

**CLIMATE REFERENCE STATION  
SASKATOON  
ANNUAL SUMMARY 2012**



C. Beaulieu  
V. Wittrock  
Saskatchewan Research Council  
Air and Climate





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*COVER PHOTOGRAPH*  
*30 meter wind tower and Belfort Precipitation Gauge, January 2012*  
*photo credit: J. Procknow*



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This report is being provided for informational purposes only. While the Saskatchewan Research Council believes this report to be accurate, it may contain errors or inaccuracies. SRC assumes no responsibility for the accuracy or comprehensiveness of this data and reliance on this data is entirely at the user's own risk.

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Information and data contained in this report shall not be published, copied, placed in a retrieval system or distributed whole or in part without prior written consent of the Saskatchewan Research Council. All references made to this report shall be acknowledged.

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## SASKATCHEWAN RESEARCH COUNCIL CLIMATE REFERENCE STATION SUPPORTERS, 2012

WE GRATEFULLY ACKNOWLEDGE THE SUPPORT OF THE FOLLOWING:



Agriculture and  
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Agriculture et  
 Agroalimentaire Canada



Saskatchewan  
 Watershed  
 Authority



## CLIMATE REFERENCE STATION HISTORY

Meteorological observations began at or near Saskatoon in 1889 with the recording of temperature by the Royal Northwest Mounted Police. There is some disagreement in the early records as to the exact location of the weather observing point, but the majority of the evidence indicates 52°15'N, 106°20'W, elevation 480m asl, as the most probable location. This would place it at Clark's Crossing on the South Saskatchewan River, approximately 16 km northeast of the centre of the City of Saskatoon. At that time, there was a settlement at Clark's Crossing as well as 10 to 15 families on either side of the river where Saskatoon is now located.

Little is known about the very early observers; however, the records do show that Major T.H. Keenan took observations from March 1892 until March 1895, and Mr. George Will was the observer from January 1897 until April 1897. It is thought that T. H. Copeland was involved in the observational programme from 1895 to May 1, 1901, at which time it was taken over by Mr. Eby, Sr. Mr. Eby, Sr. recorded the observations until his death in 1921, at which time his daughter, Miss E.S. Eby, continued to record the observations. Her brother, Mr. J.M. Eby, recorded the observations beginning in April 1931 until the station closed on October 31, 1942. The Eby station recorded temperature, precipitation and weather notes on fog, thunderstorms, winds and any unusual weather phenomena. Reports were made twice daily, morning and evening.

In 1916, a climatological station was established by the Physics Department of the University of Saskatchewan and continuous observations were kept twice daily until January 15, 1965. The longtime observer was Mr. Sidney Cox. The Saskatchewan Research Council inherited the programme in the fall of 1963 and moved it to the newly established Climatological Reference Station at latitude 52°09'N, longitude 106°36'W and elevation 497 m asl<sup>1</sup>. The first observer was Terry Beck followed three years later by Orville Olm.<sup>2</sup> In 1967, Joe Calvert became the primary observer until his retirement in 1983. Ray Begrand succeeded Mr. Calvert until 1988 when Virginia Wittrock became the primary observer. Since 1992, the primary observer has been Carol Beaulieu assisted by Virginia Wittrock.

In the summer of 1992, the CRS began to be converted to an automated system of data collection with the installation of a Campbell Scientific data logger and automatic sensors. The updating, replacing, re-installing and adding of new sensors began in 2009 and continued during 2012. Elements presently recorded at the site are temperature, precipitation, wind, solar radiation, relative humidity, barometric pressure, soil temperature and snow-on-the-ground (instrument and manual recordings).

<sup>1</sup>Christiansen 1970; Environment Canada 1975; <sup>2</sup>Olm 2001

*Mr. James Eby was one of the original members of the Temperance Colony Society. He filed his homestead in 1882 and returned with his family in 1883. He was the first president of the school board and served as the township supervisor for Nutana. While riding a horse in 1890, he was struck by lightning and was a partial invalid thereafter. In 1901, he and his daughter moved to Nutana and James served as a Federal Meteorologist for the next 20 years until his death in 1921 at the age of 77. He was buried, next to his wife, in the Nutana pioneer cemetery.<sup>1</sup>*

<sup>1</sup>Ladd, 2008



photo credit: CR Beaulieu



## WHAT IS THE CLIMATE REFERENCE STATION?

The Saskatchewan Research Council's Climate Reference Station (SRC CRS) at Saskatoon is classified as a principal climatological station with supplementary climatological observations.<sup>1</sup> A reference climatological station's data are intended for the purpose of determining climatic trends. This requires long periods (not less than thirty years) of homogeneous records, where man-made environmental changes have been or are expected to remain at a minimum. Ideally the records should be of sufficient length to enable the identification of secular changes of climate<sup>2</sup>. At our station, half-hourly readings are taken of elements which include temperature, precipitation amount, humidity, wind, and atmospheric pressure. Our supplemental observations include rainfall intensity, soil temperature, bright sunshine and solar radiation. High quality and consistent climatological observations are maintained providing data sets to meet the current concerns of the effects of climatic change and increased variability.

### Purpose and Benefits

The purpose of the SRC CRS is to provide a record of observed meteorological elements in order that the climate of the area and its changes can be accurately documented and described. Climatological data have assumed new importance as a result of social and environmental issues in which climate is a dominant factor. Climatological information assists in realizing new technological opportunities and social changes. It is necessary and valuable for areas such as agriculture, forestry, land use and facility placement, water and energy resources, health and comfort.

The CRS also allows us to:

- evaluate long term climate trends - early warning system for increased frequencies of extreme events such as drought, floods, *etc.*;
- determine the impacts of climate events on society, economy, health, and ecosystems - *e.g.* intense rainfall causing flooding and property damage, heat stress with its implications for health;
- do value-added research;
- be part of regional, national and global networks in an important agricultural and ecological area;
- facilitate development of additional programs - *e.g.* air quality, biodiversity, and climate change monitoring;
- have roles in various programs within SRC including spray drift work, Boreal Ecosystem Atmosphere Study (BOREAS), and collaborative research with the Western College of Veterinary Medicine and the College of Agriculture, University of Saskatchewan, for example; and
- provide climate data to accident studies, agricultural sectors, authors, building science, chemical companies, construction firms, governments, insurance agencies, lawyers, media, recreation facilities, schools, tourism groups, transportation studies, universities, wildlife studies, and interested individuals.

### Goals

The goals of the Climate Reference Station are first, to maintain the high quality of data gathered over its nearly 50 years of existence at its current location and, second, to continue to monitor a large variety of elements. These various elements combined with the long-term collection period as well as the stable location allow CRS to be an extremely valuable climate information collection station.

<sup>1</sup>Environment Canada 1992    <sup>2</sup>World Meteorological Organization 1988

## ACTIVITIES ASSOCIATED WITH THE SASKATOON CLIMATE REFERENCE STATION, 2012

In March, it was Sutherland Public Elementary school's turn to host the seventh year of the SPLIT programme (Schools Plant Legacy in Trees). The presentation consisted of hands-on experience with the weather instruments or a computer presentation highlighting Saskatoon's climate; past, present and future. Children from kindergarten to grade 8 were shown why consideration of the climate is necessary for the planning of the urban landscape.

CRS continued to upgrade the instruments at the site. During February and March, both old and new sensors were incorporated into one data logger and the old underground bunker, where the old data loggers resided, was closed. New monthly summaries were designed to take advantage of data automation and old manual entered summaries retired. These changes were not completed with out a few glitches but by year end most had been ferreted out and resolved.

In January, Virginia Wittrock toured personnel from Shaw Media and CTV around the site explaining the importance of climate reference stations and the climate trends for Saskatoon.



*Shaw Media Tour of CRS 2012  
photo credit: J. Procknow*



*CTV Media tour of CRS, 2012  
photo credit: J. Procknow*

## SUMMARIES FOR 2012

### Overview

Data concerning temperature, precipitation, wind speed and direction, bright sunshine, solar radiation, and soil temperatures, recorded at the Saskatchewan Research Council (SRC) Climate Reference Station (CRS) (52°09'N, 106°36'W, 497 m asl) for the forty-ninth year, are presented for the year 2012 and compared with the long-term (circa 1900-2011) and standard averaging period/normal (1981-2010) records.

The winter of 2011-12 was the warmest recorded since 1963 with a three month (Dec, Jan Feb) average of -1.9°C. It was not to last. Spring fell to thirteenth place while summer ranked at number 21 and fall brought up the rear at 38 out of 49. Thirteen daily minimum temperature records were set in 2012; not for extreme cold but for the warmest daily minimums. No extreme record lows were recorded in 2012. In January, minimum temperatures were below -30° twice and again twice in December. Extreme maximum temperatures over 30°C occurred twice in July and once in August. The start of the frost-free season, beginning on April 27<sup>th</sup>, was the earliest in 49 years. It lasted until October 3<sup>rd</sup> for a record 160 days. Unlike December of 2011, which was the second warmest recorded at the station, December 2012 was well below normal. With October and November temperatures also being below normal, many a complaint of the “Long Winter” was heard by the closure of 2012.

January 2012 continued the drying trend of the previous December. It was not until March did the station measure above normal precipitation. By the end of July, the cumulative precipitation for 2012 had exceeded the cumulative normal for the entire year. Spring (MAM) was the second wettest with 184.3mm while the summer (JJA) was the third wettest. Autumn (SON) saw the return to dry weather with the season being the sixth driest recorded since 1964. Overall, the year was the fourth wettest behind the years 2010, 1991 and 2006. The longest wet spell was seven days from June 11<sup>th</sup> to the 18<sup>th</sup> producing 33.8 mm. The longest dry spell was 28 days; from September 2<sup>nd</sup> to 29<sup>th</sup>. An early snowfall contributed to the perception of a long winter with the first flakes of fall veiling frozen fields on October 22<sup>nd</sup>.

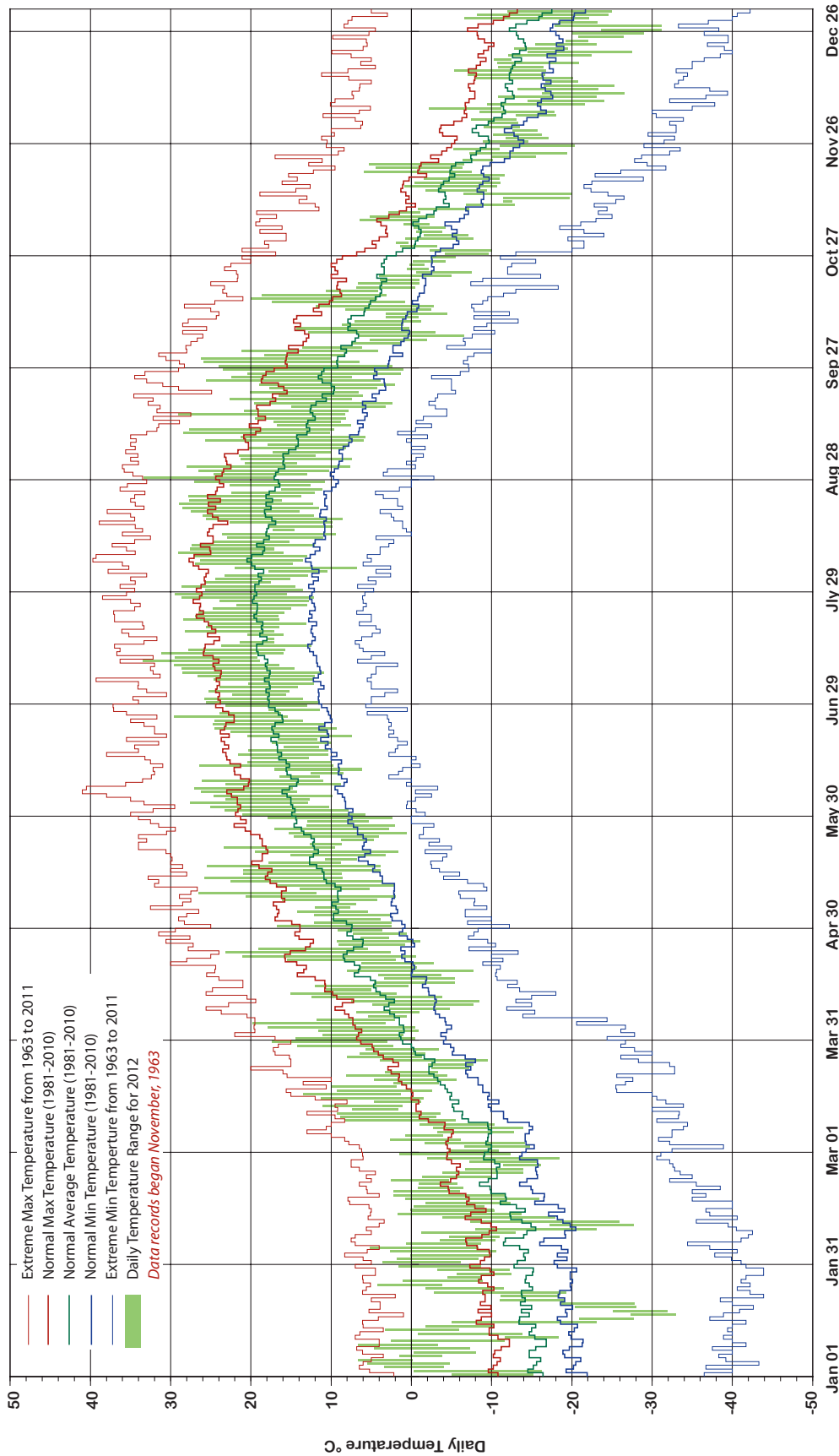
2012 produced a record winter for most bright sunshine days. Eighty-one days out of a possible ninety-two experienced some bright sunshine. Unfortunately, the rest of the seasons were near the bottom of the ranking; Spring was 40<sup>th</sup>, Summer 43<sup>rd</sup> and Autumn 41<sup>st</sup> out of 47 years. For the most bright sunshine hours, winter was fourth sunniest with 49.7% of possible hours of bright sunshine for winter.

On June 27<sup>th</sup>, the station measured the only occurrence of ‘Storm force’ winds at 96 km/h. ‘Gale force’ winds occurred 9 times and ‘Strong Gale force’ winds twice. On average, maximum winds were strongest from the west but most frequently from the west-northwest or the southeast. On January 18<sup>th</sup> a maximum wind speed of 26km combined with a frigid temperature of -31.8°C to produce the year’s only -40 wind chill value.





### DAILY TEMPERATURE



## TEMPERATURE

2012 TEMPERATURE RECORDS °C								
DAILY	TYPE			DATE	NEW RECORD	OLD RECORD/year		
	Maximum	Extreme High			Jan 05	6.7	5.0/1984	
				Jan 09	6.6	4.0/1986		
				Feb 04	5.2	4.0/1991		
				Mar 13	11.1	9.5/1981		
				Mar 30	17.4	15.0/1986 & 2004		
				Apr 04	19.8	19.5/1987, 1991, 2004		
				Sept 14	29.1	27.5/1988 & 1995		
				May 23	8.7	10.0/1983		
			Low					
Minimum		High			Jan 04	-4.8	-5.1/2001	
					Jan 05	-0.1	-1.9/1984	
					Jan 09	-3.3	-3.7/2002	
					Jan 25	-3.8	-5.5/2006	
					Mar 12	1.7	1.1/1977	
					Mar 13	1.2	0.5/1994	
					Mar 16	1.4	1.0/1995	
					Mar 18	1.9	-0.6/1972	
					Mar 30	3.0	3.0/2010	
					Apr 04	3.3	2.5/1993	
				July 10	18.9	18.5/1998		
				July 31	17.6	17.5/1987		
				Sept 29	10.1	8.3/2006&2010		
			Extreme Low		none			
Mean	High			Jan 04	0.4	-0.3/2001		
				Jan 05	3.3	1.6/1984, 2008		
				Jan 09	1.7	-0.3/1986		
				Jan 25	0.3	-0.2/2006		
				Mar 10	2.9	2.2/1977		
				Mar 13	6.2	4.0/1994, 2010		
				Mar 16	7.4	6.3/1981		
				Mar 18	5.9	4.0/1991		
				Mar 30	10.2	8.6/2010		
				Apr 04	11.6	10.7/2004		
				Jun 25	22.5	21.9/2002		
				Sept 14	18.7	18.3/1979		
				Sept 29	18.2	18.1/1970		
		Monthly	Max	Low	Highest	Sept	14.9/16	13.3/06/2008
				Ave	Highest	March	5.2	5.1/2010
			Minimum	Ext Low	Highest	March	-14.7/02	-15.5/25/2010
Ave	Highest			July	10.9/07	10.0/19/1970		
Mean	Low		Highest	March	-10.7/02	-10.8/02/2010		
				July	16.2/04	16.2/31/2006		
	Mean	Highest	March	0.3	0.1/2010			
No. of Days during a month when...	Max	Most	>0°C	January	12	10/1984, 1986		
		Min	Most	>0°C	March	6	5/1990&93, 2000&2010	
					May	31	31/1985	
Monthly Heating Degree-days	Least			March	547.8	555.7/2010		

Ave = Average Ext = Extreme

DATES & DURATION OF THE FROST-FREE SEASON			
YEAR	LAST SPRING FROST	FIRST FALL FROST	Frost-free Season Length
1964	May 31	Sept 26	117
1965	May 27	Sept 05	100
1966	May 19	Sept 13	116
1967	Jun 06	Sept 23	108
1968	May 19	Sept 25	128
1969	Jun 14	Sept 15	92
1970	May 19	Sept 12	115
1971	May 18	Sept 20	124
1972	May 08	Sept 04	118
1973	May 06	Sept 14	130
1974	May 25	Sept 02	99
1975	May 21	Sept 11	112
1976	May 06	Aug 28	113
1977	May 01	Aug 31	121
1978	May 30	Sept 30	122
1979	May 30	Aug 13	74
1980	May 14	Aug 26	103
1981	May 24	Sept 03	101
1982	May 29	Aug 27	89
1983	May 24	Sept 13	111
1984	May 24	Aug 31	98
1985	Jun 04	Sept 06	93
1986	May 17	Sept 06	111
1987	May 21	Oct 06	137
1988	May 02	Sept 19	139
1989	May 28	Sept 10	104
1990	May 13	Sept 21	130
1991	May 27	Sept 18	113
1992	May 23	Sept 14	113
1993	May 17	Sept 14	119
1994	May 09	Oct 04	147
1995	May 22	Sept 18	118
1996	May 12	Sept 29	139
1997	May 14	Oct 05	143
1998	May 13	Sept 30	139
1999	May 09	Sept 27	140
2000	May 17	Sept 23	128
2001	May 10	Oct 04	146
2002	May 23	Sept 23	122
2003	May 18	Sept 29	133
2004	May 20	Sept 30	132
2005	May 14	Sept 28	136
2006	May 04	Sept 19	137
2007	May 10	Sept 14	126
2008	May 26	Sept 26	122
2009	June 05	Oct 07	123
2010	May 07	Sept 17	132
2011	May 10	Sept 14	126
2012	April 26	Oct 04	160
1981-2010 Normal	May 18	Sept 20	124



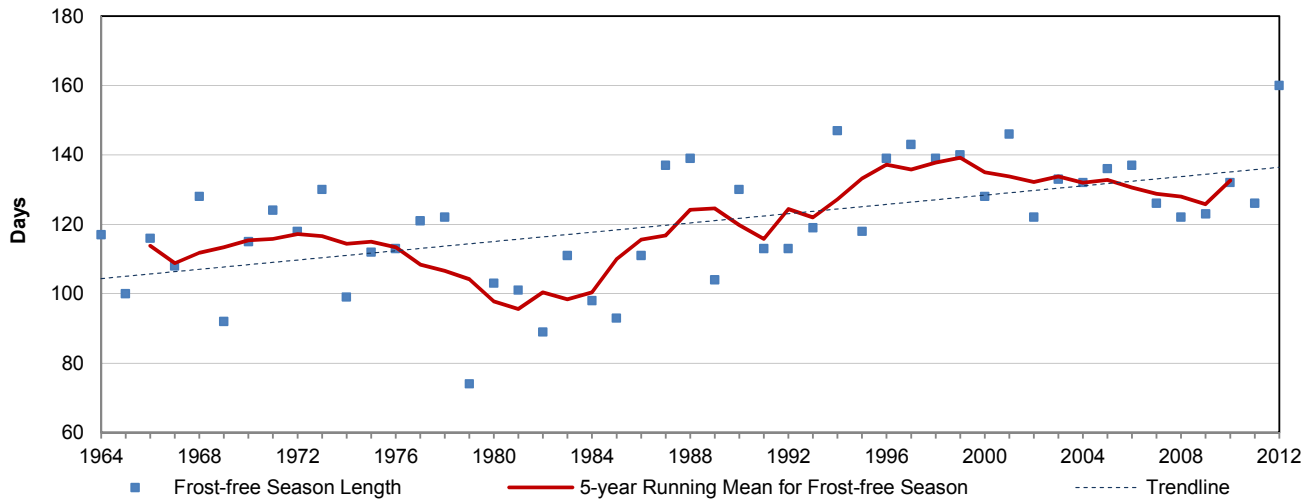
photo credit: C.R. Beaulieu

2012 EXTREME TEMPERATURES			
COLD SPELL (less than or equal to -30°C)		HOT SPELL (greater than or equal to 30°C)	
DATE	TEMPERATURE °C	DATE	TEMPERATURE °C
January 17	-32.9	July 10	33.5
January 18	-31.9	July 12	31.2
December 26	-31.2	August 28	33.4
December 27	-31.2		

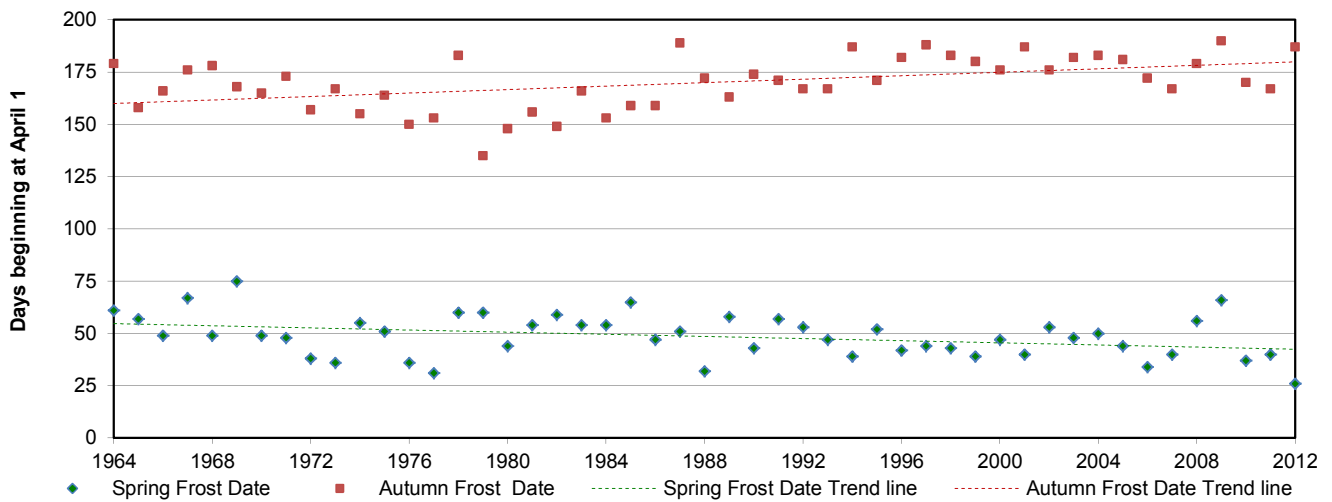
Coloured cells indicate extremes for the year

# TEMPERATURE

## Frost-free Growing Season Duration



## Frost-free Growing Season End Points



Day 1 = April 1 Day 50 = May 20 Day 100 = July 9 Day 150 = August 28 Day 200 = October 17



March 20, 2012 Glazing on Tress  
photo credit: C.R. Beaulieu



### TEMPERATURE RANKINGS

AVERAGE ANNUAL TEMPERATURES °C					
MAXIMUM TEMP		MINIMUM TEMP		MEAN TEMP	
1987	11.6	1987	-0.8	1987	5.4
2001	10.8	2006	-1.3	2001	4.6
1981	10.5	2012	-13	1981	4.5
1988	10.1	1999	-1.4	1998	4.3
1998	10.1	2010	-1.5	1999	4.2
1999	9.8	1981	-1.5	2006	4.2
2006	9.6	1998	-1.5	2012	4.0
2011	9.6	2005	-1.6	1988	3.9
1976	9.5	2001	-1.6	2011	3.8
1997	9.5	2011	-2.1	2005	3.8
2003	9.3	2007	-2.2	2010	3.7
2012	9.3	1988	-2.3	1997	3.5
2005	9.1	1997	-2.4	2003	3.4
1986	9.0	2003	-2.5	1991	3.2
1991	8.9	1993	-2.5	1986	3.2
2010	8.9	1991	-2.5	2007	3.2
2000	8.8	1992	-2.5	1976	3.0
1984	8.7	1986	-2.6	1992	3.0
1990	8.7	2004	-2.8	2000	3.0
1977	8.6	2002	-2.9	1984	2.9
1980	8.6	1984	-2.9	1993	2.8
2007	8.6	2000	-2.9	2004	2.8
1992	8.5	1964	-2.9	2002	2.8
2008	8.5	1994	-3.2	1964	2.7
2002	8.5	1983	-3.2	1994	2.7
1994	8.5	2008	-3.3	2008	2.6
2004	8.4	1995	-3.4	1990	2.6
1989	8.3	1968	-3.4	1977	2.5
1964	8.2	1976	-3.5	1980	2.4
1993	8.1	1990	-3.6	1989	2.3
1995	7.9	1977	-3.6	1995	2.3
1973	7.8	1989	-3.8	1983	2.2
1968	7.7	1980	-3.8	1968	2.2
2009	7.7	2009	-3.8	2009	2.0
1983	7.7	1973	-4.0	1973	1.9
1978	7.4	1970	-4.0	1970	1.7
1970	7.3	1978	-4.6	1978	1.4
1974	7.1	1969	-4.6	1971	1.2
1971	7.1	1971	-4.6	1974	1.2
1967	7.0	1974	-4.7	1967	1.1
1985	6.9	1967	-4.7	1969	1.1
1975	6.9	1985	-4.8	1985	1.1
1969	6.8	1972	-4.8	1975	0.9
1979	6.5	1975	-5.1	1972	0.6
1966	6.4	1996	-5.2	1979	0.6
1965	6.3	1965	-5.3	1965	0.5
1982	6.2	1982	-5.3	1966	0.4
1996	6.1	1979	-5.3	1996	0.4
1972	6.1	1966	-5.5	1982	0.4

SEASONAL AVERAGE MAXIMUM TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	-1.9	1977	12.9	2001	26.5	1987	13.1
1987	-3.6	1987	12.7	2003	26.3	2011	12.6
2006	-4.7	1988	12.6	1984	26.1	2009	12.1
1998	-4.8	1981	12.1	1988	26.0	1994	11.8
2000	-5.4	1998	12.0	1970	25.9	2001	11.8
1992	-5.7	2001	11.9	2006	25.6	2008	11.8
2002	-6.0	1994	11.5	1998	25.6	1999	11.4
1964	-6.6	2010	11.4	1997	25.6	1981	11.1
1983	-7.1	1993	11.4	1981	25.3	1997	11.0
1988	-7.2	1980	11.3	1989	25.3	2005	11.0
2004	-7.2	1986	11.1	2002	25.3	1976	10.8
1986	-7.3	2000	11.0	1983	25.0	1980	10.8
1976	-7.3	2012	10.9	1996	24.9	1974	10.6
1981	-7.4	1992	10.8	1991	24.8	1979	10.6
1977	-7.4	1991	10.5	1964	24.6	2004	10.5
2007	-7.7	1976	10.4	2008	24.5	1998	10.4
2003	-8.0	1984	10.2	2007	24.5	1967	10.4
2005	-8.0	1999	10.1	1979	24.5	2000	10.3
1975	-8.0	2007	10.1	1995	24.4	1988	10.3
1999	-8.0	2006	10.1	2011	24.4	1975	9.9
1984	-8.1	1968	10.0	2012	24.4	1989	9.8
1995	-8.1	2004	10.0	1967	24.3	2007	9.8
1990	-8.2	1985	10.0	1978	24.2	1990	9.7
1991	-8.6	1990	10.0	1965	24.2	1968	9.7
1989	-8.7	2005	9.9	1969	24.1	2010	9.6
2001	-9.3	1973	9.9	1990	24.1	2003	9.4
1970	-9.3	1978	9.7	1987	24.0	1970	9.3
2011	-9.5	2003	9.4	1972	24.0	1983	9.2
1980	-9.5	2008	9.1	1976	23.8	1992	8.8
2010	-9.8	1972	9.1	1973	23.8	1971	8.8
1968	-9.8	1971	8.6	2000	23.8	1964	8.8
2008	-10.1	1969	8.3	1971	23.6	1978	8.7
1973	-10.3	1995	8.3	1986	23.6	1977	8.7
1997	-11.0	1989	8.2	1994	23.5	1966	8.6
1967	-11.1	1964	8.2	1980	23.5	1995	8.6
1993	-11.5	1966	8.1	1975	23.2	1993	8.4
1985	-11.6	1997	7.6	1999	23.1	1982	8.3
2009	-11.7	2011	7.5	2010	23.0	2012	8.2
1994	-12.1	2009	7.4	1977	23.0	1969	8.0
1996	-12.2	1983	7.0	2009	22.9	2002	7.8
1974	-12.6	1982	6.7	1966	22.8	2006	7.5
1966	-13.1	1996	6.3	1982	22.6	1986	7.3
1982	-13.3	1970	6.1	2005	22.6	1965	7.3
1971	-13.4	2002	5.8	1985	22.4	1973	7.3
1978	-14.5	1965	5.7	1974	22.4	1991	7.0
1965	-14.8	1979	4.8	1992	22.4	1972	6.6
1972	-14.9	1974	4.7	1968	22.0	1996	6.2
1969	-15.2	1975	4.4	2004	21.6	1984	5.6
1979	-15.5	1967	4.4	1993	21.1	1985	4.5

### TEMPERATURE RANKINGS

SEASONAL AVERAGE MINIMUM TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	-12.6	1993	0.3	2012	12.9	2009	1.3
2006	-13.2	2010	0.2	2006	12.5	2005	0.4
1998	-13.4	2012	0.0	2003	12.5	2011	0.3
1987	-13.6	1987	-0.2	1988	12.3	2008	0.1
1992	-14.9	1977	-0.5	1970	12.3	1998	0.1
1964	-15.0	1999	-0.5	2002	12.2	1981	0.0
2002	-15.5	1985	-0.7	1991	12.2	2001	-0.1
1983	-15.6	1994	-0.8	2011	11.8	1967	-0.2
2000	-15.8	1981	-1.0	2001	11.7	1968	-0.2
2004	-16.7	1992	-1.0	2007	11.7	1997	-0.3
1999	-16.8	2006	-1.0	1989	11.6	1987	-0.3
2007	-17.0	1988	-1.0	1998	11.6	2004	-0.4
1981	-17.1	1986	-1.1	2010	11.5	1994	-0.5
1995	-17.2	2000	-1.1	1997	11.5	1999	-0.6
1986	-17.3	2001	-1.2	2008	11.3	1992	-0.7
2003	-17.5	2007	-1.3	1984	11.2	2010	-0.7
1988	-17.8	2005	-1.4	1996	11.2	1980	-0.9
1976	-17.8	1990	-1.5	1983	11.2	1983	-1.0
1984	-17.8	1973	-1.7	1964	11.0	1970	-1.1
2005	-17.8	1978	-1.7	2005	11.0	2007	-1.1
2011	-18.3	1991	-2.0	1972	11.0	1964	-1.4
1975	-18.5	1968	-2.0	2000	11.0	1988	-1.4
1970	-18.7	1998	-2.0	1981	10.9	1979	-1.4
1977	-18.8	1984	-2.2	1995	10.8	2000	-1.7
1989	-18.9	2003	-2.3	1990	10.7	1989	-1.8
2001	-19.0	1972	-2.4	1999	10.7	1969	-1.9
2010	-19.1	2004	-2.5	1987	10.6	2012	-1.9
1990	-19.1	1980	-2.6	1994	10.6	1971	-2.1
1991	-19.3	2008	-3.2	1965	10.5	2002	-2.2
2008	-19.5	1976	-3.3	1976	10.5	2003	-2.2
1980	-19.6	1983	-3.7	1971	10.3	1977	-2.4
1968	-20.0	1969	-3.8	2009	10.3	1974	-2.4
1973	-20.3	1995	-3.8	1973	10.0	1975	-2.5
1993	-20.5	1966	-3.9	1979	10.0	1993	-2.5
1994	-20.8	1964	-3.9	1966	9.9	1995	-2.6
1967	-21.1	2011	-3.9	1993	9.9	1972	-2.7
1997	-21.3	1971	-4.0	1975	9.8	2006	-2.8
2009	-21.4	1997	-4.3	2004	9.7	1978	-2.9
1996	-21.9	1982	-4.3	1978	9.7	1986	-3.1
1974	-22.6	1989	-4.3	1980	9.6	1990	-3.4
1985	-22.9	1996	-4.9	1982	9.6	1976	-3.6
1971	-23.1	1970	-5.0	1986	9.6	1982	-3.7
1982	-23.6	2009	-5.6	1974	9.6	1991	-3.7
1966	-23.6	1965	-5.8	1967	9.5	1984	-3.8
1969	-24.0	1979	-6.1	1969	9.4	1966	-4.3
1965	-24.0	1974	-6.5	1968	9.2	1996	-4.3
1978	-24.5	1975	-6.5	1992	8.8	1965	-4.4
1972	-25.0	1967	-6.9	1977	8.8	1973	-4.6
1979	-25.2	2002	-7.6	1985	8.2	1985	-6.0

SEASONAL AVERAGE MEAN TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	-7.3	1987	6.2	2003	19.4	2009	6.7
1987	-8.6	1977	6.2	1988	19.2	2011	6.5
2006	-8.9	1993	5.8	2001	19.1	1987	6.4
1998	-9.1	2010	5.8	1970	19.1	2008	5.9
1992	-10.3	1988	5.8	2006	19.1	2001	5.8
2000	-10.6	1981	5.6	2002	18.8	2005	5.7
2002	-10.8	2012	5.4	1984	18.7	1994	5.7
1964	-10.8	1994	5.4	2012	18.7	1981	5.5
1983	-11.4	2001	5.4	1998	18.6	1999	5.4
2004	-12.0	1986	5.0	1997	18.5	1997	5.4
1981	-12.3	1998	5.0	1991	18.5	1998	5.3
1986	-12.3	1992	4.9	1989	18.5	1967	5.1
2007	-12.4	2000	4.9	1983	18.1	2004	5.0
1999	-12.4	1999	4.8	1981	18.1	1980	5.0
1988	-12.5	1985	4.7	2011	18.1	1968	4.8
1976	-12.6	2006	4.5	2007	18.1	1979	4.6
1995	-12.7	2007	4.4	1996	18.1	1988	4.4
2003	-12.7	1980	4.4	2008	17.9	2010	4.4
2005	-12.9	1991	4.3	1964	17.8	2007	4.4
1984	-13.0	2005	4.3	1995	17.7	2000	4.3
1977	-13.1	1990	4.3	1972	17.5	1970	4.2
1975	-13.3	1973	4.1	2000	17.4	1974	4.1
1990	-13.7	1978	4.0	1990	17.4	1983	4.1
1989	-13.8	1968	4.0	1965	17.4	1992	4.1
2011	-14.0	1984	4.0	1987	17.3	1989	4.0
1991	-14.0	2004	3.8	1979	17.3	1975	3.8
1970	-14.0	2003	3.6	1976	17.2	1964	3.7
2001	-14.2	1976	3.5	2010	17.2	1976	3.6
2010	-14.5	1972	3.4	1994	17.1	2003	3.6
1980	-14.6	2008	2.9	1978	17.0	1971	3.4
2008	-14.8	1971	2.3	1971	17.0	1977	3.2
1968	-15.0	1969	2.2	1973	17.0	1990	3.2
1973	-15.4	1995	2.2	1999	16.9	1969	3.1
1993	-16.0	1964	2.2	1967	16.9	2012	3.1
1967	-16.1	1966	2.1	2005	16.8	1995	3.0
1997	-16.2	1989	2.0	1969	16.7	1978	2.9
1994	-16.5	2011	1.9	1986	16.6	1993	2.9
2009	-16.6	1997	1.7	2009	16.6	2002	2.8
1996	-17.1	1983	1.6	1980	16.6	2006	2.4
1985	-17.3	1982	1.2	1975	16.5	1982	2.3
1974	-17.6	2009	0.9	1966	16.4	1966	2.2
1971	-18.3	1996	0.7	1982	16.2	1986	2.1
1966	-18.4	1970	0.5	1974	16.0	1972	1.9
1982	-18.5	1965	-0.1	1977	15.9	1991	1.6
1965	-19.4	1979	-0.7	2004	15.7	1965	1.5
1978	-19.5	1974	-0.9	1992	15.6	1973	1.3
1969	-19.6	2002	-0.9	1968	15.6	1984	0.9
1972	-20.0	1975	-1.0	1993	15.5	1996	0.9
1979	-20.4	1967	-1.3	1985	15.3	1985	-0.8

### TEMPERATURE

	Ave. Monthly Maximum(°C)		Ave. Monthly Minimum (°C)		Ave. Monthly Mean (°C)		2012 Extreme Daily Values (°C)		Extreme Daily Values 1963 to present		Extreme Daily Values for Saskatoon area stations circa 1889 to present	
	2012	Normal	2012	Normal	2012	Normal	Max/Date	Min/Date	Max/Date	Min/Date	Max/Date	Min/Date
Jan	-4.3	-9.8	-13.6	-19.7	-9.0	-14.7	6.7/05	-32.9/17	7.0/1993/30&1986/11	-43.9/1966/22&1969/29	11.0/1980/23 <sub>SWT</sub>	-48.9/1893/31 <sub>SM</sub>
Feb	-2.1	-7.1	-12.8	-16.9	-7.5	-12.0	5.2/04	-27.7/10	8.3/2005/02	-41.1/1972/06	12.8/1931/19 <sub>SE</sub>	-50.0/1893/01 <sub>SM</sub>
Mar	5.2	0.0	-4.5	-9.7	0.3	-4.9	17.4/30	-14.7/02	20.0/1993/ 23	-38.9/1972/02	22.8/1910/23 <sub>SE</sub>	-43.3/1897/14 <sub>SM</sub>
Apr	10.6	11.2	-0.7	-1.4	5.0	4.9	23.2/23	-8.5/10	31.5/2001/28	-27.8/1979/01	33.3/1952/28 <sub>SAUS</sub>	-30.5/1979/01 <sub>SWT</sub>
May	16.9	18.3	5.1	4.6	11.0	11.5	26.5/09	0.7/25	35.0/1988/30	-10.0/1967/02	37.2/1936/27 <sub>SE</sub>	-12.8/1907/06 <sub>SE</sub>
June	22.3	22.5	11.3	9.8	16.9	16.2	29.6/25	6.2/11	41.0/1988/05	-3.3/1967/06	41.5/1988/06 <sub>S2</sub>	-3.9/1917/02 <sub>US</sub>
July	26.0	25.2	15.0	12.1	20.5	18.7	33.5/10	10.9/07	39.3/2001/05	1.7/1967/02&1978/09	40.0/1919,1941,1946 <sub>SE SA US</sub>	-0.6/1918/25 <sub>SE</sub>
Aug	25.0	24.9	12.4	11.0	18.7	18.0	33.4/28	6.8/04	39.7/1998/06	-2.8/1976/28	39.7/1998/06 <sub>SRC</sub>	-2.8/1901/23 <sub>SM</sub> &1976/28 <sub>SRC</sub>
Sept	21.4	18.7	6.8	5.6	14.1	12.2	29.1/14	1.0/26	35.6/1978/04	-7.8/1974/30	35.6/1978/04 <sub>SRC</sub>	-11.1/1908/28 <sub>SE</sub>
Oct	6.7	10.4	-1.8	-1.2	2.4	4.6	21.2/01	-10.0/28	28.5/1980/06&1984/08	-21.5/1991/29&30	32.2/1943/05 <sub>SAUS</sub>	-25.6/1919/26 <sub>SEUS</sub>
Nov	-3.6	-0.6	-10.7	-9.4	-7.2	-5.0	6.4/05	-20.3/25	19.4/1975/04	-33.5/1985/24	21.7/1903/03 <sub>SE</sub>	-39.4/1893/30 <sub>SM</sub>
Dec	-12.6	-8.3	-21.5	-17.4	-17.1	-12.9	-2.2/05	-31.2/26&27	11.2/1997/14	-42.2/1973/31	14.4/1939/05 <sub>SE</sub>	-43.9/1892/22 <sub>SM</sub>
Ave	9.3	8.8	-1.3	-2.7	3.9	3.0						

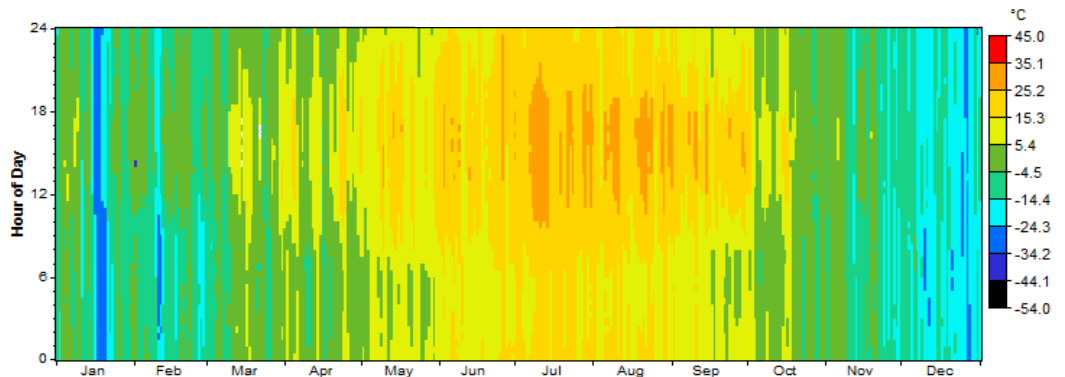
Normal = 1981-2010

SM = Saskatoon stations circa 1889 - 1901(RNWMP et al)  
 SE = Saskatoon Eby 1901-42  
 US = University of Saskatchewan 1915-64  
 S = Saskatoon 1941-42  
 SA = Saskatoon Diefenbaker Int'l Airport 1942-

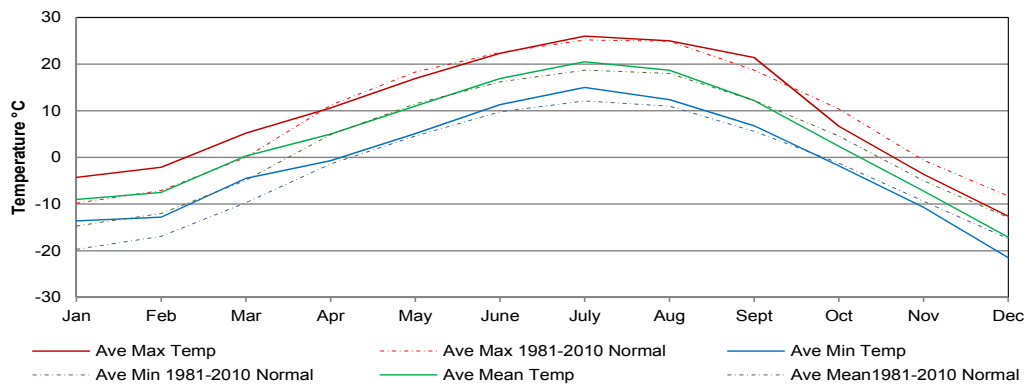
NRC = Nat. Res. Council 1952-66  
 SRC = Saskatchewan Research Council 1963-  
 SWT = Saskatoon Water Treatment Plant 1974 -  
 SC = S'toon Central Ave 1974-89  
 S1 = Saskatoon 1 1976-78

S2 = Saskatoon 2 1977-90  
 K = S'toon Kernen Farm 1993-2004  
 KCS = S'toon Kernen Farm CS 1996 -  
 RCS = Environment Canada 2008 -

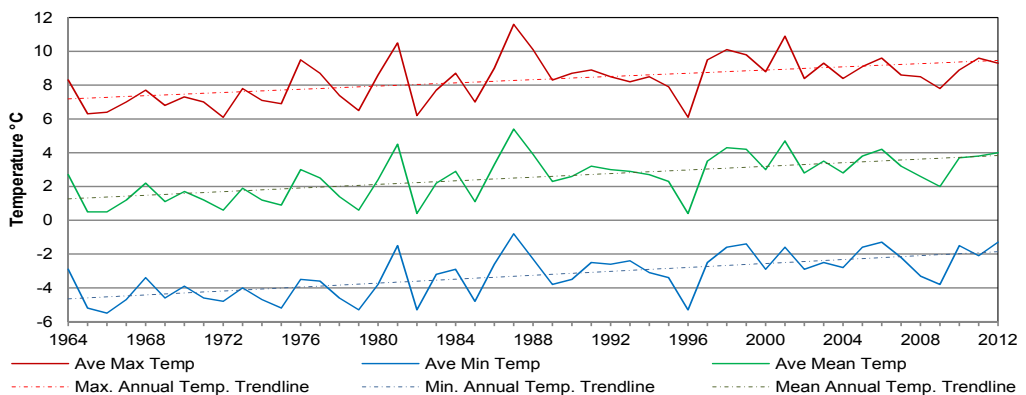
#### Hourly



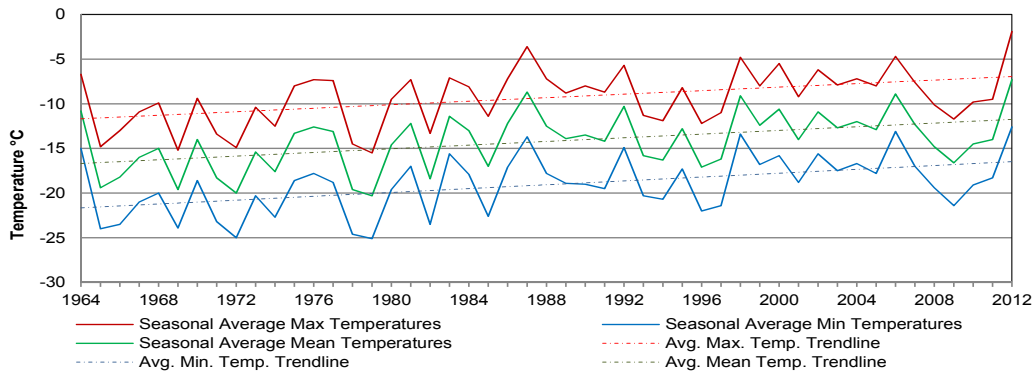
#### Monthly



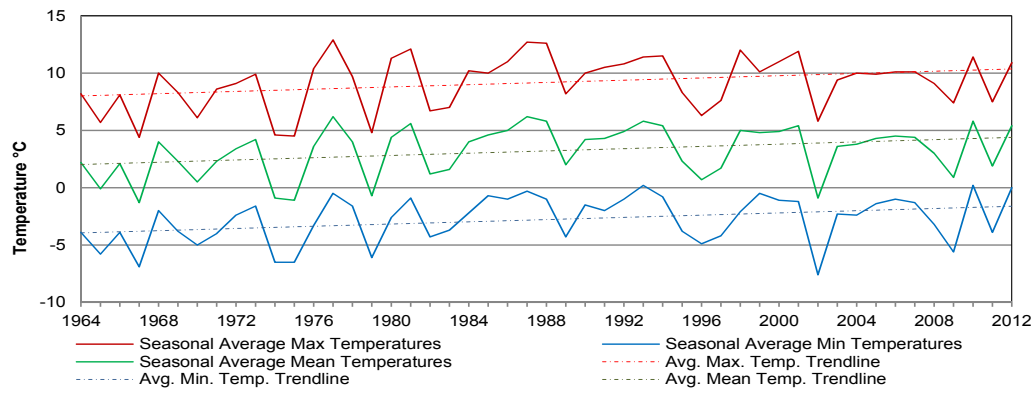
#### Annual



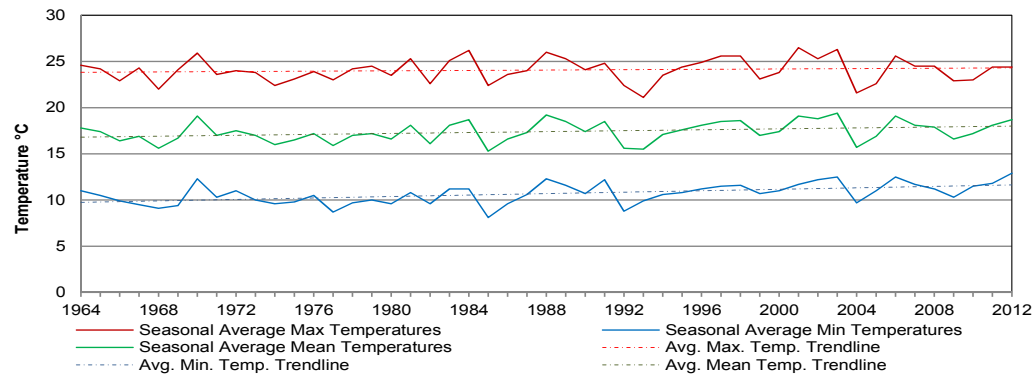
### SEASONAL TEMPERATURES for 1964 to 2012



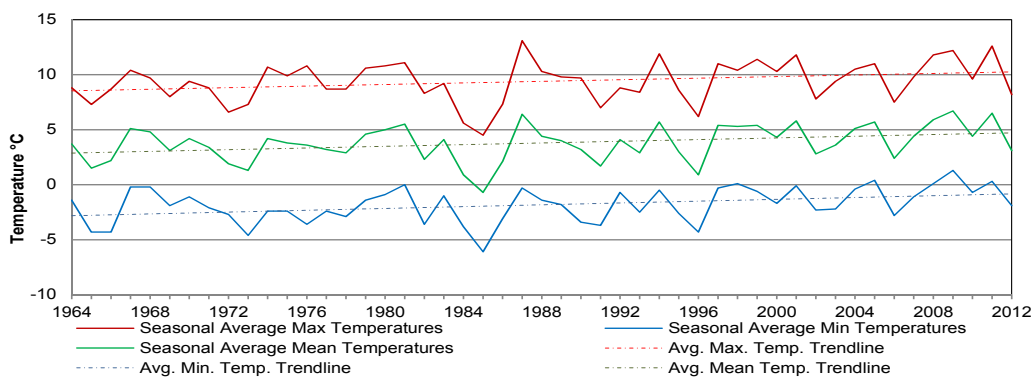
Winter (DJF)



Spring (MAM)



Summer (JJA)

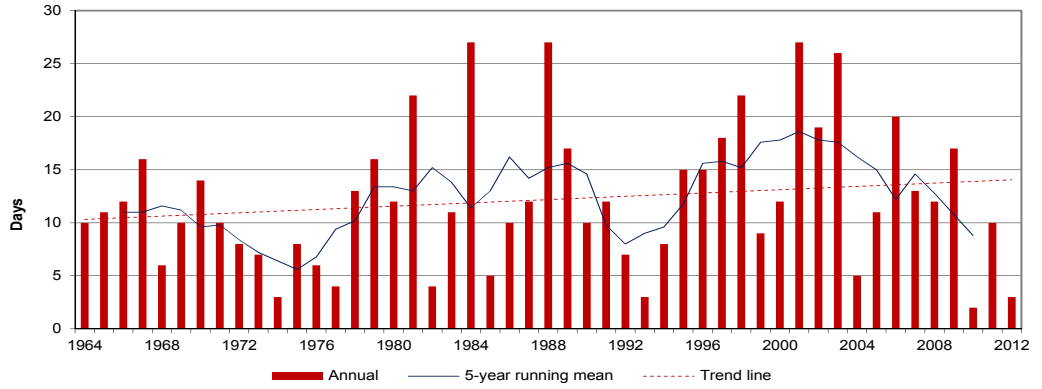


Autumn(SON)

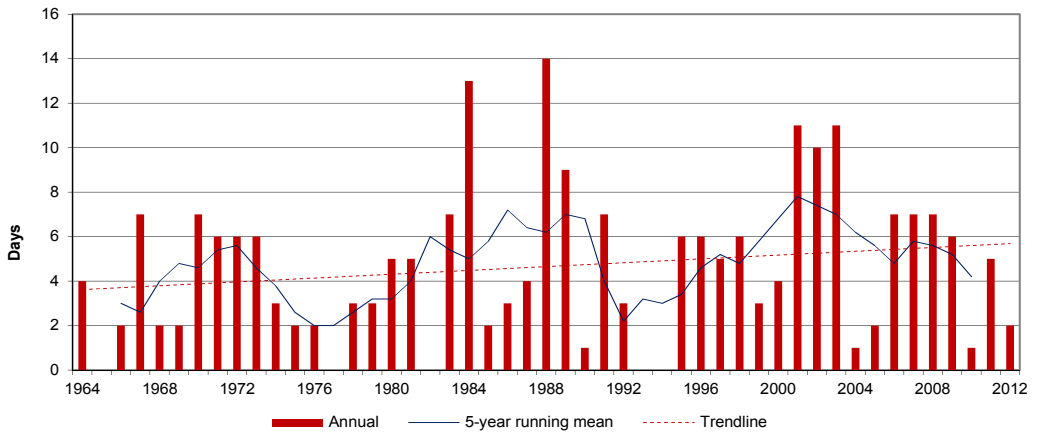


### DAYS WITH TEMPERATURES GREATER THAN A SET POINT

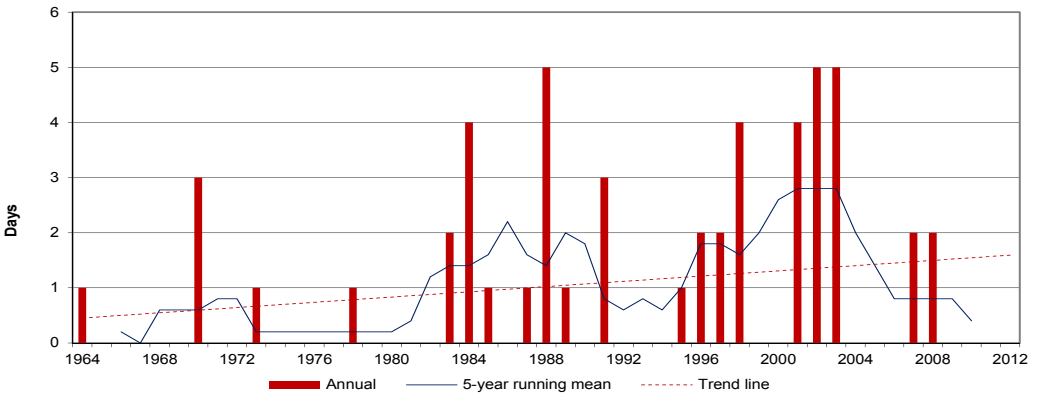
#### 30°C or Greater



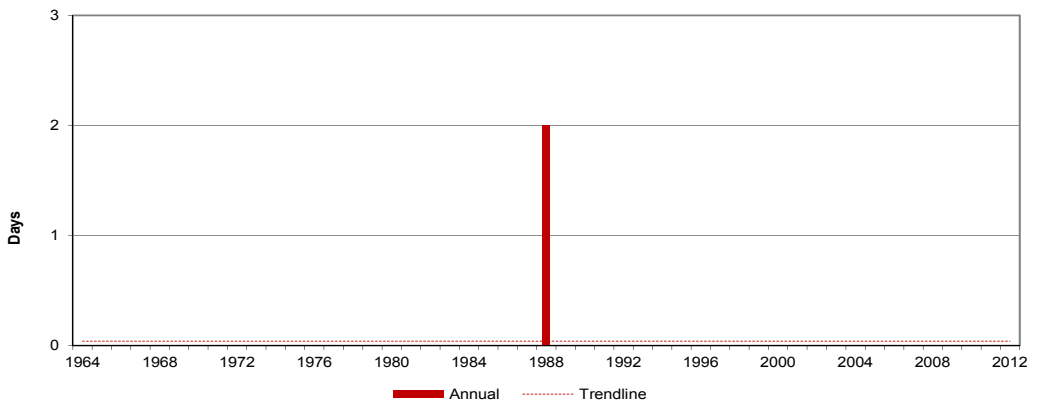
#### 32°C or Greater



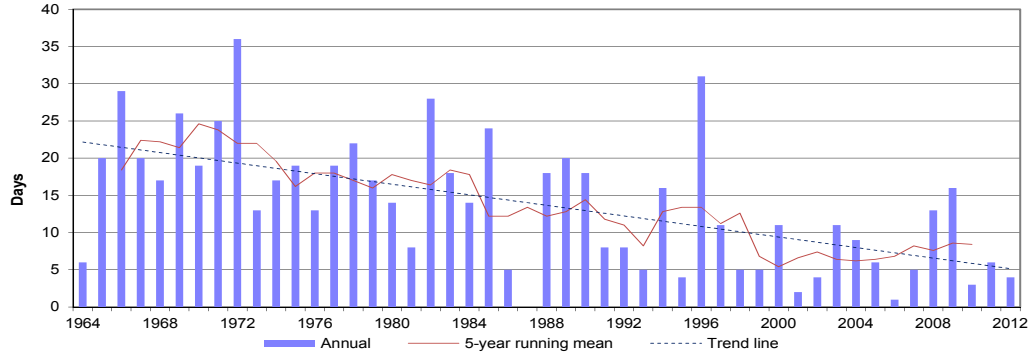
#### 35°C or Greater



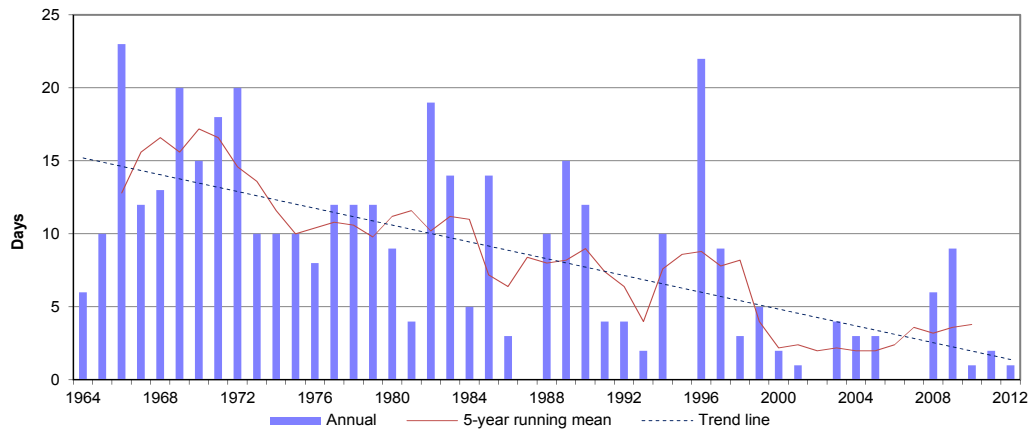
#### 40°C or Greater



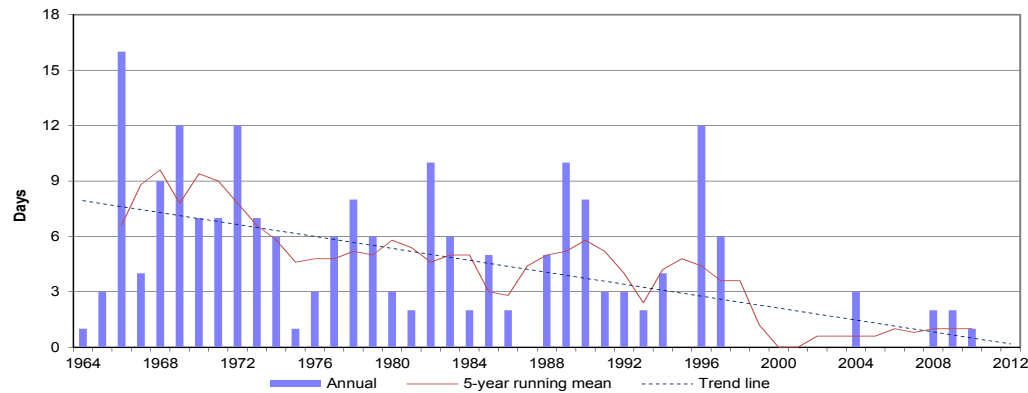
### DAYS WITH TEMPERATURES LESS THAN A SET POINT



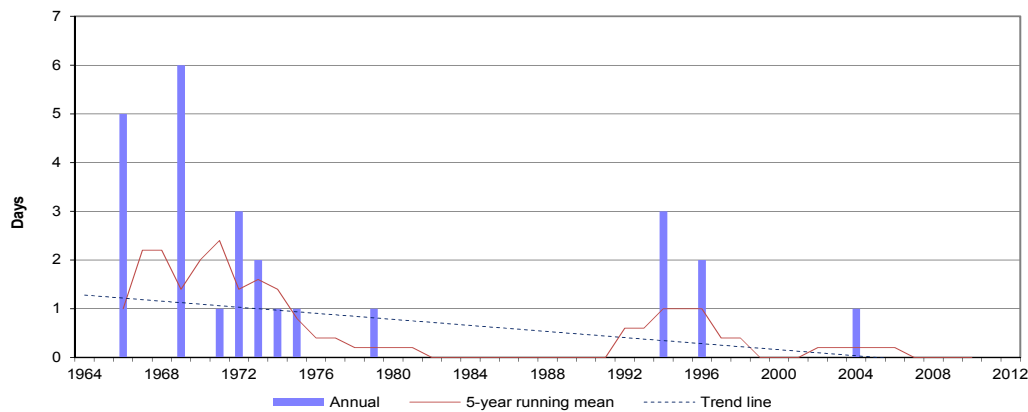
**Minus 30°C or Less**



**Minus 32°C or Less**



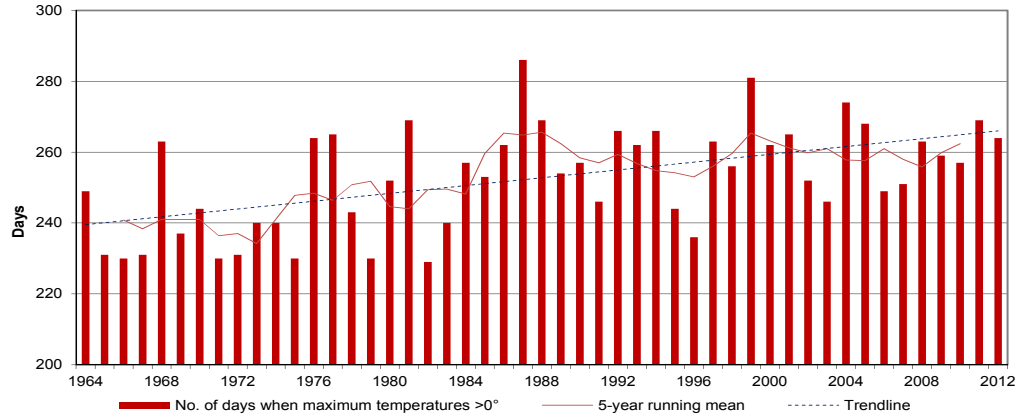
**Minus 35° or Less**



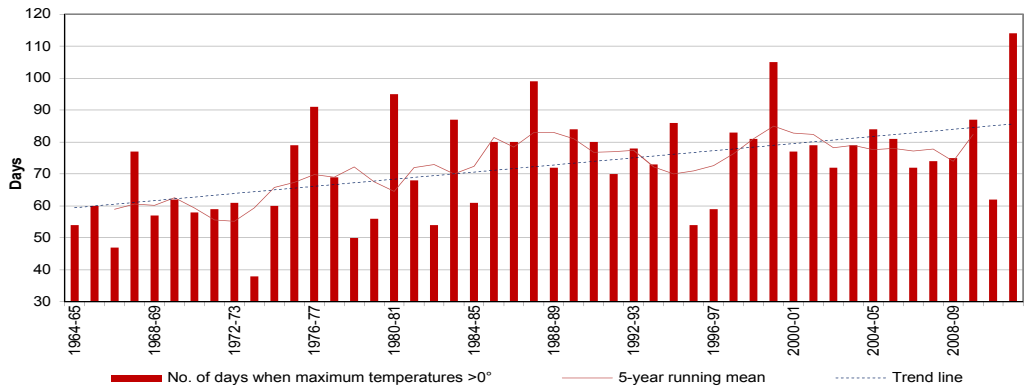
**Minus 40°C or Less**

### DAYS WITH TEMPERATURES GREATER THAN 0°C

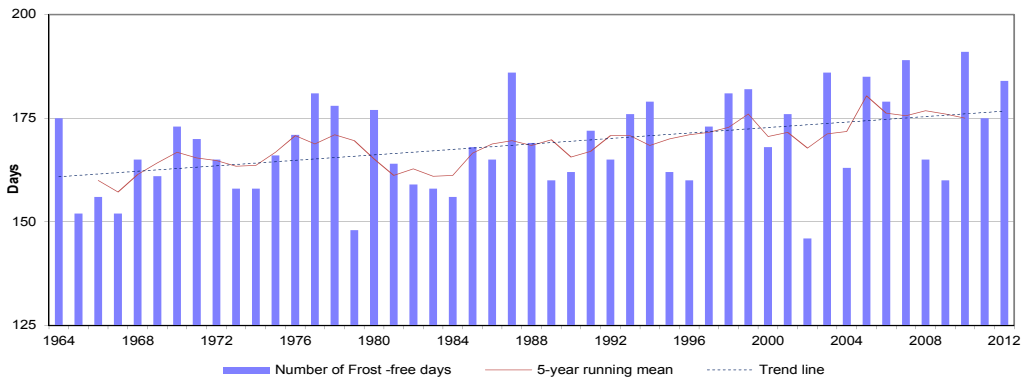
**Maximum Temperature greater than 0°C (Thaw Days) Jan 1<sup>st</sup> to Dec 31<sup>st</sup>**



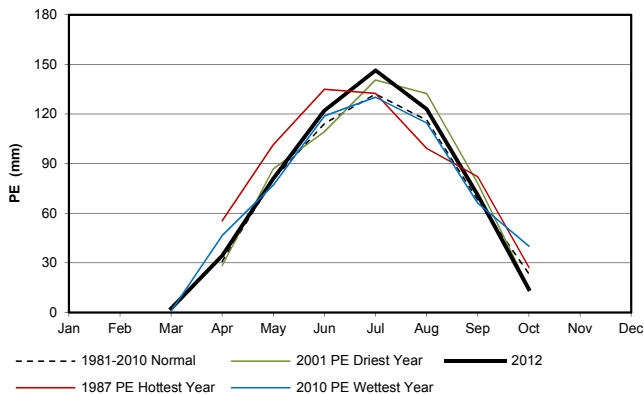
**Maximum Temperature greater than 0°C (Thaw Days) Oct 1<sup>st</sup> to Mar 31<sup>st</sup> (Cold Season)**



**Minimum Temperature greater than 0°C (Frost-free Days)**



### POTENTIAL EVAPOTRANSPIRATION (PE) using the Thornthwaite Method<sup>1</sup>

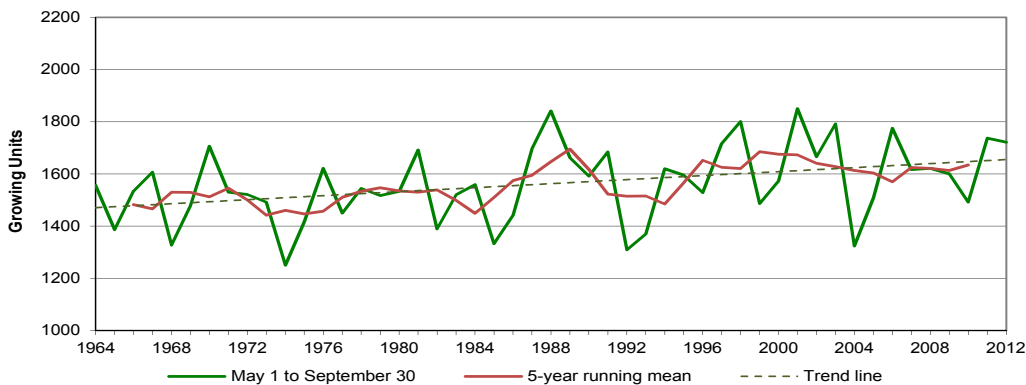
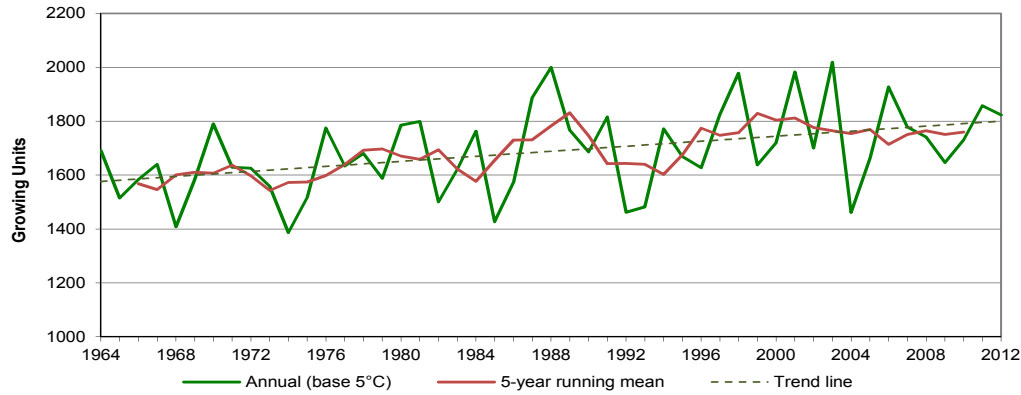
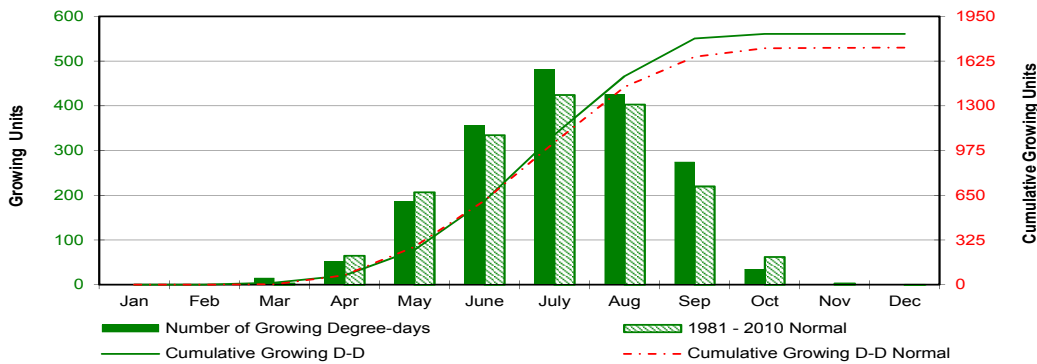


MONTH	PE (mm) 2012	PE (mm) 2010 Wettest Year	PE (mm) 2001 Driest Year	PE (mm) 1987 Hottest Year	PE (mm) 1981-2010 Normal
Jan	0	0	0	0	0
Feb	0	0	0	0	0
Mar	2.4	0.9	0	0	0
Apr	34.3	46.5	28.5	55.5	30.9
May	81.0	77.0	86.8	101.4	80.5
June	122.1	118.8	109.3	135.0	114.2
July	146.4	130.2	140.6	132.5	132.1
Aug	123.0	114.6	132.4	99.2	116.3
Sept	70.9	66.1	78.1	82.1	67.9
Oct	14.1	40.1	14.8	27.3	23.4
Nov	0	0	0	0	0
Dec	0	0	0	0	0
<b>Total</b>	<b>563.7</b>	<b>594.3</b>	<b>590.4</b>	<b>632.9</b>	<b>565.4</b>

<sup>1</sup>Thornthwaite and Mather 1955

### DEGREE-DAYS

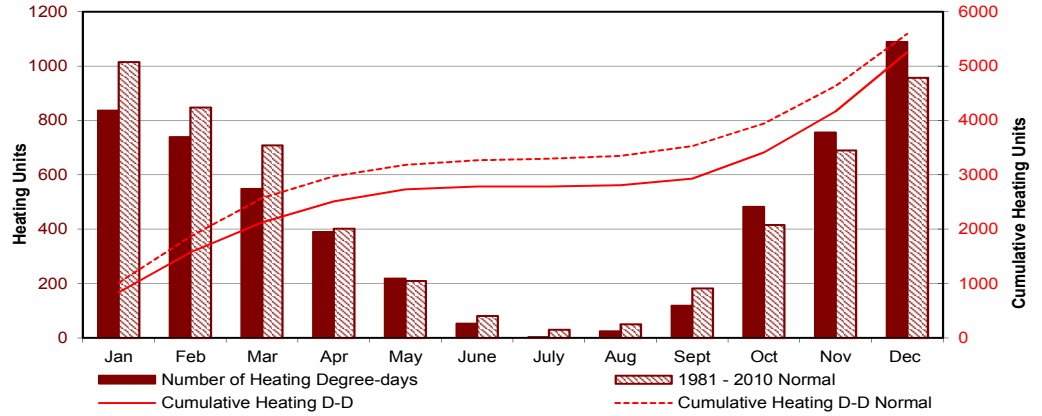
MONTH	GROWING DEGREE-DAYS Base 5°C			HEATING DEGREE-DAYS Base 18°C			COOLING DEGREE-DAYS Base 18°C			EXTREME COOLING DEGREE-DAYS Base 24°C		
	2012	Cumulative	Normal	2012	Cumulative	Normal	2012	Cumulative	Normal	2012	Cumulative	Normal
January	0.0	0.0	0.0	836.2	836.2	1015.1	0.0	0.0	0.0	0.0	0.0	0.0
February	0.0	0.0	0.0	738.7	1574.9	848.2	0.0	0.0	0.0	0.0	0.0	0.0
March	15.0	15.0	3.0	547.8	2122.7	708.8	0.0	0.0	0.0	0.0	0.0	0.0
April	51.8	66.8	65.2	389.6	2512.3	402.4	0.0	0.0	0.2	0.0	0.0	0.0
May	185.8	252.6	206.9	218.4	2730.7	209.3	1.2	1.2	6.3	0.0	0.0	0.1
June	355.5	608.1	334.8	52.6	2783.3	81.4	18.1	19.3	24.8	0.0	0.0	1.5
July	481.0	1089.1	424.0	2.8	2786.1	30.7	80.8	100.1	51.7	2.6	2.6	2.9
August	425.1	1514.2	402.8	24.1	2810.2	50.0	46.2	146.3	49.8	1.0	3.6	3.5
September	274.3	1788.5	219.9	118.6	2928.8	182.5	2.9	149.2	7.6	0.0	3.6	0.1
October	34.5	1823.0	62.2	482.4	3411.2	415.1	0.0	149.2	0.1	0.0	3.6	0.0
November	0.0	1823.0	2.9	755.8	4167.0	690.1	0.0	149.2	0.0	0.0	3.6	0.0
December	0.0	1823.0	0.1	1088.6	5255.6	957.5	0.0	149.2	0.0	0.0	3.6	0.0



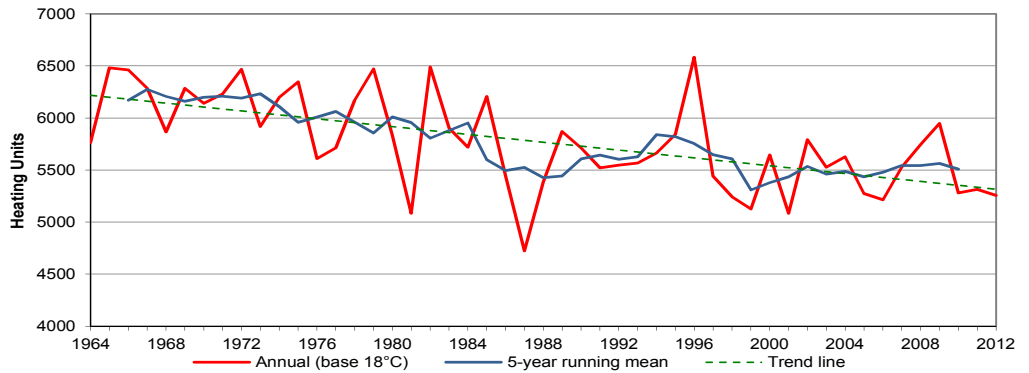


### DEGREE-DAYS

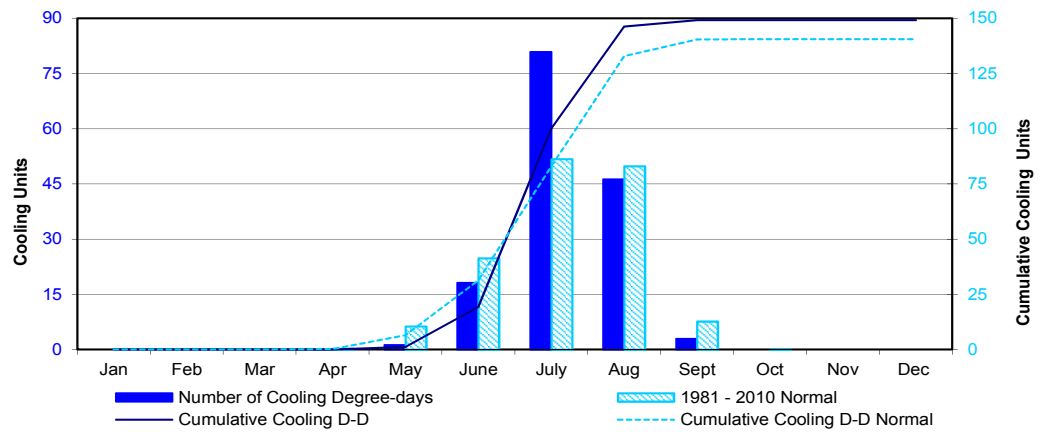
**Heating Degree-days Monthly**



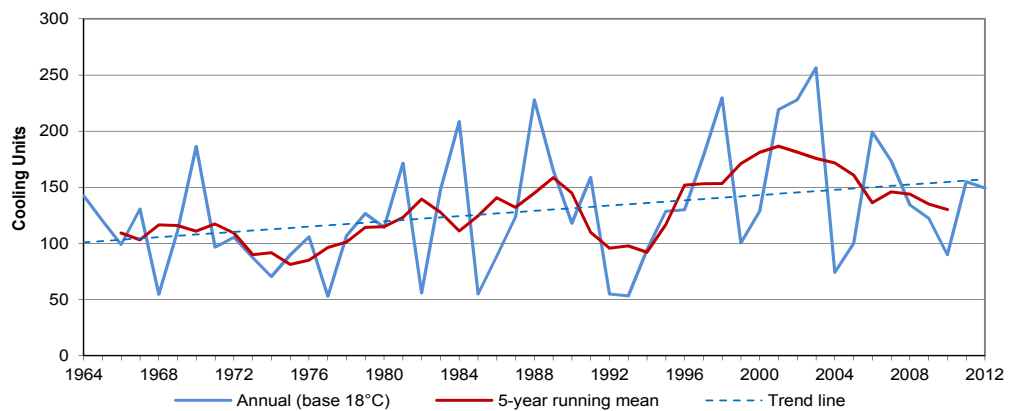
**Heating Degree-days Annual**



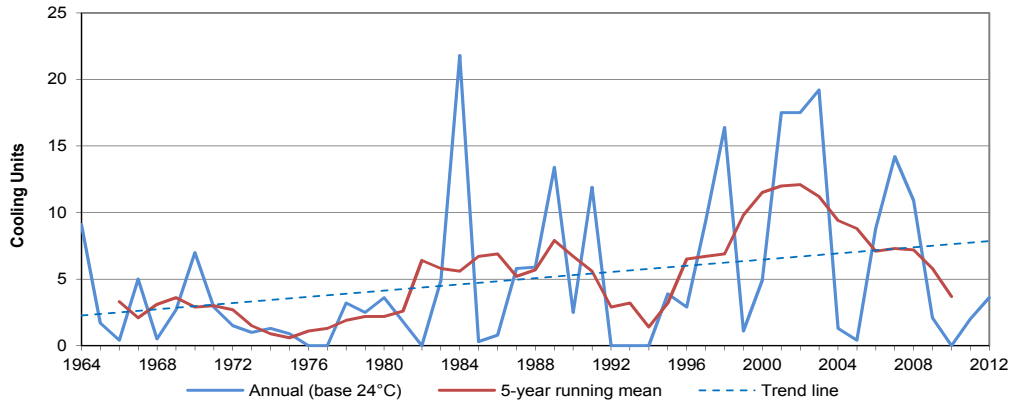
**Cooling Degree-days Monthly**



**Cooling Degree-days Annual**



### DEGREE-DAYS



**Extreme Cooling Degree-days Annual**

2012	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	-5.0	1.9	-4.6	11.1	12.1	25.1	22.3	24.4	20.8	21.2	-1.6	-9.5
2	-0.3	0.1	-6.6	11.6	9.9	27.6	25.2	23.3	21.3	13.6	-0.6	-7.5
3	3.4	2.6	-1.7	17.9	12.1	23.2	23.9	17.8	21.5	7.5	-0.3	-13.0
4	5.5	5.2	2.7	19.8	14.2	24.7	20.3	22.0	17.3	5.2	1.0	-8.5
5	6.7	0.6	0.8	11.8	12.0	26.2	24.6	26.9	20.2	6.5	6.4	-2.2
6	1.5	-3.6	-3.2	5.4	9.8	27.0	26.7	26.3	17.9	12.8	5.2	-9.5
7	-0.3	-4.7	-2.7	6.8	16.1	23.2	28.5	27.0	25.7	14.3	2.8	-14.5
8	4.6	-1.3	-1.0	2.8	20.7	26.1	28.7	29.1	21.3	8.7	-0.9	-10.8
9	6.6	-8.0	8.2	4.9	26.5	16.4	29.6	27.6	28.4	7.1	-6.8	-16.3
10	2.5	-17.2	8.8	7.5	13.9	12.5	33.5	27.4	27.7	3.2	-11.4	-13.3
11	-11.6	-7.4	9.3	12.5	16.9	17.1	29.5	24.7	16.8	3.2	-11.4	-16.5
12	-0.8	-3.9	7.4	15.1	22.5	26.4	31.2	22.9	17.2	8.3	-6.5	-16.7
13	3.3	1.7	11.1	10.7	25.8	20.4	27.8	23.6	19.5	11.9	-1.8	-7.9
14	-1.8	0.1	4.6	12.0	20.9	19.9	23.7	17.3	29.1	17.3	0.9	-7.0
15	-5.0	-0.3	11.3	4.6	21.0	21.6	21.3	17.9	20.8	20.0	-0.4	-5.3
16	-20.9	-1.8	13.4	3.4	25.5	20.3	18.0	22.6	14.9	18.6	-1.6	-10.8
17	-27.3	0.8	9.3	4.1	17.8	15.9	20.4	25.6	19.6	10.6	-4.7	-10.7
18	-25.1	2.2	9.9	8.0	10.7	17.4	28.2	26.0	22.6	6.8	5.9	-10.3
19	-20.4	2.3	2.2	6.5	15.1	16.6	25.6	27.5	16.5	6.7	4.5	-12.1
20	-18.5	-0.8	4.6	6.2	19.5	20.4	25.3	28.5	20.1	3.9	5.3	-14.5
21	-11.0	-0.9	8.1	15.5	23.4	22.5	28.4	28.9	17.7	4.0	-6.4	-12.8
22	-11.1	2.5	3.3	21.0	12.6	24.5	27.0	27.7	19.0	-0.6	-10.0	-15.4
23	-2.9	-1.3	-2.5	23.2	8.7	24.7	26.5	27.8	25.6	0.5	-7.3	-19.2
24	-1.8	-3.9	-2.0	19.0	14.7	24.5	24.7	22.4	22.4	0.3	-5.2	-20.8
25	4.3	-6.7	3.9	9.0	15.2	29.6	21.8	16.2	20.4	-0.2	-11.0	-20.0
26	1.0	-11.4	8.0	9.3	17.1	23.9	23.9	22.6	23.4	-2.4	-8.9	-23.7
27	-4.5	-7.2	6.5	6.3	13.1	17.8	28.6	27.0	24.0	-4.2	-11.8	-17.9
28	-5.6	-2.0	5.7	7.3	12.9	23.2	29.4	33.4	25.9	-2.3	-10.2	-18.3
29	-3.2	1.5	14.2	9.2	17.9	25.6	25.7	24.6	26.2	1.4	-12.6	-6.6
30	1.6		17.4	16.8	21.0	25.8	28.6	26.5	18.3	1.9	-9.0	-8.2
31	3.6		14.4		23.3		25.8	28.0		0.8		-12.0

**Maximum Temperature Daily**

March 12, 2012 Saskatoon  
photo credit: CR Beaulieu



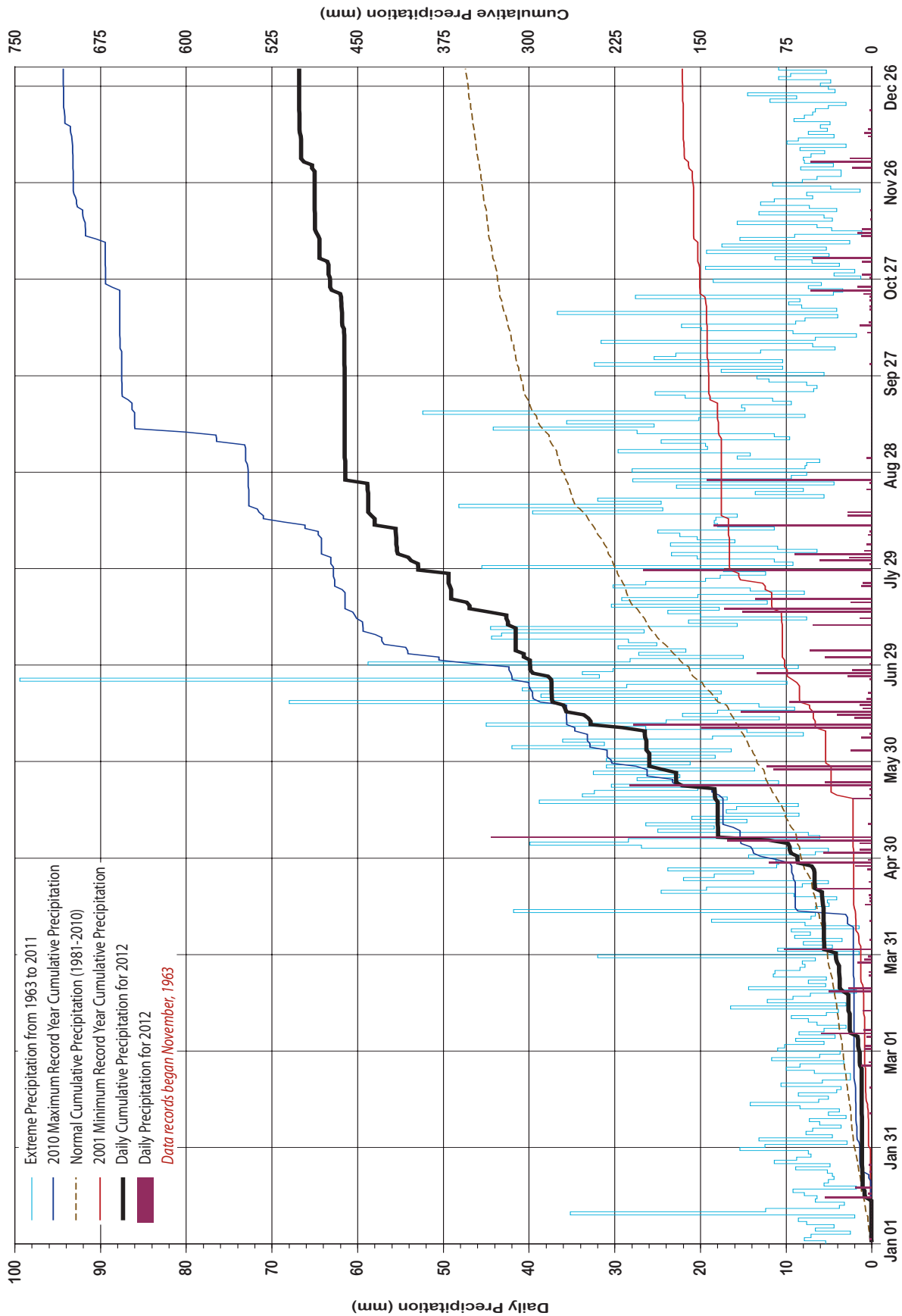
**Minimum Temperature  
Daily**

2012	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
1	-15.1	-8.3	-10.8	1.1	2.5	10.3	15.6	15.1	14.3	4.2	-7.1	-13.3
2	-16.2	-10.1	-14.7	-0.9	3.8	12.9	15.2	12.9	7.5	6.2	-3.8	-13.1
3	-4.0	-10.6	-14.2	-0.5	2.6	12.7	14.2	10.5	12.0	1.5	-4.2	-18.0
4	-4.8	-8.3	-6.1	3.3	5.4	9.9	12.1	6.8	10.0	-1.9	-2.2	-17.8
5	-0.1	-8.7	-3.9	2.1	7.6	14.3	12.2	14.8	8.2	-6.6	-1.0	-11.2
6	-3.8	-10.5	-12.7	0.6	6.9	14.8	12.1	13.5	7.7	-3.0	-2.9	-21.6
7	-8.0	-11.0	-13.9	-1.0	4.3	8.8	10.9	13.0	6.0	0.3	-1.1	-24.0
8	-7.3	-13.0	-10.3	-4.7	2.0	11.0	14.6	16.0	5.8	1.0	-7.2	-23.1
9	-3.3	-23.1	-5.5	-7.7	11.9	11.4	16.5	17.1	10.1	-1.2	-12.8	-26.6
10	-11.6	-27.7	-3.1	-8.5	5.2	8.5	18.9	12.1	9.7	-0.9	-12.5	-23.3
11	-18.3	-25.9	-3.6	-3.8	2.1	6.2	19.2	15.2	7.6	-4.5	-19.7	-25.3
12	-13.8	-17.9	1.7	1.9	3.5	9.7	16.0	11.0	8.8	-2.4	-20.0	-20.7
13	-5.9	-13.7	1.2	5.0	8.6	10.0	15.8	9.5	8.2	-2.8	-9.4	-20.1
14	-10.3	-10.3	-1.2	0.4	8.7	12.8	12.5	14.6	8.3	0.8	-10.6	-16.6
15	-23.0	-9.1	-1.5	-5.4	3.9	10.4	17.1	9.9	7.8	4.3	-11.1	-16.7
16	-27.7	-12.3	1.4	-5.4	3.9	10.4	17.1	9.9	3.2	3.1	-11.0	-16.4
17	-32.9	-15.9	-2.5	-3.7	8.8	11.5	15.9	8.6	2.4	4.2	-11.6	-20.8
18	-31.9	-11.7	1.9	-7.7	6.8	10.0	17.1	12.2	7.4	-0.5	-7.5	-12.4
19	-28.0	-6.0	-3.4	-0.7	3.3	11.7	16.5	14.0	6.1	-1.0	-6.3	-22.4
20	-27.8	-6.4	-5.6	-2.8	1.7	7.4	13.1	11.5	6.6	-1.0	-6.5	-27.5
21	-19.0	-5.7	-4.5	2.0	9.6	10.4	16.5	12.3	4.3	-5.0	-10.2	-19.5
22	-18.4	-4.7	-3.3	-0.6	8.7	9.3	16.6	16.2	2.1	-7.5	-15.5	-23.0
23	-19.3	-9.9	-7.2	2.6	4.7	10.8	15.8	13.8	3.9	-2.1	-19.4	-22.0
24	-11.5	-13.9	-7.7	5.5	4.1	13.5	15.0	12.0	7.4	-1.6	-11.0	-26.4
25	-3.8	-13.9	-9.5	0.8	0.7	15.4	13.0	11.1	1.3	-4.2	-20.3	-28.9
26	-8.9	-16.1	-1.3	-1.1	2.8	16.2	12.8	12.6	1.0	-5.5	-14.5	-31.2
27	-8.6	-15.6	-1.7	2.8	2.1	11.4	12.2	10.8	2.4	-9.6	-17.1	-31.2
28	-12.4	-18.5	-3.4	0.6	5.3	13.0	15.5	17.1	6.5	-10.0	-16.2	-23.2
29	-12.2	-12.3	2.3	3.7	2.4	11.4	13.6	13.0	10.1	-3.2	-15.7	-22.1
30	-8.7		3.0	2.5	5.7	13.6	14.5	10.3	8.4	0.4	-13.5	-24.6
31	-6.1		-0.5		7.9		17.6	7.7		-7.7		-25.0

**Average Temperature  
Daily**

2012	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
1	-10.1	-3.2	-7.7	6.1	7.3	17.7	19.0	19.8	17.6	12.7	-4.4	-11.4
2	-8.3	-5.0	-10.7	5.4	6.9	20.3	20.2	18.1	14.4	9.9	-2.2	-10.3
3	-0.3	-4.0	-8.0	8.7	7.4	18.0	19.1	14.2	16.8	4.5	-2.3	-15.5
4	0.4	-1.6	-1.7	11.6	9.8	17.3	16.2	14.4	13.7	1.7	-0.6	-13.2
5	3.3	-4.1	-1.6	7.0	9.8	20.3	18.4	20.9	14.2	0.0	2.7	-6.7
6	-1.2	-7.1	-8.0	3.0	8.4	20.9	19.4	19.9	12.8	4.9	1.2	-15.6
7	-4.2	-7.9	-8.3	2.9	10.2	16.0	19.7	20.0	15.9	7.3	0.9	-19.3
8	-1.4	-7.2	-5.7	-1.0	11.4	18.6	21.7	22.6	13.6	4.9	-4.1	-17.0
9	1.7	-15.6	1.4	-1.4	19.2	13.9	23.1	22.4	19.3	3.0	-9.8	-21.5
10	-4.6	-22.5	2.9	-0.5	9.6	10.5	26.2	19.8	18.7	1.2	-12.0	-18.3
11	-15.0	-16.7	2.9	4.4	9.5	11.7	24.4	20.0	12.2	-0.7	-15.6	-20.9
12	-7.3	-10.9	4.6	8.5	13.0	18.1	23.6	17.0	13.0	3.0	-13.3	-18.7
13	-1.3	-6.0	6.2	7.9	17.2	15.2	21.8	16.6	13.9	4.6	-5.6	-14.0
14	-6.1	-5.1	1.7	6.2	14.8	16.4	18.1	16.0	18.7	9.1	-4.9	-11.8
15	-14.0	-4.7	4.9	-0.4	12.5	16.0	19.2	13.9	14.3	12.2	-5.8	-11.0
16	-24.3	-7.1	7.4	-1.0	14.7	15.4	17.6	16.3	9.1	10.9	-6.3	-13.6
17	-30.1	-7.6	3.4	0.2	13.3	13.7	18.2	17.1	11.0	7.4	-8.2	-15.8
18	-28.5	-4.8	5.9	0.2	8.8	13.7	22.7	19.1	15.0	3.2	-0.8	-11.4
19	-24.2	-1.9	-0.6	2.9	9.2	14.2	21.1	20.8	11.3	2.9	-0.9	-17.3
20	-23.2	-3.6	-0.5	1.7	10.6	13.9	19.2	20.0	13.4	1.5	-0.6	-21.0
21	-15.0	-3.3	1.8	8.8	16.5	16.5	22.5	20.6	11.0	-0.5	-8.3	-16.2
22	-14.8	-1.1	0.0	10.2	10.7	16.9	21.8	22.0	10.6	-4.1	-12.8	-19.2
23	-11.1	-5.6	-4.9	12.9	6.7	17.8	21.2	20.8	14.8	-0.8	-13.4	-20.6
24	-6.7	-8.9	-4.9	12.3	9.4	19.0	19.9	17.2	14.9	-0.7	-8.1	-23.6
25	0.3	-10.3	-2.8	4.9	8.0	22.5	17.4	13.7	10.9	-2.2	-15.7	-24.5
26	-4.0	-13.8	3.4	4.1	10.0	20.1	18.4	17.6	12.2	-4.0	-11.7	-27.5
27	-6.6	-11.4	2.4	4.6	7.6	14.6	20.4	18.9	13.2	-6.9	-14.5	-24.6
28	-9.0	-10.3	1.2	4.0	9.1	18.1	22.5	25.3	16.2	-6.2	-13.2	-20.8
29	-7.7	-5.4	8.3	6.5	10.2	18.5	19.7	18.8	18.2	-0.9	-14.2	-14.4
30	-3.6		10.2	9.7	13.4	19.7	21.6	18.4	13.4	1.2	-11.3	-16.4
31	-1.3		7.0		15.6		21.7	17.9		-3.5		-18.5

### DAILY PRECIPITATION





## PRECIPITATION

2012 PRECIPITATION RECORDS			
TYPE	DATE	NEW RECORD	OLD RECORD/ date
Greatest Daily Precipitation (mm)	January 18	1.9	1.8/1987
	March 19	5.0	1.8/1972
	April 28	12.0	10.9/1973&1990
	May 6	44.4	6.1/1968
	July 28	26.6	17.3/1965
	August 11	18.4	18.0/2002
	October 23	7.1	3.4/1981&1984
	November 10	1.6	1.2/1985
Greatest Daily Maximum for the Month	May 6	44.4	39.9/04/1985
Least Monthly Precipitation (mm)	February	1.9	2.5/1984
	September	0.8	0.8/1995
Least number of Days with Precipitation	September	2	2/1995

EXTREME PRECIPITATION EVENTS *		
PERIOD	DATE	AMOUNT
0.5 hour	August 11	15.4 mm
0.5 hour	July 28	12.6 mm
1 hour	August 11	17.2 mm
1 hour	July 19	13.6 mm
2 hours	August 11	17.6 mm
2 hours	July 19	13.6 mm
6 hours	May 6	22.0 mm
6 hours	June 10	19.8 mm
12 hours	May 6	32.0 mm
12 hours	June 10	27.6 mm
24 hours	May 5-6	54.4 mm
Daily	May 6	44.4 mm
Daily	June 10	27.8 mm
More than one day	May 4 - 6	62.6 mm
Longest wet spell	June 11 - 18	7 days (33.8mm)
Longest dry spell	Sept 2 -29	28 days.

\*recorded by the tipping bucket from May to September inclusive

RANKING BY DRIEST MONTH BY PRECIPITATION AMOUNT		RANKING BY DRIEST MONTH BY % OF NORMAL PRECIPITATION	
SEP	0.8	SEP	2.2
FEB	1.9	FEB	20.4
JAN	8.4	JAN	54.2
DEC	11.4	OCT	72.4
OCT	13.9	DEC	89.8
NOV	14.4	NOV	107.5
MAR	20.9	AUG	123.9
APR	33.8	APR	147.6
AUG	57.6	MAR	151.4
JLY	104.0	JUN	156.8
JUN	104.4	JLY	176.4
MAY	129.8	MAY	329.4

ANNUAL RANKING BY DRIEST YEAR (mm)									
ANNUAL		WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2001	165.8	2002	12.1	2009	19.0	1984	70.2	1999	17.2
1987	232.4	2012	13.5	2002	20.3	1964	73.9	1994	21.0
2003	257.7	1984	19.2	2008	29.8	1977	81.9	1976	21.8
1998	263.3	2008	21.6	1998	29.8	2001	91.2	1987	27.4
1981	279.8	1993	22.0	2001	34.0	1985	91.8	2001	28.5
1964	282.7	1998	22.4	2011	41.3	1987	92.6	2012	29.1
1988	285.7	2010	22.5	1980	42.2	1969	105.5	2000	31.2
1992	288.1	2001	23.1	1965	43.2	1992	115.6	1972	32.3
1997	291.4	2003	29.2	1981	54.3	1997	116.4	1990	33.9
1984	293.1	2004	29.3	2004	55.4	1980	120.3	1971	34.2
1999	297.7	1987	30.6	1992	55.5	1981	124.9	1988	38.1
1993	300.0	1999	31.3	1988	55.6	2003	126.2	1974	40.0
1980	305.9	1995	31.3	1999	56.5	1972	133.3	2007	45.3
1990	309.8	2000	31.7	1984	57.2	1998	133.4	1975	48.8
2008	313.8	2006	32.0	1996	58.8	1979	135.9	2004	50.0
2000	315.4	2011	32.3	2000	59.2	1967	139.9	1966	50.2
1972	317.9	1988	35.9	1971	61.1	1978	142.5	1965	50.9
2009	319.3	1982	37.0	1966	61.2	1975	144.5	2003	51.2
2002	320.0	1967	37.9	2003	61.8	1990	144.5	1995	52.6
2011	320.6	2009	38.8	2005	62.1	1988	148.9	1979	53.4
1995	327.7	1991	40.3	1993	62.2	1989	149.9	1985	55.2
1985	330.6	1983	41.1	2007	64.7	1993	151.0	1970	56.4
1976	331.8	1977	43.1	1995	65.4	1996	154.4	2009	56.5
1996	340.6	1994	45.1	1970	65.7	1973	156.1	1981	61.4
1994	341.4	2005	45.4	1964	65.8	1995	164.4	1997	61.6
1979	352.0	1964	47.9	1969	68.5	1994	165.6	2008	64.4
1967	354.3	1997	48.0	1976	69.1	1976	169.4	1989	64.5
1978	358.1	1996	51.0	1972	71.6	2000	183.8	1977	65.4
1965	358.8	1981	52.2	1978	72.8	2006	183.8	2011	65.7
1977	370.5	1985	52.3	1973	73.1	2011	186.6	1992	65.9
1966	376.9	1970	52.7	1987	73.6	2008	191.2	1980	66.6
1989	384.8	1968	53.8	1967	78.0	1999	194.2	1998	70.0
1970	388.8	1966	54.7	1986	82.5	1986	196.2	1968	71.3
1975	392.3	1992	55.0	1990	87.2	1974	205.5	2002	72.8
1973	393.3	1990	55.6	1979	87.3	1965	206.6	1993	73.1
2004	404.5	1986	57.2	1997	88.2	2002	206.8	1996	74.4
1986	411.3	1989	57.9	1968	97.6	1982	208.4	1967	76.8
2007	413.9	1971	60.4	1989	101.7	2009	212.8	1964	77.4
1971	414.6	1979	61.3	2006	101.8	1983	215.8	1982	81.5
1969	427.4	1978	63.0	1994	109.4	1970	216.5	1986	87.2
1982	436.2	1973	63.2	1982	110.8	1966	222	1973	88.2
1968	443.1	1975	67.3	1975	119.6	1968	225.9	1983	96.2
1974	462.7	1965	69.3	1983	125.2	2007	231.0	1991	105.4
1983	471.6	1976	69.5	1985	134.3	1971	248.8	2005	109.4
2005	486.8	1980	73.0	1991	147.3	1991	251.6	1978	111.4
2012	501.1	2007	74.7	1974	148.0	2004	260.0	1984	137.0
2006	517.5	1974	92.2	1977	164.1	2012	266.0	2010	151.1
1991	546.9	1972	92.2	2012	184.3	2005	269.4	1969	151.8
2010	707.4	1969	98.1	2010	216.1	2010	316.4	2006	203.4

### PRECIPITATION RANKINGS

ANNUAL RANKING BY DAYS WITH PRECIPITATION									
ANNUAL		WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2001	84	2002	16	1964	14	1984	18	1976	9
1964	86	1984	18	1965	16	2001	23	1974	13
1984	88	1987	19	1966	18	1967	25	1999	13
1988	91	2012	19	1968	19	1985	25	1987	14
1965	94	1995	21	1988	19	2011	25	1997	14
1966	98	1985	22	1992	20	2003	26	1994	15
1986	98	1988	23	1994	20	1969	27	1966	17
1997	98	1994	23	2001	20	1964	28	1964	18
1967	100	2001	23	1967	21	1970	28	1990	18
1994	101	1964	24	1981	21	1979	28	1982	19
1987	102	1993	24	1978	22	1998	28	1988	19
1990	105	1996	24	1980	22	1965	29	2000	19
1968	106	1968	25	1986	22	1971	31	1995	20
1993	106	1999	25	1998	22	1983	31	1979	21
1998	106	1966	26	2002	22	2007	31	1968	22
1985	107	1967	26	1972	23	1988	32	1972	22
1995	107	1986	26	1976	23	1990	32	1993	22
1999	107	2008	26	1984	24	1995	32	2005	22
2002	107	1965	27	1996	24	1968	33	2012	22
1996	110	1989	27	2009	24	1977	33	1971	23
2003	110	1990	27	1985	25	1992	33	1980	23
1981	113	1998	27	2008	25	1996	34	1986	23
1976	115	2004	29	1970	26	1997	34	2009	23
1992	116	2010	29	1971	26	1999	34	1965	24
2000	118	1992	30	1973	26	1966	35	1981	24
2009	119	1997	30	1987	27	1975	35	1996	24
2012	120	2000	30	1990	27	1980	35	1998	24
2008	121	2007	30	1991	27	1987	35	2001	24
1971	122	1977	31	2010	28	1993	35	2011	24
1980	123	1975	33	1969	30	2000	35	1973	25
1989	124	1991	33	1989	30	2006	35	1975	25
1970	126	2003	33	1995	30	1972	36	2003	25
1979	126	1982	34	2003	30	1989	36	1967	27
1973	127	1973	36	2007	30	2002	36	2008	27
2011	127	1980	36	2011	30	2008	36	1985	28
1972	128	1981	36	1977	31	2009	36	1984	29
2007	128	2006	36	1993	31	1986	37	2002	29
1977	129	2005	37	1999	31	1973	38	1977	30
1975	130	1970	40	1997	32	1974	38	1991	30
1991	131	1971	40	2000	32	1981	38	2010	30
1983	132	1978	40	1982	34	1976	39	1989	31
2010	132	2011	40	1975	35	2005	40	1969	32
2005	135	1976	41	1974	36	1994	41	1970	32
1974	136	1983	41	1983	36	1982	42	1983	32
1982	136	2009	43	2005	36	1991	42	1992	33
1978	139	1972	48	2006	36	2004	42	2004	34
2006	139	1979	48	1979	37	1978	43	1978	36
1969	147	1974	57	2012	39	2012	43	2007	36
2004	158	1969	61	2004	44	2010	45	2006	38

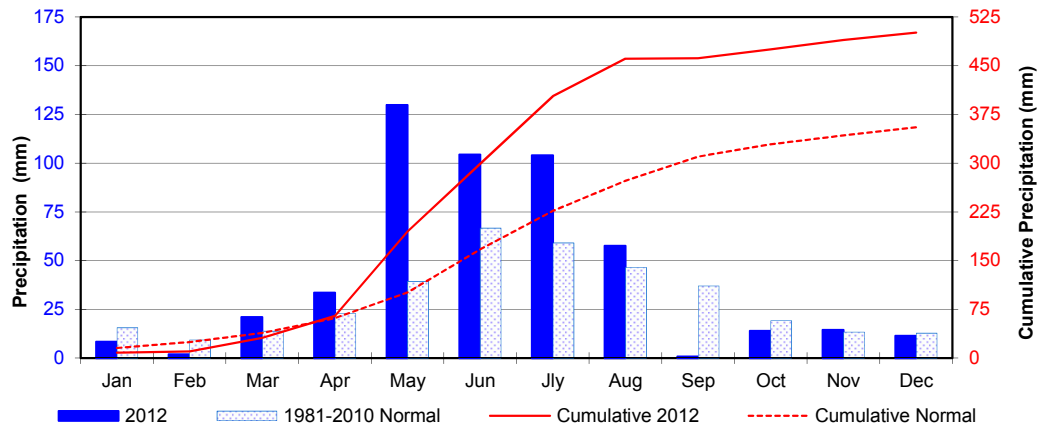
RANKING BY					
Total Number of Dry Days		Maximum Length of Dry Spell		Maximum Length of Wet Spell	
1973	200	1970	13	1967	4
2004	208	2006	13	1984	4
1969	218	1989	14	2001	4
1978	224	1971	15	1971	5
2006	227	2007	15	1985	5
1974	229	1983	16	1987	5
1982	229	1990	16	1990	5
2005	231	1991	16	1995	5
1983	233	1992	16	1998	5
2010	233	1975	17	1999	5
1991	234	1979	17	1964	6
1975	235	1985	17	1966	6
2007	237	1998	17	1970	6
1972	238	2005	17	1975	6
1977	238	1994	18	1978	6
1979	239	1995	18	1979	6
2011	239	2003	18	1981	6
1970	240	1967	19	1988	6
1989	241	1981	19	1991	6
1971	243	1988	19	1994	6
1980	244	2008	19	1996	6
2008	245	1969	20	2006	6
2009	246	1986	20	2007	6
2000	248	1999	20	1973	7
2012	248	2011	20	1976	7
1992	250	1978	21	1982	7
1976	251	1982	21	1992	7
2003	255	2001	21	1993	7
1996	256	1977	22	2000	7
1985	258	1987	22	2002	7
1993	258	1972	23	2012	7
1995	258	1973	23	1965	8
1999	258	1996	23	1972	8
2002	258	2004	25	1974	8
1998	259	1968	27	2005	8
1968	260	1966	28	2009	8
1990	260	1974	28	2011	8
1994	264	2012	28	1983	9
1967	265	2010	29	1986	9
1981	266	1984	30	2010	9
1987	266	2009	30	1977	10
1966	267	1964	31	1980	10
1986	267	2002	35	1989	10
1997	267	1980	36	2004	10
1965	271	1997	36	2008	10
1988	275	1965	37	1997	12
1984	278	1993	40	1968	14
1964	280	2000	40	1969	14
2001	282	1976	48	2003	21

# PRECIPITATION

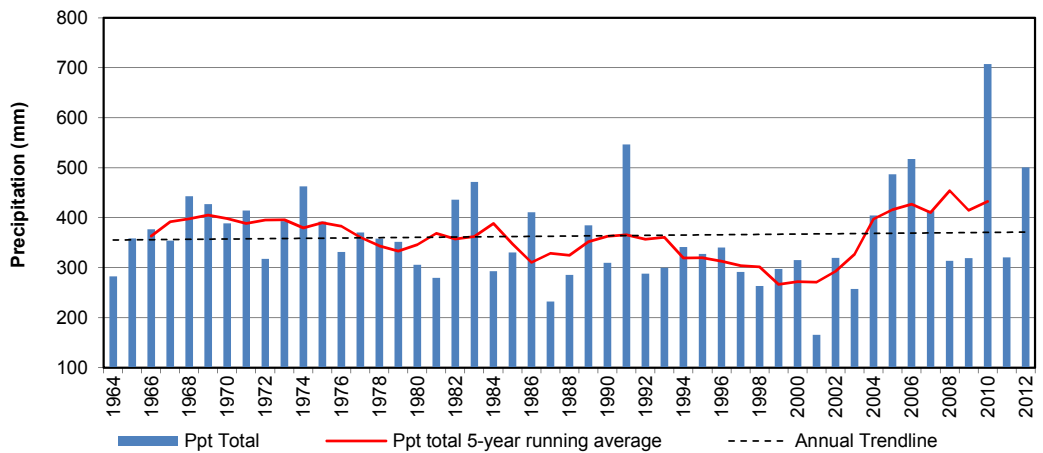
MONTH	MONTHLY PRECIPITATION (mm)				EXTREME VALUES (mm)			STATION	OPERATIONAL PERIOD	
	2012	NORMAL	CUMULATIVE 2012	% OF CUMULATIVE NORMAL	CRS Maximum	CRS Minimum	SASKATOON AREA Maximum			
January*	8.4	15.5	8.4	54.2	48.6/1969	2.6/2001	66.1/1911 <sup>SE</sup>	SM	Saskatoon stations circa (RWNIP et al)	1889-1901
February*	1.9	9.3	10.3	41.5	40.2/1979	2.5/1984	43.7/1924 <sup>SE</sup>	SE	Saskatoon Eby	1901-42
March*	21.0	13.8	31.3	81.1	57.1/1967	0.8/2010	59.0/1927 <sup>SE</sup>	US	University of Saskatchewan	1915-64
April*	33.5	22.9	64.8	105.4	81.1/2010	2.4/2007	86.1/1955 <sup>US</sup>	S	Saskatoon	1941-42
May	129.8	39.4	194.6	192.9	145.3/1977	0.2/2002	178.0/1977 <sup>SWT</sup>	SA	S'toon Diefenbaker In'l Airport	1942-2008
June	104.4	66.6	299.0	178.5	171.0/2005	13.0/1985	186.8/1942 <sup>S</sup>	NRC	National Research Council	1952-66
July	104.0	59.0	403.0	177.9	125.9/1971	13.0/1984	162.9/1928 <sup>SE</sup>	SRC	Sask. Research Council	1963-
August	57.6	46.5	460.6	168.7	105.2/2007	7.0/2001	178.9/1954 <sup>NRC</sup>	SWT	S'toon Water Treatment Plant	1974-2006
September	0.8	37.0	461.4	148.8	128.4/2006	0.8/1995	128.4/2006 <sup>SRC/KCS</sup>	SC	Saskatoon Central Ave	1974-89
October*	13.9	19.2	475.3	144.4	69.8/1969	0.0/2000	69.8/1969 <sup>SRC</sup>	S2	Saskatoon 2	1977-90
November*	14.4	13.4	489.7	142.9	48.2/1973	0.4/2009	57.3/1940 <sup>SE</sup>	K	Saskatoon Kemen Farm	1993-2004
December*	11.4	12.7	501.1	141.0	43.0/1977	1.2/1997	59.2/1956 <sup>SA</sup>	KCS	Saskatoon Kemen Farm CS	1996-2008
Total	501.1	355.3			707.4/2010	165.8/2001	707.4/2010 <sup>SRC</sup>	RCS	Environment Canada	2008-

\*Belfort weighing gauge values

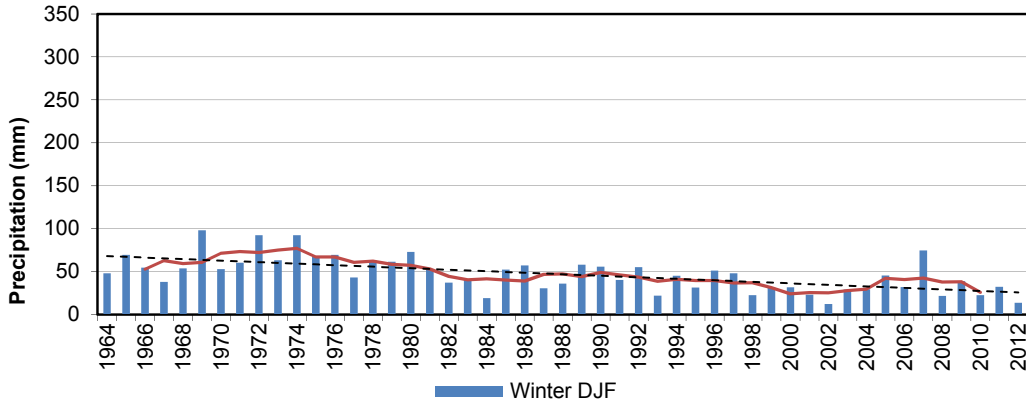
## Monthly



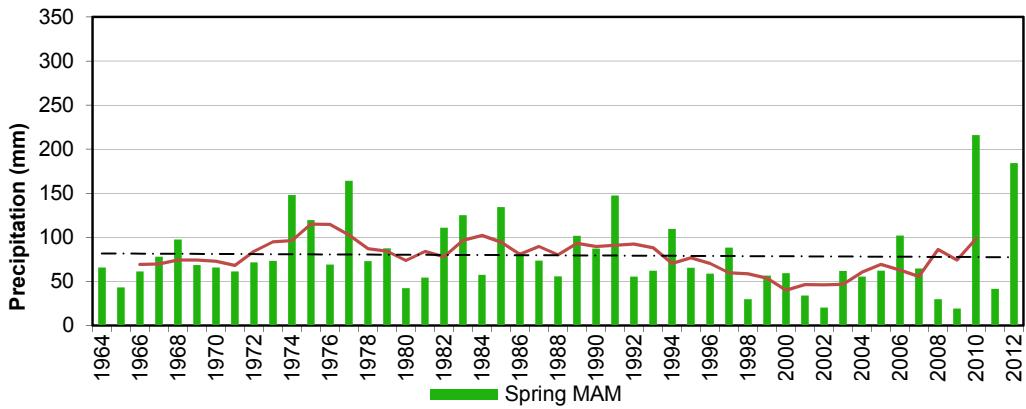
## Annual



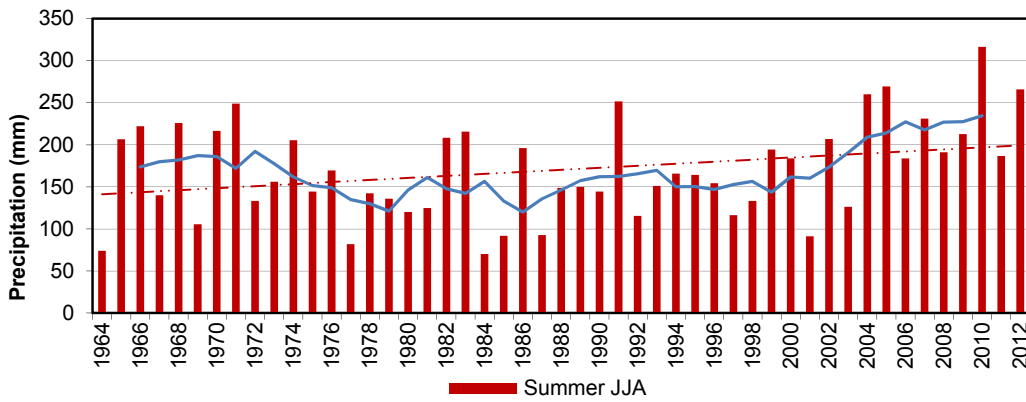
### SEASONAL PRECIPITATION for 1964 to 2012



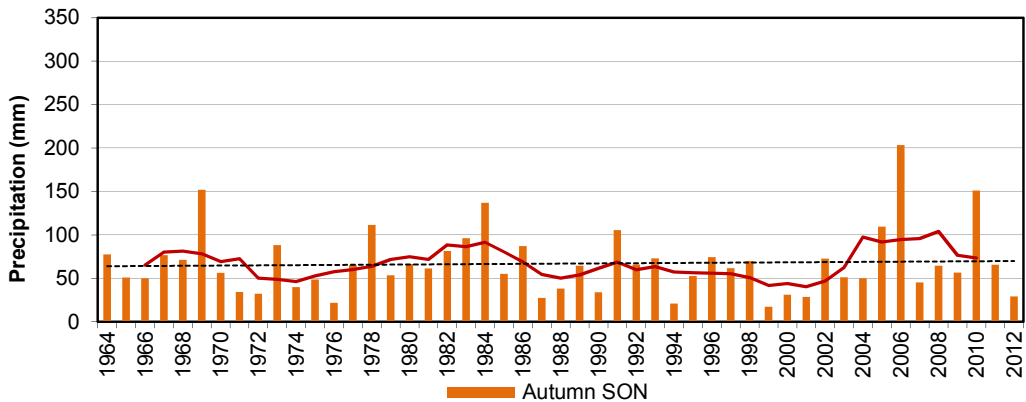
Winter



Spring



Summer



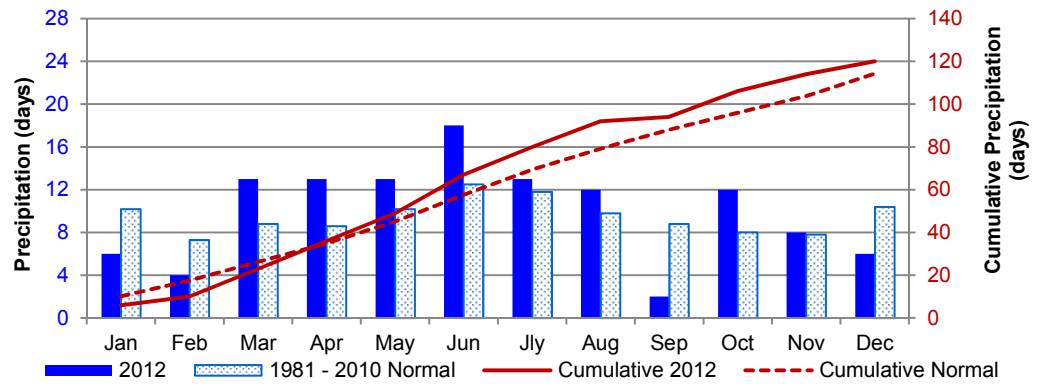
Autumn



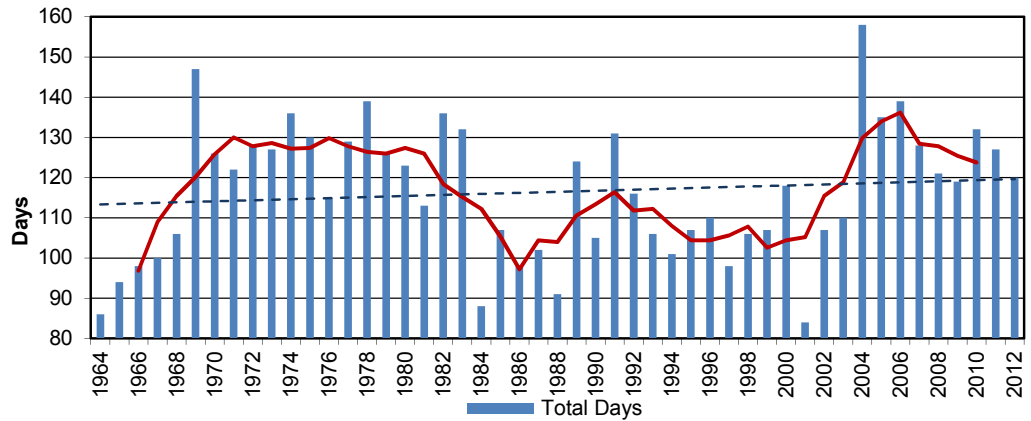
### PRECIPITATION

MONTH	NUMBER OF DAYS WITH MEASURABLE PRECIPITATION				EXTREME VALUES	
	2012	NORMAL	CUMULATIVE 2012	% OF CUMULATIVE NORMAL	CRS Maximum	CRS Minimum
January	6	10.2	6	58.8	25/1974	3/2001
February	4	7.3	10	57.1	20/1969	2/1984
March	13	8.8	23	87.5	19/2004	2/1990, 92, 94 2007
April	13	8.6	36	103.2	17/2003	2/1964
May	13	10.2	49	108.6	19/1989	1/2002
June	18	12.5	67	116.3	21/1991	7/1964 & 1968
July	13	11.8	80	115.3	19/1986	4/1984
August	12	9.8	92	116.2	18/2002	2/2001
September	2	8.8	94	106.8	19/1977	2/1995
October	12	8.0	106	110.4	16/2004	0/2000
November	8	7.8	114	109.8	18/1970	1/1986, 74, 76, 90
December	6	10.4	120	105.1	19/1977	2/1997
Total	120	114.3			158/2004	84/2001

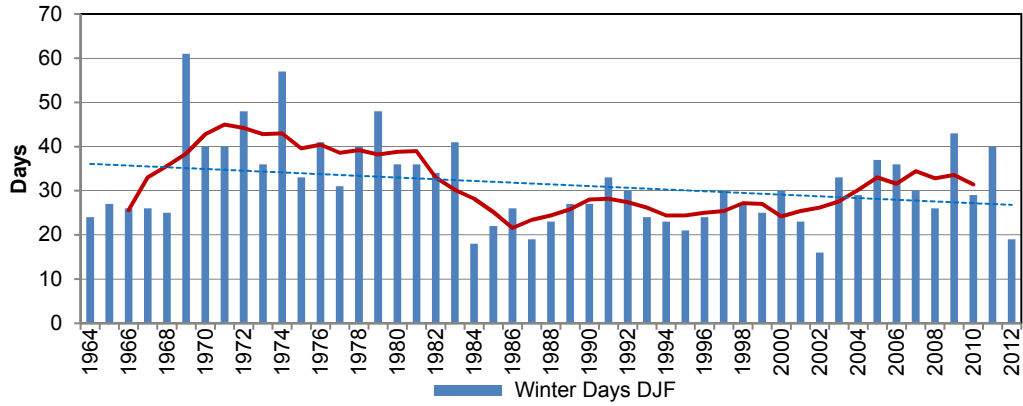
#### Monthly Days



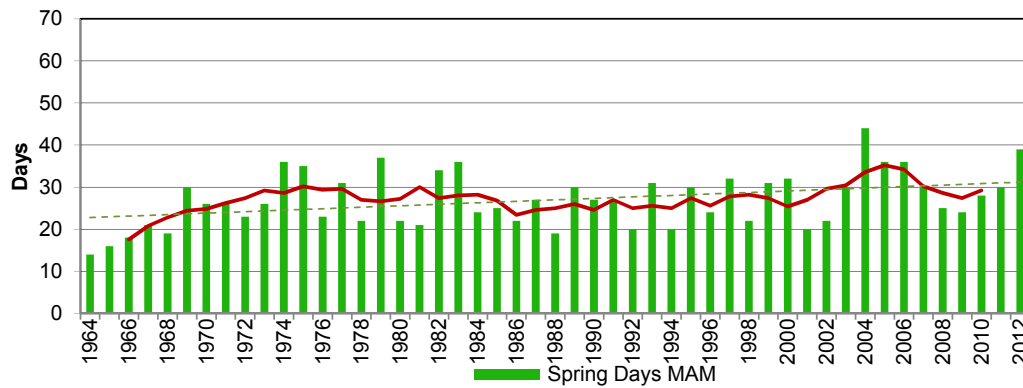
#### Annual Days



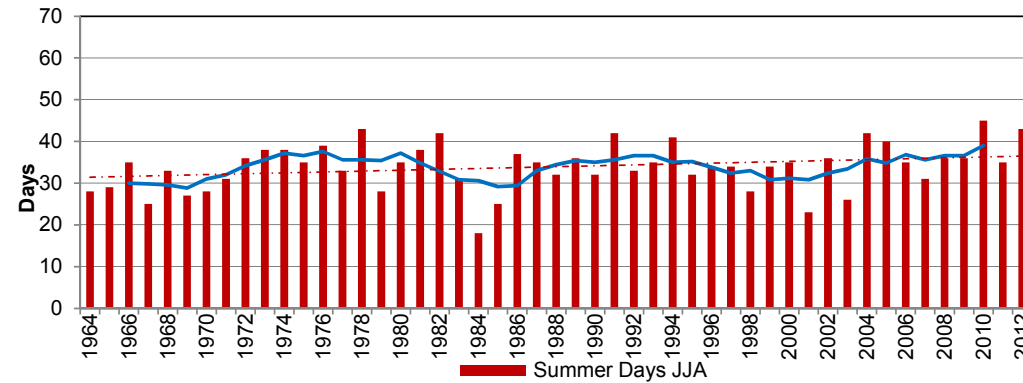
### SEASONAL PRECIPITATION DAYS for 1964 to 2012



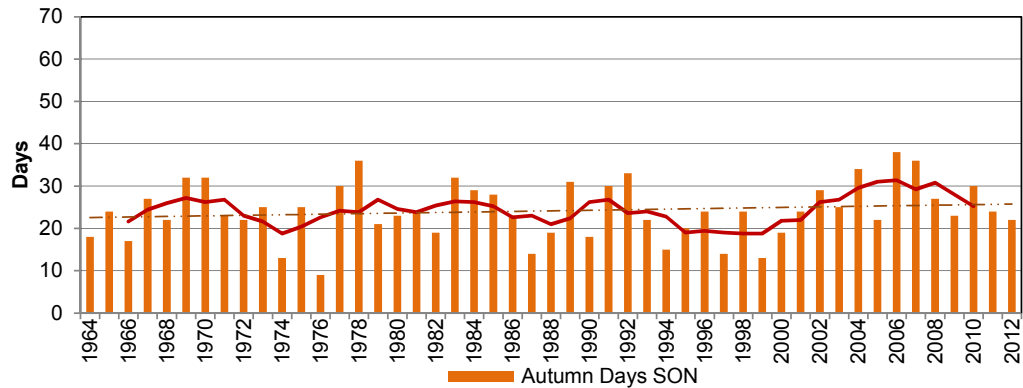
Winter Days



Spring Days



Summer Days



Autumn Days

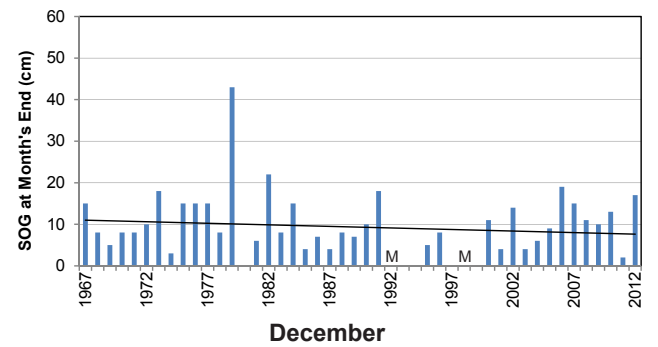
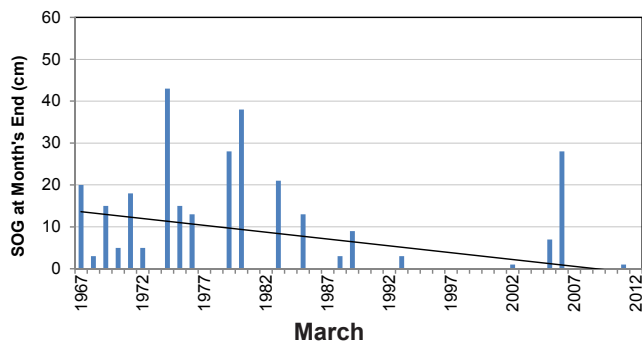
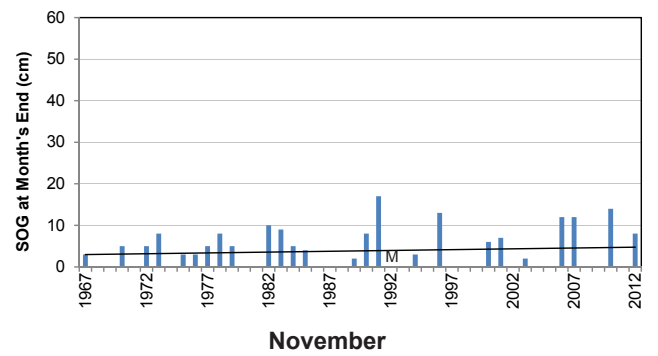
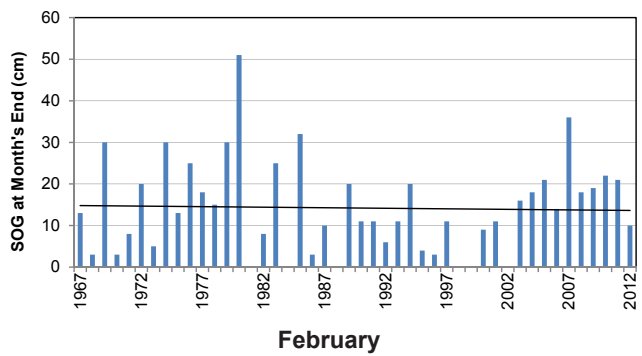
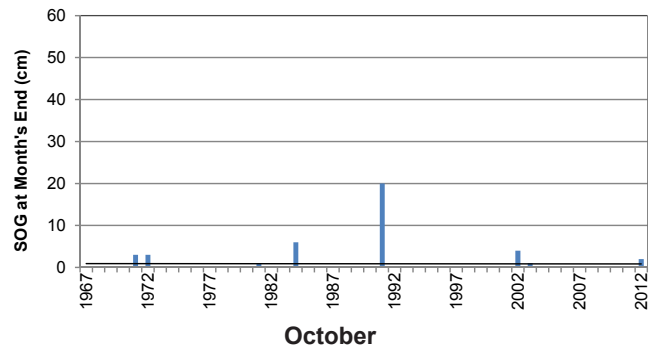
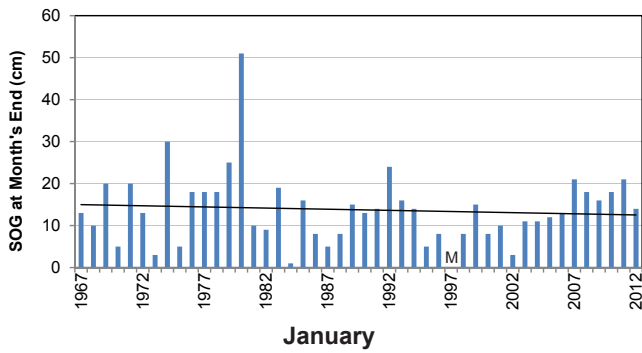
**Precipitation  
Daily**

	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.8	10.2	5.6	0.0	5.4	2.6	0.6	0.0	1.1	0.0
2	0.2	0.0	0.7	0.0	1.4	2.4	0.0	9.0	0.0	0.0	6.9	7.1
3	0.0	0.0	0.0	0.0	0.0	0.0	7.2	0.8	0.0	0.0	0.0	2.5
4	0.0	0.0	0.0	0.2	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.6	0.0	16.8	0.0	0.0	0.6	0.0	0.0	0.0	0.0
6	0.0	0.0	5.9	0.0	44.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.9	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	19.8	0.0	0.2	0.0	0.0	1.2	0.0
10	0.0	0.2	0.0	0.2	0.4	27.8	0.0	0.0	0.0	0.5	1.6	0.4
11	0.0	0.0	0.0	0.0	0.0	0.0	6.8	18.4	0.0	0.0	1.1	0.8
12	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	1.4	0.0	0.4
13	0.0	0.0	1.0	0.0	0.0	4.0	1.4	0.0	0.0	0.3	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	15.2	0.0	2.8	0.0	0.0	0.1	0.0
15	5.4	0.0	0.0	0.7	0.0	1.0	15.0	2.8	0.0	0.0	0.0	0.0
16	0.4	0.0	0.0	0.2	0.0	1.4	17.2	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.2	0.0	9.6	0.0	0.0	0.0	0.2	0.1	0.0
18	1.9	0.2	0.0	0.3	2.2	0.6	2.4	0.0	0.0	0.2	0.0	0.2
19	0.0	0.0	5.0	0.0	0.2	0.0	13.6	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	2.7	6.4	0.0	0.4	0.0	0.0	0.0	0.2	0.0	0.0
21	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0
22	0.0	0.0	0.0	0.3	28.2	0.0	0.0	0.6	0.0	0.9	0.0	0.0
23	0.2	0.0	0.0	0.0	5.4	0.0	1.2	0.0	0.0	7.1	0.0	0.0
24	0.0	0.0	0.3	0.0	0.0	0.2	1.0	0.2	0.0	1.6	0.0	0.0
25	0.3	1.2	0.3	0.0	0.0	2.8	0.0	19.2	0.0	0.0	0.0	0.0
26	0.0	0.3	0.0	0.5	0.0	13.4	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	1.9	11.4	2.2	0.0	0.0	0.0	0.2	0.0	0.0
28	0.0	0.0	1.6	12.0	12.2	0.0	26.6	0.0	0.0	1.1	0.0	0.0
29	0.0	0.0	0.8	0.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0		0.4	0.0	0.0	0.0	0.2	0.0	0.2	0.0	2.3	0.0
31	0.0		0.0		0.0		6.0	0.0		0.0		0.0



March 6-12, 2012 Blizzard Martensville  
photo credit: V. Witrock

### SNOW-ON-THE-GROUND (SOG)



March 2012 Blizzard aftermath  
photo credit: CR Beaulieu



March 2012 Blizzard aftermath, note the head of  
large lab at the level of the snow bank  
photo credit: V. Wittrock  
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### RADIATION

MONTH	BRIGHT SUNSHINE HOURS					BRIGHT SUNSHINE DAYS					
	2012	NORMAL	% OF NORMAL	POSSIBLE HOURS*	% OF POSSIBLE	2012	NORMAL	WITH MORE THAN 1 HOUR	WITH MORE THAN 5 HOURS	WITH MORE THAN 10 HOURS	WHEN EXCEEDS 100% OF NORMAL
JAN	133.6	101.0	132.3	258.7	51.7	30	23.4	26	11	0	20
FEB	168.6	132.6	127.1	289.0	58.3	27	23.9	25	16	1	19
MAR	178.6	182.0	98.1	370.5	48.2	28	27.4	25	21	5	17
APR	212.8	227.2	93.7	419.5	50.7	28	27.6	24	20	12	15
MAY	273.4	256.9	106.4	488.4	56.0	26	29.3	25	21	17	20
JUNE	264.1	258.2	102.3	500.2	52.8	27	28.0	27	21	15	17
JULY	343.1	298.8	114.8	501.2	68.5	29	30.3	28	27	22	21
AUG	315.0	271.3	116.1	451.5	69.8	30	29.9	29	26	23	23
SEP	292.9	197.4	148.4	378.1	77.5	30	27.3	30	28	19	25
OCT	105.6	156.1	67.6	328.1	32.2	25	26.7	20	9	3	8
NOV	89.9	97.0	92.7	263.2	34.2	17	22.5	17	10	0	12
DEC	85.0	85.7	99.2	242.2	35.1	24	22.6	19	7	0	13
<b>TOTAL</b>	<b>2463.6</b>	<b>2264.0</b>	<b>108.8</b>	<b>4490.6</b>	<b>54.8</b>	<b>321</b>	<b>318.7</b>	<b>295</b>	<b>217</b>	<b>117</b>	<b>210</b>

\*National Research Council, Canada, Hertzberg Institute of Astrophysics

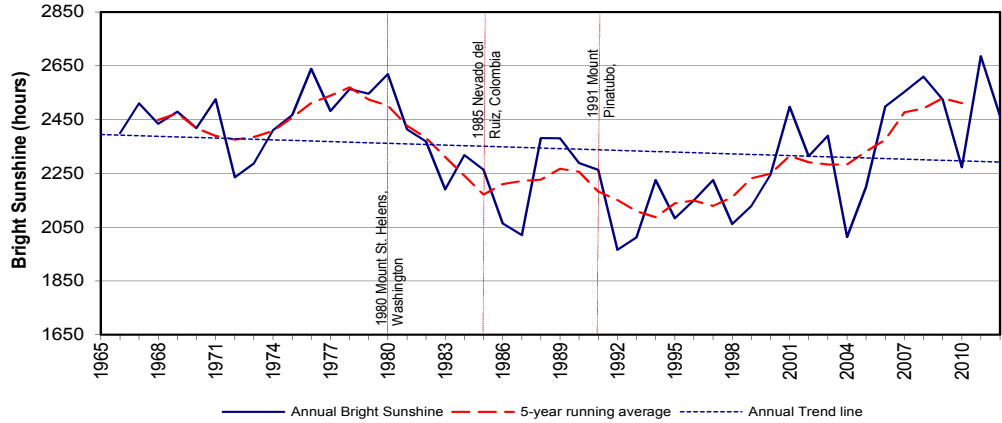
### Global and Diffuse Radiation (MJ/m<sup>2</sup>)

DATE	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse
1	3.3	0.9	4.9	3.4	5.9	5.5	5.0	3.4	8.4	6.6	25.1	4.7	7.1	5.0	17.9	3.6	7.6	5.2	9.0	5.3	1.7	1.5	1.6	1.4
2	2.1	2.0	7.5	1.4	9.3	6.0	17.2	5.6	6.3	4.8	21.8	7.8	25.6	3.8	9.5	6.0	12.9	4.3	6.3	4.1	3.1	2.7	1.2	1.0
3	2.8	1.0	6.5	2.2	6.4	6.1	18.6	2.7	19.9	5.4	28.1	3.1	12.8	5.7	7.7	5.9	17.5	3.6	5.5	4.5	3.4	2.9	2.9	2.6
4	3.2	1.9	6.6	1.4	11.9	2.5	16.7	4.7	16.7	6.3	26.9	3.9	23.1	5.9	24.4	2.3	9.2	6.6	5.4	4.6	3.2	2.8	2.5	2.1
5	2.7	1.3	7.2	1.5	8.4	6.8	11.7	3.9	4.5	3.7	16.4	8.7	26.3	5.2	22.0	4.0	11.2	6.2	12.9	1.4	3.8	2.4	1.6	1.4
6	2.7	2.2	3.3	3.2	8.4	6.1	4.4	3.7	4.1	3.3	10.7	7.5	25.5	4.2	19.4	5.7	11.8	5.0	8.1	4.9	6.3	1.0	4.0	0.9
7	2.0	1.7	4.5	4.1	11.4	4.5	15.3	7.0	21.2	6.2	20.5	9.3	27.2	2.7	16.1	5.4	17.8	2.1	5.6	3.8	1.8	1.6	2.5	2.1
8	3.0	1.4	9.7	1.6	10.9	7.2	14.7	6.9	23.7	5.6	24.7	4.7	26.7	3.0	20.4	4.0	18.1	1.5	6.7	4.7	2.2	2.0	2.8	2.3
9	2.8	1.7	6.7	2.9	10.5	8.2	20.7	2.2	23.0	5.6	3.3	2.7	26.4	3.6	22.3	3.5	14.6	4.6	7.2	4.7	1.7	1.5	3.4	1.8
10	1.6	1.6	8.4	1.5	9.9	6.0	20.5	2.3	11.6	8.9	4.7	3.8	24.4	4.9	20.9	5.1	16.9	2.2	3.7	3.1	2.7	2.4	2.4	1.8
11	4.1	1.2	9.0	1.5	11.6	5.7	19.2	4.2	25.1	3.4	23.4	6.5	25.7	4.2	19.8	4.8	13.5	5.6	10.8	1.3	6.1	1.5	1.5	1.3
12	2.1	1.6	7.8	1.5	14.1	2.2	12.1	6.8	24.9	4.9	20.5	4.5	23.4	7.2	20.5	4.6	17.0	2.4	6.3	4.4	5.5	1.4	2.0	1.8
13	2.7	1.7	7.3	1.7	moved to new datalogger		5.8	4.7	25.8	3.2	11.8	7.5	23.7	6.4	20.6	4.0	15.0	3.5	7.2	4.2	4.2	3.4	2.8	2.0
14	3.4	1.6	7.8	3.5			18.1	5.8	25.4	5.6	12.0	7.2	11.0	6.7	4.7	3.8	16.3	1.9	9.8	1.1	5.8	2.1	5.6	1.2
15	3.0	2.9	6.3	4.2	9.0	2.1	8.7	7.2	21.4	9.1	17.0	7.5	3.6	2.9	12.9	8.5	14.3	4.1	8.7	1.9	5.6	1.3	4.9	1.0
16	3.7	3.1	5.6	3.4			12.8	8.6	24.1	4.9	27.0	4.8	4.9	4.0	22.5	2.3	12.8	5.1	5.6	2.7	5.1	1.2	5.3	1.2
17	3.9	2.9	8.5	2.3	power and battery backup failure		7.9	6.3	17.6	7.7	6.7	5.4	6.1	5.0	20.2	5.4	14.4	3.7	1.8	1.5	5.7	1.9	4.1	1.3
18	5.3	1.3	9.3	2.1			22.5	3.5	3.2	2.6	12.6	9.4	19.8	5.7	21.2	2.8	8.7	4.4	4.8	3.8	3.5	2.8	1.5	1.3
19	5.3	1.3	6.2	4.1	1.2	1.0	9.6	7.1	22.2	5.9	11.5	8.9	23.1	4.1	21.3	2.5	9.8	6.5	2.7	2.1	3.8	2.2	2.0	1.7
20	5.8	1.8	4.4	3.3	13.2	3.0	5.3	4.4	25.0	6.4	19.2	9.0	25.3	3.8	20.9	3.2	13.6	3.9	2.3	2.0	2.2	1.5	3.1	1.6
21	2.3	2.3	5.4	4.9	15.6	1.8	20.0	4.3	19.8	6.0	25.6	5.0	24.5	4.3	19.2	5.2	14.8	1.4	7.6	2.4	1.1	1.0	3.6	1.5
22	3.2	2.4	6.9	5.4	5.1	4.0	21.7	4.5	3.0	2.4	27.5	3.4	19.5	6.5	13.5	6.3	14.6	1.5	2.9	2.4	3.4	2.6	2.8	2.3
23	5.5	2.2	4.4	4.0	2.1	1.8	19.8	5.3	3.9	3.2	27.1	5.2	20.6	5.5	20.2	2.8	14.4	1.4	2.1	1.8	3.4	2.5	1.9	1.7
24	5.1	1.6	6.2	5.8	7.3	6.2	16.2	8.3	24.6	7.6	22.4	5.5	20.6	7.0	17.3	5.2	11.6	4.3	4.9	4.1	1.6	1.5	2.8	2.2
25	4.9	1.7	3.9	3.7	17.8	3.6	15.4	8.2	28.4	3.5	25.7	3.7	17.7	9.8	3.7	3.1	14.2	1.3	5.2	4.2	4.5	1.0	4.1	1.3
26	4.6	1.7	8.4	6.9	5.3	5.3	11.6	8.0	25.8	7.4	10.9	6.1	18.9	7.9	11.8	7.3	12.7	2.8	6.1	4.4	4.1	1.7	2.3	1.5
27	5.5	1.5	10.1	4.8	7.3	7.3	2.0	1.7	8.5	6.3	7.7	4.7	23.5	4.3	18.6	3.3	12.6	2.4	8.2	2.0	5.1	1.7	1.4	1.2
28	2.9	2.5	11.9	3.0	13.2	4.9	6.7	5.5	11.5	8.8	28.4	2.3	23.7	3.9	19.7	2.7	11.8	3.0	3.4	3.0	2.5	2.2	2.6	0.9
29	3.4	3.2	8.9	4.1	16.5	2.9	8.6	6.7	26.8	4.8	17.7	7.4	22.8	5.1	16.4	4.9	12.2	2.2	2.8	2.4	2.2	2.0	3.6	1.3
30	5.9	1.3			11.9	4.1	21.4	4.9	27.4	4.1	27.0	3.4	24.2	3.7	19.6	2.0	10.4	2.7	1.9	1.7	2.0	1.8	4.8	1.0
31	5.8	3.7			18.3	1.8			22.2	6.7			24.3	2.9	18.6	3.1			1.9	1.7			3.7	1.5
<b>TOTAL</b>	<b>114.6</b>	<b>59.2</b>	<b>203.6</b>	<b>93.4</b>	<b>262.5</b>	<b>116.6</b>	<b>410.2</b>	<b>158.4</b>	<b>556.0</b>	<b>170.9</b>	<b>563.9</b>	<b>173.6</b>	<b>632.0</b>	<b>154.9</b>	<b>543.8</b>	<b>133.3</b>	<b>402.3</b>	<b>105.4</b>	<b>177.4</b>	<b>96.2</b>	<b>107.3</b>	<b>58.1</b>	<b>91.3</b>	<b>48.2</b>
1971-2000 NORMAL	126.9	69.2	213.1	104.8	371.9	162.6	486.9	185.8	603.5	219.5	625.7	225.8	650.6	211.3	542.1	180.5	374.1	124.7	239.0	97.1	127.2	63.6	100.0	49.9

Units = MJ/m<sup>2</sup>

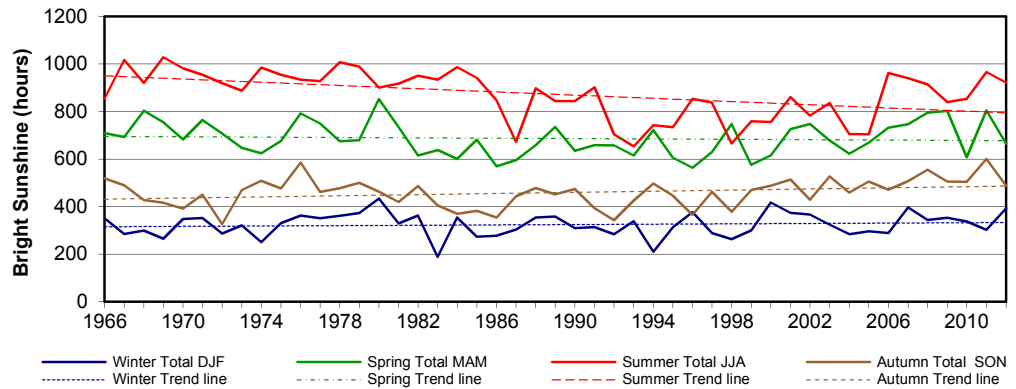
# RADIATION

## Bright Sunshine Hours Annual

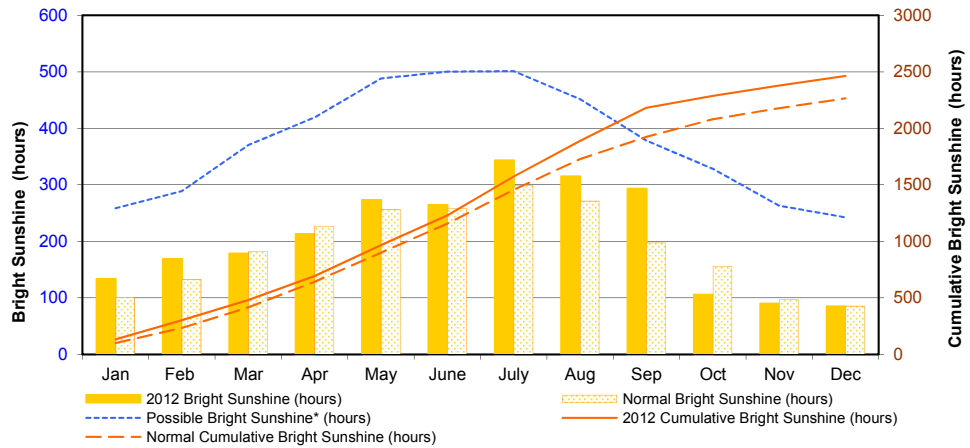


Goble, 2002; U.S Geological Survey, n.d.

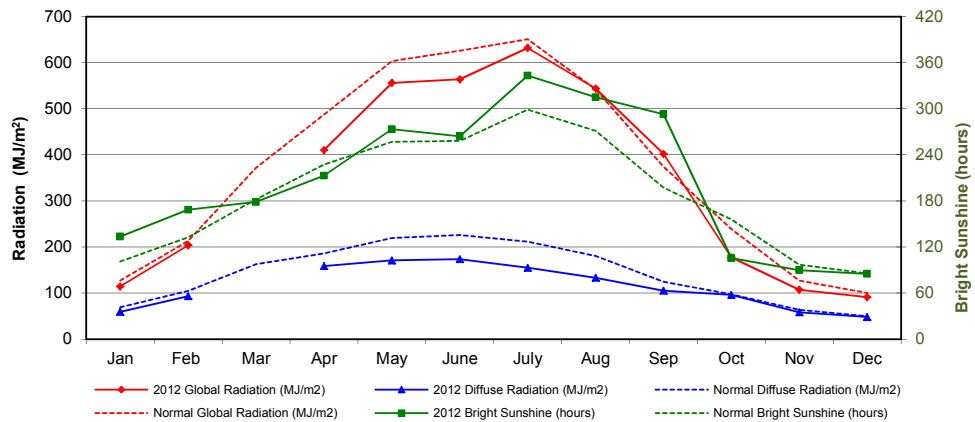
## Bright Sunshine Hours Seasonal



## Bright Sunshine Hours Monthly

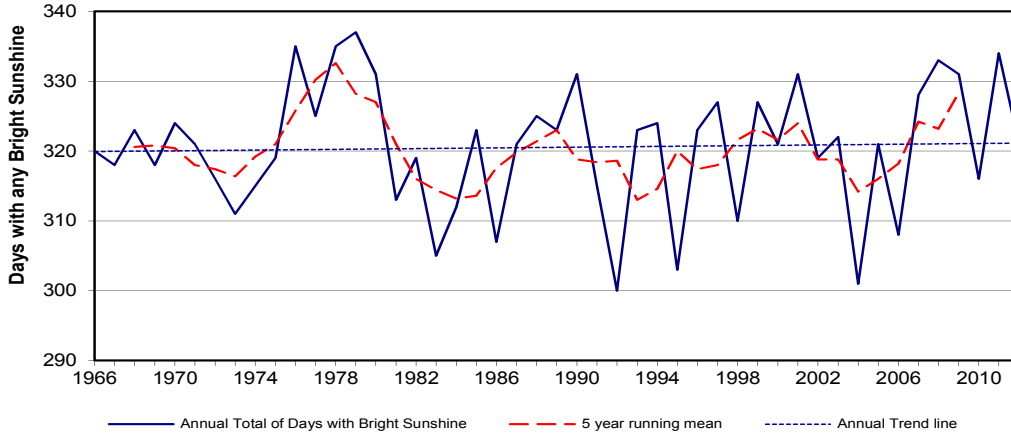


## Monthly Comparison Bright Sunshine Hours, Global & Diffuse Radiation\*

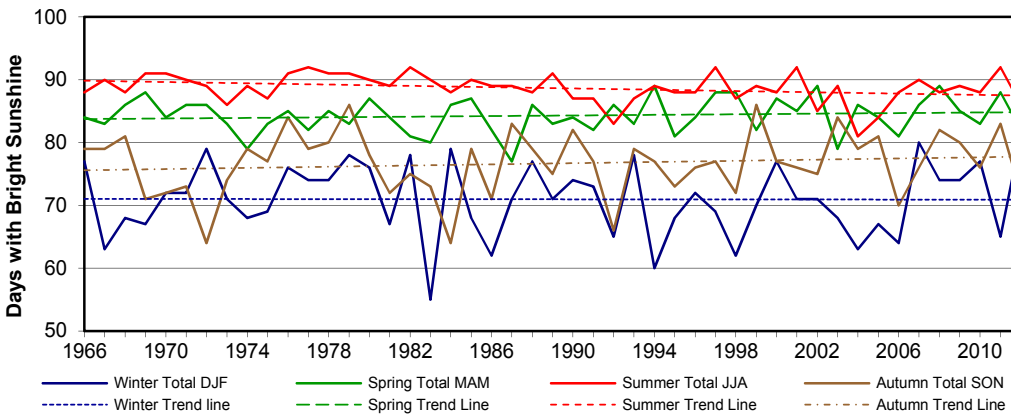


\*Global and Diffuse radiation incomplete for March 2012

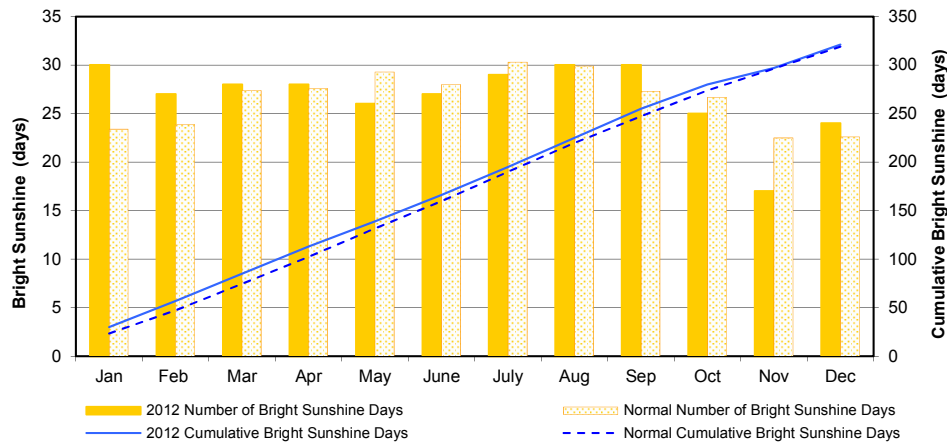
# RADIATION



**Bright Sunshine Days Annual**



**Bright Sunshine Days Seasonal**



**Bright Sunshine Days Monthly**



Campbell Stokes bright sunshine recorder circa 1990  
 photo credit: CR Beaulieu



SRC bright sunshine recorder circa 1990  
 photo credit: CR Beaulieu



Kipp and Zonen bright sunshine recorder  
 photo credit: V. Wittrock

# RADIATION

## Bright Sunshine Ranking

% OF ACTUAL TO POSSIBLE HOURS OF BRIGHT SUNSHINE						
% ANNUAL	WINTER % DJF	SPRING % MAM	SUMMER % JJA	AUTUMN % SON		
2011	59.9	1980 55.0	1980 66.7	1969 70.7	2011 61.7	
1976	58.8	2000 52.8	2011 63.1	1967 69.8	1976 60.3	
1980	58.3	2007 50.9	1968 63.0	1978 69.2	2008 57.3	
2008	58.1	2012 49.7	2009 62.8	1979 67.9	1966 53.3	
1978	57.2	1979 47.9	2008 62.2	1984 67.9	2001 52.9	
2007	57.0	2001 47.8	1976 62.1	1974 67.7	1974 52.2	
1979	56.8	1996 47.7	1971 60.1	1970 67.5	2007 52.1	
1971	56.3	2002 47.1	1969 59.2	2011 66.4	2009 52.1	
2009	56.3	1982 46.6	1977 58.8	2006 66.1	2005 52.1	
1967	56.0	1978 46.4	2002 58.6	1975 65.6	2010 51.8	
2006	55.7	1976 46.0	1998 58.6	1971 65.6	1979 51.3	
2001	55.7	1989 45.8	2007 58.6	1982 65.4	1994 51.1	
1977	55.4	2009 45.3	1989 57.6	1985 64.8	2012 50.4	
1969	55.3	1971 45.2	1981 57.6	2007 64.7	2000 50.3	
1975	55.0	1966 45.1	2006 57.4	1976 64.2	1967 50.2	
2012	54.8	1977 45.0	2001 56.9	1983 64.2	1982 50.0	
1968	54.2	1984 44.9	1994 56.6	1977 63.8	1988 49.3	
1970	53.9	1988 44.8	1966 55.7	2012 63.5	1978 49.1	
1981	53.8	1970 44.6	1972 55.4	1968 63.3	2003 49.1	
1974	53.8	2008 43.5	1967 54.4	1972 63.3	1975 48.9	
1966	53.5	1993 43.4	1970 53.6	1981 63.1	1990 48.7	
1989	53.1	2010 43.3	1979 53.4	2008 62.9	2006 48.5	
1988	53.0	1975 42.4	1985 53.4	1980 62.0	1973 48.3	
1982	52.8	1981 42.2	2003 53.3	1991 61.9	1980 47.7	
2003	52.1	2003 41.6	1975 53.1	1988 61.8	1977 47.6	
2002	51.6	1973 41.2	1978 53.0	1973 61.1	1997 47.5	
1984	51.6	1991 40.2	2005 52.4	2001 59.2	2004 47.4	
1990	51.0	1995 40.2	2012 52	2010 58.7	1989 46.5	
1973	51.0	1990 39.7	1991 51.7	1996 58.7	1971 46.2	
2010	50.7	1987 38.9	1988 51.6	1966 58.7	1995 45.8	
1985	50.5	2011 38.8	1992 51.5	1986 58.2	1987 45.5	
1991	50.5	1999 38.5	1973 50.8	1989 58.1	1999 44.2	
2000	50.0	1968 38.0	1983 50.1	1990 58.0	2002 44.1	
1972	49.8	2005 37.9	1990 49.8	2009 57.8	1968 44.0	
1997	49.6	2006 37.1	1997 49.3	1997 57.7	1993 43.8	
1994	49.6	1997 37.0	1974 49.0	2003 57.4	1981 43.1	
2005	49.1	1967 36.5	2004 48.7	2002 53.8	1969 42.9	
1983	48.9	1972 36.3	1982 48.3	1999 52.2	1983 41.5	
1996	47.9	2004 35.9	1993 48.2	2000 52.1	1991 40.4	
1999	46.5	1992 35.9	2000 48.1	1994 51.0	1970 40.2	
1995	46.5	1986 35.6	2010 47.6	1995 50.5	1985 39.3	
1986	46.0	1985 35.1	1995 47.6	2004 48.5	1998 38.9	
1998	46.0	1969 34.0	1984 47.0	2005 48.5	1984 38.1	
1987	45.1	1998 33.7	1987 46.8	1992 48.4	1996 37.7	
1993	44.9	1974 32.2	1999 45.2	1987 46.3	1986 36.4	
2004	44.8	1994 26.9	1986 44.7	1998 45.8	1992 35.3	
1992	43.8	1983 24.2	1996 44.1	1993 44.9	1972 33.6	

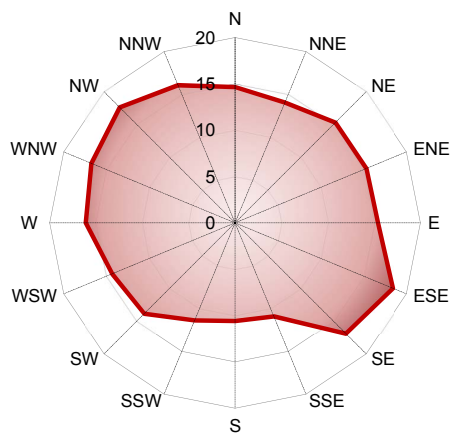
DAYS WITH BRIGHT SUNSHINE									
ANNUAL	WINTER DJF	SPRING MAM	SUMMER JJA	AUTUMN SON					
1979	337	2012 81	1994 89	1977 92	1979 86				
1976	335	2007 80	2002 89	1982 92	1999 86				
1978	335	1972 79	2008 89	1997 92	1976 84				
2011	334	1984 79	1969 88	2001 92	2003 84				
2008	333.0	1979 78	1997 88	2011 92	1987 83				
1980	331	1982 78	1998 88	1969 91	2011 83				
1990	331	1993 78	2011 88	1970 91	1990 82				
2001	331	1966 77	1980 87	1976 91	2008 82				
2009	331.0	1988 77	1985 87	1978 91	1968 81				
2007	328	2000 77	2000 87	1979 91	2005 81				
1997	327	1976 76	1968 86	1989 91	1978 80				
1999	327	1980 76	1971 86	1967 90	2009 80				
1977	325	1977 74	1972 86	1971 90	1966 79				
1988	325	1978 74	1984 86	1980 90	1967 79				
1970	324	1990 74	1988 86	1983 90	1974 79				
1994	324	2008 74	1992 86	1985 90	1977 79				
1968	323	2009 74	2004 86	2007 90	1985 79				
1985	323	1991 73	2007 86	1972 89	1988 79				
1989	323	1970 72	1976 85	1974 89	1993 79				
1993	323	1971 72	1978 85	1981 89	2004 79				
1996	323	1996 72	2001 85	1986 89	1980 78				
2003	322	1973 71	2009 85	1987 89	1975 77				
1971	321	1987 71	1966 84	1994 89	1991 77				
1987	321	1989 71	1970 84	1999 89	1994 77				
2000	321	2001 71	1981 84	2003 89	1997 77				
2005	321	2002 71	1990 84	2009 89	2000 77				
2012	321	1999 70	1996 84	1966 88	1996 76				
1966	320	1975 69	2005 84	1968 88	2001 76				
1975	319	1997 69	1967 83	1984 88	2007 76				
1982	319	1968 68	1973 83	1988 88	2010 76				
2002	319	1974 68	1975 83	1995 88	1982 75				
1967	318	1985 68	1979 83	1996 88	1989 75				
1969	318	1995 68	1989 83	2000 88	2002 75				
1972	316	2003 68	1993 83	2006 88	1973 74				
2010	316	1969 67	2010 83	2008 88.0	1971 73				
1974	315	1981 67	1977 82	2010 88	1983 73				
1991	315	2005 67	1986 82	1975 87	1995 73				
1981	313	1992 65	1991 82	1990 87	1970 72				
1984	312	2011 65	1999 82	1991 87	1981 72				
1973	311	2006 64	2012 82	1993 87	1998 72				
1998	310	1967 63	1982 81	1998 87	2012 72				
2006	308	2004 63	1995 81	1973 86	1969 71				
1986	307	1986 62	2006 81	2012 86	1986 71				
1983	305	1998 62	1983 80	2002 85	2006 70				
1995	303	1994 60	1974 79	2005 84	1992 66				
2004	301	1983 55	2003 79	1992 83	1972 64				
1992	300	2010 44	1987 77	2004 81	1984 64				

### WIND

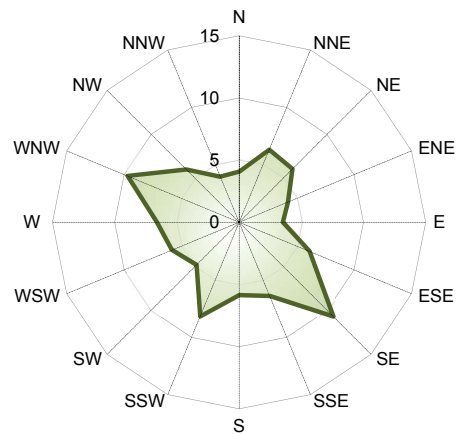
MONTH	AVERAGE WIND SPEED (km/h)		HIGHEST INSTANTANEOUS WIND SPEED (km/h)						
	2012 Average	Normal*	2012 for CRS (Speed / direction / day)		Since 1953 (Saskatoon Diefenbaker Int'l. Airport) (Speed / direction / day / year)				
January	15.6	16	69.4	W	05	111	W	11	1986
February	11.9	16	47.6	ENE	25	106	N	22	1988
March**	15.7	17	68.0	ENE	06	93	W	18	1959
April	17.4	18	62.7	ESE	26	108	W	06	1959
May	18.8	18	68.7	NW	14	132	SW	17	1965
June	16.1	17	95.8	W	27	117	S	01	1986
July	12.8	16	79.5	WSW	04	113	E	05	1955
August	13.4	16	62.5	WNW	29	151	W	14	1967
September	14.7	17	78.9	W	11	148	W	22	1967
October	15.3	17	61.8	NNW	17	138	NW	16	1967
November	15.7	16	53.3	NW	24	100	W	17	1967
December	11.8	16	55.1	SE	04	121	W	12	1955

\*1961-90 Normals used are from the Environment Canada, Saskatoon Diefenbaker International Airport station, 1993  
 \*\*Incomplete data for March

ANNUAL AVERAGE WIND SPEED (km/h)

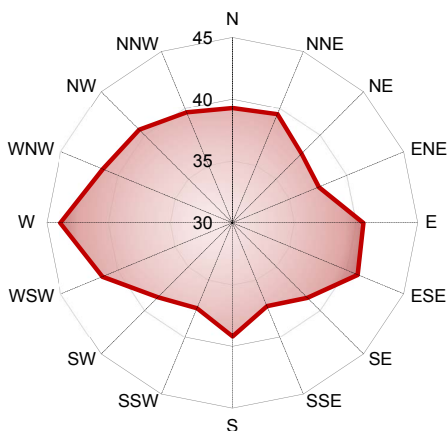


ANNUAL AVERAGE WIND FREQUENCY %

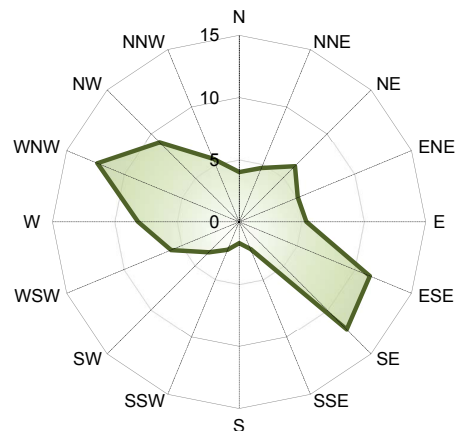


CALM 1.5%

ANNUAL AVERAGE MAXIMUM WIND GUSTS SPEED km/h\*



ANNUAL AVERAGE MAXIMUM WIND GUSTS FREQUENCY %\*

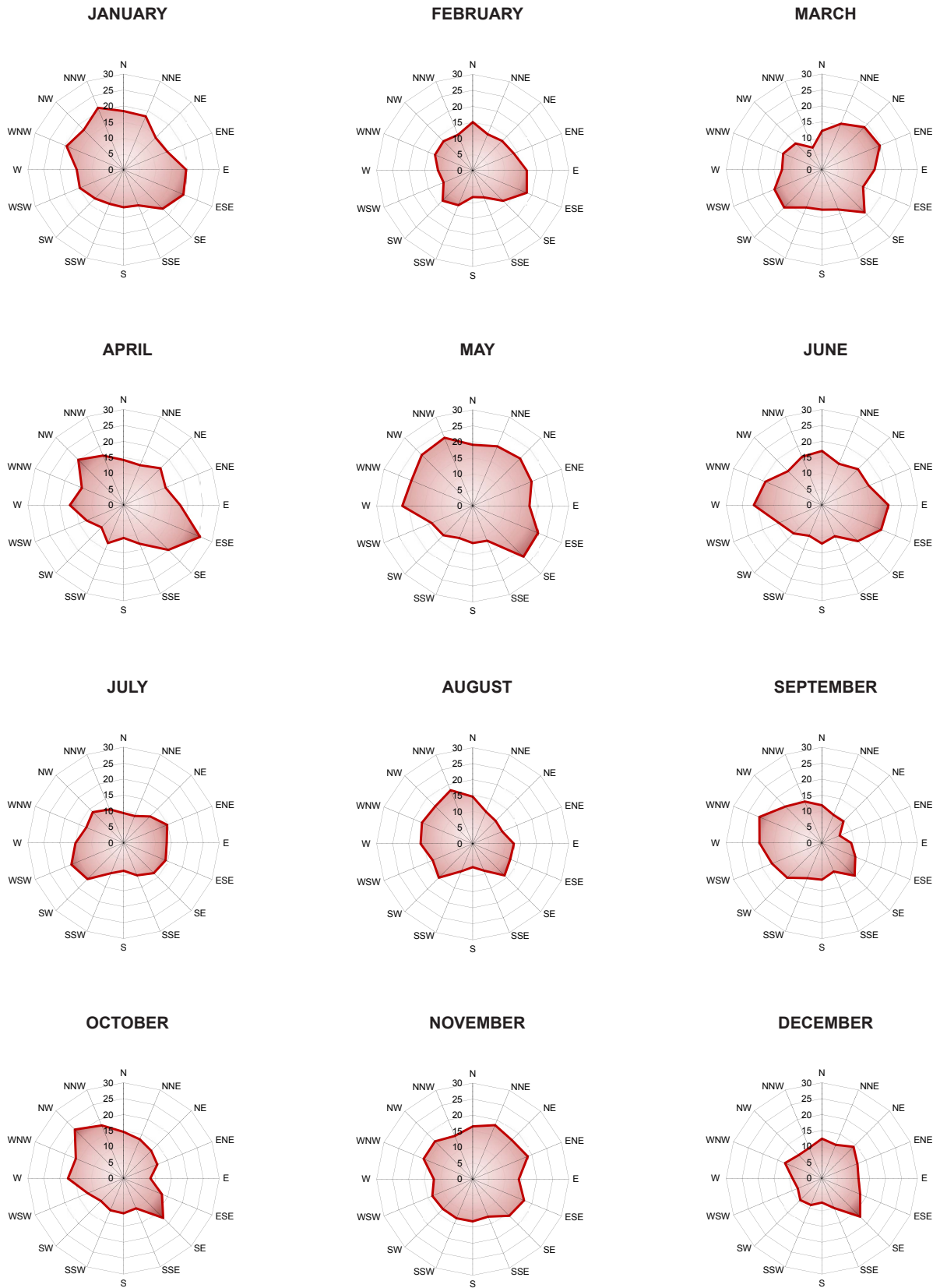


\*excludes maximum ½ hour winds < 31 km/h



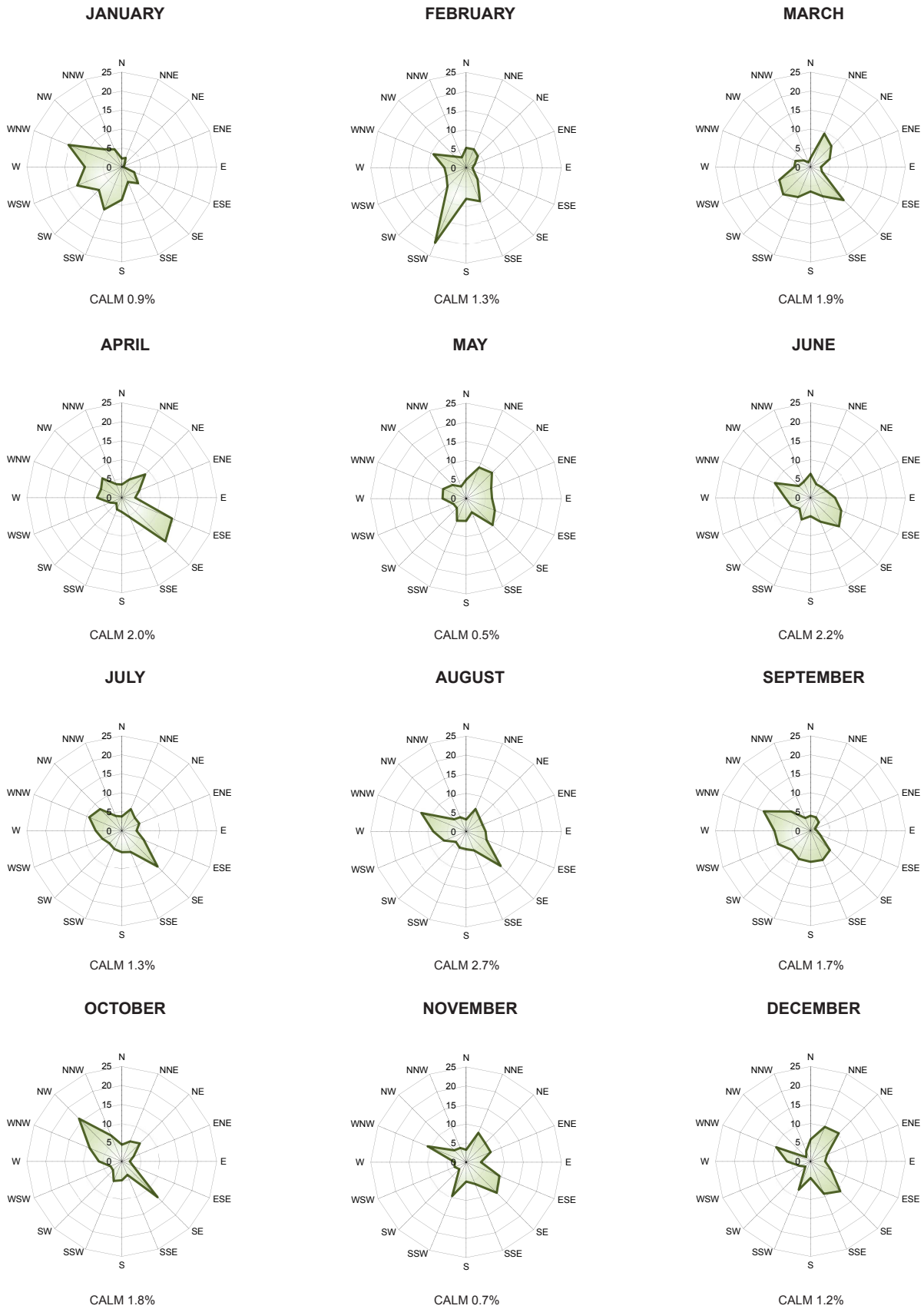
# WIND

## Average Wind Speed by Direction (km/h)



# WIND

## Average Wind Frequency by Direction (%)



### WIND

EXTREME DAILY WINDS (km/h)		
DATE	WIND SPEED/DIRECTION	BEAUFORT WIND SCALE DESIGNATION*
January 05	69.4 W	Gale
January 06	55.4 WNW	Near Gale
January 10	60.5 N	Near Gale
January 15	53.1 N	Near Gale
January 25	51.4 NW	Near Gale
March 6	68.0 ENE	Near Gale
March 19	65.6 NE	Near Gale
March 20	53.9 SSW	Near Gale
March 28	57.1 ESE	Near Gale
March 30	53.9 SSW	Near Gale
April 1	57.6 SE	Near Gale
April 7	55.5 WNW	Near Gale
April 12	55.3 ESE	Near Gale
April 15	51.2 NNE	Near Gale
April 26	62.7 ESE	Near Gale
April 27	54.3 SE	Near Gale
May 6	56.9 NNE	Near Gale
May 10	55.9 NNW	Near Gale
May 11	61.8 WSW	Near Gale
May 12	59.3 WNW	Near Gale
May 14	68.7 NW	Gale
May 19	51.9 WNW	Near Gale
May 22	64.2 ESE	Gale
May 23	51.9 E	Near Gale
May 27	53.5 ENE	Near Gale
May 28	57.4 NE	Near Gale
May 31	53.1 SW	Near Gale
June 3	69.2 WNW	Gale
June 5	62.6 E	Near Gale
June 6	71.0 ESE	Gale
June 10	63.1 N	Gale
June 11	52.1 NNW	Near Gale
June 25	60.0 SW	Near Gale
June 26	53.5 NNE	Near Gale
June 27	95.8 W	Storm
June 28	53.0 W	Near Gale
July 4	79.5 WSW	Strong Gale
July 28	58.8 NW	Near Gale
July 31	65.1 W	Gale
August 11	62.0 W	Near Gale
August 24	61.9 WSW	Near Gale
August 25	59.6 W	Near Gale
August 29	62.5 WNW	Near Gale
September 2	71.5 WSW	Gale
September 3	56.5 WNW	Near Gale
September 10	66.5 W	Gale
September 11	78.9 W	Strong Gale
September 12	51.2 WNW	Near Gale
September 14	52.1 SSW	Near Gale
September 18	55.0 WNW	Near Gale
October 1	58.0 NNW	Near Gale
October 2	52.6 WNW	Near Gale
October 8	53.6 NW	Near Gale
October 16	57.2 NNW	Near Gale
October 17	61.8 NNW	Near Gale
October 19	59.4 SE	Near Gale
October 28	51.0 SE	Near Gale
November 23	53.2 SE	Near Gale
November 24	53.3 NW	Near Gale
December 4	55.1 SE	Near Gale

\*Near Gale >=51 but < 63 \*Gale >=63 but <76  
 \*Strong Gale >=76 but <88 \*Storm >=88 but <102

WINDCHILL CALCULATION CHART <sup>1</sup>												
T°C km/h Speed	5°	0°	-5°	-10°	-15°	-20°	-25°	-30°	-35°	-40°	-45°	-50°
5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47	-53	-58
10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63
15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66
20	1	-5	-12	-18	-24	-31	-37	-43	-49	-56	-62	-68
25	1	-6	-12	-19	-25	-32	-38	-45	-51	-57	-64	-70
30	0	-7	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72
35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73
40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74
45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75
50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63	-70	-76
55	-2	-9	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77
60	-2	-9	-16	-23	-30	-37	-43	-50	-57	-64	-71	-78
65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
70	-2	-9	-16	-23	-30	-37	-44	-51	-59	-66	-73	-80
75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80
80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81
Approximate Thresholds												
-10	Low	Risk of hypothermia if outside for long periods without adequate protection.										
-28	Risky	Risk of frostnip/frostbite on extremities. Exposed skin can freeze in 10 - 30 min.										
-40	High Risk	High risk of frostbite. Exposed skin can freeze in 5 - 10 minutes.										
-48	Very High Risk	Serious risk of frostbite. Exposed skin can freeze in 2 - 5 minutes.										
-55	Extreme Risk	Outdoor conditions are hazardous. Exposed skin can freeze in 2 minutes or less.										

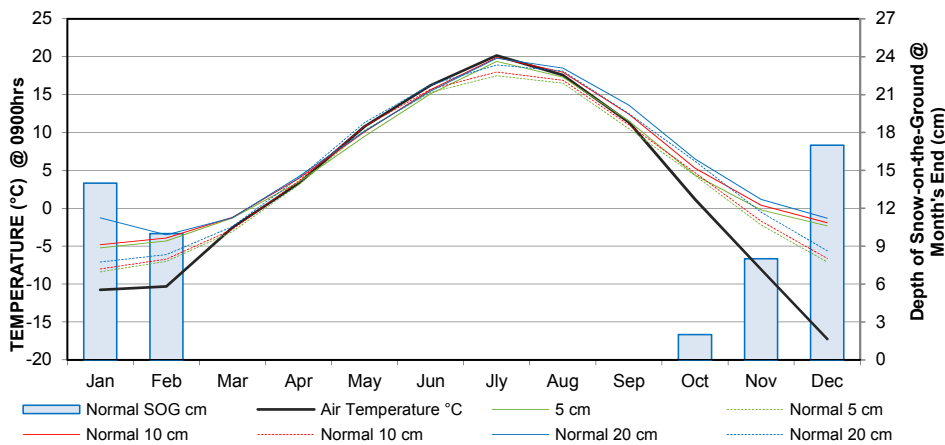
1: Environment Canada, 2004b

MAXIMUM DAILY WIND CHILL VALUE WHEN TEMPERATURE <0°C												
	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	-17	-9	-11	-1							-11	-17
2	-18	-11	-16	-3							-6	-18
3	-5	-13	-17	-1							-6	-20
4	-6	-10	-8								-6	-21
5	-3	-10	-7							-6	-4	-17
6	-7	-15	-15	-1						-5	-4	-24
7	-11	-14	-17	-4							-5	-26
8	-10	-17	-14	-8							-12	-25
9	-5	-26	-9	-10						-3	-19	-29
10	-18	-29	-3	-8						-3	-17	-26
11	-25	-28	-4	-7						-6	-23	-28
12	-18	-20	-1							-4	-24	-25
13	-7	-16	-1							-2	-10	-23
14	-11	-12	-3	-1							-14	-19
15	-28	-11	-2	-10							-13	-21
16	-34	-12	-4	-7							-12	-21
17	-35	-17	-4	-6							-14	-21
18	-40	-11	-5	-5						-2	-8	-17
19	-35	-8	-5	-2						-3	-7	-24
20	-31	-8	-5	-4						-2	-9	-28
21	-25	-7	-6							-6	-15	-22
22	-19	-7	-6	-1						-9	-18	-25
23	-23	-14	-10							-4	-22	-27
24	-14	-15	-10							-5	-17	-32
25	-7	-18	-12	-2						-6	-23	-33
26	-12	-20	-5	-5						-9	-18	-32
27	-12	-19	-2	-1						-11	-20	-31
28	-14	-19	-4	-1						-12	-21	-27
29	-16	-15	-1							-6	-21	-25
30	-9									-2	-19	-27
31	-7		-2							-11	-17	-27

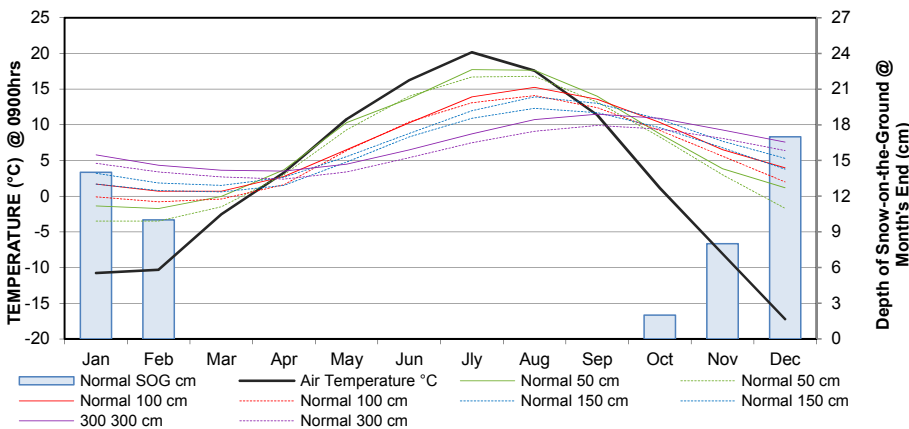
### SOIL TEMPERATURES AND DEPTH OF SNOW-ON-THE-GROUND @ MONTH END

	Mean Air Temp @ 0900h (°C)	SOIL TEMPERATURES @ 0900h (°C)																	Mean Air Temp @ 1600h (°C)	SOIL TEMPERATURES @ 1600h (°C)								
		Surface		5 cm		10 cm		20 cm		50 cm		100 cm		150 cm		300 cm		Snow-on-the-Ground		Surface		5 cm		10 cm		20 cm		
		2012	NORM	2012	NORM	2012	NORM	2012	NORM	2012	NORM	2012	NORM	2012	NORM	2012	NORM	2012		NORM	2012	NORM	2012	NORM	2012	NORM	2012	NORM
JAN	-10.8	-11.5	-5.2	-8.4	-4.8	-8.0	-1.3	-7.1	-1.4	-3.5	1.7	-0.1	3.2	1.7	5.8	4.6	14	12	-5.5	-5.9	-4.6	-7.8	-4.5	-7.8	-4.1	-6.2		
FEB	-10.3	-11.2	-4.3	-7.0	-3.9	-6.7	-3.5	-6.1	-1.7	-3.5	0.7	-0.8	1.9	0.8	4.3	3.4	10	12	-3.1	-3.2	-4.3	-6.5	-4.1	-6.6	-3.7	-5.2		
MAR	-2.6	-3.1	-1.3	-3.1	-1.2	-2.8	-1.3	-2.4	0.0	-1.5	0.7	-0.4	1.5	0.6	3.6	2.7	0	3	2.7	2.8	-1.0	-2.7	-1.0	-2.6	-1.2	-1.8		
APR	3.3	3.3	3.5	3.1	3.9	3.6	4.2	4.0	3.7	3.0	2.8	1.6	2.7	1.5	3.5	2.4	0	0	9.4	10.2	6.9	6.0	5.9	5.5	4.2	4.6		
MAY	10.8	10.1	9.5	10.3	10.1	10.8	10.2	11.3	10.3	9.3	6.5	6.4	5.5	4.8	4.5	3.4	0	0	15.7	15.6	13.8	13.9	12.6	13.6	10.4	12.0		
JUN	16.2	15.3	15.1	15.3	15.7	15.7	15.5	16.3	13.7	14.0	10.3	10.4	8.8	8.3	6.5	5.4	0	0	20.8	20.1	19.6	19.6	18.2	19.0	15.8	17.1		
JULY	20.2	19.4	19.4	17.5	19.9	18.0	19.8	18.9	17.7	16.7	13.9	13.1	12.0	10.9	8.7	7.5	0	0	24.9	25.2	23.8	21.8	22.7	21.3	20.1	19.5		
AUG	17.6	16.9	17.3	16.5	18.0	16.9	18.5	18.1	17.7	16.8	15.3	14.1	13.9	12.3	10.7	9.1	0	0	23.9	24.0	22.1	20.4	20.7	20.0	18.7	18.6		
SEP	11.4	10.7	11.5	10.5	12.4	11.0	13.6	12.5	14.0	13.2	13.6	12.4	13.0	11.7	11.5	9.9	0	0	20.5	21.0	16.4	13.7	15.2	13.4	13.7	13.1		
OCT	1.2	0.7	4.4	4.3	5.3	4.7	6.5	6.2	8.7	8.3	10.3	9.2	10.8	9.6	10.9	9.4	2	1	5.9	6.0	6.5	6.2	6.4	6.4	6.5	6.9		
NOV	-8.1	-8.6	-0.2	-2.2	0.4	-1.7	1.2	-0.5	3.9	3.0	6.5	5.6	7.7	6.8	9.3	8.1	8	4.5	-5.5	-6.0	-0.2	-1.5	0.4	-1.2	1.1	0.3		
DEC	-17.2	-17.7	-2.3	-7.1	-1.9	-6.6	-1.3	-5.6	1.2	-1.7	4.0	2.0	5.3	3.8	7.6	6.4	17	8.5	-15.6	-15.6	-2.4	-6.5	-2.0	-6.3	-1.3	-4.6		

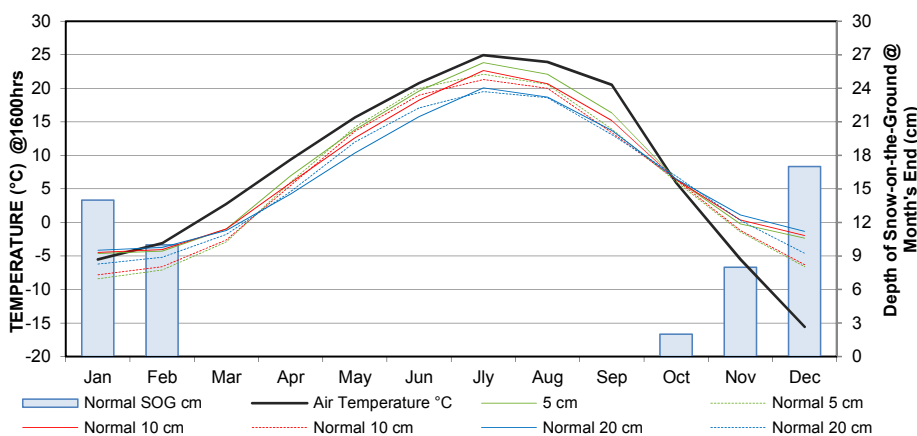
Normal Soil temperatures (1971-2000) for SRC CRS are provided by Environment Canada 2004a



Soil Temperatures at @0900h Monthly



Soil Temperatures at @0900h Monthly



Soil Temperatures at @1600h Monthly

## INSTRUMENTS USED AT SASKATOON SRC CRS AND GLOSSARY OF TERMS

(Unless otherwise stated, source for definitions of terms is Environment Canada, 1978)

**BEAUFORT WIND SCALE** was developed by Admiral Sir Francis Beaufort in 1805 and adopted by the British Navy in 1838. It consisted of 13 degrees of wind strength, from calm to hurricane, based upon the effects of various wind strengths upon the amount of canvas carried by the fully rigged frigates of the period. Over the years it has been modified as needed and in 1946 the scale values (Force Numbers) were defined by ranges of wind speed as measured at a height of 10 meters above the surface. In effect, this transformed the 'Beaufort Wind Force Scale' into the 'Beaufort Wind Speed Scale'. This scale is the current standard scale for visual observations of the wind (Heidorn, 1998).

**BRIGHT SUNSHINE** is the unobstructed direct radiation from the sun, as opposed to the shading of a location by clouds or by other atmospheric obstructions.

*Number of Days* is defined as the total number of days when at least 0.1 of an hour of bright sunshine was recorded.

*Percentage Possible* refers to the ratio of measured bright sunshine hours to the total possible daylight hours in a given period, expressed as a percentage.

*Possible daylight hours* are taken from the sunrise/set tables provided by the National Research Council of Canada, Herzberg Institute of Astrophysics, Victoria, BC.

*Total* is the sum of the daily bright sunshine values in hours and tenths of hours as measured by an automated sunshine recorder using voltaic cells.

**DEGREE-DAY** is an index for various temperature related calculations

*Cooling* (CDD) is the cooling requirement to achieve a stipulated comfort value in an indoor environment. For most purposes, a temperature of greater than 18°C is considered uncomfortable and supplementary cooling is required. On a specific day, the amount by which 18°C is less than the daily average temperature defines the number of cooling degree-days for that day.

Mathematically:  $CDD = (T - 18^\circ\text{C})$ , for that day, where T = daily mean temperature in °C if T is equal to or less than 18°C, CDD = 0.

Monthly and annual values of CDD are obtained by summing daily values.

*Growing* (GDD) is the growing requirement in order for plant growth to proceed. The air temperature must exceed a critical value appropriate to the plant species in question. For many members of the grass family, including most commercial cereals grown on the prairies, a base temperature of 5.0°C has been established. On a specified day, the difference between the daily average temperature and the 5.0°C base temperature defines the number of growing degree-days.

Mathematically:  $GDD = (T - 5.0^\circ\text{C})$ , for that day, where T = daily mean temperature in °C if T is equal to or less than 5.0°C, GDD = 0.

Daily GDD values are summed to provide totals for the appropriate month, growing season or year.

*Heating* (HDD) is the heating requirement to achieve a stipulated comfort value in an indoor environment. For most purposes, a temperature of less than 18°C is considered uncomfortable and supplementary heating is required. On a specific day, the amount by which 18°C exceeds the daily average temperature defines the number of heating degree-days for that day.

Mathematically:

$HDD = (18^\circ\text{C} - T)$ , for that day, where T = daily mean temperature in °C if T is equal to or greater than 18°C, HDD = 0.

Monthly and annual values of HDD are obtained by summing daily values.

**EXTREME** is the highest or lowest value of a particular element recorded during the period in question.

**EXTREME ALL YEARS** Temporal comparisons at a point are also of value in some types of climatic studies. Therefore, it is desirable to produce the maximum length of reliable climatic record to carry out studies over a period of time. Data are drawn mainly from the following data sets:

SRC: 1963 to present

Saskatoon Airport: 1942 to present

University of Saskatchewan: 1916 to 1963

Eby station: 1901-1941

NWMP: circa 1892 to circa 1900 (sporadic)

Station locations, exposures and measurement procedures were subject to change during this time period. Data are not adjusted and users are cautioned accordingly.

**FROST** is recorded on each occasion when the daily minimum temperature is equal to or less than 0°C.

**NORMAL VALUE (1981-2010)** In climatology it is often useful to make spatial comparisons of particular element values over a common time period. At an interior continental site such as Saskatoon, a period of 30 years is required to produce statistically stable estimates of the more variable elements. To facilitate spatial comparisons, the World Meteorological Organization recommends the standard normal (average) period of thirty years. The current normal period for data analysis at CRS is from January 1<sup>st</sup>, 1981 to December 31<sup>st</sup>, 2010. Data derived from CRS conform to this standard, except where noted. The normals for CRS have been calculated using the data collected during this standard period. Where gaps existed, data from the nearest climate station were used and referenced as to being used. (Environment Canada, 1993, 2002, 2004a)

**POTENTIAL EVAPOTRANSPIRATION (Thornthwaite Method)** is the amount of water which will be lost from a surface completely covered with vegetation if there is sufficient water in the soil at all times for the use of the vegetation. It is computed by means of an empirical formula involving mean monthly temperature and average length of day.

Mathematically:  $PET = mT^a$  where PET = Potential of Evapotranspiration; m = % of day length for the month as compared to the year; T = Temperature °C when T is less than or equal to 0; otherwise T = 0; and a = yearly heat index. (Thornthwaite and Mather, 1955)

## PRECIPITATION

*Day* is recorded on occasions when the amount of precipitation in a 24-hour period equals or exceeds 0.2 mm water. An asterisk (\*) appearing in the average column denotes the occurrence of measurable precipitation on one or more occasions, and that the calculated 30-year average amounts to less than a trace. The so-called climatological day, beginning at 9 a.m. standard time on the date of reference and ending at 9 a.m. the next morning, was employed in record keeping up to January 1994. On February 1, 1994, after consultation with Environment Canada, record keeping was changed to the 24-hour period of 0000 hours - 2400 hours to conform to their reporting of climatological statistics.

*Measurable* precipitation is when the amount equals or exceeds 0.2 mm of water or water equivalent.

*Dry day* is when no measurable precipitation is recorded.

*Total* is the sum of the daily recorded precipitation. The snowfall component of precipitation is recorded as an equivalent amount of liquid water. The notation "T" refers to a trace of precipitation (less than 0.2 mm water equivalent). As of August 7, 1993, total precipitation was measured using a weighing gauge for the winter season and the tipping bucket during frost-free period.

**SEASONS** Meteorologists prefer to divide the year into four 3-month periods based primarily on temperature. Thus winter is defined as December (previous year), January, and February (DJF); spring as March, April and May (MAM); summer as June, July and August (JJA); and fall as September, October and November (SON). (Lutgens and Tarbuck, 1992)

**SOIL TEMPERATURE** under a short grass surface with normal snow accumulation, is measured according to procedures outlined in the Environment Canada publication "*Soil Temperature*" January 1, 1976. Depths below surface at which soil temperature measurements are made are: 5 cm, 10 cm, 20 cm, 50 cm, 100 cm, 150 cm and 300 cm. Since soil temperature is affected by profile structure and water content, extrapolation of the measured data is difficult.

## SOLAR RADIATION

*Diffuse - Total* is radiation reaching the earth's surface after having been scattered from the direct solar beam. The instrument used is an Eppley pyranometer with a shade ring (See SOLAR RADIATION-Global- Total).

*Global - Total* is the sum of the direct solar and diffuse radiation during the period in question. Measurements are carried out on a horizontal surface near ground level and integrated over the whole celestial dome, summing the diffuse and direct components of the solar beam. The temperature-compensated Eppley pyranometer is used. The standard metric unit of measurement is the megajoule per square metre (MJ/m<sup>2</sup>). (To facilitate comparison with past years' data: 1.0 MJ/m<sup>2</sup> = 23.895 langley). Comparison is provided with a provisional average based on 16 years of data (1975-1990).



**SPELLS**

*Temperature spells* are defined as days when the daily maximum temperature is higher than or equal to 30°C (hot spell) or the daily minimum temperature is lower than or equal to -30°C (cold spell).

*Precipitation spells*, for this report, are defined as when more than one day is (wet spell) or is not (dry spell) measured.

**SUNRISE/SUNSET** times have been included in this report. They have been acquired from the National Research Council, Canada, Herzberg Institute of Astrophysics.

**TEMPERATURE**

*Average Annual* is the average of the daily average temperatures in degrees Celsius (°C) for one year.

*Average Daily* is defined as the arithmetic mean of the daily maximum temperature in degrees Celsius (°C) and the daily minimum temperature in degrees Celsius (°C) for the day in question.

*Average Maximum* is the average of the daily maximum temperatures in degrees Celsius (°C) average over the appropriate time periods.

*Average Minimum* is the average of the daily minimum temperatures in degrees Celsius (°C) averaged over the appropriate time periods. Refer to TEMPERATURE-Average Maximum concerning measurement procedures.

*Average Monthly* is the average of the daily average temperatures in degrees Celsius (°C) for the month under consideration.

**WIND CHILL** describes a sensation, the way we feel as a result of the combined cooling effect of temperature and wind. This feeling can't be measured using an instrument, so a mathematical formula was developed in 1939 that related air temperature and wind speed to the cooling sensation. This formula was revised in 2001 by a team of scientists and medical experts from Canada and the U.S. with the Canadian Department of National Defence contributing human volunteers. The new index is based on the loss of heat from the face (Environment Canada 2004b).

**WAVES** - Temperature waves are defined as a sequence of three or more days when the daily maximum/minimum temperatures are higher/lower than, or equal to, a set temperature. For a heat wave the temperature is 32°C. (Environment Canada 2012).

**WIND SPEED**

*Average* is the average of the hourly wind speeds for the period in question measured in kilometres per hour (km/h). Average hourly wind speeds are obtained from a RM Young Wind Monitor anemometer at a height of 10 m.

*Peak Gust* refers to the highest instantaneous value recorded by the anemometer system for the period of reference, irrespective of direction and/or duration. Comparison is with published data for Environment Canada, Saskatoon Airport station.

*see also* **Beaufort Wind Scale**

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