Environment Canada Environnement Canada

Climatic Perspectives

Monthly Review **January 1993** *Vol. 15*

CLIMATIC HIGHLIGHTS

Cold weather dominated British Columbia for most of January - a continuation of the year-end cold spell, which affected the western parts of the country. The New Year started off with a headline-making storm across the Atlantic region. Subsequent storms also made the news.

Cold in British Columbia...

A persistent cold spell, along with abundant ice and snow, forced some logging operations to shut down. Logs iced up on the Lower Fraser River and hampered efforts to supply logs to saw mills on the Lower Fraser. Although the tugboats could tow the logs through the drift ice to upriver mills, fuel costs soared. Since Christmas Day, below-freezing temperatures prevailed for about three weeks, even in the southern parts of interior B.C. Snow remained on the ground for 23 consecutive days at Vancouver from December 29 to January 20 - the second longest period on record. Many motorists with summer tires could not stop their vehicles at intersections; their vehicles continued to slide, running red lights. Business boomed for body repair shops and stores carrying snow tires, salt, tire chains and snow shovels.

On January 5, the RCMP in Richmond, B.C. found an unidenified man in his 50's slumped against a fencepost in a ditch, in an isolated area of the Westminster Highway. Temperatures had dipped to -9°C that night. He was rushed to hospital, where he died of hypothermia. The normally balmy city of Victoria also endured the wrath of cold temperatures and snow. There was a high incidence of burst water mains as nightime temperatures hovered near -7.5°C. The cold air remained around long enough to allow outdoor skating on frozen ponds - an unusual occurrence.

In the coastal valleys, the combination of cold air and strong winds generated dangerous wind chills in the -50°C range. In the interior, the strong winds caused avalanches and subsequent closures of some passes. Across the southern agricultural districts, fruit trees were damaged by the cold weather. During the cold spell, the temperature at Dease Lake and Smithers dropped to -33.8°C. Also during the same week, Victoria recorded mean temperatures 4°C below normal, while in Port Hardy's mainland inlet, heavy freezing spray, created dangerous conditions for fishing boat operations. By the week of the 18th, milder Pacific air started to flush the cold air mass out of western Canada.

In with the new...

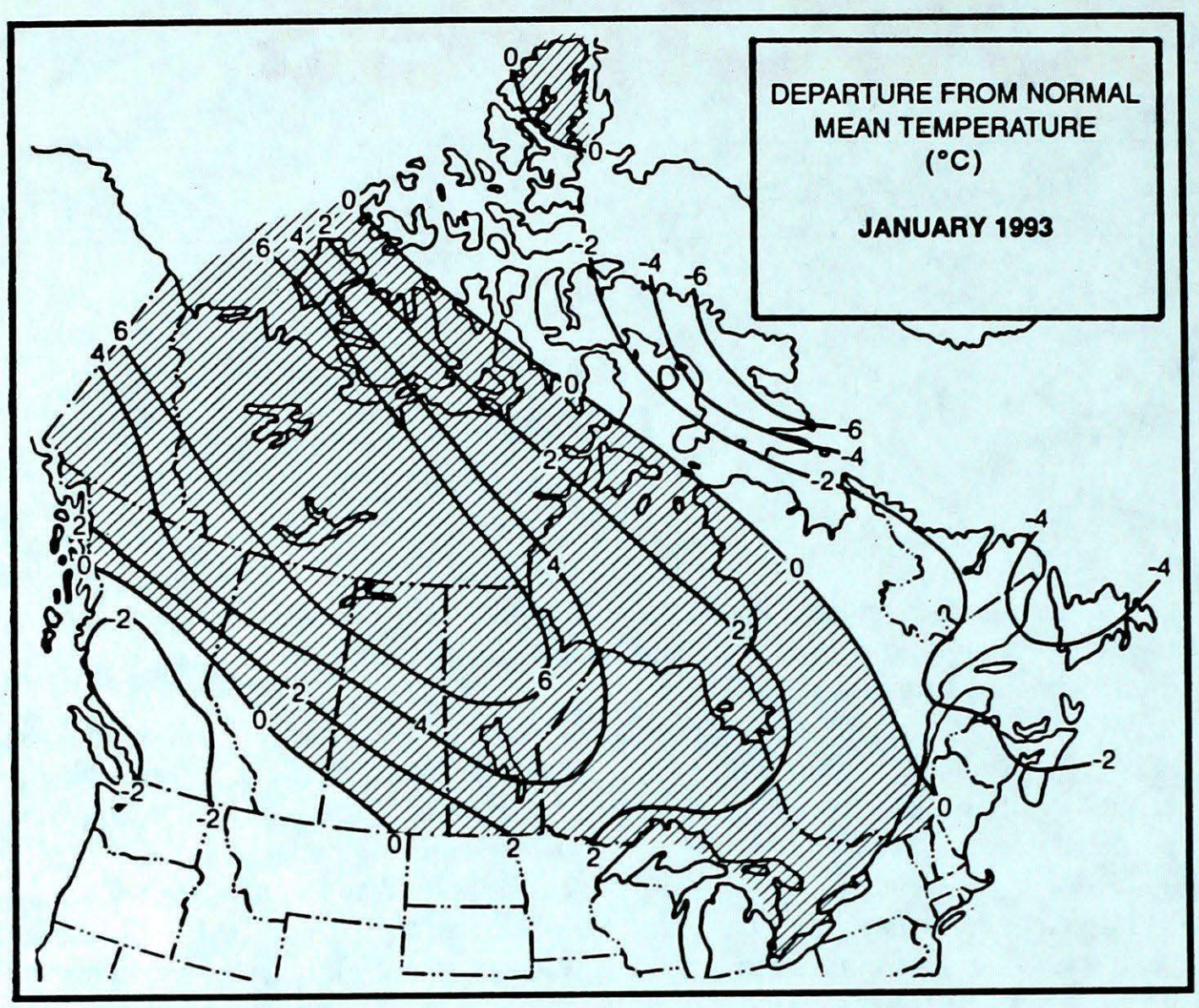
A weather system crossing the Maritimes on New Year's Eve dumped 20 to 30 centimeters of snow on parts of New Brunswick, Prince Edward Island and Cape Breton Island. The first weekend of the New Year was cold and windy, in the wake of the storm. As a result of the icy roads and blowing snow, three people were killed and three others were seriosly injured in accidents on Nova Scotia roads. In some areas, the blowing snow reduced visibilities to near-zero.

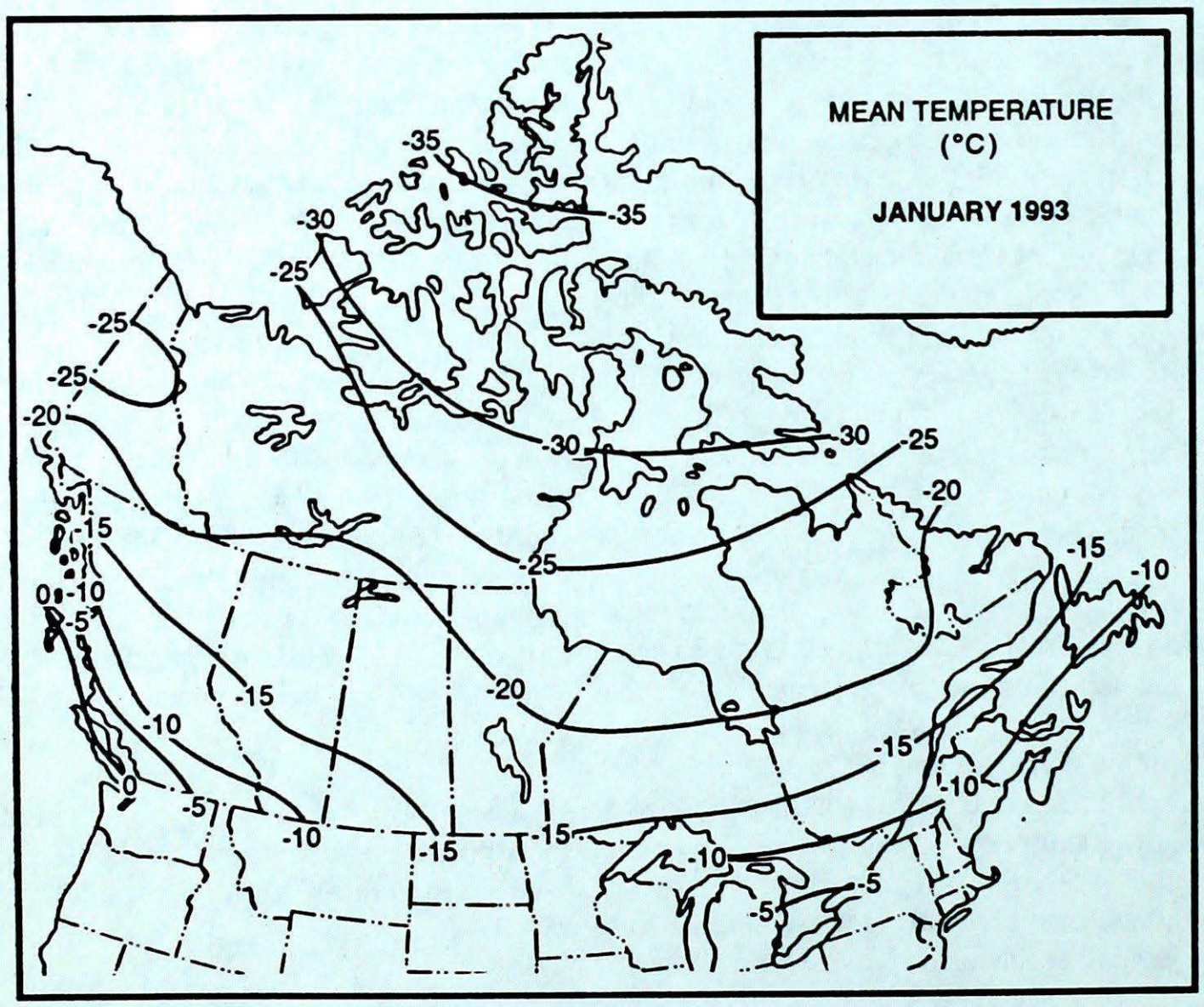
On the 27th, a major snowstorm struck the Maritimes. Between 20 and 40 centimeters of snow covered the ground across Nova Scotia. The Halifax area received more than 25 cm of the white stuff. Winds gusting over 100 km/h caused blowing and drifting snow, which resulted in the closure of schools and many roadways.

In the storm's wake, temperatures bottomed out to record-low values. At Halifax, the mercury sank to -28.5°C, on the 31st, setting a new all-time minimum temperature record. A major power outage in New Brunswick was blamed on the Arctic blast. More than 10,000 people were left without power.

Three Lunenburg, N.S. fishermen died and two had gone missing after a vessel sank on the 31st, 110 kilometers south of Cape Sable Island. Rescuers plucked 11 survivors from the vessel, a 40-metre scallop dragger. The vessel sank after becoming top heavy from freezing spray. At the time of the sinking, the air temperature was about -20°C and wind speeds were 80 km/h.

Across Newfoundland, up to 60 cm of snow buried the western half of the Island. Winds gusted to 115 km/h on the 27th and 28th.





Across the country

Yukon

An unusual temperature and precipitation pattern predominated during the first two weeks of the month, as Pacific storms tracked across the northern Yukon and into the Territories. Temperatures and precipitation values were well-above average across the north, while the south recorded near normal values.

January 1993, featured a good old fashion Yukon cold snap, with above average snowfalls across most of the Territory. Almost all Yukon stations recorded at least one -40°C reading during the month. Most of these chilly values occurred from January 20 to 26. During this cold spell, Old Crow logged seven consecutive days, where minimum temperatures dropped below -50°C. On three of those days, the maximum temperature even failed to climb above -50°C. On the 23rd, Old Crow recorded the coldest temperature in the Yukon so far this year, when the mercury fell to a bone chilling -57°C. Surprisingly, despite this cold snap, overall temperatures averaged above normal across the north by up to 6°C. A Territorial high of 6°C was established at Haines Junction on the 16th and Watson Lake on the 31st. Most other Yukon communities recorded maximum temperatures near or slightly above zero during the last three days of the month.

At the end of January, the relatively warmer days and pleasant nights started the sap flowing in body and soul. More Yukoners were out enjoying the positive turn around in weather conditions than during the previous weeks. Skis were freshly waxed and Oreo cookies were tucked into day packs for afternoon snacks, as adventurous residents spirited themselves away to the back country.

Drier than average conditions occurred in the southeast corner of the Yukon, while the rest of the Territory saw above average precipitation. Haines Junction doubled their normal snowfall, with 65 cm, the highest total in the Yukon. Carcross and Klondike also more than doubled their average snowfall, but it was the far north that saw the greatest deviations. Old Crow and Shingle Point more than quadrupled their

average snowfalls, recording 46 and 25 centimetres respectively. In contrast, Fraser Camp, situated on the road to the Pacific coast through B.C., had 229 mm of precipitation, mostly in the form of snow. Normally this station gets 160 mm in January.

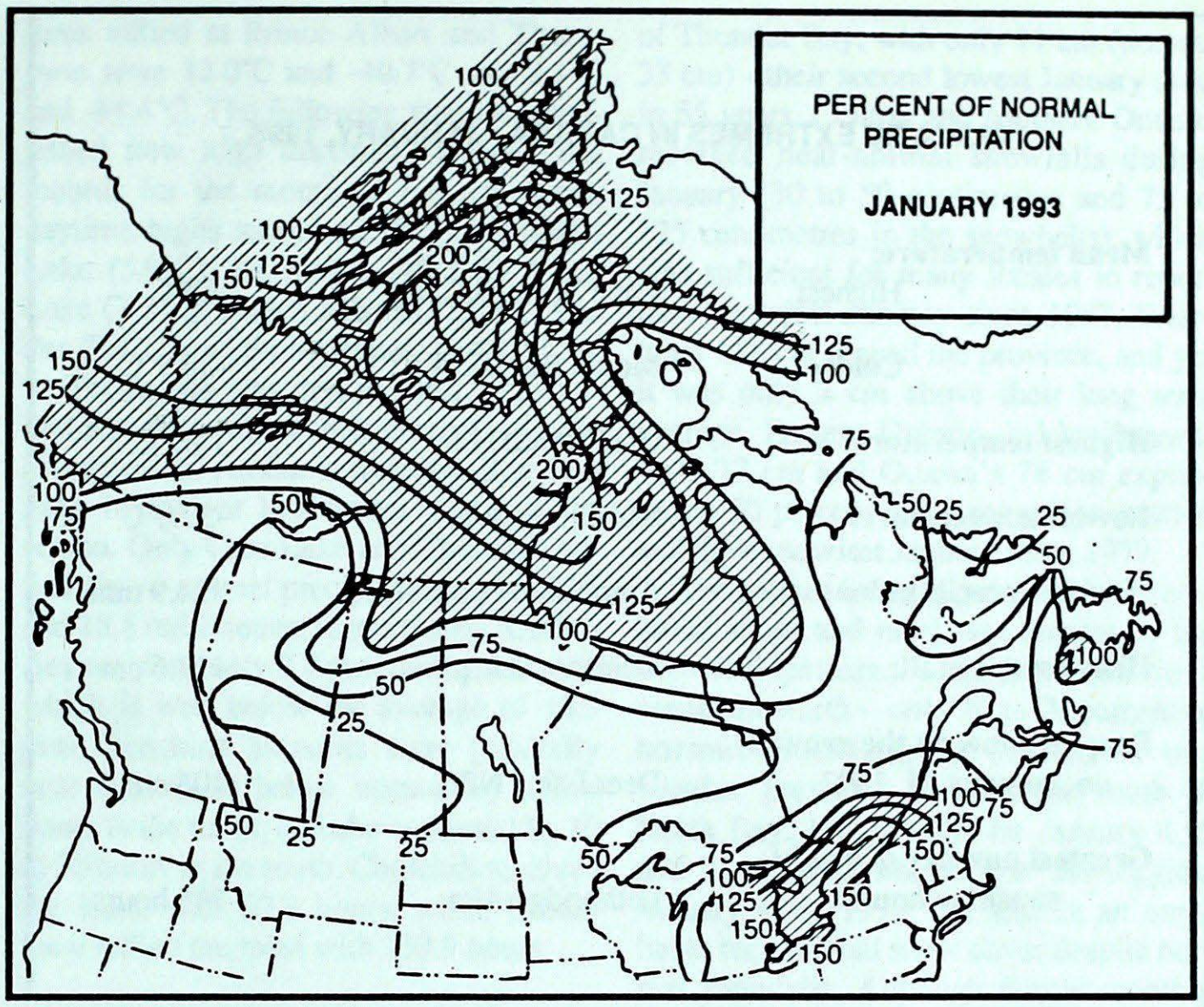
Wind also made weather headlines this month. At Old Crow on January 13, wind gusts of 120 km/h caused minor structural damage to some of the community's buildings. Winds of this magnitude are normally unheard of in this area.

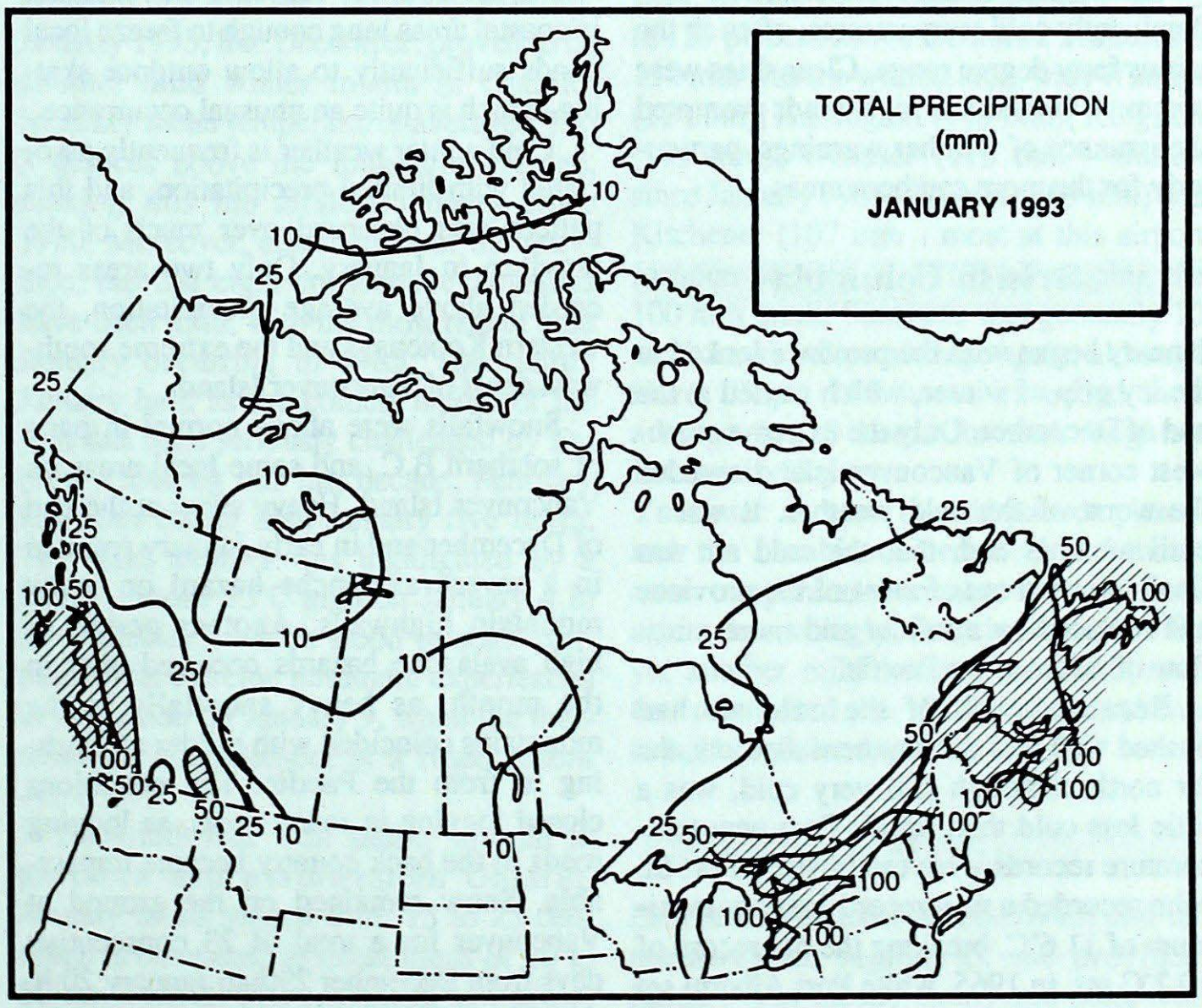
Northwest Territories

In the Mackenzie region, the month started out unusually warm in the more northern districts. Several maximum temperature records were broken in the Mackenzie Delta during the first two weeks of the month. On the other hand, during the second half of the month, a number of new record low minimum temperatures were set. In the southern part of the district, temperatures varied either side of normal until the last few days of the month, when record highs of 9°C were established at Hay River, Fort Smith and Fort Simpson.

Although not as dramatic as the Mackenzie Region, the Keewatin experienced some record high maximums during the second week of the month. Otherwise, strong northwesterlies kept temperatures at or below normal, with numerous weather warnings issued for blizzard or near blizzard conditions. The mercury dipped to -40°C or colder at all sites, although, Mould Bay was the coldest with a minimum temperature of -48.0°C.

Precipitation amounts were variable. The 16.9 mm at Baker Lake represents more than twice the normal of 8.4 mm, while the total of 11.3 mm at Resolute Bay is more than 3 times the average of 3.5 mm. At month's end Baker Lake had 79 cm of snow on the ground. Complete darkness north of the Arctic circle continued, although by the end of the month, increasing amounts of twilight brightened the southern skies. South of the Arctic circle, Coral Harbour reported a monthly sunshine total of 23.0 hours, just more than half of the normal of 43.2 hours.





CLIMATIC EXTREMES IN CANADA - JANUARY, 1993

Mean temperature:		
Highest	Cape Scott, B.C.	4.0°C
Coldest	Mould Bay, N.W.T.	-34.5°C
Highest temperature:	Greenwood N.S.	14.9°C
Lowest temperature:	Old Crow, Y.T.	-57.0°C
Heaviest precipitation:	Amphitrite Point, B.C.	424.9 mm
Heaviest snowfall:	Wiarton, Ont.	117.6 cm
Deepest snow on the ground on January 31, 1993	Deer Lake, Nfld.	106 cm
Greatest number of bright sunshine hours:	Lethbridge Alta.	145 hours

The Arctic Islands experienced predominantly cold temperatures, often in the minus forty degree range. Clear skies were common. Occasional high winds prompted the issuance of weather warnings, particularly for the more southern areas.

British Columbia

January began with the province locked in the icy grip of winter, which started at the end of December. Only the extreme southwest corner of Vancouver Island avoided the worst of the cold weather. It wasn't until month's end, that the cold air was finally pushed out of most of the province and replaced by a milder and more moist flow of air from the Pacific.

Because much of the cold air had pushed well into the southern districts, the far north, although still very cold, was a little less cold than usual. Two new temperature records were established. Fort St. John recorded a new record January maximum of 11.6°C, breaking the old record of 10.7°C set in 1965, while Port Alberni set a new record low monthly mean temperature of -1.4°C, breaking the old record of -0.9°C set in 1972. The cold air remained in coastal areas long enough to freeze local ponds sufficiently to allow outdoor skating, which is quite an unusual occurrence.

Cold winter weather is frequently associated with limited precipitation, and this pattern was observed over much of the province in January. Only two areas recorded above average precipitation, the western Kootenays and the extreme southwest coast of Vancouver Island.

Snowfalls were above normal in parts of southern B.C. and some local areas on Vancouver Island. Heavy snow at the end of December and in early January resulted in a severe avalanche hazard on many mountain highways. Another period of high avalanche hazards occurred later in the month, as heavy snowfalls in the mountains coincided with milder air pushing in from the Pacific. The conditions closed logging in many areas, as logging roads in the back country became impassable. Snow remained on the ground at Vancouver for a total of 23 consecutive days from December 29th to January 20th, the second longest period on record, the longest being 33 days in December 1964 and January 1965.

Cold winter months can also be quite sunny and this year was no exception. New monthly sunshine records for January were broken at: Abbotsford, Blue River, Port Hardy, Smithers, Terrace, Tofino and Victoria.

The southward advance of cold Arctic air frequently pushes the Pacific storm track out of B.C. resulting in only a few Pacific storms affecting the province. This causes an obvious reduction in strong winds associated with these storms, but this reduction, is in part, offset by strong outflow winds in mainland inlets as Arctic air rushes from the interior out to the coast. Windy conditions in this very cold outflow caused some very high windchill values in January in many of the mainland inlets and coastal valleys.

At the end of the month, strong Chinook winds, brought mild Pacific air to the Peace River country. Winds at Fort St. John gusted to 98 km/h on the 29th and 107 km/h on the 30th. These are the strongest winds recorded since 1963, and caused quite a bit of local damage. These warm winds also melted most of the accumulated snow cover on the ground.

Alberta

January statistics will show temperatures as having averaged near normal this month. Slightly above normal in the north and a little below normal in the southern half of the province. But a check of the day to day values will reveal quite a different story. The first half of the month was dominated by an Arctic air mass, which produced temperatures as much as 10°C below average. In contrast, the last half of the month was the exact opposite, with temperatures 10°C above normal.

Numerous record minimums were set during the first half of the month, when a series of Arctic high pressure cells drifted southeastwards from the Yukon. The month started with record-low values. January 9 was one of the coldest mornings, with records being set at Red Deer (-36.2°C), Coronation (-38.2°C), Edmonton International (-37.2°C), Rocky Mountain House (-35.4°C) and Calgary

(-33.0°C). In most areas, this cold spell was the longest cold stretch in the last 5 to 10 years.

On January 15, mild Pacific air pushed into the province to end the cold weather that had gripped southern Alberta for three weeks. Temperatures immediately jumped to record warm values, as Chinook conditions developed across the province. The start of Chinook winds in southern Alberta reduced visibilities in blowing snow, but the snow cover melted, as temperatures rose well above freezing.

The month ended on a balmy note, when most stations in northern and central Alberta had record highs during the last three days of the month. New January monthly high temperature records were set at Edson (14.0°C), Fort Chipewyan (9.0°C), Fort McMurray (13.1°C), Grande Prairie (12.6°C), High Level (10.5°C), Jasper (11.0°C), Slave Lake (13.5°C), and Whitecourt (14.5°C).

The impact of the predominantly dry air over the province during January was two fold, the first being that hours of bright sunshine were above normal by 20 to 30 percent. The second was the lack of snow. The only significant snowfall occurred during the last week of the month, as a system tracked northeast across the province from Grande Prairie, to Fort McMurray, dumping 2 to 9 cm. Central areas had the least snow, but the impact was more noticeable in the mountain parks, with the Jasper town site only recording 17 percent and Banff 25 percent of their normal January snowfall.

Manitoba and Saskatchewan

January started off with very cold temperatures covering the entire region, and ended with a record-setting mild spell. Many locations, including some in the south, dipped down to the minus forties early in the period. On the other hand, some of these same locations climbed well-above freezing, reaching the double digits late in the month. This meant that communities like Prince Albert, Sask., and Thompson, Man., had a monthly temperature range of more than 52 degrees this month. For example, the highest and lowest temperatures tallied at Prince Albert and Thompson were 12.0°C and -40.7°C and 8.1°C and -44.4°C. The following stations established new high maximum temperature records for the month of January, when daytime highs soared on the 30th: Island Lake (5.9°C), La Ronge (12.5°C), Lynn Lake (7.7°C), Prince Albert (12.0°C), The Pas (9.4°C) and Stony Rapids (5.4°C).

The month was dry, as most areas tallied less than half of their normal monthly precipitation. Amounts were small, averaging 10 mm or less across much of the region. Only Cree Lake and Churchill tallied above-normal precipitation, with 17.6 and 18.8 millimetres, respectively. Kindersley received only 0.4 mm during January, which is well below the average of 16.9 mm. Sunshine amounts were generally near normal or below normal by a few hours in the north, and above normal by 10 to 30 hours in the south. Churchill received the least, with 67.3 hours, while Broadview tallied the most with 139.9 hours.

Ontario

Despite a cold and blustery ending, January 1993, like December, proved to be another mild winter month in Ontario. Monthly mean temperatures averaged 2 to 3 degrees above the long-term average, making this the mildest January since 1990. Moreover, across most of the province, the last eight consecutive Januaries have been mild, with the most recent cold January occurring in 1985. The stature January held as the coldest month of the year has been seriously challenged by February. During this last decade, February has been colder than January five times. The mild weather was highlighted by a balmy, record 13°C high on January 4 in St. Catharines, which stood in stark contrast to the extreme minimum experienced in Geraldton on January 9, when the thermometer bottomed-out at a frigid record -41°C.

Snowfall was well below normal in northern and northwestern Ontario. January totals ranged from 15 to 25 centimetres compared to usual totals of 30 to 50 centimetres. The provincial low snowfall occurred at Pickle Lake, 320 km north of Thunder Bay, with only 11 cm (normal 33 cm) - their second lowest January total in 55 years. Central and southern Ontario received near-normal snowfalls during January (30 to 50 centimetres and 75 to 125 centimetres in the snowbelts), which was sufficient for many locales to report their snowiest January since 1987. Wiarton's 118 cm topped the province, and yet it was only 2 cm above their long term average. Eastern Ontario, led by Petawawa's 77 cm and Ottawa's 76 cm experienced 50 percent more snow than normal and their snowiest January since 1979.

The pattern for total precipitation (combined snow and rain) was similar to the snowfall pattern, with dry conditions across the north - only 30 to 70 percent of normal precipitation. However, wet weather prevailed in all areas south of North Bay. Heavy rains on January 4, 5 and 21 resulted, not only in the soggiest January since 1979, but also in an unreliable recreational snow cover despite normal snowfalls. Although winter monthly precipitation rarely tops 100 mm, January 1993 featured numerous 100 mm plus sites, as total precipitation ranged from 25 to 125 percent above the norm. Muskoka's 134 mm was the wettest area, with Wiarton (124mm), Burlington (115 mm), Kingston (113 mm), Windsor (113 mm - wettest since January 1965), Ottawa (109 mm) and Kitchener (107 mm - most at this airport location starting in 1970) all topping the 100 mm mark. Sunshine was generally 10 to 20 hours below average again, although North Bay's 108 hours exceeded their average by 10 hours for their brightest January in 12 years.

Winter is now two-thirds completed, and the combined December - January mean temperatures are above normal once again. Accordingly, Ontario is on-track for yet another mild winter season - a trend that dominated the 1980's, and continues to hold prominence in the 1990's.

Quebec

Except for the extreme southwest and the northwestern regions of the province, January was mostly sunny and cold, with below normal precipitation.

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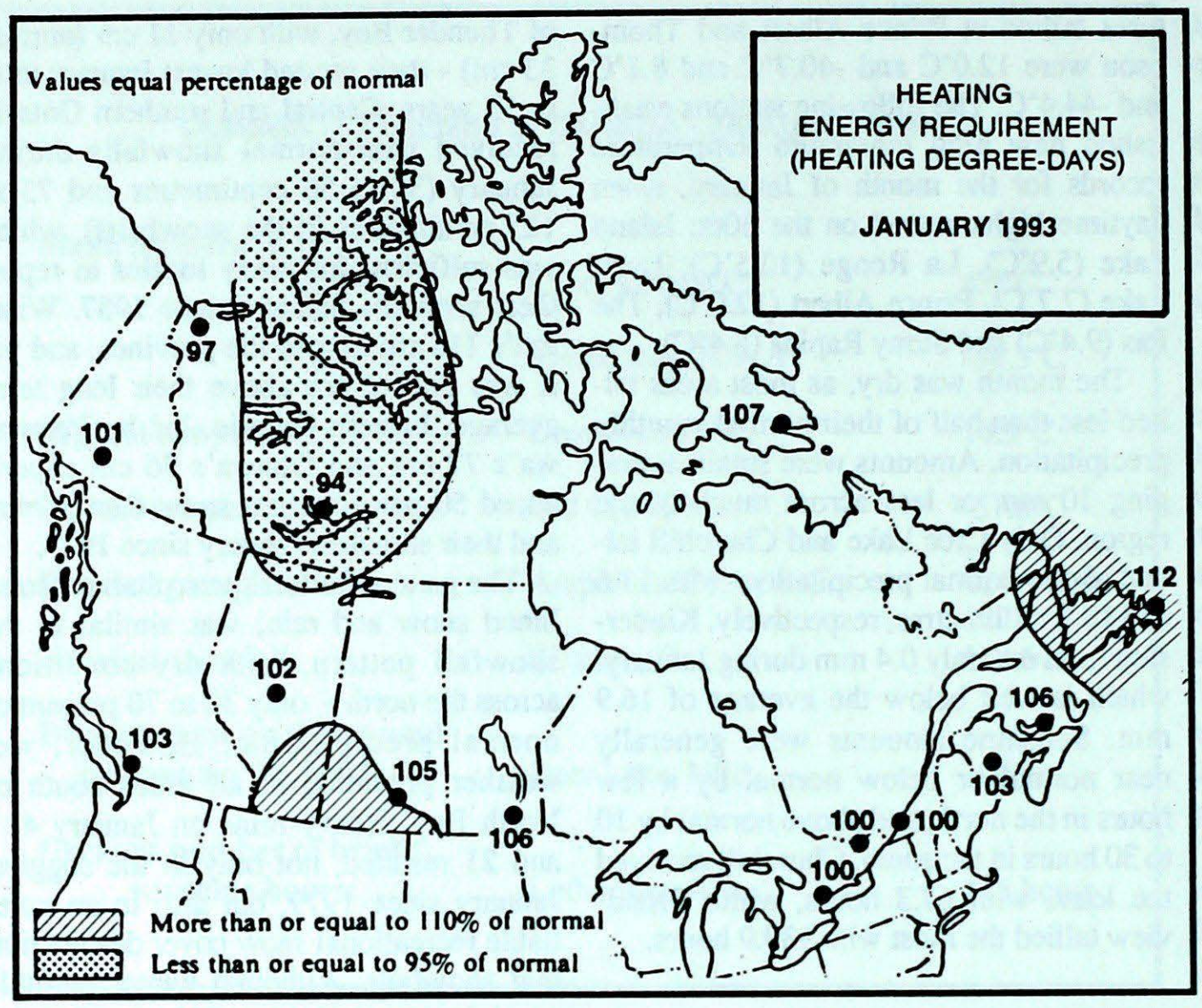
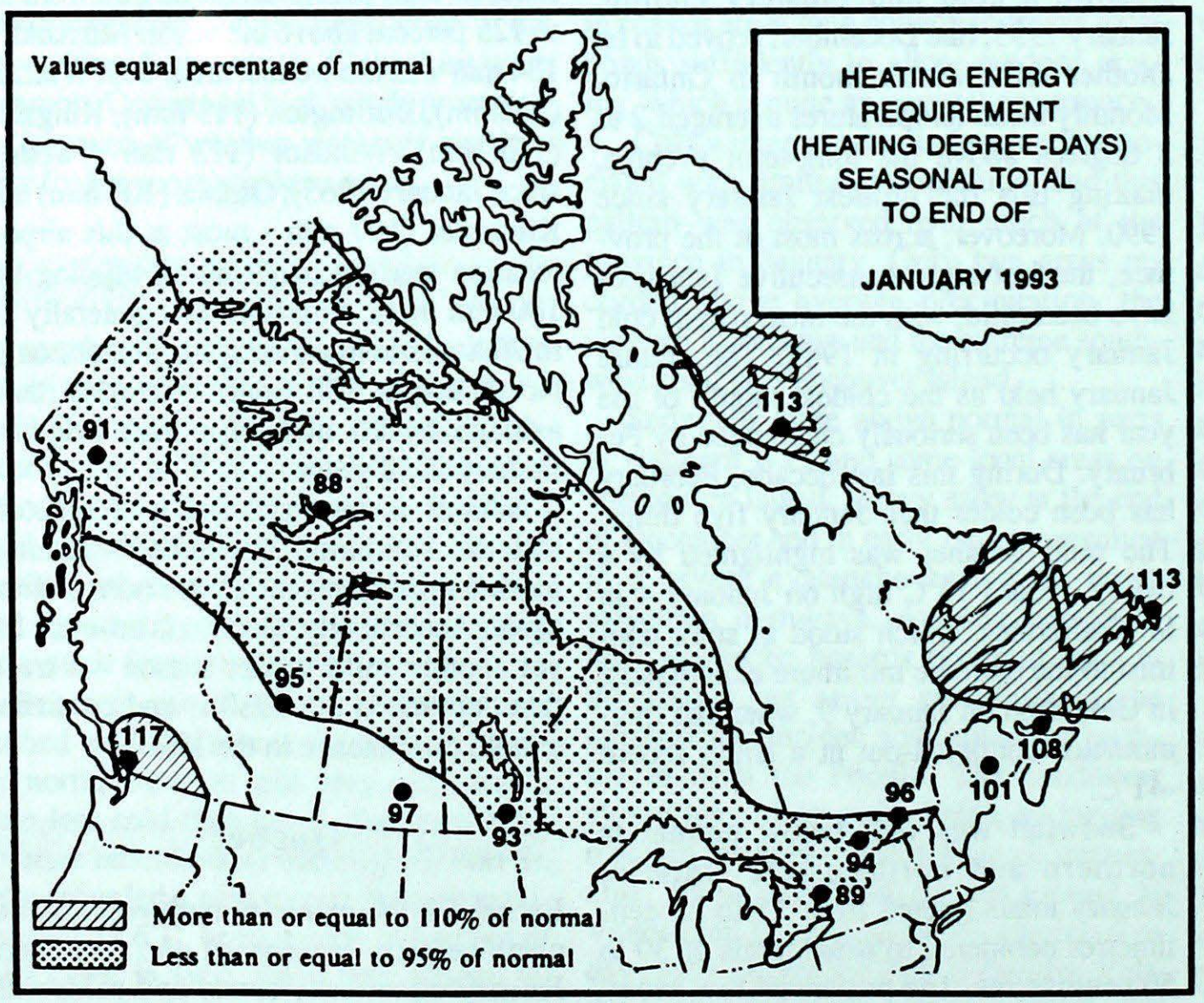


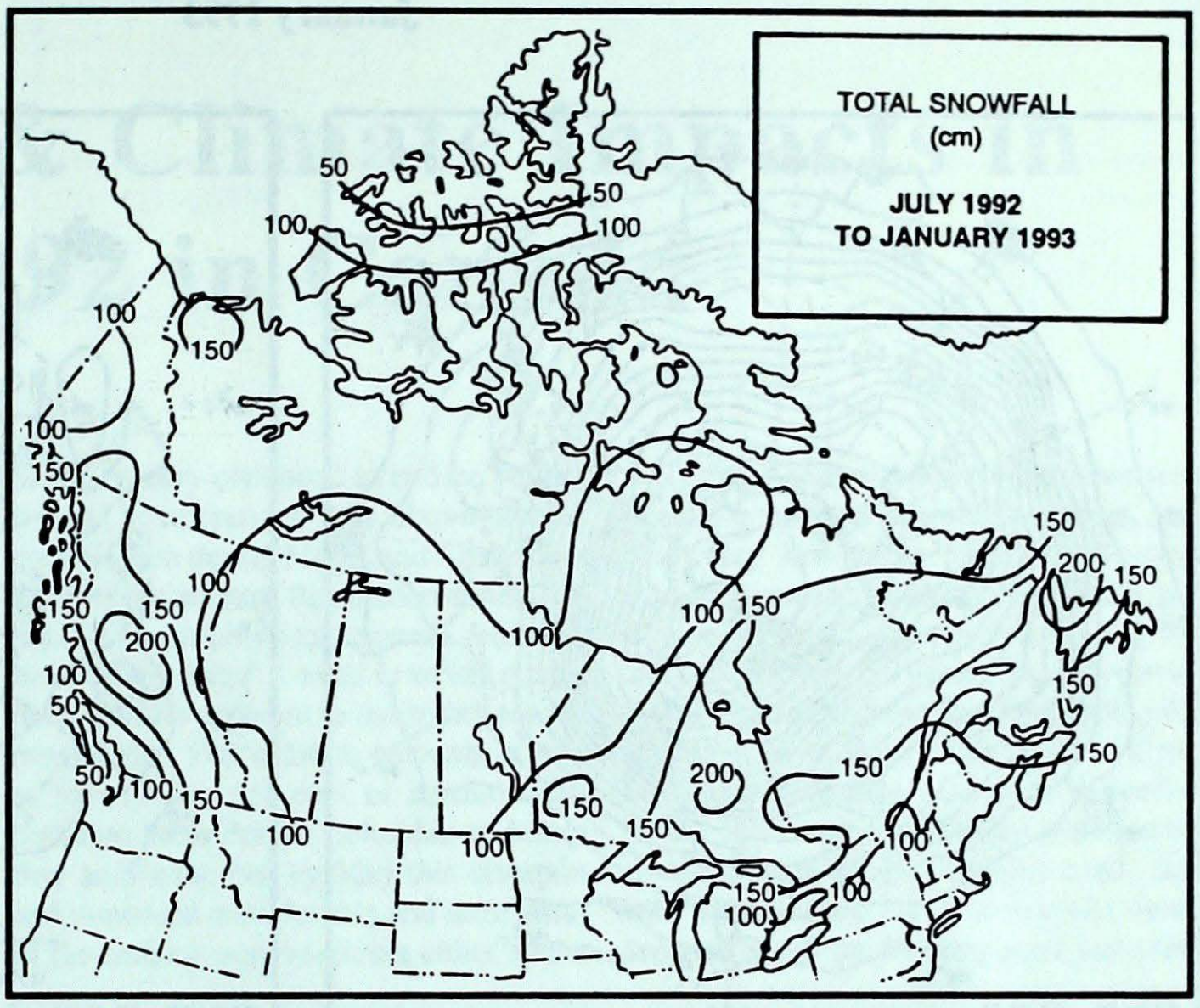


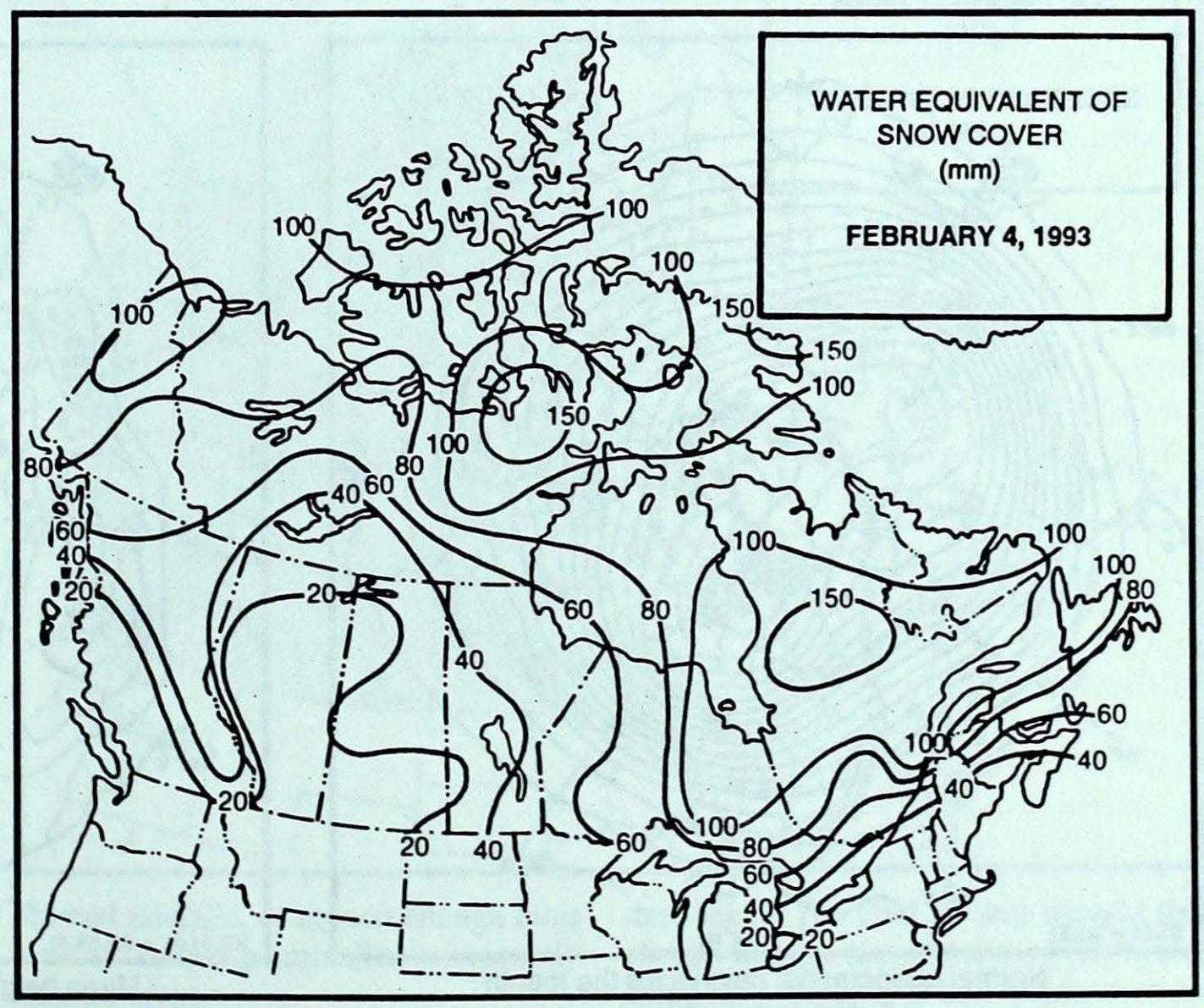
SEASONAL TOTAL OF HEATING DEGREE-DAYS TO END OF JANUARY

	1993	1992	NORMAL
BRITISH COLUMBIA			
Kamloops	2577	1940	2281
Penticton	2211	1813	2056
Prince George	3344	2611	3234
Vancouver	1751	1517	1698
Victoria	1769	1596	1745
YUKON TERRITORY			
Whitehorse	4246	3789	4224
NORTHWEST TERRITORIES			
Iqaluit	5752	5192	5362
Inuvik	5468	5828	5661
Yellowknife	4565	4960	4833
ALBERTA			
Calgary	3281	2620	3091
Edmonton Mun.	3295	2931	3218
Grande Prairie	3868	3328	3644
SASKATCHEWAN			
Estevan	3474	3056	3146
Regina	3545	3196	3370
Saskatoon	3746	3369	3506
MANITOBA			
Brandon	3798	3595	3506
Churchill	4985	5064	4943
The Pas	3894	3878	3899
Winnipeg	3555	3320	3367
ONTARIO			
Kapuskasing	3648	3624	3602
London	2244	2181	2224
Ottawa	2614	2647	2617
Sudbury	3072	3023	2996
Thunder Bay	3313	3309	3210
Toronto	2229	2156	2225
Windsor	1926	1918	1983
QUEBEC			
Baie Comeau	3437	3381	3310
Montréal	2523	2575	2516
Québec	2893	2972	2856
Sept-Îles	3653	3539	3421
Sherbrooke	2848	2896	2900
Val d'Or	3592	3503	3440
NEW BRUNSWICK			
Fredericton	2660	2655	2581
Moncton	2672	2614	2517
NOVA SCOTIA			
Sydney	2414	2313	2213
Yarmouth	2283	2098	2094
PRINCE EDWARD ISLAND			
Charlottetown	2522	2432	2381
NEWFOUNDLAND			
Gander	2989	2872	2603
St. John's	2710	2613	2424

SEASONAL SNOWFALL TOTALS (cm) TO END OF JANUARY

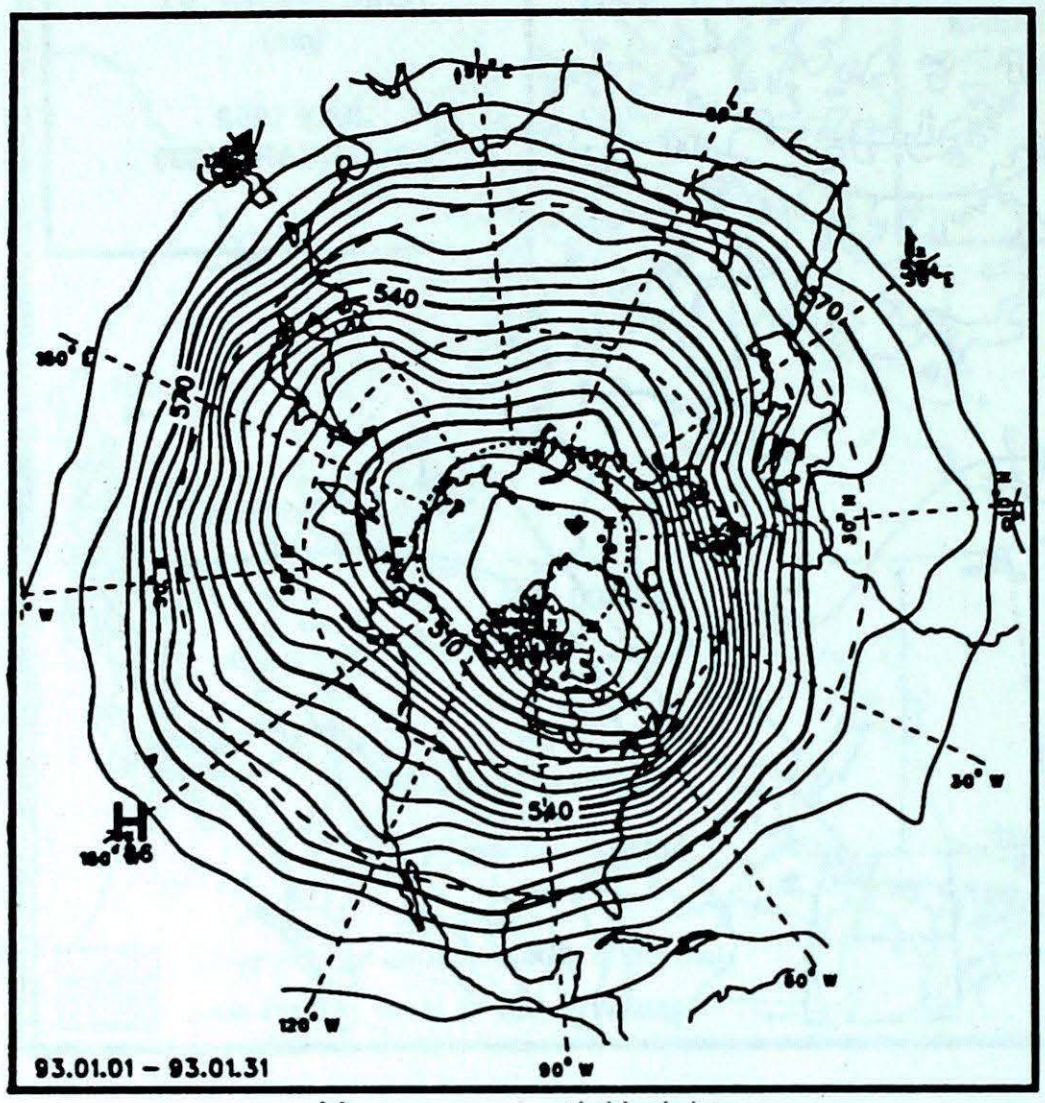
	1992	1991	NORMAL
BRITISH COLUMBIA			
Kamloops	81	30	74
Port Hardy	37	1	49
Prince George	221	166	164
Vancouver	62	2	46
Victoria	27	5	35
YUKON TERRITORY			
Whitehorse	165	174	91
NORTHWEST TERRITORIES			
Iqaluit	127	124	144
Inuvik	151	105	117
Yellowknife	78	125	94
ALBERTA			
Calgary	88	44	77
Edmonton Mun.	62	86	78
Grande Prairie	79	125	115
SASKATCHEWAN			
Estevan	72	53	63
Regina	64	60	65
Saskatoon	58	82	65
MANITOBA			
Brandon	63	118	64
Churchill	100	164	117
The Pas	72	136	96
Winnipeg	100	63	72
ONTARIO			
Kapuskasing	223	201	193
London	85	154	133
Ottawa	131	108	132
Sudbury	152	133	150
Thunder Bay	144	139	128
Toronto	76	79	75
Windsor	46	80	70
QUEBEC			
Baie Comeau	148	212	203
Montréal	65	53	134
Québec	101	132	202
Sept-Îles	173	118	244
Sherbrooke	111	130	180
Val d'or	148	108	188
NEW BRUNSWICK			
Fredericton	84	88	156
Moncton	160	158	175
NOVA SCOTIA			
Sydney	160	128	93
Yarmouth	94	88	114
PRINCE EDWARD ISLAND			
Charlottetown	193	164	174
NEWFOUNDLAND			
Gander	180	138	194
St. John's	131	163	172



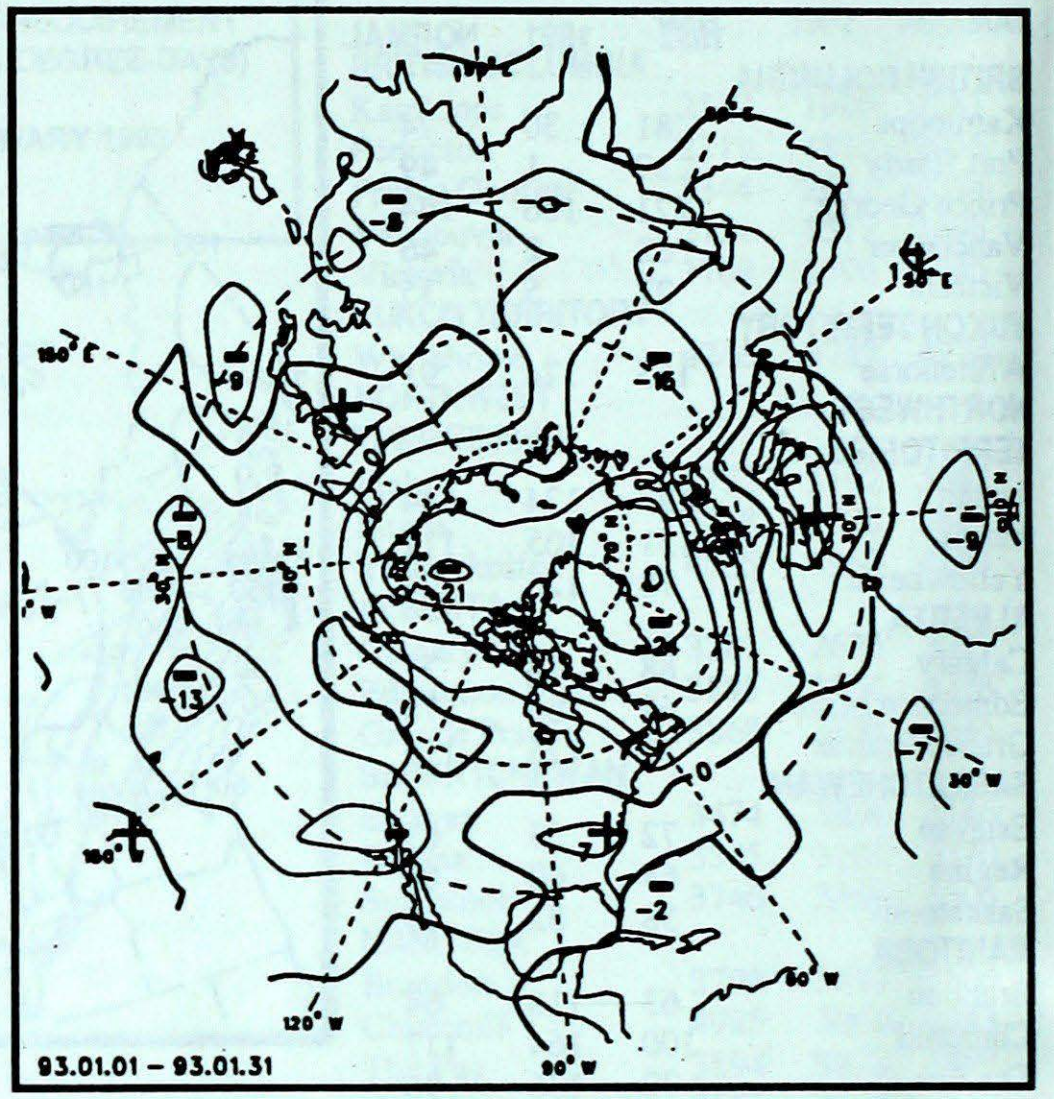


50-kPa ATMOSPHERIC CIRCULATION

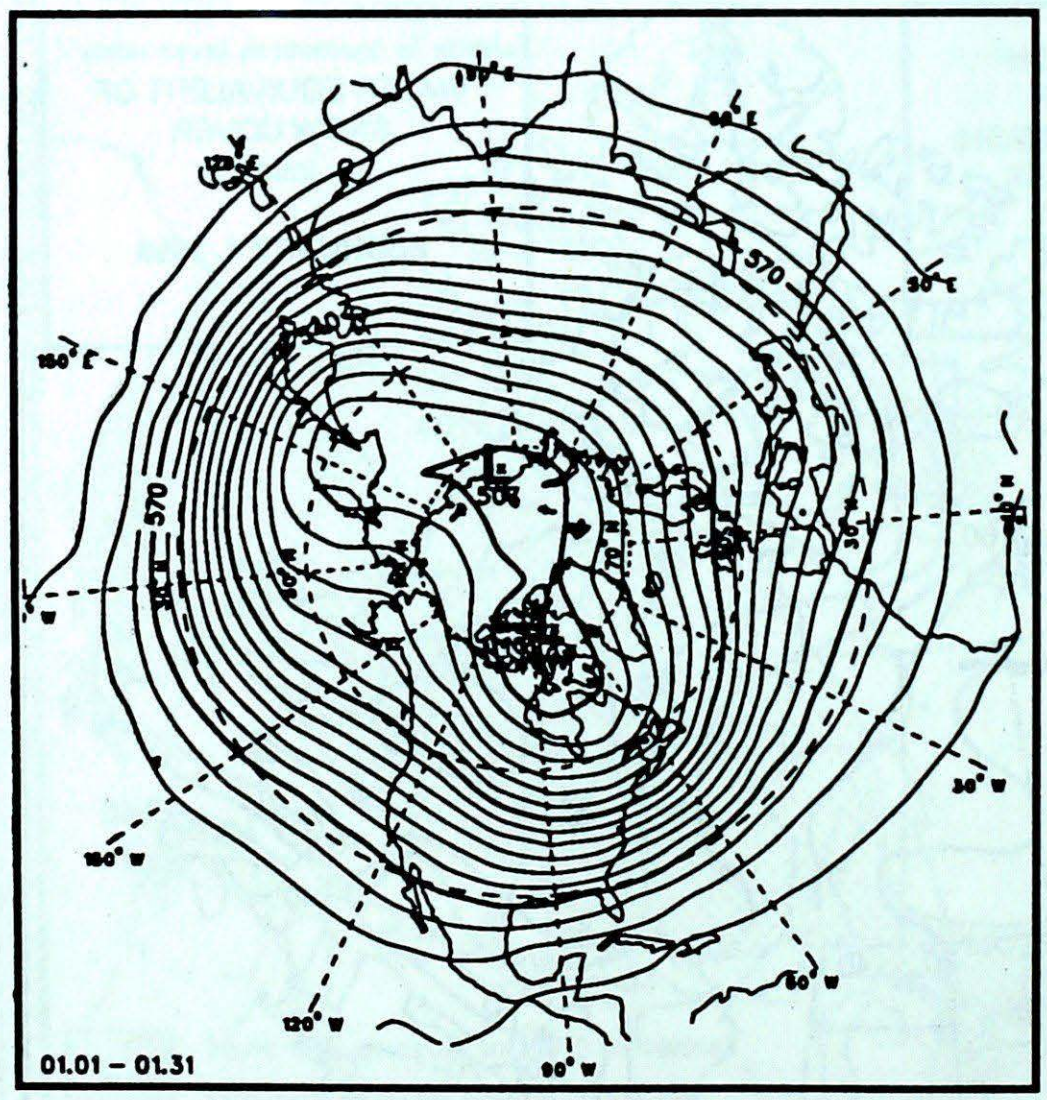
January 1993



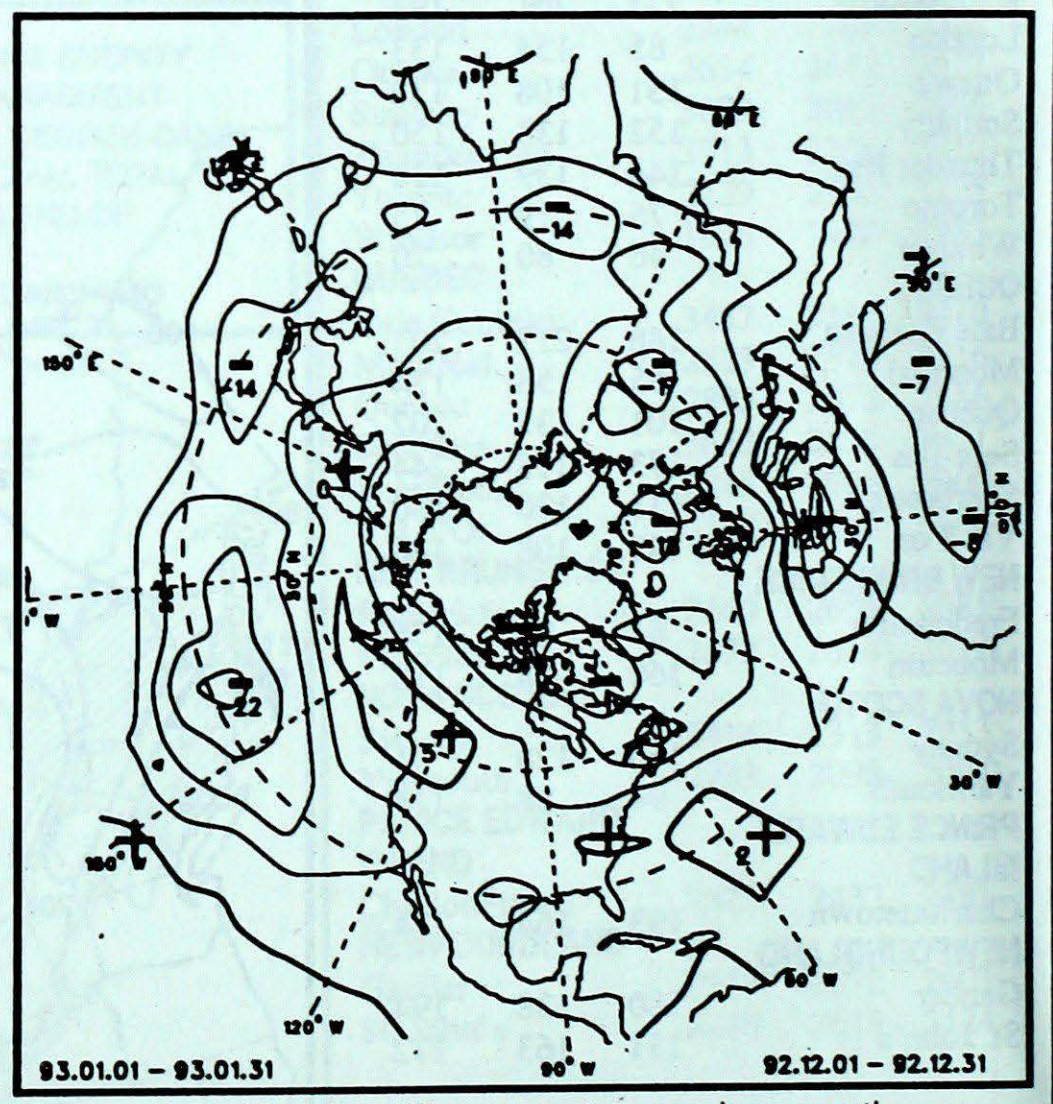
Mean geopotential heights
- 5 decametre interval -



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 -

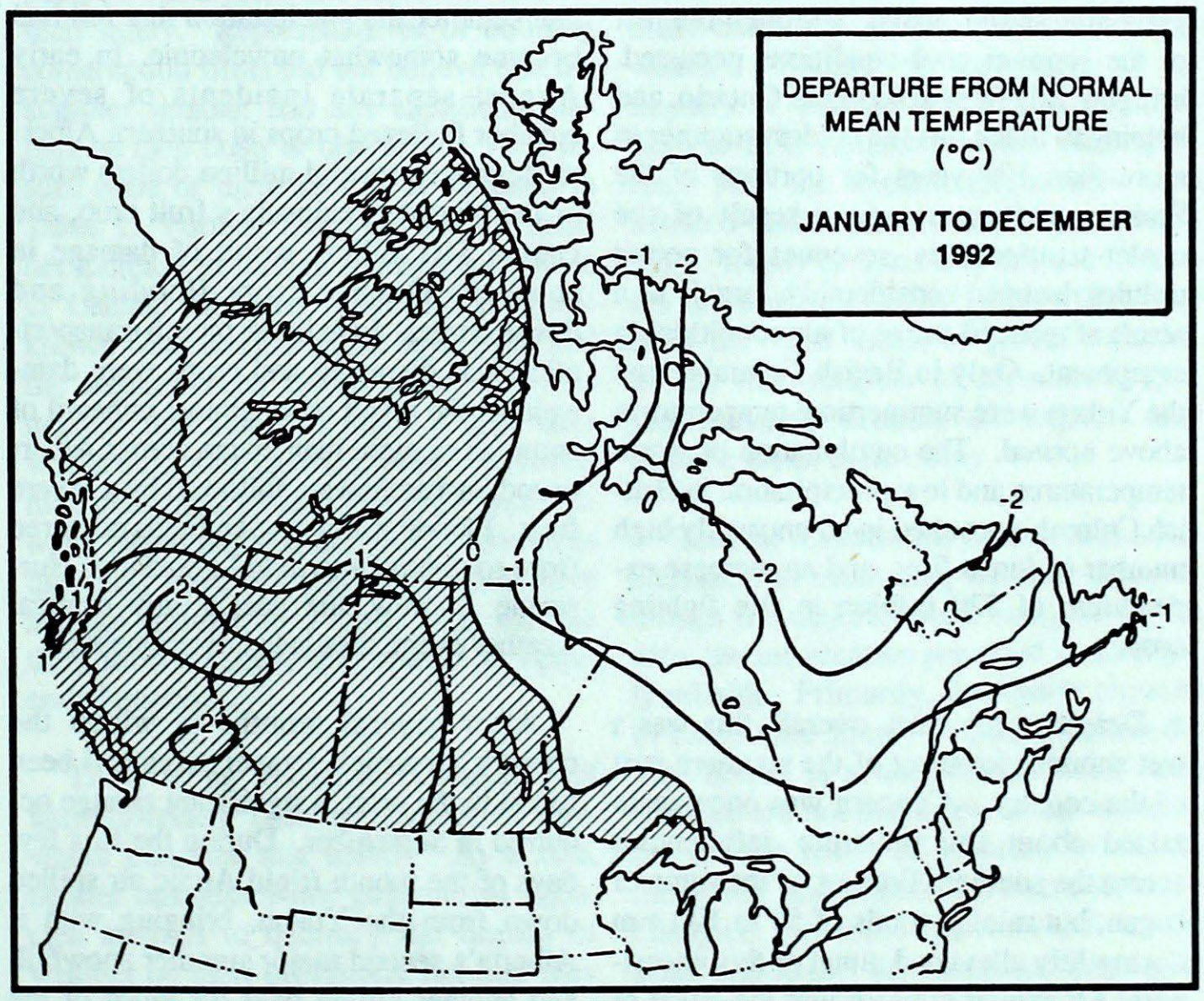
Weather & Climate Impacts in 1992 in Canada

During the first few months of the year a persistent upper ridge was responsible for spring-like conditions throughout much of the western half of the country, while below-normal temperatures were the rule in the east. The effects were attributed to a combination of the latest El Niño event and the eruption of Mount Pinatubo the previous year. Monthly means were generally four to six degrees above normal from the Pacific coast to Manitoba and two to four degrees below normal from Quebec eastward.

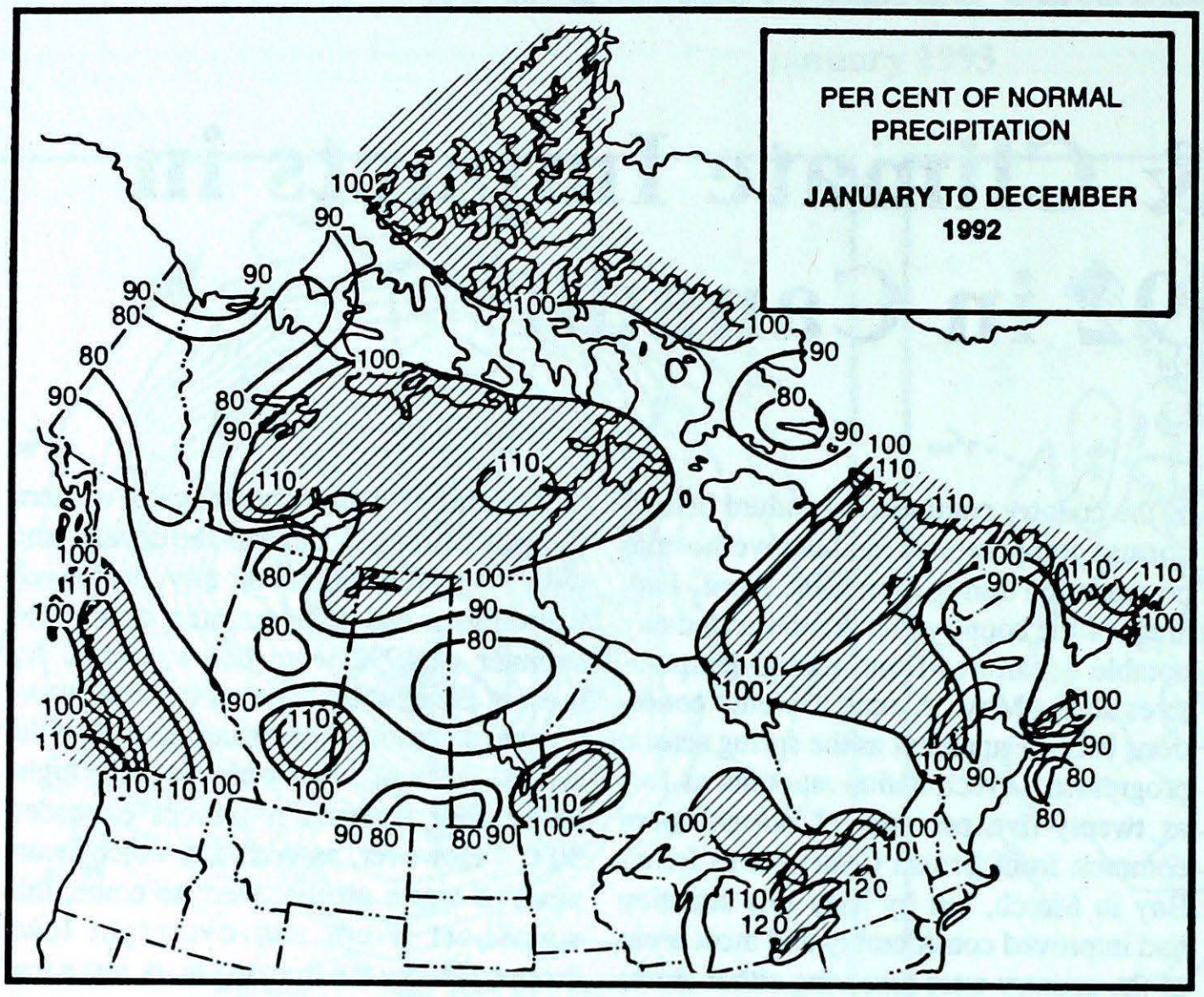
Significant precipitation events during the winter months were mostly confined to the coastal areas. A westerly airflow brought heavy rains to western British Columbia during January and February. Several hundred millimetres fell in some locations. In early February a combination of high-winds and a one-day rainfall event exceeding 100 mm in both Victoria and Vancouver produced mudslides and cut power to well over 50,000 homes.

On the east coast, Moncton also had a spectacular February start. During the month's first weekend, hurricane-force winds and an unprecedented 161 cm of snow combined to produce blizzard conditions, setting new one-day and monthly snowfall records. In contrast, there was little precipitation across the Prairies. Combined with the abnormally high temperatures, this resulted with severely depleted soil moisture, and raised concerns for the upcoming planting season.

During the spring a change to the "warm in the west, cold in the east" pattern began to emerge. Much of the eastern half of the country continued to endure below-normal temperatures and above-normal precipitation during March and April. Few areas of the country that demonstrated any notable departures from normal temperatures during May. A trend to wetter conditions became apparent as the spring season progressed. Precipitation amounts as low as twenty-five per cent of normal were common from British Columbia to James Bay in March, but by May this situation had improved considerably and most areas of the country were receiving either above normal rainfalls, or at least enough moisture to enable germination of recently-planted crops.



The shift to cooler conditions in western Canada continued beyond the spring, and with very few signs of any prolonged warming, mean temperatures during the summer of 1992 were below normal for most of the country. One of the few occurrences of summer heat occurred during the second week of June, when daytime highs in all four western provinces exceeded 30°C. However, as with any other incursions of warm air that were to come, this was short lived, and overnight lows dropped below the freezing mark just a few days later. The cold air that brought this abrupt change rapidly moved eastward, bringing record cold and even snow to



parts of eastern Canada. Through the rest of the summer cool conditions persisted, bringing July frost to southern Ontario, and helping to make this the coldest summer in more than 100 years for portions of the Prairies provinces. As a result of the cooler temperatures, revenues for power utilities dropped considerably, largely as a result of reduced usage of air conditioning equipment. Only in British Columbia and the Yukon were summertime temperatures above normal. The combination of warm temperatures and low precipitation in British Columbia resulted in an unusually high number of forest fires, and an increase expenditure of $20 million in fire fighting costs.

Despite a dry start, overall, this was a wet summer for most of the southern part of the country. Concern was once again raised about soil moisture deficiencies across the southern Prairies as the summer began, but rainfall totals of 50 to 100 mm during July alleviated much of this uneasiness. Of greater concern was the effect of the cooler weather, which slowed crop growth in all areas east of the Rockies. By late summer the precipitation that fell had become somewhat unwelcome. In early August separate incidents of severe weather flattened crops in southern Alberta, destroyed several million dollars worth of the Niagara Peninsula's fruit crop, and caused $10 million worth of damage in southern Quebec from flooding and downed trees. Late in the month transportation was disrupted and crops were damaged as the result of an almost unheard of snowfall of more than 20 cm across Alberta and Saskatchewan, followed by a severe frost. Flooding and sodden fields occurred from southern Ontario to Labrador as Hurricane Andrew, the year's only tropical weather event, dissipated over Quebec.

After several months in which the country's warmest temperatures had been found in the west, a significant change occurred in September. During the first few days of the month frigid Arctic air spilled down from the Yukon, bringing with it Alberta's second major summer snowfall, and another killing frost for much of the Prairies. This set the stage for a month that would end up two degrees below normal from British Columbia to Manitoba. Largely as a result of the cool and very wet autumn conditions that occurred in all of the country's principal agricultural areas, harvesting of already-poor crops were delayed or made impossible. That problem, when combined with the effects of a summer that was cold, wet, and received below-normal amounts of sunshine, resulted in nation-wide crop losses exceeding $2 billion.

Characteristic of the season, highly variable conditions dominated in the autumn. Warm weather, which had moved into the east in mid-September, managed to extend its influence westward by the end of the month, but by early October was displaced by another frigid airmass that extended from British Columbia to the St. Lawrence Valley. This was to be the pattern for the next couple of months, as incursions of mild weather were quickly replaced by equally shortlived outbreaks of cold air. Significant rain or snow accompanied many of these air mass changes, resulting in above-normal precipitation amounts over most of the country. One of the more notable events came in early October, when a combination or rain, snow, and high winds brought transportation in Newfoundland to a halt, and resulted in damage exceeding $9 million.

As the year ended, there was little doubt that winter had returned. Early in December heavy snowfalls were recorded in Ontario and Atlantic Canada, and were followed at mid-month by an unusually early snowfall in southern British Columbia. An extremely cold air mass moved over much of the nation in the last two weeks of the month, dropping overnight lows below -35°C from the Yukon through the Prairies and into northern Ontario.

Overall, 1992 was a cool year for Canada. Despite a cool finish to the year, the warmth felt in the west in the winter and early spring was strong enough to maintain an annual mean one to two degrees above normal from British Columbia to Saskatchewan. For the east there were few epi-

sodes of pronounced warming, and as a result, the mean temperature varied from a few tenths of a degree below normal near the Great Lakes, to two degrees below normal in Labrador and in the Eastern Arctic. The coldest temperature recorded in 1992 was -54°C at Clyde on Baffin Island in January, while the warmest was 38°C recorded several times in Kelowna and Kamloops between June and August. Perhaps the most unusual temperatures were found in Alberta; a summer-like value of 24°C occurred in late February at Claresholm, and a wintry -8°C occurred at Pincher Creek in August.

Precipitation totals throughout the country were generally within 10 percent of the 30-year average. Only parts of the Pacific coast, southern Ontario, and the island of Newfoundland received a significantly larger amount of moisture Totals in those areas were as much as 30 percent higher than the usually expected amounts.

-Malcolm Geast

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The Cost of Summer 1992 Weather? Could be Half a Billion Dollars

□ *Deborah Herbert, CCAD*

Canadians, with the exception of those fortunate enough to live in British Columbia, suffered through an unusually cold and wet summer in 1992. People in Ontario and on the Prairies also experienced hailstorms and freak snowstorms. Because the weather last summer was considerably different from what we have come to expect, it provided an opportunity to study the effects of weather on economy.

Informed people within each of the sectors or activities of the Canadian economy that are most affected by the weather (agriculture, forestry, tourism, national parks, utilities, air conditioner supply, road construction, beer sales, retail sales, building construction, and road safety) were contacted for both their opinions as well as whatever relevant data they could provide. Several newspaper articles also gave some leads for potential costs. The final results of the survey (costs in each sector) are listed in Table 1. Data on summer 1992 retail and soft drink sales as well as traffic volumes is not yet available; consequently, it was impracticable to determine the impacts on either retail and soft drink sales or road safety. Representatives of building construction firms did not believe that the summer weather had any significant impact on their costs or operations. As a result, none of these sectors is included in Table 1. Further, there has been a small net increase in foreign tourist expenditure in Canada this year. Because it is unknown what tourists might have spent had the weather been closer to normal, it is unclear this small increase is less than would otherwise have occurred. However, nine percent of tourists leaving Prince Edward Island this summer volunteered that they may have extended their visits there had the weather been nicer. This was the third most frequent response to an open-ended question.

There is no systematic collection of weather-related costs in Canada, or anywhere else, for that matter. As a rule, neither businesses nor government agencies attempt to quantify the impact of weather on their operations, because they view weather as being beyond their control and thus cannot justify the effort necessary to analyze its impact. Although it is true that atmospheric processes are largely outside the influence of humans, people can make choices about how they will react to weather. Clearly, the knowledge of the impacts of weather, as well as our reactions to it, is valuable: we can then determine how the impacts might have been avoided and adjust our activities accordingly. It may be that many of our activities are more vulnerable to weather than they need be. The threat of global warming makes this analysis of adjustment even more crucial, because the impacts may become much more costly.

Because respondents are (mostly) unaccustomed to estimating weather costs, although the majority were intrigued by the idea, the information provided is not highly reliable. Primarily, the figures reported in Table 1 are simply the changes from the year before or some average level; these changes are not due solely to the weather, but are the result of a variety of factors including the recession, intra-industry changes, fashions, international conditions, and so on. In some cases, the impact of weather may have been masked by impacts (in the opposite direction) of other variables. Further, the list in Table 1 is not comprehensive; as mentioned above, sev-

eral sectors could not be included because of data constraints. As a result, the costs reported in Table 1 are only rough approximations of the actual costs.

These estimates do suggest that significant costs were incurred and could be as high as (or even higher than) half a billion dollars; by comparison, *Canada's Green Plan* provides about that much ($575 million) over five years for "Global Environmental Security", which deals with such issues as global warming, ozone depletion, and acid rain. Part of the impact of global warming could be more variable weather, implying that unusual weather like this past summer's[1], and its associated costs, could become more common.

[1] *It should be recognized, however, that global warming probably did not play a part in creation of last summer's weather; atmospheric scientists suspect that it was a result of the El Nino and the eruption of Mount Pinatubo in the Phillipines.*

Table 1: Costs of Summer 1992 Weather

Sector, Type of cost	cost
Agriculture	
- Lost Production Value	$250-$350 million
- Crop Insurance Indemnities- Premiums	$207 million
Forestry	
- Forest Fire Suppression Cost, 1992 - 1991	- $15,1 million
- Hectares Burrnt, 1992 - 1991	- 510 456 ha
Tourism	
- no weather-dependent tourism cost have determined	
National Parks	
-Park Entrance Revenue, Decline from Forecast 1992	$728 550
Utilities	
-Ontario Hydro net income, Decline from Forecast, 1992	$40 million
-Hydro Quebec net income, Decline from Forecast, 1992	$0.4 million
Air Conditioners (2nd & 3rd Quarters)	
- Residential Air Conditioners, Decline in Shipments 1992 - 1991	'7665 units
- Commercial Air Conditioners, Decline in Shipments 1992 - 1991	5 458 units
- Residential Air Conditioners, Decline in Sales Revenue, 1992 - 1991	$46 million
Road Constructio	
- Increase in Total Cost for Firms in Ontario	4,5 - 6.0 percent
Beer Sales(May through August)	
- Decline in Summer Beer Sales, 1992 - 1991	56 404 900 litres
- Decline in sales Revenue, 1992 - 1991	$125 071 000
Total, Canada	**$447 085 000 - $547 085 000**

JANUARY 1993

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	-1.2	-2.8	12.1	-16.4	51.6	158	168.1	80	0	11	117	172	595.7
ALERT BAY	1.9	-0.9	9.6	-5.5	8.9	26	117.6	60	0	11	*	*	500.6
AMPHITRITE POINT	3.9	-0.8	12.8	-3.5	2.8	19	424.9	104	0	11	*	*	437.1
BLUE RIVER A	-13.6	-2.2	5.2	-32.8	72.8	74	50.0	61	57	6	74	158	*
CAPE SCOTT	4.0	0.4	5.9	2.0	3.2	14	141.6	42	0	12	0	*	435.8
CASTLEGAR A	-5.1	-0.7	5.5	-15.8	72.7	87	80.5	100	39	8	42	92	715.4
COMOX A	0.6	-1.6	8.1	-10.8	6.0	14	111.8	58	0	9	74	*	540.4
CRANBROOK A	-11.4	-0.9	6.5	-30.7	33.3	62	29.3	67	33	7	51	65	910.9
DEASE LAKE	-17.5	2.2	7.1	-33.8	14.6	43	18.6	67	41	4	66	105	1099.8
FORT NELSON A	-19.0	4.8	10.1	-33.3	24.2	77	17.7	71	28	5	78	*	1146.9
FORT ST JOHN A	-13.2	4.5	11.6	-35.4	11.0	29	8.8	25	0	3	71	*	968.9
HOPE A	-3.3	-2.9	9.4	-14.0	23.9	29	188.5	73	0	10	20	115	659.0
KAMLOOPS A	-11.6	-5.5	6.0	-28.6	29.2	91	26.0	82	10	7	68	116	916.8
KELOWNA A	-8.8	-2.3	5.9	-27.4	21.2	67	27.0	81	14	7	37	85	829.7
MACKENZIE A	-15.3	-0.8	8.4	-38.5	37.4	46	35.6	55	66	8	73	131	1033.4
PENTICTON A	-5.3	-2.6	6.2	-16.3	15.7	54	20.6	64	0	7	24	49	722.8
PORT ALBERNI A	-1.4	-2.2	7.5	-12.1	43.7	72	207.4	85	0	12	48	*	601.7
PORT HARDY A	1.4	-1.0	12.4	-8.1	11.1	38	108.0	51	0	11	107	167	517.1
PRINCE GEORGE A	-15.3	-3.2	7.3	-37.0	43.0	70	32.3	56	7	4	79	134	1030.3
PRINCE RUPERT A	-0.9	-0.4	13.8	-14.0	36.5	73	223.9	97	0	16	74	154	587.0
PRINCETON A	-11.2	-3.3	5.6	-30.7	19.4	35	22.7	42	24	6	70	*	*
REVELSTOKE A	-8.4	-0.6	3.1	-24.0	94.2	65	74.5	67	75	8	48	109	819.5
SANDSPIT A	2.2	0.2	11.6	-5.6	15.4	45	89.6	62	0	14	64	110	489.7
SMITHERS A	-14.7	-3.8	10.4	-33.8	24.4	43	19.3	35	32	5	82	150	1015.3
TERRACE A	-8.6	-2.7	8.7	-22.3	72.5	62	93.7	61	0	12	104	200	824.0
VANCOUVER INT'L A	-0.4	-2.9	11.6	-14.1	27.3	106	103.4	67	0	10	94	174	569.9
VICTORIA INT'L A	1.7	-1.4	10.8	-7.6	6.9	34	94.6	61	0	10	109	170	504.4
WILLIAMS LAKE A	-13.7	-3.3	6.2	-33.7	44.6	90	32.2	73	53	7	77	112	983.8

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	-28.5	*	-4.2	-48.6	53.6	*	24.9	*	*	*	*	*	*
MAYO A	-25.7	3.3	-1.4	-48.2	35.8	191	29.8	170	*	*	*	*	*
WATSON LAKE A	-24.3	2.4	6.3	-44.1	28.2	70	18.4	56	53	9	18	41	1310.5
WHITEHORSE A	-17.7	3.0	3.7	-40.2	30.5	143	20.3	115	16	7	52	113	1107.7
NORTHWEST TERRITORIES													
BAKER LAKE A	-29.1	3.9	-11.4	-42.5	17.4	217	16.9	219	75	7	*	*	1460.2
CAMBRIDGE BAY A	-30.5	3.1	-10.8	-43.4	16.4	309	12.2	254	46	5	0	0	1505.0
CLYDE A	-32.5	-6.0	-11.3	-42.5	14.2	142	12.8	129	49	5	0	*	1564.7
COPPERMINE A	-23.7	6.4	-5.2	-39.0	18.6	202	17.8	191	80	6	3	73	1293.1
CORAL HARBOUR A	-29.0	0.7	-10.4	-41.7	10.6	125	10.6	128	19	4	23	52	1409.5
EUREKA	-36.2	0.2	-20.9	-47.0	3.4	106	3.4	117	14	2	0	*	1682.3
FORT SIMPSON A	-21.4	6.9	9.2	-40.0	13.3	64	10.2	57	35	3	42	87	1221.8
FORT SMITH A	-19.8	7.0	8.7	-39.5	10.9	51	5.5	30	20	1	60	105	1173.5
IQALUIT	-31.5	-5.9	-6.2	-42.5	25.8	93	23.8	91	30	5	46	130	1533.9
HALL BEACH A	-32.1	-1.1	-14.1	-45.2	5.0	57	5.0	57	45	1	*	*	1553.3
HAY RIVER A	-17.6	8.2	9.3	-34.6	14.4	64	9.6	46	20	2	*	*	1101.5
INUVIK A	-22.8	6.8	2.4	-46.2	32.0	157	27.5	154	65	9	1	11	1264.9
MOULD BAY A	-34.5	-1.0	-8.6	-48.0	2.8	85	2.2	81	13	1	0	*	1627.1
NORMAN WELLS A	-23.0	5.9	-18.3	-27.6	36.0	175	24.5	126	30	6	9	29	1269.5
POND INLET A	-33.8	*	-16.9	-41.9	13.4	*	10.0	*	14	2	0	*	1606.8
RESOLUTE A	-33.6	-1.5	-18.6	-43.6	11.4	335	11.3	342	15	5	0	*	1600.3
YELLOWKNIFE A	-22.4	6.4	-5.8	-39.0	7.6	49	6.0	45	19	1	35	24	1251.8
ALBERTA													
BANFF	-12.3	-0.8	6.5	-35.0	9.6	22	6.6	17	10	2	*	*	946.2
CALGARY INT'L A	-11.4	0.4	14.4	-33.0	8.8	42	5.8	36	0	2	142	139	911.8
COLD LAKE A	-17.3	1.7	10.2	-38.8	14.9	63	11.8	53	14	7	76	84	1070.6
CORONATION A	-17.6	-1.1	6.8	-38.3	9.0	36	3.0	14	16	2	119	100	1102.0

JANUARY 1993

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	-14.9	1.6	7.9	-37.2	5.2	18	4.2	17	9	2	132	135	1020.5
EDMONTON MUNICIPAL	-12.5	2.5	11.0	-29.2	3.8	*	3.6	15	11	1	121	134	944.5
EDMONTON NAMAO A	-13.3	2.3	10.0	-32.0	3.2	13	2.5	10	13	0	*	*	969.9
EDSON A	-13.4	0.9	14.0	-37.0	15.0	42	5.0	20	18	2	114	137	973.8
FORT CHIPEWYAN A	-19.1	6.6	9.0	-38.0	8.5	40	5.6	27	*	*	*	*	*
FORT MCMURRAY A	-17.7	4.1	13.1	-33.9	23.9	91	16.3	72	12	4	86	97	1107.0
GRANDE PRAIRIE A	-17.5	0.2	12.6	-38.6	13.7	36	12.0	35	21	3	73	*	1098.6
HIGH LEVEL A	-19.4	3.8	10.5	-34.6	6.2	23	6.0	26	6	2	28	52	1159.9
JASPER	-13.2	-0.4	11.0	-32.5	6.0	16	4.8	14	10	2	90	*	957.3
LETHBRIDGE A	-11.1	-0.8	11.3	-32.8	10.0	35	6.3	27	0	2	145	152	902.2
MEDICINE HAT A	-13.4	-0.8	10.8	-34.6	5.4	21	5.2	23	0	1	123	132	973.0
PEACE RIVER A	-17.6	2.8	8.1	-36.6	6.8	25	6.8	31	15	2	*	*	1103.2
RED DEER A	-16.1	-0.6	7.3	-36.2	7.2	29	5.5	23	9	3	*	*	1058.8
ROCKY MTN HOUSE A	-15.4	-2.4	14.0	-36.3	23.0	76	11.8	43	20	4	*	*	1034.8
SLAVE LAKE A	-15.7	1.5	13.5	-32.5	22.6	68	15.6	59	3	3	100	119	1034.8
SUFFIELD A	-14.6	*	7.9	-33.6	4.5	*	4.0	*	0	1	126	*	1011.5
WHITECOURT A	-13.1	3.5	14.5	-33.5	9.3	29	4.5	15	9	1	*	*	965.5
SASKATCHEWAN													
BROADVIEW	-15.9	3.8	6.9	-41.5	3.8	20	3.8	22	6	2	140	117	1051.9
CREE LAKE	-19.3	5.6	9.9	-40.2	19.8	95	17.6	117	20	1	69	81	1155.2
ESTEVAN A	-16.3	0.0	5.0	-36.7	16.6	81	9.4	49	11	3	132	109	985.8
KINDERSLEY	-17.6	-0.4	4.5	-37.5	0.4	2	0.4	2	18	0	94	*	1104.3
LA RONGE A	-17.4	5.3	12.5	-36.3	7.0	32	7.0	40	18	2	*	*	1096.8
MEADOW LAKE A	-19.1	*	8.9	-41.7	8.0	*	7.6	*	9	5	98	*	1149.9
MOOSE JAW A	-14.2	1.6	10.5	-37.1	3.7	16	1.2	6	4	0	126	120	999.4
NIPAWIN A	-18.8	*	7.7	-41.7	18.8	*	14.2	*	36	3	136	*	1139.4
NORTH BATTLEFORD A	-18.0	1.0	9.1	-41.0	2.8	13	2.2	11	8	0	*	*	1116.0
PRINCE ALBERT A	-18.3	3.2	12.0	-40.7	8.9	49	7.0	42	11	2	128	133	1126.0
REGINA A	-16.7	1.2	6.8	-39.1	5.3	26	2.5	15	12	1	122	122	1076.1
SASKATOON A	-18.2	1.1	5.5	-38.0	4.0	20	3.4	19	9	1	*	*	1121.8
SWIFT CURRENT A	-14.4	0.3	8.1	-38.1	4.4	20	3.8	18	4	2	108	118	1005.9
YORKTON A	-17.1	2.8	7.6	-39.2	4.0	17	3.0	13	10	1	134	124	1086.1
MANITOBA													
BRANDON A	-17.8	1.9	5.4	-41.2	8.8	42	7.2	37	24	4	131	*	1110.0
CHURCHILL A	-22.3	5.2	-2.6	-36.9	26.2	155	18.8	123	13	4	67	84	1248.8
DAUPHIN A	-15.1	4.4	7.6	-37.0	22.2	86	8.6	35	10	4	132	111	1026.0
GILLAM A	-21.3	6.7	0.0	-39.6	20.6	90	9.8	55	24	5	*	*	1214.0
ISLAND LAKE	-19.4	5.4	5.9	-37.7	8.6	21	6.6	30	15	3	*	*	1160.5
LYNN LAKE A	-20.5	6.4	7.7	-38.2	8.8	33	8.0	43	15	2	78	83	1192.3
NORWAY HOUSE A	-19.5	*	7.7	-40.7	13.2	*	8.2	*	10	2	*	*	1160.6
THE PAS A	-17.8	4.9	9.4	-35.7	8.0	34	6.1	34	8	2	125	122	1109.6
THOMPSON A	-21.3	5.3	8.1	-44.4	7.3	29	5.3	28	14	2	92	98	1216.6
WINNIPEG INT'L A	-16.6	2.7	5.1	-35.3	18.4	78	14.0	66	28	5	128	106	1072.7
ONTARIO													
EARLTON A	-15.7	0.6	2.1	-38.7	30.1	53	32.1	57	28	8	*	*	1046.0
GERALDTON A	-17.6	*	2.1	-41.4	18.2	*	17.6	*	48	6	*	*	1091.6
GORE BAY A	-7.8	2.3	4.0	-22.6	69.4	122	57.5	94	38	9	*	*	789.9
HAMILTON RBG	-3.0	*	12.0	-12.5	46.0	*	115.4	*	10	10	55	*	*
HAMILTON A	-3.7	2.7	11.4	-15.1	51.4	130	103.9	147	10	11	*	*	672.3
KAPUSKASING A	-16.4	2.2	2.1	-37.9	31.6	57	29.6	55	66	8	*	*	1064.7
KENORA A	-16.0	2.5	6.7	-33.3	18.2	58	16.2	57	40	5	*	*	1053.3
KINGSTON A	-5.8	1.9	7.6	-19.0	54.8	106	112.6	141	12	13	78	78	738.8
LONDON A	-3.7	2.9	11.1	-16.7	46.0	83	111.3	148	8	14	42	59	673.6
MOOSONEE	-18.3	2.1	2.5	-38.1	21.2	50	17.0	42	42	4	102	124	1126.4
MUSKOKA A	-7.8	2.6	7.9	-26.4	96.1	119	134.1	156	35	18	*	*	807.9
NORTH BAY A	-10.9	2.1	5.5	-27.8	66.4	112	62.8	99	40	13	108	111	896.1
OTTAWA INT'L A	-9.2	1.7	7.5	-23.9	75.8	151	109.2	179	30	10	95	96	842.3
PETAWAWA A	-12.0	1.1	4.2	-28.8	77.4	166	80.9	143	39	12	*	*	929.2
PETERBOROUGH A	-6.4	3.2	9.0	-19.4	37.8	107	86.4	155	13	13	*	*	757.6
PICKLE LAKE	-17.8	3.6	4.0	-36.1	11.0	26	9.6	25	24	4	*	*	1111.2
RED LAKE A	-17.9	3.1	5.3	-38.3	22.2	71	16.9	59	54	4	116	*	1111.7
ST CATHARINES A	-1.9	2.8	12.8	-10.7	25.0	76	74.4	127	7	9	50	*	615.4
SARNIA A	-3.1	3.4	11.5	-14.3	18.8	65	73.0	139	*	7	55	66	654.6
SAULT STE MARIE A	-9.1	1.6	4.1	-27.4	67.1	88	51.5	64	20	14	66	86	840.2
SIOUX LOOKOUT A	-17.2	2.2	3.9	-37.8	16.2	43	16.6	46	41	5	*	*	1092.0
SUDBURY A	-11.8	1.9	2.7	-26.5	46.4	86	55.2	96	49	10	93	92	928.4
THUNDER BAY A	-14.1	1.3	5.4	-33.9	28.6	59	20.3	50	28	7	101	86	995.6
TIMMINS A	-15.8	1.5	2.5	-38.4	31.7	48	29.8	53	75	11	*	*	1048.5
TORONTO	-2.2	*	11.4	-12.5	37.8	*	95.8	*	10	11	*	*	626.2
TORONTO INT'L A	-4.0	2.7	12.0	-15.5	27.2	81	70.6	140	9	10	*	*	680.6
TORONTO ISLAND A	-2.5	*	7.4	-12.6	38.6	124	96.2	*	8	11	*	*	633.5
TRENTON A	-5.8	1.8	7.9	-18.2	31.1	65	99.9	145	5	13	*	*	736.4
WATERLOO WELLINGTON	-4.7	3.0	10.6	-14.2	51.4	127	106.8	177	24	13	*	*	704.4
WAWA A	-13.3	*	1.9	-35.0	56.6	*	51.6	*	83	11	*	*	970.7
WIARTON A	-4.9	2.2	9.0	-18.4	117.6	115	123.7	128	30	21	46	67	710.8
WINDSOR A	-2.2	2.7	11.5	-12.5	28.4	94	112.6	205	0	11	*	*	623.8

JANUARY 1993

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	-17.1	-1.3	0.9	-36.0	46.4	68	55.9	88	39	10	*	*	1089.6
BAIE COMEAU A	-15.7	-1.7	0.6	-36.6	45.3	53	50.3	55	36	10	118	121	1045.1
BLANC SABLON A	-16.7	-5.4	3.9	-30.9	39.6	35	41.4	32	26	9	118	*	1078.1
GASPE A	-13.8	*	4.6	-30.6	41.1	*	63.7	*	17	6	126	*	987.2
INUKJUAK A	-23.0	1.5	-1.8	-35.0	12.0	120	11.6	118	21	4	43	83	127.0
KUUJJUAQ A	-23.7	-0.4	0.7	-39.3	22.0	67	21.8	66	28	9	53	84	1291.3
KUUJJUARAPIK A	-20.5	2.0	1.1	-36.0	29.0	108	26.2	102	20	9	53	73	1192.3
LA GRANDE IV A	-22.9	*	-0.4	-46.1	39.2	*	33.6	*	42	13	74	*	1228.5
LA GRANDE RIVIERE A	-21.6	*	1.4	-39.2	44.4	*	44.4	*	64	13	47	*	1228.3
MANIWAKI	-13.2	0.3	4.4	-28.8	85.0	176	88.2	160	44	13	103	112	967.8
MONT JOLI A	-13.2	-1.6	3.3	-31.9	40.8	47	53.2	61	12	12	107	132	967.0
MONTREAL INT'L A	-8.8	1.4	7.6	-25.0	43.0	82	118.6	165	9	14	97	92	829.3
MONTREAL MIRABEL I/	-10.8	*	7.4	-26.9	59.2	*	145.6	*	15	15	125	*	893.4
NATASHQUAN A	-16.0	-3.9	2.0	-33.2	36.6	53	42.0	46	28	11	117	107	1053.8
QUEBEC A	-12.5	-0.4	1.9	-29.3	41.0	53	89.2	99	26	11	90	93	945.4
ROBERVAL A	-15.1	0.7	2.9	-33.3	30.0	43	31.6	47	24	9	106	*	1061.6
SCHEFFERVILLE A	-23.4	-0.6	-1.1	-41.4	30.8	64	28.4	61	57	10	92	116	1284.2
SEPT-ILES A	-17.5	-3.5	0.3	-35.1	47.8	51	48.6	51	34	7	123	114	1101.8
SHERBROOKE A	-9.9	1.7	8.7	-32.3	74.6	120	96.8	132	18	19	81	*	863.8
ST HUBERT A	-9.0	1.1	8.6	-26.2	46.3	*	126.1	151	9	14	99	*	837.6
VAL D'OR A	-17.1	-0.3	1.2	-38.1	42.0	71	38.4	64	41	12	89	89	1087.6
NEW BRUNSWICK													
CHARLO A	-14.5	-1.8	2.7	-30.7	54.3	65	62.5	69	63	6	131	111	997.1
FREDERICTON A	-9.7	-0.5	11.7	-28.3	17.0	27	61.0	59	6	9	*	*	859.6
MONCTON A	-10.2	-2.1	10.7	-30.2	39.6	51	74.5	60	19	9	111	104	875.2
SAINT JOHN A	-8.9	-1.1	9.0	-28.2	36.8	48	119.1	80	11	10	12	11	833.3

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	-6.7	-1.7	14.9	-24.4	55.6	73	76.6	61	25	7	*	*	765.7
HALIFAX INT'L A	-7.4	-1.4	10.3	-28.5	50.3	80	91.4	60	25	13	*	*	786.8
SABLE ISLAND	-1.6	-1.7	10.6	-16.5	44.4	122	123.4	84	100	13	43	81	606.8
SHEARWATER A	-6.0	-1.9	10.2	-25.0	23.8	52	60.0	42	14	6	92	82	744.5
SYDNEY A	-7.3	-2.6	10.1	-24.6	63.1	85	116.3	78	12	9	87	101	784.2
YARMOUTH A	-4.4	-1.7	10.7	-20.3	64.7	104	99.2	70	17	14	80	112	693.8
PRINCE EDWARD ISLAND													
CHARLOTTETOWN A	-9.4	-2.3	8.3	-29.3	61.6	80	89.4	77	30	12	*	*	848.7
NEWFOUNDLAND													
BONAVISTA	-7.5	-3.2	8.5	-18.5	34.6	68	75.4	83	13	8	*	*	791.5
BURGEO	-7.4	-2.6	6.0	-21.5	24.4	43	88.9	58	17	11	*	*	788.7
CARTWRIGHT	-16.9	-3.7	4.7	-30.5	10.9	13	10.9	12	66	4	88	98	1082.5
CHURCHILL FALLS A	-22.6	-1.3	-2.7	-41.0	41.0	48	39.8	55	84	6	101	101	1259.7
COMFORT COVE	-11.2	-3.8	3.6	-25.6	61.4	76	67.2	70	58	9	*	*	901.9
DANIELS HARBOUR	-10.5	-3.6	8.8	-24.5	97.8	110	100.8	102	39	19	45	80	879.1
DEER LAKE A	-11.8	-3.4	5.7	-32.8	104.1	120	85.8	92	106	15	*	*	924.2
GANDER INT'L A	-10.4	-4.2	7.9	-22.8	54.4	69	62.2	57	21	8	117	138	879.3
GOOSE A	-18.6	-2.2	3.3	-34.9	28.0	35	22.8	31	20	6	119	135	1135.8
MARY'S HARBOUR	-16.1	-5.8	2.0	0.0	23.2	31	23.8	28	76	5	*	*	1057.8
PORT AUX BASQUES	-7.2	-3.1	5.2	-21.2	79.4	108	133.4	100	43	23	42	*	741.4
ST ANTHONY	-14.8	-3.5	1.0	-28.4	59.6	104	59.4	61	72	10	*	*	1007.9
ST JOHN'S A	-7.2	-3.3	10.7	-19.5	50.7	62	100.6	65	3	14	75	106	783.0
ST LAWRENCE	-6.5	-2.7	7.9	-19.7	61.8	121	113.8	96	6	17	*	*	759.1
STEPHENVILLE A	-9.5	-4.5	4.5	-25.1	123.3	130	140.3	122	92	24	49	*	816.5
WABUSH LAKE A	-22.5	-0.2	-2.8	-40.0	30.2	*	27.4	42	52	8	108	*	1255.8

AGROCLIMATOLOGICAL STATIONS — **JANUARY 1993**

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	-0.9	-2.1	13.0	-11.0	54.0	198.0	86	0	11	95	0.0	8.5
SUMMERLAND	-6.6	-3.2	6.5	-19.0	13.2	20.2	57	1	7	28	0.0	0.0
ALBERTA												
BEAVERLODGE	-13.5	2.4	12.0	-35.5	12.4	13.6	41	8	6	87	0.0	3.5
LACOMBE	-14.6	0.9	11.5	-36.0	2.7	2.4	11	17	2	100	0.0	0.0
SASKATCHWAN												
INDIAN HEAD	-16.1	1.8	9.0	-39.0	4.0	1.1	5	27	0	**	0.0	0.5
MELFORT	-17.0	3.9	8.5	-37.0	7.0	7.0	37	28	2	103	0.0	0.0
REGINA	-18.3	-0.3	6.0	-42.0	1.0	1.2	7	10	1	**	0.0	0.0
SCOTT	-18.7	0.4	5.0	-44.0	5.4	3.4	20	25	1	116	0.0	0.0
SWIFT CURRENT	-14.2	0.6	8.0	-37.0	4.0	3.5	21	2	***	0	*.*	*.*
MANITOBA												
BRANDON	-17.7	1.6	7.3	-40.8	9.8	9.8	46	21	5	**	0.0	0.0
MORDEN	-14.5	5.2	7.0	-35.0	16.4	17.4	68	6	6	124	0.0	0.5
GLENLEA	-18.0	-0.7	4.0	-40.0	16.4	16.4	70	84	6	98	0.0	0.0
ONTARIO												
DELHI	-3.0	3.0	11.5	-17.0	30.0	123.9	185	4	14	**	0.0	3.0
ELORA	-5.2	3.0	9.8	-18.1	*	*	*	10	14	**	*.*	*.*
GUELPH	-4.6	2.4	10.5	-17.8	45.7	106.4	189	10	14	58	0.0	1.9
HARROW	-3.0	1.8	11.0	-13.0	25.7	124.7	211	0	10	58	0.0	3.5
KAPUSKASING	-16.9	1.7	1.5	-41.5	29.1	35.8	74	47	7	65	0.0	0.0
OTTAWA	-8.8	2.0	7.2	-23.5	54.6	115.2	209	22	10	95	0.0	0.0
SMITHFIELD	-4.9	2.6	9.1	-18.0	51.1	114.4	139	5	12	**	0.0	0.6

Courtesy of Agriculture Canada

STATION	Temperature C				Snowfall (cm)	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	Degree days above 5 C	
	Mean	Difference from Normal	Maximum	Minimum							This month	Since jan. 1st
QUEBEC												
LA POCATIERE	-11.9	-0.6	6.0	-31.0	23.6	46.1	58	18	8	109	0.0	0.0
L'ASSOMPTION	-10.6	1.3	5.5	-28.0	44.2	115.9	156	10	12	109	0.0	0.0
NORMANDIN	-19.7	-1.7	1.7	-40.7	*.*	8.7	14	9	9	128	0.0	0.0
NEW BRUNSWICK												
FREDERICTON	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
NOVA SCOTIA												
KENTVILLE	-6.1	-1.1	14.0	-27.5	54.6	81.0	60	38	8	66	0.0	5.8
NAPPAN	-7.5	-0.7	13.5	-34.0	37.6	142.3	125	25	8	95	0.0	3.3
PRINCE EDWARD ISLAND												
CHARLOTTETWN	*.*	*.*	*.*	*.*	*.*	*.*	**	***	***	**	*.*	*.*
NEWFOUNDLAND												
ST.JOHN'S WEST	-6.9	-3.1	10.5	-18.5	31.6	108.4	60	3	9	69	0.0	0.0

Courtesy of Agriculture Canada

...continued from page 5

Two new low precipitation records were set. Chibougamau with 20.8 mm and Blanc Sablon with 41.4 mm. Precipitation extremes were measured at Inukjuak, with 11.6 mm and at Montreal, with 145.6 mm or 177 percent of normal.

Snowfall amounts varied from a minimum of 12.0 cm at Inukjuak to a maximum of 85.0 cm in Maniwaki. This last value represents a new monthly record.

Total hours of bright sunshine were above seasonal values over Quebec, except in the Ottawa and St. Lawrence River Valley regions and the western portions of the province, from Val d'Or northwards to Kuujjuaq. Sunshine extremes were measured at Mont-Joli, with 137 percent of normal, and in Inukjuak with 75 percent of normal.

Several storms affected the province. On January 3, a warm front moving eastwards over Quebec, brought freezing precipitation to the Ottawa Valley and southwestern Quebec. In Montreal the freezing rain lasted 17 hours. In addition behind this front on January 4 and 5, 30 to 55 millimetres of rain fell on southwestern Quebec, resulting in flooding and ice jams on several rivers. Houses had to be evacuated in Saint-Roch-de-l'Achigan, about 25 km northeast of Montreal, as the water of the l'Achgan River rose by about one and a half metres in less than one hour. Further to the east, in Saint-Nicephore near Drummonville, roughly 100 km east of Montreal, an ice jam caused the waters of the St-Francois River to rise. In Montreal and the suburbs, a few tunnels, underpasses and one bridge had to be temporarily closed because of local flooding.

On January 13, southern Quebec and the Ottawa Valley were hit by another storm. Snow and strong northeasterly winds were associated with this low pressure system. Snowfalls were as high as 30 cm in Hull/Ottawa region.

On the 17th, snow squalls associated with an intense cold front moving in from northwestern Quebec swept across the Abitibi region and reached the western parts of the Eastern Townships by evening. On the 22nd and 23rd, another low pressure system gave more freezing precipitation to many areas.

An intense low pressure system brought rain to southern Quebec on the 24th and left close to 15 cm of snow on the hilly terrains north of the St. Lawrence Valley. The low pressure system intensified on the 25th, as it reached the Gulf of St. Lawrence, producing high winds, which at times reached 130 km/h on the Gaspe Peninsula and the North Shore, resulting in whiteouts.

At the end of the month, a low pressure system moving just south of the province on the 30th and 31st gave 10 to 25 cm of new snow to the southern and western regions, making road conditions very slippery.

Maritimes

January was a cold and dry month in all areas. It was extremely cold on the 30th and 31st, with a few locations setting record low temperatures on both days. Halifax recorded a minimum of -28.5°C on the 31st, the lowest minimum temperature ever recorded at the Airport since records began in 1960. The previous record was -26.1°C set on February 4, 1971.

Precipitation totals ranged from near, to less than half the normal. The total at Shearwater, N.S., was only 60.0 mm, the lowest January precipitation total since 1960, and the third lowest January total on record. Records at Shearwater date back to 1945.

Snowfall totals were also generally well-below normal, with the exception of Sable Island. Fredericton, N.B., reported only 17.0 cm of snow, the lowest January snowfall ever recorded at the Airport since records began in 1952. Previous record was 17.5 cm set in 1980.

Total hours of sunshine varied, ranging from 21 hours below normal at Shearwater, N.S., to 15 hours above average at Charlo, N.B.

The highlight for the month was a major snowstorm that struck the Maritimes on the 27th, dumping 15 to 35 centimetres of snow. New Brunswick, with the exception of the southern areas, went unscathed. Schools were closed and many streets and roads were impassable. There were numerous cancellations and accidents throughout the area. The storm paralysed the Halifax-Dartmouth metro area, with commuters spending many hours trying to get home from work. A Metro Transit bus got stuck on the McKay Bridge that connects the two cities, blocking traffic for several hours.

On a sad note, five are dead after the scallop dragger Cape Aspy sank late on the 30th, approximately 110 km south of Cape Sable Island, N.S. Vessel icing due to freezing spray is suspected as a contributing factor.

Newfoundland and Labrador

Below-normal precipitation was reported across most of the Island, except along the west coast, where snowfall was 10 to 18 centimetres above normal. Below-normal temperatures were reported across Newfoundland. The lowest temperature recorded was at Deer Lake, -32.8°C. Between January 28 and 30, a brief warming trend spread across the Island, and St. John's reported a high of 9.8°C. For most of the Island, the hours of bright sunshine were close to normal, with the exception of Gander, which had 32 hours more than usual. Sagona and Grates Cove reported strong northerly winds, with gusts to 95 km/h during the third week of the month. Meanwhile, with the below-normal temperatures, heavy pack ice continued its southward advance. At the end of January ice conditions off the east coast were about three weeks ahead of normal.

In Labrador, temperatures were below normal by about 3°C. Churchill Falls reported a low of -41.0°C, but a warming trend moved into Labrador during the last week of the month. Some stations reported record high, near freezing temperatures on the 26th. Precipitation amounts were less than half the normal. Cartwright recorded only 10.9 cm of snow, which is almost 75 cm below normal. During the last week of January, a disturbance moving northeastwards brought strong winds and blizzard-like conditions, especially in the coastal areas. Hours of bright sunshine were near normal, but Goose Bay and Wabush Lake recorded almost 30 hours more sunshine than the average.

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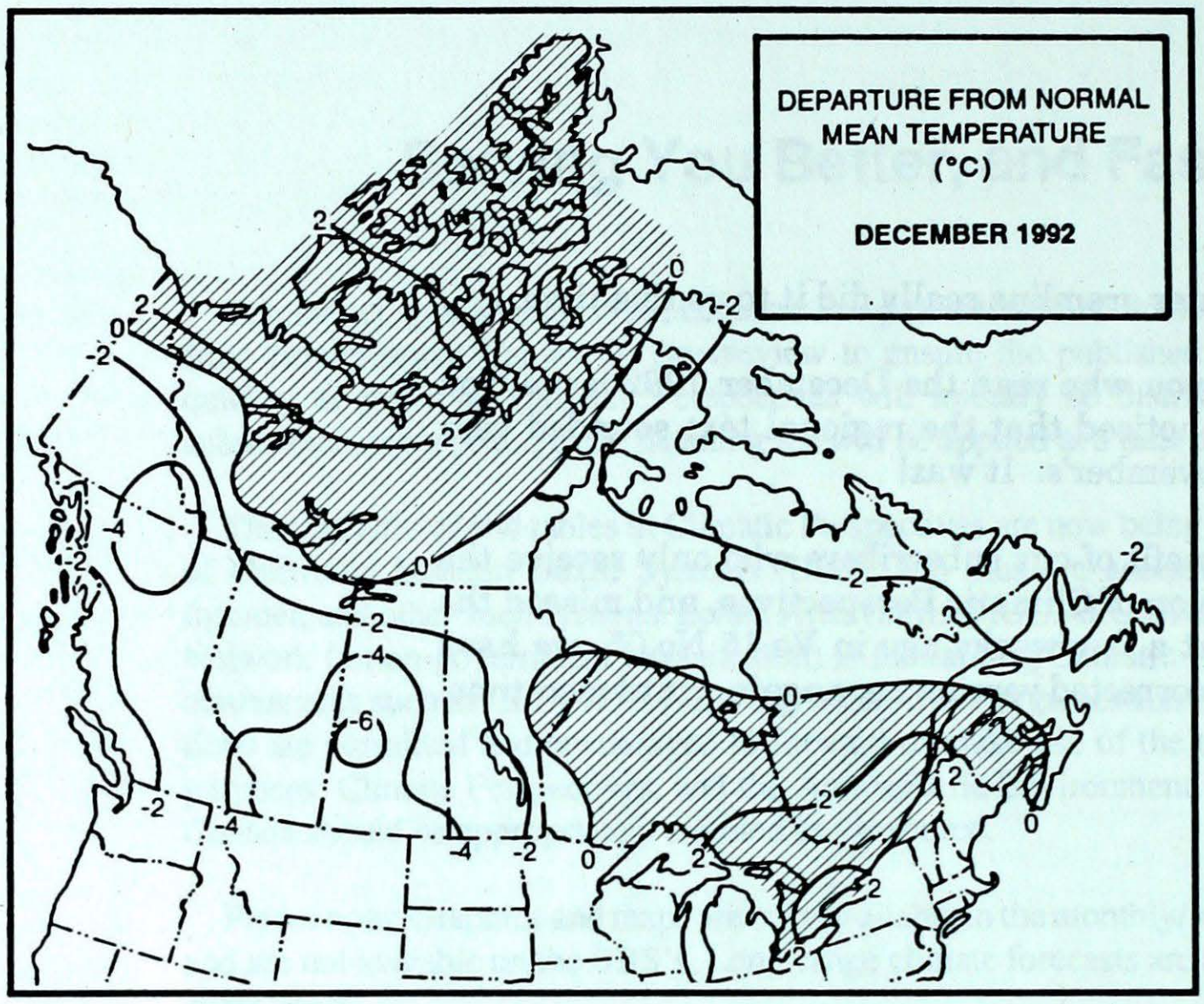
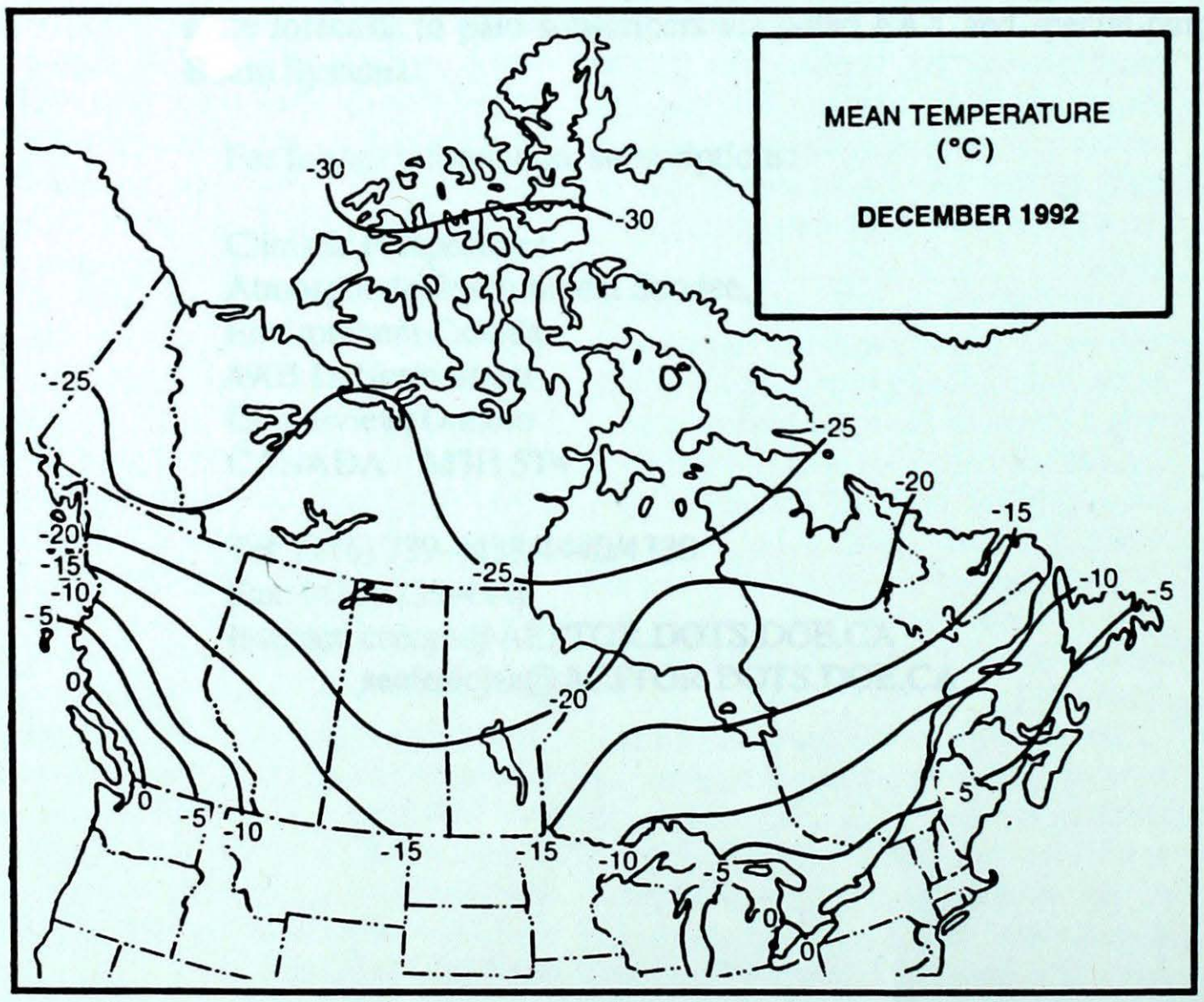
Those computer gremlins really did it to us this time.

For those of you who read the December 1992 issue, you should have noticed that the regional text sounded very much like November's. It was!

For the benefit of our subscribers who only receive the monthly version of Climatic Perspectives, and missed the reprinted text a few weeks ago in Vo.15 No.05, we have included the corrected version once again. Until next time.





Across the country

Yukon

At the onset of December, warm temperatures, produced from a low pressure system originating in the Gulf of Alaska, kept winter at bay. Whitehorse recorded above freezing temperatures five days in a row and Old Crow warmed to -8°C.

Temperatures quickly began to fall when a high pressure ridge entered the northern and eastern areas giving strong winds and cold temperatures. By Christmas Day the centre of the cold air mass had settled into the central Yukon. A tight pressure gradient was formed and high wind chills were reported throughout most of the region. In the coastal mountain passes, the wind chill dropped temperatures to -50°C at Old Crow and Ross River and to -48°C at several other locations. Advisories were issued every day during the last week in review for the southern Yukon and coastal passes. However, the eastern Yukon's cold temperatures were not accompanied by high winds and no advisories were required. The cold Arctic air dominated the Yukon for the remainder of December.

Significant snowfalls resulted, when the warm Pacific air mass encountered the cold Arctic air. The Pacific coastal passes received heavy snow, measuring up to 60 cm at Fraser, B.C. on the 12th. Several snowfall advisories were given for Muncho-Stone Mountain Parks, Dease Lake and southern Yukon. Blanchard River on the Haines Alaska highway received 64 cm of snow. A cold wave warning was issued on Christmas Eve for the northern Yukon. Wind warnings were also issued for Kluane Lake due to the strong air flow.

Northwest Territories

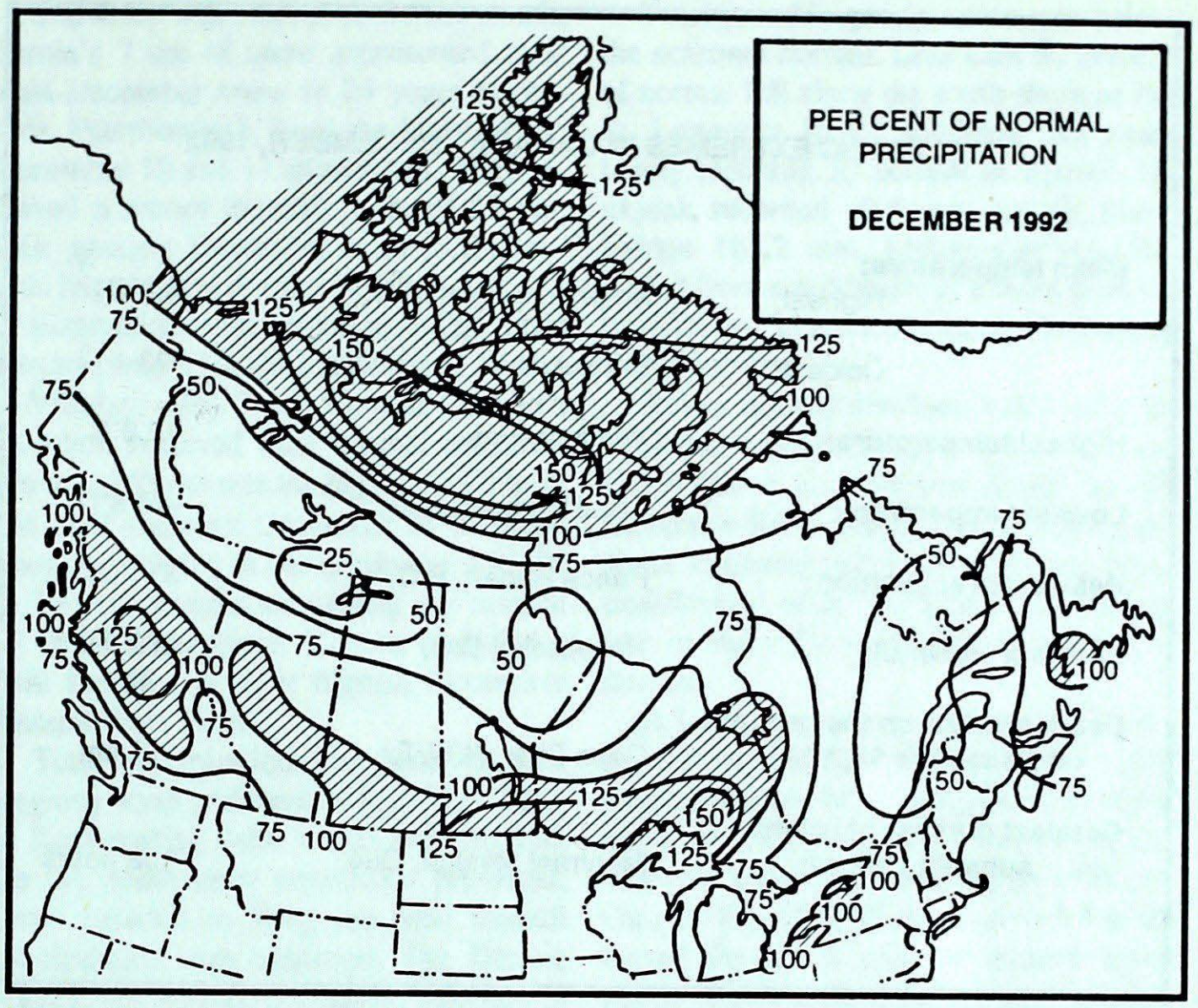
In the Mackenzie District, the first half of the month was mild. The winter ice roads and bridges had barely begun. The Fort Providence ferry was closed due to an ice jam on December 10. Normally not an issue after November, ice conditions made travel unsafe and the Forces had to cancel their cold weather training.

About the middle of the month, cold temperatures invaded the region. In Fort Providence, the ice bridge opening, for light vehicle traffic, was advanced to December 22. However, commercial mines waited for thicker ice, for their heavier vehicles.

Warm air returned late in the month. Storms were common throughout the southwestern Arctic Islands, affecting Mould Bay, Resolute Bay, and Grise Fiord. Cambridge Bay airport closed for a couple of days and most sites to the west were closed to aviation for short periods.

Sanikiluit bore the brunt of storms tracking south through the Keewatin. While this was the warmest reporting station in the Territories, the high winds made it less inviting. The Keewatin received snow and wind from numerous systems, with drifting or blowing snow at most locations for more than half of the month.

The dark season descended on the Arctic islands where the sun did not rise during the month. Further south, cloudy skies allowed only six minutes of sunshine at Coral Harbour. The December normal is 23.2 hours.

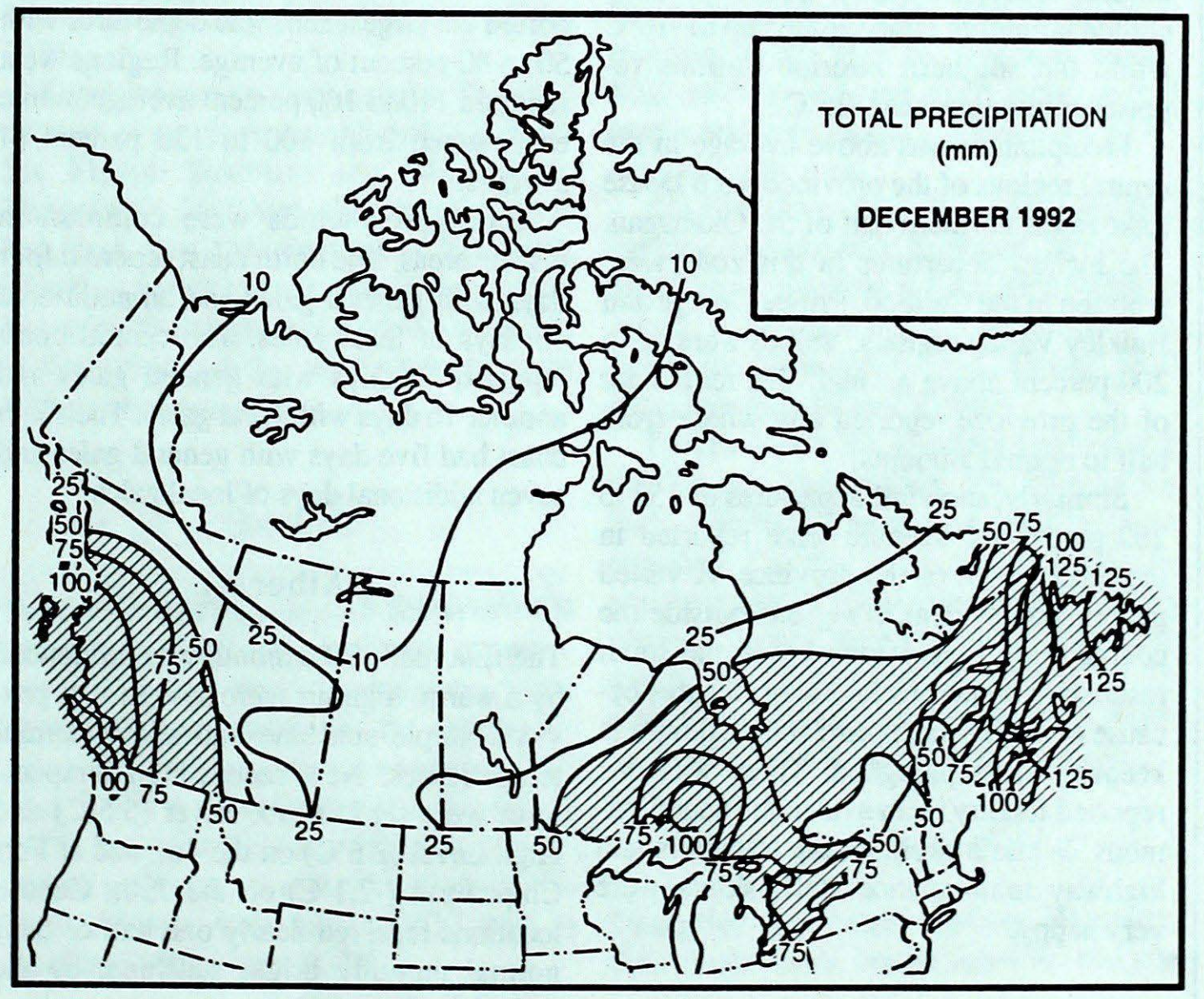


British Columbia

British Columbians who thought that the mild winter of 1991/1992 was a herald of future winters had there mind's changed in December. All parts of the province felt winter's hand to some degree.

Temperatures were below average throughout the province. The highest departures were from Dease Lake southeastward to the Okanagan and along the eastern fringe of the province. Here temperature were up to 4°C below average. The west Kootenays, Columbia and north Thompson sections had departures up to 2.5°C below average.

One temperature record was broken; Fort St. John reported a new December minimum temperature of -44.6°C, on December 29th. The coldest temperature reported at Fort St. John since January 1954. In the northern regions, extreme minimums of -40°C or colder were recorded. This made outdoor activities difficult and dangerous to the unwary or unprepared. The



CLIMATIC EXTREMES IN CANADA - DECEMBER, 1992

Mean temperature:		
Highest	Amphitrite Point, B.C.	4.9°C
Coldest	Eureka, N.W.T.	-33.4°C
Highest temperature:	Windsor, Ont.	12.8°C
Lowest temperature:	Coral Harbour, N.W.T.	-46.8°C
Heaviest precipitation:	Prince Rupert, B.C.	311.0 mm
Heaviest snowfall:	Revelstoke, B.C.	162.0 cm
Deepest snow on the ground on Decembre 31, 1992	Cape Dyer, N.W.T.	108 cm
Greatest number of bright sunshine hours:	Montreal Mirabel, Que.	102 hours

coastal areas, normally quite mild, recorded minimum temperatures up to -10°C while the southern interior stations reported minimums near -25°C.

Precipitation was above average in the central regions of the province from Dease Lake to the northern half of the Okanagan. The highest departures in this zone were reported in the Cariboo, Prince George and Bulkley Valley regions. Values were up to 200 percent above normal. The remainder of the province reported any where from half to normal amounts.

Similarly, snowfall departures of 150 to 200 percent of average were reported in the central core of the province. A varied pattern was evident in regions outside the central core. Heavy snowfall in the south resulted in numerous highway closures because of avalanche hazard and difficulty in keeping roads ploughed. There was one reported fatality in an avalanche near Sicamous. While a problem for travellers and highway maintenance staff, skiers were very happy.

The central core of the province reported the largest sunshine departures with 50 to 80 percent of average. Regions west reported 110 to 160 percent average, while east ranged from 100 to 130 percent of average.

Gale force winds were common in marine areas. The north coast reported four days with general gales and an additional 15 days of local gales. The central coast reported 10 days with general gales and another 16 days with local gales. The south coast had five days with general gales and seven additional days of local gales.

Alberta.

The first half of the month was influenced by a warm, high pressure system that provided ample sunshine and above-normal temperatures. New record-high temperatures were set at Peace River (5.5°C) and High Level (2.6°C) on the 4th, and at Fort Chipewyan (-2.1°C) on the 13th. Central locations received nearly one half of their normal monthly bright sunshine, by the end of the first week.

Precipitation was below normal. Edmonton received the only significant snow. On December 10, a vigorous low pressure system crossed central Alberta, dumping 8 to 15 centimetres of snow from Edmonton eastward.

Chinook conditions developed on the December 13 and 14, as a low pressure area tracked east through the Northwest Territories. Behind this system an Arctic air mass pushed southwards from the Mackenzie Valley to start a cold winter outbreak.

The Arctic front pushed southwards through the Peace River district on the 15th, and then stalled over the central part of the province for several days before continuing south. The Arctic front pushed into southern Alberta on the 16th, and a strong high pressure area developed in the north. Temperatures plummeted to the mid-minus thirties for the first time this season. Slave Lake set a new record low at -32.4°C on the 18th.

On December 19, a low pressure system over the West coast pushed inland, moderating temperatures slightly. However, Arctic air returned on the 20th and 21st, reenforcing the cold Arctic outbreak.

A Pacific weather system brought 10 to 16 centimetres of snow to the Peace district on the 23rd. Winds and the fresh snow combined to produce near blizzard conditions for Christmas travellers.

The month ended with an Arctic high pressure area covering western Canada, sending temperatures down to record low values on the last four days of the year. Grande Prairie recorded one of the lowest readings at -46.5C on the 30th.

Saskatchewan and Manitoba

December was cold with variable amounts of precipitation. Mean temperatures ranged from -14.3°C at Swift Current to -24.0°C at Lynn Lake. Not all areas reported below-normal temperatures. A small portion of east-central Manitoba, benefited from milder air in the east. Temperatures there were about 1°C above normal. In the rest of the region, temperatures were below-normal. Anomalies increased from east to west. In Manitoba, tempera-

tures were up to 3°C below normal, while in Saskatchewan temperatures were up to 6°C degrees below normal.

During the first half of the month, temperatures were slightly above normal throughout the region. The very cold air did not arrive until the latter half of the month, making the Christmas period especially cold. Several Saskatchewan sites reported minimum temperatures of -40°C or colder on several consecutive days during that period. In fact, at Meadow Lake the temperature dipped to -40°C or colder on each of the last five days of the month. Prince Albert endured -40°C minima on four of the last five days of 1992.

Precipitation amounts were variable, ranging from 10 mm or less in the northwest to 30 mm or more in the southeast. The northern half of the region tallied below-normal precipitation amounts, while the south was near to above normal. Much of central Manitoba and northern Saskatchewan reported less than half of the monthly normal. Snowfall was below normal in the north and above normal in the south. Amounts ranged from 10 to 20 centimetres in the north and ranged between 25 and 40 centimetres in the south.

Sunshine amounts were generally near normal or below normal by a few hours. Cree Lake tallied the least with 43.1 hours while, Dauphin tallied the most with 94.7 hours.

Ontario

Ontario ended 1992 on a mild note with temperatures up to 2C warmer than normal. This broke the nine month string of cooler than normal months. However cloudy skies prevailed, ending the dullest year ever recorded in much of Ontario.

This was the mildest December since 1987, north of a line from Wiarton to Ottawa. South of this line, December 1990 was milder. Only in the extreme northwestern towns of Red Lake and Kenora, removed from the moderating Great Lakes and the southwesterly flow of mild Gulf of Mexico air, did cool conditions exist, a half degree below the long term average.

Snowfall was variable. In the south, Sarnia's 7 cm of snow represented their least December snow in 24 years of records. Peterborough, bore the brunt of the December 10 and 11 snowstorm. They received a record monthly total of 82 cm, their greatest December snow since records began at the Airport in 1969.

Elsewhere in the south, snowfall totals ranged from 30 to 60 centimetres, except in Windsor with 7 cm. Central Ontario's snowbelt received near normal amounts. Wawa's 135 cm was the highest in Ontario and their snowiest December in 16 years. Snow was heavy in the northwest with 50 to 75 centimetres surpassing the normal 30 to 40 centimetres. Kenora recorded a total for 56 cm, their highest December amount since 1948.

Total precipitation was less variable. Regions north and west of Sault Ste Marie to Kapuskasing were wetter than normal. To the south drier conditions prevailed. From London to Kingston near normal precipitation was recorded. The Ottawa Valley, southwestern Ontario, Manitoulin Island and the Muskoka-Lake Nipissing areas were drier than normal. North Bay's 43 mm made it their driest December since 1976.

Sunshine was in short supply. The least amount of sunshine was recorded at Sault Ste Marie, Sudbury and Moosonee. Moosonee's 25 hours was the provincial low, less than half their usual 59 hours. This now stands as their cloudiest month in 61 years. The bright spots were Sarnia and St Catharines where sunshine hours were slightly above normal.

Quebec

December was cloudy with below-normal precipitation and above-normal temperatures. Monthly mean temperatures were above average, except in the eastern regions. Temperature anomalies ranged from plus 3.3°C in Trois-Rivières to minus 4.0°C in Blanc Sablon. Temperature extremes were recorded at the Magdalen Islands Airport with minus 2.8°C and in Kuujjuaq with minus 21.8°C.

Total monthly precipitation was below the seasonal normal. Less than 50 percent of normal fell along the south shore of the St. Lawrence River. Montreal had totals barely reaching 30 percent of normal. Inukjuak recorded 13.4 mm and in Blanc Sablon 103.2 mm. Measurable snowfall varied from a minimum of 8.0 cm at Montreal/Dorval to a maximum of 103.0 cm at Blanc Sablon.

Below normal sunshine hours were recorded throughout the province, except for Hull/Ottawa and regions along the St. Lawrence River Valley. Here, bright sunshine extremes were measured in Montreal/Dorval with 109 percent of normal and in Val d'Or with only 45 percent of normal.

A low pressure system from the Atlantic east coast on December 10 and 11, produced a narrow band of moderate to heavy snow activity in the Hull/Ottawa region. The new snow fall measured up to 25 cm. On the 18th, 10 to 15 cm of snow fell in the Gaspé Peninsula and the eastern lower North Shore. On the 20th, 10 cm of snow fell in eastern Québec. Totals near 40 cm were measured in the Parc des Laurentides. From the evening of the 23rd to the early morning of the 24th, snowsqualls, associated with an intense cold front, swept across southern Québec. Visibility was reduced to near zero.

On Christmas Day, late afternoon and evening snowsqualls produced by an approaching cold front hit southern Quebec. Again, visibility was reduced to near zero due to the snow flurries and blowing wind gusts between 40 and 90 km/h.

Freezing rain hit southern Québec and the Ottawa Valley from the 29th to the 30th. Fenders-benders and pile-ups were reported. On the 31st, freezing rain in southern Quebec and snow in the eastern regions. Traffic problems were numerous due to the freezing precipitations. In the east, snowfall amounts varied from 10 cm in Mont-Joli to 34 cm at Gaspé Airport.

Maritimes

December was cloudy and dry. Precipitation totals were below normal, ranging

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from six to 34 percent at Moncton, N.B. and Charlottetown, P.E.I., respectively.

Snowfall amounts varied either side of normal with the greatest in Prince Edward Island and southeastern New Brunswick and the least in southwestern Nova Scotia and Sable Island.

Mean temperatures were generally above normal in New Brunswick and Prince Edward Island, while in Nova Scotia they were slightly above normal and only 0.4°C below normal at Yarmouth.

Sunshine totals were below normal in all areas. Moncton, N.B. recorded 61 hours, the lowest December sunshine hours since 1964.

Two major storms set December off to a wintry start. The first occurred on the 3rd with strong winds, rain and snow. Moncton, N.B. got 38 cm of snow, just over half their December normal. Numerous cancellations and accidents were reported.

The second storm arrived on the 5th. Once the storm moved out, up to 25 cm of snow was reported. Hardest hit was Sydney with 26.1 cm. St. Paul Island, N.S. reported wind gusts up to 117 km/h and Grand Etang 106 km/h. The snow storm knocked out power, closed highways and cancelled ferry services.

Power outages in the Cape Breton Highlands left over 1 800 homes between Ingonish and Cape North without electricity. In the Pictou and Antigonish areas of Nova Scotia hundreds of homes were also without power for several hours. Power outages were reported in parts of Prince Edward Island as well. Ferry traffic between Nova Scotia and Prince Edward Island was cancelled.

Strong wind gusts, snow and rapidly falling temperatures on Christmas Eve made conditions unpleasant for those travelling home for the holidays. Snowfalls were generally light, but visibility was reduced in blowing snow. The temperature at Fredericton, N.B. dropped from 1°C at noon to -16°C by 8 p.m.

Sunny skies and cold temperatures were reported Christmas morning, then a disturbance brought cloud and snow later in the day.

Newfoundland

Near normal precipitation and below-normal temperatures were reported across Newfoundland during December 1992 as a changeable weather pattern prevailed. Sunshine hours were close to normal. Early in the month temperatures were near normal, with a mild spell during mid-month resulting in maximums near 10°C. However, late in the month minimums dipped to near -25°C inland, about 10°C below normal.

Overall mean temperatures were up to 2°C below normal. During the first half of the month periods of snow or rain were common across the region, with the heaviest precipitation in western locations. The exception was the major storm on Christmas Day. Up to 20 cm of snow, whipped by winds in excess of 100 km/h, buffeted the region.

Blizzard conditions were reported from many locations, disrupting holiday travel plans. Monthly snowfall totals were near 65 cm in eastern regions and near 90 cm in western locations. St Anthony was an exception where 145 cm were recorded, about twice the normal. Several major wind storms were reported during the month. On December 6 wind gusts in excess of 100 km/h were common, with Sagona reporting gusts up to 127 km/h.

In Labrador, below-normal temperature and snowfall highlighted the month's weather. Sunshine hours were close to normal across the area. Early in the month several storms gave snow to most areas, especially at eastern locations. However, cold Arctic air dominated the latter half of the month, with cold wave warnings on several occasions. Overall mean temperatures were up to 3°C below normal over eastern locations and near normal in the west. In the west snowfall amounts were up to 45 cm, about half of normal, while to the east, Mary's Harbour reported 75 cm, a little above normal. Sunshine hours were near 75 hours, close to normal.