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Climatic Perspectives

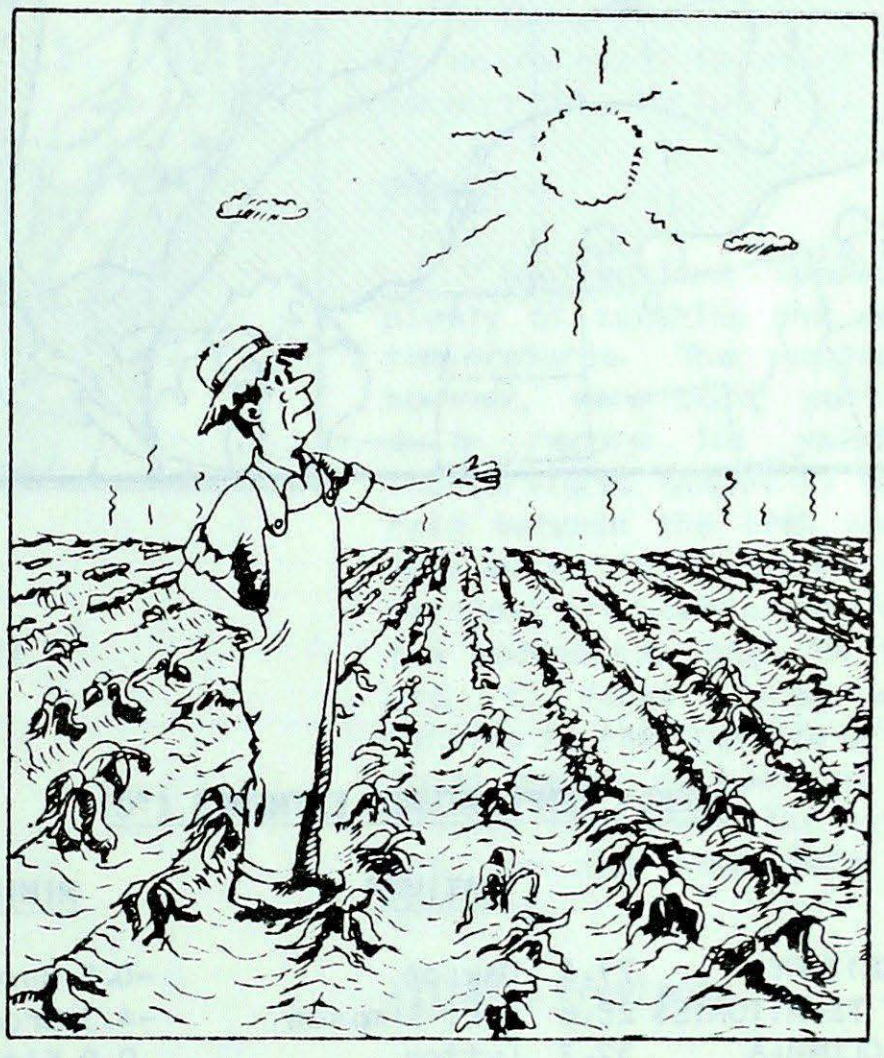
A WEEKLY REVIEW OF CANADIAN CLIMATE

JULY 29,1983 | (Aussi disponible en français) | VOL.5 NO.30

FOR THE PERIOD JULY 19-25, 1983

• Drought in Southern Ontario

The lengthening dry spell has lowered the soil moisture reserves to critical levels in areas south of Sudbury. Southeastern Ontario and the Bruce Peninsula were the driest, receiving only 30 per cent of their normal June and July rainfalls to date. July has been particularly dry around Trenton where only 5.7 mm of rain has fallen, Gore Bay has fared a little better with 9.3 mm.



The dry weather that began during the second week of June has parched most southern Ontario fields. Lack of rain has stunted the growth on the spring-planted crops, and drought stress was evident on sandy soil. New seedlings were having a difficult time surviving. Corn, soybeans, wheat and alfalfa were especially hard hit. The corn stalk height was variable throughout southern Ontario and some fields had uneven growth. In eastern Ontario, crops were wilting in the hot and dry weather. Ironically, the wet muck soil and excellent irrigation provided ideal growth in the important farming area of Holland Marsh near Barrie. If abundant rains do not arrive within the next week or so, major crop losses may occur in southern Ontario.

• More tornadoes in Southern Saskatchewan

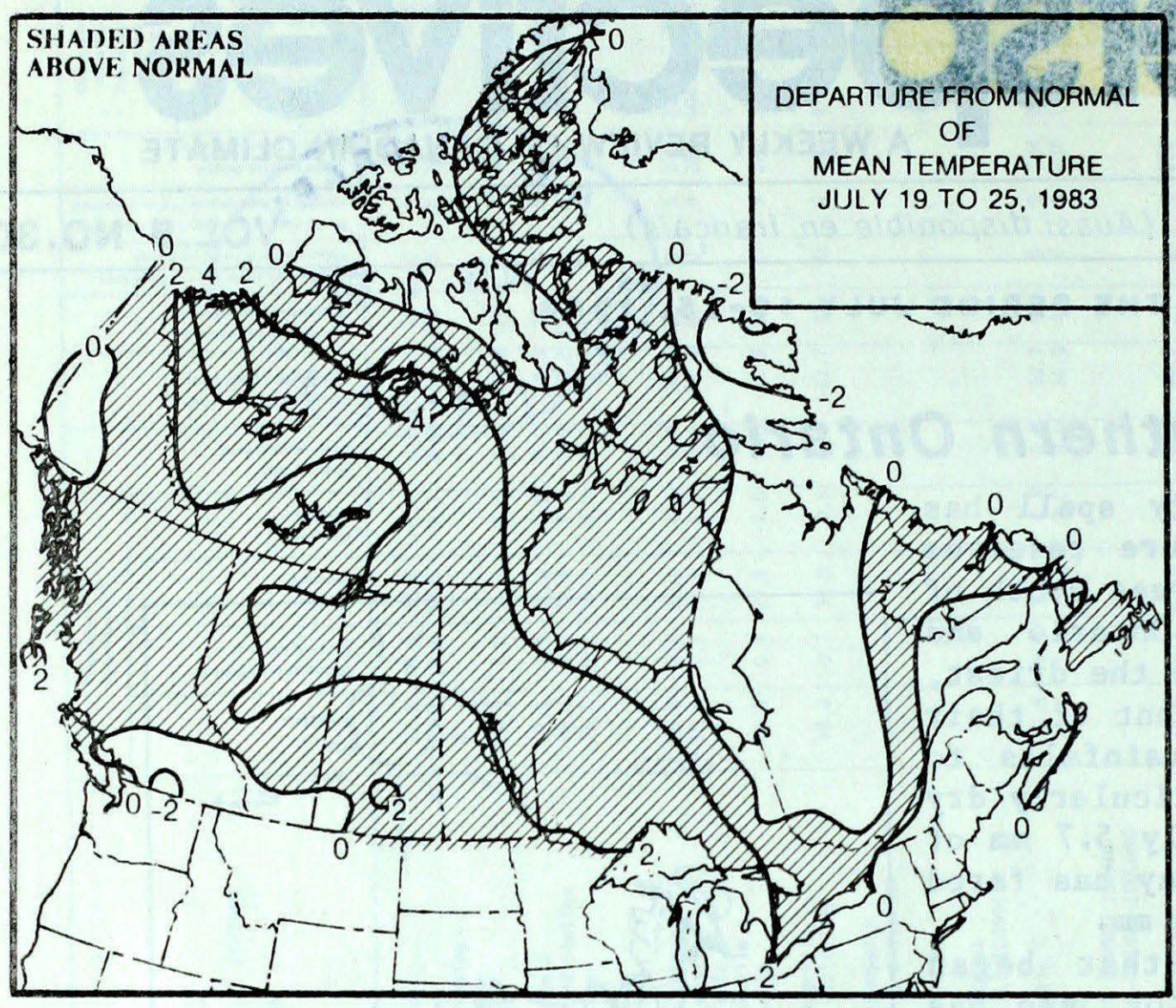
page 5

• Hazards of summer's excessive heat and humidity : Humidex

ISSN 0225-5707
UDC: 551.506.1(71)

NOTE: The data shown in this publication are based on unverified reports from approximately 225 Canadian synoptic stations.

Canada



WEEKLY TEMPERATURES EXTREMES (°C)

		MAXIMUM		MINIMUM	
YUKON TERRITORY	27.4	Dawson	-0.5	Burwash
NORTHWEST TERRITORIES	28.8	Fort Simpson	-4.3	Broughton Island
BRITISH COLUMBIA	32.7	Lytton	0.0	Kindakun Point
ALBERTA	32.5	Medicine Hat	2.1	Banff
SASKATCHEWAN	32.6	Estevan	6.8	E Cypress
MANITOBA	32.3	Portage la Prairie	1.2	Churchill
ONTARIO	32.5	Kenora	0.3	Moosonee
QUÉBEC	28.9	Québec City	2.1	Kuujjarapik La Grande Riviere
NEW BRUNSWICK	29.0	Chatham	8.6	Charlo
NOVA SCOTIA	28.8	Shelburne	9.0	Shelburne
PRINCE EDWARD ISLAND	26.8	Charlottetown Summerside	12.9	Charlottetown
NEWFOUNDLAND	27.9	Goose	2.3	Cartwright

ACROSS THE NATION

Warmest mean temperature	24.4	Windsor, ONT.
Coolest mean temperature	2.0	Cape Hooper, NWT

ACROSS THE COUNTRY...

Yukon and Northwest Territories

Mean temperatures across the north ranged from 4° above normal in the extreme northwest to 4° below normal over Baffin Island. Except for the weekend, rain fell almost every day in the Yukon; Burwash received the most, 37 mm. The weather was generally dry across the Northwest Territories. With an overnight temperature of -0.5° on July 24, Burwash experienced the first frost of the season in the Yukon. The cool and damp weather was continuing to keep the threat of forest fires at low level. In the Yukon, out of the 178 fires reported to date this year, 24 were still burning.

British Columbia

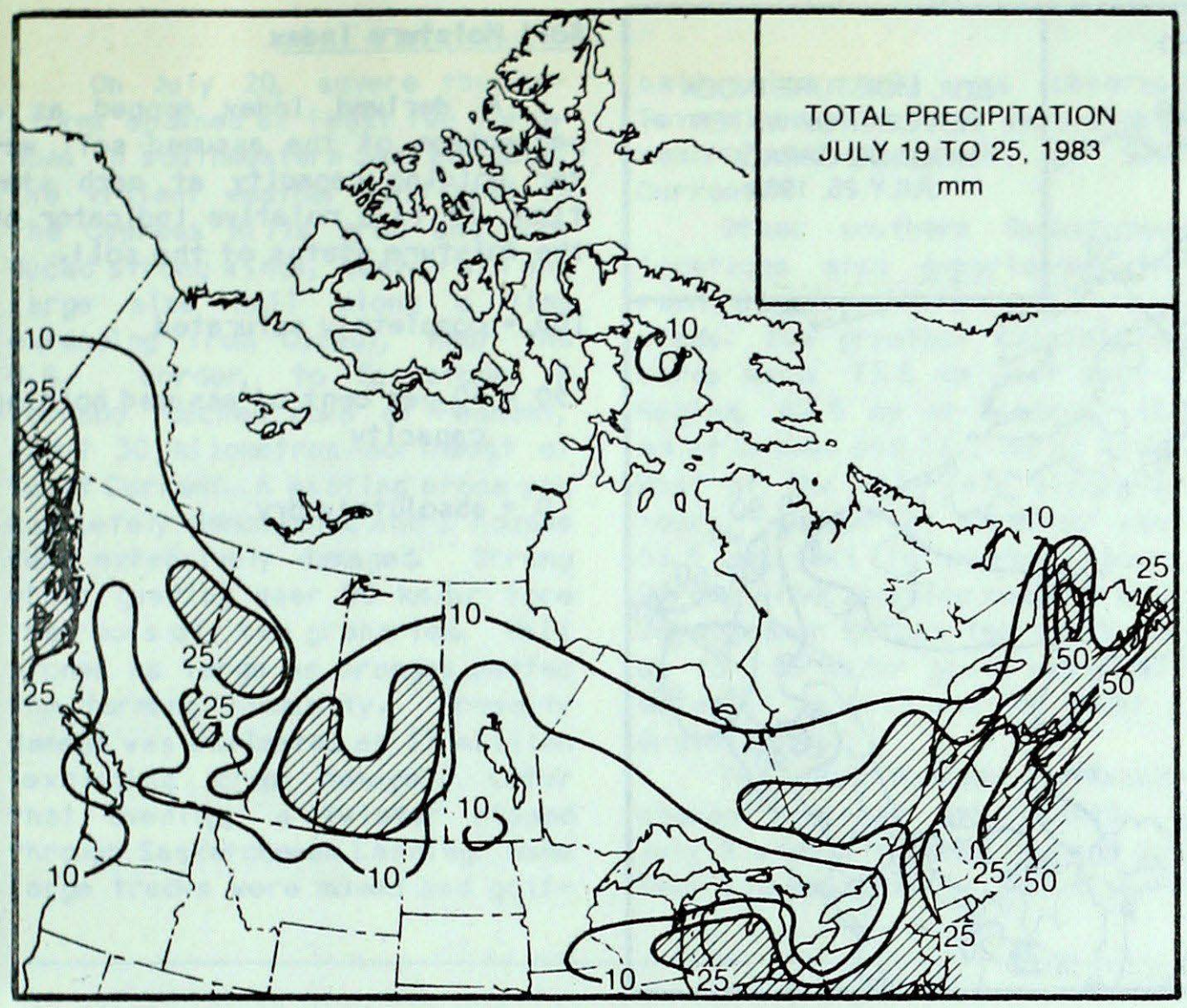
Strong winds and hail associated with thunderstorms affected many areas of the southern and central interior. On the 23rd and 24th of July, several storms hit the Okanagan producing heavy downpours and hail, and causing significant crop damage in many areas.

Prairies

It was very warm and dry in Manitoba while Alberta and Saskatchewan continued to experience unsettled weather. Many localities received significant localized rainfalls of 40 to 80 millimetres. Hail on the 19th and 20th of July was reported in a number of communities including Raymond, southwest of Lethbridge, where crop was extensively damaged. Tornadoes and funnel clouds were sighted in several areas including two northwest of Swift Current, one northwest of Edmonton and another southeast of Rocky Mountain House.

Ontario

Southern and central Ontario's dry spell continued. The Bruce Peninsula and areas south of a line from Toronto to Peterborough to Kingston appeared to be the driest; only 30 per cent of the normal June and July rain has fallen to date. In Toronto, the driest June and July since 1840 occurred in 1899 when a



HEAVIEST WEEKLY PRECIPITATION (mm)

YUKON	36.9	Burwash
NORTHWEST TERRITORIES	10.7	Longstaff Bluff
BRITISH COLUMBIA	36.3	Prince Rupert
ALBERTA	57.0	Coronation
SASKATCHEWAN	48.6	Wynyard
MANITOBA	24.8	Gillam
ONTARIO	49.4	Timmins
QUEBEC	33.8	Québec City
NEW BRUNSWICK	91.3	Moncton
NOVA SCOTIA	96.1	Yarmouth
PRINCE EDWARD ISLAND	49.4	Charlottetown
NEWFOUNDLAND	52.0	Daniels Harbour

RAINFALL STATISTICS FOR SOME SOUTHERN ONTARIO STATION

PRECIPITATION FOR JUNE AND JULY TO DATE IN MILLIMETRES:

	This Year	Normal
Toronto City	38.7	137.7
Gore Bay	47.7	119.1
Trenton	48.2	124.6
Kingston	48.4	117.2
Peterborough	66.6	138.3
Wiarton	69.1	142.3
Muskoka	76.8	159.4
Hamilton	117.8	144.6

meagre 42.9 mm fell. This year, only 38.7 mm fell since the beginning of June. In contrast, rainfall amounted to over 200 mm at Windsor since early June. Northwestern Ontario has also received fair amounts of rain; at Timmins, 43 mm fell on July 23 alone. Kenora was the driest location in the North, receiving only 13 mm this month.

The hot and dry weather has stunted the crop growth throughout most of southern Ontario, but the wet muck soil and an excellent irrigation system provided good growing conditions in the Holland Marsh near Barrie. Most of Ontario is in desperate need of a gentle 25-50 mm rainfall to avert disastrous harvest this fall.

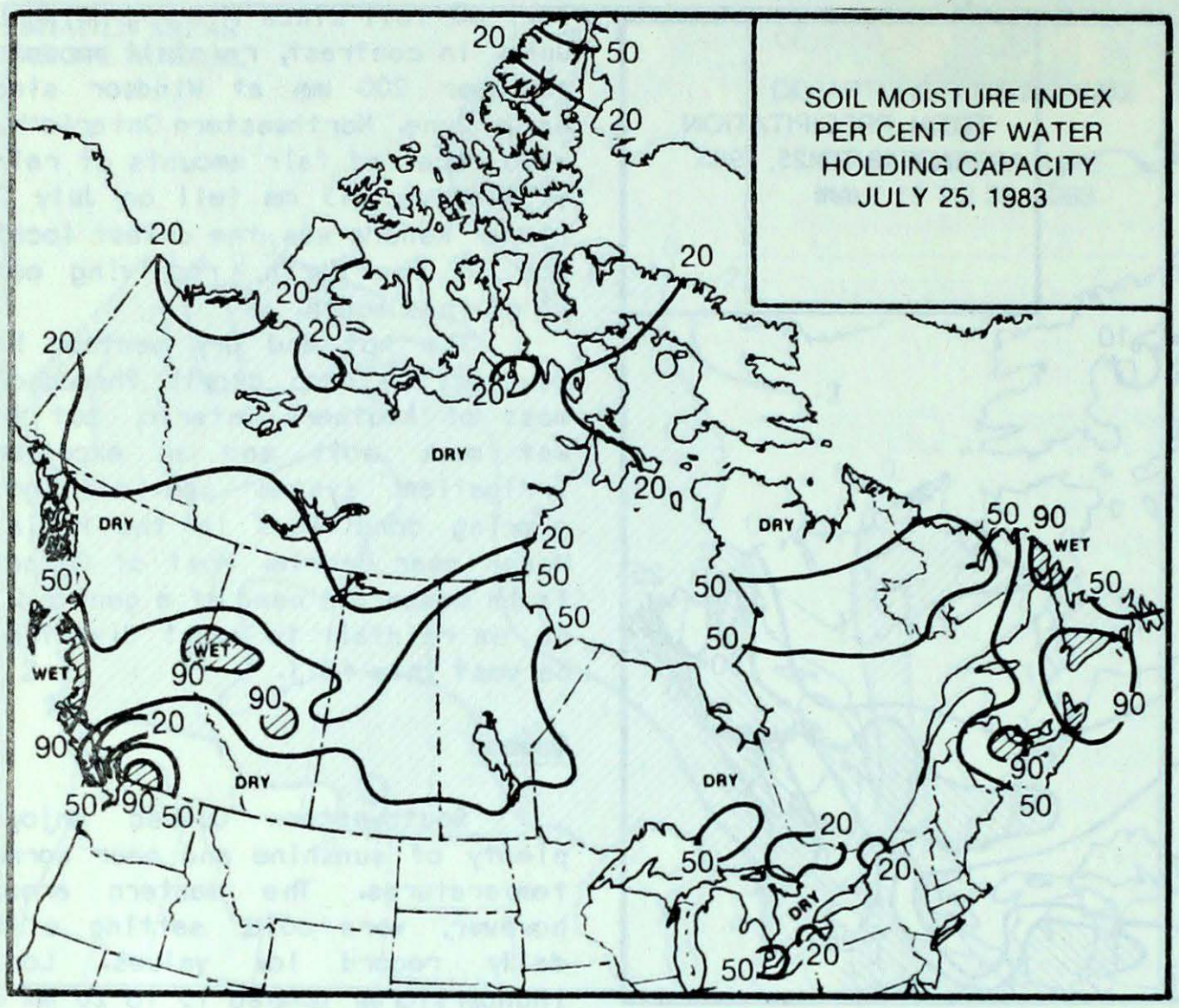
Québec

Southwestern Québec enjoyed plenty of sunshine and near normal temperatures. The eastern areas, however, were cold, setting a few daily record low values. Local thunderstorms dumped 15 to 20 mm of rain between the 19th and 21st of July mostly in the south. Inadequate rainfall produced a poor quality in the second hay crop. By the week's end, 13 forest fires were still burning in the Province bringing the total number of hectares burned to 270,600 this year. The 5-year average for the same date is 5,500 hectares.

Atlantic Provinces

Heavy rains of 50 to 80 mm were a welcome relief to the dry Maritime Provinces. On July 22, a rainfall of 69.4 mm at Truro proved to be the highest 24-hr. amount for any July since 1970. Although the rain caused minor flooding of basements and roadways in Nova Scotia, it also replenished the low soil moisture reserves. The rain was especially needed in the growing areas of the Annapolis Valley. On July 20, heavy thunderstorms caused many power disruptions across the Maritimes. Lightning strikes damaged two buildings in Nova Scotia. The wet weather has reduced the forest fire danger to low levels.

SOIL MOISTURE



Soil Moisture Index

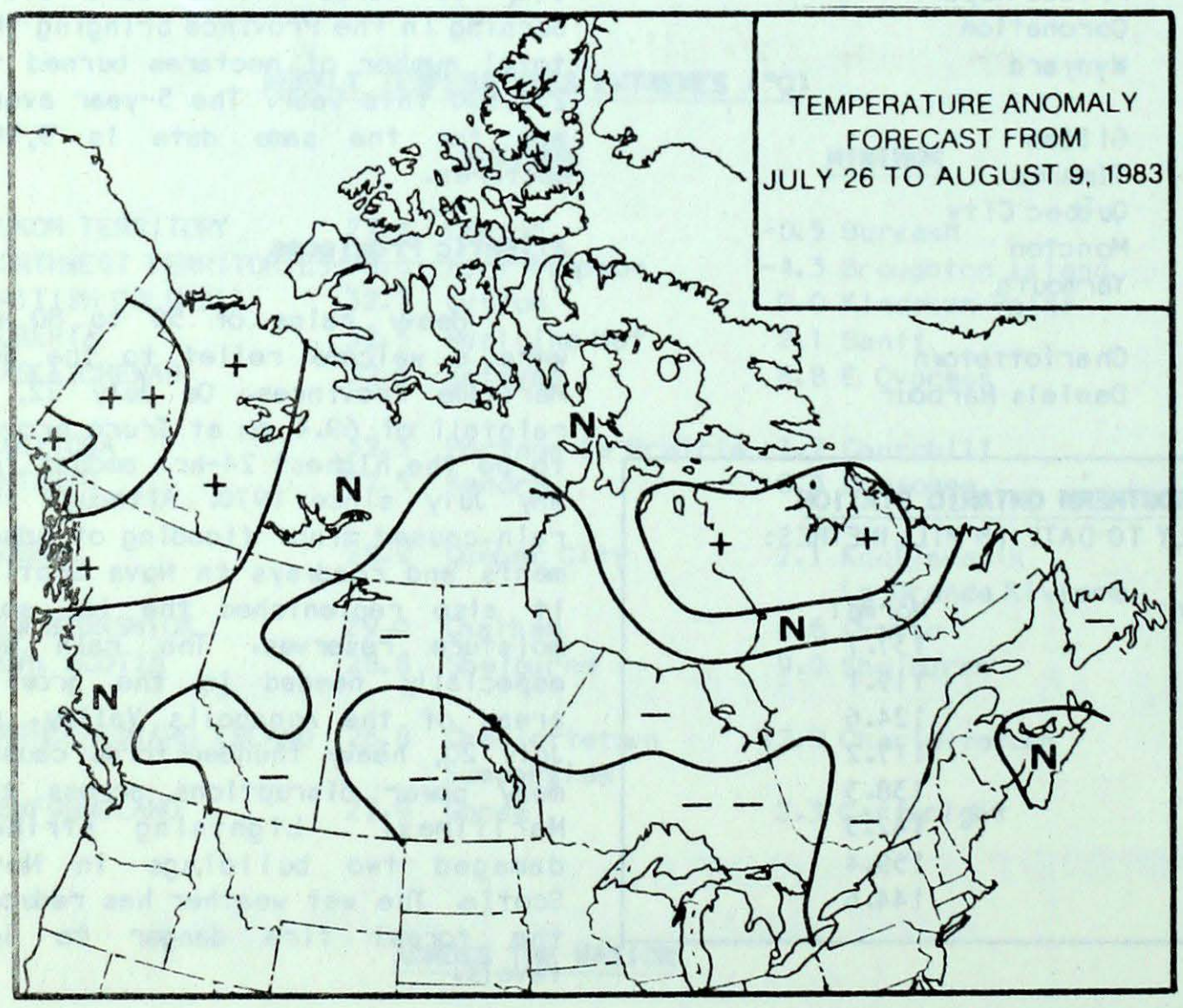
A derived index mapped as a percentage of the assumed soil water holding capacity at each station. It is a relative indicator of the moisture status of the soil.

100 = completely saturated

50 = 50 per cent of assumed holding capacity

0 = absolutely dry

TEMPERATURE ANOMALY FORECAST



Temperature Anomaly Forecast

The temperature anomaly forecast, for each of the 70 Canadian stations, is prepared by searching historical weather maps to find cases similar to the present one. The principle used is that a prediction for the next 15 days may be based on what is known to have actually happened during the 15-day anomaly periods. After the five best sets are selected, the surface temperature anomalies are calculated. This results in five separate forecasts, which are averaged to provide the consensus forecast depicted.

++ much above normal

\+ above normal

N normal

– below normal

–– much below normal

TORNADOES STRIKE SOUTHWESTERN SASKATCHEWAN

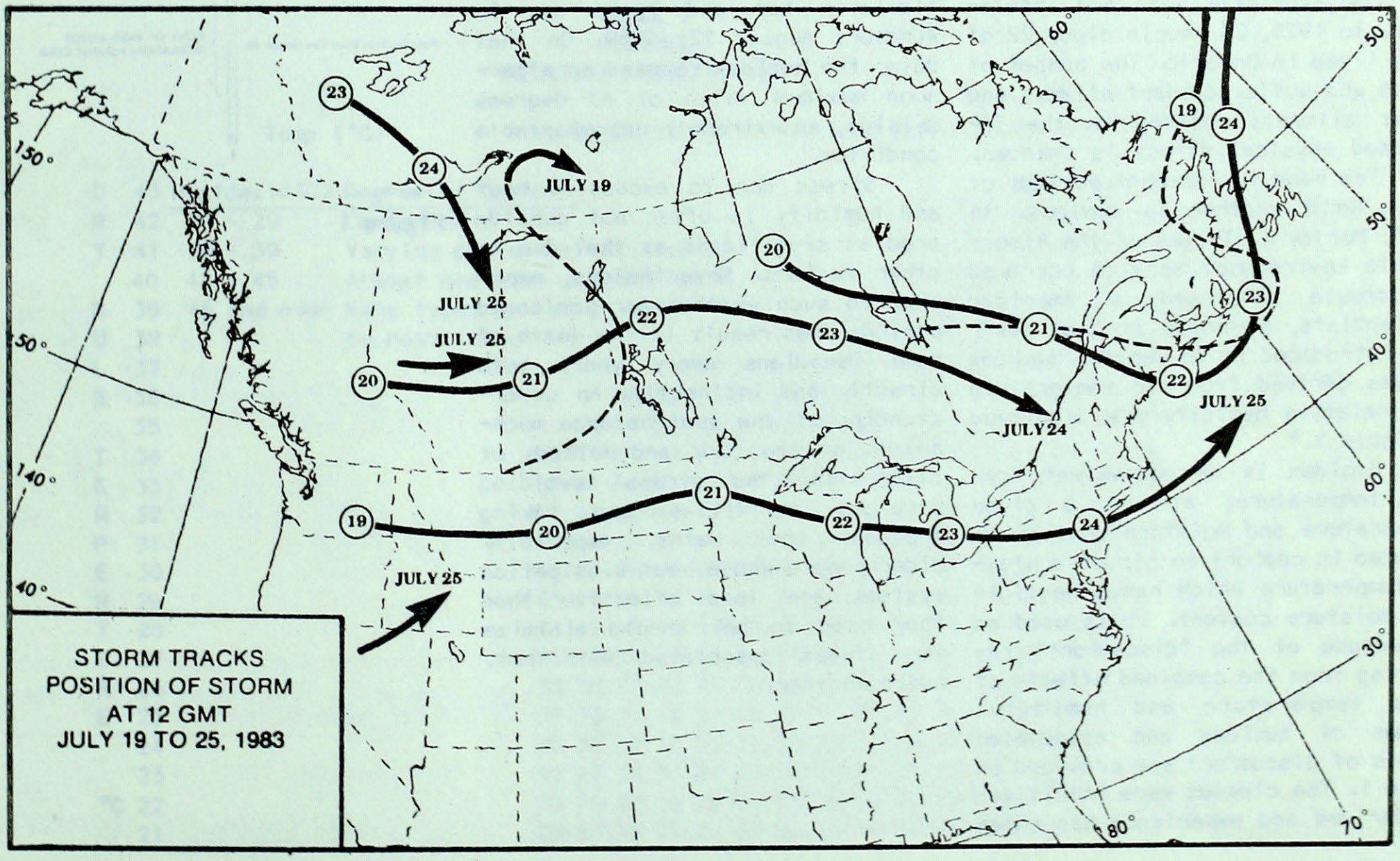
On July 20, severe thunderstorms spawned at least two tornadoes in southwestern Saskatchewan. The violent weather initiated in the Cypress Hills area and produced strong winds, heavy rain and large size hail along a line extending from Consul, near the U.S. border, to Saskatoon. A tornado touched down at Pennant, about 30 kilometres northwest of Swift Current. A skating arena was completely demolished and 2 houses were extensively damaged. Strong winds gusting near 90 km/hr tore the roofs off two granaries. Hail stones as large as oranges pelted the farming community. Property damage was estimated at $5 million (excluding crop damage). Later that evening, a twister ripped through Saskatchewan Landing. Some large trucks were moved and golf-ball size hail was observed. Several funnel clouds were sighted near Frontier, south of Swift Current.

Other southern Saskatchewan locations also experienced torrential downpours and strong winds. The greatest rainfall records were: 73.6 mm just west of Regina, 62.5 mm at Dundrun, 48.3 mm at Craven and 39.2 mm at Dilke. Most of the rain fell within 2-3 hours, except at Dundrun where 62.5 mm fell in one-half hours. Strong winds gusting near 90 km/hr were common across the south, but up to 140 km/hr gusts were estimated at Chaplin and 130 km/hr at Gravelbourg.

The last tornado in Saskatchewan occurred as recently as July 8 when a twister touched down near Lloydminster on the Alberta-Saskatchewan border. One person was seriously injured and several farm animals were killed. Climate records indicate that a tornado can be expected once every five years per 10,000 square kilometres in southwestern Saskatchewan.

A. Shabbar

STORM TRACKS



Humidex: A Measure of Hot, Humid Hazards to Human Health

by

Joan M. Masterton
Canadian Climate Centre

At the end of a long winter season, most Canadians look forward to the warm, sunny weather of the coming summer. In its own way, however, a Canadian summer can periodically be just as stressful to most people as can winter.

The feeling of thermal comfort in the human body is maintained when heat gains and heat losses are balanced. Figure 1 indicates how the body responds to the stresses of excessive heat or cold. Under high temperature conditions, high humidity interferes with the body's ability to lose heat through the evaporation of sweat from the skin's surface. Humid air is unable to absorb further quantities of moisture. As the body continues to overheat, physical discomfort increases. On average, 11 Canadians die annually from excessive heat and insolation. In 1975, 24 people died, 22 of whom lived in Ontario. The number of those who suffered heart attacks and other ailments related to the increased physical stress is unknown.

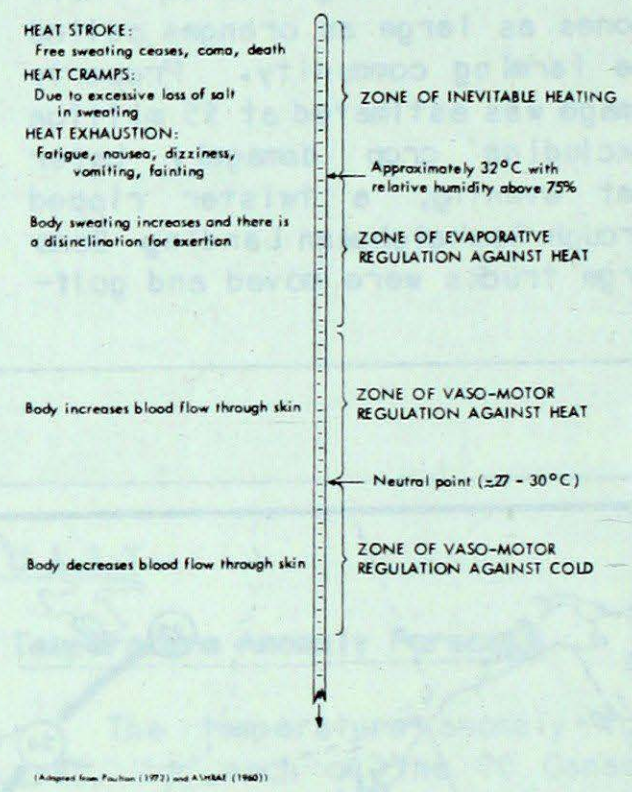
The need to document periods of hot, humid weather is obvious. In 1965, Morley K. Thomas of the Atmospheric Environment Service borrowed a formula developed by American scientists, re-named it "humidex", and introduced it to Canada. Humidex values derived from air temperature and relative humidity are displayed in Table 1.*

Humidex is an equivalent dry-air temperature; air of a given temperature and moisture content is equated in comfort to air of a higher temperature which has a negligible moisture content. It is used as a measure of the "discomfort" resulting from the combined effects of high temperature and humidity. Ranges of humidex and associated levels of discomfort are provided in Table 1. The classes were intuitively derived and experience has shown that they provide a reasonable description of the degree of discomfort felt by most people. Comfort is, nevertheless, subjective, and largely dependent on the age and physical health of the individual. Weather conditions causing heat cramps in a 17 year old may result in heat exhaustion for someone in their forties, and heat stroke in a person over 60.

On average, southwestern Ontario experiences the highest frequency of hot, humid weather in Canada, usually during the latter two weeks of July. Figure 2 illustrates the mean hourly humidex values at Windsor for the month of July and for the last two weeks of July (July 21/31), and their standard deviations. Also indicated are hourly humidex values for one particularly hot and humid day in Windsor; August 22, 1959. On that date, the humidex reached an afternoon maximum value of 43 degrees Celsius, an extremely uncomfortable condition.

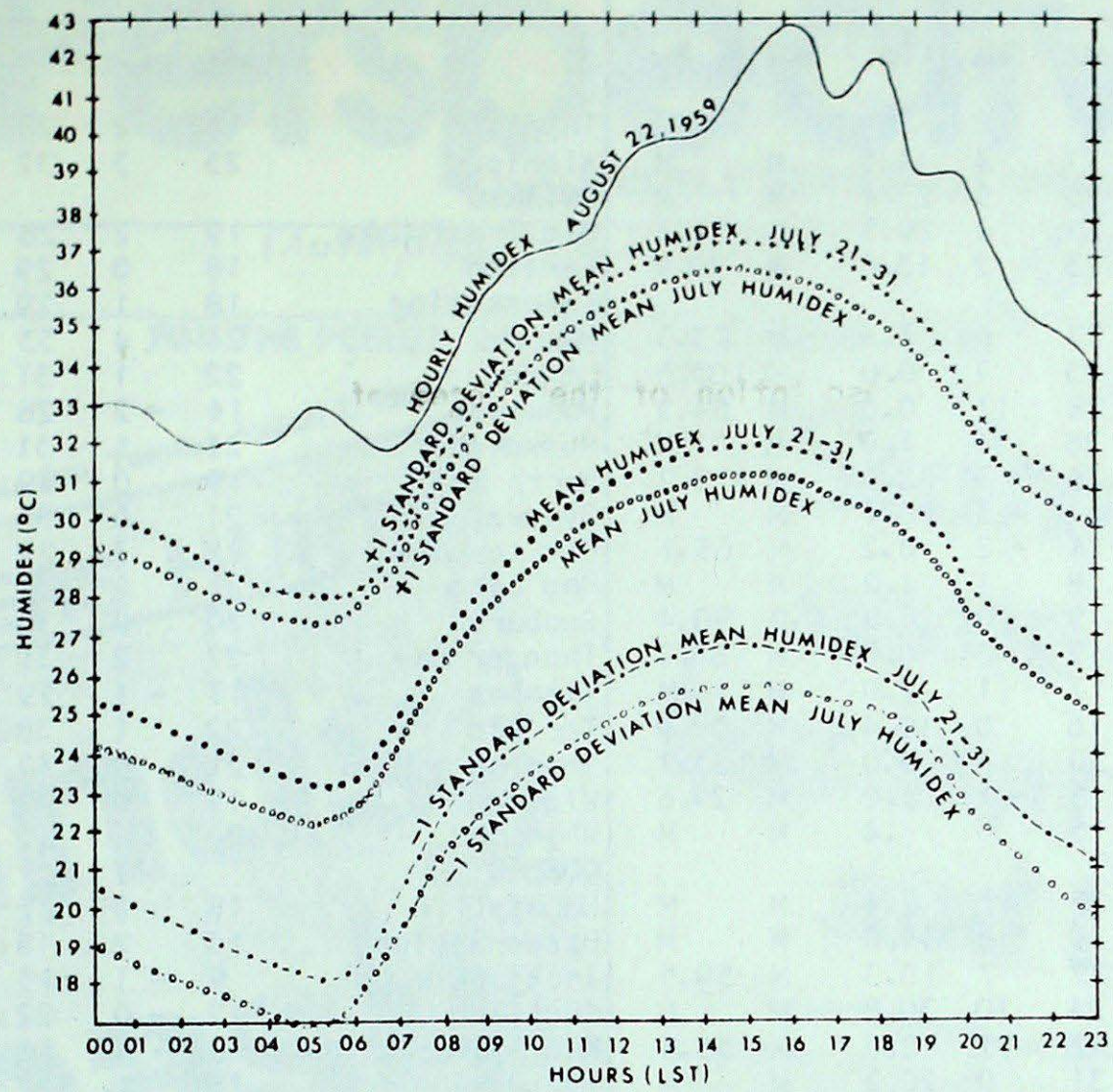
Stress due to excessive heat and humidity is often not considered as significant as that due to other factors. Nevertheless, exposure to such weather for prolonged periods does result in the death of some Canadians every year, both directly and indirectly. An understanding of the heat balance mechanisms of the body and methods of alleviating the stress (avoiding strenous activities and taking frequent cool baths, especially older people whose heat dissipation systems are less effective than they used to be) should minimize the stress associated with hot, humid weather.

MAN'S PHYSIOLOGICAL RESPONSES TO EXCESSIVE HEAT AND HUMIDITY



(Adapted from Fanger (1972) and ASHRAE (1980))

Figure 1



HUMIDEX AT WINDSOR (A)

Figure 2

TABLE 1
HUMIDEX
RELATIVE HUMIDITY (%)

		Temp (°C)	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20
D	43	Humidex (°C)	Degree of Comfort												56	54	51	49	47
R	42	20 - 29	Comfortable											56	54	52	50	48	46
Y	41	30 - 39	Varying degrees of discomfort										56	54	52	50	48	46	44
	40	40 - 45	Almost everyone uncomfortable									57	54	52	51	49	47	44	43
B	39	46 and over	Many types of labour must								56	54	53	51	49	47	45	43	41
U	38		be restricted							57	56	54	52	51	49	47	46	43	42	40
L	37								58	57	55	53	51	50	49	47	45	43	42	40	
B	36							58	57	56	54	53	51	50	48	47	45	43	42	40	38
	35							58	57	56	54	52	51	49	48	47	45	43	42	41	38	37
T	34						58	57	55	53	52	51	49	48	47	45	43	42	41	39	37	36
E	33						55	54	52	51	50	48	47	46	44	43	42	40	38	37	36	34
M	32						52	51	50	49	47	46	45	43	42	41	39	38	37	36	34	33
P	31						50	49	48	46	45	44	43	41	40	39	38	36	35	34	33	31
E	30						48	47	46	44	43	42	41	40	38	37	36	35	34	33	31	31
R	29						46	45	44	43	42	41	39	38	37	36	34	33	32	31	30	
T	28						43	42	41	41	39	38	37	36	35	34	33	32	31	29	28	
U	27						41	40	39	38	37	36	35	34	33	32	31	30	29	28	28	
R	26						39	38	37	36	35	34	33	32	31	31	29	28	28	27		
E	25						37	36	35	34	33	33	32	31	30	29	28	27	27	26		
	24						35	34	33	33	32	31	30	29	28	28	27	26	26	25		
	23						33	32	32	31	30	29	28	27	27	26	25	24	23			
°C	22						31	29	29	28	28	27	26	26	24	24	23	23				
	21						29	29	28	27	27	26	26	24	24	23	23	22				

*Readers seeking more information about humidex are directed to "Humidex: A Method of Quantifying Human Discomfort Due to Excessive Heat and Humidity", by J.M. Masterton and F.A. Richardson of the Canadian Climate Centre (CLI-1-79).

TEMPERATURE, PRECIPITATION AND BRIGHT SUNSHINE DATA FOR THE WEEK ENDING 0600 GMT JULY 26, 1983

STATION	TEMP				PRECIP		SUN
	Av	Dp	Mx	Mn	Tp	SOG	H
YUKON TERRITORY							
Dawson	14	- 1	27	4	14.5	M	M
Mayo A	15	1	25	5	23.4	M	M
Watson Lake	15	0	25	4	20.5	M	61.3
Whitehorse	12	- 1	23	2	13.6	M	70.9
NORTHWEST TERRITORIES							
Fort Smith	18	1	27	6	3.4	M	83.3
Inuvik	18	6	28	7	0.0	M	105.5
Norman Wells	20	4	28	11	0.0	M	84.5
Yellowknife	18	2	26	11	1.0	M	M
Baker Lake	15	3	26	3	0.0	M	112.2
Cape Dyer	3	- 4	11	- 3	6.4	M	M
Clyde	3	- 2	14	- 2	0.2	M	65.1
Frobisher Bay	8	- 1	18	1	1.2	M	M
Alert	3	- 1	9	0	0.0	0.0	90.4
Eureka	7	2	12	3	0.0	M	86.7
Hall Beach	8	2	17	1	2.0	M	M
Resolute	4	0	16	0	10.4	M	39.9
Cambridge Bay	11	3	20	4	0.0	M	183.7
Mould Bay	3	- 1	8	- 1	5.0	M	29.6
Sachs Harbour	5	0	15	0	.4	M	M
BRITISH COLUMBIA							
Cape St. James	15	3	22	11	7.1	M	M
Cranbrook	17	- 2	29	8	15.0	M	M
Fort Nelson	18	1	27	7	10.3	M	59.5
Fort St. John	14	0	24	10	30.8	M	M
Kamloops	21	- 0	32	11	2.6	M	55.5
Penticton	19	- 2	31	9	20.2	M	M
Port Hardy	15	1	20	10	16.4	M	40.7
Prince George	16	1	27	7	12.9	M	54.1
Prince Rupert	14	2	18	10	36.3	M	29.0
Revelstoke	18	- 1	30	9	11.2	M	51.5
Smithers	15	1	28	7	6.4	M	39.2
Vancouver	18	- 0	24	12	0.6	M	59.0
Victoria	17	1	26	10	0.4	M	66.8
Williams Lake	16	1	28	6	13.6	M	61.6
ALBERTA							
Calgary	17	0	27	8	6.0	M	M
Cold Lake	19	1	27	11	23.4	M	50.3
Coronation	19	1	29	10	57.0	M	76.3
Edmonton Namao	19	1	27	9	15.2	M	M
Fort McMurray	19	2	28	10	7.0	M	64.2
Jasper	17	1	28	7	8.4	M	62.4
Lethbridge	18	- 1	28	9	33.9	M	M
Medicine Hat	21	0	33	10	45.1	M	73.6
Peace River	17	1	26	10	27.0	M	M
SASKATCHEWAN							
Cree Lake	18	X	28	8	7.7	M	M
Estevan	22	2	33	12	22.8	M	87.8
La Ronge	19	2	27	10	35.4	M	M
Regina	21	2	32	11	27.6	M	90.3
Saskatoon	21	2	30	12	14.9	M	M
Swift Current	19	0	29	11	M	M	84.2
Yorkton	20	1	29	12	20.5	M	88.6
MANITOBA							
Brandon	21	1	30	11	2.1	M	M
Churchill	13	0	26	1	4.2	M	75.1
The Pas	20	2	29	11	8.3	M	M
Thompson	18	2	29	8	7.8	M	63.8
Winnipeg	23	3	32	13	0.2	M	88.2
ONTARIO							
Big Trout Lake	19	2	28	12	17.0	M	M
Earlton	18	0	29	7	M	M	M
Kapuskasing	18	1	29	5	14.2	M	M
Kenora	24	4	33	16	0.0	M	M
London	22	1	31	11	2.4	M	M
Mbosonee	14	- 2	26	0	12.7	M	58.0
Muskoka	21	1	31	7	0.0	M	M
North Bay	19	0	29	7	22.2	M	67.0
Ottawa	21	0	31	14	19.9	M	M
Pickle Lake	21	3	29	12	1.8	M	M
Red Lake	21	2	30	8	1.0	M	78.8
Sudbury	20	0	30	9	23.4	M	72.0
Thunder Bay	22	2	30	10	0.4	M	82.0
Timmins	17	- 1	29	2	49.4	M	M
Toronto	22	1	30	11	4.0	M	M
Trenton	21	0	30	12	0.3	M	M
Wiarton	19	0	29	9	0.4	M	M
Windsor	24	2	32	17	31.0	M	M
QUEBEC							
Bagotville	18	0	27	10	18.2	M	M
Blanc-Sablon	13	2	18	6	M	M	M
Inukjuak	9	- 1	13	4	0.2	M	M
Kuujjuaq	12	- 0	22	3	4.2	M	M
Kuujjuarapik	8	- 4	16	2	0.2	M	54.2
Manawaki	18	- 1	27	8	24.8	M	64.9
Mont-Joli	16	- 2	25	9	21.4	M	45.0
Montréal	21	- 1	29	13	25.8	M	66.4
Natashquan	14	0	21	8	14.8	M	28.7
Nitchequon	14	1	22	6	0.2	M	74.3
Québec	19	0	29	11	33.8	M	58.2
Schefferville	13	1	21	3	1.6	M	64.4
Sept-Iles	15	- 1	27	9	1.2	M	41.8
Sherbrooke	18	0	27	9	16.8	M	M
Val-d'Or	17	- 1	27	6	17.6	M	M
NEW BRUNSWICK							
Charlo	16	- 2	28	9	49.6	M	39.3
Fredericton	19	- 1	28	10	13.8	M	M
Saint John	18	1	26	12	28.6	M	47.4
NOVA SCOTIA							
Greenwood	19	- 1	29	10	45.1	M	M
Shearwater	18	0	28	13	61.3	M	44.1
Sydney	17	- 2	24	10	82.8	M	38.7
Yarmouth	17	0	23	10	96.1	M	M
PRINCE EDWARD ISLAND							
Charlottetown	18	- 1	27	13	49.4	M	M
Summerside	19	- 1	27	14	48.2	M	40.8
NEWFOUNDLAND							
Gander	16	0	23	10	8.6	M	M
Port aux Basques	15	1	18	11	45.4	M	M
St. John's	16	1	25	8	50.0	M	52.0
St. Lawrence	16	3	23	9	51.6	M	M
Cartwright	12	0	25	2	1.2	M	M
Goose	17	1	28	7	7.6	M	74.8
Hopedale	13	2	24	3	0.0	M	M

Av = weekly mean temperature (°C)
Mx = weekly extreme maximum temperature (°C)
Mn = weekly extreme minimum temperature (°C)
Tp = weekly total precipitation (mm)
Dp = Departure of mean temperature from normal (°C)

SOG = snow depth on ground (cm), last day of the period
H = weekly total bright sunshine (hrs)

X = not observed
P = extreme value based on less than 7 days
M = not available at press time

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Annual subscription rate for weekly issues--- $35.00
Annual subscription rate for one issue per month including monthly supplement--- $10.00

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Subscription enquiries: Supply and Services Canada, Publishing Centre, Ottawa, Ontario, Canada, K1A 0S9