


## CLIMATIC PERSPECTIVES VOLUME 16

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The purpose of the publication is to make topical information available to the public concerning the Canadian climate and its so-cio-economic impact.
The data in this publication are based on unverified reports from approximately 225 Canadian synoptic weather stations. Information concerning climatic impacts is gathered from AES contacts with the public and from the media. Articles do not necessarily reflect the views of Atmospheric Environment Service.

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## Across the country

## Yukon

Generally, the Yukon was dry, with temperatures below normal in the north and 2 to 4 degrees above normal in southern and central areas. Exceptions in the south were Carcross, which was 0.1 degree below normal and Swift River at 0.6 degree above normal. Burwash and Ross River were 4.1 degrees above normal. Whitehorse had a monthly mean of $3.8^{\circ} \mathrm{C}$ which broke the record of $3.5^{\circ} \mathrm{C}$, set last year. In the north, Old Crow was more than 2 degrees above normal, while all stations along the Dempster Highway corridor were below normal. Eagle Plains was 6.4 degrees below normal which was the greatest negative anomaly in the Yukon while Ogilvie was close at 5.4 degrees below normal. The highest temperature was $18.0^{\circ} \mathrm{C}$ which was recorded at Dawson on April 23 and 26. The coldest temperature, $-36.0^{\circ} \mathrm{C}$, was recorded at Ogilvie, on the 14th.

Precipitation throughout the Yukon, with the exception of Dawson, Mayo and Old Crow, was below normal. The driest spot was Klondike which recorded only a trace of precipitation. Swift River received the most precipitation with 15.0 mm but this was only $64 \%$ of normal. Old Crow recorded 11.0 mm which was $126 \%$ of normal. Whitehorse recorded only 3.0 cm of snow (normal, 9.8 cm ) and 3.0 mm of rain (normal, 1.0 mm ). The lack of precipitation caused concern of forest fires as several man-made fires were reported. Spring break-up on the rivers started in April. There was some flooding near Dawson caused by an ice-jam on the Klondike River.

## Northwest Territories

After a cold, record-breaking winter, daytime highs in the Mackenzie Valley were a few degrees above normal for most of the month. On the 12 th, an intense disturbance moving along 60 Degrees North gave 25 cm of snow, locally, to Hay River which was more than double the normal monthly snowfall. Most winter roads in the Sahtu (west of Great Bear Lake) were closed early in the month and by month's end all ice crossings were officially closed to traffic. The rivers at Fort Liard and Hay River


CLIMATIC EXTREMES IN CANADA - APRIL, 1994

Mean temperature:

| Highest | Hope, B.C. | $11.5^{\circ} \mathrm{C}$ |
| :--- | :--- | ---: |
| Coldest | Eureka, N.W.T. | $-27.3^{\circ} \mathrm{C}$ |
| Highest temperature: | Windsor, Ont. | $28.8^{\circ} \mathrm{C}$ |
| Lowest temperature: | Eureka, N.W.T. | $-38.8^{\circ} \mathrm{C}$ |
| Heaviest precipitation: Port-aux-Basques, Nfld. | 230.2 mm |  |
| Heaviest snowfall: | St. Anthony, Nfld. | 89.1 cm |
| Deepest snow on the ground <br> on April 30, 1994: | La Grande Rivière, Que. | 60 cm |
| Greatest number of bright <br> sunshine hours: | Coppermine, N.W.T. | 313 hours |

broke up late in the month with minimal flooding. About 100 people were evacuated for three nights from their homes in Hay River as river levels rose to 7 metres above normal. By April 30, maximum temperatures were regularly in the low 20's in Fort Liard and near $5^{\circ} \mathrm{C}$ in Inuvik.

Winter maintained its grip on the Keewatin for much of the month. Blizzard or near-blizzard conditions were common for Baker Lake, Coral Harbour and Rankin Inlet and less frequent for sites along the Arctic coast. Improvement was evident by the end of April, as the wind was replaced with fog and low cloud resulting from open water in Hudson Bay. These poor to marginal flying conditions persisted in spite of a ridge of high pressure which dominated the region for much of the month. Temperatures climbed into the -10 to $-5^{\circ} \mathrm{C}$ range in most areas by month's end.

The Arctic islands continued to register minimums in the -30 to $-20^{\circ} \mathrm{C}$ range throughout the month, although slight warming was evident during the last week of April as temperatures in Resolute Bay climbed to $-14^{\circ} \mathrm{C}$. A late-winter blizzard occurring on Baffin Island, at the middle of the month, took the lives of two Cape Dorset residents when they were caught out on the land. By month's end, daytime highs were near $0^{\circ} \mathrm{C}$ in Iqaluit. The rapid
lengthening of daylight hours was a contributing factor to warming temperatures throughout the Territories.

## British Columbia

The month started with a series of disturbances dominating southern areas with generally wet conditions. A heavy snowfall, east of Golden on the 5th, closed the Trans-Canada Highway. Kamloops received 6 cm of snow on the 6 th. Weather conditions improved throughout April but the month ended with mixed conditions. A fairly persistent southerly flow led to the whole province recording well-above average temperatures with some new records being established. Precipitation and sunshine values were somewhat mixed.

Temperatures were 1.5 to 2.5 degrees above average throughout the province. Ice break-up and agriculture were a little ahead of normal due to the warm weather. By the end of the month, most interior fruit trees were either in blossom or had finished blossoming. Many stations established or tied monthly mean temperatures: these included Penticton $\left(11.0^{\circ} \mathrm{C}\right.$, old $\left.10.9^{\circ} \mathrm{C}\right)$, Port Hardy $\left(8.6^{\circ} \mathrm{C}\right.$, old $\left.8.2^{\circ} \mathrm{C}\right)$, and Vancouver $\left(10.9^{\circ} \mathrm{C}\right.$, old $\left.10.7^{\circ} \mathrm{C}\right)$.

The southerly flow that brought mild temperatures also brought a fair bit of
moisture to many areas but the pattern was somewhat mixed. In the far north, values ranged from $3 \%$ of average at Fort Nelson in the east, to $50 \%$ at Dease Lake, in the west. Further south, values reached near average very quickly and rose to 150 to $200 \%$ of average from Terrace, east to Fort St. John. Coastal sections of this central region reported near to slightly-below average precipitation. In the southern half of the province, coastal sections reported 75 to $105 \%$ rising to over $200 \%$ in the Kamloops-Okanagan area. No new records were established.

Although warm and for many areas, drier than average, it was not a particularly sunny month. Northern Vancouver Island and the central coast reported only 70 to $80 \%$ of average sunshine and most of the remainder of the province reported 80 to $100 \%$.

## Alberta

The month began with an arctic front slumped into northern regions which brought clouds and cool temperatures. On the 3rd, the arctic front moved southwards and combined with a disturbance in southern B.C. to produce 10 cm of snow in the southern foothills. A low pressure area crossed the Rockies on the 5th and deposited up to 20 cm of snow to the southern mountain parks and up to 5 cm to the Calgary and Lethbridge regions. On the 10th, a southwest flow pushed temperatures to $20^{\circ} \mathrm{C}$ across all but the extreme north. Cold air covered the south from April 12 to 14 , producing up to 3 cm of snow. A strong, westerly flow aloft on the 15 th pushed temperatures to $20^{\circ} \mathrm{C}$, with wind gusts to $100 \mathrm{~km} / \mathrm{h}$ in the foothills; however, the north continued with temperatures less than $10^{\circ} \mathrm{C}$. Northern regions received 20 mm of rain on the 22 nd . An arctic front brought a record-minimum temperature of $-14.9^{\circ} \mathrm{C}$ to Fort Chipewyan on the 24th. This cold air collided with a Pacific system in Idaho resulting in 25 cm of snow in Waterton Park and 5 to 10 cm in the Lethbridge area. The last two days of the month were sunny with temperatures near $20^{\circ} \mathrm{C}$ in all areas except the mountain parks.

## Saskatchewan and Manitoba

Precipitation was quite minimal across both provinces. Total precipitation for the
month was less than $50 \%$ of normal in many areas. There were a few isolated pockets of above-normal precipitation in the Interlake Region of Manitoba and in the Cypress Hills of extreme southwestern Saskatchewan. Thompson, Manitoba, recorded the driest April on record, with only a trace of rain and 1.6 cm of snow. Oxbow, Saskatchewan, also set a new record with only 0.4 mm of precipitation.

Not only was it a dry month, but it was also cool. The first few days of April were above normal but a persistent cool northerly flow developed, giving normal to be-low-normal temperatures for the month. Northern Manitoba was 2 to 4 degrees below normal. The monthly mean temperature in Churchill was $-14.5^{\circ} \mathrm{C}$ which is nearly 5 degrees below normal and on April 30, the maximum of $3.5^{\circ} \mathrm{C}$ was the only day above freezing. The warmest temperature in Manitoba was Steinbach at $29.0^{\circ} \mathrm{C}$, on the 23 rd . In Saskatchewan, the warmest temperature was $28.0^{\circ} \mathrm{C}$, on the 17th.

## Ontario

Mean temperatures in northern and central Ontario ranged from one-half to one and one-half degrees below the long-term average, giving the north their third cool April in succession. However, south of a line from the Bruce Peninsula to Ottawa, mean temperatures were up to one-half degree milder than normal for the "warmest" April in the south since 1991. Unfortunately, brisk winds and frequent rain/snow showers interfered with the enjoyment of most outdoor activities.

Snowfall continued into the final week of the month. Thunder Bay measured 54 cm of snow for the month (the most snowfall in Ontario), which was their snowiest April since 1950. Geraldton, measuring 51.2 cm , set a new record for April snowfall. In the south, St. Catharines' 26 cm (normal, 3 cm )) was the most since 1979 , while Hamilton's 21 cm was the greatest since 1982. In contrast, Muskoka received only 6 cm - less than half of normal, while Sudbury received 7 cm (normal, 18 cm ).

Southern Ontario received 120 to $140 \%$ of normal precipitation. A corridor running from Thunder Bay to Timmins was also wet, with totals close to double the normal:

Timmins recorded 99 mm compared to the usual 50 mm making it the wettest April since 1981. Ontario's dry regions included the extreme northwest and another corridor in central Ontario from Muskoka to Earlton, where precipitation totals were 50 to $75 \%$ of normal. Red Lake was the driest site in the province with 19.2 mm (normal, 35 mm ). The northwest was drier than normal for the period of December 1993 through April 1994: Kenora recorded a total of only 78 mm of precipitation which represented only $65 \%$ of normal. The below-normal precipitation may render the forests of the northwest more vulnerable to fire than usual.

Sunshine totals were above normal in the southwest, Niagara and the extreme northwest. For example, St. Catharines' 201 hours was 19 hours greater than normal. The remainder of Ontario was cloudier than normal, by 10 to 40 hours.

## Quebec

Most of the province experienced belownormal temperatures except near-normal temperatures occurred along the Ottawa Valley, Montréal region and in the Eastern Townships. On April 2, Sept-Îles registered a record minimum of $-26.4^{\circ} \mathrm{C}$, lowering the old record of $-21.1^{\circ} \mathrm{C}$, set in 1946.

On April 6-7, a wide band of snow along the St. Lawrence deposited 20.2 cm in Montréal and 43.3 cm in Blanc Sablon, at the easternmost point of Quebec. Snowfall totals for the month were above normal along the St. Lawrence and Saguenay Rivers. Montréal recorded $249 \%$ of normal, Québec, $225 \%$ and Chicoutimi, $181 \%$. Blanc Sablon recorded $162 \%$ of normal.

Flooding occurred at the middle of the month due to above-normal temperatures, melting snow and ice-jams. The affected areas were the Sherbrooke area and various communities along the Richelieu River, south of Montréal, after receiving 25 mm of rain from the 13 th to the 17 th, combined with temperatures to $20^{\circ} \mathrm{C}$. Communities in the Gaspé also experienced flooding.

Severe weather occurred on the 27th along the Ottawa Valley and in the Montréal region, where winds gusted to 96 $\mathrm{km} / \mathrm{h}$ : rooves were damaged, trees uprooted and there were numerous power outages. A confirmed tornado severely
damaged an ice arena in St-Janvier, about 10 km southeast of Montréal's Mirabel Int'l Airport.

## Maritimes

April was sunny and mild. Mean temperatures for the month were generally wellabove normal in Nova Scotia and Prince Edward Island. Kentville, Nova Scotia, reported a mean temperature of $7.2^{\circ} \mathrm{C}$, which was the mildest April since records began in 1913; the previous record was $6.9^{\circ} \mathrm{C}$, set in 1953. Mean temperatures in New Brunswick were a bit cooler, ranging from 0.3 degrees above normal at Charlo, to 1.3 degrees above at Moncton. A mild spell during the middle of the month caused temperatures to climb to wellabove normal values. On the 16th, several locations set new record-high maximums for the date: Truro, Nova Scotia, with records dating back to 1873, reported $21.8^{\circ} \mathrm{C}$; Charlottetown Airport, P.E.I., at $22.5^{\circ} \mathrm{C}$, was within 0.5 degree of tying its high maximum for April. Charlottetown recorded a monthly mean of $4.4^{\circ} \mathrm{C}$ which was the second-warmest April on record; the warmest was $6.5^{\circ} \mathrm{C}$, set in 1951 .

Precipitation totals were generally above normal, although below-normal values were reported in some areas. Totals ranged from $71 \%$ of normal at Sydney, Nova Scotia, to $168 \%$ of normal at Saint John, New Brunswick. One of the most notable features was the lack of snowfall: Moncton, New Brunswick, received only 6.8 cm , compared to a normal of 35.9 cm . Charlottetown recorded only 3 cm of snow, where 30 cm would be normal. The exception occurred at Charlo, New Brunswick, where a total of 56.1 cm fell, which was 20.8 cm above normal for April.

Mild temperatures and rain near the middle of the month resulted in a number of ice-jams that caused some severe flooding on several rivers in New Brunswick. The flooding washed out bridges and power lines, forced the evacuation of a number of homes, flooded roads and highways and was blamed for two deaths.

Most locations reported well-above normal hours of sunshine. Both CFB Shearwater and Sable Island, Nova Scotia, recorded their sunniest April since records


## SEASONAL TOTAL OF HEATING DEGREE-DAYS TO END OF APRIL

|  | 1994 | 1993 | NORMAL |
| :---: | :---: | :---: | :---: |
| BRITISH COLUMBIA |  |  |  |
| Kamloops | 3120 | 3842 | 3540 |
| Penticton | 3014 | 3469 | 3267 |
| Port Hardy | 2870 | 3083 | 3222 |
| Vancouver | 2479 | 2713 | 2732 |
| Victoria | 2528 | 2766 | 2789 |
| YUKON TERRITORY |  |  |  |
| Whitehorse | 5838 | 6211 | 6441 |
| NORTHWEST |  |  |  |
| TERRITORIES |  |  |  |
| Iqaluit | 9198 | 9714 | 8821 |
| Inuvik | 8645 | 8517 | 9274 |
| Yellowknife | 7965 | 7241 | 7930 |
| ALBERTA |  |  |  |
| Calgary | 4659 | 4929 | 4920 |
| Edmonton Mun. | 4888 | 4970 | 5117 |
| Grande Prairie | 5370 | 5631 | 5728 |
| SASKATCHEWAN |  |  |  |
| Estevan | 5585 | 5354 | 5146 |
| Regina | 5556 | 5429 | 5494 |
| Saskatoon | 5819 | 5642 | 5682 |
| MANITOBA |  |  |  |
| Brandon | 5998 | 5819 | 5732 |
| Churchill | 8814 | 8176 | 8203 |
| Dauphin | 5886 | 5523 | 5738 |
| Winnipeg | 5721 | 5596 | 5555 |
| ONTARIO |  |  |  |
| Kapuskasing | 6299 | 5996 | 5930 |
| London | 4065 | 3930 | 3834 |
| Ottawa | 4723 | 4523 | 4411 |
| Sudbury | 5481 | 5148 | 5049 |
| Thunder Bay | 5685 | 5363 | 5295 |
| Toronto | 4115 | 3914 | 3843 |
| Windsor | 3609 | 3416 | 3412 |
| Quebec |  |  |  |
| Baie Comeau | 5761 | 5738 | 5471 |
| Montréal | 4609 | 4452 | 4276 |
| Québec | 5163 | 4955 | 4804 |
| Sept-Îles | 6040 | 6035 | 5576 |
| Sherbrooke | 4996 | 4885 | 4850 |
| Val-d'Or | 6234 | 5922 | 5690 |
| NEW BRUNSWICK |  |  |  |
| Fredericton | 4572 | 4584 | 4370 |
| Moncton | 4591 | 4643 | 4335 |
| NOVA SCOTA |  |  |  |
| Sydney | 3996 | 4319 | 3996 |
| Yarmouth | 3693 | 3903 | 3637 |
| PRINCE EDWARD |  |  |  |
| ISLAND |  |  |  |
| Charlottetown | 4455 | 4526 | 4218 |
| NEWFOUNDLAND |  |  |  |
| Gander | 4881 | 5014 | 4475 |
| St. John's | 4450 | 4525 | 4188 |

SEASONAL SNOWFALL TOTALS (cm) TO END OF APRIL

|  | 1994 | 1993 | NORMAL |
| :---: | :---: | :---: | :---: |
| BRITISH COLUMBIA |  |  |  |
| : Kamloops | 43 | 91 | 91 |
| Port Hardy | 37 | 37 | 72 |
| Prince George | 240 | 234 | 236 |
| Vancouver | 14 | 68 | 60 |
| Victoria | 23 | 46 | 50 |
| YUKON TERRITORY |  |  |  |
| Whitehorse | 169 | 184 | 133 |
| NORTHWEST |  |  |  |
| TERRITORIES |  |  |  |
| Iqaluit | 160 | 155 | 222 |
| Inuvik | 167 | 193 | 162 |
| Yellowknife | 148 | 128 | 132 |
| ALBERTA |  |  |  |
| Calgary | 85 | 138 | 142 |
| Edmonton Mun. | 139 | 118 | 129 |
| Grande Prairie | 205 | 117 | 176 |
| SASKATCHEWAN |  |  |  |
| Estevan | 167 | 100 | 114 |
| Regina | 107 | 104 | 119 |
| Saskatoon | * | 76 | 111 |
| MANITOBA |  |  |  |
| Brandon | 74 | 77 | 115 |
| Churchill | * | 129 | 173 |
| The Pas | 140 | 129 | 164 |
| Winnipeg | 82 | 112 | 123 |
| ONTARIO |  |  |  |
| Kapuskasing | 253 | 280 | 310 |
| London | 117 | 216 | 209 |
| Ottawa | 284 | 544 | 226 |
| Sudbury | 224 | 208 | 245 |
| Thunder Bay | 198 | 179 | 209 |
| Toronto | 116 | 138 | 131 |
| Windsor | 140 | 134 | 117 |
| QUEBEC |  |  |  |
| Baie Comeau | 348 | 290 | 368 |
| Montréal | 281 | 238 | 223 |
| Québec | 448 | 231 | 343 |
| Sept-Îles | 422 | 319 | 421 |
| Sherbrooke | 427 | 238 | 291 |
| Val-d'Or | 288 | 203 | 307 |
| NEW BRUNSWICK |  |  |  |
| Fredericton | 245 | 237 | 289 |
| Moncton | 321 | 371 | 339 |
| NOVA SCOTIA 321 |  |  |  |
| Sydney | 317 | 392 | 313 |
| Yarmouth | 288 | 256 | 207 |
| PRINCE EDWARD |  |  |  |
| ISLAND |  |  |  |
| Charlottetown | 339 | 400 | 329 |
| NEWFOUNDLAND |  |  |  |
| Gander | 517 | 440 | 389 |
| St. John's | 320 | 275 | 347 |



## 50-kPa ATMOSPHERIC CIRCULATION

April 1994


Mean geopotential heights
5 decametre interval -


Normal geopotential heights for the month - 5 decametre interval -


Mean geopotential height anomaly - 5 decametre interval -


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

## Drought

## What is drought?

Drought is different from other meteorological disasters because it is the absence of, rather then the presence of, something. It becomes even more difficult to define because it is dependent on the normal climate of the area, i.e. two years of very little rain in the Gobi Desert would not be considered a drought. One of the simplest yet meaningful definitions is: a prolonged and abnormal moisture deficiency (Palmer, 1965). Another simple but effective definition is: a worrisome lack of rain (Maybank).

Drought can strike anywhere in Canada but is most common on the Prairies. Droughts have been experienced in both Ontario and B.C. in the 1980's but it is the drier, semi-arid climate of the southern Prairies which is especially susceptible to drought. The area is on the fringe of having adequate moisture supply for crop production and any variation downwards in the average rainfall or snowfall can quickly affect production.

Drought means different things to different people, depending on their interest. To the farmer, it means crop failure because of soil moisture shortages at critical times. To the hydrologist, it means belownormal levels of lakes and streams over extended periods of time. To the economist, a drought exists when it affects the economy of a large area. To the politician, it means pressure for subsidies to carry the affected groups through hard times.

## Measuring drought

Drought is very difficult to measure because it has both temporal and spatial dimensions. The extent of both of these determine its severity. A drought can be severe because it covers a wide area of the country for one growing season or it can be severe because it affects a smaller area for iseveral years wiping out most of the agricultural community in that area. Several indices have been devised to measure
drought: The Rainfall Anomaly Index (Rooy, 1965); The Bhalme and Mooley Index (Bhalme and Mooley, 1980); and the Palmer Drought Index (Palmer, 1965). Several agencies also run soil moisture and water budget models which are used to assist in determining crop yield.

The Palmer Drought Index (PDI) has gained the most popularity of the indices and is used extensively in the U.S.A. and on the Canadian Prairies to monitor drought. Palmer is popular because the index is normalized with respect to time and location making the comparison of the index much easier.

## Droughts of the past

The most famous droughts are of course the widespread droughts of the 1930's and the 1980's, but if one looks at a single year alone, the year of 1961 is the most severe from the standpoint of crop production because of weather. The overall impact of the 1961 drought was less because it is somewhat isolated from any other drought. This one-year drought caused extremely poor yields in the agricultural areas of Manitoba, southern Saskatchewan and Alberta. Only the northern agricultural areas of Saskatchewan were spared.

The Figure shows the Palmer Drought Index averaged over southern Saskatchewan from 1908 to 1993 (5 to 7 stations were used to derive the mean). If we use a PDI of minus 4 to indicate severe drought, then the years $1919,1931,1937,1980 / 81$, 1984 and 1988 all stand out as severe droughts in southern Saskatchewan. Surprisingly, 1961 only reaches a value of minus 2.2. This is because northern locations such as Saskatoon, North Battleford and Prince Albert did not experience the 1961 drought that devastated the more southern locations of Saskatchewan as well as Manitoba and Alberta.

Looking at PDI values, the drought of 1988 stands out as the most extreme in Saskatchewan reaching a value of minus
5.2 over the southern half of the province. When one looks at this in combination with the drought of $1980 / 81$ and 1984, it is surprising that the 80 's did not have the same disastrous affect on the agricultural community as the drought of the 30 's. One reason of course, is better farming practices against erosion such as shelterbelts and notill. Blowing soil and drifting were certainly problems in the droughts of the 1980's, but not anywhere to the extent that it was in the 1930's when over 100,000 ha of the Canadian Prairies were blowing out of control (Gray, 1978) and two-thirds of the rural population was living on government relief (Britnell, 1939).

The droughts of the 1930's and the 1980's were the two longest stretches of dry or drought conditions; the 30 's drought running from 1929 to 1941 ( 12 years) with only slight breaks in the dry conditions in 1935 and 1939; the 80's drought running from 1977 to 1991 (14 years) with slight breaks from the dry conditions in 1983 and 1986. Drought years within each of the above periods were quite different in some ways. The year 1931, had an extremely mild winter and spring with little snowfall whereas in 1936/37 the winters were colder and snowier than normal but the summers were incredibly hot and dry. Crops literally burnt in the searing summer heat. In the 80 's, late winters and springs were extremely mild with very little run-off from snowmelt. Summers were not overly hot, the exception being June 1988 when all kinds of records previously set in the 30's were broken.

## Droughts in the future

Drought will always be a part of the Prairie scene. Climate models of two times $\mathrm{CO}_{2}$ scenarios have shown an increase of precipitation on the Prairies but a reduction in soil moisture. How is this possible? The Prairies normally run a soil moisture deficit every summer. From the months of May to September, more water is lost through evaporation than falls as precipitation. The Prairies are very dependent on winter
snowfall to replenish water resources lost over the summer. With increases in temperature projected by the two times CO 2 models not only more evaporation will occur during the summer, but the evaporation period will last a much longer time beginning in April and ending in October. An increase in temperature essentially accelerates the hydrological cycle and continental climates become drier and maritime climates, wetter.

This is, of course, an over-simplification of a very complicated process. If the increase in temperatures projected by the models is correct, then the Prairies will become drier because of soil moisture loss. Work by Williams et al. (1984) using future scenarios projected by the models has shown that drought under these scenarios will become more frequent and last much longer.

The droughts of the 1980's are certainly not unprecedented and have occurred before and will occur again. Warming the earth through the greenhouse effect can only make the drought problem worse.

Ken Jones
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agroclimatological stations


PRII 1994

... continued from page 5
began in 1961, with totals of 215.6 hours and 193.3 hours, respectively.

## Newfoundland and Labrador

Above-normal precipitation and sunshine were experienced over most of Newfoundland. Temperatures were slightly-below normal due mainly to the extreme cold which afflicted the Island at the beginning of the month, thereby creating several record-low monthly temperatures. Precipitation along the west and south coasts during the first two weeks broke daily rainfall records. Stephenville reported 68.8 mm on the 7th, breaking the old record by almost 60 mm . Monthly totals in some of
these locations were at least $175 \%$ of normal. Central and eastern loations received close to $75 \%$ of normal precipitation. Sunshine was 30 to 40 hours above normal across the province, despite the rain. Monthly snowfall was in the 10 to 30 cm range, across the province.

The maximum temperature was $15.3^{\circ} \mathrm{C}$ at St. John's and the minimum was $-24.6^{\circ} \mathrm{C}$ at Deer Lake. Prevailing winds were from the southwest at $25 \mathrm{~km} / \mathrm{h}$ which resulted in ice being packed along the west coast but more than 100 km off the east coast. As of the end of the month, the ice break-up was three weeks behind schedule.

In Labrador, frequent sunshine, light precipitation and below-normal tempera-
tures highlighted the month of April Sunny skies were predominant through most of the month, yielding unseasonablylow temperatures at the beginning of the month but unusually-mild temperatures by month's end. Total monthly snowfall was 20 to 30 cm in coastal locations, about 25 cm below normal, and 40 to 70 cm , elsewhere. Temperatures varied, with Goose Bay reporting a maximum of $14.0^{\circ} \mathrm{C}$ and Wabush Lake, a minimum of $-30.8^{\circ} \mathrm{C}$. Temperatures were 2 to 3 degrees below normal. Sunshine averaged about 160 hours, approximately 30 hours above normal.


