrite Point, 311.4 mm, Cape Scott, 266.5 mm, Port Alberni, 202.9 mm, Sandspit, 146.9 mm, Vancouver, 170.0 mm, and Sooke, 129.1 mm. At Vancouver, the unusually high August rainfall combined with slightly above average June and July precipitation produced the wettest summer on record, with 257.2 mm. The previous record was 211.0 mm set in 1981. Vancouver also established a new record one day precipitation total for the month of August of 39.4 mm on the 30th, breaking the old record of 31.1 mm set on August 20, 1941.

Whistler received a record 222.2 mm this month. The heavy rain, which occurred towards the end of the month, caused extensive flooding, especially at Britannia Beach near Squamish. There, a creek cut a new channel through town resulting in significant damage. Preliminary damage estimates are as high as $4 million.

Earlier in the month a series of weather systems set off heavy thunderstorms in the interior. Severe thunderstorms were reported in the Mount Robson area and at



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

| | | |
|---|---|---|
| **Mean Temperature:** | | |
| Highest | Windsor, ONT. | 22.5°C |
| Coldest | Resolute, N.W.T. | 1.3°C |
| **Highest Temperature:** | Medicine Hat, ALTA. | 38.3°C |
| **Lowest Temperature:** | Cape Parry, N.W.T. | -4.2°C |
| **Heaviest Precipitation:** | Amphitrite Point, B.C. | 311.4 mm |
| **Heaviest Snowfall:** | Alert, N.W.T. | 25.0 cm |
| **Deepest Snow on the Ground on August 31, 1991** | Alert, N.W.T. | 9 cm |
| **Greatest number of Bright Sunshine Hours:** | Coronation, ALTA. | 353 Hours |

into southern Alberta, which marred some Calgary Stampede activities and produced large accumulations of hail in the vicinity of Calgary. Edmonton's Klondike Days were favoured by more benign conditions, as a dry westerly flow produced only scattered afternoon or evening thundershowers.

A strong upper ridge that developed over western Canada, shifted the storm track farther north. This was reflected by the fact that areas from the Peace District through the northern third of Alberta were the only areas east of the mountains with above normal amounts of rain. Fort McMurray and Fort Chipewyan reported the highest amounts, between 100 and 115 mm. An area encompassing southern, central, and eastern regions was dry, with some stations receiving only one quarter of their normal monthly rainfall. After the wet spring, this was in fact welcomed by most farmers, as the accumulated seasonal moisture was still above normal even into the third week of July. Insufficient moisture was becoming a concern by the end of the month, especially in eastern regions. Edmonton had the second driest July on record, with only 14.7 mm of rain. The lack of moisture in areas east of Lesser Slave Lake became a major concern to Alberta Forestry. The area surrounding Lac La Biche was described as being tinder dry, with high fire indices during the second half of the month.

Temperatures climbed to a range of 29 to 31 record breaking degrees in a few areas of northern Alberta, during the third week of July, as very warm air was pulled northward from the United States. On July 29, a severe thunderstorm produced baseball size hail in a swath extending from Ponoka to Red Deer.

## Saskatchewan and Manitoba

Showers and thundershowers produced ample moisture in most of the grain growing areas, although the central parts of the region were a little on the dry side. Localized heavy thunderstorms produced downpours, along with tornados, hail and damaging winds. On July 21, a tornado ripped through a farm near Russell, Man., moving buildings off their foundations. That same day, in the Riding Mountain Park area, there were reports of over 100 mm of rain in less than 3 hours, causing creeks and rivers to overflow. A violent storm passing through Eriksdale, Man. on the 18th, flattened maple trees 46 cm in diameter, and moved 800 kg bales of hay a distance of 150 metres.

Precipitation amounts for the month were much higher than usual across the north and south, except for a small area in southeastern Manitoba. Churchill had a whopping 168.2 mm compared to their usual monthly total of 45.6 mm. Dauphin, to the south, recorded 175 mm, which was nearly 111 mm above normal. In contrast, central areas did not reach normal precipitation values. The driest area was at North Battleford, where only 28.0 mm was reported, compared to a normal of 65.1 mm. In Winnipeg, July was much drier than the last few months have been, but the number of days with measurable precipitation was quite high at 14, as compared to the normal 11.

Temperatures were very close to normal over the southern parts of both provinces and warmer over the north. At Churchill, the mean temperature was nearly 3°C above normal. The warmest temperature was a maximum of 32.9°C degrees at The Pas, Man., while the coldest was 1.5°C at Meadow Lake, Sask.

Hours of bright sunshine were higher than normal at many locations in southern and central areas, as much 66 hours at Prince Albert, Sask.

## Ontario

July featured yet another warmer than normal month in Ontario, while total rainfall, on the other hand, revealed huge variations, as thundershowers left torrents in some areas and barely traces in others.

A mid-month heat wave - the most intense in Ontario since the summer of 1988 - was mainly responsible for pushing monthly mean temperatures above normal for the 9th successive month (November 1990 to July 1991, inclusive) at the majority of Ontario weather stations. In comparison to the recent hot summers of 1987 and 1988, July 1991 was more comfortable, as overall, the mean temperature was only one-half to one degree warmer than

A torrential downpour in Essex County, south of Windsor, on August 19 and 20, saw 150 to 300 mm of rain fall, causing significant flooding and road washouts. Damage estimates of $1 million resulted from this storm, which was very reminiscent of a similar storm that occurred in July 1989.

Sunshine was generally abundant. Sault Ste. Marie led the province with their sunniest August since 1976 - 293 hours of sun or 43 hours above normal.

A review of the summer months (June-August) verifies just how warm this summer really was. In Toronto, where records date back to 1840, the mean summer temperature was 22.2°C or 1.4 degrees above normal, making this the fourth warmest summer in 152 years of record! Moreover, given the continuous run of warmer than normal months in Ontario, this year is still in the running as the warmest year of the century.

## Quebec

August was another warm month across most of Quebec. On the east coast of Hudson Bay, the combined monthly mean temperature during June, July and August made this summer the warmest since 1955 at Kuujjuarapik and Inukjuak.

Except along the north shore of the St. Lawrence and the Ungava Peninsula, most locations reported more than 100 mm of rain. The highest rainfall recorded this month was 250.8 mm at Trois-Rivières, setting a new monthly record. The old record was 220.5 mm set in 1938. At Gaspé, a total of 160.8 mm was recorded during the month, of which 73.2 mm fell between the 19th and the 21st in association with Hurricane Bob.

There were numerous cases of severe weather this month. There were a number of reports of hail in the Montreal, Trois-Rivières regions and in the Eastern Townships.

The most significant weather-related event this month was a damaging tornado that touched down in the town of Maskinongé on August 27th. Miraculously, no deaths were reported but there were injuries. Damage is estimated at over $17 million. The same day, flooding occurred in the towns of Grand-Mère, Shawinigan and Trois-Rivières, with heavy rainfalls near Lake St-Pierre, ranging between 40 to 90 millimetres.

On August 30, winds gusting to 120 km/h ripped through Gatineau Airport overturning 16 aircraft.

As of August 31, there have been 1089 forest fires reported in Quebec since the beginning of the season, which have burned a total of 383,653.7 hectares. The 5-year cumulative mean for the same period is 913 fires and 43,395.3 hectares burned.

## Maritimes

August was on the warm side with generally well-above normal precipitation in many areas.

Both Fredericton and Chatham, N.B. reported more than double their normal rainfall for the month of August. Charlottetown, P.E.I., reported its wettest August since records began in 1943, with a total of 209.6 mm of rain. The previous record was 190.2 mm set in 1951. This is also the second largest August precipitation total for the Charlottetown area, dating back to 1892.

Hours of bright sunshine were below normal in New Brunswick and Prince Edward Island, as much as 28.5 hours below at Chatham, N.B. In Nova Scotia, totals ranged from 5 hours below normal at Sydney, N.S. to 25 hours above normal at Sable Island.

Thunderstorms, some of which were severe, occurred in some areas of the Maritimes on the 2nd, causing extensive power outages, particularly in New Brunswick and Prince Edward Island. Lightning struck several houses, destroyed a barn on Prince Edward Island, knocked out the traffic radio for the Halifax Harbour and killed 19 cattle at Millville, N.B. Hail and strong winds also accompanied the storms, damaging cars, windows and gardens.

The highlight of the month was Hurricane Bob, which moved up the east coast of the United States, making landfall near Brunswick, Maine on the evening of the 19th. Bob was downgraded to a tropical storm late on the 19th and to an extra tropical storm early on the 20th, as the storm moved across New Brunswick and into the northern Gulf of St. Lawrence. Bands of thunderstorms, ahead of Hurricane Bob spread across the southern Maritimes giving heavy rainfalls and unconfirmed reports of hail and a tornado at Mahone Bay.

## Newfoundland

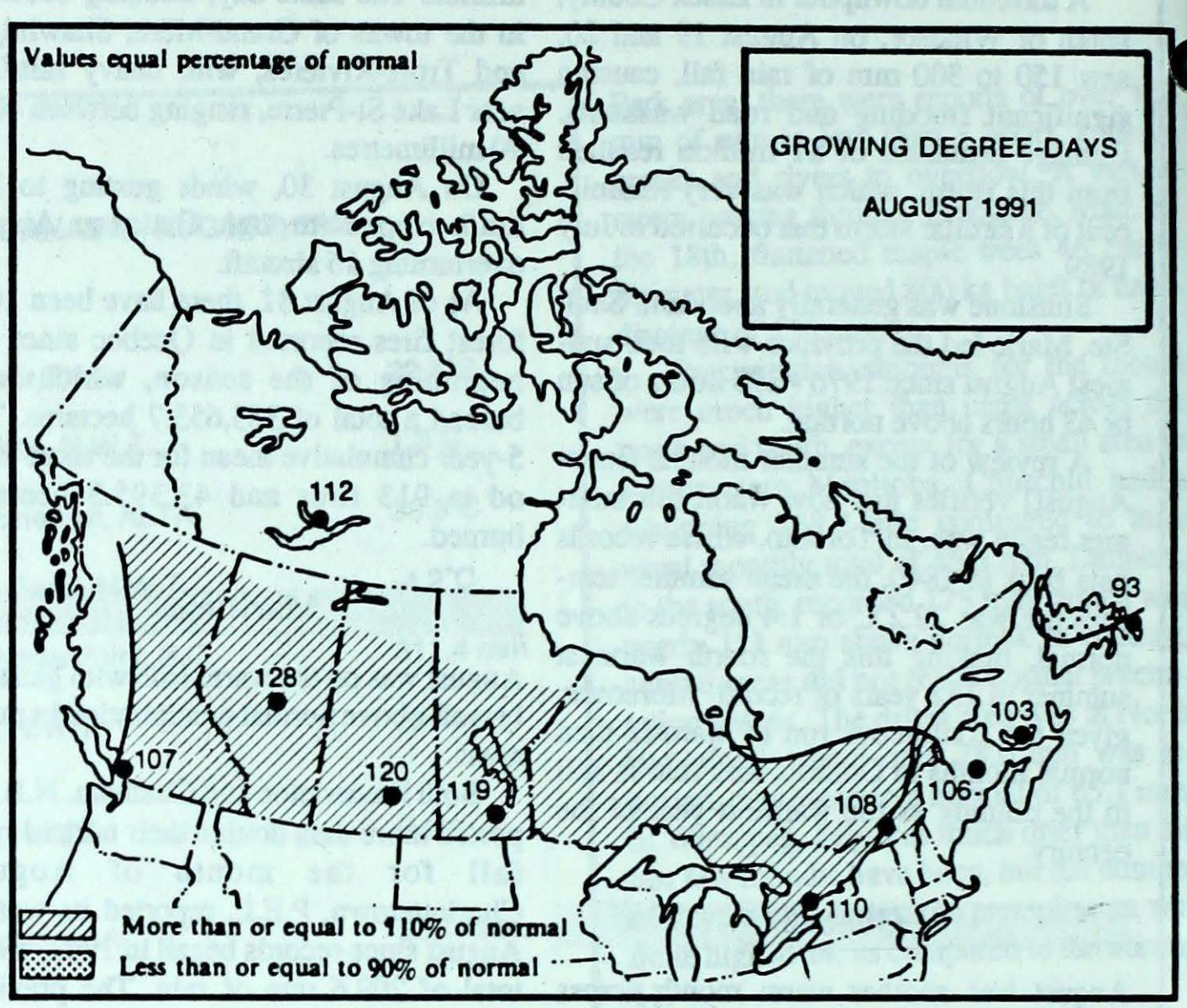
Weather conditions were variable across the Island this month.

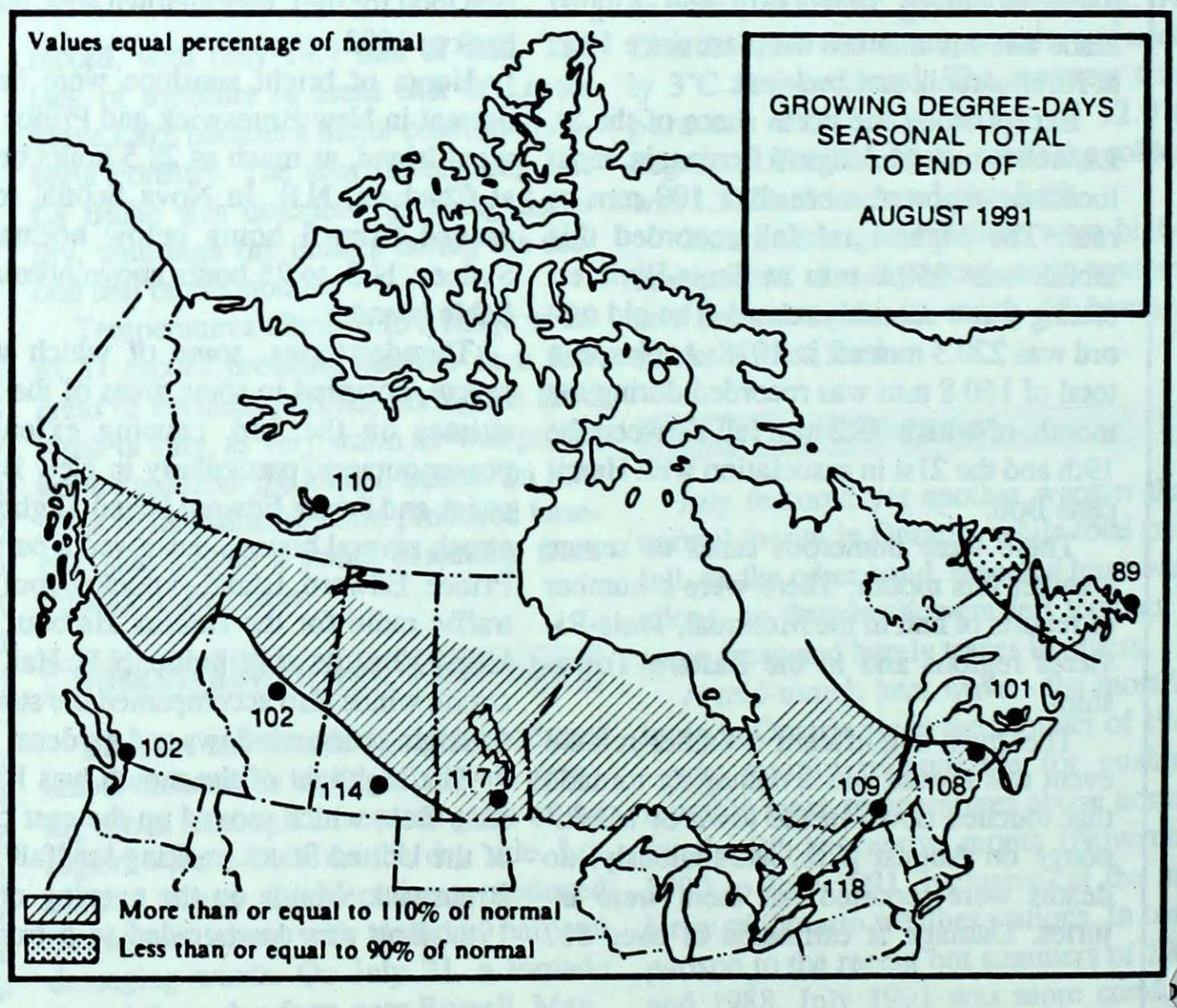
The month began with a cool, wet weather. Fair conditions with more frequent sunshine returned during the latter half of the month. On August 20, the remnants of Hurricane Bob dumped more than 50 mm of rain on the central and western parts of the Island. Monthly rainfall totals ranged between 100 to 130 mm; however, St. Lawrence reported 62.3 mm, approximately half the normal. With more frequent sunshine evident during the latter half of the month, western locations recorded slightly above normal hours of bright sunshine. This summer's cool, unsettled summer weather pattern has depressed tourism, crops have been slow to mature and the annual fall blueberry harvest was less than fifty percent ripe at the end of August.

In Labrador, near normal temperatures and above normal sunshine prevailed in most locations. The month began with fair conditions and daily maximums near 30°C, which is approximately 10 degrees above normal. However, later in the month unsettled conditions were more common, with a trace of snow falling at Churchill Falls at the end of the month. Monthly rainfall totals were in the area of 100 mm, except Nain, which recorded 43.8 mm, about half of the normal. Sunshine was frequent especially early in the month, with totals in western Labrador more than 50 hours above normal. The warm, dry conditions early in the month resulted in several major forest fires burning out of control in western Labrador. In contrast, the heavy ice conditions along the coast finally receded to allow for the shipping season to begin some six to eight weeks later than normal.

## SEASONAL TOTAL OF GROWING DEGREE-DAYS TO END OF AUGUST

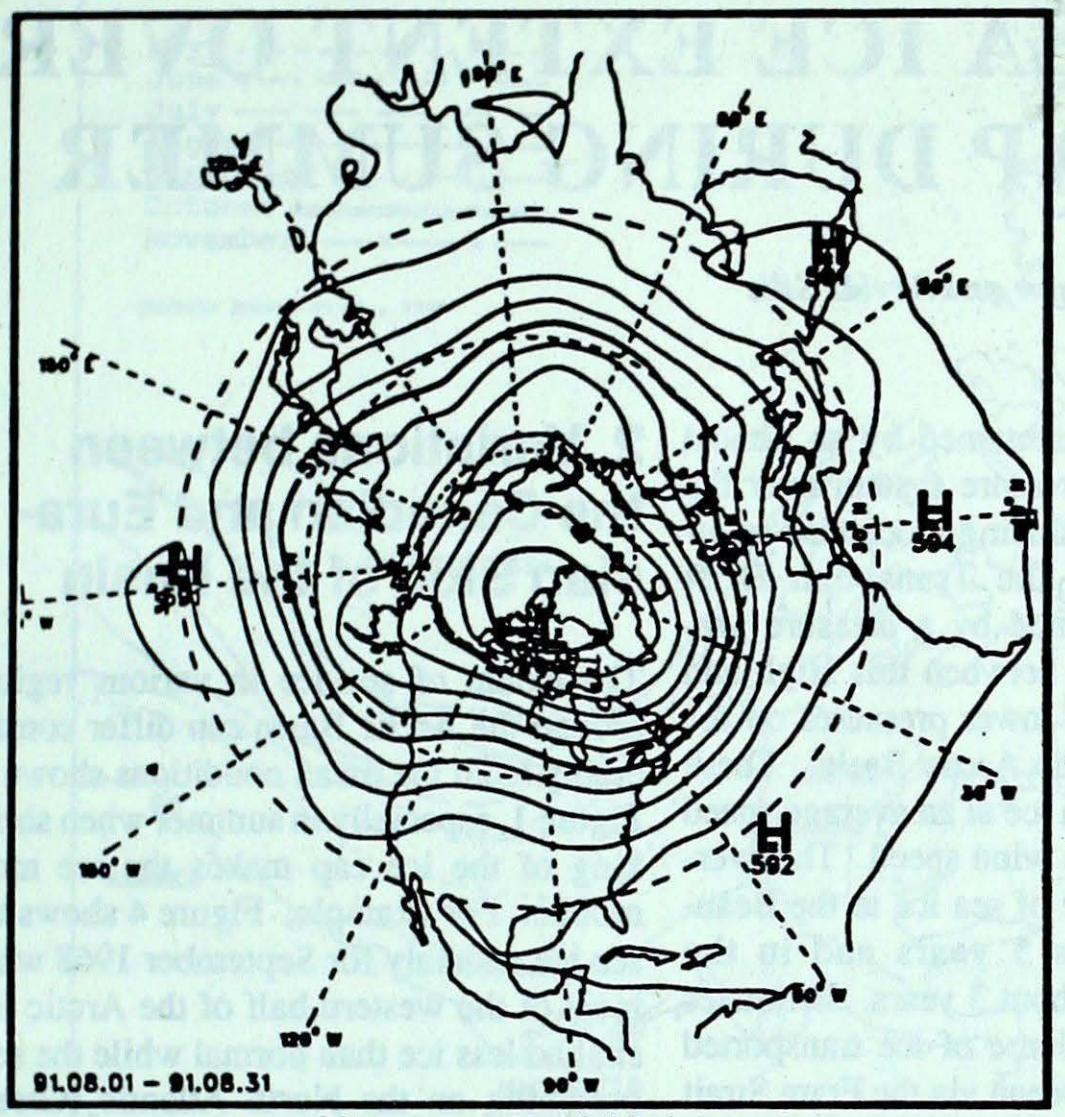
| | 1991 | 1990 | NORMAL |
|---|---|---|---|
| **BRITISH COLUMBIA** | | | |
| Abbotsford | 1469 | 1691 | 11375 |
| Kamloops | 1825 | 1919 | 1772 |
| Penticton | 1685 | 1820 | 1661 |
| Prince George | 1092 | 1050 | 969 |
| Vancouver | 1448 | 1617 | 1416 |
| Victoria | 1279 | 1441 | 1297 |
| **ALBERTA** | | | |
| Calgary | 1113 | 1063 | 1041 |
| Edmonton Mun. | 1315 | 1228 | 1198 |
| Grande Prairie | 1152 | 1112 | 1068 |
| Lethbridge | 1311 | 1244 | 1275 |
| Peace River | 1179 | 1112 | 1009 |
| **SASKATCHEWAN** | | | |
| Eastvan | 1485 | 1336 | 1380 |
| Prince Albert | 1379 | 1222 | 1134 |
| Regina | 1488 | 1321 | 1304 |
| Saskatoon | 1443 | 1272 | 1266 |
| Swift Current | 1333 | 1218 | 1238 |
| **MANITOBA** | | | |
| Brandon | 1453 | 1284 | 1284 |
| Churchill | 560 | 448 | 395 |
| Dauphin | 1411 | 1247 | 1246 |
| Winnipeg | 1597 | 1373 | 1366 |
| **ONTARIO** | | | |
| London | 1854 | 1626 | 1586 |
| Mount Forest | 1251 | * | * |
| North Bay | 1491 | 1204 | 1249 |
| Ottawa | 1853 | 1719 | 1600 |
| Thunder Bay | 1220 | 1099 | 1059 |
| Toronto | 1877 | 1723 | 1585 |
| Trenton | 1765 | 1630 | 1597 |
| Windsor | 2131 | 1902 | 1833 |
| **QUÉBEC** | | | |
| Baic Comeau | 918 | 891 | 880 |
| Maniwaki | 1493 | 1274 | 1313 |
| Montréal | 1785 | 1699 | 1641 |
| Québec | 1548 | 1445 | 1365 |
| Sept-Îles | 823 | 848 | 792 |
| Sherbrooke | 1393 | 1150 | 1263 |
| **NEW BRUNSWICK** | | | |
| Charlo | 1091 | 1173 | 1075 |
| Fredericton | 1505 | 1290 | 1389 |
| Moncton | 1150 | 1227 | 1129 |
| **NOVA SCOTIA** | | | |
| Sydney | 1013 | 1151 | 1047 |
| Truro | 859 | * | * |
| Yarmouth | 1068 | 1100 | 995 |
| **PRINCE EDWARD ISLAND** | | | |
| Charlottetown | 1119 | 1243 | 1112 |
| **NEWFOUNDLAND** | | | |
| Gander | 680 | 947 | 838 |
| St. John's | 562 | 783 | 634 |
| Stephenville | 802 | 925 | 890 |



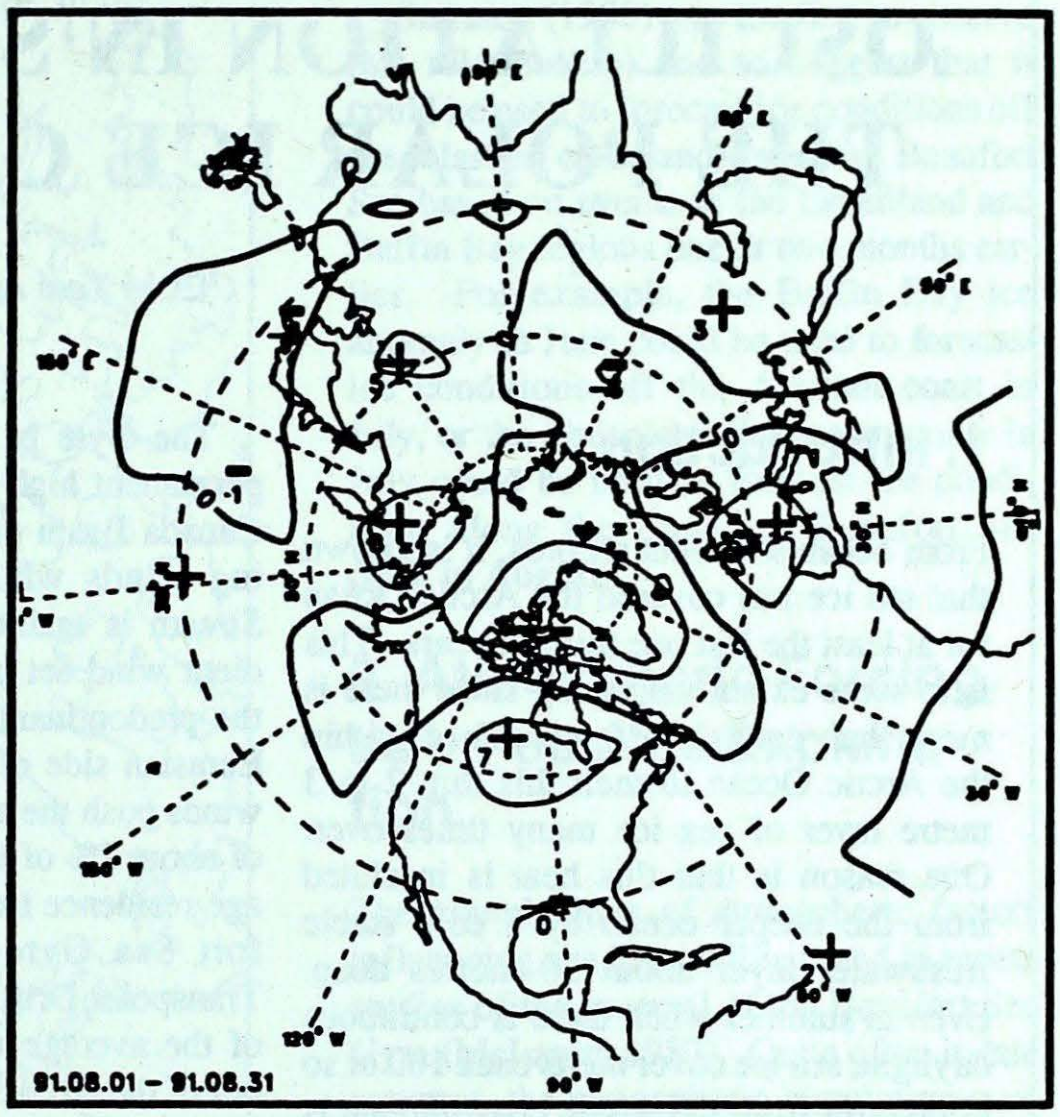



# 50-kPa ATMOSPHERIC CIRCULATION

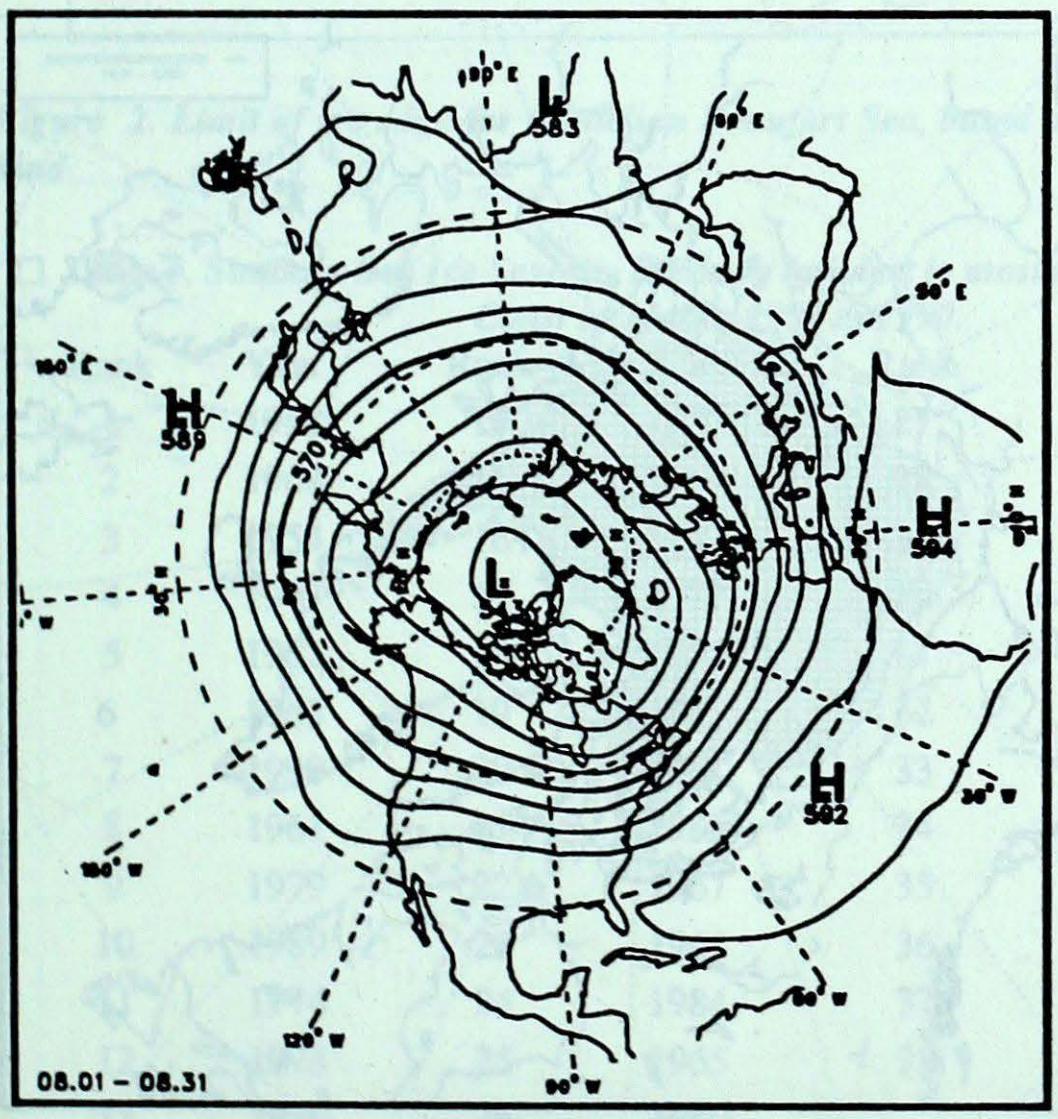
## August 1991



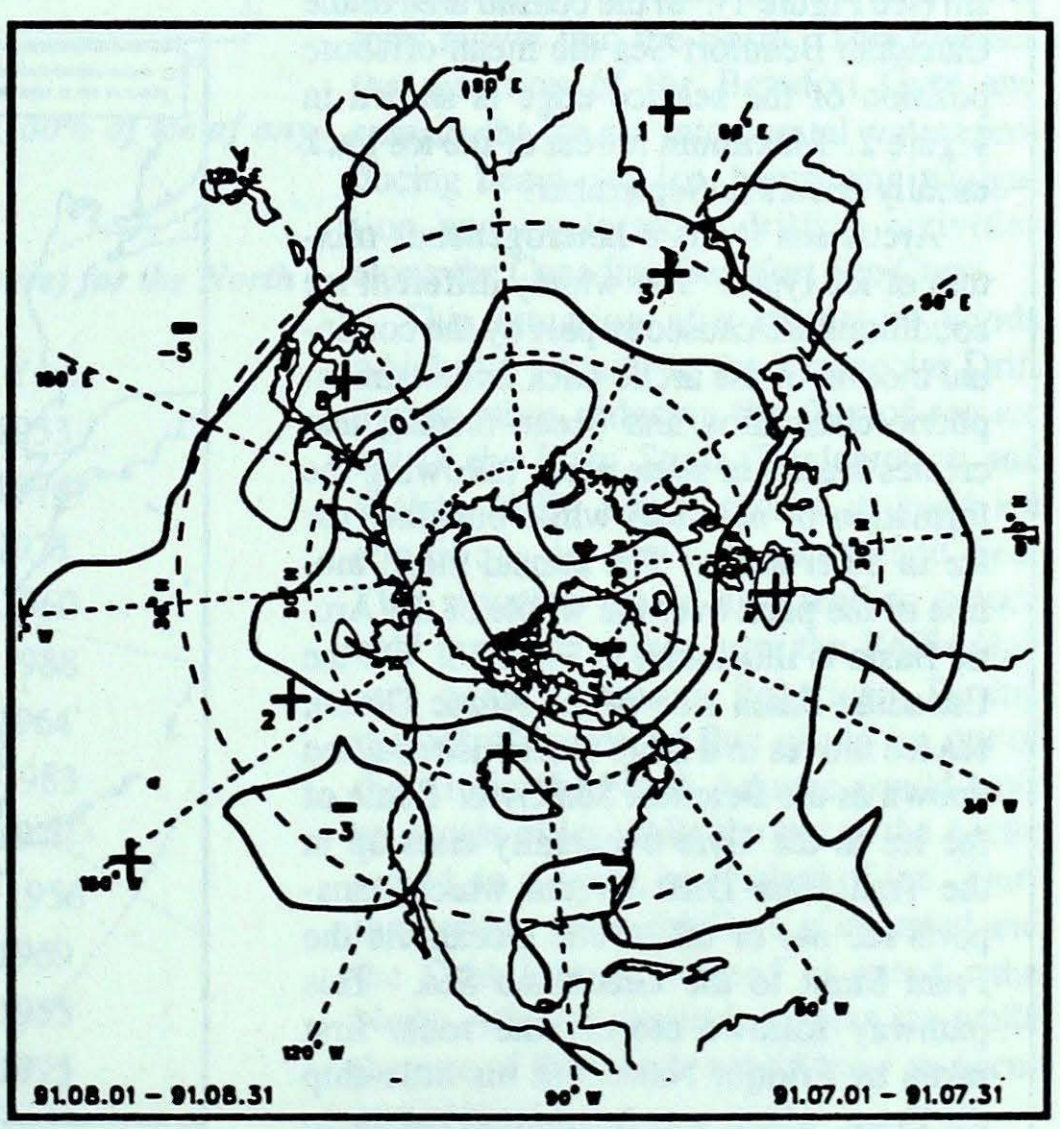

Mean geopotential heights
- 5 decametre interval -




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 -

# OSCILLATION IN SEA ICE EXTENT OVER THE POLAR ICE CAP DURING SUMMER

□ *by Tom Agnew and Arvids Silis*

## 1. Introduction

From ocean sediment records, it is known that sea ice has covered the Arctic Ocean for at least the last one million years. This is to some extent surprising since there is more than enough heat contained within the Arctic Ocean to melt this thin 2 to 3 metre layer of sea ice many times over. One reason is that this heat is insulated from the deeper ocean by a cold stable freshwater layer about 30 metres deep. Even in summer when there is continuous daylight, sea ice cover melts back 100 or so kilometres from the Arctic coastline but is maintained over the rest of the Arctic Basin (see Figure 1). In the coastal area of the Canadian Beaufort Sea the mean offshore position of the sea ice edge is shown in Figure 2. Maximum retreat of the ice pack usually occurs in September.

Arctic sea ice is a heterogeneous mixture of ice types. The widely different ice conditions are caused in part by the continual motion of the arctic pack under atmospheric circulation and ocean forcing that creates cracks in some areas (allowing the formation of new ice) while buckling the ice in other areas. The annual mean motion of the pack over the whole of the Arctic Basin is illustrated in Figure 3. On the Canadian Basin side of the Arctic Ocean, sea ice moves in a large clockwise rotation known as the Beaufort Sea Gyre. Some of the ice in the Gyre eventually ends up in the Transpolar Drift Stream which transports ice out of the Arctic Ocean via the Fram Strait to the Greenland Sea. This pathway follows closely the route first taken by Fridtjof Nansen in his little ship the Fram, which was frozen into the ice in the Laptev Sea in 1893 and ended up in the Greenland Sea four years later.

The Gyre is maintained by an almost permanent high pressure system over the Canada Basin producing clockwise rotating winds while the Transpolar Drift Stream is maintained by a pressure gradient wind set up between this High and the predominantly lower pressures on the Eurasian side of the Arctic Basin. These winds push the sea ice at an average speed of about 1% of the wind speed. The average residence time of sea ice in the Beaufort Sea Gyre is 5 years and in the Transpolar Drift about 3 years. Estimates of the average volume of ice transported out of the Arctic Ocean via the Fram Strait is 150,000 cubic metres per second.

## 2. Variations between the Canadian and Eurasian Side of the Basin

The extent of sea ice in various regions around the Arctic Basin can differ considerably from the mean conditions shown in Figure 1, especially in summer when shrinking of the ice cap makes the ice more mobile. For example, Figure 4 shows the sea ice anomaly for September 1968 when most of the western half of the Arctic Basin had less ice than normal while the seas bordering on the North Atlantic (Greenland, Barents) had more. This is a com-

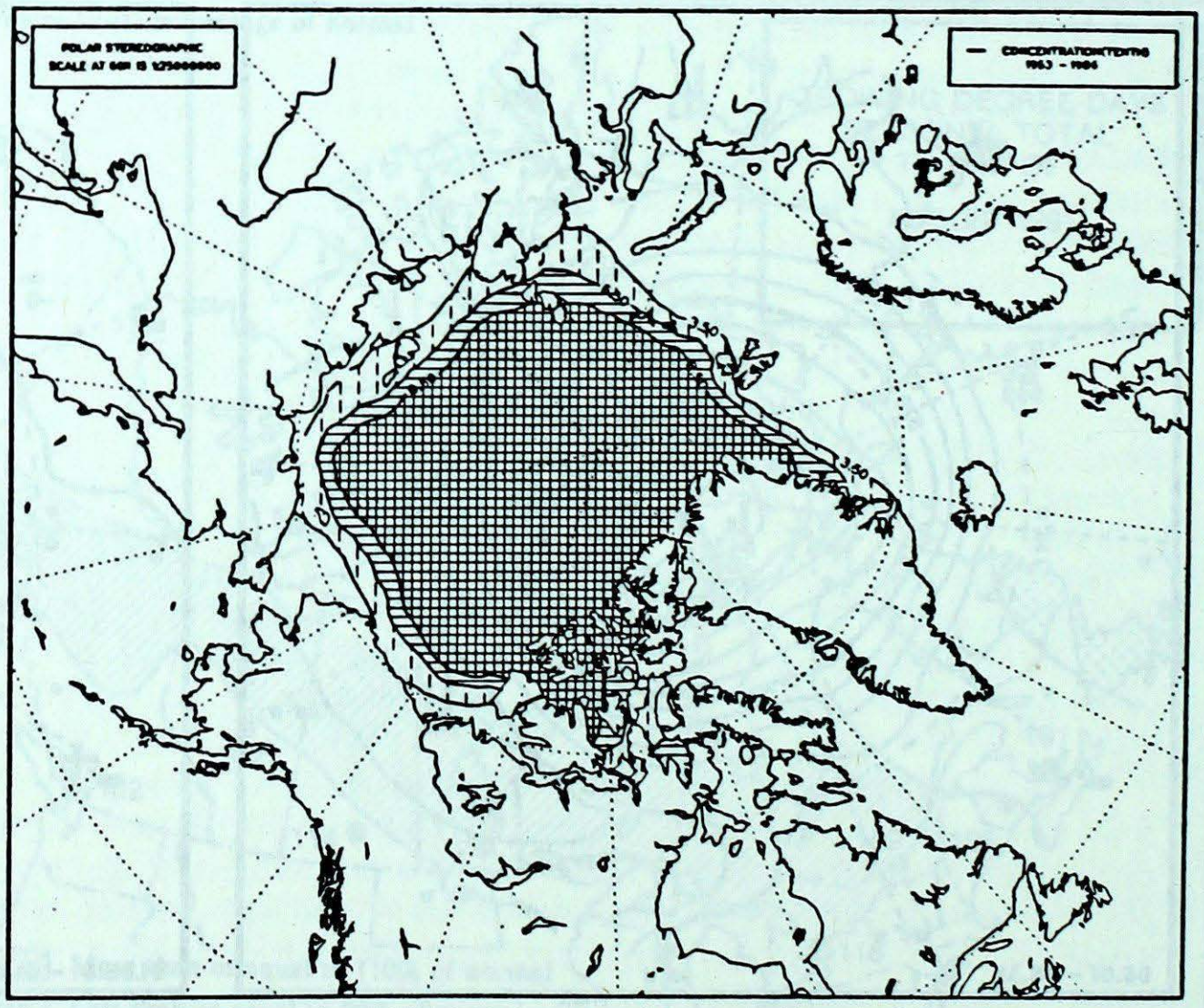


*Figure 1. Normal Sea Ice Cover (1953-88) for September. Vertical hatched area represents 4 to 6 tenths ice cover, horizontal hatched 7 and 8 tenths cover and cross hatched 9 and 10 tenths cover.*

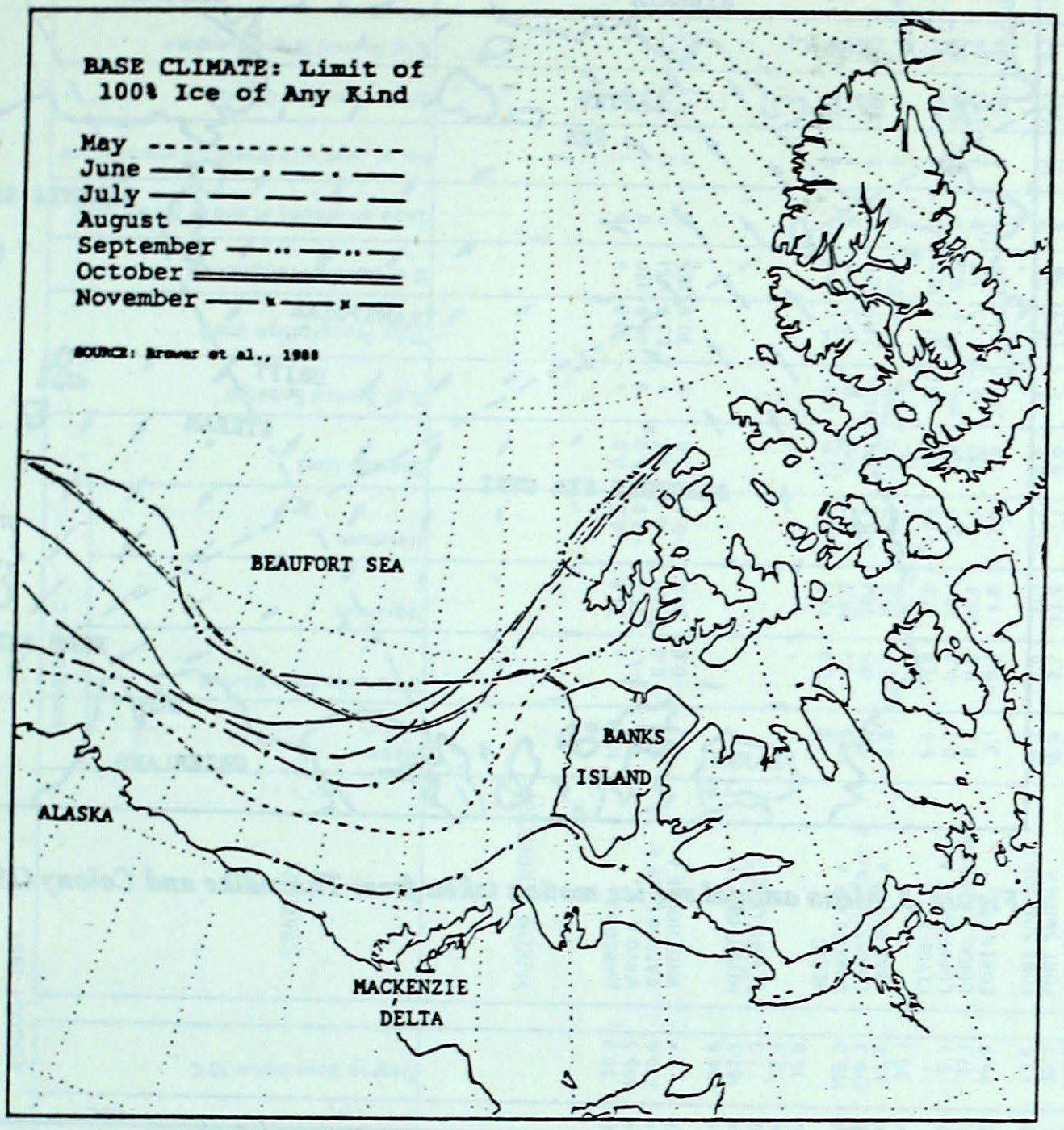



*Figure 2. Limit of ice edge for Canadian Beaufort Sea, based on 100% of ice of any kind*

☐ *Table 1. Summer Sea Ice Severity Ranking (mildest to most severe) for the North Coast of Alaska 1953 to 1990.*

| Rank | Year | Rank | Year | Rank | Year |
|---|---|---|---|---|---|
| 1 | 1958 | 14 | 1977 | 27 | 1953 |
| 2 | 1968 | 15 | 1959 | 28 | 1976 |
| 3 | 1954 | 16 | 1982 | 29 | 1971 |
| 4 | 1973 | 17 | 1972 | 30 | 1960 |
| 5 | 1962 | 18 | 1957 | 31 | 1988 |
| 6 | 1963 | 19 | 1987 | 32 | 1964 |
| 7 | 1990 | 20 | 1981 | 33 | 1983 |
| 8 | 1961 | 21 | 1985 | 34 | 1970 |
| 9 | 1979 | 22 | 1967 | 35 | 1956 |
| 10 | 1989 | 23 | 1966 | 36 | 1969 |
| 11 | 1974 | 24 | 1984 | 37 | 1955 |
| 12 | 1978 | 25 | 1965 | 38 | 1975 |
| 13 | 1986 | 26 | 1980 | | |

mon mode of east-west basin variation with conditions on the Canadian side of the Basin lagging the Eurasian side by several months.

Smirnov (1980) was the first to observe this relationship, and to suggest that it could be used to forecast ice conditions off the Alaskan coast and Canadian Beaufort Sea based on events in the Greenland and Baffin Bay regions one or two months earlier. For example, the Baffin Bay ice anomaly in June could be used to forecast ice conditions off the Alaskan coast in July, or the Greenland Sea ice anomaly in July could be used to forecast ice conditions along the Canadian Beaufort Sea coast in August.

## 3. Atmospheric Forcing as a Possible Explanation

The complexities of atmospheric factors influencing sea ice are illustrated in recent studies of the reversal of the Beaufort Sea Gyre (McLaren, 1987). Quite often in late summer, the atmospheric circulation over the Canada Basin reverses, and a quasi-permanent low pressure system or series of lows moves into the Basin. This reverses the direction of the Beaufort Gyre and spreads the ice out into coastal waters producing heavy sea ice, hampering navigation and exploratory drilling activities along the Canadian Beaufort Sea Coast.

This situation also results in winds which run counter to the Transpolar Drift Stream, thus reducing the flux of sea ice out of the Fram Strait (Englegretson and Walsh, 1989) which results in good ice conditions in the East Greenland Sea. This situation would also tend to reduce cold northerly winds over the Baffin Bay area again favouring light ice. During periods of increased flux of sea ice out of the Arctic, the North Atlantic would have an excess of ice while the rest of the Arctic would, in a sense, be flushed of ice. During periods when the Gyre is reversed and the Drift Stream reduced in speed, the North Atlantic would have less ice while the rest of the Arctic would have an accumulation of ice.

The recent years of 1989 and 1990 provide some support for this argument. The

US NOAA Navy Joint Ice Centre has analysed and ranked all the North Alaskan and Beaufort Sea summers over the last 38 years (Table 1) in terms of summer sea ice severity. The summers of 1989 and 1990 are ranked as the 7th and 10th mildest while the Baffin Bay/Davis Strait was particularly bad in terms of late winter and spring ice conditions in those years (see Climate Perspectives February 1991). The summer of 1968 is ranked as the second mildest on record. This year (1991), The late spring situation for eastern Canada was worse than normal again suggesting milder conditions in the Beaufort.

## 4. Conclusions

Monthly average pressure and wind patterns over the Arctic Basin can explain the contrast in heavy and light ice conditions between the eastern and western Arctic observed by Smirnov and others. Although using this to provide seasonal ice severity forecasts for the Beaufort Sea would be too qualitative it does suggest that there are large scale teleconnections between the eastern and western arctic which require further research.

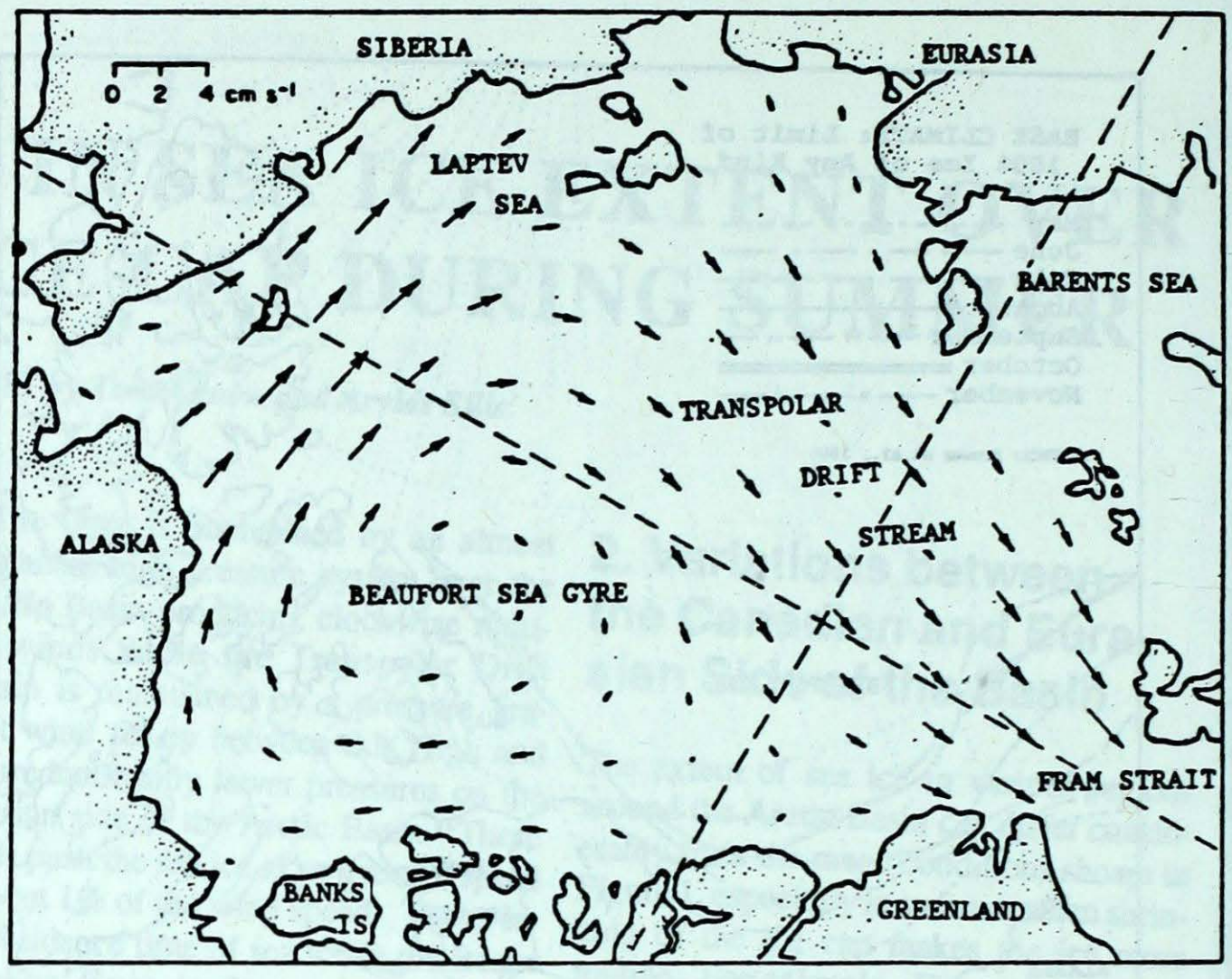



*Figure 3. Mean annual sea ice motion taken from Thorndike and Colony (1982)*

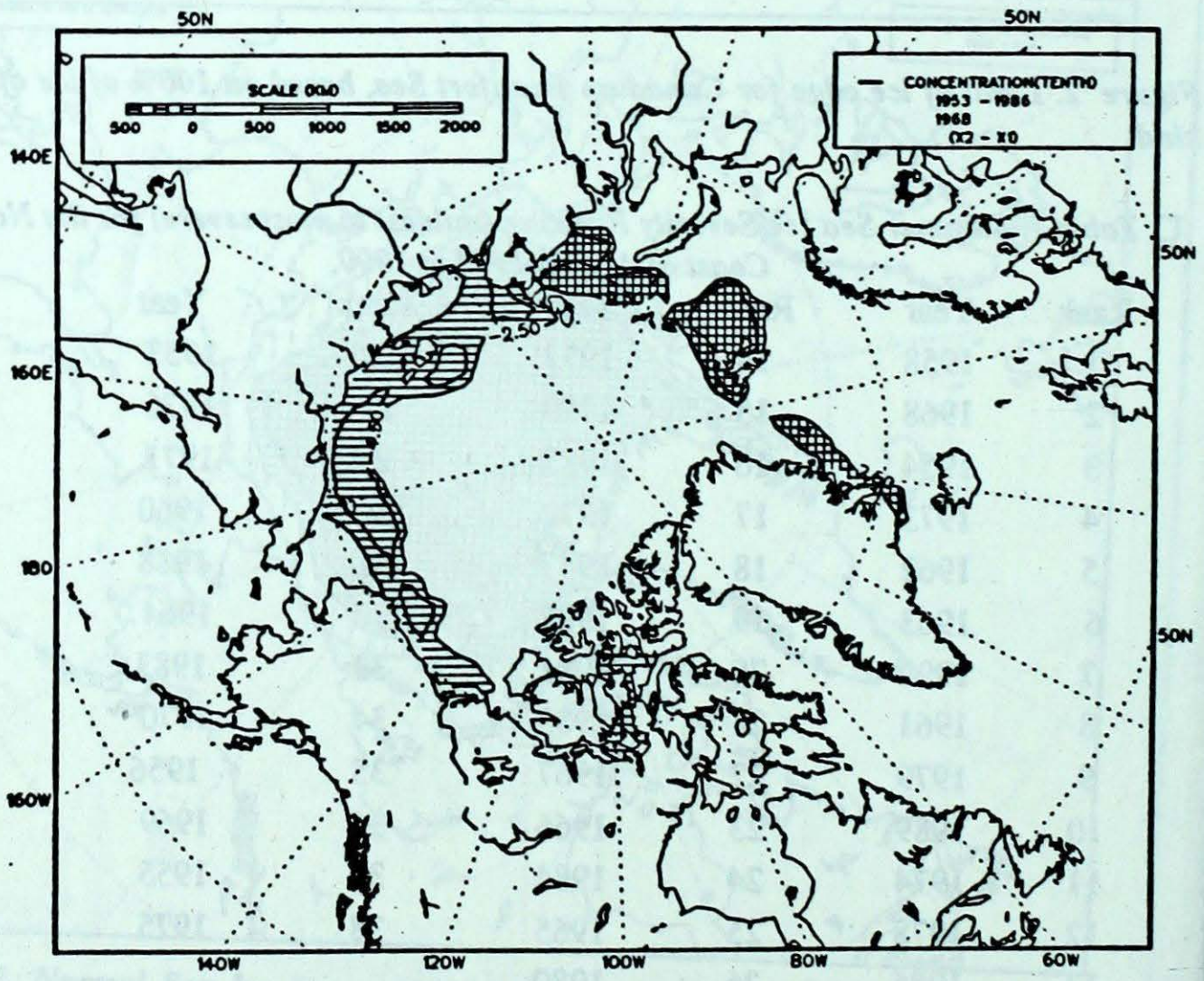



*Figure 4. Sea ice anomaly for September, 1968. Cross-hatched regions represent more ice than normal and horizontal-hatched regions less ice than normal.*

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| STATION | Temperature C Mean | Difference from Normal | Maximum | Minimum | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BRITISH COLUMBIA | | | | | | | | | | | | | |
| ABBOTSFORD A | 18.1 | 1.2 | 29.4 | 7.7 | 0.0 | * | 187.2 | 335 | 0 | 11 | 240 | 98 | 30.9 |
| ALERT BAY | 14.6 | 0.3 | 25.2 | 7.0 | 0.0 | * | 132.3 | 199 | 0 | 9 | * | * | 106.5 |
| AMPHITRITE POINT | 13.6 | -0.7 | 19.0 | 10.0 | 0.0 | * | 311.4 | 275 | 0 | 8 | * | * | 134.6 |
| BLUE RIVER A | 16.9 | 0.9 | 33.0 | 5.5 | 0.0 | * | 145.8 | 188 | 0 | 14 | 197 | 87 | * |
| CAPE ST JAMES | 13.6 | -0.2 | 21.3 | 9.2 | 0.0 | * | 114.3 | 145 | 0 | 11 | 209 | * | 134.6 |
| CAPE SCOTT | 13.6 | 0.1 | 17.9 | 10.1 | 0.0 | * | 266.5 | 236 | 0 | 12 | * | * | 167.5 |
| CASTLEGAR A | 20.6 | 0.8 | 34.8 | 5.5 | 0.0 | * | 19.7 | 43 | 0 | 2 | 274 | 100 | 7.3 |
| COMOX A | 17.7 | 0.7 | 27.4 | 10.8 | 0.0 | * | 103.0 | 232 | 0 | 8 | 272 | * | 32.3 |
| CRANBROOK A | 19.5 | 2.0 | 34.0 | 4.6 | 0.0 | * | 16.2 | 43 | 0 | 4 | 303 | 109 | 15.8 |
| DEASE LAKE | 11.8 | 0.2 | 29.5 | -1.1 | 0.4 | * | 80.8 | 154 | 0 | 14 | 185 | 91 | 196.3 |
| FORT NELSON A | 14.9 | 0.1 | 32.5 | 0.2 | 8.4 | * | 55.4 | 91 | 0 | 9 | 238 | * | 129.3 |
| FORT ST JOHN A | 16.5 | 2.1 | 31.9 | 2.6 | 0.0 | 0 | 23.9 | 40 | 0 | 7 | 257 | * | 65.4 |
| HOPE A | 18.8 | 0.4 | 30.5 | 7.4 | 0.0 | * | 99.9 | 199 | 0 | 11 | *** | *** | 30.1 |
| KAMLOOPS A | 21.2 | 1.4 | 35.3 | 8.5 | 0.0 | * | 37.2 | 135 | 0 | 8 | 251 | 90 | 9.3 |
| KELOWNA A | 20.3 | 2.2 | 35.4 | 6.4 | 0.0 | * | 43.8 | 136 | 0 | 8 | 244 | 94 | 17.1 |
| MACKENZIE A | 15.0 | 1.2 | 33.0 | 1.3 | 0.0 | * | 59.6 | 112 | 0 | 9 | 247 | 103 | 99.9 |
| PENTICTON A | 21.3 | 1.8 | 35.9 | 11.5 | 0.0 | * | 43.8 | 165 | 0 | 11 | 248 | 92 | 13.5 |
| PORT ALBERNI A | 18.3 | 0.7 | 32.5 | 7.7 | 0.0 | * | 202.9 | 468 | 0 | 9 | 244 | * | 32.2 |
| PORT HARDY A | 14.3 | 0.5 | 22.7 | 6.5 | 0.0 | * | 146.0 | 212 | 0 | 8 | 211 | 115 | 114.8 |
| PRINCE GEORGE A | 16.6 | 2.5 | 32.9 | 3.3 | 0.0 | * | 34.9 | 51 | 0 | 8 | 258 | 102 | 73.7 |
| PRINCE RUPERT A | 13.3 | 0.3 | 19.9 | 5.5 | 0.0 | * | 289.5 | 173 | 0 | 17 | 161 | 117 | 146.9 |
| PRINCETON A | 18.1 | 1.0 | * | 3.3 | 0.0 | * | 42.4 | 166 | 0 | * | 246 | * | * |
| REVELSTOKE A | 18.7 | 0.9 | 33.9 | 7.7 | 0.0 | * | 109.0 | 207 | 0 | 10 | 238 | 98 | 27.0 |
| SANDSPIT A | 14.7 | 0.0 | 24.0 | 7.7 | 0.0 | * | 146.9 | 297 | 0 | 13 | 170 | 97 | 108.0 |
| SMITHERS A | 15.3 | 1.2 | 33.2 | 2.6 | 0.0 | * | 37.1 | 85 | 0 | 6 | 239 | 102 | 103.9 |
| TERRACE A | 16.2 | 0.4 | 32.4 | 7.3 | 0.0 | * | 86.9 | 137 | 0 | 14 | 197 | 98 | 84.3 |
| VANCOUVER INT'L A | 18.0 | 0.9 | 26.2 | 10.7 | 0.0 | * | 170.0 | 414 | 0 | 12 | 220 | 86 | 30.0 |
| VICTORIA INT'L A | 16.4 | 0.3 | 28.0 | 7.0 | 0.0 | * | 75.6 | 283 | 0 | 7 | 253 | 93 | 53.7 |
| VICTORIA MARINE | 13.9 | -0.2 | 22.6 | 7.2 | 0.0 | * | 129.1 | 405 | 0 | 6 | * | * | 126.6 |
| WILLIAMS LAKE A | 16.2 | 1.2 | 30.5 | 0.9 | 0.0 | * | 38.6 | 91 | 0 | 9 | 216 | 78 | 75.5 |

| STATION | Temperature C Mean | Difference from Normal | Maximum | Minimum | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YUKON TERRITORY | | | | | | | | | | | | | |
| DAWSON A | 10.7 | * | 23.6 | -6.5 | 0.0 | * | 71.8 | * | 0 | * | * | * | * |
| MAYO A | 11.5 | -1.1 | 25.8 | -2.9 | 0.0 | 0 | 49.6 | 120 | 0 | * | * | * | * |
| WATSON LAKE A | 12.3 | -0.8 | 29.0 | 0.1 | 2.0 | * | 63.6 | 151 | 0 | 12 | 213 | 93 | 182.3 |
| WHITEHORSE A | 11.7 | -0.8 | 26.8 | -0.4 | 0.0 | 0 | 70.0 | 185 | 0 | 11 | 143 | 62 | 199.3 |
| NORTHWEST TERRITORIES | | | | | | | | | | | | | |
| ALERT | 1.8 | 0.9 | 13.5 | -6.4 | 25.0 | 120 | 25.4 | 90 | 9 | 8 | 214 | 104 | 505.6 |
| BAKER LAKE A | 10.9 | 1.2 | 28.0 | -0.1 | 0.0 | 0 | 37.2 | 100 | 0 | 6 | 254 | 120 | 227.4 |
| CAMBRIDGE BAY A | 7.0 | 0.5 | 26.1 | -0.7 | 3.4 | 567 | 29.0 | 104 | 0 | 8 | 226 | 129 | * |
| CAPE PARRY A | 3.6 | -1.8 | 15.9 | -4.2 | 4.0 | 250 | 29.4 | 106 | 0 | 6 | * | * | 443.3 |
| CLYDE A | 5.4 | 1.4 | 17.0 | -1.9 | 1.2 | 15 | 42.6 | 163 | 0 | 9 | 186 | 97 | 392.3 |
| COPPERMINE A | 8.7 | 0.0 | 28.1 | -2.5 | 0.4 | 100 | 39.4 | 102 | 0 | 10 | 226 | 118 | 276.1 |
| CORAL HARBOUR A | 8.2 | 0.8 | 25.4 | -1.3 | 0.0 | 0 | 23.5 | 53 | 0 | 2 | 293 | 130 | 302.5 |
| EUREKA | 3.1 | -0.2 | 9.8 | -2.0 | 5.6 | 207 | 26.4 | 228 | 0 | 5 | 155 | 65 | 462.5 |
| FORT SIMPSON A | 14.7 | 0.6 | 31.1 | -0.2 | 0.4 | * | 70.3 | 151 | 0 | 10 | 253 | 103 | 137.8 |
| FORT SMITH A | 16.9 | 2.7 | 33.9 | -1.1 | 0.0 | * | 33.2 | 78 | 0 | 11 | 277 | * | 91.1 |
| IQALUIT | 8.2 | 1.3 | 25.5 | 0.4 | 0.2 | 50 | 68.4 | 116 | 0 | 10 | 190 | 118 | 303.1 |
| HALL BEACH A | 6.2 | 1.6 | 24.8 | -0.6 | 0.4 | 22 | 39.8 | 98 | 0 | 7 | * | * | 364.8 |
| HAY RIVER A | 15.9 | 1.5 | 30.3 | 3.7 | 0.0 | * | 45.3 | 120 | 0 | 11 | * | * | 64.4 |
| INUVIK A | 9.1 | -1.6 | 23.3 | -4.1 | 8.0 | 242 | 73.2 | 168 | 0 | 10 | 198 | 92 | 276.3 |
| MOULD BAY A | 0.6 | -0.8 | 8.4 | -5.2 | 14.0 | 156 | 26.4 | 123 | 0 | 9 | 91 | 69 | 540.8 |
| NORMAN WELLS A | 13.4 | 0.0 | 29.3 | -1.2 | 0.0 | * | 14.9 | 25 | 0 | 3 | 257 | 108 | 158.1 |
| POND INLET A | 4.4 | * | 16.3 | -3.2 | 6.0 | * | 50.8 | * | 0 | 6 | 185 | * | 420.6 |
| RESOLUTE A | 1.3 | -1.1 | 11.2 | -3.4 | 9.6 | 143 | 29.2 | 94 | 0 | 6 | 108 | 68 | 518.8 |
| YELLOWKNIFE A | 15.4 | 1.3 | 30.7 | 3.5 | 0.0 | * | 62.9 | 143 | 0 | 9 | 293 | 102 | 118.5 |
| ALBERTA | | | | | | | | | | | | | |
| BANFF | 16.8 | 3.0 | 31.4 | 4.8 | 0.2 | 200 | 53.2 | 109 | 0 | 11 | * | * | 50.3 |
| CALGARY INT'L A | 18.1 | 2.9 | 32.7 | 6.2 | 0.0 | * | 64.2 | 116 | 0 | 6 | 291 | 103 | 36.9 |
| COLD LAKE A | 19.9 | 4.4 | 36.1 | 4.9 | 0.0 | * | 17.8 | 23 | 0 | 3 | 348 | 136 | 24.1 |
| CORONATION A | 16.7 | 0.6 | 29.6 | 4.8 | 0.0 | * | 70.8 | 137 | 0 | 9 | 353 | 123 | 47.6 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EDMONTON INT'L A | 18.2 | 3.4 | 32.3 | 4.0 | 0.0 | * | 77.6 | 99 | 0 | 9 | 285 | 101 | 29.6 |
| EDMONTON MUNICIPAL | 19.4 | 3.2 | 33.9 | 7.5 | 0.0 | * | 121.0 | 155 | 0 | 7 | 300 | 108 | 18.5 |
| EDMONTON NAMAO A | 18.6 | 3.0 | 33.1 | 6.6 | 0.0 | * | 64.8 | 88 | 0 | 7 | * | * | 27.6 |
| EDSON A | 15.9 | 2.5 | 30.7 | 2.4 | 0.0 | 0 | 88.0 | 101 | 0 | 10 | 262 | 106 | 80.7 |
| FORT CHIPEWYAN A | 18.6 | 4.3 | 34.0 | 5.0 | 0.0 | * | 21.8 | 44 | 0 | * | * | * | * |
| FORT MCMURRAY A | 18.8 | 4.0 | 37.0 | 5.0 | 0.0 | * | 22.4 | 29 | 0 | 6 | 294 | 118 | 49.6 |
| GRANDE PRAIRIE A | 17.2 | 2.4 | 32.3 | 2.9 | 0.0 | 0 | 76.9 | 127 | 0 | 10 | 267 | * | 56.8 |
| HIGH LEVEL A | 15.7 | 1.9 | 30.1 | 3.1 | 0.0 | * | 40.8 | 66 | 0 | 10 | 246 | 97 | 98.3 |
| JASPER | 16.1 | 1.9 | 31.6 | 2.5 | 0.0 | 0 | 109.2 | 225 | 0 | 11 | 233 | * | 76.4 |
| LETHBRIDGE A | 19.6 | 2.0 | 36.5 | 3.6 | 0.0 | 0 | 56.1 | 119 | 0 | 5 | 320 | * | 16.1 |
| MEDICINE HAT A | 21.4 | 2.5 | 38.3 | 6.9 | 0.0 | * | 49.7 | 137 | 0 | 8 | 315 | 107 | 4.4 |
| PEACE RIVER A | 17.7 | 3.5 | 33.0 | 4.0 | 0.0 | 0 | 42.0 | 84 | 0 | 9 | * | * | 55.7 |
| RED DEER A | 17.2 | 2.3 | 32.3 | 2.0 | 0.0 | 0 | 122.7 | 186 | 0 | 9 | * | * | 47.7 |
| ROCKY MTN HOUSE A | 16.0 | 1.7 | 30.1 | 1.0 | 0.0 | 0 | 90.8 | 118 | 0 | 8 | * | * | 71.5 |
| SLAVE LAKE A | 17.9 | 3.9 | 32.0 | 5.0 | 0.0 | * | 60.0 | 83 | 0 | 6 | 297 | 121 | 43.4 |
| WHITECOURT A | 17.2 | 3.3 | 30.3 | 2.7 | 0.0 | * | 34.8 | 39 | 0 | 9 | * | * | 54.1 |
| SASKATCHEWAN | | | | | | | | | | | | | |
| BROADVIEW | 18.5 | 2.2 | 31.6 | 7.1 | 0.0 | * | 162.2 | 277 | 0 | 9 | 285 | 96 | 26.6 |
| CREE LAKE | 17.9 | 4.1 | 35.8 | 4.5 | 0.0 | * | 65.8 | 98 | 0 | 4 | 290 | 117 | 68.8 |
| ESTEVAN A | 20.2 | 1.6 | 34.5 | 7.9 | 0.0 | * | 56.6 | 107 | 0 | 7 | 295 | 95 | 11.6 |
| HUDSON BAY A | 18.5 | * | 32.6 | 4.3 | 0.0 | * | 10.4 | * | 0 | 3 | 321 | * | 34.2 |
| KINDERSLEY | 20.7 | 3.3 | 37.4 | 6.8 | 0.0 | * | 19.4 | 52 | 0 | 4 | 330 | * | 8.3 |
| LA RONGE A | 19.0 | 4.2 | 36.1 | 4.6 | 0.0 | * | 39.5 | 60 | 0 | 5 | * | * | 39.5 |
| MEADOW LAKE A | 18.5 | * | 37.2 | 5.5 | 0.0 | * | 72.4 | * | 0 | 7 | 318 | * | 31.4 |
| MOOSE JAW A | 21.1 | 2.5 | 35.9 | 9.1 | 0.0 | * | 43.3 | 107 | 0 | 4 | 328 | 110 | 9.5 |
| NIPAWIN A | 19.5 | * | 35.4 | 5.8 | 0.0 | * | 28.6 | * | 0 | 5 | 336 | * | 20.7 |
| NORTH BATTLEFORD A | 20.7 | 3.9 | 37.9 | 8.5 | 0.0 | * | 50.8 | 111 | 0 | 5 | * | * | 6.8 |
| PRINCE ALBERT A | 19.8 | 3.9 | 35.2 | 6.9 | 0.0 | * | 17.4 | 33 | 0 | 6 | 339 | 127 | 14.1 |
| REGINA A | 20.3 | 2.5 | 35.1 | 8.2 | 0.0 | * | 41.2 | 92 | 0 | 4 | 304 | 103 | 12.1 |
| SASKATOON A | 21.0 | 3.8 | 35.5 | 7.5 | 0.0 | * | 14.0 | 37 | 0 | 7 | * | * | 5.8 |
| SWIFT CURRENT A | 19.5 | 2.0 | 35.6 | 8.4 | 0.0 | * | 40.6 | 94 | 0 | 6 | 337 | 113 | 15.2 |
| YORKTON A | 18.9 | 2.0 | 32.3 | 7.0 | 0.0 | * | 39.4 | 65 | 0 | 6 | 308 | 108 | 23.6 |
| MANITOBA | | | | | | | | | | | | | |
| BRANDON A | 19.1 | 1.6 | 35.4 | 7.2 | 0.0 | * | 30.0 | 46 | 0 | 6 | 324 | * | 20.4 |
| CHURCHILL A | 14.4 | 3.1 | 36.9 | 4.3 | 0.0 | * | 48.4 | 83 | 0 | 9 | 294 | 127 | 146.0 |
| DAUPHIN A | 18.9 | 1.8 | 33.9 | 5.4 | 0.0 | * | 17.0 | 27 | 0 | 7 | 319 | 116 | 29.0 |
| GILLAM A | 15.6 | 2.5 | 35.1 | 5.3 | 0.0 | 0 | 48.6 | 59 | 0 | 7 | * | * | 111.9 |
| GIMLI | 19.2 | * | 36.3 | 7.3 | 0.0 | * | 12.2 | * | 0 | 3 | 303 | 115 | 26.2 |
| ISLAND LAKE | 18.3 | 2.8 | 32.4 | 6.8 | 0.0 | * | 35.0 | 45 | 0 | 4 | * | * | 52.8 |
| LYNN LAKE A | 16.4 | 2.9 | 35.3 | 1.5 | 0.0 | * | 123.7 | 159 | 0 | 9 | 290 | 125 | 98.1 |

| STATION | Temperature C Mean | Difference from Normal | Maximum | Minimum | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NORWAY HOUSE A | 17.6 | * | 31.2 | 5.4 | 0.0 | * | 44.6 | * | 0 | 6 | * | * | 60.5 |
| PORTAGE LA PRAIRIE | 20.4 | 2.0 | 37.8 | 7.2 | 0.0 | * | 11.2 | 14 | 0 | 5 | * | * | 11.2 |
| THE PAS A | 19.1 | 3.0 | 32.9 | 7.7 | 0.0 | * | 26.9 | 47 | 0 | 7 | 334 | 129 | 26.0 |
| THOMPSON A | 15.9 | 2.7 | 34.6 | 1.9 | 0.0 | 0 | 59.2 | 67 | 0 | 7 | 284 | 124 | 101.9 |
| WINNIPEG INT'L A | 20.9 | 2.6 | 37.1 | 6.9 | 0.0 | * | 6.2 | 8 | 0 | 2 | 322 | 114 | 12.6 |
| ONTARIO | | | | | | | | | | | | | |
| BIG TROUT LAKE | 16.9 | 2.6 | 32.9 | 3.1 | 0.0 | * | 51.0 | 62 | 0 | 9 | 265 | * | 85.7 |
| EARLTON A | 17.6 | 1.4 | 33.0 | 0.9 | 0.0 | * | 80.6 | 97 | 0 | 12 | * | * | 62.2 |
| GERALDTON A | 16.8 | * | 33.6 | 0.5 | 0.0 | * | 46.2 | * | 0 | 10 | * | * | 79.7 |
| GORE BAY A | 20.2 | 2.0 | 32.0 | 9.0 | 0.0 | * | 21.8 | 29 | 0 | 5 | * | * | 8.6 |
| HAMILTON RBG | 21.8 | * | 33.9 | 11.7 | 0.0 | * | 53.6 | * | 0 | 6 | 273 | * | * |
| HAMILTON A | 20.2 | 0.2 | 32.4 | 8.4 | 0.0 | * | 38.2 | 52 | 0 | 7 | * | * | 6.6 |
| KAPUSKASING A | 16.6 | 1.3 | 33.2 | 0.3 | 0.0 | * | 107.7 | 116 | 0 | 10 | * | * | 76.7 |
| KENORA A | 20.8 | 3.2 | 33.8 | 8.6 | 0.0 | * | 20.8 | 24 | 0 | 2 | * | * | 16.0 |
| KINGSTON A | 20.6 | 1.0 | 31.0 | 8.6 | 0.0 | * | 74.8 | 102 | 0 | 8 | 234 | 92 | 5.0 |
| LONDON A | 20.7 | 1.2 | 32.3 | 8.0 | 0.0 | * | 52.0 | 65 | 0 | 9 | 241 | 98 | 5.4 |
| MOOSONEE | 15.1 | 0.8 | 34.8 | 1.8 | 0.0 | * | 88.6 | 112 | 0 | 11 | 221 | 103 | 111.2 |
| MUSKOKA A | 18.8 | 1.4 | 30.9 | 6.0 | 0.0 | * | 38.5 | 43 | 0 | 8 | * | * | 21.5 |
| NORTH BAY A | 18.4 | 1.4 | 30.6 | 3.8 | 0.0 | * | 61.1 | 62 | 0 | 8 | 239 | 102 | 37.2 |
| OTTAWA INT'L A | 20.9 | 1.7 | 34.8 | 8.9 | 0.0 | * | 63.6 | 72 | 0 | 8 | 244 | 100 | 10.9 |
| PETAWAWA A | 18.8 | 1.1 | 33.3 | 4.7 | 0.0 | * | 92.1 | 116 | 0 | 11 | * | * | 33.1 |
| PETERBOROUGH A | 19.3 | 0.6 | 34.3 | 4.2 | 0.0 | * | 36.6 | 49 | 0 | 8 | * | * | 22.1 |
| PICKLE LAKE | 18.0 | 2.9 | 32.9 | 3.2 | 0.0 | * | 39.6 | 38 | 0 | 3 | * | * | 60.6 |
| RED LAKE A | 18.3 | 2.0 | 32.8 | 3.0 | 0.0 | * | 57.0 | 64 | 0 | 4 | 290 | * | 46.8 |
| ST CATHARINES A | 21.7 | 0.8 | 33.9 | 11.0 | 0.0 | * | 55.4 | 73 | 0 | 8 | 279 | * | 0.8 |
| SARNIA A | 21.0 | 0.5 | 33.5 | 7.6 | 0.0 | * | 51.8 | 102 | 0 | 9 | 281 | 112 | 5.8 |
| SAULT STE MARIE A | 18.7 | 1.8 | 32.8 | 6.1 | 0.0 | * | 43.0 | 52 | 0 | 5 | 293 | 118 | 32.5 |
| SIOUX LOOKOUT A | 19.2 | 2.6 | 33.6 | 5.9 | 0.0 | * | 65.0 | 74 | 0 | 4 | * | * | 32.3 |
| SUDBURY A | 18.9 | 1.6 | 31.4 | 6.8 | 0.0 | * | 44.9 | 54 | 0 | 6 | 256 | 102 | 33.6 |
| THUNDER BAY A | 18.3 | 1.9 | 34.6 | 3.2 | 0.0 | * | 33.4 | 40 | 0 | 4 | 279 | 109 | 48.1 |
| TIMMINS A | 16.8 | 1.3 | 34.4 | 0.5 | 0.0 | * | 86.1 | 96 | 0 | 8 | * | * | 78.7 |
| TORONTO | 22.5 | * | 34.0 | 14.5 | 0.0 | * | 83.6 | * | 0 | 5 | * | * | 0.0 |
| TORONTO INT'L A | 21.1 | 1.4 | 33.0 | 10.2 | 0.0 | * | 91.4 | 119 | 0 | 8 | * | * | 2.5 |
| TORONTO ISLAND A | 21.5 | * | 33.8 | 13.0 | 0.0 | * | 75.2 | * | 0 | 7 | * | * | 0.5 |
| TRENTON A | 20.5 | 0.8 | 31.2 | 7.7 | 0.0 | * | 75.4 | 105 | 0 | 12 | * | * | 6.3 |
| WATERLOO WELLINGTON | 19.8 | 0.9 | 31.7 | 8.5 | 0.0 | * | 47.8 | 60 | 0 | 7 | * | * | 10.3 |
| WAWA A | 15.9 | * | 28.8 | 4.0 | 0.0 | * | 115.0 | * | 0 | 8 | * | * | 71.1 |
| WIARTON A | 19.8 | 1.7 | 30.9 | 8.3 | 0.0 | * | 22.5 | 26 | 0 | 5 | 297 | 116 | 11.8 |
| WINDSOR A | 22.5 | 1.2 | 32.7 | 11.3 | 0.0 | * | 97.4 | 116 | 0 | 7 | * | * | 0.6 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Difference from Normal | Maximum | Minimum | | | | | | | | | |
| QUEBEC | | | | | | | | | | | | | |
| BAGOTVILLE A | 17.7 | 1.3 | 31.8 | 4.6 | 0.0 | * | 115.5 | 116 | 0 | 14 | * | * | 48.3 |
| BAIE COMEAU A | 15.1 | 0.5 | 30.1 | 3.1 | 0.0 | * | 54.4 | 57 | 0 | 10 | 230 | 115 | 99.1 |
| BLANC SABLON A | 11.3 | -0.5 | 21.3 | 2.4 | 0.0 | * | 85.8 | 78 | 0 | 12 | 189 | * | 205.3 |
| CHIBOUGAMAU CHAPAIS | 15.8 | * | 30.9 | 0.7 | 0.0 | * | 118.4 | * | 0 | 13 | 219 | 106 | 82.7 |
| GASPE A | 15.8 | * | 30.7 | 3.9 | 0.0 | * | 160.8 | * | 0 | 11 | 220 | * | 84.5 |
| INUKJUAK A | 11.2 | 2.3 | 25.4 | 2.9 | 0.0 | * | 61.8 | 95 | 0 | 7 | 212 | 145 | 214.7 |
| KUUJJUAQ A | 10.4 | 0.0 | 26.9 | -0.4 | 0.0 | 0 | 30.8 | 48 | 0 | 11 | 161 | 96 | 234.1 |
| KUUJJUARAPIK A | 12.7 | 2.3 | 16.3 | 9.1 | 0.0 | * | 62.8 | 67 | 0 | 10 | 175 | 105 | 164.6 |
| LA GRANDE IV A | 13.4 | * | 27.3 | 0.8 | 0.0 | * | 118.0 | * | 0 | 11 | 204 | * | 142.4 |
| LA GRANDE RIVIERE A | 10.0 | * | 30.2 | 2.3 | 0.0 | * | 119.0 | * | 0 | 12 | 225 | * | 141.3 |
| MANIWAKI | 18.4 | 1.4 | 31.1 | 4.1 | 0.0 | * | 121.2 | 133 | 0 | 13 | 213 | 95 | 35.6 |
| MONT JOLI A | 16.8 | 0.8 | 29.1 | 5.9 | 0.0 | * | 124.0 | 157 | 0 | 12 | 212 | 87 | 69.4 |
| MONTREAL INT'L A | 20.7 | 1.1 | 31.4 | 7.8 | 0.0 | * | 111.6 | 121 | 0 | 11 | 234 | 98 | 11.0 |
| MONTREAL MIRABEL I/ | 19.5 | * | 31.1 | 6.1 | 0.0 | * | 101.2 | * | 0 | 12 | * | * | 23.7 |
| NATASHQUAN A | 13.7 | 0.4 | 24.9 | 1.5 | 0.0 | * | 82.6 | 79 | 0 | 11 | 240 | 104 | 133.5 |
| QUEBEC A | 19.2 | 1.7 | 30.1 | 7.6 | 0.0 | * | 121.0 | 103 | 0 | 12 | 229 | 105 | 19.9 |
| ROBERVAL A | 18.2 | 1.8 | 32.3 | 5.0 | 0.0 | * | 121.4 | 123 | 0 | 16 | 238 | * | 45.1 |
| SCHEFFERVILLE A | 12.0 | 1.2 | 23.8 | 0.7 | 0.0 | 0 | 100.0 | 102 | 0 | 13 | 178 | 116 | 185.8 |
| SEPT-ILES A | 14.7 | 0.6 | 29.6 | 2.0 | 0.0 | * | 74.1 | 71 | * | 13 | 242 | 108 | 110.0 |
| SHERBROOKE A | 18.0 | 1.5 | 29.4 | 4.1 | 0.0 | * | 152.7 | 116 | 0 | 16 | 225 | * | 37.3 |
| STE AGATHE DES MONT | 17.8 | 1.5 | 27.8 | 4.2 | 0.0 | * | 157.0 | 147 | 0 | 14 | 238 | 100 | 44.3 |
| ST HUBERT A | 20.6 | 1.4 | 32.3 | 7.3 | 0.0 | * | 78.0 | 81 | 0 | 11 | 232 | * | 14.3 |
| VAL D'OR A | 16.7 | 1.2 | 31.5 | 2.6 | * | * | 119.4 | 118 | 0 | 12 | 217 | 92 | 75.2 |
| NEW BRUNSWICK | | | | | | | | | | | | | |
| CHARLO A | 17.7 | 1.3 | 32.1 | 4.0 | 0.0 | * | 148.9 | 142 | 0 | 16 | 232 | 95 | 43.8 |
| CHATHAM A | 18.8 | 0.8 | 33.1 | 4.4 | 0.0 | * | 184.3 | 221 | 0 | 13 | 209 | 88 | 33.0 |
| FREDERICTON A | 19.1 | 0.9 | 32.7 | 5.5 | 0.0 | * | 181.4 | 209 | 0 | 11 | * | * | 25.9 |
| MONCTON A | 18.5 | 0.9 | 30.7 | 3.7 | 0.0 | * | 149.5 | 190 | 0 | 12 | 228 | 99 | 30.9 |
| SAINT JOHN A | 17.6 | 1.0 | 28.2 | 6.6 | 0.0 | * | 168.2 | 165 | 0 | 11 | 205 | 96 | 34.2 |

| 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 | | | | | | | | | |
| NOVA SCOTIA | | | | | | | | | | | | | |
| GREENWOOD A | 19.5 | 1.2 | 31.0 | 4.5 | 0.0 | * | 165.1 | 183 | 0 | 10 | * | * | 20.0 |
| HALIFAX INT'L A | 19.2 | 1.1 | 31.2 | 7.4 | 0.0 | * | 131.1 | 118 | 0 | 9 | * | * | 22.3 |
| SABLE ISLAND | 17.7 | 0.1 | 23.7 | 6.1 | 0.0 | * | 82.8 | 71 | 0 | 6 | 208 | 112 | 26.4 |
| SHEARWATER A | 18.9 | 1.1 | 29.2 | 9.1 | 0.0 | * | 137.2 | 140 | 0 | 11 | 230 | 102 | 19.1 |
| SYDNEY A | 17.6 | 0.0 | 30.9 | 6.5 | 0.0 | * | 112.5 | 111 | 0 | 10 | 221 | 98 | 45.6 |
| YARMOUTH A | 17.4 | 1.0 | 26.1 | 8.8 | 0.0 | * | 160.4 | 165 | 0 | 10 | 225 | 108 | 30.5 |
| PRINCE EDWARD ISLAND | | | | | | | | | | | | | |
| CHARLOTTETOWN A | 18.1 | 0.3 | 28.7 | 6.3 | 0.0 | * | 209.6 | 238 | 0 | 13 | * | * | 37.7 |
| NEWFOUNDLAND | | | | | | | | | | | | | |
| BONAVISTA | 13.4 | -1.6 | 27.0 | 5.7 | 0.0 | * | 107.2 | 129 | 0 | 13 | * | * | 145.9 |
| BURGEO | 14.3 | -0.4 | 22.0 | 7.1 | 0.0 | * | 151.5 | 103 | 0 | 13 | * | * | 113.5 |
| CARTWRIGHT | 11.7 | -0.3 | 27.6 | 2.5 | 0.0 | * | 126.0 | 154 | 0 | 17 | 196 | 112 | 191.3 |
| CHURCHILL FALLS A | 13.1 | 1.1 | 25.0 | 3.1 | 0.0 | * | 93.9 | 95 | 0 | 11 | 200 | 117 | 154.0 |
| COMFORT COVE | 13.9 | -1.4 | 27.0 | 5.4 | 0.0 | * | 172.8 | 164 | 0 | 14 | * | * | 138.2 |
| DANIELS HARBOUR | 13.8 | -0.7 | 17.3 | 8.7 | 0.0 | * | 103.2 | 90 | 0 | 14 | 199 | 111 | 149.5 |
| DEER LAKE A | 14.1 | -1.2 | 28.9 | 1.1 | 0.0 | * | 126.9 | 125 | 0 | 12 | * | * | 128.1 |
| GANDER INT'L A | 14.2 | -1.4 | 28.1 | 5.5 | 0.0 | * | 119.0 | 122 | 0 | 15 | 181 | 97 | 127.3 |
| GOOSE A | 14.6 | 0.3 | 28.3 | 0.5 | * | * | 90.6 | 88 | * | 12 | 206 | 117 | 118.9 |
| MARY'S HARBOUR | 11.6 | 0.7 | 27.5 | 0.4 | 0.0 | * | 78.6 | 96 | 0 | 12 | * | * | 209.4 |
| PORT AUX BASQUES | 14.5 | -0.2 | 22.1 | 7.1 | 0.0 | * | 140.1 | 122 | 0 | 10 | 195 | * | 108.6 |
| ST ANTHONY | 11.4 | -0.7 | 24.8 | 2.9 | 0.0 | * | 95.4 | 70 | 0 | 11 | * | * | 302.2 |
| ST JOHN'S A | 14.3 | -1.0 | 25.9 | 2.5 | 0.0 | * | 109.8 | 90 | 0 | 11 | 161 | 87 | 120.2 |
| ST LAWRENCE | 14.2 | 0.3 | 23.5 | 3.8 | 0.0 | * | 62.3 | 44 | 0 | 9 | * | * | 117.2 |
| STEPHENVILLE A | 15.1 | -1.0 | 26.8 | 5.7 | * | * | 126.6 | 122 | * | 12 | 188 | 101 | 84.7 |
| WABUSH LAKE A | 13.3 | 1.5 | 24.7 | 3.1 | 0.0 | * | 102.1 | 108 | 0 | 11 | 244 | 128 | 147.2 |

**The data from agroclimatological stations (Agriculture Canada) were not available at the time of printing.**