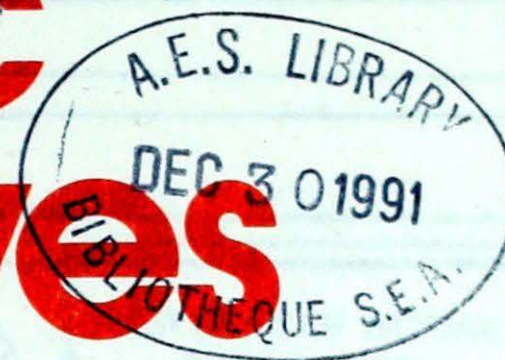




Environment
Canada

Environnement
Canada

Climatic Perspectives



Monthly Review

November - 1991

Vol. 13

CLIMATIC HIGHLIGHTS

Prairie winds whistle through Winnipeg in 1991

Winds measured at the Winnipeg International Airport during 1991 will be amongst the highest of recent years. The past three months, September, October and November have been especially windy.

Wind-data quality depends on many factors such as the accuracy of the observational equipment and changes in the height and exposure of the anemometers. During the 1950's and early '60's the anemometer at the airport was mounted on the roof of the TCA hanger at a height of 23 metres. In 1963, the observing site was moved and a standard 10 metre wind tower was erected in a well exposed instrument compound. Consequently, monthly mean winds were stronger during the period when winds were observed using the higher, roof-mounted anemometer. Because these stronger winds were used to calculate the 1951-1980 normals, the normal monthly mean wind speed has not been exceeded for the past 8.75 years or since January 1983. Not until this year that is! Since the monthly mean wind speeds have been below normal for over 100 consecutive months, the winds of September, October and November 1991 appear to be that much more extraordinary.

For example, the September 1991 mean wind speed of 23.9 km/h (normal is

18.5 km/h), is the highest since 1943, and ranks as the 2nd windiest September since wind measurement began in January of 1921. The highest September mean wind was 25.7 km/h in 1949. Winds gusted to at least 30 km/h on every day of the month. The peak gust for the month was 98 km/h.

The October 1991 monthly mean wind speed of 22.6 km/h is the highest since 1956, and ranks as the 7th windiest October since wind measurement began in January of 1921. The normal is 19.6 km/h. The highest October mean wind was 25.7 km/h in 1949. In addition, winds gusted to at least 30 km/h on 29 out of 30 days. The peak gust for the month was 119 km/h, a new record for October.

The November 1991 mean wind speed of 25.3 km/h ranks as the 2nd highest since wind measurement began in January of 1921. The normal is 14.4 km/h. The highest November mean wind was 25.4 km/h in 1953. Winds gusted to at least 30 km/h on 28 out of 30 days. The peak gust for the month was 104 km/h.

For more information contact the Winnipeg Climate Centre (204) 983-2082.

Heavy rains in Nova Scotia

Nova Scotia was drenched on November 10 and 11, as a slow-moving storm tracked east of the province. The hardest hit area was the southwest shore, where amounts as high as 154 mm were recorded at Liverpool in a two-day period. Halifax received 126 mm. A state of emergency was declared in Queens County, due to extensive flooding of roads and homes;

evacuations were necessary. Winds gusting to 110 km/h accompanied this storm. The heavy November rainfalls produced above normal river flows in the Maritimes, especially in Nova Scotia and on Cape Breton Island. Surface water held in ten reservoirs operated by the Nova Scotia Power Corporation, increased by 10 to 59 percent of their full rated capacity this month.

Fierce winds in Ontario and British Columbia

This month, storms produced high winds and record rainfalls of between 100 and 200 millimetres on B.C.'s north coast. In addition, snowfalls in excess of 200 cm fell in northeastern B.C. On November 16, storm-force winds, between 100 and 150 km/h, ravaged the coast, and to a lesser extent in the interior valleys. Wind damage was considerable, as communities were left without power, and ferry crossings were cancelled.

Very high winds swept across Ontario, on November 30. The strong southerly circulation pumped an unseasonably warm air mass into the southern half of the province, pushing maximum temperatures into the record high teens. It reached a high of 17.6°C in Toronto on the 30th, toppling the old record of 13.9°C set in 1908. Toronto's Pearson Airport registered 18.3°C. The strongest recorded wind gust was 111 km/h. There were numerous reports of downed hydro lines, trees and branches in many parts of Ontario.

Across the country

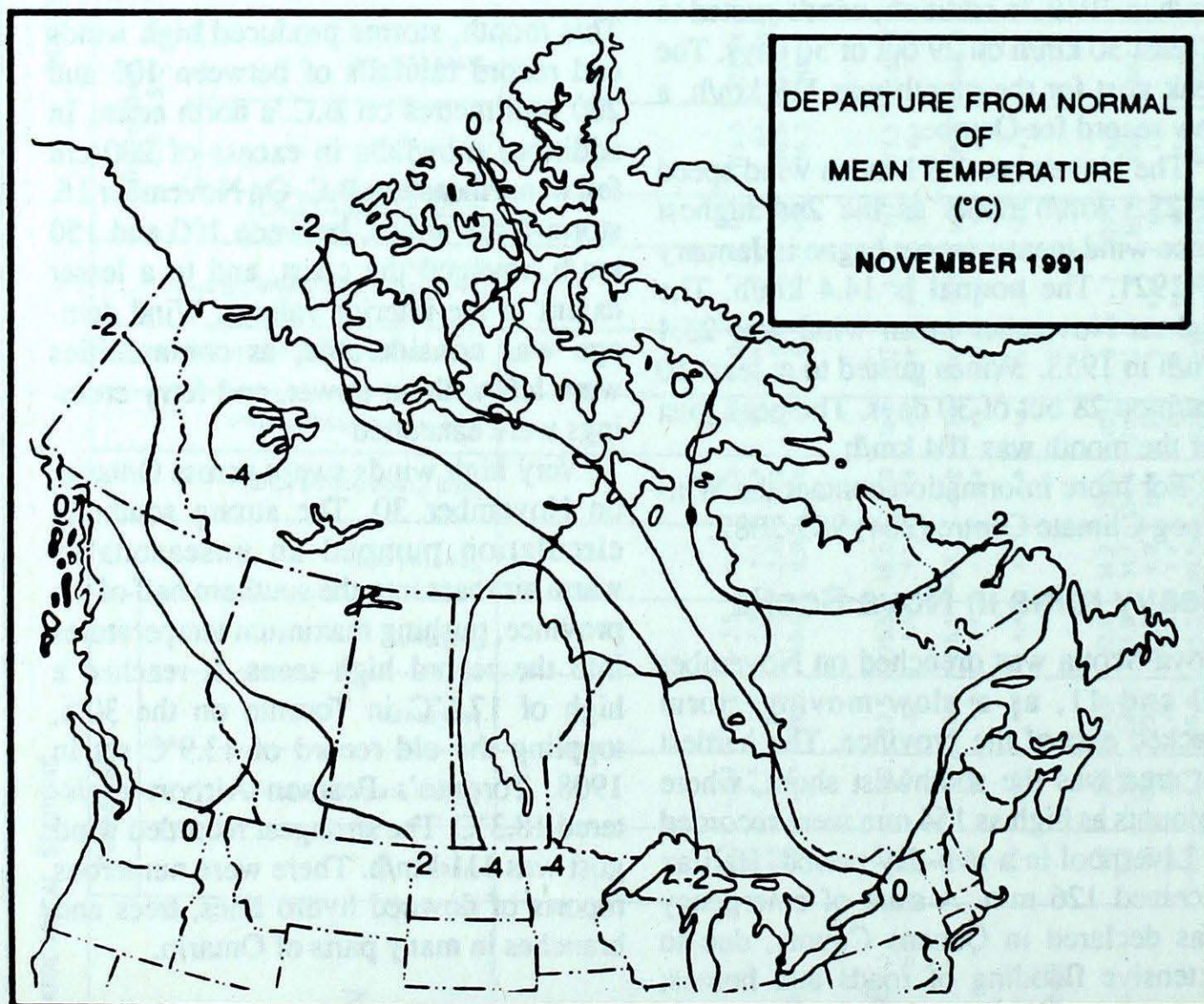
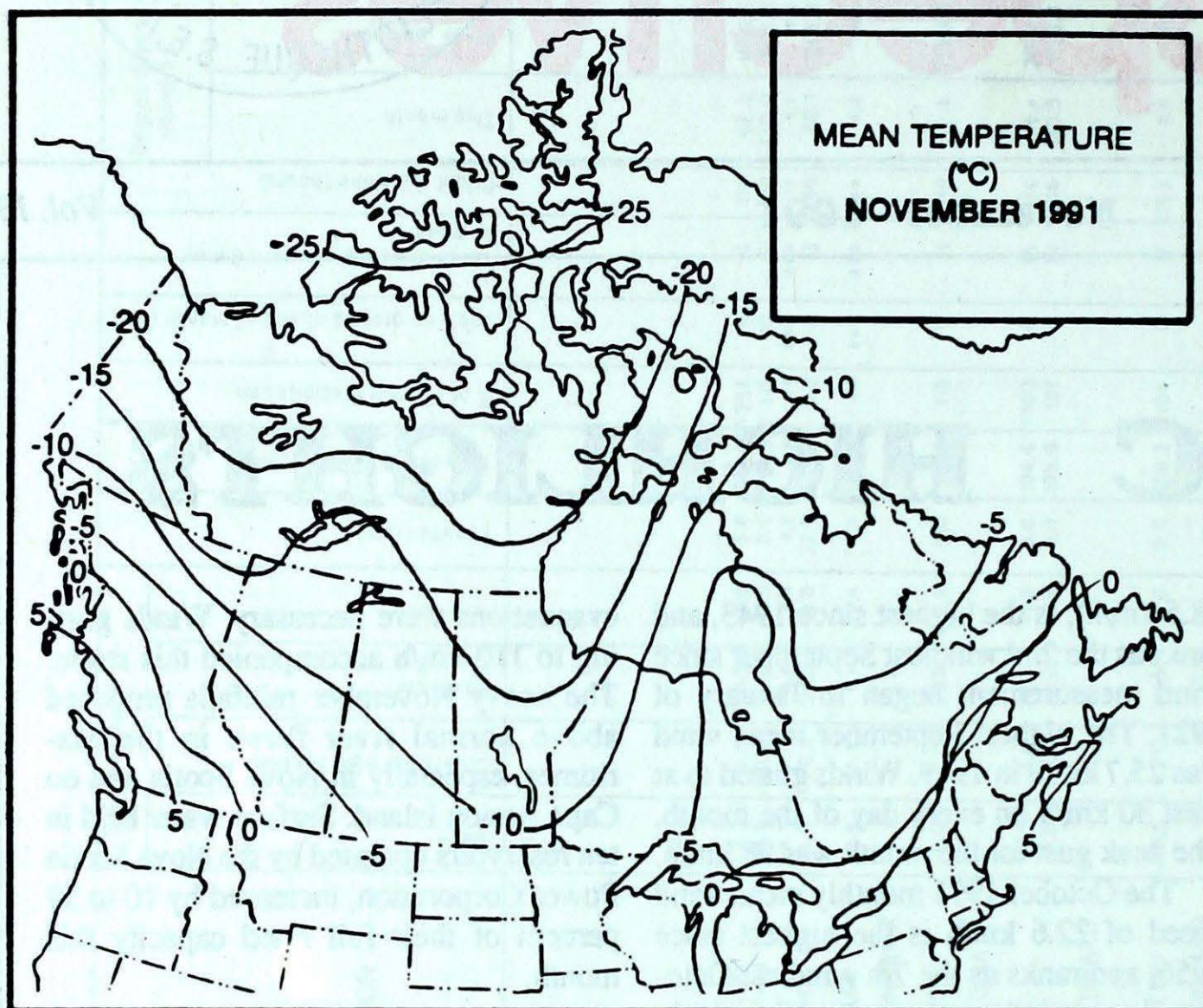
Yukon and Northwest Territories

In the northern Yukon it was generally clear and very cold, while the southern Yukon had much more snow than normal. Precipitation was heaviest on the coastal side of the St. Elias Mountains, which bridge British Columbia and the Yukon. Snowfalls in some of the mountain passes were as much as 200 and 300 centimetres, and road maintenance crews were hard pressed to keep roads open. The south Klondike Highway from Whitehorse to Skagway, Alaska, was closed at times due to avalanches and whiteouts. The Canadian customs station, Fraser, received 150 cm of snow.

Large amounts of moisture also crossed the coastal mountains, and was deposited as snow throughout the southern Yukon, with some interior locations reporting over 60 cm. Whitehorse tallied 55 cm of snow this month, the second greatest monthly snowfall since records began in 1942, and 31 cm above normal. The heaviest November snowfall occurred in 1978, 69 cm.

While winter darkness has fallen on the Arctic Islands, sunshine was also scarce in the southern Yukon and Northwest Territories. Whitehorse received just 27 hours of sunshine, which is half the normal. In the Keewatin District, predominantly cloudy skies allowed only an average of one hour of sunshine per day. Normally you would expect two hours per day. On the other hand, precipitation was well above normal in the Arctic, with some stations tallying two to three times their monthly average.

In the Mackenzie Valley, all highway river crossing ferries were out of service and replaced by ice bridges. The exception is the Mackenzie River ferry at Fort Providence. This ferry is always the last one to be pulled out of service, and hopefully it will be able to plough through the wide ice-choked Mackenzie River until mid-December or until an ice bridge is ready for traffic. By the end of the month, two southern Mackenzie ice roads were in full operation: one from Fort Simpson to Wrigley; the other to Jean Marie River. In the eastern Arctic and on Baffin Island it



was a typically windy and snowy month. A mild spell during the middle of the month saw the mercury climb to near zero.

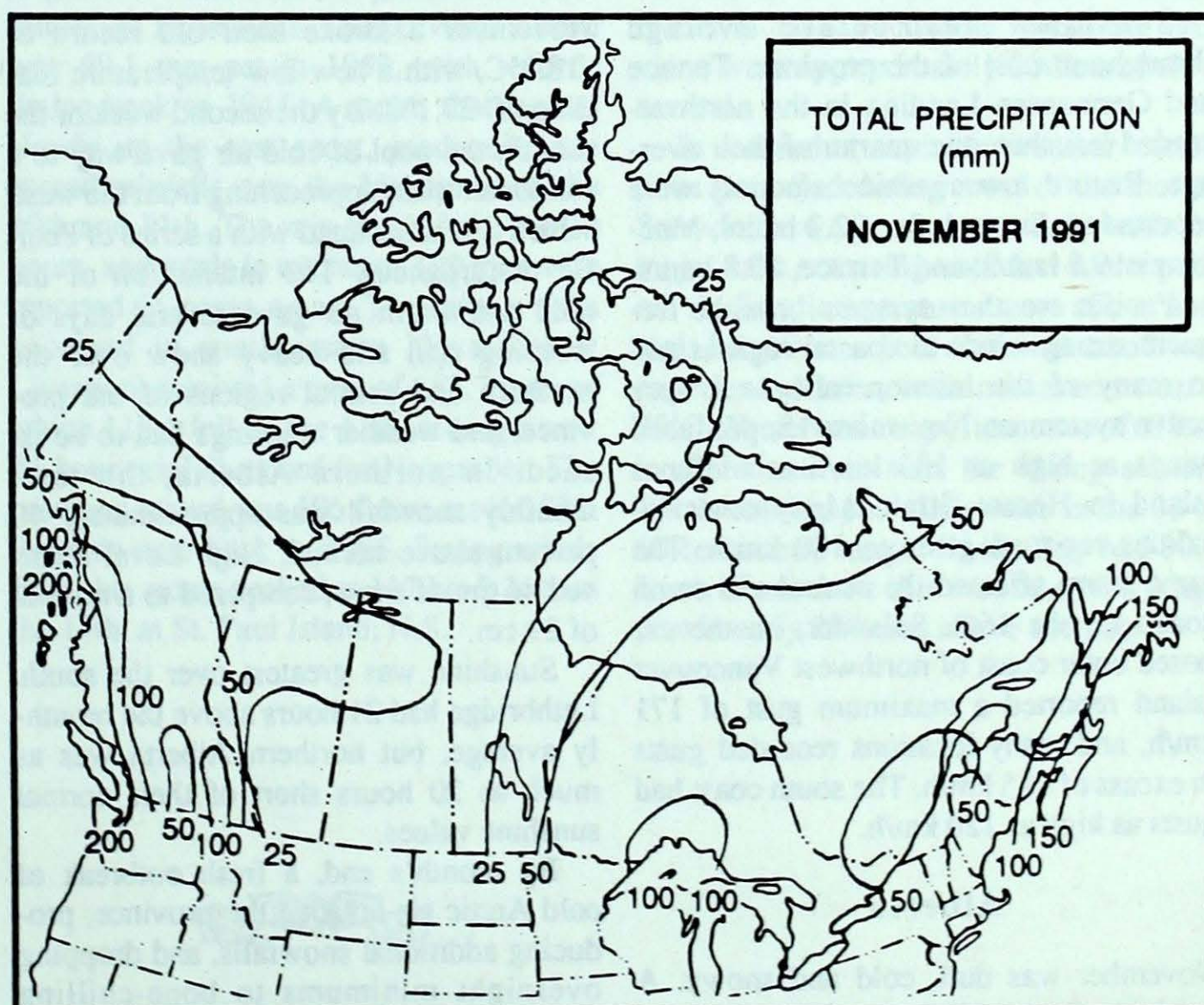
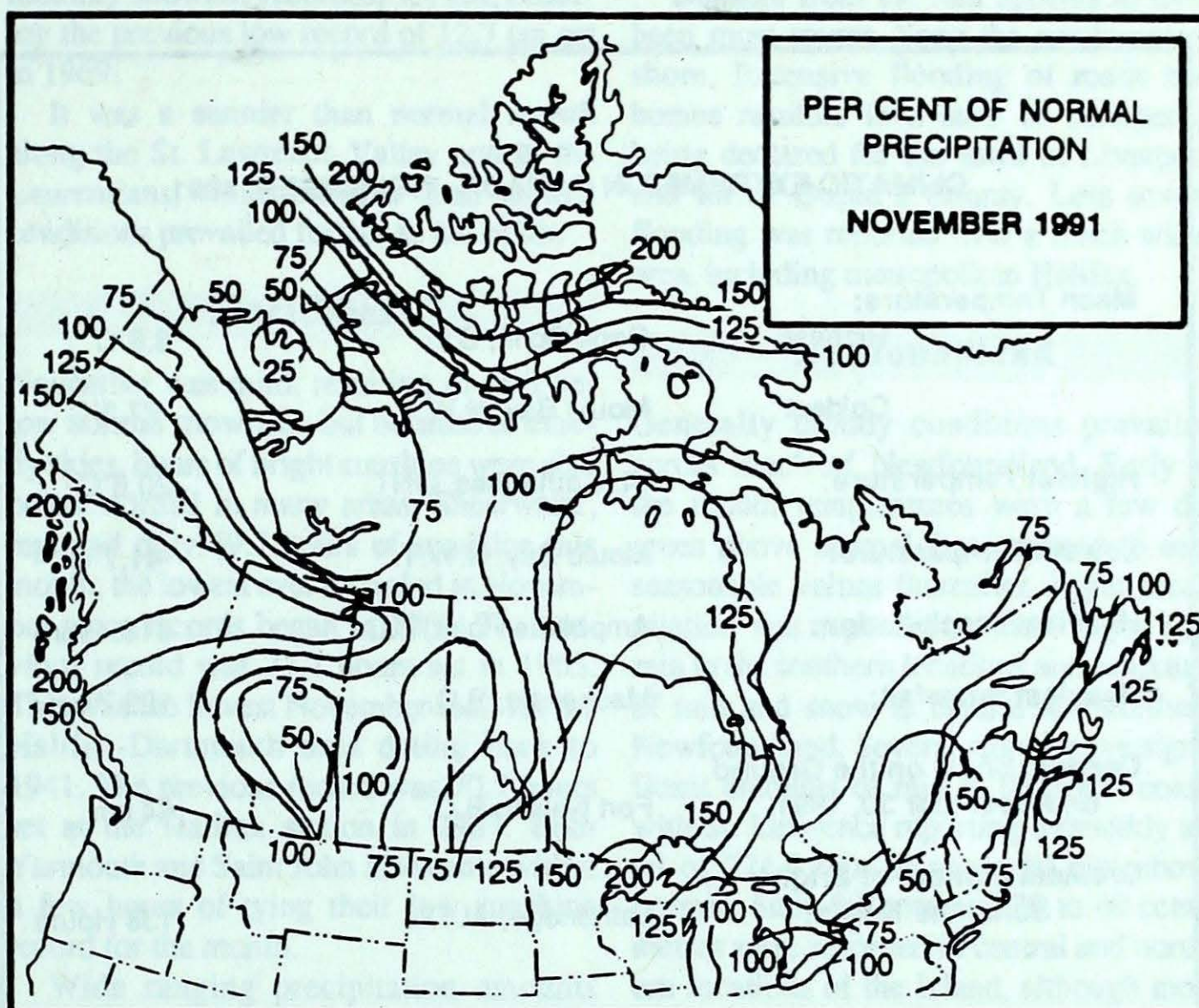
British Columbia

After an unusually early outbreak of cold Arctic air late in October, November was a relatively more normal month, temperature-wise; but a southwesterly circulation allowed numerous Pacific weather systems to affect the province, producing inclement, wet weather.

After a record cold start to the month, temperatures moderated in most areas. The exception was the northeastern portions of the province, which stayed under the influence of an Arctic air mass through most of the period. Merry Island, situated along the south coast, set a new monthly maximum temperature record of 15.6°C, breaking the old record of 15.0°C set in 1962 and 1975.

For the most part precipitation was above average, and in many cases, amounts were two to three times the monthly normal. New record high November precipitation values were established at: Blue River, 185.3 mm; Dease Lake, 75.0 mm; Mackenzie, 151.2 mm; Prince Rupert, 601.1 mm; Terrace, 379.6 mm. Some of the Pacific weather systems produced heavy one and two day rainfalls, causing local flooding. Vancouver Airport reported 50.6 mm on the 19th, the 5th highest one-day precipitation total on record for November. Several local roads, highways and smaller bridges were closed to traffic due to flooding and mud slides. Similar conditions prevailed along the south coast.

While lower coastal areas received little or no snow, the white stuff fell and remained in many of the interior valleys. Heaviest snowfalls occurred in the northeast, where amounts were more than double the monthly average. Some mountain passes received almost 300 cm of snow. Mackenzie reported a new record November snowfall of 129.7 cm, breaking the old record of 86.9 cm set in 1975. Snow in the southern interior valleys allowed a number of ski areas to begin early operation.



CLIMATIC EXTREMES IN CANADA - NOVEMBER, 1991

Mean Temperature:			
Highest	Cape Scott, B.C.	8.6°C	
Coldest	Mould Bay, N.W.T.	-27.3°C	
Highest Temperature:			
	St. Catharines, ONT.	20.6°C	
Lowest Temperature:			
	Mould Bay, N.W.T.	-41.7°C	
Heaviest Precipitation:			
	Amphitrite Point, B.C.	618.4 mm	
Heaviest Snowfall:			
	Mackenzie, B.C.	129.7 cm	
Deepest Snow on the Ground on November 30, 1991			
	Fort Nelson B.C.	64 cm	
Greatest number of Bright Sunshine Hours:			
	Lethbridge, ALTA.	138 Hours	

Manitoba and Saskatchewan

November was a cold and windy month, with precipitation amounts close to normal. Central areas, along the Manitoba and Saskatchewan border, had the greatest deficit, with less than half of the monthly average.

The month began with strong winds and blizzards in the east, as a major storm moved through northwestern Ontario. The strong northwesterly winds behind the storm pulled very cold Arctic air into the region, and resulted in dozens of new low temperature records during the first week of the month. Monthly mean temperatures in November were well below normal. The coldest temperature in the region was -36.5°C at Stony Rapids, while the warmest reading was 13.5°C at Estevan.

Hours of bright sunshine were below normal in the northwest and above normal in the southeast, with sunshine ranging from only 51.1 hours at Cree Lake to 124.2 hours at Moose Jaw.

Ontario

Colder than normal temperatures ushered in an early winter across most of Ontario, and quietly ended the string of ten consecutive abnormally mild months in southwestern and south-central Ontario. This was the coldest November since the frigid November of 1989. The only exception surfaced in the extreme eastern regions of the province, where it was slightly milder than usual. Despite the cold, the final day of the month featured a host of daily record high temperatures, as a balmy blast of air from the Gulf States pushed the mercury to the high teens from Windsor to Muskoka. In Toronto for example, a high of 17.6°C erased the former record high of 13.9°C set in 1908.

Ontario was sharply divided as far as the precipitation pattern was concerned. Heavy snow started falling early in the month in the far northwest, and just kept on accumulating, resulting in the snowiest November since 1966 at Moosonee, where 104 cm fell - almost double the normal. In Thunder Bay, total precipitation amounted to 106 mm - the wettest November since 1958. Other locations experiencing heavy

Sunshine was below average throughout most of the province. Terrace and Germansen Landing in the north recorded less than one quarter of their average. Record low sunshine amounts were reported at: Dease Lake, 22.3 hours; Mackenzie, 9.8 hours; and Terrace, 10.8 hours.

Pacific weather systems brought frequent strong winds to coastal regions and to many of the interior valleys. A very active system on November 15, produced winds as high as 133 km/h at McInnes Island in Hecate Strait. Many other localities reported gusts to 100 km/h. The same storm affected the central and south coasts on the 16th. Solander, on the exposed outer coast of northwest Vancouver Island reported a maximum gust of 171 km/h, and many locations recorded gusts in excess of 125 km/h. The south coast had gusts as high as 120 km/h.

Alberta

November was dull, cold and snowy. A northerly flow early in the month resulted in a number of new monthly minimum temperature records. Grande Prairie on

November 2, broke their old record of -18.2°C, with a new low temperature reading of -27.1°C. By the second week of the month, the pool of cold air gave way to a milder air mass approaching from the west, which was associated with a series of Pacific disturbances. The interaction of the cold and warm air gave several days of freezing rain and heavy snow over the northern and central regions of the province, and weather warnings had to be issued. In northern Alberta, the total monthly snowfall was approximately 40 percent above normal. High Level received 46 cm of snow, compared to a normal of 29 cm.

Sunshine was greatest over the south. Lethbridge had 21 hours above the monthly average, but northern Alberta was as much as 20 hours short of their normal sunshine values.

By month's end, a fresh outbreak of cold Arctic air invaded the province, producing additional snowfalls, and dropping overnight minimums to bone-chilling values once again.

precipitation included Geraldton, 104 mm (normal 62) and Wawa 122 mm (normal 83 mm). In southern and central Ontario, precipitation was closer to normal. However, a number of drier than normal sites were embedded within this area led by Earlton, where only 35 mm of precipitation was measured - the least since 1974. Ottawa's 41 mm and Kingston's 49 mm were their driest November since 1976. In addition, Ottawa's unusual lack of snow, only 2 cm, marked their least November snowfall since 1960. Ironically, a surprise overnight snowfall beginning on the 28th, dumped 15 to 20 cm across south-central Ontario, creating commuter chaos. As well, this was the heaviest one-day snowfall in the area since 1958. Needless to say November more than lived up to its reputation as being a cloudy month, with well below normal hours of bright sunshine.

However, despite the cold temperatures, the year 1991 remains on target to become the warmest year ever recorded in southern Ontario. Only a very cold December can stop it now.

Quebec

The month was mostly cloudy and mild, with the warmest temperatures occurring on November 20 and 30, when a number of new daily records were set.

Total precipitation amounts in southwestern Quebec were less than half the average. Roberval received only 27.2 mm of precipitation this month, a new low monthly record. In addition, new monthly low precipitation records were established at Trois-Rivières, Quebec City, Montreal, Sherbrooke and Sainte-Agathe-des-Monts. In contrast, more than 100 mm fell along the North Shore. All areas of the province had snow this month, ranging from 100 cm near James Bay to less than 5 cm in the Ottawa Valley. Roberval set a new low

monthly snowfall record of 7.4 cm, breaking the previous low record of 12.7 cm set in 1969.

It was a sunnier than normal month along the St. Lawrence Valley and in the Laurentians, while cloudier than normal conditions prevailed further to the north.

Maritimes

November was mild, resulting in well below normal snowfalls, but because of cloudy skies, hours of bright sunshine were also below normal in many areas. Shearwater, reported only 69.7 hours of sunshine this month, the lowest ever recorded in November since records began in 1961. The previous record was 77.7 hours set in 1963. This was the lowest November total for the Halifax-Dartmouth area dating back to 1941. The previous record was 70.7 hours set at the Halifax station in 1957. Both Yarmouth and Saint John also came within a few hours of tying their low sunshine record for the month.

Wide ranging precipitation amounts were recorded this month. On the 11th, Shearwater reported 70.0 mm of rain, setting a new record for the greatest 24-hour rainfall in November. The previous record was 69.1 mm set in 1959, with records dating back to 1944. A storm that moved slowly up the east coast, produced wide spread rainfalls over the Maritimes on the 10th and 11th. The rain lasted for 27 to 30 hours, and totals in excess of 100 mm were reported in some areas. The largest falls occurred in southwestern Nova Scotia; Liverpool received a total of 153.7 mm, of which 113.1 fell on the 11th, setting a new 24-hour rainfall record for November. The previous record was 106.0 mm set in 1983. Records date back to 1966. Strong winds from this storm peaked at 117 km/h late on the 11th, at St. Paul Island, N.S.

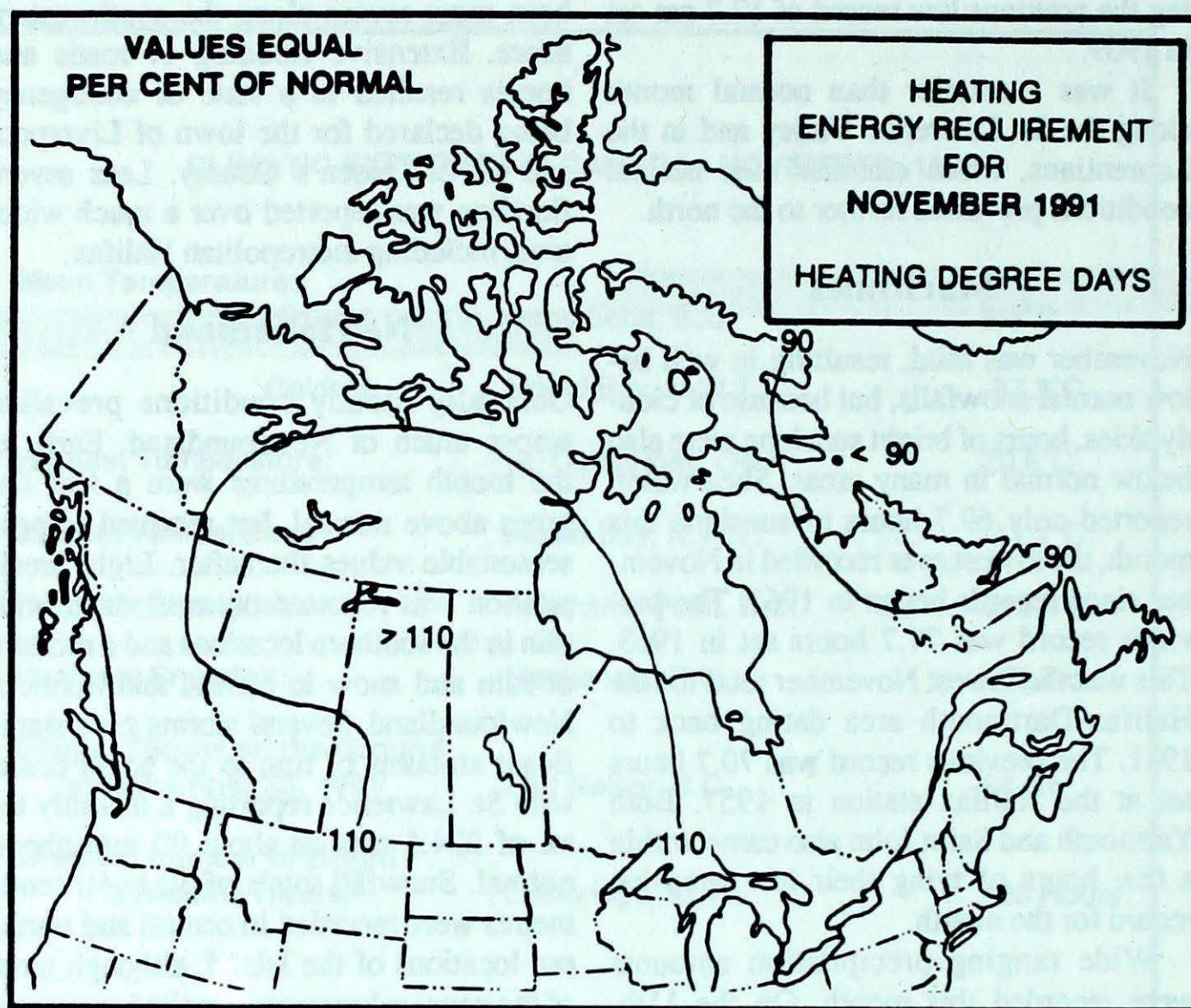
Damage from the rain appears to have been most severe along the southwestern shore. Extensive flooding of roads and homes resulted in a state of emergency being declared for the town of Liverpool and all of Queen's County. Less severe flooding was reported over a much wider area, including metropolitan Halifax.

Newfoundland

Generally cloudy conditions prevailed across much of Newfoundland. Early in the month temperatures were a few degrees above normal, but returned to near seasonable values thereafter. Light precipitation was reported on most days, with rain in the southern locations and a mixture of rain and snow in central and northern Newfoundland. Several storms gave significant amounts of rain to the south coast, with St. Lawrence reporting a monthly total of 224.6 mm or about 80 mm above normal. Snowfall totals of 30 to 40 centimetres were recorded in central and northern locations of the Island, although most of the snow subsequently melted, except in the extreme north. St. John's recorded only 1.2 cm of snow, 20 cm below normal. Hours of bright sunshine across the province were approximately 20 hours below normal.

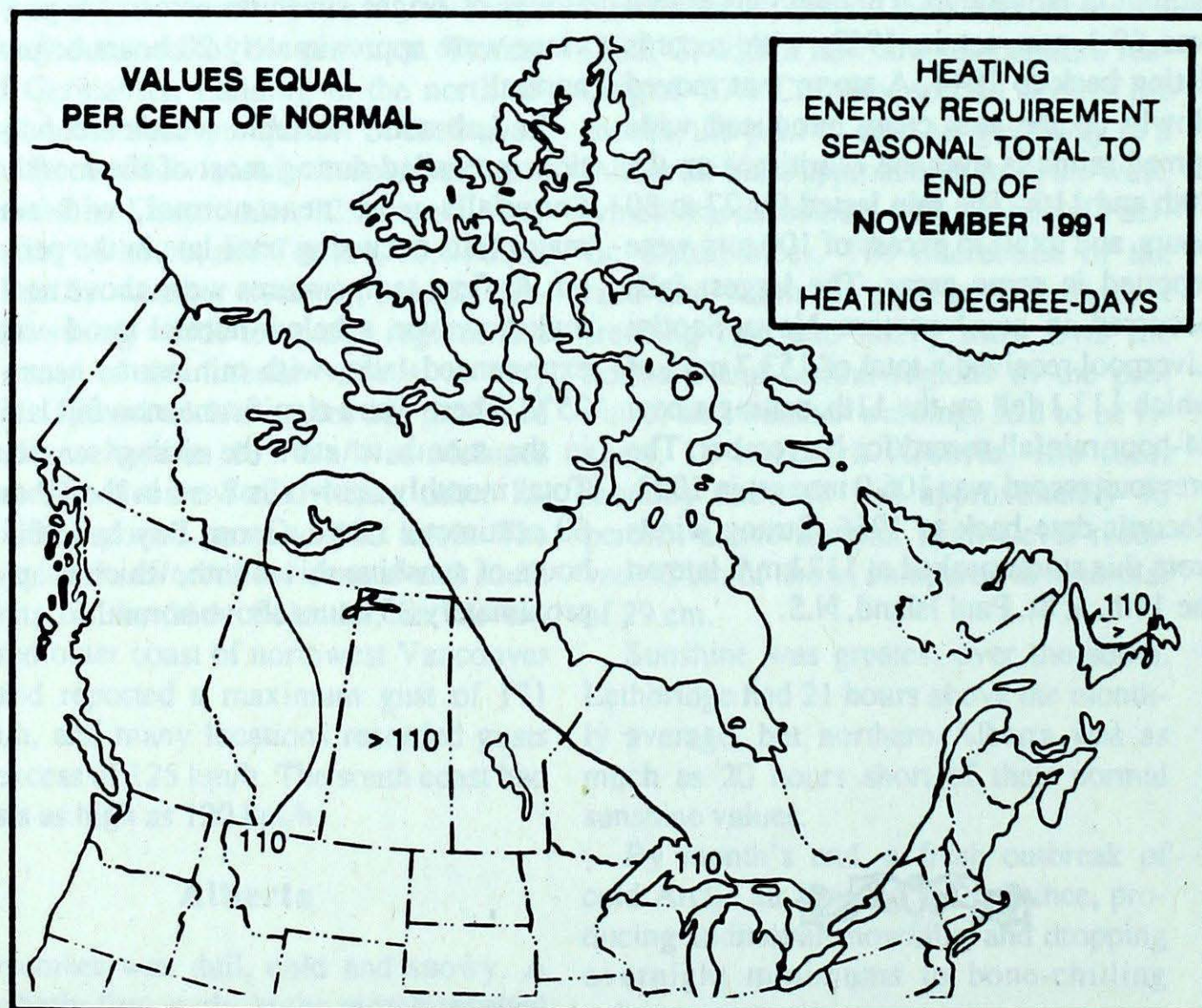
In Labrador, variable weather conditions prevailed during most of the month. Snowfalls were near normal, with no major falls occurring until late in the period. At first, temperatures were above normal; however, a below-normal trend was experienced later, with minimums near -25°C. There was a significant snowfall late in the month to start the skiing season. Total monthly snowfalls were in the 50 to 60 centimetre range. Goose Bay had 90.1 hours of sunshine this month, which is approximately 25 hours above normal.





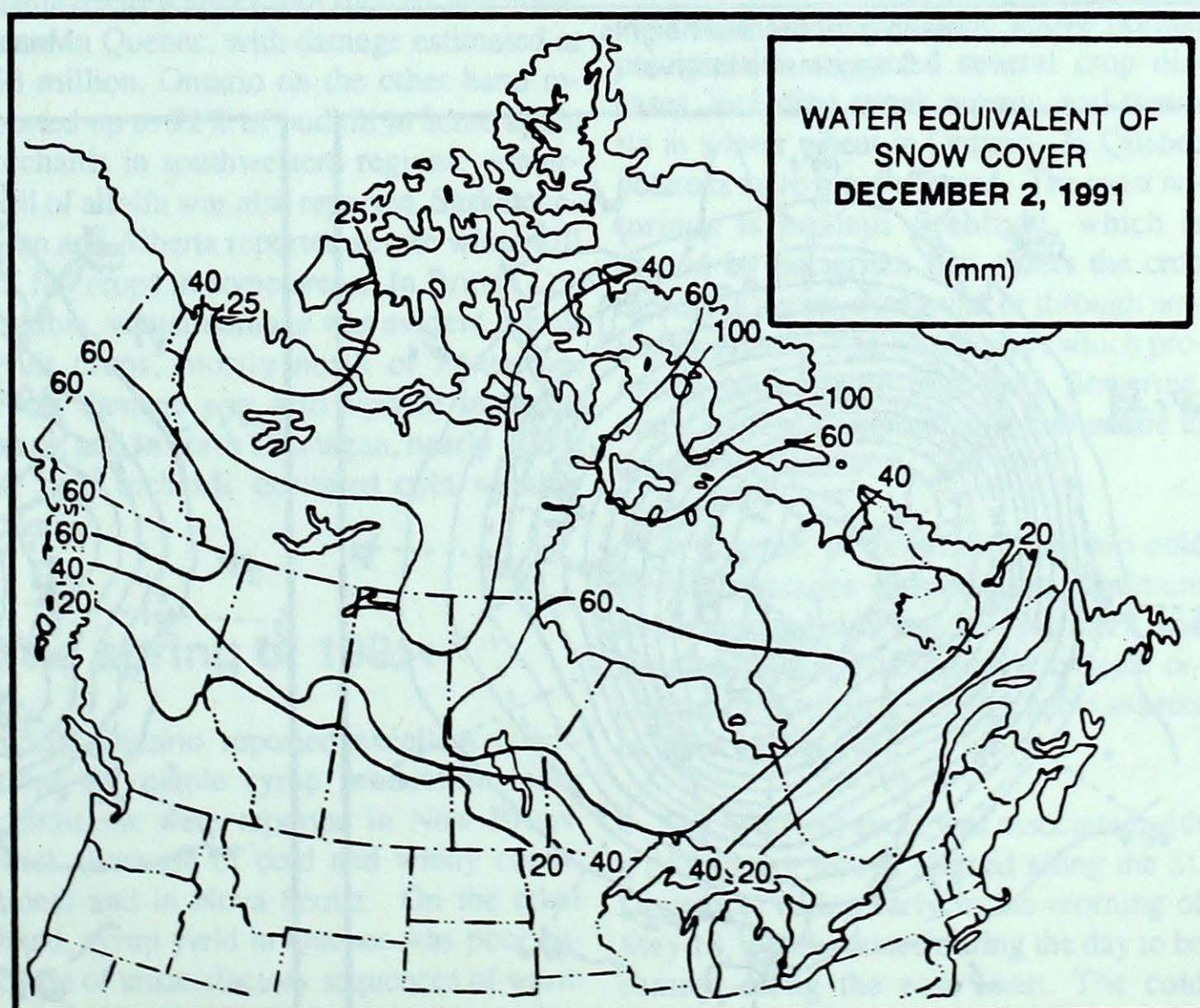
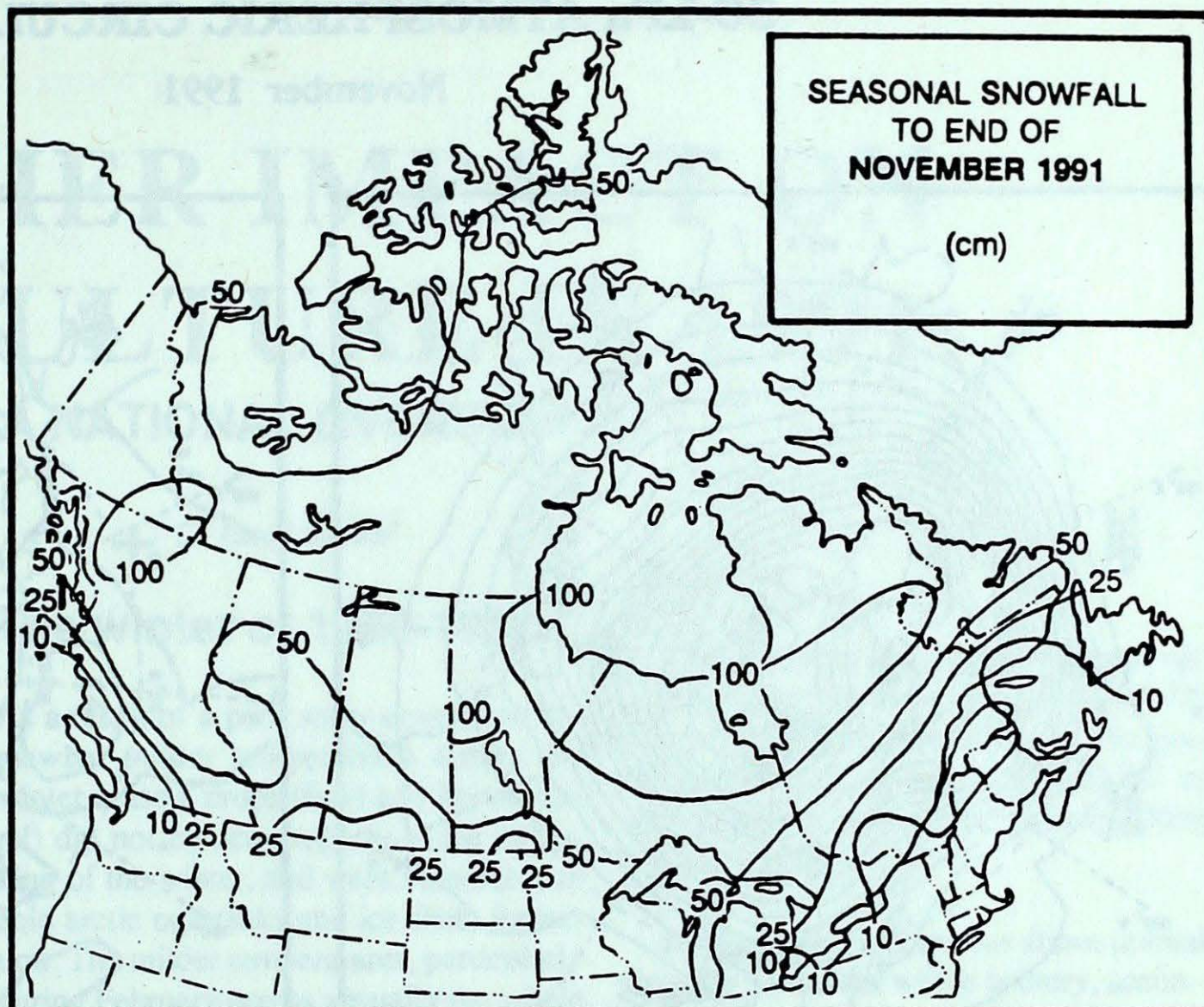
SEASONAL TOTAL OF HEATING DEGREE-DAYS TO END OF NOVEMBER

	1991	1990	NORMAL
BRITISH COLUMBIA			
Kamloops	887	848	887
Penticton	815	799	844
Prince George	1438	1478	1500
Vancouver	750	675	779
Victoria	836	811	853
YUKON TERRITORY			
Whitehorse	2073	2225	1953
NORTHWEST TERRITORIES			
Iqaluit	2606	2810	2778
Inuvik	2931	2943	2788
Yellowknife	2335	2383	2083
ALBERTA			
Calgary	1397	1344	1369
Edmonton Mun.	1424	1414	1318
Grande Prairie	1683	1714	1563
SASKATCHEWAN			
Estevan	1404	1272	1183
Regina	1448	1326	1301
Saskatoon	1564	1486	1357
MANITOBA			
Brandon	1659	1417	1332
Churchill	2403	2323	2289
The Pas	1790	1633	1536
Winnipeg	1504	1242	1222
ONTARIO			
Kapuskasing	1548	1530	1456
London	845	801	795
Ottawa	929	945	924
Sudbury	1199	1199	1141
Thunder Bay	1487	1316	1276
Toronto	830	786	793
Windsor	707	632	659
QUÉBEC			
Baie Comeau	1434	1434	1442
Montréal	886	897	870
Québec	1119	1097	1087
Sept-Îles	1490	1497	1532
Sherbrooke	1118	1085	1156
Val d'or	1444	1485	1392
NEW BRUNSWICK			
Charlo	1228	1224	1228
Fredericton	985	984	981
Moncton	980	993	983
NOVA SCOTIA			
Sydney	906	861	898
Yarmouth	829	774	887
PRINCE EDWARD ISLAND			
Charlottetown	895	917	923
NEWFOUNDLAND			
Gander	1296	1158	1180
St. John's	1184	1082	1141



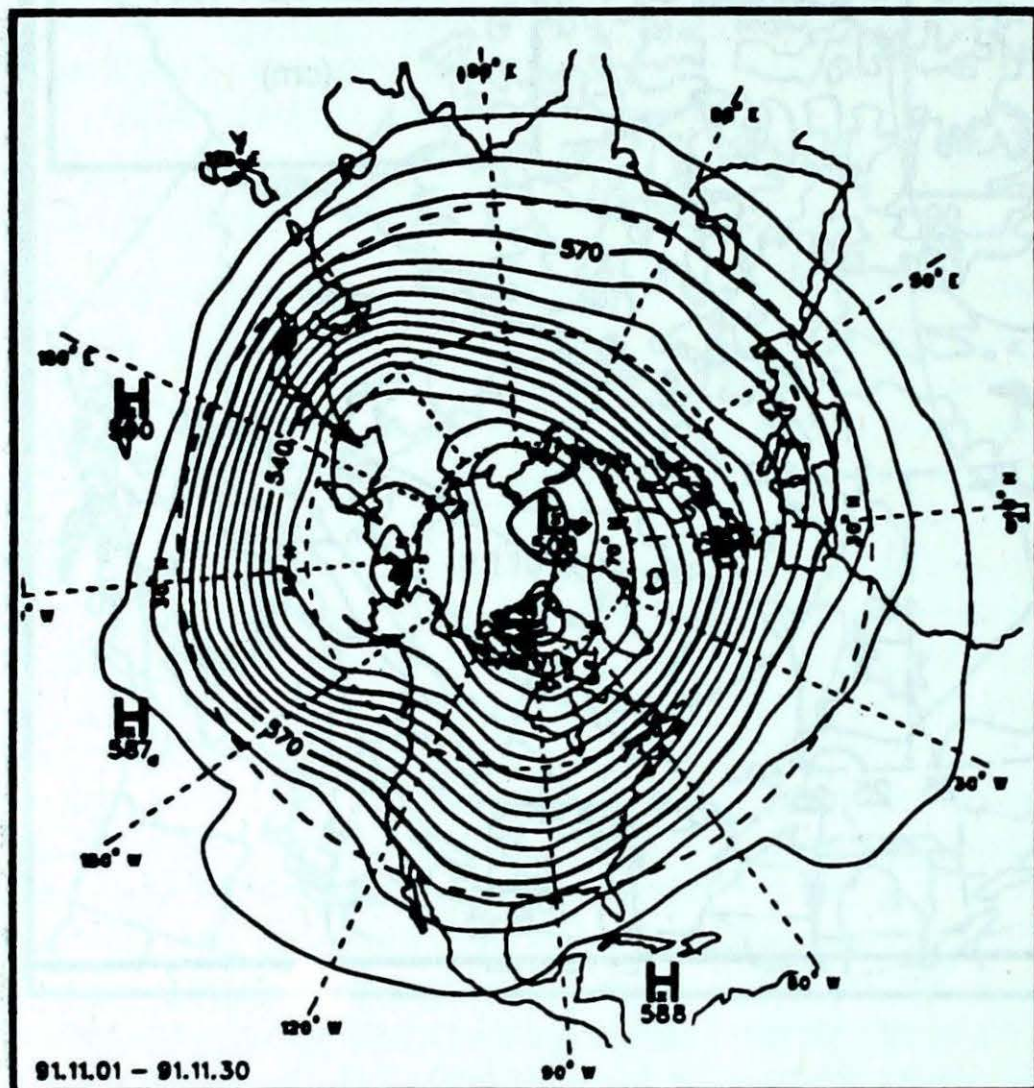
SEASONAL SNOWFALL TOTALS (cm) TO END OF NOVEMBER

	1991	1990	NORMAL
BRITISH COLUMBIA			
Kamloops	18	17	12
Port Hardy	1	12	4
Prince George	75	111	50
Vancouver	2	0	3
Victoria	5	0	2
YUKON TERRITORY			
Whitehorse	78	64	43
NORTHWEST TERRITORIES			
Iqaluit	58	*	91
Inuvik	67	67	76
Yellowknife	70	57	57
ALBERTA			
Calgary	38	42	36
Edmonton	47	41	27
Grande Prairie	47	101	42
SASKATCHEWAN			
Estevan	25	11	23
Regina	17	5	24
Saskatoon	50	26	23
MANITOBA			
Brandon	59	9	23
Churchill	112	135	77
The Pas	105	70	44
Winnipeg	41	9	27
ONTARIO			
Kapuskasing	96	75	85
London	17	11	26
Ottawa	2	8	26
Sudbury	37	50	39
Thunder Bay	76	47	33
Toronto	18	1	9
Windsor	3	0	12
QUÉBEC			
Baie Comeau	47	89	42
Montréal	7	16	23
Québec	10	51	38
Sept-Îles	45	94	61
Sherbrooke	22	29	42
Val d'or	43	72	64
NEW BRUNSWICK			
Charlo	36	58	43
Fredericton	2	17	23
Moncton	8	19	25
NOVA SCOTIA			
Sydney	6	17	15
Yarmouth	12	1	8
PRINCE EDWARD ISLAND			
Charlottetown	8	8	24
NEWFOUNDLAND			
Gander	52	70	44
St. John's	13	32	26

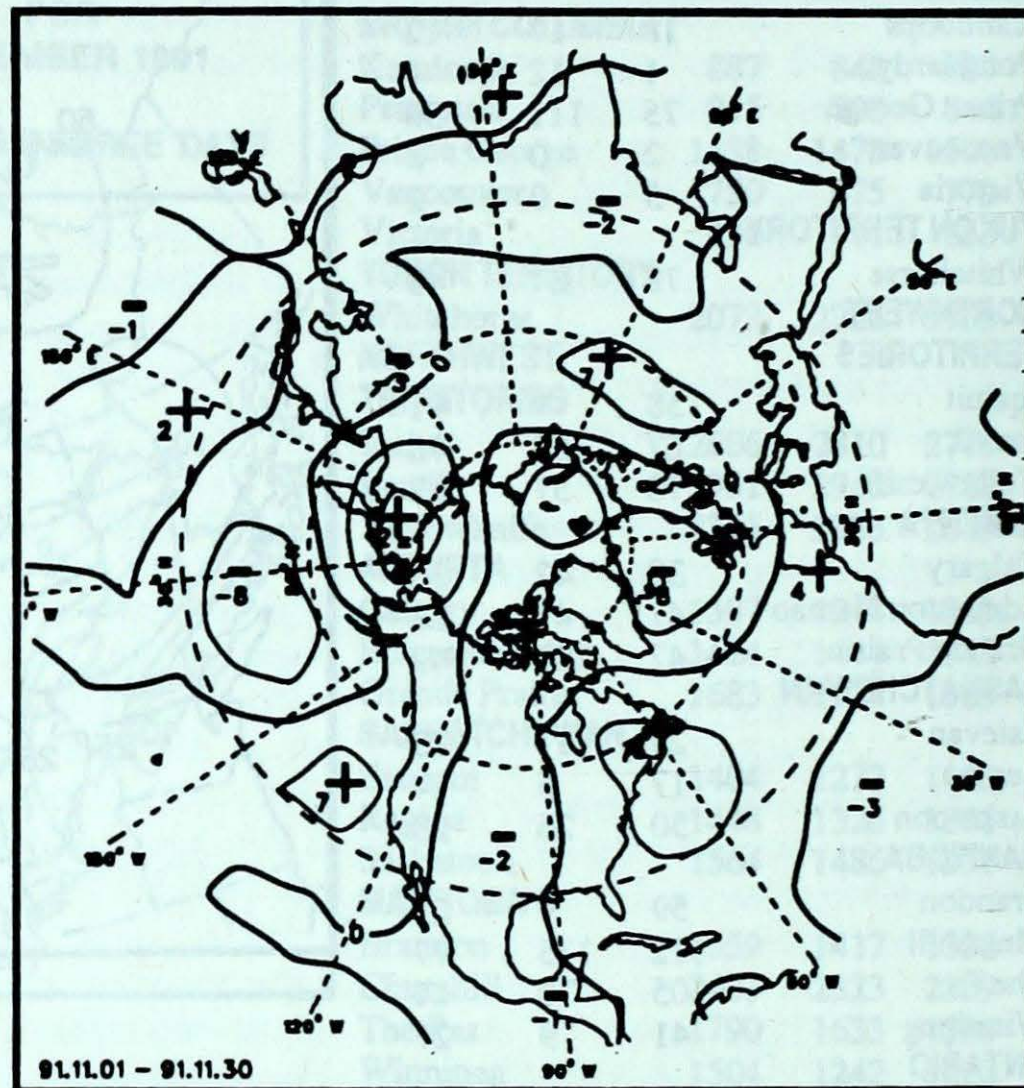


50-kPa ATMOSPHERIC CIRCULATION

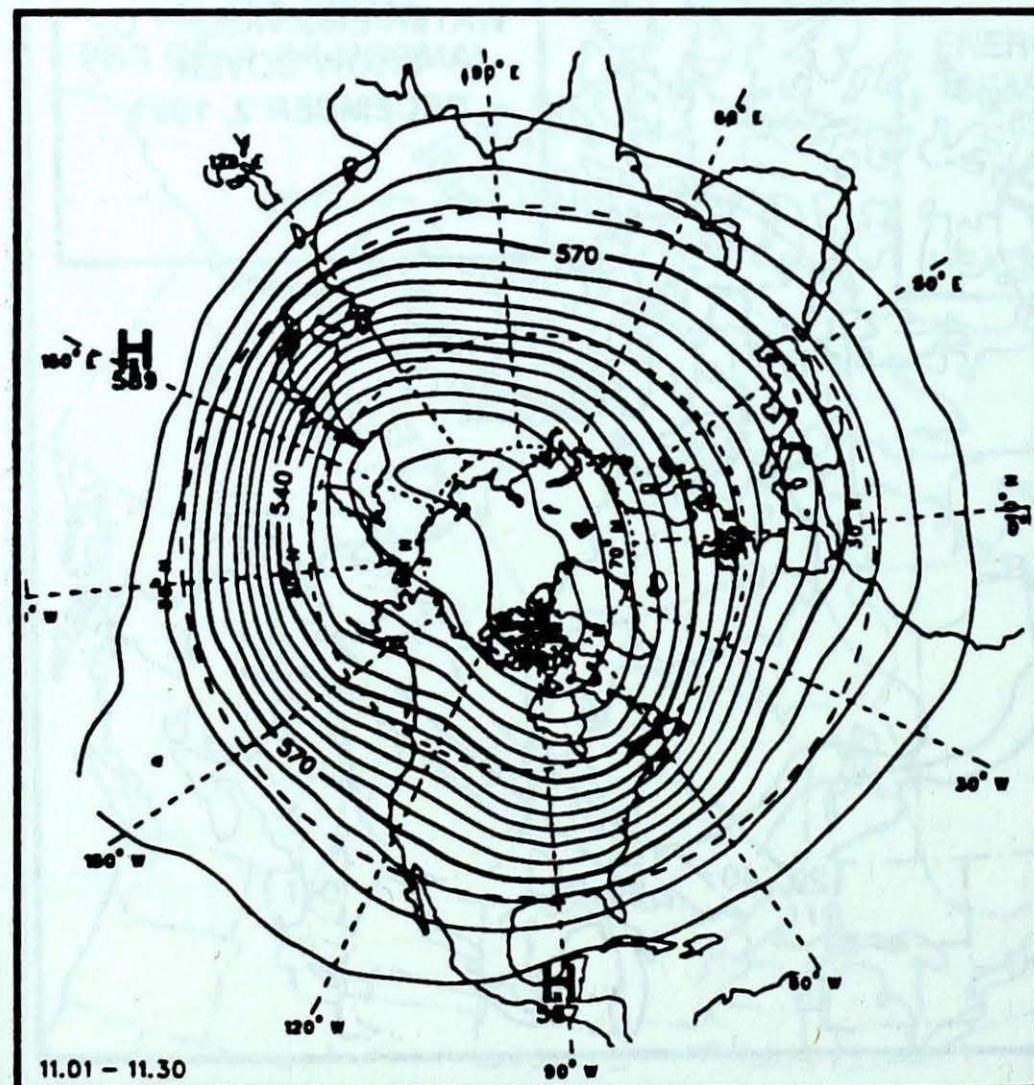
November 1991



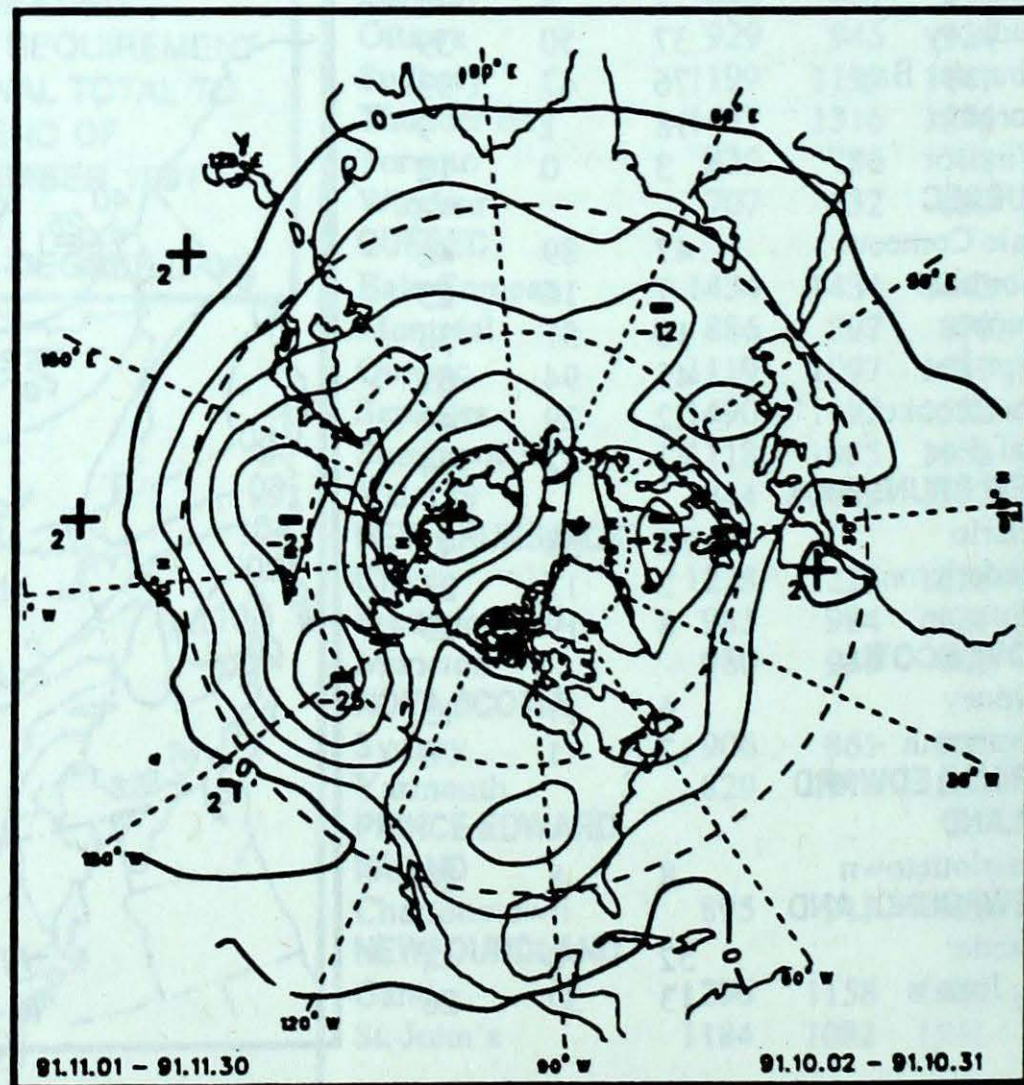
Mean geopotential heights
- 5 decametre interval -



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 -

WEATHER IMPACT ON AGRICULTURE IN 1991:

A NATIONAL OVERVIEW

□ *Isaac Savdié*

Introduction:

The 1991 growing season stands out as one having many severe events. These events ranged from poor overwintering conditions in Quebec and British Columbia, to late frost in the Maritimes, droughts, floods, and severe weather including tornadoes, hail and strong winds in the Prairies, Ontario and Quebec. The 1991 growing season is illustrative of the vulnerability of agriculture to the variable climatic regimes prevailing across the nation.

This report is not meant to be an exhaustive account of every detail; rather, it is selective of certain events that affected agriculture. Impacts on agriculture may be direct such as poor growing conditions resulting in loss in yield and or in quality, or mortality over several years. Or, they may be indirect such as changes in deployment of labour and material resources to control disease and pests in order to grow a crop of an acceptable yield and quality. The more subtle impacts of weather in 1991 include unseasonal temperature and precipitation patterns, which: (a) made weed control in some cases more difficult if not impossible; (b) induced or exacerbated crop diseases, and; (c) provided near ideal conditions for insect proliferation.

Readers may improve the picture derived from the following description of events by consulting maps published in the monthly supplements of *Climatic Perspectives* volume 13.

The winter of 1990-1991:

As a result of a poor snow cover, and somewhat milder temperatures during the winter season, crops (field and horticultural) did not harden properly at the beginning of the winter, and were vulnerable to cold arctic outbreaks and ice sheet formation. The milder temperatures, particularly during February across virtually the whole country resulted in frequent freezing and thawing cycles, which resulted in severe damages to winter crops, berries and apple trees in Quebec, with damage estimated at \$3 million. Ontario on the other hand reported up to 92% of budkill in some apple orchards in southwestern regions; winterkill of alfalfa was also reported. Saskatchewan and Alberta reported severe winterkill of fall crops in some areas. In British Columbia, winter damage was evident in soft fruit crops, mostly north of Penticton. Frost damage was also evident in peach trees, and in north Okanagan, nearly 100% of pear orchards exhibited cold weather damage.

The spring of 1991:

While Ontario reported excellent conditions for maple syrup production, poor conditions were reported in New Brunswick (because of cold and windy conditions) and in Nova Scotia. On the other hand, syrup yield in Quebec was poor because of unsatisfactory sequences of warm and cold episodes; however, the quality was excellent.

Above normal temperatures in April did not benefit spring crops, in that seeding was delayed by excess precipitation. The precipitation was, however, beneficial to winter crops in the Prairies by replenishing low soil moisture.

In May, precipitation was above normal virtually across the whole country, accompanied by above normal temperatures. This resulted from a positive 50 kPa height anomaly, dominating most of the North American Continent. The above normal precipitation triggered several crop diseases, including streak mosaic, and septoria in winter wheat in Ontario. In Quebec potatoes were most affected. The most notorious is perhaps fireblight, which is caused by bacterium that enters the crop through a lesion, the flower or through new tender growth. The warm May, which promoted new growth and early flowering, made several apple orchards vulnerable to disease in Ontario.

In contrast in the Maritimes, two cold frontal passages dropped the minimum temperatures below the freezing mark, and resulted in extensive damage to apple orchards. It is worth reviewing some aspects of these events.

The first frost event was associated with a deep upper trough aligned along the St. Lawrence Valley early in the morning of May 18, which rotated during the day to be centred along the east coast. The cold front, which crossed the Maritimes, ushered in a northerly flow of dry, cold

Arctic air, leaving surface temperatures by nightfall at near freezing, and by midnight frost occurrences were widespread. As the wind dropped, the cold air layers stratified over the ground, and strong radiational cooling dropped temperatures to -4°C at many localities.

On Wednesday, May 22, an upper trough over Labrador and an associated surface wave pulled cold Arctic air over the Gulf of St Lawrence, and snow flurries were reported on Cape Breton Island. While the advective cooling was less severe for most of the Maritimes than the event of the previous weekend, nocturnal radiative heat loss lowered regional temperatures to the freezing point.

As a result of these two late frosts, an estimated 70 to 80% of the apple buds were killed in key horticultural areas, and many surviving buds produced deformed fruits.

Also in May, outbreaks of tornadoes and severe weather, producing hail and strong winds affected the Prairies, Ontario and Quebec, destroying property and littering the land with considerable debris, making field work very difficult.

The summer of 1991:

The 50 kPa mean height anomaly for June exhibited two centres: a negative centre along the west coast, and a positive one over Hudson Bay. This pattern led to much above normal precipitation over the western half of Canada, and much below normal precipitation over the eastern half, with the exception of eastern Labrador, and northern Newfoundland. The surface temperature pattern was above normal over most of Canada, except in southern B.C., Alberta, Newfoundland and Labrador. The higher temperatures and the drier conditions accelerated crop growth at the expense of yields. As a result, there was a poor first cut of forages, and a reduction in yield in blueberries and cereals in Quebec.

Corn was greatly affected by the drought in both Ontario and Quebec.

Once again, severe weather was reported (strong winds and hail) in Quebec, affecting apples, field corn, cereals, tobacco and vegetables. Heavy hail damage was also reported in the Prairies and Ontario. Several tornadoes were reported in Saskatchewan, damaging trees and buildings, as well, a severe infestation of grasshoppers was reported in some areas in both Alberta and Saskatchewan. Strong winds delayed spraying for weeds in Saskatchewan.

The drier conditions that prevailed in June, persisted in southern Quebec, southwestern and western Ontario during July. Also, drier conditions developed over central and southern Alberta, and central Saskatchewan. The drier conditions were also accompanied by above normal temperatures. Corn was the most affected during the month in both Quebec and Ontario, with estimated drops in yield of up to 50% in southwestern Ontario. In Quebec, the succession of frost, hail, drought and excessive heat throughout the season hurt the apple crop, causing an early drop and smaller sizes. Heat and moisture stress were reported to have affected field crops in western Saskatchewan and Alberta. Nova Scotia anticipated a drop of 25 to 30% of its potential yield of vegetables and potatoes, and in spite of the drier conditions several apple scab infection periods were reported in that province. The above normal temperatures also resulted in severe Colorado potato beetle infestations in New Brunswick. Also in Ontario a bivoltine (two generations in a given growing season) strain of the European corn borer appeared in counties north of where the pest usually appears. The warmer temperatures were undoubtedly a factor. Once again severe weather plagued B.C. the Prairies, Ontario and Quebec. Flooding in low lying areas was also reported in Saskatchewan.

In August, a 50 kPa height anomaly centred over the Prairies produced above normal temperatures over the whole country, with the exception of Newfoundland, and a much below normal precipitation pattern over northern Alberta, Saskatchewan, Manitoba and Ontario. This pattern helped advance crops to maturity rapidly in the Prairies, thus affecting yields and quality. In northeastern Alberta, the hot dry weather subjected crops to thermal stress, and in spite of the below normal precipitation, several crop diseases were reported. A tornado was reported in Quebec (St. Joseph and St. Justin) on August 27, producing considerable damage. Earlier in the month (August 1 to 4), severe weather erupted producing strong winds, and hail. The first, second, and third cuts of forage crops in that province are all reported to be of poor yield, because of the drier conditions, which prevailed during the previous months. Also, potato yield were expected to be 20 to 40% lower than previously anticipated.

It is interesting to note that the corn belt in the U.S. was not spared the dry conditions that prevailed during June, July and August on this side of the border. The Palmer Drought Index (P.D.I.) was severe to extreme from Ohio eastward through Pennsylvania, Maryland and Virginia, as well as the southern plains and middle Mississippi Valley. Maryland and Pennsylvania estimated losses due to the drought to be \$57 and \$278 million, respectively.

1991 harvest season

A dipole pattern of the 50 kPa height anomalies, virtually the reverse of June pattern, featured a positive cell along the west coast, and a broad negative centre extending over central and eastern Canada. This pattern produced above normal temperatures over B.C., Alberta and Saskatchewan, with the remainder of the country near normal. The precipitation pattern was below normal over the provinces west of

Manitoba, providing generally ideal harvest weather, except for local interruptions by showers. Manitoba, Ontario and the Maritimes experienced above normal precipitation except in southwestern Ontario and southern Quebec.

In spite of the somewhat unfavourable initial growing conditions, and the drier conditions from mid-July and August, near ideal growing conditions prevailed during the critical growth periods, thus producing a record production of 26.3 million tonnes of major grains, oilseeds and specialty crops. The drier conditions on the Prairies persisted in October, resulting in undesirable soil moisture deficits, which coupled with financial difficulties, reduced considerably the areas planted for winter crops.

In Quebec, early frost in September claimed several unharvested crops, particularly vegetables. The apple crop was of lower size, with coloration problems and hail damaged. One million bushels were destined for processing. Precipitation in Quebec in early October slowed down the

harvest, but on the bright side, it replenished soil moisture for fall crops.

During this growing season, total damage in Quebec attributable to the weather is estimated to be \$32 million, 55% of which is for field crops and the remainder for horticulture.

In Saskatchewan, damage is estimated to be \$100 million, attributable to either excessive moisture or drought. About \$10 million is the estimated damage price in both Manitoba and British Columbia. In Ontario, the damage estimates range from \$45 to \$55 million. Nova Scotia reported approximately \$1.5 million in damages due to late frost and very wet fall, and in New Brunswick and Prince Edward Island crop damages are estimated at about \$4.0 and \$2 million, respectively, due to summer drought conditions and fall precipitation.

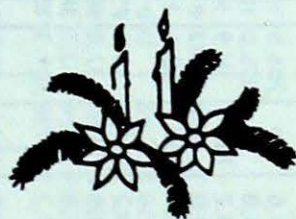
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NOVEMBER 1991

NOVEMBER 1997

STATION	Temperature C				Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
	Mean	Difference from Normal	Maximum	Minimum									
BRITISH COLUMBIA													
ABBOTSFORD A	6.7	1.1	15.2	-3.0	0.0	0	256.4	134	0	20	43	60	337.8
ALERT BAY	6.9	1.2	13.8	1.9	0.0	0	326.0	154	0	25	*	*	334.2
AMPHITRITE POINT	8.1	0.7	12.4	1.1	0.0	0	618.4	156	0	25	*	*	297.4
BLUE RIVER A	-1.2	1.5	7.7	-20.6	86.5	153	185.3	221	49	21	*	*	*
CAPE ST JAMES	8.3	1.4	12.4	3.5	0.0	0	286.0	153	0	25	42	*	290.1
CAPE SCOTT	8.6	1.8	13.5	3.8	0.8	20	375.0	106	0	27	*	*	284.0
CASTLEGAR A	1.3	-0.5	13.0	-12.1	54.2	180	111.9	145	1	13	52	91	502.4
COMOX A	6.7	1.4	16.5	-0.3	0.0	0	223.2	116	0	17	44	*	339.8
CRANBROOK A	-2.0	-0.1	11.3	-18.7	26.6	109	40.4	131	5	12	87	105	599.6
DEASE LAKE	-7.9	0.6	4.1	-25.3	88.2	254	75.0	256	57	15	22	37	785.8
FORT NELSON A	-16.1	-4.1	-6.9	-26.2	59.8	211	42.9	189	64	12	40	*	1023.9
FORT ST JOHN A	-9.4	-3.4	7.9	-21.7	53.9	175	52.7	169	25	10	54	*	820.2
HOPE A	6.9	2.2	16.9	-3.0	1.2	7	304.3	136	0	23	13	46	334.6
KAMLOOPS A	2.6	1.0	13.5	-8.2	15.3	132	26.6	121	0	9	56	79	463.2
KELOWNA A	2.0	0.9	11.5	-10.3	19.0	164	35.5	137	0	8	51	89	480.9
MACKENZIE A	-2.9	1.5	6.8	-22.1	129.7	262	151.2	253	52	19	10	20	625.8
PENTICTON A	3.7	0.7	12.3	-7.1	1.6	21	31.2	131	0	10	62	103	430.4
PORT ALBERNI A	6.8	1.9	16.3	-4.3	0.0	0	385.0	134	0	20	16	*	335.5
PORT HARDY A	6.7	1.4	13.8	-0.3	0.0	0	356.5	146	0	25	33	52	339.5
PRINCE GEORGE A	-0.5	2.4	10.5	-23.5	45.2	114	74.5	148	7	16	44	67	553.4
PRINCE RUPERT A	6.2	2.3	12.6	-1.7	2.2	25	601.1	224	0	29	18	36	352.4
PRINCETON A	1.5	2.4	12.8	-11.0	8.7	37	37.4	99	2	11	76	*	*
REVELSTOKE A	1.6	1.3	7.4	-9.5	67.2	132	118.4	122	4	19	34	81	491.5
SANDSPIT A	7.1	1.6	12.4	0.1	0.0	0	296.3	164	0	23	47	73	327.5
SMITHERS A	-0.5	1.8	7.5	-13.4	43.5	113	84.6	145	16	15	30	65	553.8
TERRACE A	1.9	1.6	8.5	-5.1	52.4	107	379.6	211	9	28	11	19	482.1
VANCOUVER INT'L A	7.1	1.2	16.2	-1.6	0.0	0	192.4	128	0	16	42	61	325.8
VICTORIA INT'L A	6.9	0.9	16.5	-0.7	0.0	0	178.9	137	0	17	62	80	331.6
VICTORIA MARINE	7.4	0.8	14.0	-0.6	0.0	0	215.6	125	0	19	*	*	318.7
WILLIAMS LAKE A	-0.6	2.0	9.1	-14.5	36.8	119	44.7	142	11	9	64	88	557.2
YUKON TERRITORY													
DAWSON A	-18.7	*	-4.1	-36.1	68.9	*	31.6	*	*	*	*	*	*
MAYO A	-15.7	-0.5	-4.2	-34.7	47.8	187	26.9	110	*	*	*	*	*
WATSON LAKE A	-16.3	-2.5	-0.1	-35.0	72.6	195	57.9	182	43	19	15	34	1028.1
WHITEHORSE A	-9.2	-0.4	2.7	-23.3	55.5	233	38.1	192	20	13	27	47	815.9
NORTHWEST TERRITORIES													
BAKER LAKE A	-21.7	-1.4	-6.4	-34.8	18.0	103	16.5	100	13	8	37	72	50.9
CAMBRIDGE BAY A	-23.6	0.2	-10.6	-35.0	11.6	129	10.0	130	20	2	20	201	1247.1
CAPE PARRY A	-21.7	-3.4	-10.4	-34.5	1.6	11	1.9	20	16	0	*	*	1192.1
CLYDE A	-16.8	0.6	-2.2	-34.7	29.2	178	26.2	174	33	4	0	*	1051.1
COPPERMINE A	-20.7	-1.0	-8.2	-33.2	9.4	62	7.4	52	21	3	33	273	1163.2
CORAL HARBOUR A	-16.5	1.0	-2.8	-29.9	23.4	129	23.4	130	27	9	29	50	1045.6
EUREKA	-27.0	4.5	-8.6	-39.3	5.7	190	5.7	228	16	2	0	*	1350.0
FORT SIMPSON A	-18.6	-2.9	-10.2	-31.6	29.7	117	24.6	102	38	9	38	75	1099.0
FORT SMITH A	-14.4	-2.8	1.6	-34.4	33.9	118	21.4	82	37	7	49	112	970.5
IQALUIT	-9.8	3.2	0.5	-28.9	27.6	75	26.4	77	15	7	16	34	832.8
HALL BEACH A	-20.5	1.0	-4.2	-34.4	6.4	50	6.2	49	15	2	*	*	1155.8
HAY RIVER A	-14.7	-3.4	-0.6	-33.8	18.2	46	15.9	43	39	6	*	*	982.9
INUVIK A	-24.1	-3.4	-9.2	-36.8	16.2	72	13.1	73	26	5	6	34	1264.2
MOULD BAY A	-27.3	-0.7	-9.7	-41.7	16.0	364	12.2	330	20	6	0	*	135.7
NORMAN WELLS A	-22.6	-4.4	-9.8	-34.9	26.4	124	19.1	91	6	8	56	175	1239.1
POND INLET A	-21.5	2.1	-5.2	-39.0	19.8	194	12.4	112	15	2	0	*	1184.4
RESOLUTE A	-24.5	0.0	-12.8	-37.6	15.8	259	15.8	277	6	3	1	*	1275.9
YELLOWKNIFE A	-17.2	-3.1	-2.9	-37.9	41.8	139	18.8	77	32	4	55	130	1056.0
ALBERTA													
BANFF	-3.7	0.2	6.4	-22.4	31.8	99	17.4	56	7	8	*	*	650.7
CALGARY INT'L A	-2.6	0.1	10.8	-23.7	13.6	83	9.6	76	0	3	124	100	618.1
COLD LAKE A	-8.1	-1.9	8.3	-26.9	19.4	92	15.3	75	13	4	75	80	783.7
CORONATION A	-6.9	-2.0	5.9	-25.2	8.8	55	6.6	44	12	3	98	76	764.8

NOVEMBER 1991

STATION	Temperature C				Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
	Mean	Difference from Normal	Maximum	Minimum									
EDMONTON INT'L A	-6.2	-0.7	7.4	-26.5	9.2	51	8.6	51	8	2	99	96	725.5
EDMONTON MUNICIPAL	-4.7	-1.0	7.8	-21.9	10.6	*	10.6	68	7	3	101	94	680.8
EDMONTON NAMAO A	-5.3	-0.4	7.5	-22.1	10.0	60	9.1	51	7	4	*	*	713.0
EDSON A	-6.3	-0.4	9.0	-30.3	13.2	52	8.6	47	19	4	75	81	728.2
FORT CHIPEWYAN A	-13.0	-2.9	5.5	-30.5	41.8	168	41.8	175	*	*	*	*	*
FORT MCMURRAY A	-10.5	-2.3	7.0	-28.5	41.0	141	33.9	135	17	9	65	78	855.5
GRANDE PRAIRIE A	-8.3	-2.3	7.4	-27.1	28.1	108	36.1	130	16	8	56	*	789.2
HIGH LEVEL A	-13.7	-3.0	2.1	-33.6	45.8	157	45.2	179	23	14	56	81	951.4
JASPER	-2.3	1.6	7.6	-24.5	18.2	74	24.4	82	6	7	65	*	609.3
LETHBRIDGE A	-1.2	-0.4	14.5	-25.4	22.8	121	22.2	132	0	3	138	118	576.1
MEDICINE HAT A	-2.6	-1.0	13.5	-25.4	5.3	38	6.1	42	1	3	127	113	614.9
PEACE RIVER A	-10.7	-2.6	6.9	-27.7	36.1	164	36.9	184	23	10	*	*	860.7
RED DEER A	-5.9	-1.3	8.0	-26.3	16.8	111	12.0	79	7	5	*	*	727.1
ROCKY MTH HOUSE A	-5.7	-2.1	12.8	-28.1	25.3	128	16.4	92	20	4	*	*	715.6
SLAVE LAKE A	-8.4	-2.4	8.5	-24.9	20.0	85	17.0	81	15	4	58	59	790.9
WHITECOURT A	-6.1	0.2	9.0	-26.2	12.2	56	13.4	57	10	4	*	*	722.4
SASKATCHEWAN													
BROADVIEW	-7.8	-2.0	9.8	-27.6	24.3	163	18.6	136	9	8	111	103	772.5
CREE LAKE	-13.9	-3.6	4.3	-37.1	27.0	96	25.9	122	24	6	51	81	957.6
ESTEVAN A	-6.0	-2.4	13.5	-28.0	10.4	70	8.7	54	3	3	101	84	720.1
HUDSON BAY A	-10.7	*	7.0	-33.6	16.4	*	9.4	*	22	5	90	*	859.4
KINDERSLEY	-7.1	-1.9	8.1	-28.9	6.6	65	5.0	40	6	1	106	*	752.6
LA RONGE A	-11.0	-2.6	7.2	-28.7	17.1	49	18.1	71	33	8	*	*	867.9
MEADOW LAKE A	-9.4	*	7.0	-27.5	25.0	*	22.0	*	17	9	68	*	821.7
MOOSE JAW A	-5.2	-1.6	12.1	-12.9	11.1	59	11.1	66	2	3	124	113	695.8
NIPAWIN A	-11.5	*	7.0	-33.5	14.4	*	10.8	*	31	4	77	*	884.8
NORTH BATTLEFORD A	-8.9	-3.1	6.0	-30.4	19.8	145	19.6	137	18	5	*	*	804.1
PRINCE ALBERT A	-10.2	-3.0	7.6	-30.1	13.0	75	11.4	67	21	6	73	87	845.7
REGINA A	-6.6	-1.5	10.7	-27.2	10.6	75	8.8	65	5	2	107	103	738.7
SASKATOON A	-8.6	-2.9	5.4	-27.2	19.6	151	18.0	122	15	4	*	*	787.5
SWIFT CURRENT A	-5.7	-2.0	11.5	-26.3	16.0	107	14.1	89	4	5	101	92	708.8
YORKTON A	-9.1	-3.2	7.0	-30.9	16.6	85	15.4	77	13	5	93	104	816.1
MANITOBA													
BRANDON A	-10.1	-4.4	5.0	-28.0	16.0	96	19.0	105	12	8	113	*	843.4
CHURCHILL A	-16.8	-4.7	-0.9	-32.1	62.6	150	47.4	122	49	9	71	142	1042.1
DAUPHIN A	-9.3	-4.1	8.4	-30.9	32.8	137	20.4	81	*	70	115	124	829.8
GILLAM A	-16.6	-4.8	4.1	-32.7	65.2	147	45.8	145	22	9	*	*	1036.9
ISLAND LAKE	-12.7	-4.8	5.3	-28.9	27.0	54	36.8	100	20	89	*	*	895.0
LYNN LAKE A	-16.4	-4.6	1.1	-33.3	12.6	34	11.3	38	22	4	57	94	1033.6
NORWAY HOUSE A	-13.6	*	3.2	-33.0	28.2	*	24.6	*	8	8	*	*	949.5
PORTAGE LA PRAIRIE	-8.1	-4.0	8.6	-22.9	25.4	96	25.3	86	5	8	*	*	776.7
THE PAS A	-11.7	-4.2	6.3	-31.4	13.9	43	9.3	32	26	3	76	113	890.2
THOMPSON A	-16.5	-5.1	2.8	-34.2	29.4	87	24.0	81	24	8	80	118	1036.0
WINNIPEG INT'L A	-8.5	-4.0	5.5	-24.0	23.8	109	29.4	117	8	6	103	*	794.7
ONTARIO													
BIG TROUT LAKE	-12.1	-3.1	5.5	-25.9	61.4	145	66.0	160	20	10	60	*	902.5
EARLTON A	-1.8	0.7	11.5	-15.5	13.2	34	35.4	50	1	10	*	*	592.3
GERALDTON A	-7.2	*	6.8	-26.2	97.4	*	104.0	*	37	13	*	*	753.7
GORE BAY A	1.7	-0.2	11.5	-9.2	37.2	145	61.5	76	0	17	*	*	489.3
HAMILTON RBG	3.2	*	19.0	-8.0	7.7	*	64.2	*	0	13	57	*	*
HAMILTON A	2.4	-1.0	17.7	-11.0	20.8	181	71.8	103	0	13	*	*	468.5
KAPUSKASING A	-4.4	0.0	9.3	-20.0	74.4	121	85.8	107	48	12	*	*	673.5
KENORA A	-8.4	-3.8	7.3	-23.0	52.9	142	57.3	142	15	12	*	*	790.6
KINGSTON A	3.0	0.1	17.5	-9.9	9.0	63	49.4	53	0	7	62	80	449.1
LONDON A	2.0	-1.1	16.3	-11.2	16.8	69	91.1	108	0	11	56	75	478.8
MOOSEHORN	-4.7	-0.2	10.1	-19.6	104.4	221	104.6	158	47	13	54	106	681.7
MUSKOKA A	0.5	-0.6	15.7	-13.6	23.5	58	68.3	68	0	12	*	*	527.1
NORTH BAY A	-1.2	-0.2	11.4	-15.1	32.4	94	91.4	106	1	17	66	101	574.7
OTTAWA INT'L A	1.6	0.4	17.9	-9.1	2.2	10	40.7	52	0	6	89	111	493.0
PETAWAWA A	0.0	0.5	16.2	-13.9	3.3	17	44.2	68	0	7	*	*	539.5
PETERBOROUGH A	0.7	-1.3	17.1	-15.1	14.6	92	48.0	70	0	10	*	*	519.2
PICKLE LAKE	-10.4	-2.8	5.1	-24.7	94.2	194	85.6	175	23	13	*	*	851.9
RED LAKE A	-10.1	-4.0	5.1	-27.2	50.8	152	59.4	159	14	11	62	*	843.0
ST. CATHARINES A	4.1	-0.5	20.6	-8.0	17.2	210	63.8	101	0	12	60	*	416.1
SARNIA A	2.6	-1.2	16.9	-9.8	10.8	67	77.2	105	0	10	88	95	463.2
SAULT STE MARIE A	0.1	-0.6	12.0	-11.5	46.4	112	81.7	95	2	15	58	91	538.4
SIOUX LOOKOUT A	-9.0	-3.7	4.9	-23.7	79.8	176	87.1	175	29	10	*	*	808.7
SUDBURY A	-1.3	-0.1	10.6	-14.6	22.0	69	58.7	75	5	12	66	84	578.5
THUNDER BAY A	-5.4	-2.8	9.0	-26.1	59.4	199	106.4	201	25	12	82	94	702.0
TIMMINS A	-3.2	0.6	10.9	-21.2	59.3	97	68.3	87	19	12	*	*	635.8
TORONTO	4.3	*	17.7	-4.5	17.8	*	61.4	*	0	10	*	*	412.8
TORONTO INT'L A	2.5	-0.8	18.3	-8.4	18.2	227	56.3	90	0	9	*	*	467.1
TORONTO ISLAND A	3.7	*	15.9	-3.9	12.8	217	61.7	*	0	9	*	*	429.7
TRENTON A	2.2	-1.0	17.1	-10.3	17.2	131	60.6	70	0	10	*	*	474.6
WATERLOO WELLINGTON	1.3	-1.2	15.8	-11.6	19.6	137	62.2	85	2	11	*	*	500.8
WAWA A	-2.1	*	10.6	-20.2	82.6	*	122.1	*	17	14	*	*	615.3
WIARTON A	2.3	-0.6	17.1	-6.9	53.0	135	92.6	98	0	16	68	113	468.3
WINDSOR A	3.3	-1.1	16.5	-8.2	3.4	30	68.8	106	0	12	*	*	441.9

NOVEMBER 1991

STATION	Temperature C				Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
	Mean	Difference from Normal	Maximum	Minimum									
QUEBEC													
BAIE COMEAU A	-0.7	1.1	6.8	-14.6	22.4	63	54.0	67	2	13	88	105	561.1
BLANC SABLON A	-0.8	-0.4	9.8	-12.4	41.4	115	53.4	54	TR	8	78	*	562.8
CHIBOUGAMAU CHAPAIS	-4.3	*	9.1	-19.9	47.8	*	62.0	*	17	13	45	90	670.4
GASPE A	0.7	*	10.4	-10.9	36.0	*	79.8	*	0	12	80	*	518.4
INUKJUAK A	-4.0	3.2	2.5	-18.5	42.6	112	53.2	134	6	20	14	50	658.8
KUUJJUAQ A	-5.9	2.4	6.3	-23.8	34.2	96	38.2	95	11	14	37	71	716.5
KUUJJUARAPIK A	-3.8	1.1	6.0	-11.8	52.8	101	51.8	85	3	16	30	79	653.8
LA GRANDE IV A	-5.8	*	7.6	-20.4	66.4	*	65.0	*	14	15	27	*	*
LA GRANDE RIVIERE A	-5.5	*	6.0	-15.7	94.2	*	99.0	*	23	21	40	*	704.9
MANIWAKI	-0.1	0.2	14.5	-13.2	4.4	17	48.2	65	0	8	74	113	541.4
MONT JOLIA	0.5	0.8	10.6	-9.5	23.0	65	47.6	64	0	9	79	104	542.6
MONTREAL INT'L A	2.5	0.5	18.2	-9.0	7.3	34	31.5	39	0	7	79	92	466.0
MONTREAL MIRABEL I/	1.4	*	17.9	-11.9	6.2	*	31.7	*	0	7	102	*	501.0
NATASHQUAN A	-0.4	0.6	10.0	-12.5	29.0	90	76.4	66	1	12	106	*	520.5
QUEBEC A	0.3	0.5	16.6	-10.8	9.6	28	32.0	33	0	9	83	112	529.8
ROBERVAL A	-0.7	1.5	10.4	-12.5	7.4	16	27.2	36	3	6	66	*	542.2
SCHEFFERVILLE A	-7.6	1.4	4.7	-24.9	71.2	117	68.6	104	40	9	46	105	769.1
SEPT-ILES A	-1.3	1.2	7.7	-14.7	43.0	85	105.6	105	6	13	78	*	597.9
SHERBROOKE A	0.6	0.7	18.7	-14.2	22.0	60	54.2	56	0	10	70	*	523.5
STE AGATHE DES MONT	-0.9	0.8	14.9	-14.7	11.0	27	38.4	36	7	9	74	106	565.6
ST HUBERT A	2.1	0.3	19.2	-10.8	6.2	*	33.9	38	0	7	80	*	476.4
VAL D'OR A	-3.0	0.4	13.8	-18.1	32.8	68	67.6	85	6	11	49	84	630.8
NEW BRUNSWICK													
CHARLO A	0.6	1.4	10.3	-10.8	34.4	93	53.0	67	0	11	85	90	522.4
FREDERICTON A	2.5	1.1	16.2	-10.0	2.0	10	76.1	72	0	9	62	*	466.4
MONCTON A	2.7	0.7	15.5	-8.4	2.2	10	113.0	103	0	12	71	74	461.0
SAINT JOHN A	3.1	0.8	14.8	-7.0	4.0	28	84.0	58	0	12	62	64	446.8
NOVA SCOTIA													
GREENWOOD A	5.4	1.5	19.3	-6.5	2.6	18	163.8	151	0	13	*	*	378.8
HALIFAX INT'L A	4.8	1.4	16.5	-5.7	0.2	2	167.6	110	0	14	*	*	395.7
SABLE ISLAND	7.9	0.6	15.8	0.5	0.4	13	155.4	114	0	17	68	96	303.4
SHEARWATER A	6.0	1.4	17.0	-3.8	0.2	3	171.5	120	0	15	70	64	360.0
SYDNEY A	5.0	1.2	16.1	-3.8	1.6	13	188.2	117	0	15	62	83	390.6
YARMOUTH A	5.9	0.7	14.0	-3.0	11.8	184	174.4	129	0	13	49	56	356.4
PRINCE EDWARD ISLAND													
CHARLOTTETOWN A	4.2	1.3	17.3	-6.5	6.5	30	132.6	110	0	18	*	*	412.9
NEWFOUNDLAND													
BONAVISTA	4.0	0.6	14.8	-2.2	12.8	114	136.2	141	0	15	*	*	419.3
BURGED	4.0	1.0	12.4	-3.4	13.6	115	210.6	114	0	16	*	*	417.6
CARTWRIGHT	-1.2	0.6	10.5	-12.3	40.7	88	57.5	72	11	9	56	80	582.7
CHURCHILL FALLS A	-7.1	0.8	7.2	-26.4	59.8	84	64.0	82	33	10	52	*	752.6
COMFORT COVE	2.8	1.2	16.2	-6.0	25.2	75	141.2	128	0	17	*	*	471.0
DANIELS HARBOUR	2.5	0.7	16.6	-4.3	17.2	66	71.4	70	0	14	30	62	426.9
DEER LAKE A	1.6	0.6	16.6	-8.2	35.6	103	67.6	62	0	12	*	*	491.2
GANDER INT'L A	2.1	0.3	16.6	-5.3	42.8	135	114.8	107	0	17	48	72	477.3
GOOSE A	-3.2	0.6	11.1	-18.5	54.6	96	57.6	77	24	9	90	137	637.7
MARY'S HARBOUR	-0.7	0.2	13.7	-11.7	20.6	50	39.2	44	0	7	*	*	538.2
PORT AUX BASQUES	3.7	0.5	11.6	-3.7	8.6	75	169.3	109	0	20	57	*	429.1
ST ANTHONY	-0.3	1.0	12.6	10.2	49.6	129	96.0	77	8	15	*	*	553.9
ST JOHN'S A	4.2	0.8	17.1	-4.2	1.2	6	185.8	114	0	14	49	71	414.7
ST LAWRENCE	4.2	0.7	14.7	-4.5	0.0	0	224.6	166	0	18	*	*	413.2
STEPHENVILLE A	3.4	0.5	16.8	-4.9	15.4	63	101.4	82	0	19	43	79	437.2
WABUSH LAKE A	-6.8	1.3	6.3	-27.7	72.5	106	66.9	87	36	12	50	91	725.5

AGROCLIMATOLOGICAL STATIONS

NOVEMBER 1991

STATION	Temperature C				Snowfall (cm)	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	Degree days above 5 C	
	Mean	Difference from Normal	Maximum	Minimum							This month	Since Jan. 1st
BRITISH COLUMBIA												
AGASSIZ	7.1	1.1	16.5	-3.0	0.0	298.0	141	0	24	36	71.5	2296.9
SUMMERLAND	3.0	0.5	13.5	-5.0	5.4	26.6	105	0	8	68	10.2	2191.9
ALBERTA												
BEAVERLODGE	-6.5	-1.4	7.0	-27.0	30.0	48.0	179	17	12	67	0.0	1446.3
LACOMBE	-5.3	-0.9	7.0	-25.5	1.0	18.7	135	3	5	90	0.0	1408.3
SASKATCHWAN												
INDIAN HEAD	-7.4	-2.3	10.0	-29.0	26.7	11.2	65	11	4	**	**	1775.4
MELFORT	-1.5	5.4	5.5	-28.0	8.7	8.9	47	40	5	69	0.0	1657.5
REGINA	-7.5	-1.8	10.0	-26.0	8.0	8.5	63	6	3	**	**	1816.3
SCOTT	-9.1	-2.9	6.0	-30.0	9.5	6.9	50	8	2	95	0.0	1652.2
SWIFT CURRENT	-5.0	-1.1	11.5	-26.0	12.0	11.1	85	5	3	100	3.8	1812.9
MANITOBA												
BRANDON	-9.1	-4.1	5.2	-30.5	15.7	20.3	102	19	6	**	**	1981.2
MORDEN	-7.0	-2.1	9.0	-23.0	20.2	32.2	133	7	10	84	**	2108.0
GLENLEA	-9.0	-5.5	4.5	-27.0	25.6	33.6	131	12	10	87	**	1998.4
ONTARIO												
DELHI	3.0	-0.7	17.0	-11.5	7.3	86.5	105	0	14	**	**	2502.3
ELORA	1.2	-0.7	15.4	-11.3	0.0	56.1	85	0	**	**	**	2124.0
GUELPH	1.5	-1.0	16.4	-12.6	**	75.6	101	0	12	60	**	2280.2
HARROW	3.3	-1.2	15.5	-11.0	4.4	81.4	121	0	13	64	40.4	2883.2
KAPUSKASING	-4.5	-0.3	9.0	-20.5	70.3	96.3	131	21	14	50	0.0	1507.1
OTTAWA	2.3	0.7	18.6	-10.0	0.8	42.6	58	0	8	89	23.2	2343.0
SMITHFIELD	7.4	4.4	17.0	-9.7	24.0	57.2	65	18	8	**	**	2732.8

Courtesy of Agriculture Canada

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	Mean	Difference from Normal	Maximum	Minimum							This month	Since Jan. 1st
QUEBEC												
LA POCATIERE	1.3	0.9	16.0	-10.0	12.5	6.9	9	0	6	94	6.3	1701.9
L'ASSOMPTION	2.2	1.1	18.0	-11.5	3.4	27.0	32	0	6	97	20.0	1876.0
NORMANDIN	-2.5	0.4	11.0	-20.0	13.4	44.8	76	4	6	68	1.7	1428.5
NEW BRUNSWICK												
FREDERICTON	3.1	1.4	17.0	-9.0	0.0	63.0	56	0	10	62	28.6	2032.3
NOVA SCOTIA												
KENTVILLE	5.5	1.5	18.5	-6.0	0.6	172.6	145	0	12	51	51.0	2064.0
NAPPAN	3.9	0.9	16.0	-7.0	11.5	149.1	138	0	14	58	35.5	1762.3
PRINCE EDWARD ISLAND												
CHARLOTTETWN	4.9	1.5	17.0	-6.0	2.4	140.8	127	0	18	78	**	1832.9
NEWFOUNDLAND												
ST. JOHN'S WEST	7.9	4.4	17.0	-5.0	TR	167.6	100	0	15	48	42.6	1214.3

Courtesy of Agriculture Canada