Environment Canada Environnement Canada

Climatic Perspectives

ARCH C.1

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CLIMATIC HIGHLIGHTS

Heavy rainfalls along the B.C. coastline during the winter months are not unusual. The amount of precipitation that fell along the south coast this month during two events, November 8 to 13 and November 21 to 24, however was exceptionally high.

The heaviest precipitation occurred in the upper Fraser Valley, where the coastal mountains played an important role. Another area of heavy precipitation was the west coast of Vancouver Island near Gold River. The rainfalls have been the result of a series of strengthening weather systems approaching the British Columbia coastline. The first event began on November 8. During this period, Hope received 418.8 mm of rain. The second event, little more than a week later, netted Hope another 247.8 mm, for a combined total of 666.6 mm. Gold River and Port Alice, situated on Vancouver Island, were close behind with total accumulations for both periods of 634.4 and 479.2 millimetres respectively.

At Hope, the one, two and three-day rainfall accumulations of 173.2, 303.6 and 328.7 millimetres, respectively, can be expected to reoccur less than once every one hundred years. At Abbotsford, the 142.6 mm rainfall in two days can be expected to reoccur statistically once every 35 years. The return periods for Chilliwack and Gold River for the 5-day precipitation amounts of 245.3 and 354.2 millimetres, respectively, are 25 years.

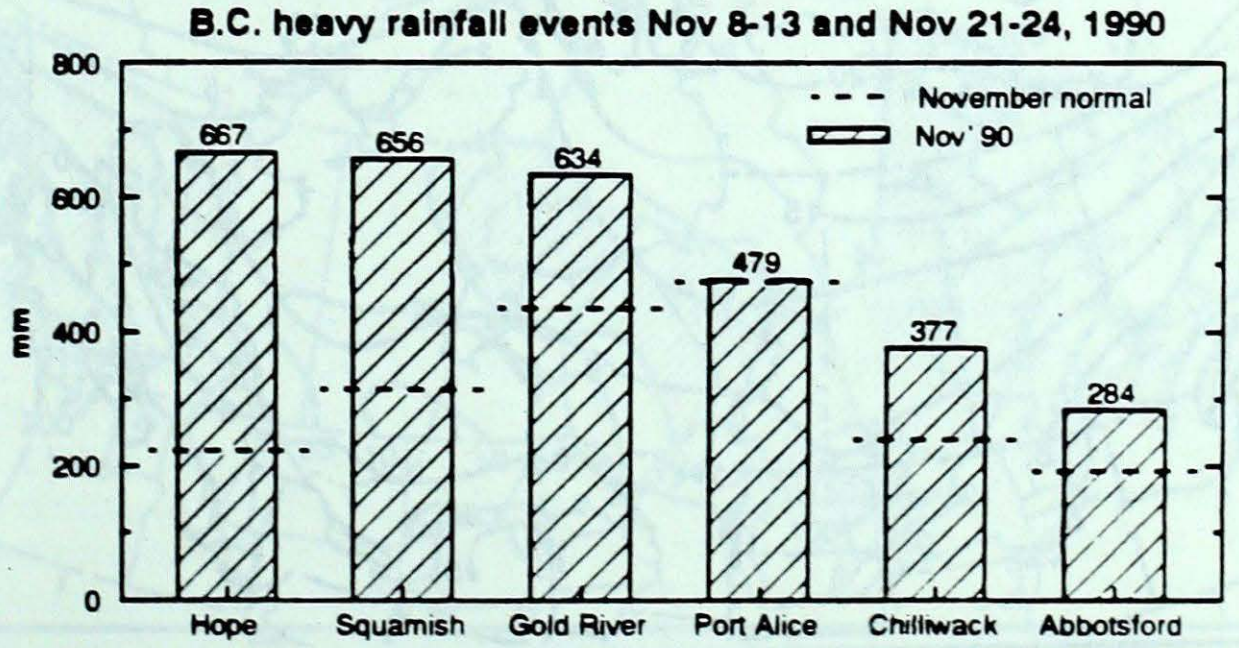
The extensive flooding that resulted was aggravated by melting snow from the mountains due to the higher freezing levels. Landslides and bridge washouts closed some of the main highways, including the Trans Canada, linking Vancouver with the rest of the province. Several rivers, flowing into the lower Fraser river crested their banks and caused heavy flooding, especially in the Chilliwack River Valley. Evacuations were also necessary on Vancouver Island at Tahsis and Sayward. In all, damage estimates are near $10 million.

Record Snowfalls

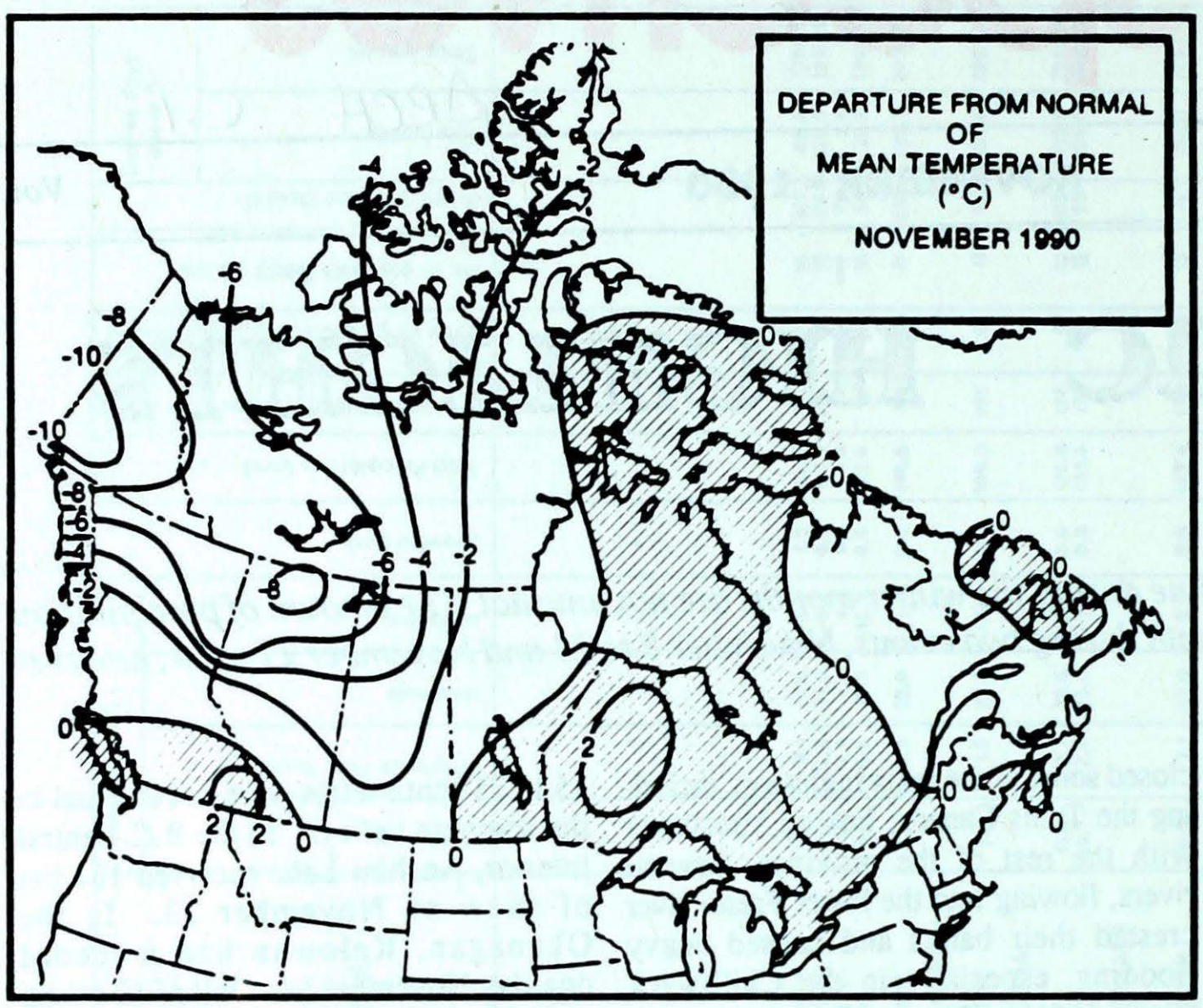
During the second heavy precipitation event that began on November 21, the precipitation spread a lot further inland falling in the southern interior partly in the form of heavy snow. Snowfalls of 15 to 25 centimetres were not unusual in the southern valleys. In the B.C. central interior, Anahim Lake received 131 cm of snow on November 23. In the Okanagan, Kelowna had a record one-day November snowfall of 17 cm on the 24th. Record snowfalls of 25 to 50 centimetres were reported in southern Alberta. More than 100 cm of snow fell at Waterton National Park, Crow's Nest Pass, Kananaskis Country and Sunshine Village in Banff National Park. The ski resort of Sunshine Village has received 231 cm of snow since the opening of the ski season in mid-month - the best start to the ski season since the resort opened in 1935.

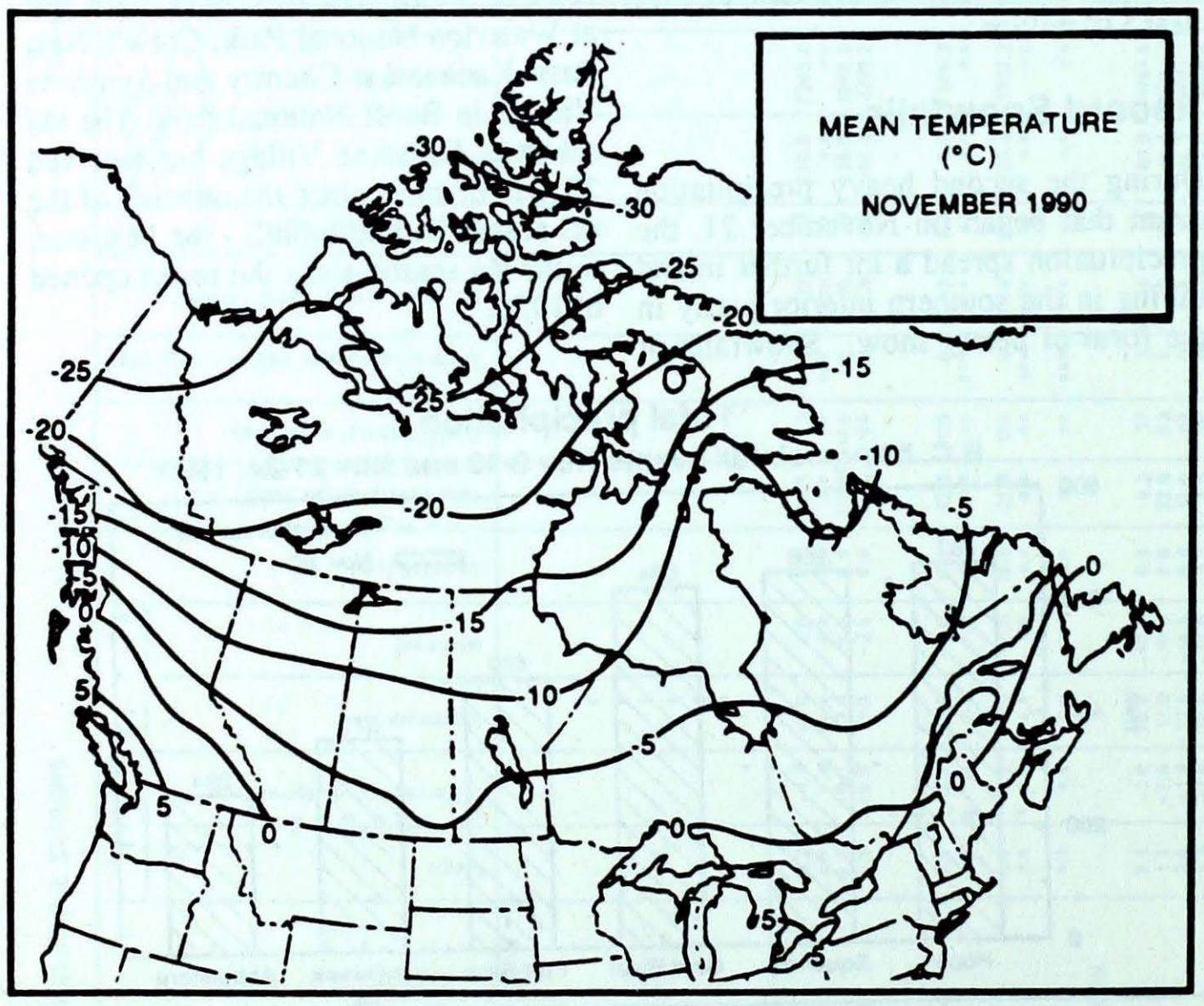
Total precipitation

B.C. heavy rainfall events Nov 8-13 and Nov 21-24, 1990



Canada





Across the country

Yukon and Northwest Territories

In the Yukon, November was record-setting cold. All areas dipped down to the minus thirties and forties, with the first minus fifty of the season also being recorded. The highest daily temperature was 3.5°C, at Tuchitua on the 7th. The coldest reading was -50.0°C, on November 12, at Ogilvie located on the Dempster Highway. Whitehorse had measurable precipitation on 20 days this month, a new record. This was 8 days more than it usually snows in November. By month's end, the northern Yukon had sunk into the Arctic night and the southern Yukon was making do with just slightly more than 6 hours of daylight. Ice roads were completed on the rivers, opening the Dempster Highway to Inuvik.

In the Northwest Territories, November was also cold throughout, with below normal precipitation in the Arctic Islands and above normal amounts in the District of Keewatin. Eureka reported the lowest temperature in the Islands, a minimum of -43.0°C. The warmest temperature in the district occurred at Rankin Inlet, where the mercury peaked at -1.6°C.

The Arctic region had very little precipitation during the month. Alert, Eureka and Resolute Bay received only 3.4, 2.6 and 1.4 millimetres, respectively. In contrast, Rankin Inlet, Baker Lake and Coral Harbour tallied much higher than normal amounts, 37.4, 23.5 and 31.6 millimetres, as compared to normals of 19.1, 16.5 and 18.0 millimetres, respectively.

British Columbia

A winter-like weather pattern established itself. Coastal regions experienced several wind storms and the southwest had two very heavy rainfall events.

Arctic air was felt in the northeastern sections of the province, and on occasion, penetrated southwards. In the far north, freeze up began early, and by month's end, ice roads and ice bridge building was in full swing. A persistent southwesterly cir-

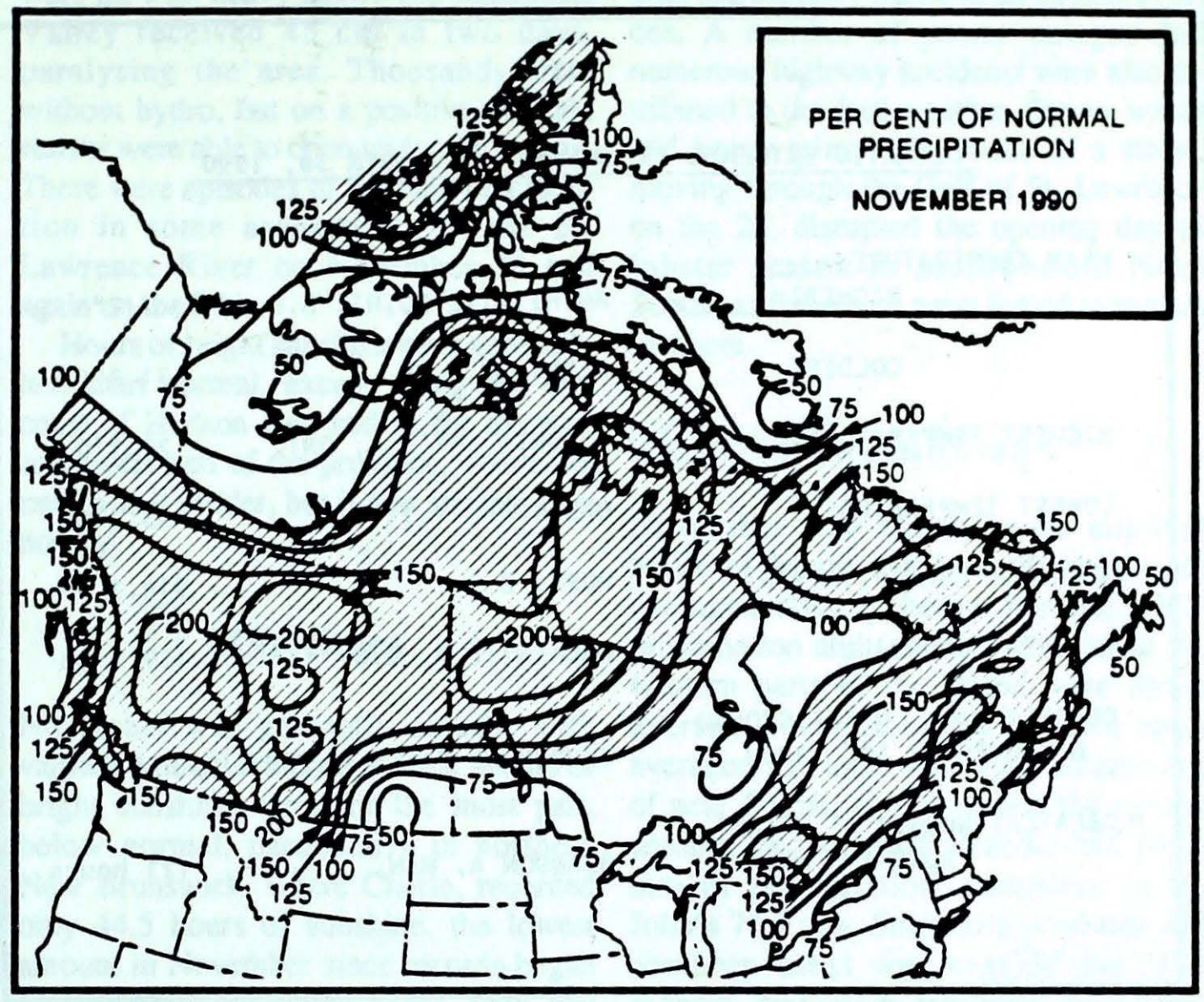
culation kept the southern fringes of the province mild.

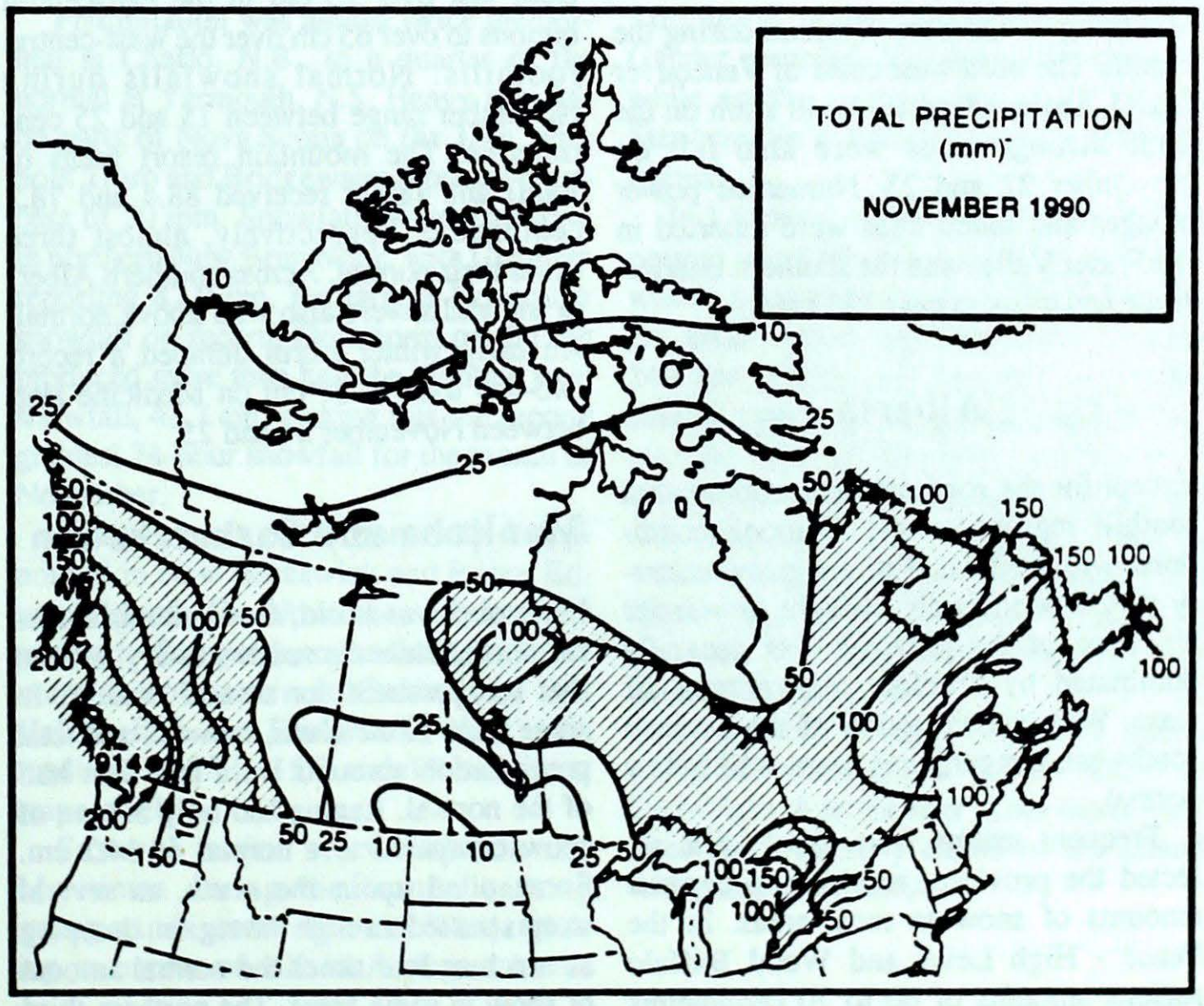
Precipitation amounts varied widely. Coastal areas recorded more than double their normal amounts. At Hope, in the eastern Fraser Valley, precipitation was four times the average. East of Hope, a rain shadow effect was noticeable, as precipitation decreased to only two or three times the normal. Record-high November precipitation values were established at: Abbotsford, 391.0 mm; Lytton, 142.4 mm; Mackenzie, 155.7 mm; Prince George, 104.1 mm; Princeton, 122.4; Revelstoke, 185.2 mm; Victoria, 270.6 mm; Whistler, 399.7 mm and Williams Lake, 92.2 mm. The most startling record was at Hope, 914.1 mm of precipitation, a new all-time record for any month. The two month total for October-November at Hope now stands at 1417.0 mm, which is startling when compared to an annual average of 1715.8 mm for the whole year.

Most of November's precipitation in southwestern B.C. came from two separate rainstorms, November 8 to 12 and November 21 to 24. The maximum one-day precipitation value was reported at Hope on November 9, 173.1 mm. sRiver runoff was aggravated by snowmelt in the mountains. Serious flooding occurred in the Fraser Valley, the Squamish area and the Sayward region on Vancouver Island, causing millions of dollars in damages.

Just as residents were cleaning up from the first event, a second storm brought more heavy rain and snow. The maximum one-day precipitation amount for this storm was 176.0 mm reported at Port Alice on the 22nd.

Snowfalls were above average in most areas of the province. Most of the central and northern interior had monthly snowfalls at least twice the average. Kleena Kleene reported five times their normal monthly snowfall. There was a report of a one day snowfall of 131 cm in the Anahim Lake area on November 23rd. That same day saw 10 to 30 centimetre snowfalls across much of the southern interior. Record monthly snowfalls were reported at: Blue River, 119.2 cm; Mackenzie, 139.3 cm; Prince George, 97.0 cm; Prince Rupert, 45.6 cm; and Williams Lake, 85.1 cm. Some interior and higher level coastal





CLIMATIC EXTREMES IN CANADA - NOVEMBER 30, 1990

MEAN TEMPERATURE:		
HIGHEST	AMPHITRITE POINT, B.C.	7.7°C
COLDEST	ALERT, N.W.T.	-31.3°C
HIGHEST TEMPERATURE:	TORONTO INT'L A, ONT.	22.1°C
LOWEST TEMPERATURE:	DAWSON A, Y.T.	-45.3°C
HEAVIEST PRECIPITATION:	HOPE, B.C.	914.1 mm
HEAVIEST SNOWFALL:	MACKENZIE A, B.C.	139.3 cm
DEEPEST SNOW ON THE GROUND ON NOVEMBER 30, 1990	CHURCHILL FALLS A, NFLD.	88 cm
GREATEST NUMBER OF BRIGHT SUNSHINE HOURS:	BRANDON A, MAN.	121 hours

ski resorts were open by the third week of the month.

Strong winds were common during the month. The northwest coast of Vancouver Island, had wind gusts to 140 km/h on the 2nd. Strong winds were also felt on November 22 and 23. Numerous power outages and fallen trees were reported in the Fraser Valley and the southern interior. Hope had gusts to near 120 km/h.

Alberta

Except for the southern and southwestern foothill regions, where Chinook conditions, with associated strong gusty westerly winds periodically brought in warmer air, most of the province was generally dominated by a colder than normal air mass. With the exception of the extreme southwest, temperatures were well below normal.

Frequent storms from the Pacific affected the province, resulting in copious amounts of snow to most areas. In the Peace - High Level and Wood Buffalo regions amounts of 60 to 70 centimetres were reported. In the central regions snowfalls were more variable. Amounts ranged from just over 25 cm in the east-central regions to over 65 cm over the west-central foothills. Normal snowfalls during November range between 15 and 25 centimetres. The mountain resort areas of Banff and Jasper received 88.4 and 78.2 centimetres, respectively, almost three times their normal. Across southern Alberta snowfalls were also well above normal. An early winter storm dumped a record two-day total of 57 cm on Medicine Hat, between November 24 and 25.

Manitoba and Saskatchewan

November was a cold, snowy month across the north, while the south was dry, a trend that has persisted for several months. In some areas of the south, snowfall and total precipitation amounts were less than half of the normal. Regina had only 3.2 cm of snow compared to a normal of 14.2 cm. Snow piled up in the north, as several storms passed through the region, dumping as much as four times the normal amount of snow in some areas. The northern third of both Saskatchewan and Manitoba received more than twice their normal November snowfall. At Stony Rapids, 100.4 cm fell compared to a normal of 25.2 cm, which is 80 percent of the normal annual snowfall.

Cold Arctic air invaded the northern portions of the region several times during the month, sending minimum temperatures to -40°C and colder at some locations. Low temperature honours go to Stony Rapids with a new record low temperature of -41.9° on the 26th. Cree Lake was a close second with -41.8°C. In the south, the first three weeks of November were mild, but the last nine days were well-below normal. Several high temperature records were broken in the south early in the month. The highest temperature, although not a record, was 17.8 at Moose Jaw, Sask.

Sunshine amounts were generally within 10 hours of normal. Churchill reported the least sunshine, 30.6 hours (normal 49.5), while Brandon received the most, 121.1 hours (normal 91.8).

Ontario

Overall, November was mild, sunny and rather dry. This is in sharp contrast from last year, when frigid snowy weather served as a precursor to the coldest December of the century.

Extra sunshine turned a traditionally grey and cloudy month into, if not a sunny month, then at least one that was "less grey" than usual. Most areas enjoying 10 to 60 hours more sun than normal. Hamilton's Botanical Gardens were the sunniest, 129 hours or 59 hours above normal, making this their brightest November in 29 years of record.

In south-central and western Ontario, it was the warmest November since 1975. London had the highest mean November temperature since the all-time warm November in 1975. In Toronto, this was the ninth warmest November in 151 years of record. Elsewhere, November ranked as the second warmest of the past decade. Also of note, were three warm spells that featured a host of record or near-record daily maximums. At Wawa, a 15.9°C high on the 1st set an all time November record, while Toronto City's 15.6°C high on

November 27, broke the record daily high that was set way back in 1896.

Snowfall and precipitation was generally less than normal, except to the lee of the Great Lakes. A good portion of southern Ontario had their driest November in ten years. London was one wet exception, receiving 105 mm of moisture, although this still was their driest November since 1986. North Bay was Ontario's wettest locale, 155 mm, the most since 1969. In contrast, the driest area was in Kenora.

Snowfalls were light in the south and in far northern and northwestern Ontario. In the south, Windsor's meagre trace of snow was their least since 1963. Generally amounts were less than 10 cm, which is less than half the normal. In the north and northwest, snowfalls of 20 to 40 cm were more common, while in the central sections snowfall was much heavier, with totals in the 40 to 60 cm range or as much as 2 1/2 times the normal. Gore Bay on Manitoulin Island recorded the greatest amount, 65 cm; their second snowiest November since 1947, and 39 cm above normal.

Quebec

With some exceptions, mean temperatures averaged within one degree of normal. Blanc Sablon on the north shore established a new record high November mean of 1.7°C, breaking the old record set in 1969. The month ended on a warm note, with a number of temperature records being broken on the 28th.

Precipitation was on the heavy side. Bagotville received twice the November normal and set a new precipitation record for the month, 146.5 mm. Except for the extreme southwest, snowfalls exceeded 25 cm. Blanc Sablon set a new November snowfall record of 101.4 cm, beating the previous record of 89.1 cm set in 1986. The first major snowfall to hit the southern areas of the province occurred on November 3. On the 6th, the Abitibi region and central and eastern Quebec received between 20 and 30 centimetres of snow. On the weekend of the 10th and 11th, the Eastern Townships and the Gaspé Peninsula were hit with heavy snow. The Matapedia Valley received 45 cm in two days, paralysing the area. Thousands were without hydro, but on a positive note ski resorts were able to open up for the season. There were episodes of freezing precipitation in some areas north of the St. Lawrence River on November 22 and again on the 27th.

Hours of bright sunshine were generally less than normal, except along the east coast of Hudson Bay and in the extreme southwest part of the province, where not only was it milder, but it was sunnier than normal.

Maritimes

November was generally cloudy, with varying amounts of precipitation. Hours of bright sunshine were for the most part, below normal, particularly in northern New Brunswick, where Charlo, recorded only 44.5 hours of sunshine, the lowest amount in November since records began in 1967. Charlottetown, P.E.I. only had 48.7 hours, 38 percent below normal and lowest November total since 1951.

Precipitation was almost twice the normal at Charlo, N.B., to a quarter of the normal at Yarmouth, N.S. Heavy rain fell on parts of Nova Scotia on the 18th, with both Truro and Bridgewater reported in excess of 70 mm. Snowfalls were excessive in northern New Brunswick, with Chatham reporting 82.0 cm, the largest November snowfall on record. One storm on the 6th produced more than half the month's total snowfall, 43.7 cm, making this the second greatest 24-hour snowfall for the month of November.

Temperatures were generally below normal in New Brunswick and Prince Edward Island. On November 28, a warm southerly flow produced record high maximum temperatures at Greenwood and Halifax N.S. and Fredericton, N.B., with readings of 18.1, 15.0 and 17.1 degrees, respectively.

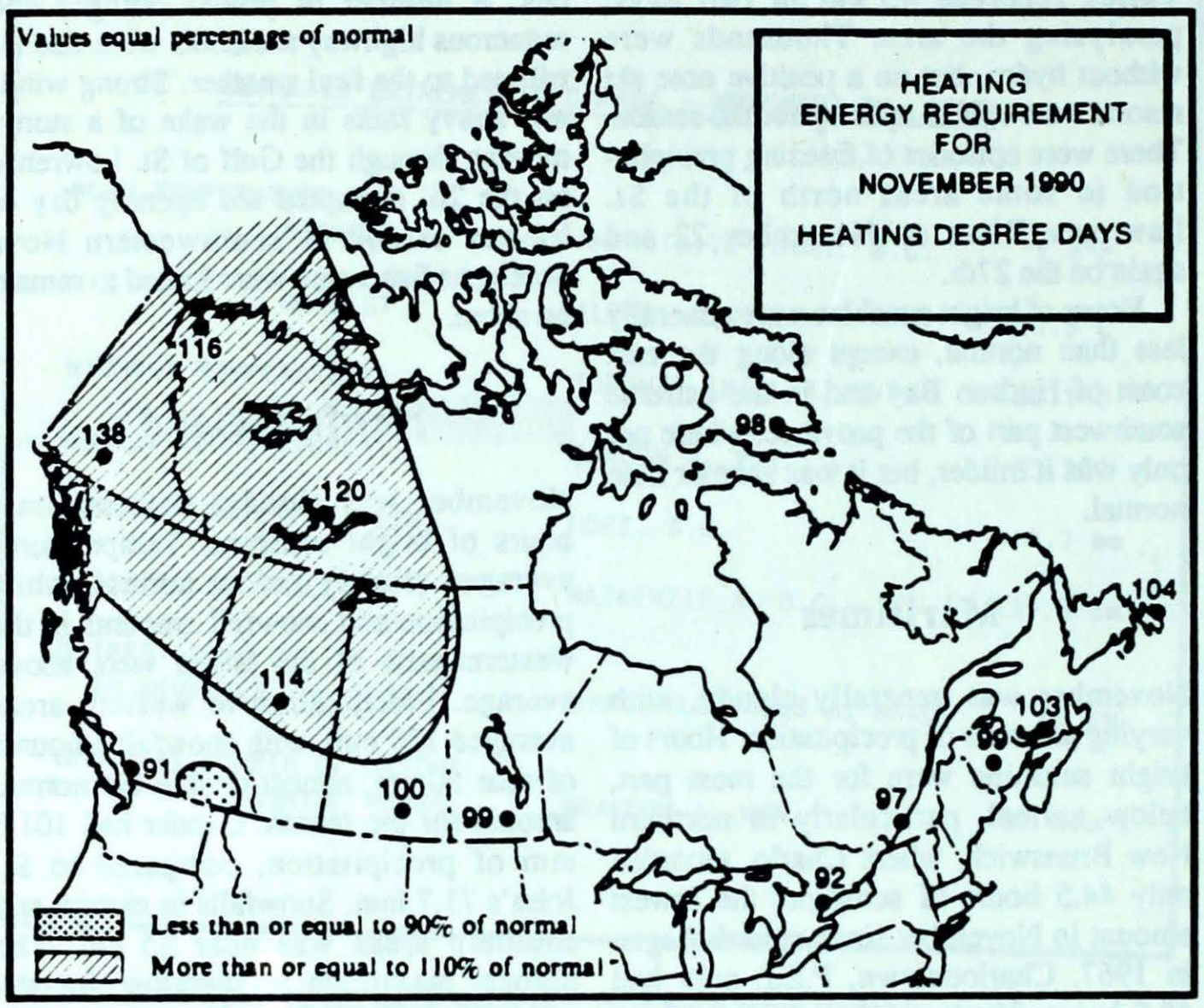
Several major storms struck the Maritimes during the month, causing strong winds, snow and rain. Winds gusting in excess of 100 km/h played havoc with marine ferry traffic in all three provinces. A number of power outages and numerous highway accidents were also attributed to the foul weather. Strong winds and heavy rains in the wake of a storm, moving through the Gulf of St. Lawrence on the 26, disrupted the opening day of lobster season in southwestern Nova Scotia, as fishermen were forced to remain on shore.

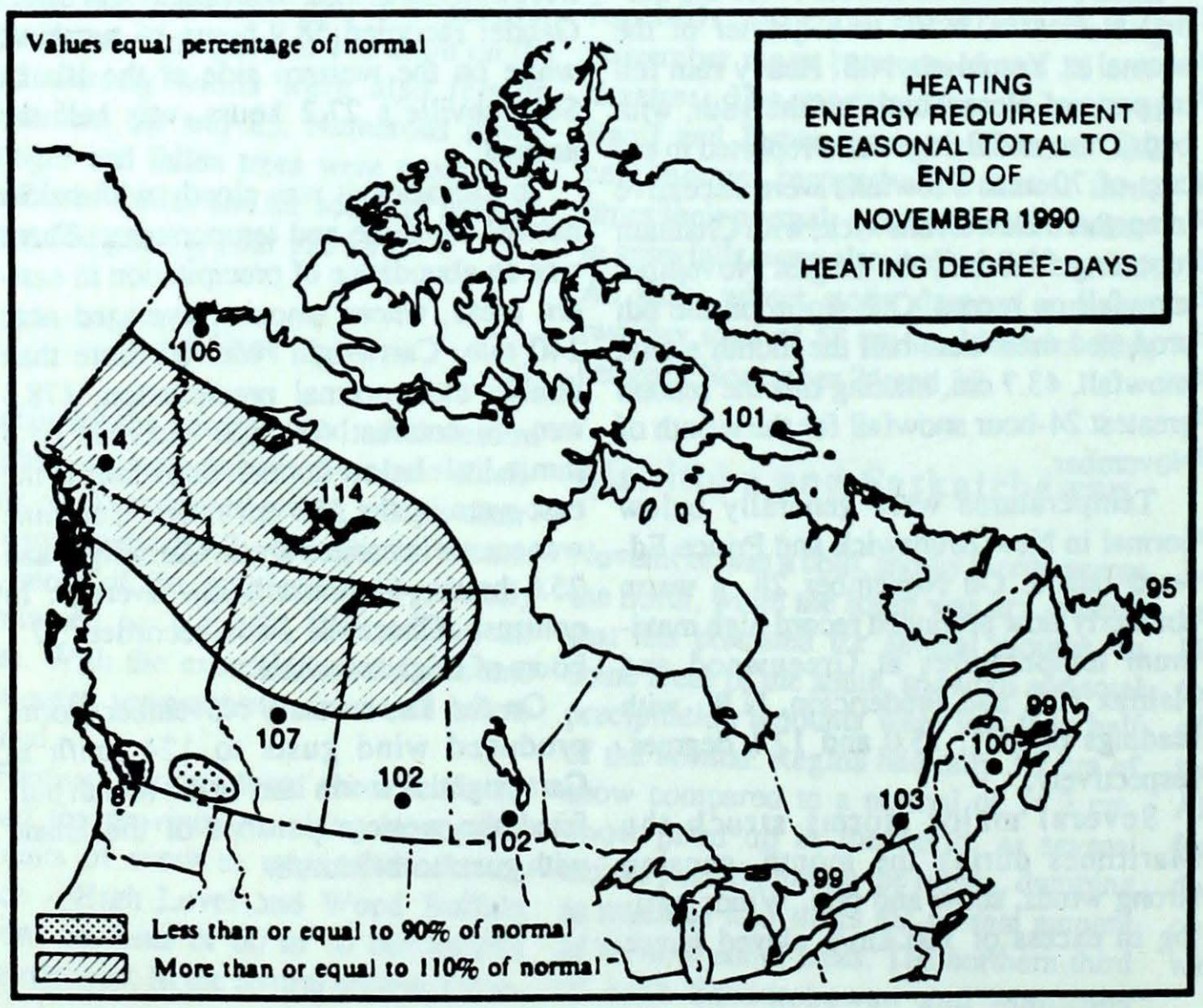
Newfoundland

November was cloudy, with minimal hours of bright sunshine. Temperatures averaged slightly below normal, while precipitation and snowfall amounts in the western parts of the Island were above average. Precipitation in western areas averaged 130 mm, with snowfall amounts of near 50 cm, almost double the normal amount for the month. Gander had 101.6 mm of precipitation, compared to St. John's 71.7 mm. Snowfalls in eastern and southern areas was near 35 cm. The highest maximum temperature for the month was 17.2°C, at St. John's. The lowest minimum reading was -8.9°C at Stephenville and Daniel's Harbour. Gander recorded 58.9 hours of sunshine, while on the western side of the Island, Stephenville's 27.2 hours, was half the normal.

In Labrador, it was cloudy with below normal sunshine and temperatures. There was an abundance of precipitation in eastern areas, where amounts averaged near 140 mm. Cartwright received more than double their normal precipitation, 178.5 mm. In contrast, Wabush recorded 65.5 mm, a little below normal. Snowfalls in the east were in the 100 cm range. Sunshine was scarce in eastern areas. Cartwright had 25.6 hours, 44 hours below average. In contrast, Churchill Falls recorded 57.7 hours of bright sunshine.

On the 1st, an early November storm, produced wind gusts to 124 km/h at Cartwright. A storm later in the month buffeted the western portions of the Island with gusts to 143 km/h.



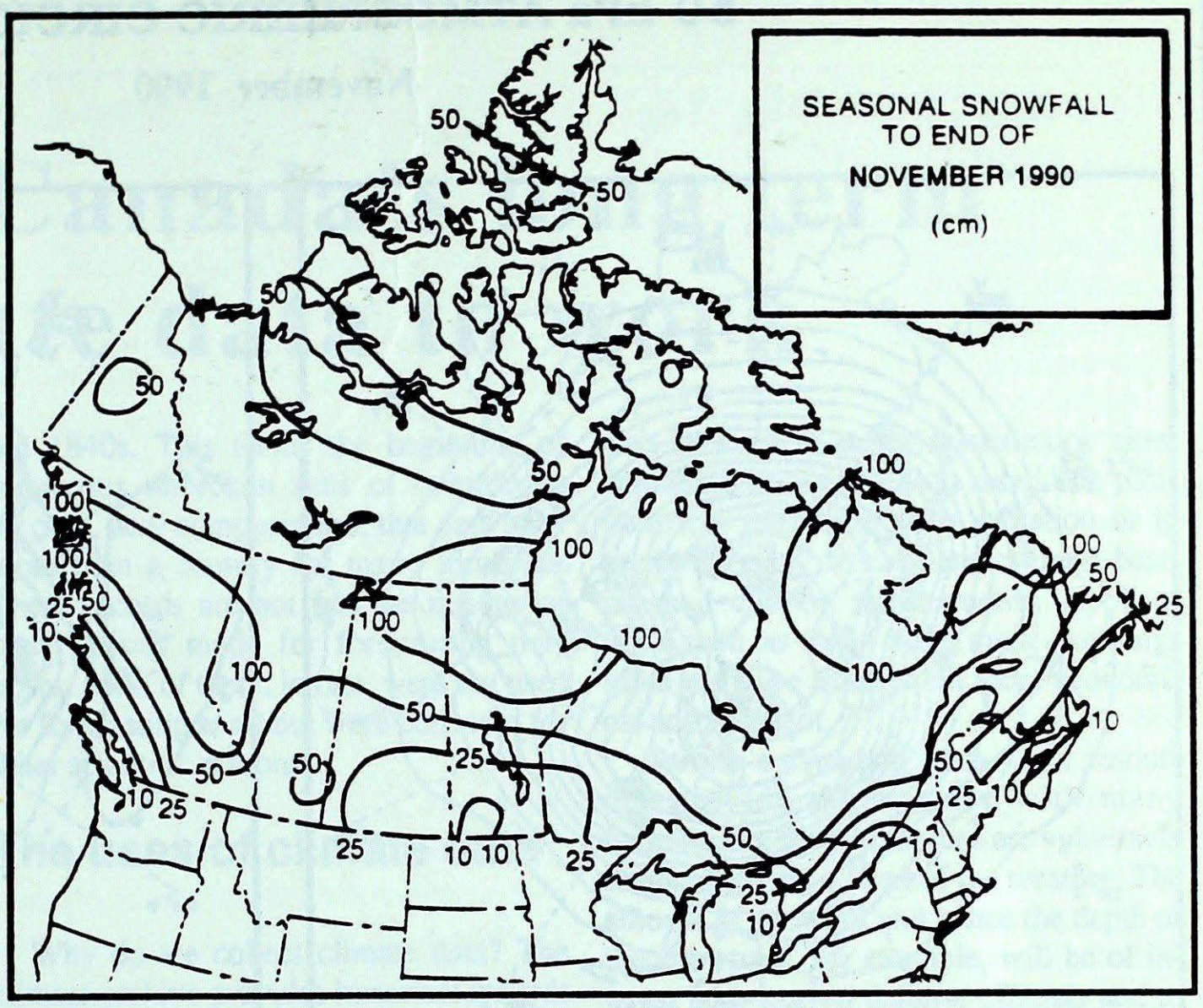


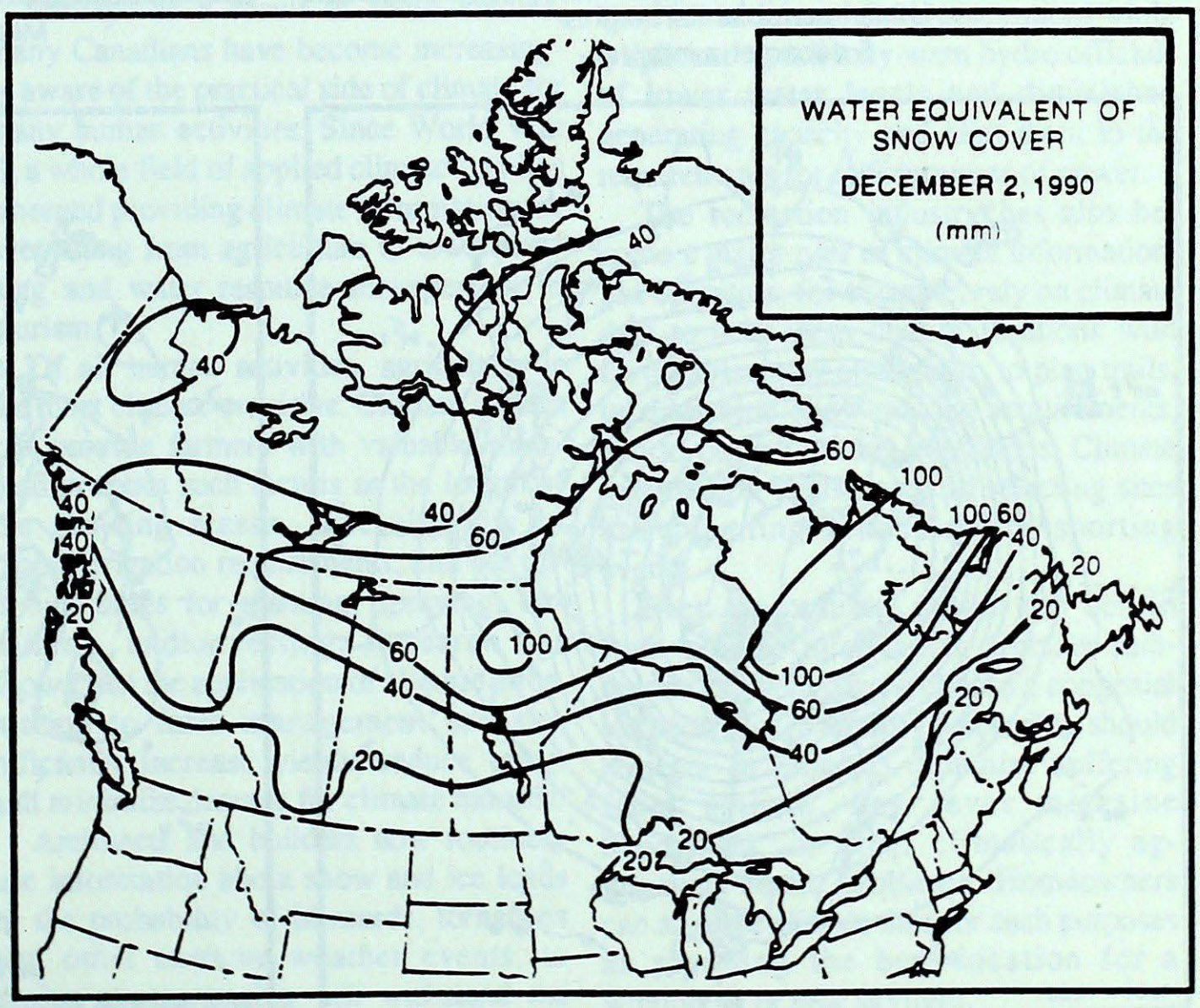
SEASONAL TOTAL OF HEATING DEGREE-DAYS TO END OF NOVEMBER

	1990	1989	NORMAL
BRITISH COLUMBIA			
Kamloops	848	844	887
Penticton	799	814	844
Prince George	1478	1323	1500
Vancouver	675	705	779
Victoria	811	834	853
YUKON TERRITORY			
Whitehorse	2225	1934	1953
NORTHWEST TERRITORIES			
Iqaluit	2810	2813	*
Inuvik	2943	2808	2788
Yellowknife	2383	2193	2083
ALBERTA			
Calgary	1344	1271	1369
Edmonton Mun	1414	1313	1318
Grande Prairie	1714	1487	1563
SASKATCHEWAN			
Estevan	1272	1230	1183
Regina	1326	1319	1301
Saskatoon	1486	1376	1357
MANITOBA			
Brandon	1417	1421	1332
Churchill	2323	2322	2289
The Pas	1633	1679	1536
Winnipeg	1242	1332	1222
ONTARIO			
Kapuskasing	1530	1565	1456
London	801	877	795
Ottawa	945	993	924
Sudbury	1199	1278	1141
Thunder Bay	1316	1403	1276
Toronto	786	867	793
Windsor	632	728	659
QUÉBEC			
Baie Comeau	1434	1528	1442
Montréal	897	948	870
Québec	1097	1148	1087
Sept-Iles	1497	1604	1532
Sherbrooke	1085	1166	1156
Val-d'Or	1485	1488	1392
NEW BRUNSWICK			
Charlo	1224	1266	1228
Fredericton	984	1100	981
Moncton	993	1071	983
NOVA SCOTIA			
Sydney	861	1007	898
Yarmouth	774	916	887
PRINCE EDWARD ISLAND			
Charlottetown	917	1048	923
NEWFOUNDLAND			
Gander	1158	1194	1180
St. John's	1082	1111	1141

SEASONAL SNOWFALL TOTALS (cm)
TO END OF NOVEMBER

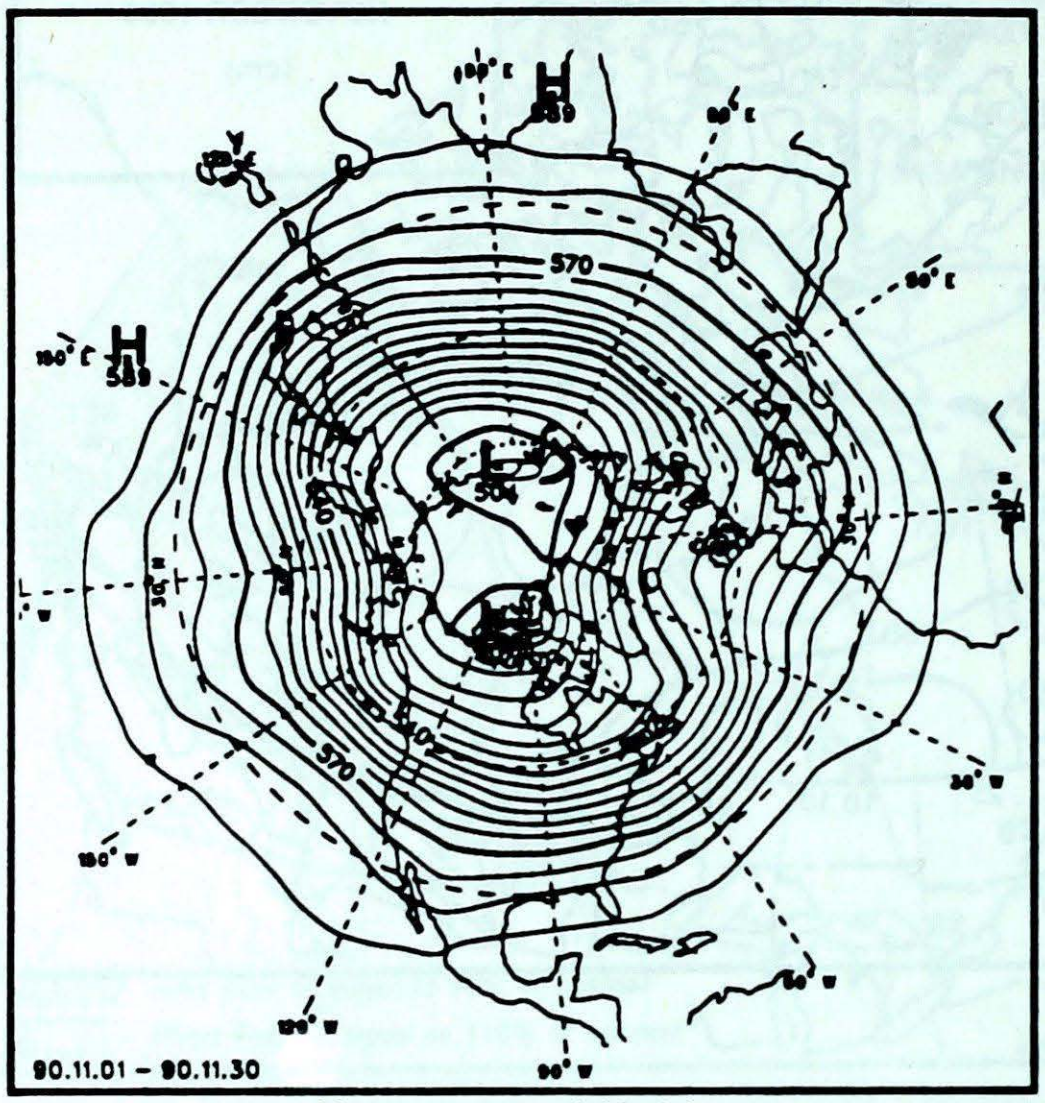
	1990	1989	NORMAL
YUKON TERRITORY			
Whitehorse	63.5	57.2	42.5
NORTHWEST TERRITORIES			
Clyde	56.6	*	97.6
Inuvik	67.0	85.4	75.6
Yellowknife	57.2	71.0	56.7
BRITISH COLUMBIA			
Kamloops	17.4	4.7	12.4
Port Hardy	11.6	3.2	4.2
Prince George	111.4	26.4	50.0
Vancouver	0.4	0.0	2.8
Victoria	0.0	0.0	2.3
ALBERTA			
Calgary	41.9	17.8	35.7
Edmonton Namao	40.6	24.9	26.5
Grande Prairie	101.0	36.2	42.4
SASKATCHEWAN			
Estevan	11.0	15.9	23.1
Regina	5.0	29.7	24.2
Saskatoon	26.4	30.8	23.4
MANITOBA			
Brandon	9.0	28.2	23.3
Churchill	135.2	52.6	77.3
The Pas	69.8	65.0	43.8
Winnipeg	9.0	17.8	27.3
ONTARIO			
Kapuskasing	74.5	146.2	85.0
London	10.8	44.0	26.3
Ottawa	7.6	43.6	25.5
Sudbury	49.5	74.0	38.6
Thunder Bay	47.4	23.6	33.1
Toronto	0.8	5.0	8.9
Windsor	0.0	18.6	11.6
QUEBEC			
Baie Comeau	89.0	66.3	41.6
Montréal	16.4	42.6	22.9
Québec	51.0	66.3	38.3
Sept-Iles	94.2	56.4	61.4
Sherbrooke	28.6	36.4	42.4
Val-d'Or	72.4	103.0	63.7
NEW BRUNSWICK			
Charlo	58.4	34.3	42.9
Fredericton	17.1	60.1	22.7
Moncton	18.7	53.1	24.7
NOVA SCOTIA			
Shearwater	0.6	36.6	9.5
Sydney	17.4	58.6	14.6
Yarmouth	1.0	39.0	8.3
PRINCE EDWARD ISLAND			
Charlottetown	7.8	63.2	24.2
NEWFOUNDLAND			
Gander	69.6	44.2	44.1
St. John's	31.7	24.4	25.6



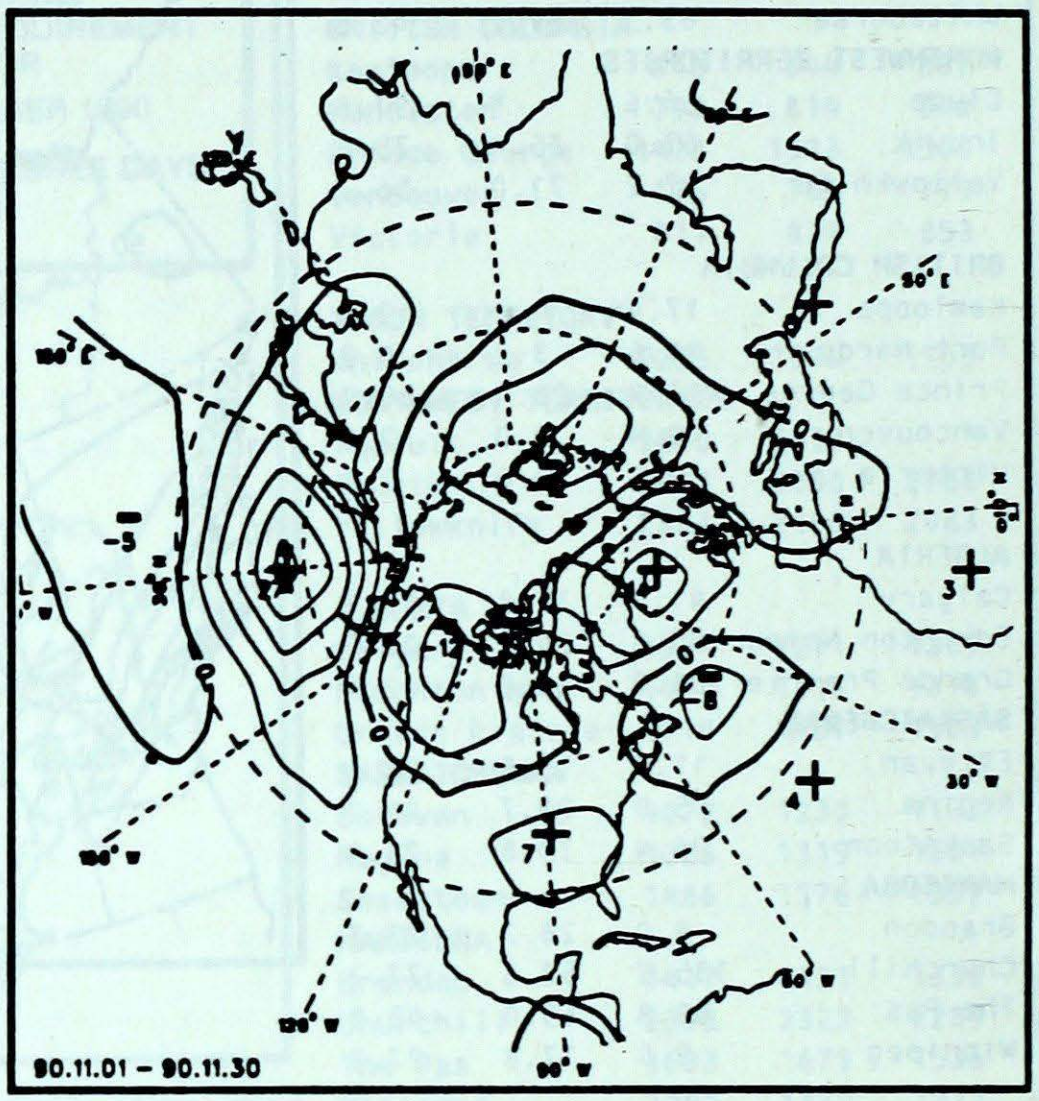


50-kPa ATMOSPHERIC CIRCULATION

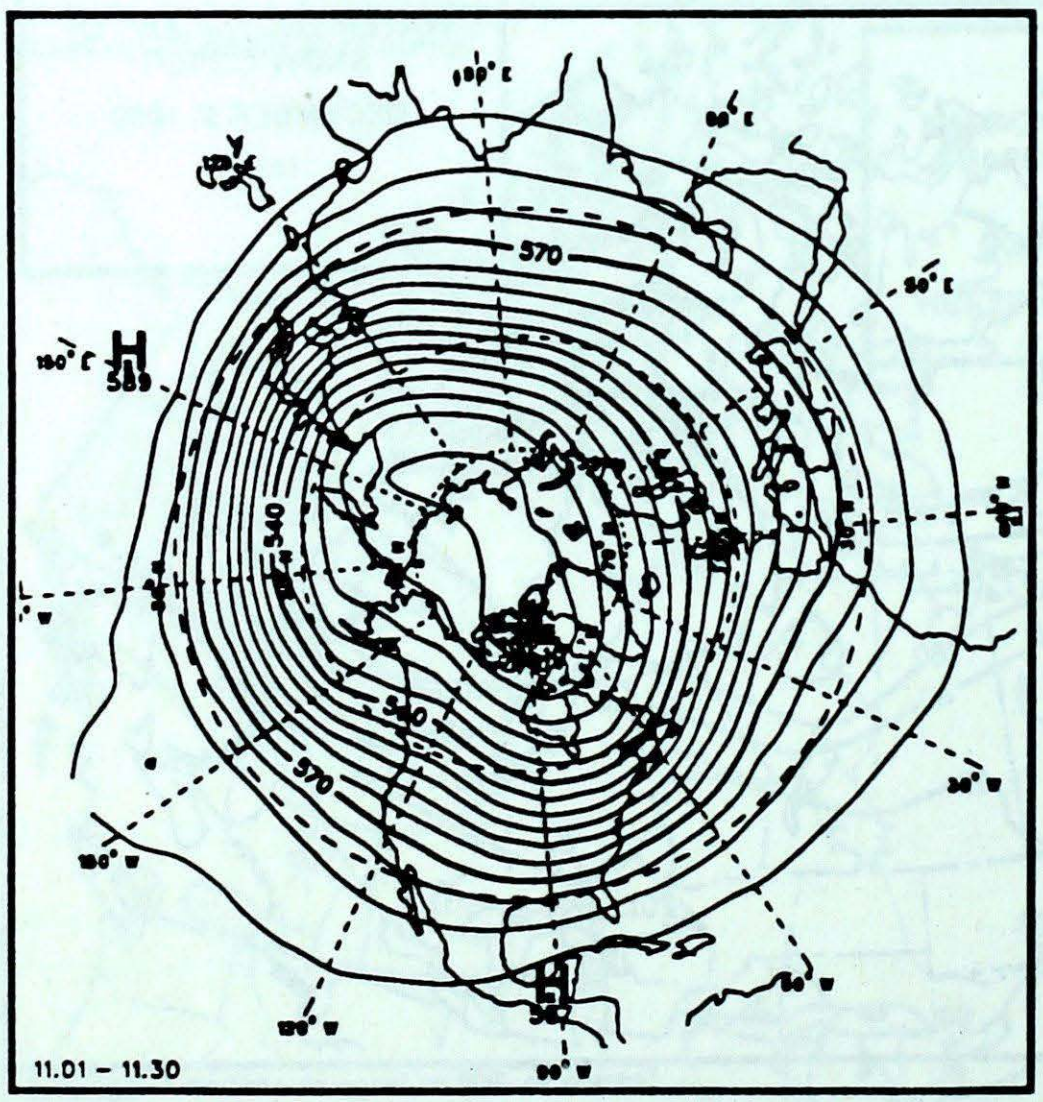
November 1990



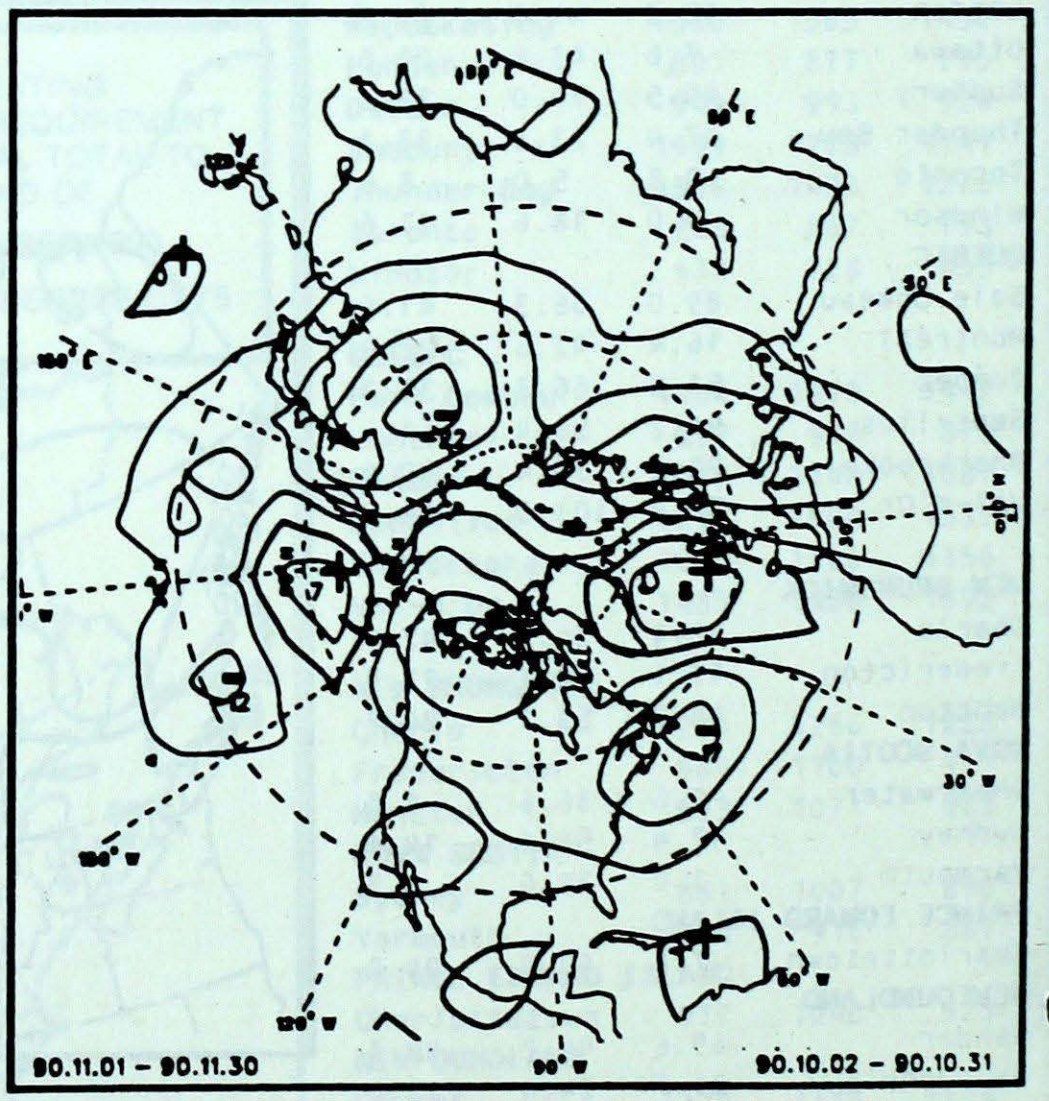
Mean geopotential heights
- 5 decametre interval -



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 -

Putting Canada's long term climate data to work

Most of us are interested in the weather as something that is happening now or is about to happen. We want to know what the temperature is before we go outside or whether it is going to rain within the next few hours and we want to be warned of any weather hazards, such as freezing rain or thunderstorms, that might come our way. But over time we also build up in our minds a picture of what is normal or average weather for our area - the temperatures and the amount of rain or snow that we can expect in the different seasons, for example and the frequency with which extreme weather events, such as blizzards or droughts, are likely to occur.

This normal weather pattern for our area is its climate, and it has an enormous effect on our lives. The buildings we live in, the clothes we wear, the things we do for recreation, the price we pay for groceries at the local supermarket - these are just a few of the many things in our day-to-day existence that are profoundly influenced by climate. In fact, climate is such a pervasive element in our lives that we tend to take it for granted. In recent decades, however, we have become increasingly aware of the significance of climate in human affairs, and with this awareness we have come to appreciate the importance of having reliable and extensive climate information at our disposal.

In addition to providing up-to-date weather information and forecasts, Environment Canada's Atmospheric Environment Service (AES) compiles and analyzes an extensive and constantly growing body of data on climate. In the archives of AES's Canadian Climate Centre in Downsview, Ontario, there are now nearly 3 billion climate observations covering some 8600 locations across the country. The oldest of these date back to the 1840s. This forms the beginning of numerous unbroken runs of continuous records, now computerized, that date back more than a century for many localities. These records are not just the residue of observations made for forecasting purposes. Most of them, in fact, were not used for forecasting at all but were collected for other scientific reasons.

The uses of climate data

Why do we collect climate data? The climate archive provides historical records against which current weather conditions can be compared.

Perhaps as a result of these studies, many Canadians have become increasingly aware of the practical side of climate for many human activities. Since World War II, a whole field of applied climatology has emerged providing climate information for everything from agriculture to town planning and water resource management to tourism.

Of all human activities, agriculture is the most climate-sensitive. Climate studies can provide farmers with valuable information about such factors as the length of the growing season, the suitability of crops, irrigation requirements, and the optimum times for planting, spraying, fertilizing, andharvesting. Research has shown that the application of climate information to farm management can significantly increase yields, reduce costs, and minimize damage for climate hazards.

Architects and builders now routinely use information about snow and ice loads or the probability of blizzards, tornadoes and other extreme weather events, to design structures that will withstand the climate stress they are likely to encounter in their lifetimes. Climate information can also be used to select construction sites, determine how a building should be positioned to maximize solar radiation or to minimize snow drifting, and estimate heating and cooling requirements. Applications such as these have made buildings safer and have made them more economical and efficient.

Canada's abundant fresh water resources provide the country with many benefits, but these resources are vulnerable to the changing whims of the weather. The amount of snowfall and hence the depth of the snowpack, for example, will be of interest both to civil defense officials and to engineers at hydro-electric generating stations. A dense snowpack may signal the need for additional flood precautions while a light snowpack may warn hydro officials of lower water levels and diminished generating capacity and alert them to the requirements for other sources of power.

The recreation industry has also become a major user of climate information. Ski operators, for example, rely on climate data to help them choose locations with favourable snow conditions, to plan trails, to determine snow-making requirements, and to project market conditions. Climate information is also used in selecting sites and planning schedules for sporting events.

Even the ordinary person can benefit from climate information. Climate summaries can help people choose a congenial vacation spot or identify where they should relocate in order to minimize suffering from asthma, hay fever migraine headaches, or other climatically aggravated health problems. Homeowners can also use climate data for such purposes as planning the best location for a windbreak or new skylight.

How is climate information processed?

Most of Canada's climate data comes from a network of more than 2200 climate stations situated in every part of the country. The majority of these are manned by volunteers who take temperature and precipitation readings twice a day and file monthly reports with the regional Atmospheric Environment Service Office. Other, more detailed information comes from the approximately 500 principal and automatic stations which provide the observations on which weather forecasts are based and from satellites and upper air balloon observations.

Once the observations have cleared the quality control, the regional offices then send them to the Canadian Climate Centre in Downsview, Ontario, where they are further thoroughly analyzed before being summarized and archived.

Data summaries are then sent to various regional and federal offices across the country. A monthly report is also filed with the World Meteorological Organization in Geneva where it is used in compiling world climate summaries and calculating global temperature averages and other statistics.

A number of statistical analyses are carried out on data received at the Centre. Averages are determined for temperature precipitation, wind, bright sunshine, and a variety of other weather elements. Extremes are noted, and the frequency and variability of different kinds of weather conditions are calculated.

Much of this information is used in the preparation of the Canadian Climate Normals. These are 30-year summaries of mean values for different weather elements. Updated every 10 years, they provide a description of current climate conditions across the country. Some information is also used for more specialized purposes, such as analyses of tornadoes, compilation of wind and snowload values for building codes, research on power line icing, or studies of drought on the Prairies.

The major climate summaries and studies can be found in the main public libraries or obtained from the Atmospheric Environment Service. Unpublished information held in the archives can be obtained on request. In an average year, the AES will respond to more than 100,000 of these requests.

Looking for the future

The usefulness of climate information has often been limited by the fact that it is historical. While it provides useful insights into other range of climate possibilities and probabilities, it cannot predict when certain climate conditions, such as a drought, will occur. One interesting means of overcoming this disadvantage is the monitoring of weather events as they develop in some cases "real time" climate data will make it possible to anticipate the emergence of extreme events such as droughts or snowmelt floods well before these occurrences reach crisis proportions. Predictive information of this kind is likely to become much more important in the future.

Even more significant, however, is the role which climate information will play in resolving some of our major environmental dilemmas. It has already helped us to understand and begin to control local air pollution and acid rain. It is also helping us to monitor the progress for global warming, to understand its potential impacts, and to refine the sophisticated computer models used in predicting future climate changes. Much work remains to be done in the study of global warming and climate change, and high quality climate data from Canada and around the world will be crucial to its success.

As we enter the twenty-first century we face some of the greatest environmental challenges ever to confront the human race. In this context, climate information is more useful and more important than ever before. Once only a scientific pastime, the study of climate data has now become not only a valuable economic tool but also a vital resource in the development of our environmental protection strategy.

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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	6.6	1.0	17.8	-1.3	2.3	42	391.0	204	0	23	30	42	342.0
ALERT BAY	5.3	-0.4	13.6	-0.2	8.2	119	331.9	156	0	25	*	*	390.1
AMPHITRITE POINT	7.7	0.3	12.5	1.0	0.0	0	516.5	130	0	24	*	*	307.4
BLUE RIVER A	-1.4	1.3	9.4	-14.5	119.2	211	148.1	176	18	21	30	65	*
CAPE ST JAMES	5.8	-1.1	11.1	0.1	6.6	174	141.0	75	2	21	66	*	367.2
CAPE SCOTT	6.4	-0.4	12.3	0.8	5.4	132	413.2	117	0	27	*	*	348.2
CASTLEGAR A	3.4	1.6	14.1	-6.0	22.4	74	64.8	84	1	14	51	89	438.9
COMOX A	5.7	0.4	15.5	-2.5	0.0	0	223.5	117	0	19	62	*	368.9
CRANBROOK A	0.9	2.8	13.6	-11.0	35.2	145	53.8	175	12	9	69	83	520.1
DEASE LAKE	-14.4	-5.9	3.9	-29.7	87.4	252	58.6	200	45	13	37	61	977.3
FORT NELSON A	-19.2	-7.2	-1.0	-35.2	43.9	155	31.2	137	34	10	57	*	1115.3
FORT ST JOHN A	-13.2	-7.2	5.7	-32.1	57.3	186	52.9	170	37	12	65	*	936.2
HOPE A	5.9	1.2	16.7	-3.9	47.1	282	914.1	408	0	26	10	33	364.5
KAMLOOPS A	2.0	0.4	19.9	-17.1	17.4	150	16.5	75	0	4	57	80	478.8
KELOWNA A	2.4	1.3	16.0	-17.2	22.0	190	42.7	164	4	10	46	78	467.3
LYTTON	4.8	2.4	19.8	-10.2	4.0	18	142.4	203	0	12	30	46	397.2
MACKENZIE A	-8.5	-4.1	3.7	-26.0	139.3	281	155.7	260	70	16	39	82	797.9
PENTICTON A	4.5	1.5	16.8	-12.6	16.0	208	31.8	133	0	6	58	97	405.6
PORT ALBERNI A	5.1	0.2	14.9	-3.1	3.4	48	509.4	177	5	23	32	*	356.2
PORT HARDY A	5.2	-0.1	13.9	-0.9	11.6	290	480.8	196	2	26	30	48	384.7
PRINCE GEORGE A	-5.1	-2.2	10.0	-20.9	97.0	245	104.1	206	20	18	39	59	692.1
PRINCE RUPERT A	3.1	-0.8	11.4	-7.1	45.6	518	330.4	123	8	23	36	71	439.5
PRINCETON A	1.0	1.9	17.2	-11.2	58.2	250	122.4	324	18	16	54	*	*
REVELSTOKE A	1.9	1.6	8.5	-5.1	88.2	173	185.2	191	0	22	16	39	484.1
SANDSPIT A	3.7	-1.8	11.1	-3.9	18.4	341	137.3	76	8	20	67	105	428.6
SMITHERS A	-4.0	-1.7	8.2	-18.8	76.0	197	59.1	101	28	14	31	67	660.9
TERRACE A	-0.7	-1.0	7.6	-11.3	87.9	180	208.5	116	22	21	28	51	561.1
VANCOUVER INT'L A	7.0	1.1	14.5	-0.9	0.4	14	250.5	167	0	23	46	66	331.4
VICTORIA INT'L A	6.6	0.6	16.4	-2.5	0.0	0	270.6	207	0	21	59	75	343.1
VICTORIA MARINE	7.4	0.8	16.2	-0.4	0.2	14	433.9	251	0	25	*	*	317.1
WILLIAMS LAKE A	-3.5	-0.9	14.8	-19.2	85.1	275	92.2	293	36	14	56	77	644.6

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	-27.0	*	-8.8	-45.3	32.6	*	18.0	*	34	*	*	*	*
MAYO A	-26.6	-11.4	-6.0	-45.5	41.1	161	16.4	67	*	*	*	*	*
WATSON LAKE A	-21.6	-7.8	-2.6	-42.0	46.4	124	34.1	107	35	8	55	128	1188.7
WHITEHORSE A	-19.1	-10.3	-0.3	-38.9	35.9	151	21.4	108	18	7	48	83	1114.1
NORTHWEST TERRITORIES													
ALERT	-31.3	-4.7	-22.3	-38.7	4.4	51	3.4	41	14	1	*	*	1478.5
BAKER LAKE A	-21.9	-1.6	-7.4	-34.1	25.4	146	23.5	142	15	8	*	*	1168.4
CAMBRIDGE BAY A	-26.5	-2.7	-7.6	-35.7	18.6	207	10.4	135	13	3	19	189	1333.5
CAPE PARRY A	-23.2	-4.9	-4.2	-34.5	9.6	64	5.1	53	7	2	*	*	1234.4
CLYDE A	-20.0	-2.6	-10.1	-30.0	9.6	59	9.2	61	21	4	11	285	1139.4
COPPERMINE A	-24.4	-4.7	-3.9	-36.7	9.5	63	5.8	41	25	1	17	139	1273.8
CORAL HARBOUR A	-16.9	0.6	-3.6	-33.1	31.8	176	31.6	176	13	10	36	63	1047.9
EUREKA	-34.9	-3.4	-21.5	-43.0	2.6	87	2.6	104	7	0	*	*	1587.4
FORT RELIANCE	-19.0	-5.0	-2.4	-33.8	37.2	145	27.9	129	21	10	*	*	1107.1
FORT SIMPSON A	-23.2	-7.5	-6.5	-41.3	23.9	94	18.6	77	33	7	59	115	1231.1
FORT SMITH A	-18.7	-7.1	-0.6	-39.8	50.7	176	35.6	136	45	11	57	*	1100.7
IQALUIT	-12.3	0.7	-1.0	-28.6	19.0	52	17.0	49	15	6	47	102	910.9
HALL BEACH A	-20.2	1.3	-5.2	-35.0	18.0	140	14.3	113	25	5	*	*	1145.2
HAY RIVER A	-18.5	-7.2	2.0	-34.8	33.5	85	33.5	91	31	10	*	*	1095.2
INUVIK A	-26.9	-6.2	0.3	-41.5	30.6	135	20.8	116	30	4	26	147	1347.3
MOULD BAY A	-29.8	-3.2	-14.4	-40.4	7.4	168	7.4	200	27	2	*	*	1433.9
NORMAN WELLS A	-24.0	-5.8	0.5	-38.1	23.3	109	11.1	53	14	4	45	141	1260.3
POND INLET A	-25.0	*	-5.5	-35.1	10.2	*	7.6	*	19	4	2	*	1289.2
RESOLUTE A	-25.2	-0.7	-12.4	-35.6	1.4	23	1.4	25	27	0	0	*	1296.0
YELLOWKNIFE A	-20.6	-6.5	-2.9	-38.8	24.4	81	20.6	84	22	6	65	154	1158.6
ALBERTA													
BANFF	-3.2	0.7	13.5	-19.0	88.4	275	84.6	272	44	12	*	*	*
CALGARY INT'L A	-4.0	-1.3	13.9	-23.0	30.9	190	20.7	163	5	5	98	79	860.0
COLD LAKE A	-9.4	-3.2	7.6	-33.1	35.8	169	29.6	146	16	8	104	111	820.3
CORONATION A	-7.3	-2.4	15.6	-25.3	21.0	132	16.6	111	8	4	99	77	758.5

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	Mean	Difference from Normal	Maximum	Minimum									
EDMONTON INT'L A	-7.6	-2.1	10.3	-30.7	27.6	153	26.8	160	17	3	104	101	768.2
EDMONTON MUNICIPAL	-6.6	-2.9	10.4	-26.2	20.0	*	27.2	173	13	2	98	91	739.0
EDMONTON NAMAO A	-7.1	-2.2	9.6	-26.6	25.6	152	24.2	134	14	3	*	*	764.8
EDSON A	-9.6	-3.7	7.9	-35.0	65.6	256	55.4	303	31	8	89	96	828.4
FORT CHIPEWYAN A	-17.5	-7.4	4.5	-39.0	62.6	251	60.0	251	57	*	*	*	*
FORT MCMURRAY A	-12.8	-4.6	7.1	-33.4	58.0	199	42.1	167	37	11	83	100	923.9
GRANDE PRAIRIE A	-12.2	-6.2	6.9	-36.7	81.1	311	62.4	224	52	13	86	*	907.0
HIGH LEVEL A	-18.8	-8.1	1.8	-39.8	59.3	204	53.3	211	43	12	52	75	1102.4
JASPER	-5.0	-1.1	13.2	-27.4	78.2	318	74.4	251	35	7	58	*	691.3
LETHBRIDGE A	-0.1	0.7	19.6	-21.8	30.4	162	29.2	174	13	4	96	*	550.7
MEDICINE HAT A	-2.3	-0.7	19.4	-25.6	66.1	469	43.3	297	10	5	88	79	605.0
PEACE RIVER A	-13.6	-5.5	4.7	-34.6	40.3	183	38.8	194	20	9	*	*	954.0
RED DEER A	-6.1	-1.5	12.7	-26.6	21.1	140	18.8	125	8	5	*	*	723.5
ROCKY MTN HOUSE A	-6.5	-2.9	11.6	-30.3	38.5	194	30.2	169	20	7	*	*	741.7
SLAVE LAKE A	-9.5	-3.5	7.3	-29.8	29.2	124	25.8	123	14	7	74	74	828.1
WHITECOURT A	-8.6	-2.3	9.1	-29.4	68.2	311	43.4	185	23	8	*	*	788.8
SASKATCHEWAN													
BROADVIEW	-5.6	0.2	11.9	-26.9	7.6	51	9.6	70	2	4	109	101	707.3
CREE LAKE	-15.1	-4.8	1.7	-41.8	79.2	282	40.6	192	54	11	67	107	950.2
ESTEVAN A	-4.5	-0.9	15.6	-28.5	11.0	74	9.1	56	6	3	117	98	676.1
HUDSON BAY A	-8.3	*	9.6	-29.1	30.8	*	23.2	*	12	5	91	*	790.0
KINDERSLEY	-6.3	-1.1	16.6	-26.8	16.0	157	10.4	83	5	4	105	*	732.2
LA RONGE A	-10.6	-2.2	6.5	-34.0	42.1	120	42.1	164	33	10	*	*	846.3
MEADOW LAKE A	-9.8	*	6.5	-37.6	38.4	*	23.6	*	12	5	104	*	834.4
MOOSE JAW A	-3.3	0.3	17.8	-21.6	4.4	24	4.6	28	0	1	104	95	638.3
NIPAWIN A	-9.8	*	4.1	-32.1	48.9	*	32.0	*	38	4	97	*	833.7
NORTH BATTLEFORD A	-8.5	-2.7	9.8	-33.1	27.9	204	27.7	194	7	3	*	*	793.7
PRINCE ALBERT A	-9.7	-2.5	7.1	-33.3	38.5	221	32.3	190	16	5	82	98	829.5
REGINA A	-5.0	0.1	17.5	-24.5	3.2	23	3.4	25	0	1	108	103	691.0
SASKATOON A	-7.8	-2.1	11.9	-28.1	22.2	171	21.2	144	4	4	*	*	775.5
SWIFT CURRENT A	-3.3	0.4	17.1	-21.6	13.0	87	13.2	84	3	3	115	105	637.5
YORKTON A	-7.0	-1.1	8.9	-26.3	12.0	62	19.4	97	3	6	94	104	748.9
MANITOBA													
BRANDON A	-5.7	0.2	10.8	-25.1	8.8	53	14.5	80	3	5	121	*	705.5
CHURCHILL A	-12.6	-0.5	-0.2	-32.3	66.8	161	50.6	130	29	12	31	61	919.0
DAUPHIN A	-5.0	0.2	13.8	-24.1	7.2	30	16.8	67	4	4	111	120	689.8
GILLAM A	-12.3	-0.5	0.1	-31.7	119.3	269	98.0	311	36	17	*	*	907.8
GIMLI	-4.6	*	13.0	-21.3	15.8	*	26.0	*	8	6	99	104	678.2
ISLAND LAKE	-6.9	1.0	5.4	-22.7	42.6	85	48.0	131	18	11	*	*	746.3
LYNN LAKE A	-13.4	-1.6	0.6	-32.2	76.0	203	51.2	174	35	9	55	90	923.9
NORWAY HOUSE A	-8.6	*	3.9	-27.4	60.0	*	57.8	*	15	11	*	*	800.9
PORTAGE LA PRAIRIE	-3.9	0.2	14.7	-20.1	10.0	38	17.4	59	6	4	*	*	643.1
THE PAS A	-8.9	-1.4	3.6	-27.1	55.2	172	48.4	168	20	6	*	*	807.1
THOMPSON A	-12.4	-1.0	1.8	-34.6	96.3	285	99.9	336	50	13	57	83	913.7
WINNIPEG INT'L A	-4.3	0.2	14.2	-21.4	7.8	36	19.6	78	5	5	103	114	668.6
ONTARIO													
BIG TROUT LAKE	-6.7	2.3	9.9	-26.0	34.8	82	58.5	142	14	11	45	*	740.9
EARLTON A	-1.3	1.2	16.4	-15.7	44.1	113	72.2	102	0	12	*	*	579.0
GERALDTON A	-3.5	*	12.1	-19.8	53.4	*	52.4	*	23	11	*	*	643.7
GORE BAY A	3.2	1.3	16.5	-6.5	65.0	254	144.5	178	*	13	*	*	329.9
HAMILTON RBG	6.8	*	21.8	-4.9	1.0	*	68.8	*	*	10	129	*	*
HAMILTON A	4.4	1.0	20.4	-6.0	3.4	30	63.6	91	*	8	*	*	407.5
KAPUSKASING A	-2.8	1.6	16.1	-19.5	25.6	42	49.5	62	11	9	*	*	623.6
KENORA A	-3.3	1.3	14.6	-20.3	19.7	53	21.9	54	10	6	*	*	638.3
KINGSTON A	3.9	1.0	18.4	-7.5	2.0	14	62.2	66	0	14	113	145	425.5
LONDON A	4.8	1.7	20.3	-4.7	9.2	38	105.4	124	0	15	93	125	398.3
MOOSONEE	-3.5	1.0	8.1	-17.5	26.0	55	49.4	75	12	9	44	87	642.9
MUSKOKA A	1.4	0.3	19.5	-11.8	40.7	101	162.3	161	3	15	*	*	495.8
NORTH BAY A	-0.1	0.9	14.7	-12.0	61.8	180	154.8	179	1	18	68	105	541.9
OTTAWA INT'L A	2.3	1.1	18.5	-8.7	6.6	29	70.2	90	0	11	101	126	477.7
PETAWAWA A	0.3	0.8	17.1	-12.2	24.4	129	92.0	141	*	13	*	*	530.8
PETERBOROUGH A	2.7	0.7	20.4	-8.8	13.0	82	51.5	76	*	9	*	*	458.6
PICKLE LAKE	-5.1	2.5	8.3	-20.8	23.1	48	53.4	109	6	11	*	*	692.4
RED LAKE A	-4.4	1.7	12.1	-19.5	21.6	64	23.6	63	7	10	78	*	671.7
ST CATHARINES A	5.6	1.0	21.0	-5.4	*	*	39.6	63	0	7	115	*	370.8
SARNIA A	5.6	1.8	22.0	-5.8	0.2	1	73.2	99	0	10	101	110	372.3
SAULT STE MARIE A	2.3	1.6	18.9	-8.0	41.4	100	97.8	114	*	15	64	100	472.5
SIOUX LOOKOUT A	-3.2	2.1	13.4	-18.6	27.9	61	47.3	95	13	11	*	*	635.1
SUDBURY A	-0.2	1.0	17.2	-12.4	42.3	132	120.5	155	0	17	78	100	543.8
THUNDER BAY A	-1.8	0.8	13.9	-17.0	34.0	114	50.0	95	20	7	113	130	592.6
TIMMINS A	-2.0	1.8	16.3	-19.0	42.3	69	70.8	90	5	15	*	*	599.7
TORONTO	6.0	*	20.4	-1.4	0.6	*	47.6	*	0	8	*	*	358.6
TORONTO INT'L A	4.6	1.3	22.1	-6.5	0.8	10	39.6	63	0	4	*	*	403.2
TORONTO ISLAND A	5.2	*	15.3	-2.2	0.2	3	49.8	*	0	9	*	*	384.3
TRENTON A	3.6	0.4	18.9	-8.3	2.8	21	49.6	58	*	12	*	*	433.6
WATERLOO WELLINGTON	3.8	1.3	20.5	-7.2	6.4	45	87.0	119	0	12	*	*	425.1
WAWA A	2.3	*	15.9	-15.8	19.5	*	85.8	*	3	10	*	*	550.1
WIARTON A	4.3	1.4	18.7	-5.7	23.3	59	153.2	162	3	17	95	158	411.0
WINDSOR A	6.2	1.8	20.9	-3.1	*	*	62.6	96	0	8	*	*	372.3

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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
QUEBEC													
BAGOTVILLE A	-3.0	-1.0	8.7	-16.0	81.1	172	146.5	200	12	19	*	*	628.4
BAIE COMEAU A	-2.0	-0.2	4.3	-12.7	72.6	205	94.8	118	18	15	76	91	598.4
BLANC SABLON A	1.7	2.4	4.4	-11.4	101.4	282	119.0	122	0	19	55	*	581.6
CHIBOUGAMAU CHAPAIS	-5.0	*	9.9	-19.4	59.4	*	92.4	*	16	15	28	57	691.0
GASPE A	-0.3	*	8.4	-10.7	53.2	*	127.9	*	0	15	58	*	548.2
INUKJUAK A	-6.4	0.8	1.6	-18.1	48.7	128	42.7	108	17	13	29	104	733.5
KUUJJUAQ A	-10.1	-1.8	2.2	-18.1	77.4	216	77.7	194	40	14	38	73	752.0
KUUJJUARAPIK A	-5.0	-0.1	5.0	-16.8	45.8	87	46.2	76	11	16	40	106	700.0
LA GRANDE IV A	-6.9	*	5.1	-19.5	49.6	*	48.0	*	46	12	35	*	747.8
LA GRANDE RIVIERE A	-6.6	*	3.8	-17.6	78.2	*	*	*	32	17	34	*	708.2
MANIWAKI	0.4	0.7	16.6	-11.5	17.2	66	92.6	125	0	12	76	115	528.0
MATAGAMI A	-4.4	*	12.8	-18.8	50.9	*	67.6	*	3	11	46	97	672.2
MONTREAL INT'L A	2.5	0.5	19.2	-7.4	16.4	77	86.9	107	0	10	84	98	464.8
MONTREAL MIRABEL 1/	1.2	*	19.8	-9.3	15.6	*	97.6	*	0	10	97	*	502.0
NATASHQUAN A	-1.8	-0.7	5.4	-14.0	56.8	177	149.0	129	3	15	69	82	593.6
QUEBEC A	-0.6	-0.4	12.4	-9.7	49.0	145	121.6	125	1	14	68	92	556.3
ROBERVAL A	-2.0	0.2	13.5	-14.5	77.9	164	126.6	169	2	12	63	*	601.3
SCHEFFERVILLE A	-10.2	-1.2	3.0	-24.8	96.4	158	89.2	136	73	16	36	83	846.7
SEPT-ILES A	-2.9	-0.4	6.6	-14.3	81.6	161	138.6	138	20	14	70	75	628.6
SHERBROOKE A	0.8	0.9	20.0	-9.8	26.2	71	85.3	89	0	12	62	*	533.5
STE AGATHE DES MONT	-0.5	1.2	16.9	-11.6	32.6	79	128.6	119	0	13	77	110	555.1
ST HUBERT A	2.4	0.6	18.3	-7.4	13.6	*	88.2	99	0	11	79	*	469.2
VAL D'OR A	-2.9	0.5	14.8	-18.8	59.6	124	91.2	115	0	17	59	100	627.3
NEW BRUNSWICK													
CHARLO A	-1.0	-0.2	5.6	-9.5	58.4	157	152.3	192	2	18	45	47	569.9
CHATHAM A	0.4	-0.5	16.1	-7.4	82.0	313	141.2	138	0	16	71	71	528.2
FREDERICTON A	1.7	0.3	20.4	-8.2	16.7	82	113.1	107	0	14	74	*	487.5
MONCTON A	1.8	-0.2	18.5	-7.8	17.7	82	133.9	122	0	14	82	86	485.2
SAINT JOHN A	2.3	0.0	14.3	-5.8	8.4	58	125.8	86	0	11	73	75	469.2

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
NOVA SCOTIA													
GREENWOOD A	4.3	0.4	19.9	-4.5	6.2	42	134.8	124	0	14	*	*	410.3
HALIFAX INT'L A	3.3	-0.1	15.2	-5.8	2.8	24	146.1	96	0	8	*	*	436.7
SABLE ISLAND	7.0	-0.3	14.7	0.6	16.8	542	155.7	114	0	18	88	126	331.0
SHEARWATER A	4.5	-0.1	15.3	-4.0	0.6	8	132.4	93	0	12	97	89	407.3
SYDNEY A	3.9	0.1	15.7	-4.8	17.2	143	130.4	81	0	18	66	88	422.4
YARMOUTH A	5.1	-0.1	16.4	-3.7	1.0	16	97.6	72	0	13	105	118	385.5
PRINCE EDWARD ISLAND													
CHARLOTTETOWN A	2.4	-0.5	12.9	-6.0	6.2	29	131.0	109	0	13	*	*	486.9
SUMMERSIDE A	2.2	-0.8	12.9	-5.8	21.4	126	128.6	129	0	12	68	71	473.1
NEWFOUNDLAND													
BONAVISTA	3.2	-0.2	14.0	-2.8	32.0	286	91.8	95	0	14	*	*	443.3
BURGEO	3.0	0.0	11.7	-5.0	12.8	108	128.3	69	0	15	*	*	339.0
CARTWRIGHT	-1.5	0.3	3.7	-11.1	105.8	229	178.5	224	36	21	26	37	586.1
CHURCHILL FALLS A	-8.2	-0.1	1.9	-23.9	91.0	129	90.5	112	88	12	58	111	787.1
COMFORT COVE	1.5	-0.1	14.8	-6.2	28.0	84	113.0	102	3	16	*	*	495.5
DANIELS HARBOUR	2.7	0.9	13.1	-8.9	45.7	174	134.6	131	0	19	27	56	460.8
DEER LAKE A	0.9	-0.1	13.3	-8.7	27.9	80	79.1	73	0	16	*	*	514.6
GANDER INT'L A	1.6	-0.2	14.2	-5.9	48.2	152	101.6	95	2	16	59	88	492.9
GOOSE A	-3.6	0.2	3.8	-12.8	71.0	125	80.0	106	27	14	37	56	650.8
MARY'S HARBOUR	-2.1	-1.2	4.5	-11.4	93.8	228	136.2	153	13	16	*	*	550.6
PORT AUX BASQUES	2.9	-0.3	11.0	-3.6	28.4	249	132.4	85	0	18	54	*	460.2
ST ANTHONY	-1.7	-0.4	3.5	-8.5	74.6	194	123.1	99	4	18	*	*	592.5
ST JOHN'S A	2.9	-0.5	17.2	-3.0	30.1	142	71.7	44	0	12	60	89	454.7
ST LAWRENCE	3.5	0.0	12.0	-4.0	16.9	188	110.4	82	0	11	*	*	437.0
STEPHENVILLE A	2.7	-0.2	13.1	-8.9	45.7	187	134.6	109	0	19	27	50	460.8
WABUSH LAKE A	-8.8	-0.7	2.7	-27.2	92.8	136	65.5	85	30	9	42	76	792.9

AGROCLIMATOLOGICAL STATIONS — NOVEMBER

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	6.4	0.4	16.5	-2.0	11.4	572.2	270	0	23	23	62.3	2407.9
KAMPLOOPS	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
SIDNEY	6.7	0.5	0.0	-1.0	0.0	293.4	226	***	23	**	*.*	*.*
SUMMERLAND	4.0	1.5	16.0	-11.5	19.0	43.0	169	0	7	64	38.1	2317.3
ALBERTA												
BEAVERLODGE	-10.7	-5.6	6.5	-31.5	67.0	55.2	206	35	11	76	0.0	1344.3
ELLERSLIE	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
LACOMBE	-6.4	-2.0	10.0	-27.0	26.2	26.9	194	12	7	105	0.0	1367.2
LETHBRIDGE	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
VEGREVILLE	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
SASKATCHWAN												
INDIAN HEAD	-5.6	-0.5	10.5	-24.0	4.6	6.6	39	2	***	1768	*.*	*.*
MELFORT	-8.4	-1.5	8.5	-33.0	32.0	32.0	169	32	5	86	0.0	1704.7
REGINA	-5.8	-0.1	15.0	-28.0	3.2	5.0	37	2	***	1682	*.*	*.*
SASKATOON	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
SCOTT	-8.4	-2.2	10.0	-29.0	21.0	19.4	141	7	3	91	0.0	1509.8
SWIFT CURRENT	-4.2	-0.3	16.5	-24.0	11.4	10.6	82	0	4	103	6.8	1743.2
MANITOBA												
BRANDON	-4.8	0.2	12.0	-27.5	8.0	14.6	73	8	5	**	0.0	1789.5
GLENLEA	-2.4	2.5	18.0	-20.0	6.0	9.8	40	2	3	121	9.5	2032.0
MORDEN	-5.0	-1.5	13.5	-26.0	6.2	9.8	38	5	3	105	4.0	1873.0
ONTARIO												
DELHI	5.3	1.6	20.5	-6.0	0.0	90.8	110	0	13	**	63.5	2257.8
ELORA	3.1	1.2	19.1	-8.6	0.0	82.4	125	0	12	**	41.0	1906.8
GUELPH	3.8	1.3	20.5	-8.8	5.4	84.2	112	0	12	116	50.1	2066.8
HARROW	6.4	1.9	20.0	-4.0	0.0	54.0	80	0	7	112	75.5	3031.9
KAPUSKASING	-1.8	2.4	16.0	-18.5	17.4	48.1	65	5	11	59	*.*	1313.9
OTTAWA	2.5	0.9	18.9	-7.7	7.6	75.5	102	0	11	101	32.4	2161.2
SMITHFIELD	4.4	1.4	19.5	-7.1	1.2	34.7	39	0	8	**	47.2	2289.5
VINELAND	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
WOODSLIE	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*

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	-0.7	-1.1	12.0	-14.5	52.9	97.0	124	5	10	65	1.0	1705.5
L'ASSOMPTION	2.0	0.9	18.5	-7.0	5.5	82.8	99	0	10	86	23.3	2020.2
LENNOXVILLE	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
NORMANDIN	-2.8	0.1	10.0	-20.5	39.6	101.6	173	0	11	68	0.0	1390.5
STE.CLOTILDE	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
NEW BRUNSWICK												
FREDERICTON	1.6	-0.1	20.3	-5.9	8.0	77.5	69	0	14	74	12.9	1999.1
NOVA SCOTIA												
KENTVILLE	4.4	0.4	19.0	-5.0	2.2	19.8	17	0	14	72	33.0	2079.9
NAPPAN	2.9	-0.1	16.5	-5.0	0.6	128.9	119	0	11	66	18.3	1706.8
PRINCE EDWARD ISLAND												
CHARLOTTETWN	3.2	-0.2	12.5	-5.0	4.0	123.6	111	0	12	49	*.*	1905.8
NEWFOUNDLAND												
ST.JOHN'S WEST	3.1	-0.4	16.0	-3.5	31.2	109.5	65	0	17	56	23.2	1417.9