

**CLIMATE REFERENCE STATION
Conservation Learning Center
RM of Prince Albert #461
ANNUAL SUMMARY 2022**

**V. Wittrock
Saskatchewan Research Council**



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SRC Publication No. 13000-2E23
August 2023
Saskatchewan Research Council
125 - 15 Innovation Blvd.
Saskatoon, SK S7N 2X8

COVER PHOTOGRAPHS

Report cover: Climate Station (October 2022)

photo credit: K. Babich

Inside cover: Diffuse pyranometer (April 2022)

photo credit: R. Jansen

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ACKNOWLEDGEMENTS

The 2022 data were compiled and recorded by Virginia Wittrock. Wittrock was responsible for the data monitoring while most of the instrument maintenance is the responsibility of Saskatchewan Research Council (SRC) Process Development (Ryan Jansen and Graham Epp) and Development Engineering and Manufacturing Business Units (Ken Babich and others). Grounds maintenance (lawn mowing) is managed by the Conservation Learning Centre personnel. Consultations with Terri Lang and others from Environment Canada, Saskatoon, SK were most helpful in verifying and comparing data. Editorial assistance for this report was provided by Kenelm Grismer and Celeste Bodnaryk (SRC Environmental Performance and Climate Business Unit).

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Enquiries concerning the SRC Conservation Learning Centre (CLC) Climate Reference Station (CRS), its data, measurement programs and publications or becoming a supporter are most welcome. For further information contact:

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 Monthly data sheets and annual summaries: <http://src.nu/crsdata>

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION SUPPORTERS, 2022-2023
WE GRATEFULLY ACKNOWLEDGE THE SUPPORT OF THE FOLLOWING:

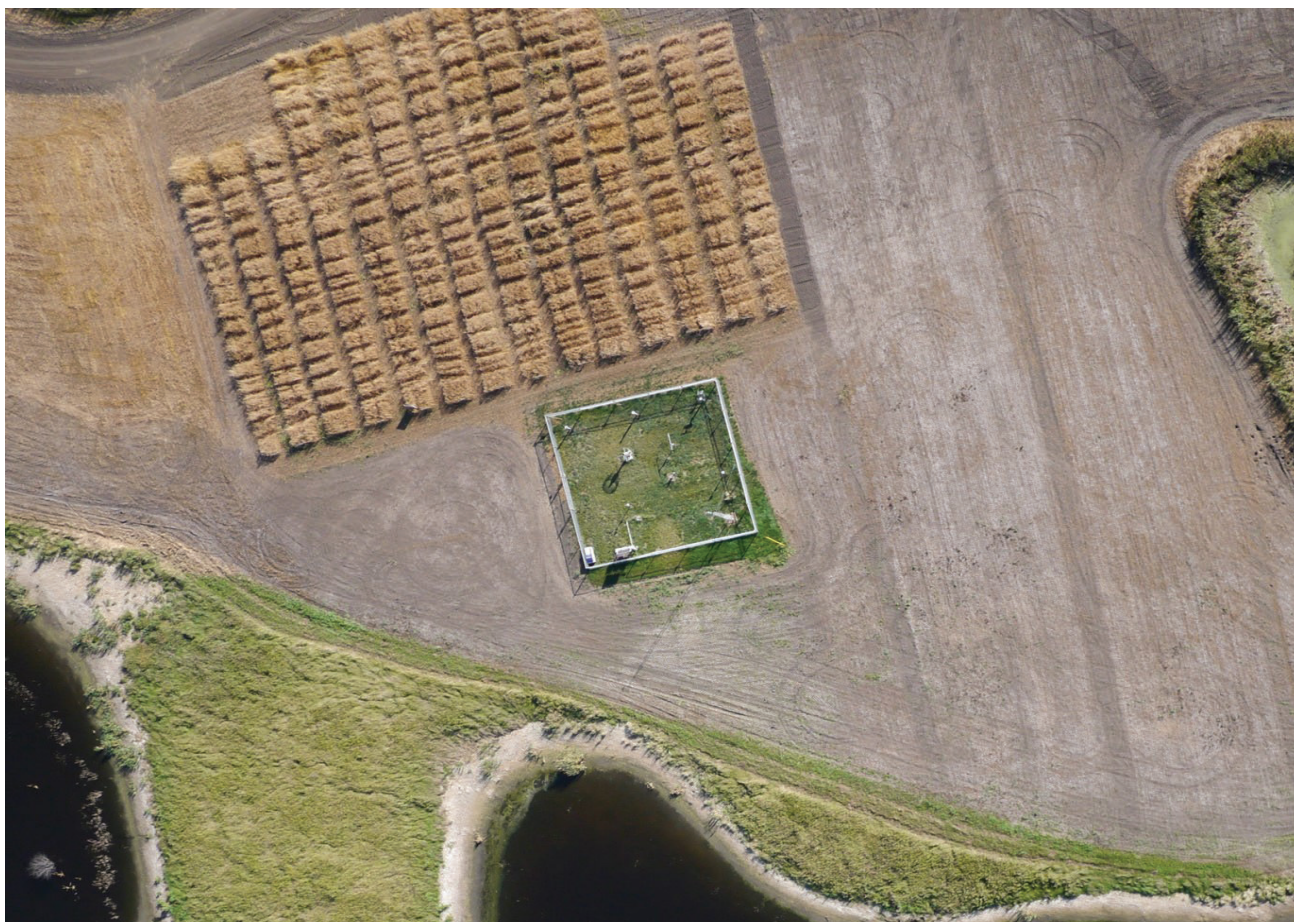


SRC'S CONSERVATION LEARNING CENTRE CLIMATE REFERENCE STATION HISTORY

The Saskatchewan Research Council's Climate Reference Station (CRS) at the Conservation Learning Centre (CLC) was established in 2011 with the first full year of data in 2012. This station is situated approximately 16km east of MacDowall, approximately 11km north of St. Louis and 18km south of Prince Albert, Saskatchewan. The oldest recordings of meteorological data in the area are south of the North Saskatchewan River at Prince Albert beginning in 1884 and lasting until 1942. In 1953, the present day Prince Albert station was established at the airport north of the river and east of the city. Other nearby stations recording intermittent data were at MacDowall (1914-2003) and Hoey (south of St. Louis) (1986-2012) with MacDowall recording both precipitation and temperature and Hoey only recording precipitation.

V. Wittrock has been project manager since the site was established. Wittrock and C. Beaulieu were the first observers. S. Dunn became primary observer between 2014-2016 with assistance from V. Wittrock. V. Wittrock took over this role in 2017 as well as remaining project manager. Instrument maintenance is carried out by R. Jansen, K. Babich and G. Epp plus others. Summer of 2018 data monitoring assistance was provided by A. Carlson. V. Wittrock continues to be the primary observer and is also the project manager of SRC's Climate Reference Stations.

The instrument array consists of temperature, precipitation, humidity, barometric pressure, wind (speed and direction), snow depth, barometric pressure, solar radiation (global, diffuse and bright sunshine), and soil moisture, grass height air temperature and soil temperature (seven levels). The site is a self-contained unit with power generated from solar panels while the data is retrieved from the data logger by an internet connection via the cellular network.



Aerial view of CRS at CLC

Photo: Lettvenuk, J.

Date: Sept 2013

WHAT IS THE CLIMATE REFERENCE STATION?

The Saskatchewan Research Council's Climate Reference Station (SRC CRS) at Conservation Learning Centre is classified as a principal climatological station with supplementary climatological observations¹. A climate reference 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 climate². At CRS Conservation Learning Centre, half-hourly readings are taken of elements (temperature, precipitation amount, humidity, wind and atmospheric pressure). Supplemental observations include rainfall intensity, soil temperature (7 levels), bright sunshine, solar radiation (diffuse and global), snow depth, relative humidity, barometric pressure, soil moisture (3 levels) and grass level temperature. 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, as well as health and comfort.

The CRS allows us to:

- Evaluate long-term climatic trends – early warning system for increased frequencies of extreme events such as floods, droughts, 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 health implications;
- Do value-added research;
- Be part of regional, national and global networks in important agricultural and ecological areas;
- 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 Atmospheric Study (BOREAS), and collaborative research with the Western College of Veterinary Medicine and the College of Agriculture, University of Saskatchewan; and
- Provide climate data to various industries, government organizations, non-government organizations, media outlets, institutions of learning, and interested individuals.

Goals

The goals of the CRS are first to maintain the high quality of data gathered over a long time period at a set location and 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 the SRC CRS at Conservation Learning Centre to be an extremely valuable climate information collection station.

¹Environment Canada 1992 ²World Meteorological Organization 1988

ACTIVITIES ASSOCIATED WITH THE SRC CLIMATE REFERENCE STATION AT THE CONSERVATION LEARNING CENTRE, 2022

The CLC is a research and demonstration farm. Its outreach program for grades 3-11 students resulted in approximately 300 students being exposed to hands-on activities related to air, soil, and water interactions at the farm. The SRC Climate Reference Station is included in the program allowing the students to become familiar with the CRS's suite of instruments. The station emphasizes the importance of climate and its application to the practical world of farming and ecology.¹ Unfortunately, with COVID-19 in 2020, that program needed to be put on hiatus.

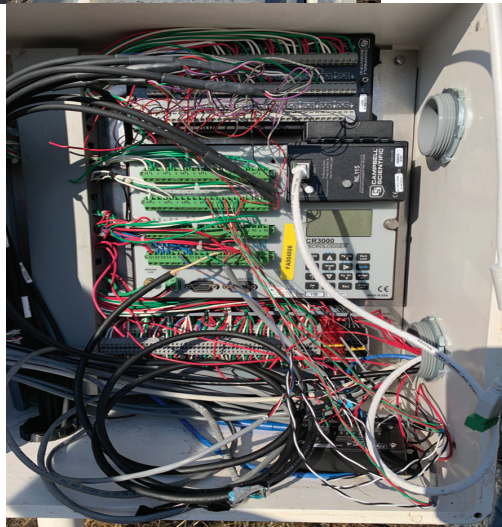
A couple of instruments, tipping bucket and the Geonor all-season precipitation gauge, were causing us issues in 2022. The tipping bucket was recalibrated in the spring maintenance trip (23 April 2022) with the recommendation of the instrument “come in for repairs” in the winter of 2022-2023. The Geonor's measurements continued to cause issues and resulted in all three transducers being replaced in the fall of 2022. That instrument is now working splendidly.



Solar Panels
October 2022
Photo: K. Babich



Geonor all-season precipitation gauge transducer replacement (all three) October 2022
Photo:K. Babich



A closer look at some of the electronics
October 2022
Photo:K. Babich

SUMMARY FOR 2022

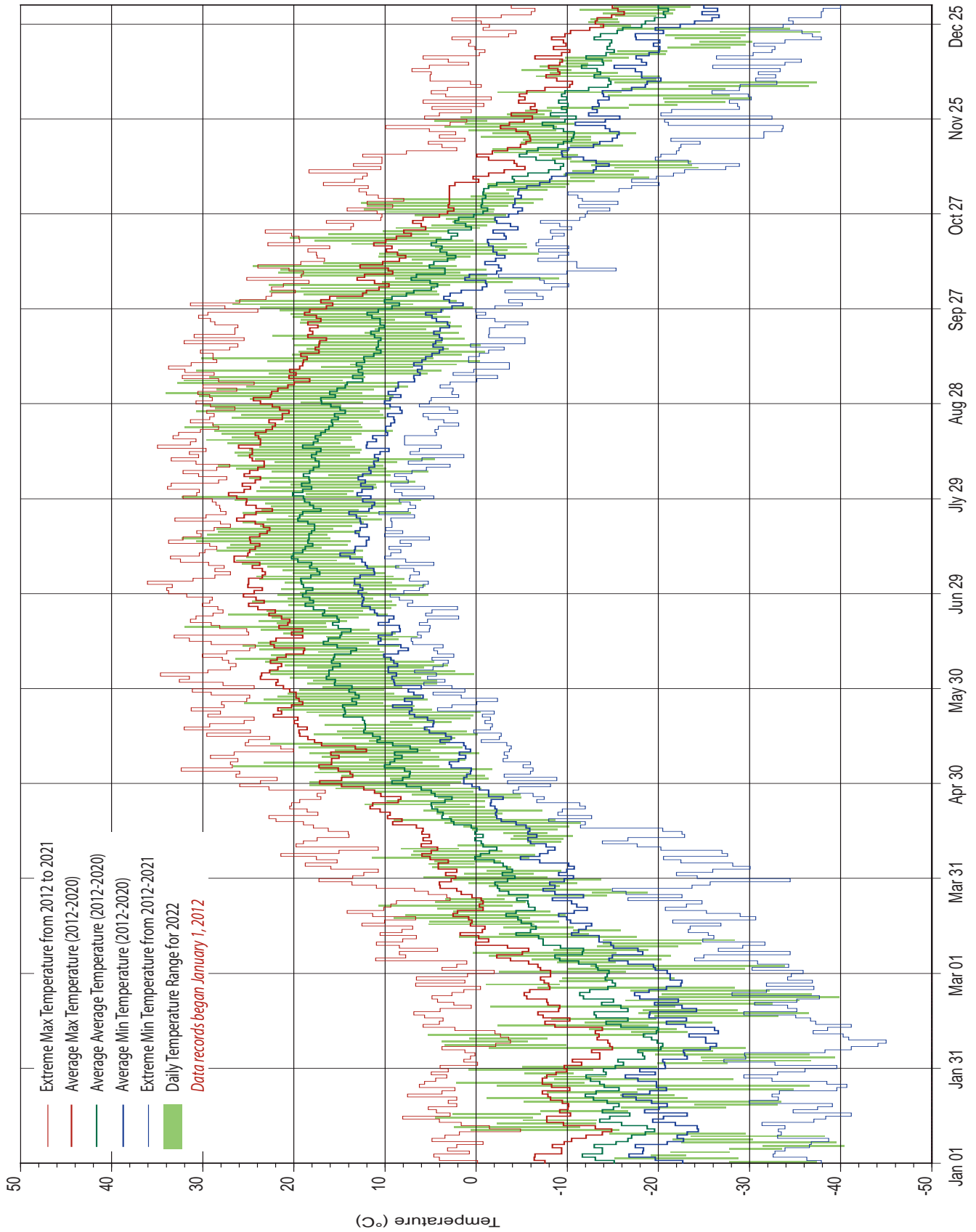
Data, including temperature, precipitation, wind speed and direction, bright sunshine, solar radiation, soil temperature and moisture, was recorded during 2022 by the Saskatchewan Research Council's (SRC) Climate Reference Station (CRS) at the Conservation Learning Centre (CLC) (53.03 N, 105.77 W), located in the Rural Municipality of Prince Albert #461, Saskatchewan.

SRC's Climate Reference Station at the CLC has been in operation for ten years (2012-2021), tracking similarities and differences of various parameters between the years and seasons. Now that the station has reached a full 10 years of records, there is sufficient data for certain statistical analyses, such as determining averages. This report examines the types of weather and climate that occurred in 2022 and compares it to the previous ten years.

Synopsis for 2022 CLC:

- 13 days with temperatures at or greater than +30C at CLC
 - Hottest day was 34.1C (August 31)
- 27 days with temperatures at or below -30C at CLC
- 1 days with temperatures at or below -40C at CLC
 - Coldest day was -40.4C (January 6)
- 2022 was one of the cooler years at SRC's CRS at CLC.
 - Winter of 2021-2022 was the second coldest at the site. The winter of 2013-2014 was colder.
 - Spring was cooler than average.
 - Summer and autumn maximum temperatures were the second highest over the past 11 years but the minimum temperatures were average or below average.
- Frost-free season was 110 days long (May 22 to September 10). This was the shortest frost-free season length at the CLC CRS.
- The hot summer of 2022 resulted in the largest number of growing degree-days (1665 (4th highest)), the number of cooling degree days (109) was above the 2012-2021 average of 97.6.
- 2022 was the fourth driest year in the past 11 years with 331.5mm of measured precipitation.
- The continuous snowpack for the 2021-2022 winter started on November 10 and lasted until April 24. The deepest the snow got at site was 72 cm in early March.
- 2022 had average number of bright sunshine hours (2459.6) but is ranked third for having greater than average number of days (325) with any bright sunshine.
- Peak wind for the year was measured on October 12 (67.7 km/h)
 - CLC had seven days with peak winds categorized as gale force winds (page 35).
- 2022 had one measured temperature at or below -40C. When windspeed is included to calculate windchill, SRC's CRS at CLC had 32 days rated at 'high risk' to 'very high risk' (see windchill calculation chart).

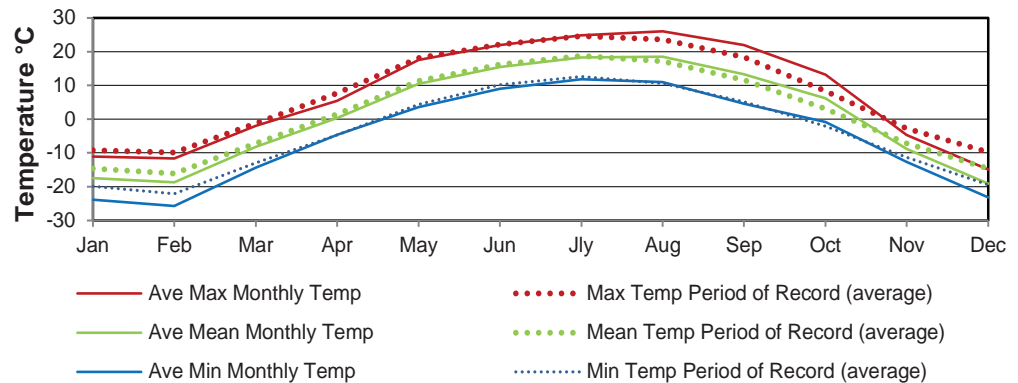
DAILY TEMPERATURE



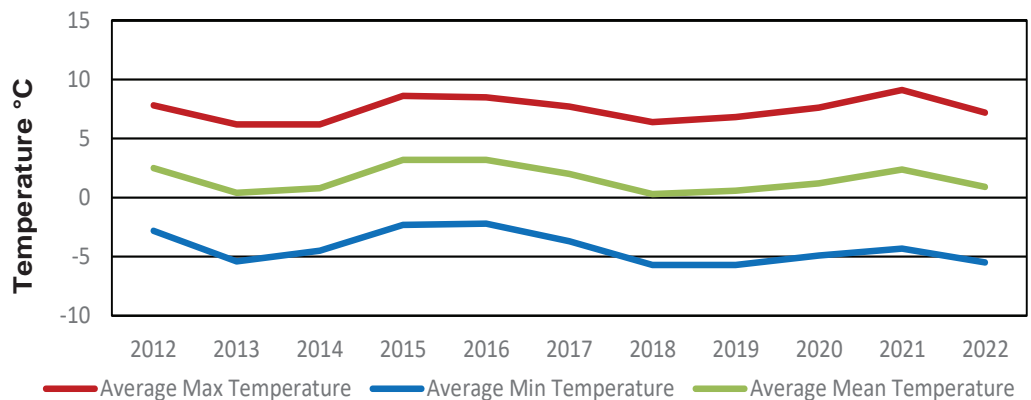
TEMPERATURE

MONTH	AVERAGE MAXIMUM TEMPERATURE (°C)	AVERAGE MINIMUM TEMPERATURE (°C)	AVERAGE TEMPERATURE (°C)	EXTREME VALUES TEMPERATURE (°C) 2022				EXTREME VALUES TEMPERATURE (°C) FOR 2012 TO 2021					
	2022	2022	2022	Max	Day	Min	Day	Max	Day	Year	Min	Day	Year
January	-11.1	-23.8	-17.5	4.5	15	-40.4	6	8.1	15	2014	-41.1	16	2020
February	-11.6	-25.7	-18.7	5.3	10	-39.9	22	6.9	17	2017	-44.9	8	2019
March	-2.0	-14.4	-8.2	10.7	22	-33.9	3	17.3	30	2012	-35.8	1	2014
April	5.4	-4.6	0.4	18.3	29	-11.5	17	26.0	29	2015	-30.0	3	2020
May	17.5	3.5	10.5	26.6	5	-1.8	4	32.4	4	2016	-8.8	1	2019
June	21.9	9.0	15.5	32.0	18	0.2	3	34.7	3	2021	0.2	3	2022
July	24.8	11.8	18.3	32.3	16	5.6	1	36.1	2	2021	4.7	8	2015
August	26.0	11.0	18.5	34.1	31	4.5	10	35.0	14	2021	1.4	11	2019
September	21.9	4.6	13.3	32.8	3	-1.0	13	33.8	8	2011	-7.3	30	2018
October	13.2	-0.9	6.2	24.5	10	-9.1	6	25.2	6	2021	-15.5	30	2019
November	-4.7	-12.7	-8.8	4.6	25	-24.4	10	18.4	9	2016	-33.6	23	2013
December	-14.9	-23.2	-19.1	-2.4	4	-37.8	23	7.1	11	2014	-39.9	31	2013
Average	7.2	-5.5	0.9										

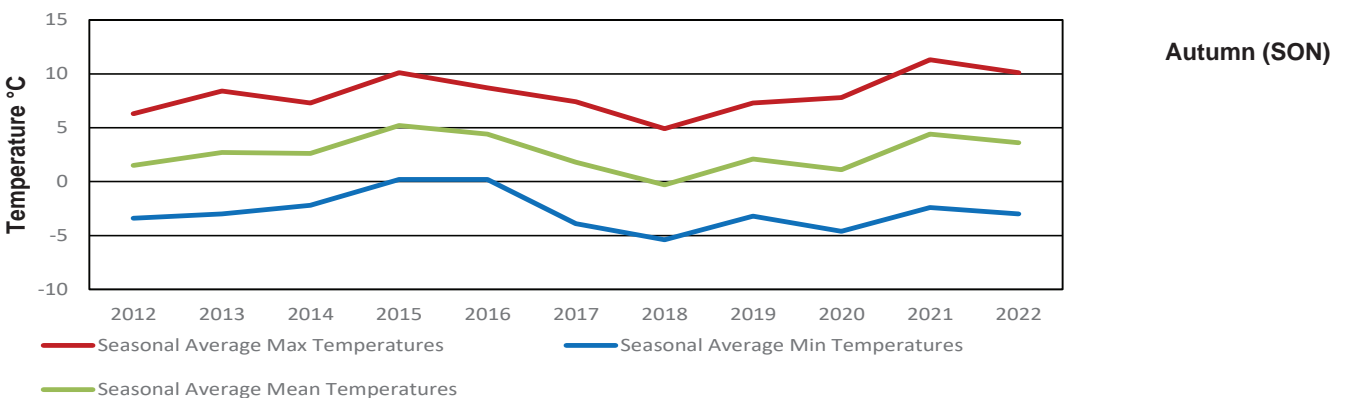
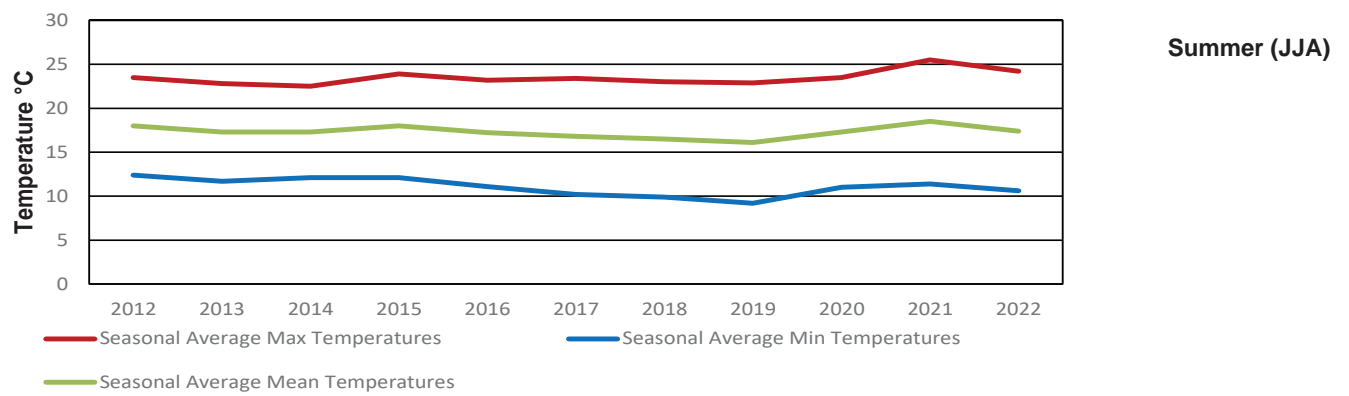
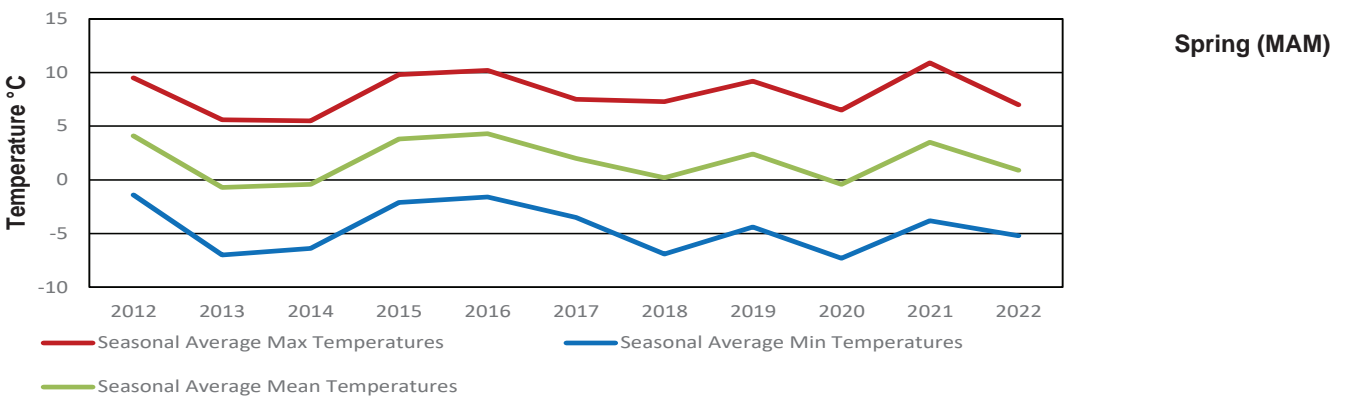
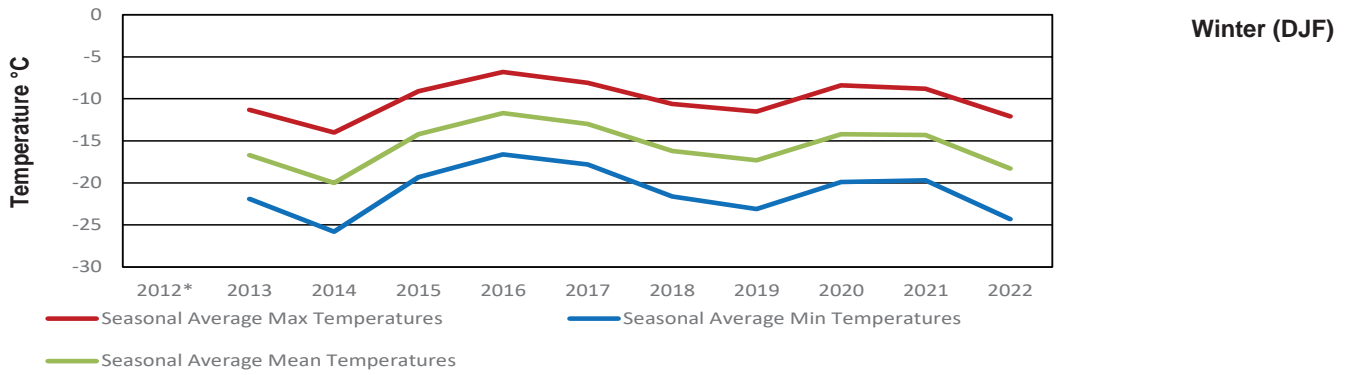
Monthly



Annual



SEASONAL TEMPERATURES



TEMPERATURE

2022 EXTREME TEMPERATURES					
COLD (less than or equal to -30°C)			HOT (greater than or equal to 30°C)		
DATE (month/day)	TEMPERATURE °C	DATE (month/day)	TEMPERATURE °C		
January	1	-37.4	June	18	32.0
	5	-33.6	July	15	30.7
	6	-40.4		16	32.3
	7	-39.5		29	32.3
	8	-30.4	August	20	32.0
	9	-38.3		25	30.7
	19	-33.1		27	30.0
	20	-33.5		30	30.4
	24	-34.9		31	34.1
	February	25	-36.6	3	32.8
2		-36.8	September	4	32.1
3		-39.4		7	30.7
4		-36.6		11	30.1
16		-33.2	Coloured cells indicate extremes		
17		-36.5			
20		-32.5			
21		-35.5			
22		-39.9			
23		-36.9			
24	-32.2				
March	3	-33.9			
December	2	-30.2			
	6	-36.5			
	7	-37.4			
	20	-30.3			
	23	-37.8			
	24	-34.4			

TEMPERATURE RANKINGS

AVERAGE ANNUAL TEMPERATURES °C					
MAXIMUM TEMP		MINIMUM TEMP		MEAN TEMP	
2021	9.1	2016	-2.2	2015	3.2
2015	8.6	2015	-2.3	2016	3.2
2016	8.5	2012	-2.8	2012	2.5
2012	7.8	2017	-3.7	2021	2.4
2017	7.7	2021	-4.3	2017	2.0
2020	7.6	2014	-4.5	2020	1.2
2022	7.2	2020	-4.9	2022	0.9
2019	6.8	2013	-5.4	2014	0.8
2018	6.3	2022	-5.5	2019	0.5
2013	6.2	2019	-5.7	2013	0.4
2014	6.2	2018	-5.8	2018	0.3

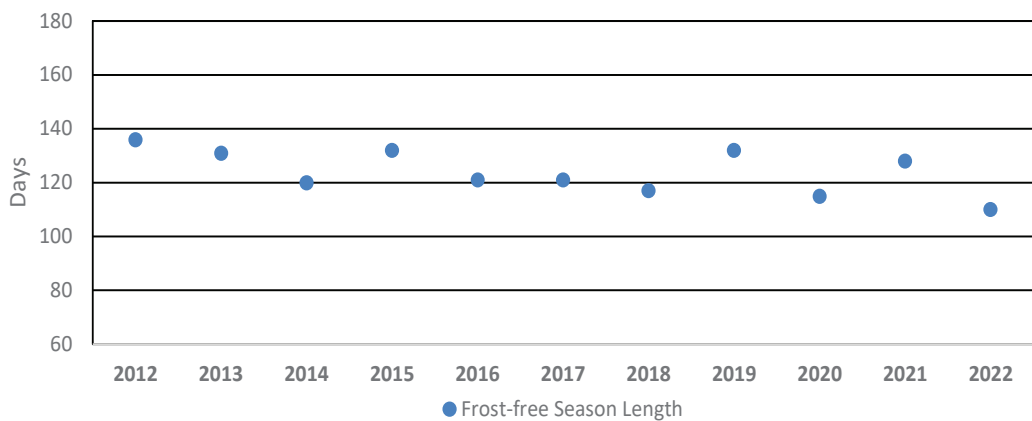
SEASONAL MAXIMUM AVERAGE TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	M	2021	10.9	2021	25.5	2021	11.3
2016	-6.8	2016	10.2	2022	24.2	2022	10.1
2017	-8.1	2015	9.8	2015	23.9	2015	10.1
2020	-8.4	2012	9.5	2020	23.5	2016	8.7
2021	-8.8	2019	9.2	2012	23.5	2013	8.4
2015	-9.1	2017	7.5	2017	23.4	2020	7.8
2018	-10.7	2018	7.3	2016	23.2	2017	7.4
2013	-11.3	2022	7.0	2018	23.0	2019	7.3
2019	-11.5	2020	6.5	2019	22.9	2014	7.3
2022	-12.1	2013	5.6	2013	22.8	2012	6.3
2014	-14.0	2014	5.5	2014	22.5	2018	4.9

SEASONAL MINIMUM AVERAGE TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	M	2012	-1.4	2012	12.4	2015	0.2
2016	-16.6	2016	-1.6	2014	12.1	2016	0.2
2017	-17.7	2015	-2.1	2015	12.1	2014	-2.2
2015	-19.2	2017	-3.5	2013	11.7	2021	-2.4
2021	-19.7	2021	-3.8	2021	11.4	2013	-3.0
2020	-19.9	2019	-4.4	2016	11.1	2022	-3.0
2018	-21.7	2022	-5.2	2020	11.0	2019	-3.2
2013	-22.0	2014	-6.4	2022	10.6	2012	-3.4
2019	-23.2	2018	-6.9	2017	10.2	2017	-3.9
2022	-24.3	2013	-7.0	2018	9.9	2020	-4.6
2014	-25.8	2020	-7.3	2019	9.2	2018	-5.4

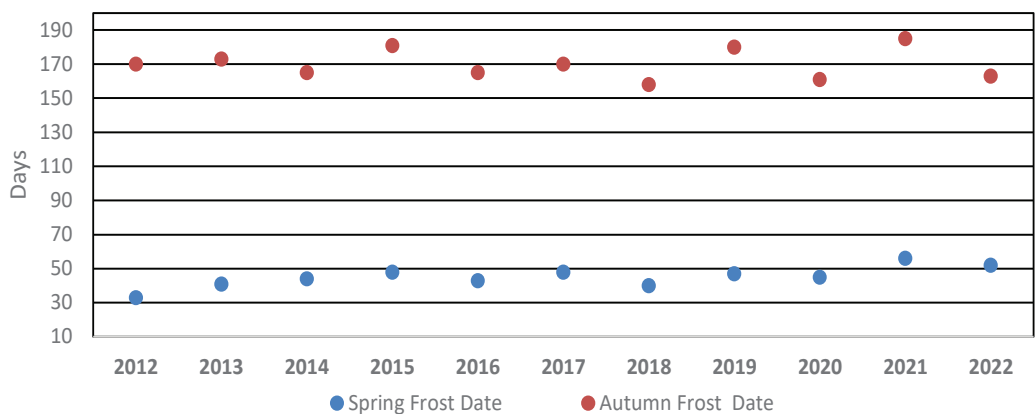
SEASONAL MEAN AVERAGE TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	M	2016	4.3	2021	18.5	2015	5.2
2016	-11.7	2012	4.1	2015	18.0	2016	4.4
2017	-13.0	2015	3.8	2012	18.0	2021	4.4
2020	-14.2	2021	3.5	2022	17.4	2022	3.6
2015	-14.2	2019	2.4	2014	17.3	2013	2.7
2021	-14.3	2017	2.0	2020	17.3	2014	2.6
2018	-16.3	2022	0.9	2013	17.3	2019	2.1
2013	-16.7	2018	0.2	2016	17.2	2017	1.8
2019	-17.4	2020	-0.4	2017	16.8	2012	1.5
2022	-18.3	2014	-0.4	2018	16.5	2020	1.1
2014	-19.9	2013	-0.7	2019	16.1	2018	-0.3

DATES & DURATION OF THE FROST-FREE SEASON			
YEAR	LAST SPRING FROST	FIRST FALL FROST	Frost-free Season Length
2011		September 14	
2012	May 3	September 17	136
2013	May 10	September 19	131
2014	May 14	September 12	120
2015	May 18	September 28	132
2016	May 13	September 13	121
2017	May 18	September 18	121
2018	May 10	September 5	117
2019	May 17	September 27	123
2020	May 15	September 8	115
2021	May 26	October 2	128
2022	May 22	September 10	110

Coloured cells indicate extremes



Frost-free Growing Season Duration



Frost-free Growing Season End Points

TEMPERATURE GRID °C

Average Temperature °C
Daily

2022	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	-32.6	-23.8	-9.5	-2.5	4.0	11.1	9.6	17.3	19.9	11.5	-1.8	-24.0
2	-22.0	-30.9	-19.8	-5.2	6.9	13.2	15.1	15.7	16.4	13.5	-2.2	-25.4
3	-21.2	-32.1	-23.3	0.5	9.3	11.4	15.9	14.7	20.7	11.9	-5.6	-21.2
4	-24.6	-28.2	-12.1	2.7	7.7	12.6	16.6	19.0	23.4	12.9	-5.5	-9.2
5	-30.7	-22.0	-13.2	1.0	15.3	12.1	15.1	12.8	20.8	3.2	-5.7	-21.7
6	-35.9	-15.5	-11.4	2.8	14.6	12.1	16.2	13.8	14.0	-0.1	-8.6	-29.9
7	-31.0	-3.2	-7.6	0.3	6.5	13.9	15.7	18.1	17.3	9.1	-14.7	-26.3
8	-26.0	-1.0	-13.7	2.0	10.5	17.8	19.5	19.3	12.0	11.7	-13.5	-17.2
9	-31.0	-3.5	-17.8	5.1	9.0	16.3	20.8	15.4	8.0	10.2	-14.3	-13.4
10	-22.2	-6.7	-19.3	-2.3	10.3	13.7	18.8	14.4	11.3	13.3	-19.8	-11.9
11	-7.6	-20.2	-21.2	-7.5	10.5	17.2	18.7	20.1	17.4	11.4	-18.2	-7.7
12	-4.5	-17.2	-7.9	-6.7	13.0	17.0	20.5	19.7	10.9	4.7	-17.0	-9.6
13	-7.8	-10.6	-7.4	-7.4	7.4	17.9	22.2	18.8	9.3	5.7	-9.4	-11.1
14	-9.2	-18.9	-13.3	-5.4	8.5	12.4	20.6	18.6	10.8	1.9	-9.0	-12.0
15	-0.9	-14.1	-6.9	-4.3	8.8	11.4	22.3	21.1	9.8	2.6	-6.0	-13.3
16	-2.3	-26.4	-0.6	-4.4	8.1	15.0	24.2	21.6	10.5	-0.6	-6.1	-17.7
17	-11.9	-27.2	-2.0	-4.1	9.5	17.7	22.9	20.3	10.8	4.1	-13.2	-18.3
18	-21.7	-23.5	1.6	0.2	11.8	24.2	20.5	20.3	13.2	9.0	-9.2	-24.5
19	-28.6	-11.8	-1.0	0.4	6.1	19.2	22.1	18.9	7.1	12.1	-8.9	-26.6
20	-19.4	-26.2	-2.8	0.7	4.0	19.1	18.7	22.3	8.3	10.7	-6.6	-27.4
21	-12.2	-26.0	1.8	-0.7	8.8	17.7	19.0	20.9	9.5	6.6	-9.7	-25.4
22	-18.9	-30.0	3.4	1.8	9.1	18.5	16.7	17.0	11.1	4.2	-4.0	-25.2
23	-12.8	-28.7	-0.5	6.5	13.2	17.7	16.3	18.4	14.1	1.9	-2.8	-32.3
24	-26.3	-24.6	0.2	4.4	13.5	12.8	16.4	18.0	11.5	0.2	-4.8	-25.0
25	-19.5	-17.6	-8.4	-0.5	17.9	14.7	18.2	20.7	12.4	0.6	1.7	-15.3
26	-4.9	-5.2	-15.8	1.1	14.3	16.9	16.2	19.1	12.6	1.7	-3.8	-14.0
27	-18.4	-11.8	-8.8	5.8	13.9	16.0	15.7	22.4	12.1	4.0	-5.5	-14.1
28	-10.9	-15.7	-5.3	7.4	14.9	13.5	16.3	15.8	16.8	5.2	-6.9	-17.6
29	-8.0		-5.2	10.6	14.8	15.7	22.5	17.0	14.3	4.3	-12.3	-17.8
30	-6.1		-5.6	10.0	12.5	15.1	16.5	19.8	12.3	3.2	-19.5	-16.7
31	-12.5		-1.0		11.4		18.8	23.3		0.9		-19.3

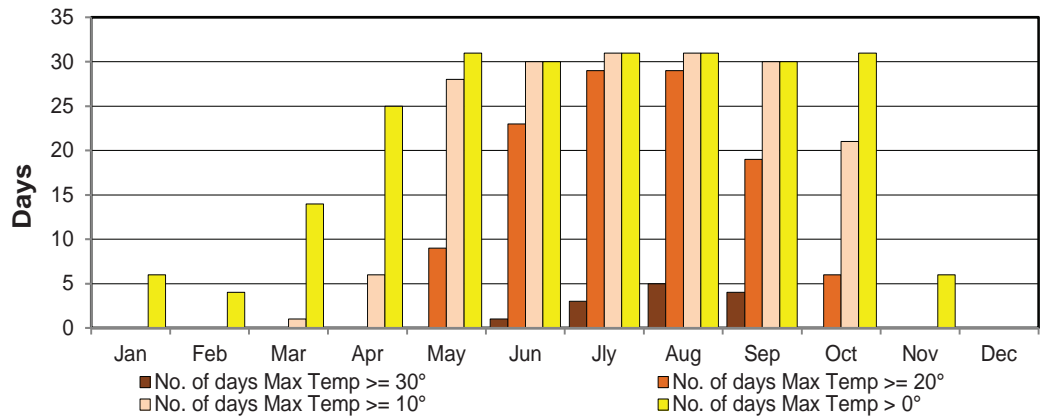


Air temperature / relative humidity sensors
Oct 2022
Photo: K. Babich

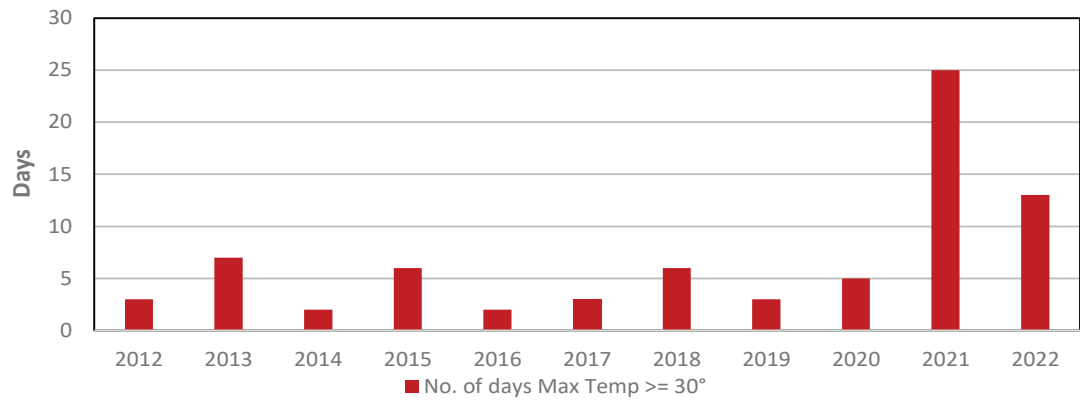
2022	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	Maximum Temperature °C Daily
1	-27.8	-19.9	-2.5	1.3	9.4	17.9	13.5	23.7	28.5	18.9	0.6	-20.7	
2	-15.2	-24.9	-10.1	-1.1	14.8	20.4	21.0	20.3	25.2	22.7	-0.7	-20.5	
3	-19.2	-24.7	-12.6	4.8	17.7	22.6	23.8	22.7	32.8	19.2	-3.3	-14.5	
4	-21.3	-19.7	-8.9	5.2	17.1	22.8	24.1	24.9	32.1	22.8	-1.2	-2.4	
5	-27.8	-17.9	-6.1	4.6	26.6	18.5	20.1	16.2	29.3	10.3	-1.2	-16.0	
6	-31.4	-1.4	-1.4	11.4	23.3	21.0	21.2	22.4	22.7	8.9	-4.1	-23.3	
7	-22.5	3.5	0.3	7.1	11.8	23.1	22.9	26.3	30.7	19.3	-10.3	-15.2	
8	-21.6	3.8	-8.5	6.9	16.9	26.4	25.7	28.3	17.0	21.7	-9.6	-14.5	
9	-23.6	0.8	-13.3	8.2	18.3	22.5	26.3	22.1	13.8	21.5	-10.6	-6.6	
10	-14.7	5.3	-13.9	2.0	15.5	17.3	25.2	24.2	22.9	24.5	-15.2	-8.1	
11	0.6	-17.1	-14.0	-5.6	19.5	23.8	24.2	26.2	30.1	16.8	-12.7	-5.0	
12	2.4	-12.4	1.9	-3.8	22.6	25.6	28.5	26.5	20.2	7.0	-10.3	-7.0	
13	-2.3	-2.3	-2.5	-4.1	11.8	24.0	27.4	24.9	19.5	10.7	-8.3	-9.9	
14	-5.1	-11.9	-10.7	-3.0	14.7	16.2	27.0	23.8	18.6	10.6	-6.9	-9.1	
15	4.5	-8.3	-3.0	0.4	17.8	16.4	30.7	27.3	20.0	8.6	-2.0	-9.8	
16	2.6	-19.6	5.2	1.4	15.2	21.1	32.3	29.6	17.3	4.5	-1.8	-14.6	
17	-7.1	-17.8	5.1	3.4	13.6	23.6	29.5	26.8	20.2	13.7	-10.3	-15.5	
18	-15.9	-18.3	9.0	9.0	16.6	32.0	28.3	28.0	22.3	17.7	-4.9	-21.0	
19	-24.0	-1.6	7.8	3.0	9.4	21.9	28.5	28.7	12.2	20.4	-5.1	-23.6	
20	-5.2	-19.8	2.5	4.3	7.3	23.9	23.7	32.0	11.1	16.2	-0.5	-24.5	
21	-1.2	-16.4	4.2	5.8	17.2	22.4	25.6	29.0	17.3	10.2	-1.8	-21.8	
22	-15.9	-20.1	10.7	4.6	18.6	27.2	23.0	21.0	19.3	8.8	0.8	-20.8	
23	-7.8	-20.4	4.5	12.2	21.5	23.0	20.6	26.8	19.2	4.9	3.4	-26.8	
24	-17.7	-17.0	3.4	9.8	20.2	16.2	25.6	25.8	20.1	2.6	1.2	-15.5	
25	-2.3	-6.8	-2.3	4.1	25.5	20.6	23.5	30.7	20.4	3.3	4.6	-13.6	
26	2.2	-1.1	-12.7	7.0	23.3	24.6	22.5	28.7	21.6	6.7	1.7	-12.3	
27	-8.6	-9.1	-2.7	11.2	21.8	20.7	23.1	30.0	23.7	10.0	-3.4	-12.6	
28	-7.5	-9.5	-1.4	15.4	20.7	21.8	26.5	19.2	26.7	12.3	-5.4	-15.3	
29	-5.3		0.8	18.3	19.4	19.3	32.3	24.8	26.4	12.0	-7.8	-13.9	
30	0.8		2.5	18.3	16.9	21.4	18.7	30.4	15.3	12.6	-16.8	-11.4	
31	-5.1		5.8		18.5		24.1	34.1		9.1		-15.1	
2022	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	Minimum Temperature °C Daily
1	-37.4	-27.6	-16.4	-6.3	-1.4	4.3	5.6	10.9	11.2	4.0	-4.1	-27.3	
2	-28.8	-36.8	-29.5	-9.3	-1.0	6.0	9.2	11.0	7.5	4.3	-3.6	-30.2	
3	-23.1	-39.4	-33.9	-3.9	0.8	0.2	7.9	6.7	8.5	4.5	-7.8	-27.9	
4	-27.8	-36.6	-15.3	0.1	-1.8	2.3	9.1	13.0	14.7	2.9	-9.8	-16.0	
5	-33.6	-26.0	-20.3	-2.7	4.0	5.7	10.0	9.4	12.2	-4.0	-10.2	-27.3	
6	-40.4	-29.6	-21.4	-5.9	5.9	3.1	11.1	5.2	5.3	-9.1	-13.0	-36.5	
7	-39.5	-9.9	-15.4	-6.5	1.2	4.6	8.4	9.9	3.8	-1.2	-19.0	-37.4	
8	-30.4	-5.7	-18.9	-2.9	4.0	9.2	13.3	10.2	6.9	1.7	-17.3	-19.8	
9	-38.3	-7.8	-22.2	1.9	-0.3	10.1	15.3	8.7	2.1	-1.1	-17.9	-20.2	
10	-29.6	-18.6	-24.7	-6.5	5.0	10.1	12.4	4.5	-0.4	2.1	-24.4	-15.6	
11	-15.7	-23.2	-28.4	-9.3	1.5	10.6	13.2	13.9	4.7	5.9	-23.7	-10.4	
12	-11.4	-22.0	-17.6	-9.6	3.3	8.4	12.4	12.8	1.6	2.3	-23.6	-12.2	
13	-13.2	-18.9	-12.3	-10.6	2.9	11.8	17.0	12.6	-1.0	0.6	-10.4	-12.3	
14	-13.2	-25.9	-15.9	-7.8	2.3	8.5	14.1	13.3	3.0	-6.9	-11.1	-14.9	
15	-6.2	-19.8	-10.7	-9.0	-0.2	6.4	13.8	14.9	-0.5	-3.4	-10.0	-16.8	
16	-7.1	-33.2	-6.4	-10.2	1.0	8.8	16.0	13.6	3.7	-5.6	-10.3	-20.8	
17	-16.7	-36.5	-9.1	-11.5	5.3	11.7	16.3	13.7	1.3	-5.5	-16.1	-21.0	
18	-27.4	-28.7	-5.9	-8.7	7.0	16.4	12.7	12.6	4.0	0.3	-13.4	-27.9	
19	-33.1	-21.9	-9.8	-2.2	2.7	16.5	15.7	9.1	1.9	3.8	-12.6	-29.6	
20	-33.5	-32.5	-8.1	-2.9	0.6	14.2	13.6	12.5	5.5	5.2	-12.6	-30.3	
21	-23.2	-35.5	-0.7	-7.2	0.3	12.9	12.3	12.7	1.6	3.0	-17.5	-29.0	
22	-21.8	-39.9	-4.0	-1.0	-0.5	9.7	10.3	12.9	2.8	-0.4	-8.8	-29.6	
23	-17.7	-36.9	-5.4	0.7	4.9	12.4	12.0	9.9	8.9	-1.2	-8.9	-37.8	
24	-34.9	-32.2	-3.1	-1.0	6.8	9.3	7.1	10.2	2.9	-2.2	-10.8	-34.4	
25	-36.6	-28.4	-14.4	-5.0	10.2	8.8	12.9	10.6	4.3	-2.1	-1.2	-17.0	
26	-11.9	-9.2	-18.8	-4.9	5.3	9.2	9.9	9.4	3.6	-3.3	-9.2	-15.7	
27	-28.2	-14.4	-14.9	0.3	6.0	11.3	8.2	14.8	0.4	-2.0	-7.5	-15.6	
28	-14.3	-21.8	-9.2	-0.6	9.0	5.2	6.0	12.4	6.9	-2.0	-8.3	-19.8	
29	-10.7		-11.1	2.9	10.1	12.0	12.6	9.2	2.1	-3.5	-16.8	-21.6	
30	-12.9		-13.7	1.7	8.1	8.8	14.2	9.1	9.2	-6.3	-22.1	-21.9	
31	-19.9		-7.8		4.3		13.5	12.5		-7.3		-23.5	

DAYS WITH MAXIMUM TEMPERATURES GREATER THAN A SET POINT

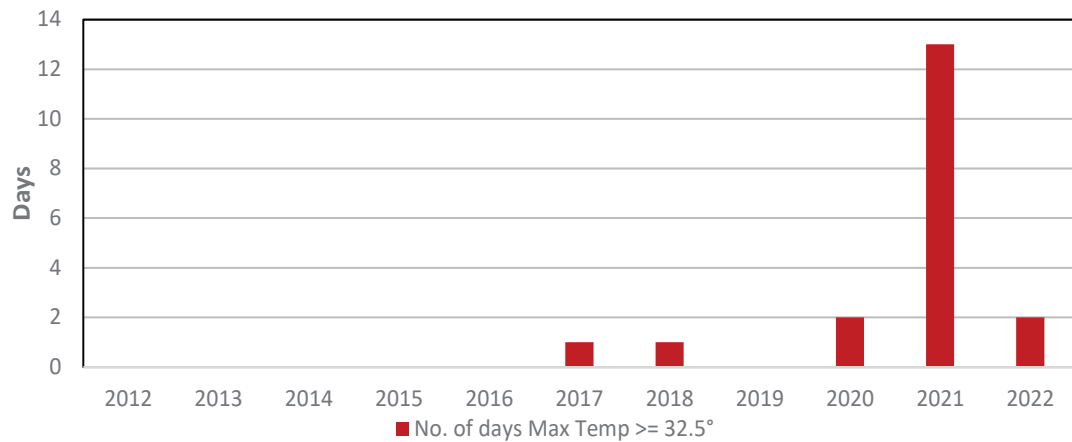
Maximum temperature relative to set points
Monthly



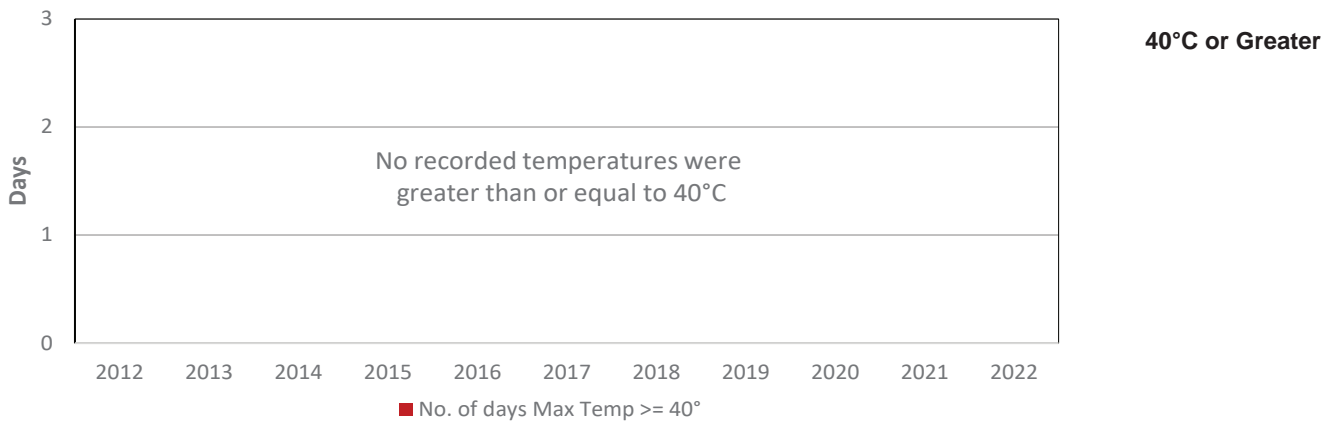
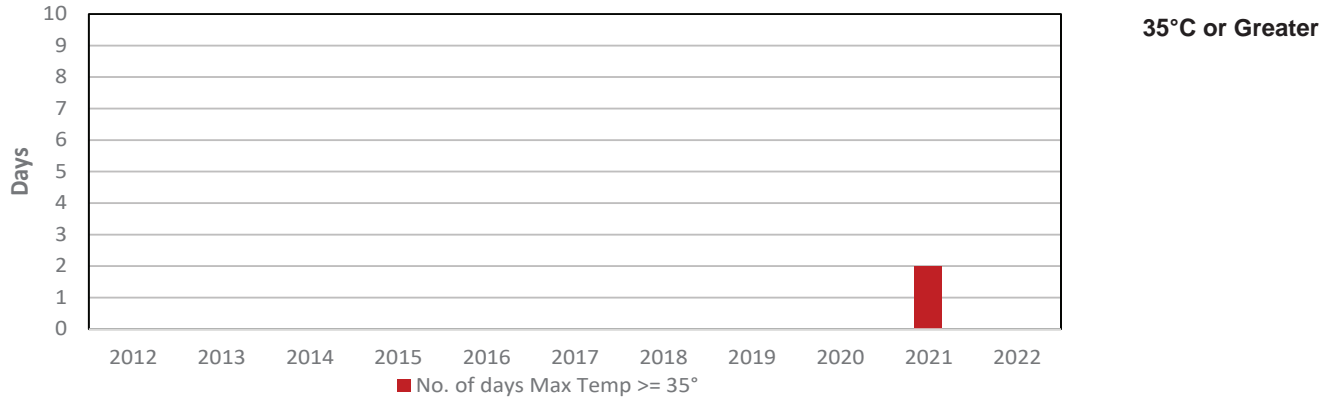
30°C or Greater



32.5°C or Greater



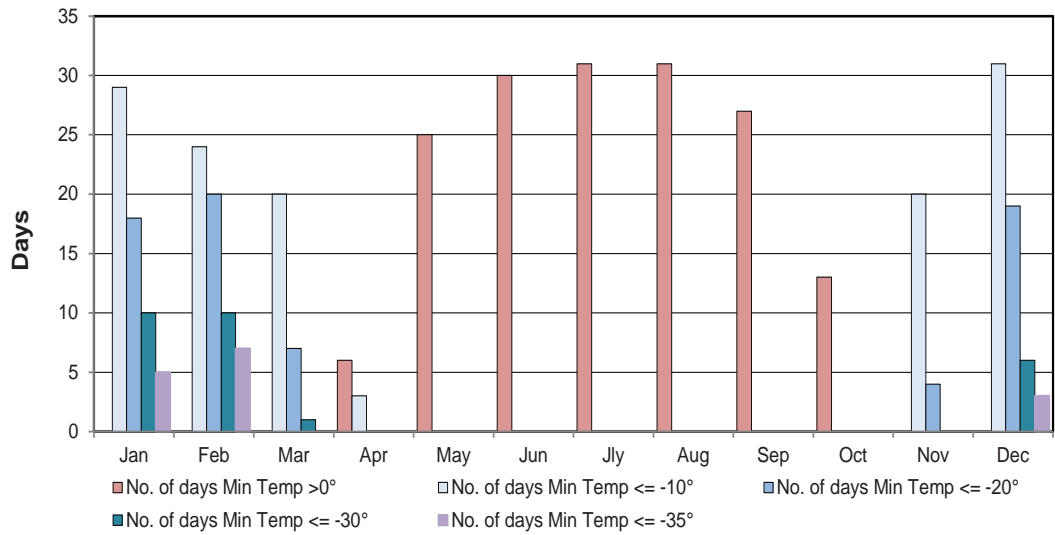
DAYS WITH MAXIMUM TEMPERATURES GREATER THAN A SET POINT



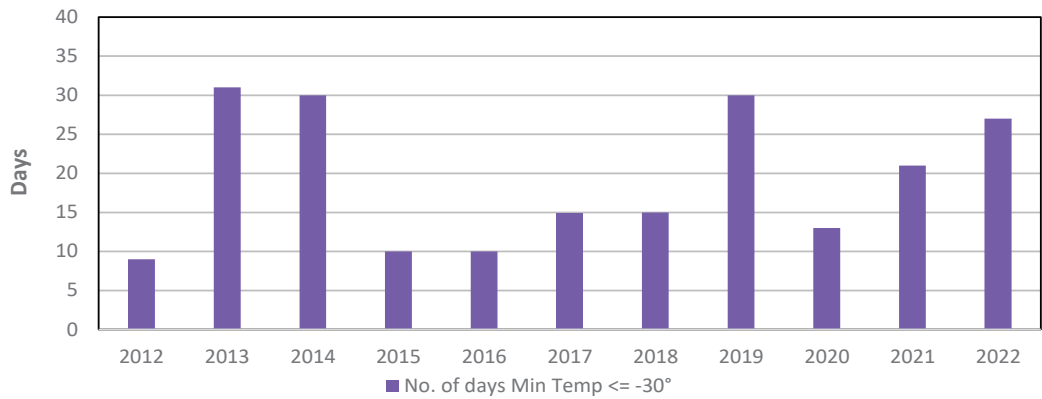
Spring at the CLC CRS
23 April 2022
Photo: R. Jansen

DAYS WITH MINIMUM TEMPERATURES LESS THAN A SET POINT

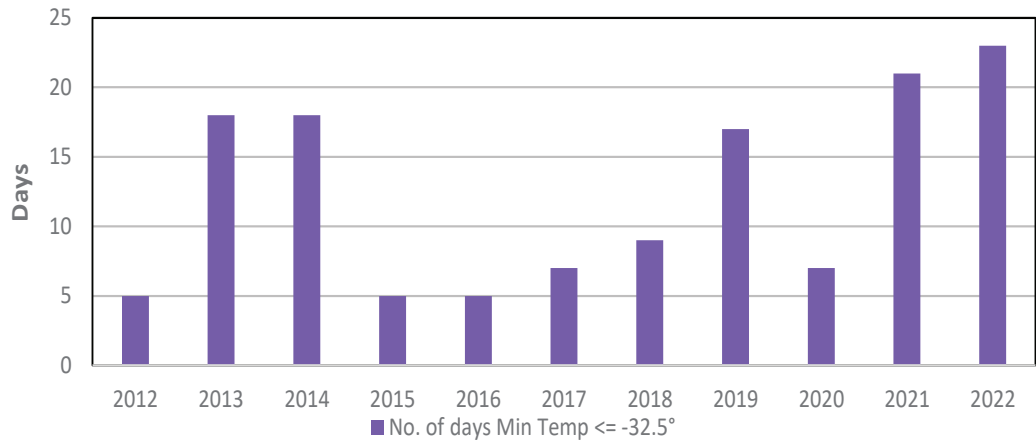
Minimum temperature relative to set points Monthly



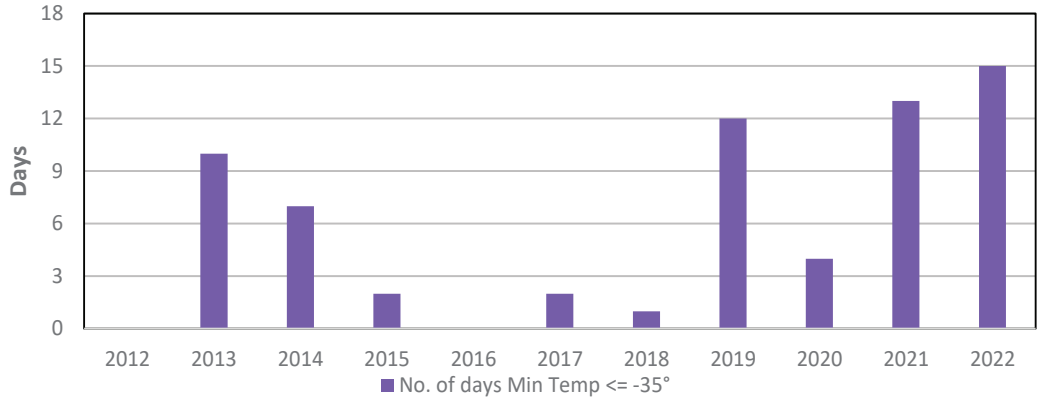
Minus 30°C or Less



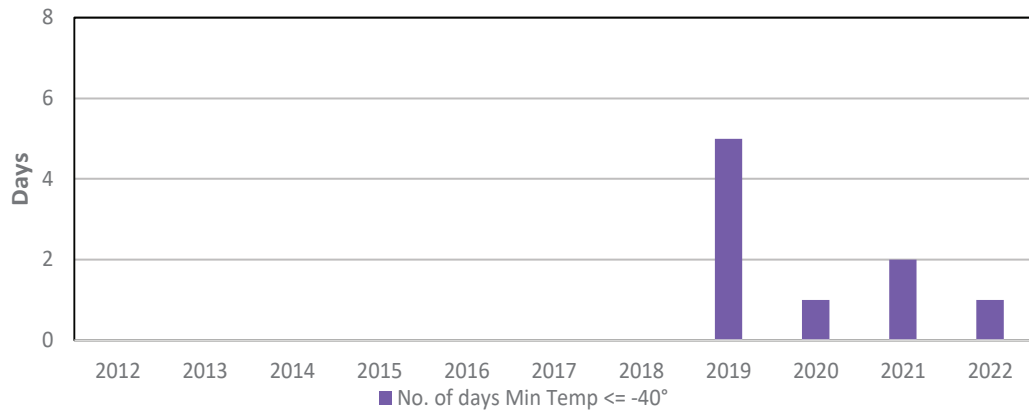
Minus 32.5°C or Less



DAYS WITH TEMPERATURES LESS THAN A SET POINT



Minus 35°C or Less



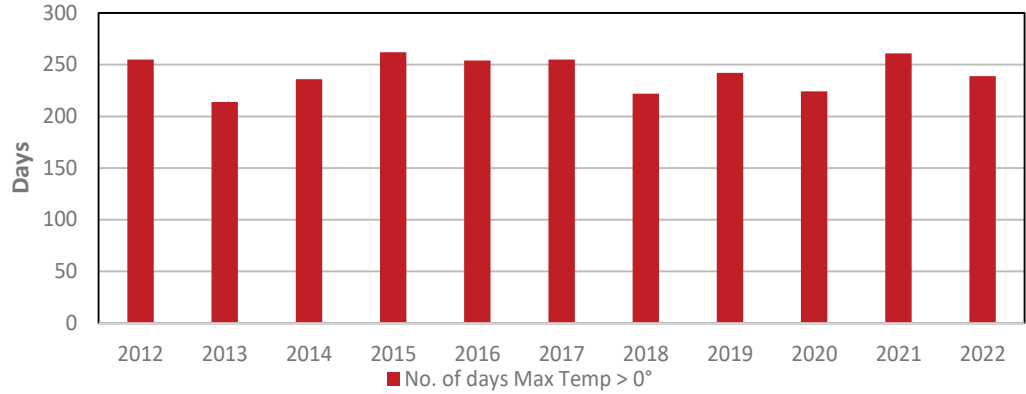
Minus 40°C or Less



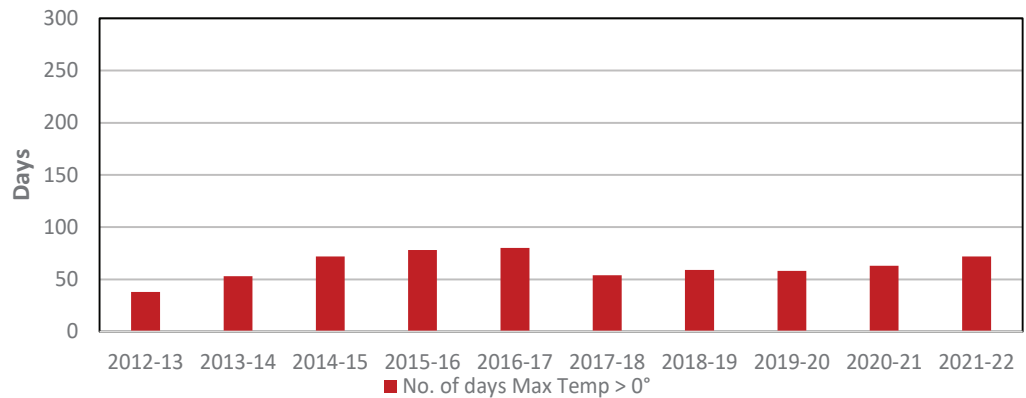
CLC CRS
July 2022
Photo: Camera at site

DAYS WITH TEMPERATURES GREATER THAN SET POINT

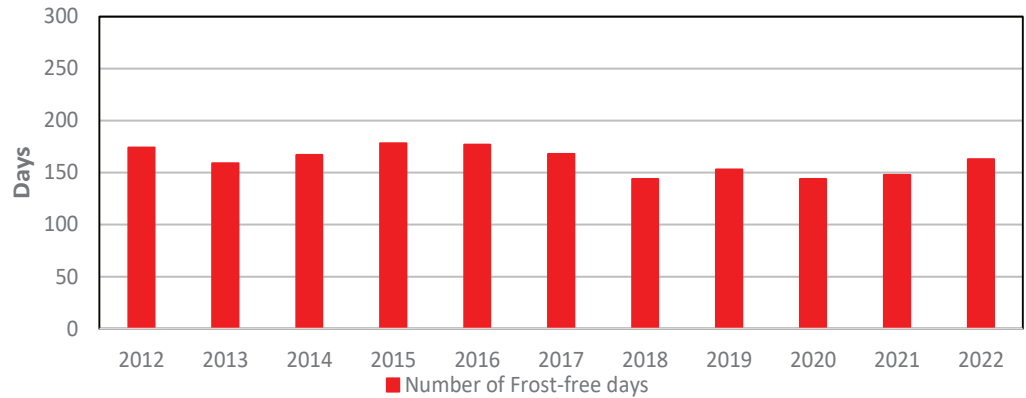
**Maximum Temperature
greater than 0°C
(Thaw Days)
Jan 1st to Dec 31st**



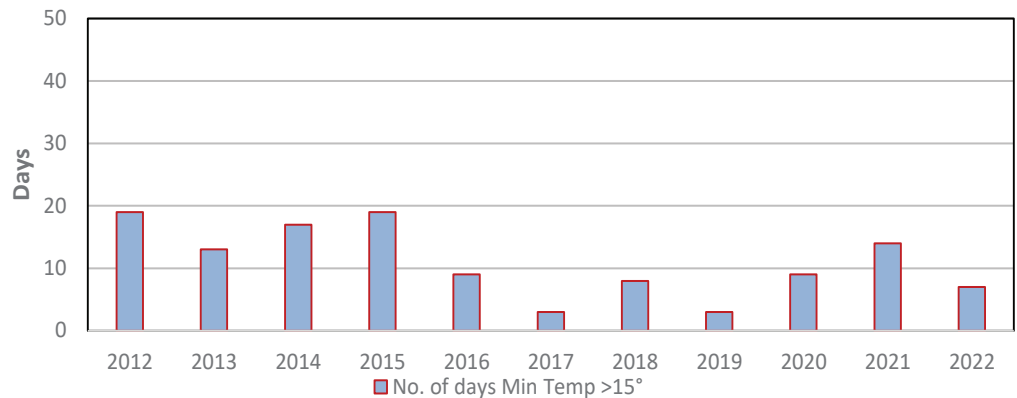
**Maximum Temperature
greater than 0°C
(Thaw Days)
Oct 1st to Mar 31st
(Cold Season)**



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

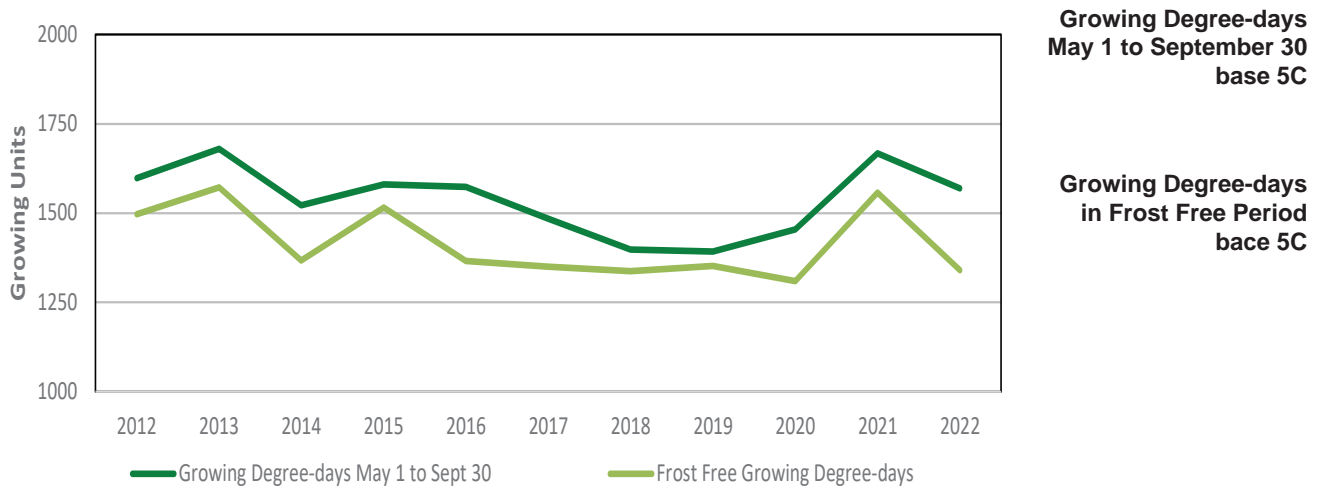
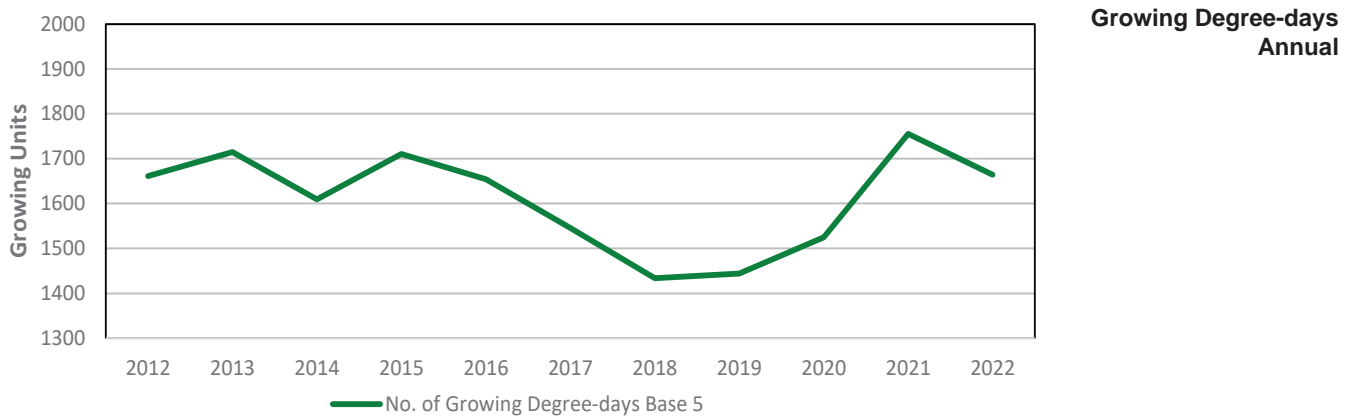
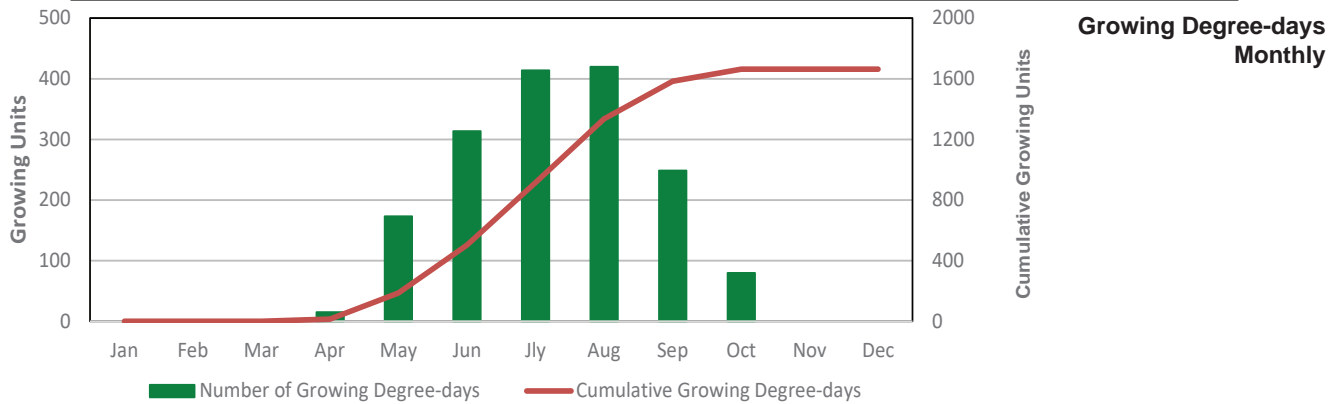


**Minimum Temperature
greater than 15°C**



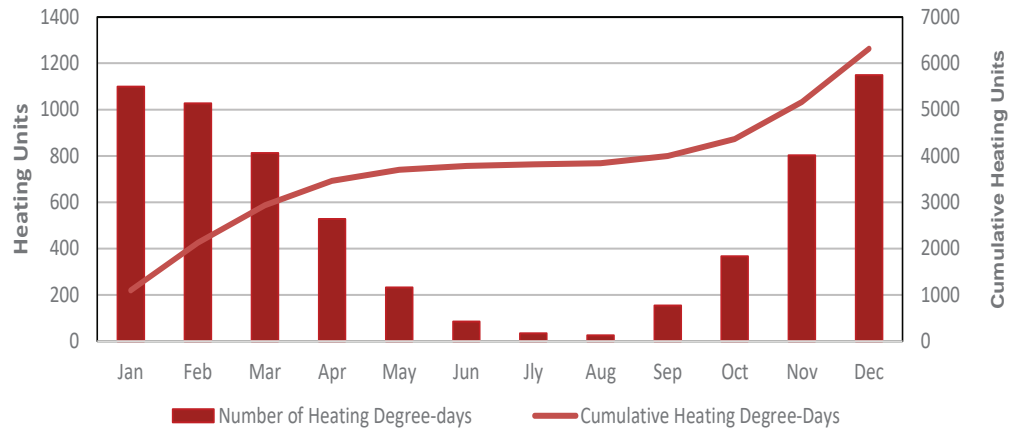
DEGREE-DAYS

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	
	2022	Cumulative	2022	Cumulative	2022	Cumulative	2022	Cumulative
January	0.0	0.0	1099.6	1099.6	0.0	0.0	0.0	0.0
February	0.0	0.0	1026.6	2126.2	0.0	0.0	0.0	0.0
March	0.0	0.0	812.4	2938.6	0.0	0.0	0.0	0.0
April	15.4	15.4	527.7	3466.3	0.0	0.0	0.0	0.0
May	173.1	188.5	231.9	3698.2	0.0	0.0	0.0	0.0
June	313.9	502.4	85.1	3783.3	9.0	9.0	0.2	0.2
July	413.6	916.0	33.7	3817.0	44.3	53.3	0.2	0.4
August	419.6	1335.6	26.1	3843.1	42.7	96.0	0.0	0.4
September	248.6	1584.2	154.2	3997.3	12.8	108.8	0.0	0.4
October	79.8	1664.0	366.4	4363.7	0.0	108.8	0.0	0.4
November	0.0	1664.0	802.9	5166.6	0.0	108.8	0.0	0.4
December	0.0	1664.0	1149.1	6315.7	0.0	108.8	0.0	0.4

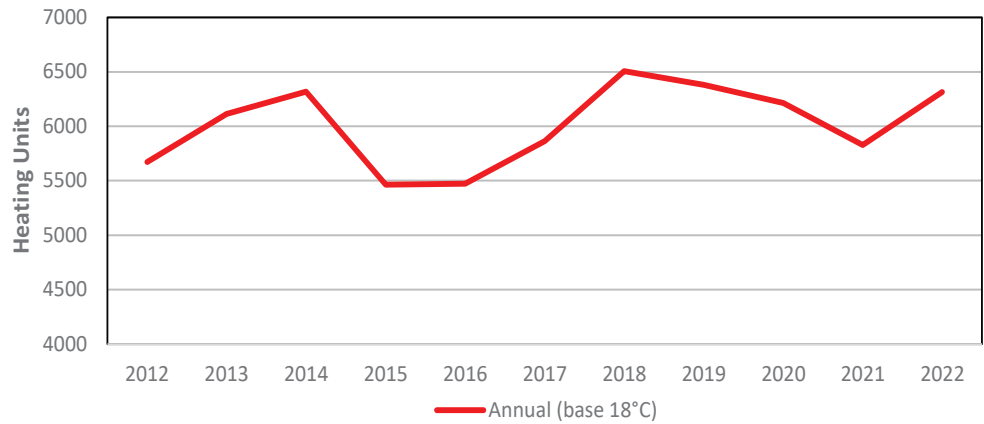


DEGREE-DAYS

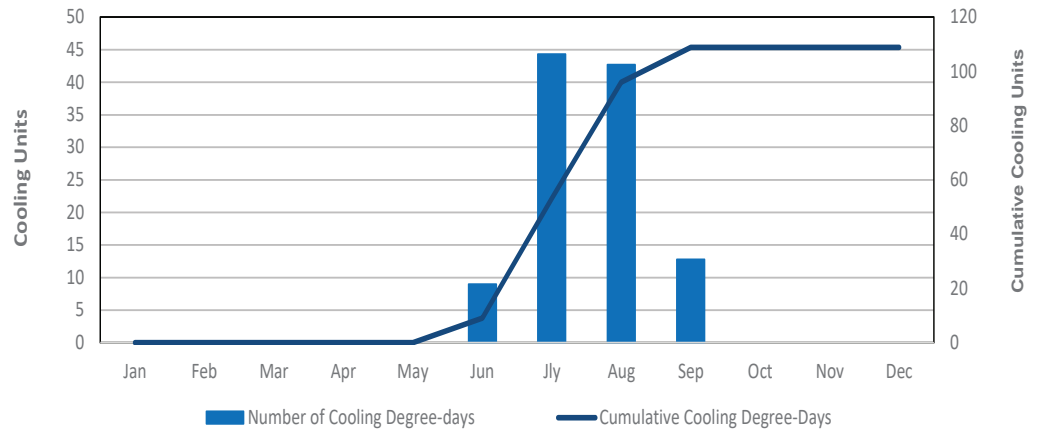
**Heating Degree-days
Monthly**



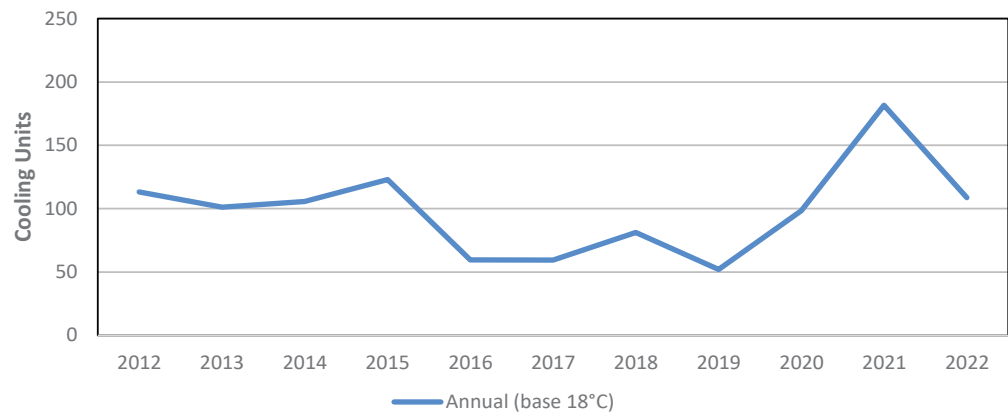
**Heating Degree-days
Annual**



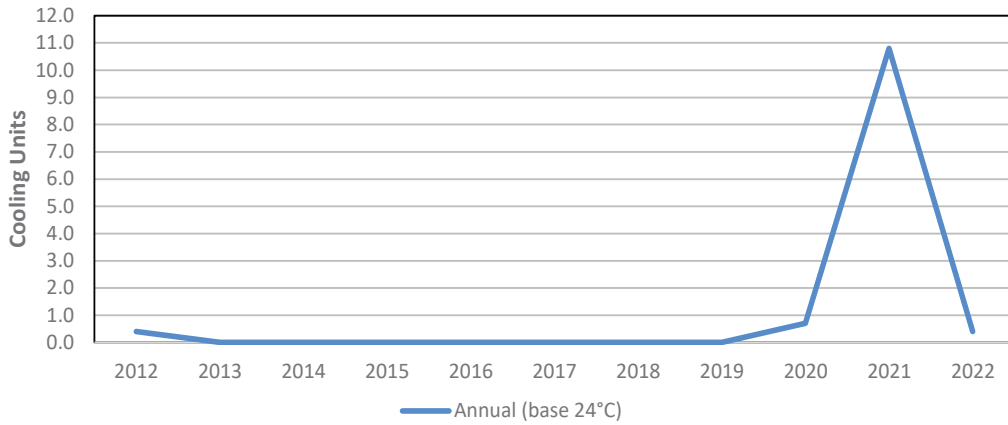
**Cooling Degree-days
Monthly**



**Cooling Degree-days
Annual**



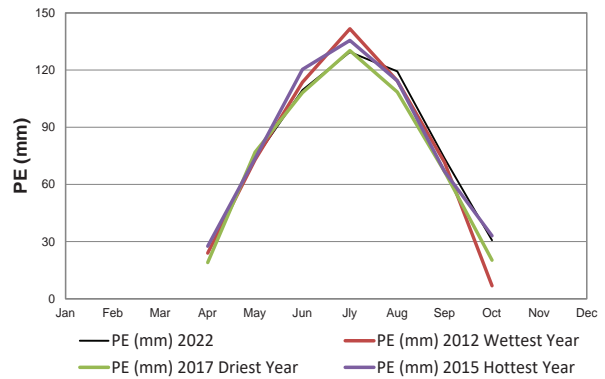
DEGREE-DAYS



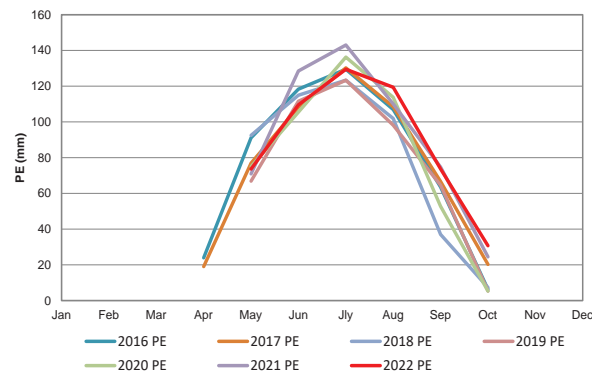
Extreme Cooling Degree-days Annual

POTENTIAL EVAPOTRANSPIRATION (PE) using the Thornthwaite Method¹

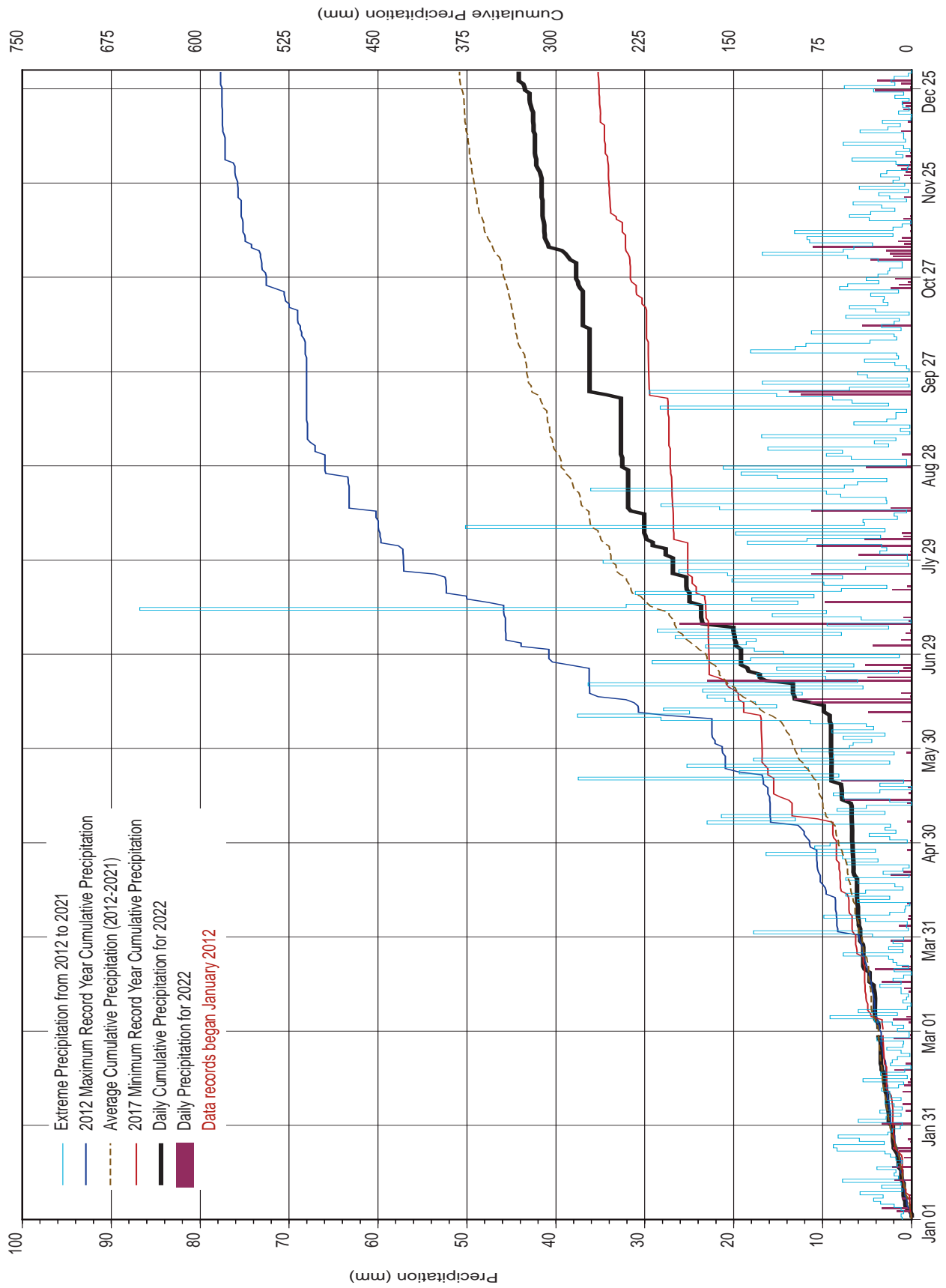
MONTH	PE (mm) 2022	PE (mm) 2012 Wettest Year	PE (mm) 2017 Driest Year	PE (mm) 2015 Hottest Year
Jan				
Feb				
Mar				
Apr		24.0	19.0	27.6
May	73.6	73.0	76.9	73.6
June	109.5	113.6	108.2	120.4
July	129.4	141.7	130.2	135.6
Aug	119.4	114.4	108.5	114.4
Sept	73.7	71.5	66.7	66.7
Oct	30.7	6.8	20.2	33.1
Nov				
Dec				
Total	536.3	545.0	529.7	571.4



¹Thornthwaite and Mather 1955
Thornthwaite 1948



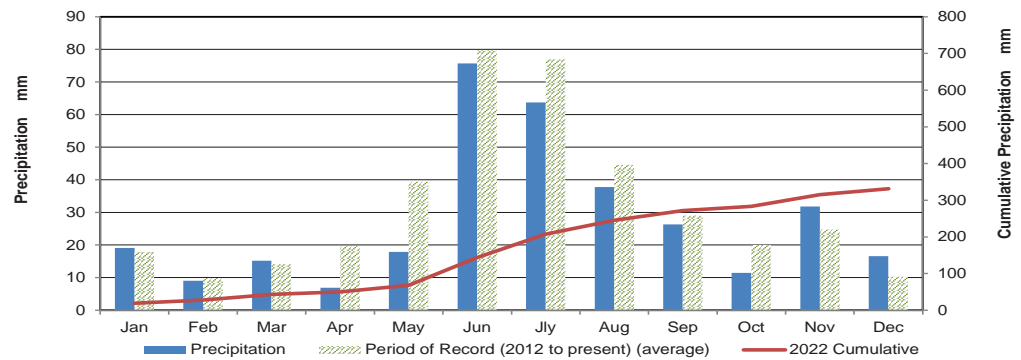
DAILY PRECIPITATION



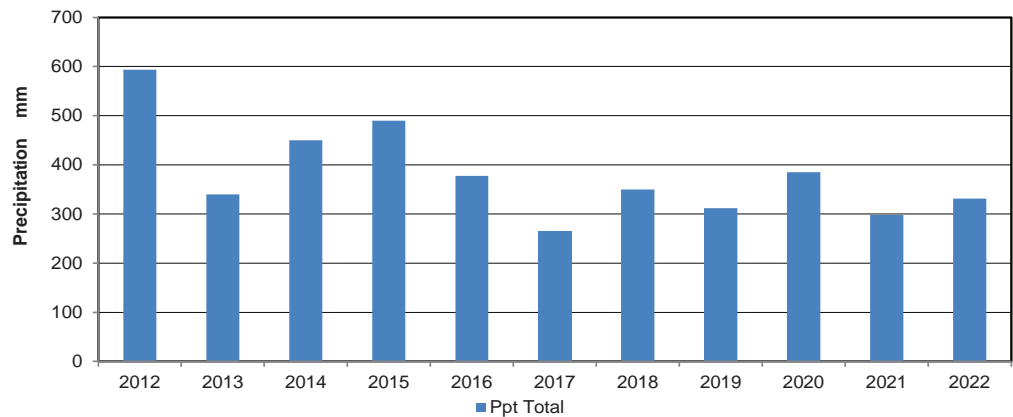
PRECIPITATION

MONTH	MONTHLY PRECIPITATION (mm)		EXTREME VALUES (mm) (2012-2022)			
	2022	Cumulative 2022	Monthly Maximum		Monthly Minimum	
			Year	Maximum	Year	Minimum
January	19.1	19.1	2013	26	2014	8.9
February	9.0	28.1	2015	18.3	2018	4.7
March	15.2	43.3	2018	25.7	2019	2.5
April	6.9	50.2	2014	52.5	2016	4.6
May	17.9	68.1	2012	85.4	2013	6.8
June	75.7	143.8	2012	140.4	2017	44.9
July	63.7	207.5	2015	176.6	2021	8.6
August	37.8	245.3	2016	79.5	2013	5.8
September	26.3	271.6	2019	66.3	2021	9.5
October	11.5	283.1	2016	58.2	2013	5.6
November	31.8	314.9	2020	36.7	2016	11.7
December	16.6	331.5	2021	28.8	2015	2.4
Total	331.5		2012	593.5	2017	264.4

Monthly



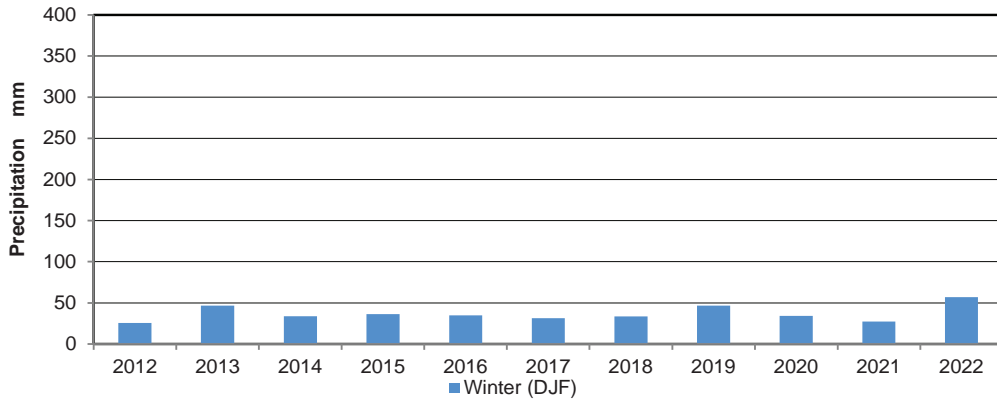
Annual



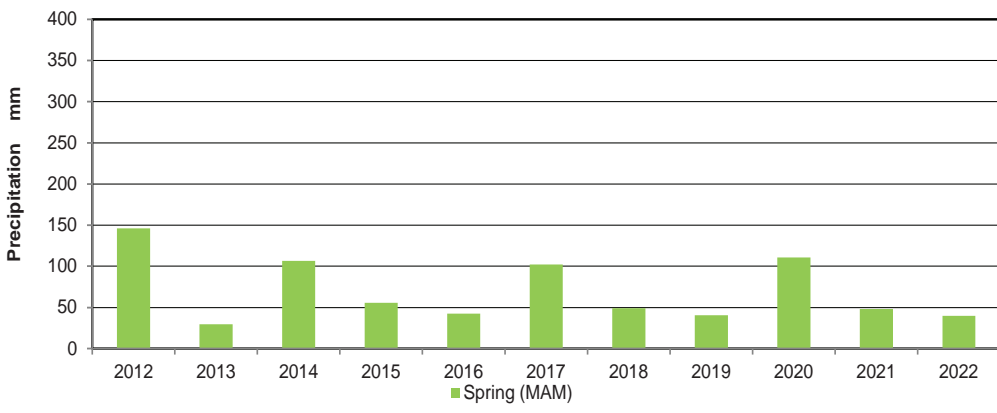
PRECIPITATION

SEASONAL PRECIPITATION (mm)

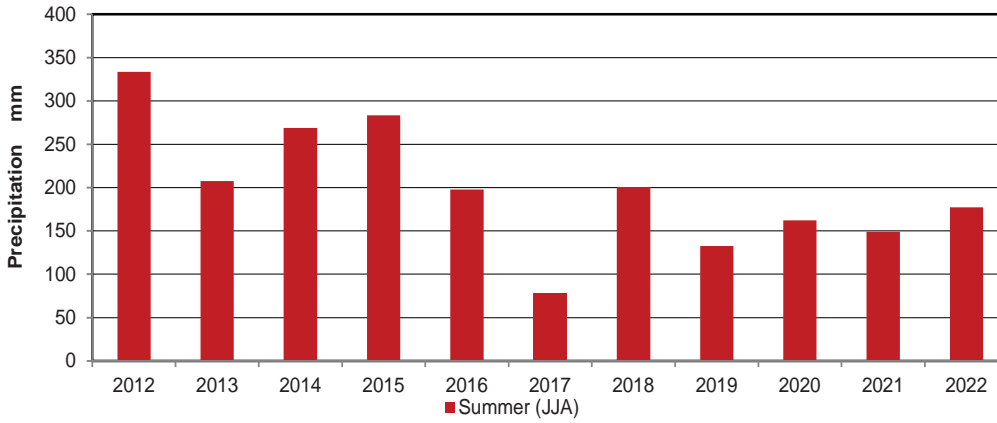
Winter



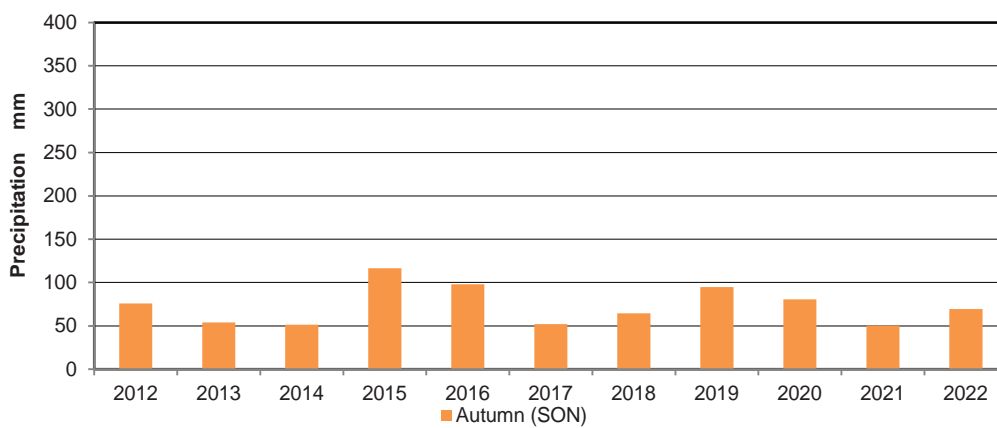
Spring



Summer



Autumn

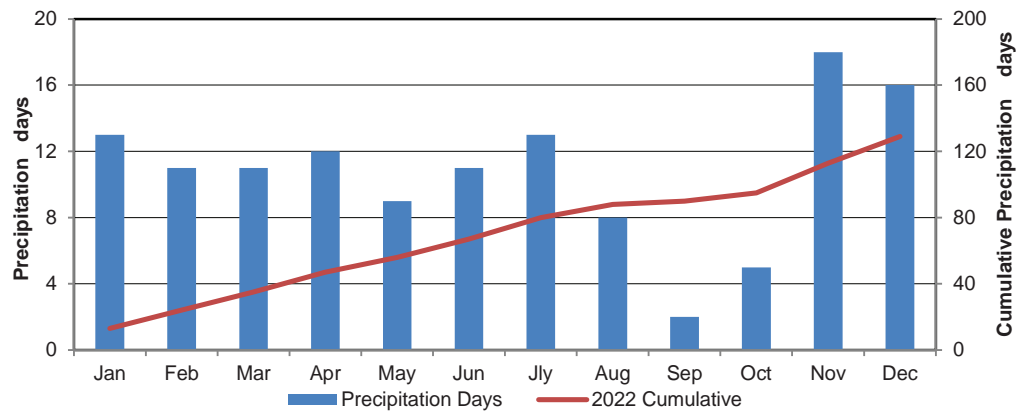


PRECIPITATION

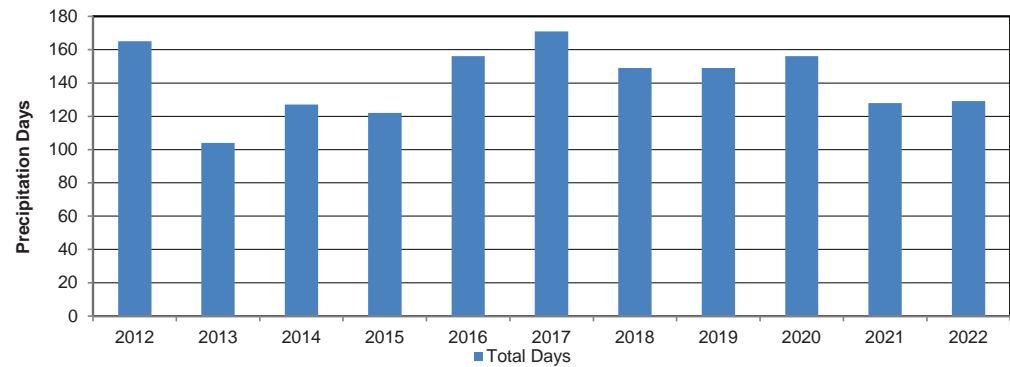
PRECIPITATION DAYS

MONTH	NUMBER OF DAYS WITH MEASURABLE PRECIPITATION		EXTREME VALUES (2012-2021)			
	2022	Cumulative 2022	Monthly Maximum		Monthly Minimum	
			Year	Days	Year	Days
January	13	13	2020	21	2014	8
February	11	24	2016	18	2014	6
March	11	35	2012	19	2019	2
April	12	47	2012	17	2013	4
May	9	56	2012	13	2013	4
June	11	67	2020	19	2018	12
July	13	80	2016	19	2021	6
August	8	88	2016	15	2013	5
September	2	90	2018	18	2012	5
October	5	95	2016	18	2013	4
November	18	113	2014	21	2021	6
December	16	129	2016	17	2015	6
Total	129		2017	171	2013	104

Monthly Days



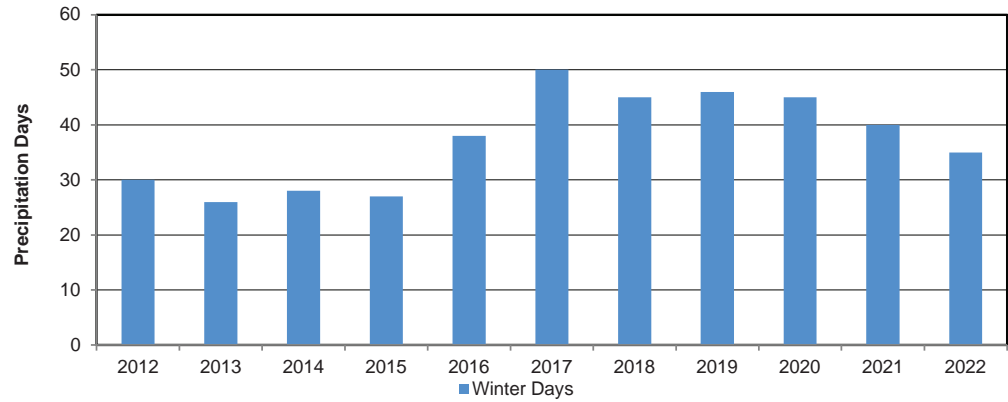
Annual Days



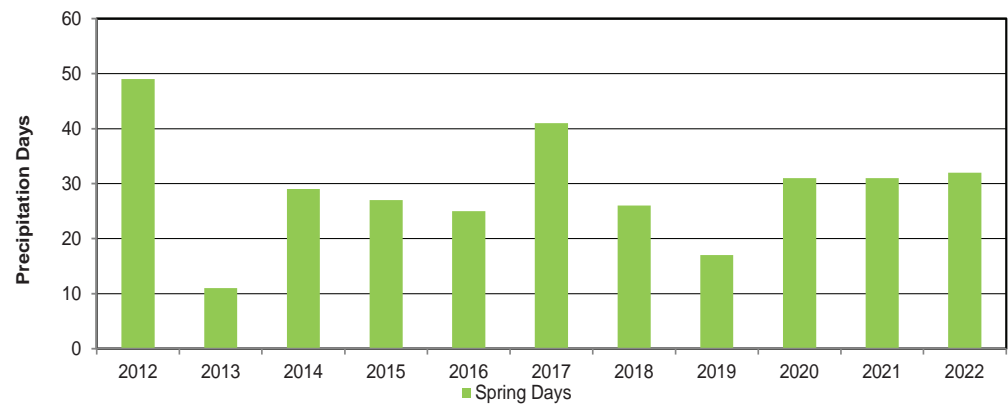
PRECIPITATION

SEASONAL PRECIPITATION DAYS

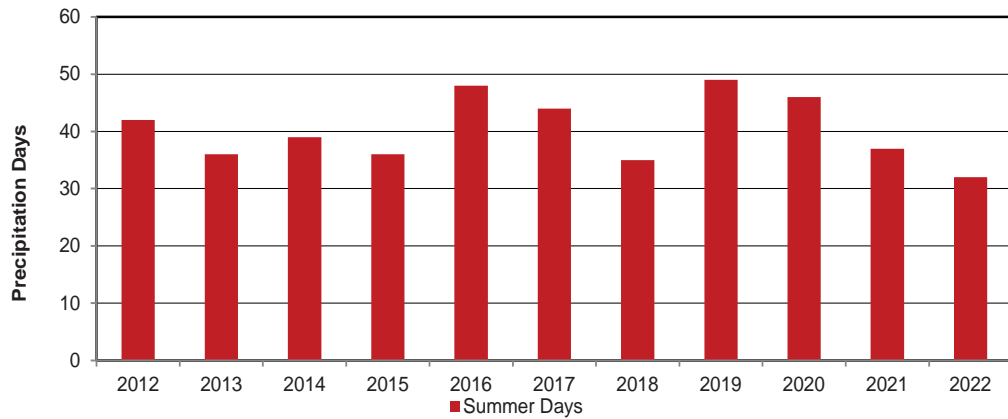
Winter Days



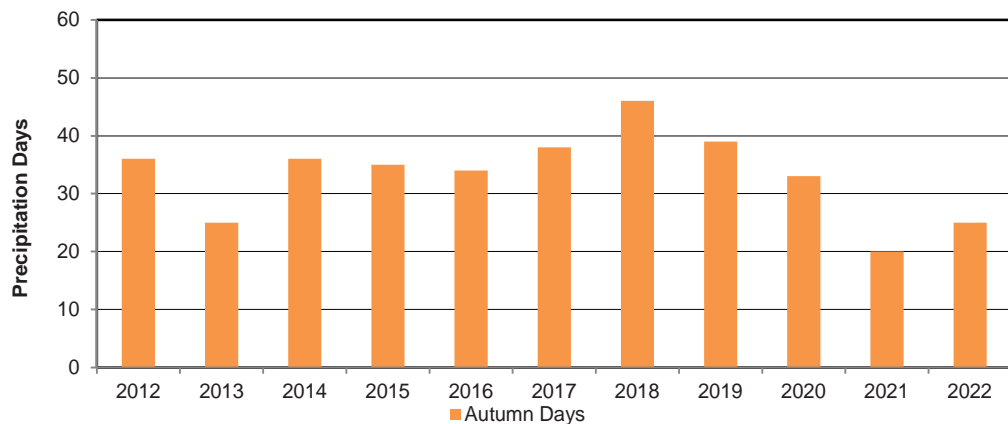
Spring Days



Summer Days



Autumn Days



PRECIPITATION

PRECIPITATION RANKINGS

RANKING BY WETTEST YEAR (mm)									
ANNUAL (JAN-DEC)	WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)		
2017	264.4	2012*	25.6	2013	29.4	2017	78.6	2021	50.3
2021	298.2	2021	27.3	2022	40.0	2019	132.6	2014	51.3
2019	311.4	2017	31.4	2019	40.5	2021	148.8	2017	52.0
2022	331.5	2018	33.5	2016	42.2	2020	162.0	2013	53.6
2013	340.0	2014	33.9	2021	48.2	2022	177.2	2018	64.4
2018	349.5	2020	34.2	2018	49.0	2016	197.8	2022	69.6
2016	377.6	2016	34.8	2015	55.4	2018	200.6	2012	75.9
2020	385.1	2015	36.4	2017	102.1	2013	207.6	2020	80.6
2014	450.2	2013	46.5	2014	106.6	2014	268.8	2019	94.6
2015	489.5	2019	46.8	2020	110.7	2015	283.4	2016	97.9
2012	593.5	2022	56.9	2012	146.0	2012	333.8	2015	116.6

Winter 2012* missing December 2011 data

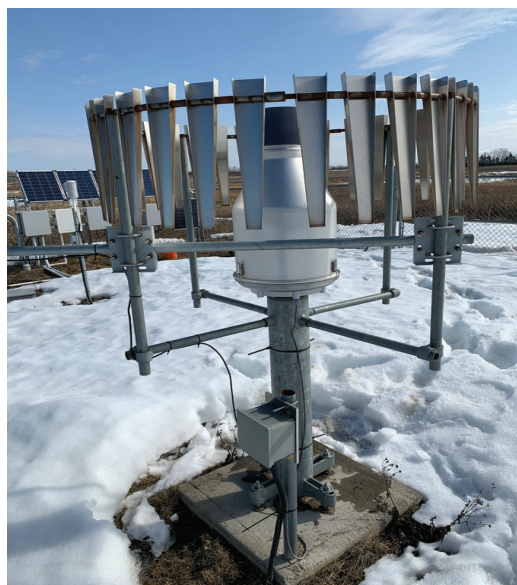
ANNUAL RANKING BY DAYS WITH PRECIPITATION									
ANNUAL (JAN-DEC)	WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)		
2013	104	2013	26	2013	11	2015	26	2021	20
2015	122	2015	27	2019	17	2018	35	2013	25
2014	127	2014	28	2016	25	2013	36	2022	25
2021	128	2012*	30	2018	26	2021	37	2020	33
2022	129	2022	35	2015	27	2022	37	2016	34
2018	149	2016	38	2014	29	2014	39	2015	35
2019	149	2021	40	2020	31	2012	42	2012	36
2016	156	2018	45	2021	31	2017	44	2014	36
2020	156	2020	45	2022	32	2021	46	2017	38
2012	165	2019	46	2017	41	2016	48	2019	41
2017	171	2017	50	2012	49	2019	49	2018	46

Winter 2012* missing December 2011 data

RANKING BY DRIEST MONTH			
PRECIPITATION AMOUNT (mm)		PRECIPITATION DAYS	
APRIL	6.9	SEPTEMBER	2
FEBRUARY	9.0	OCTOBER	5
OCTOBER	11.5	AUGUST	8
MARCH	15.2	MAY	9
DECEMBER	16.6	FEBRUARY	11
MAY	17.9	MARCH	11
JANUARY	19.1	JUNE	11
SEPTEMBER	26.3	APRIL	12
NOVEMBER	31.8	JANUARY	13
AUGUST	37.8	JULY	13
JULY	63.7	DECEMBER	16
JUNE	75.7	NOVEMBER	18

RANKING BY					
Total Number of Dry Days*	Maximum Length of Dry Spell*		Maximum Length of Wet Spell*		
2013	261	2019	25	2015	9
2015	250	2012	21	2013	8
2014	239	2016	21	2022	8
2021	236	2022	20	2014	7
2022	231	2021	19	2020	7
2018	216	2014	17	2016	6
2019	214	2018	16	2017	6
2016	210	2013	15	2018	6
2020	208	2015	14	2019	6
2012	200	2020	13	2012	5
2017	194	2017	9	2021	4

*For this report, a dry day is defined as a day on which precipitation is not recorded; a dry spell is 2+ consecutive days of no precipitation; a wet spell is 2+ consecutive days of precipitation.



All-season precipitation weighing gauge
23 April 2022
Photo: R. Jansen

PRECIPITATION GRID (mm)

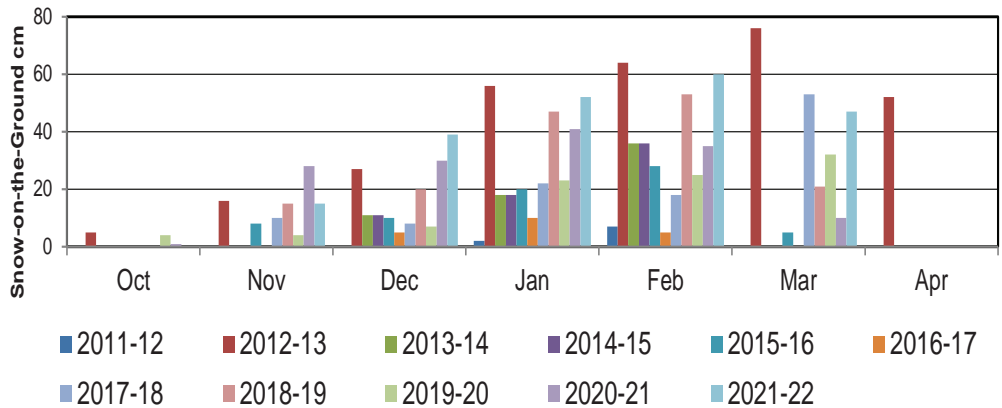
Precipitation Daily

2022	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	4.6	1.6
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	0.0	0.0	2.1	0.2
3	1.7	0.0	0.3	1.4	0.0	0.0	1.2	0.0	0.0	0.0	2.4	0.0
4	3.4	0.7	2.1	0.0	0.0	0.0	0.0	5.3	0.0	0.0	2.8	0.7
5	0.3	0.1	0.6	0.4	0.0	0.0	0.7	0.9	0.0	0.0	11.1	0.2
6	0.0	1.0	0.0	0.3	0.5	0.0	0.2	1.1	0.0	0.0	0.8	0.1
7	1.1	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	1.5	0.0
8	0.3	0.0	0.0	0.0	0.0	0.0	26.1	0.0	0.0	0.0	1.1	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
10	0.0	1.0	0.0	0.5	0.0	4.9	0.9	0.0	0.0	0.0	0.2	0.0
11	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0
12	0.0	0.8	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.2	1.2
13	1.9	0.4	0.3	0.1	7.5	11.4	0.0	11.3	0.0	0.0	0.2	0.0
14	0.0	0.2	0.8	0.0	0.1	13.2	0.0	2.3	0.0	0.0	0.9	0.0
15	0.0	0.0	0.0	0.0	0.3	0.2	9.7	0.0	0.0	0.0	0.2	0.4
16	0.0	0.0	3.3	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0
17	2.2	1.9	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
19	0.0	0.7	0.0	2.3	7.9	0.0	2.2	0.0	12.5	0.0	0.0	0.9
20	0.8	0.0	4.1	0.9	0.0	23.0	0.5	0.0	13.8	0.0	0.0	0.7
21	0.0	0.0	1.1	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.8	1.0
22	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
23	2.1	0.0	0.0	0.0	0.0	9.6	0.0	0.0	0.0	2.3	0.0	0.0
24	0.0	0.0	0.2	0.0	0.0	0.9	11.3	0.0	0.0	1.4	0.0	0.0
25	0.2	0.0	0.0	0.1	0.0	5.2	0.0	0.0	0.0	0.4	0.0	4.1
26	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.2
27	0.0	2.0	0.0	0.5	0.0	0.0	0.0	5.1	0.0	0.0	0.2	1.2
28	0.0	0.2	0.1	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.8	3.9
29	0.0		2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0
30	0.0		0.0	0.2	0.0	0.0	6.0	0.0	0.0	0.0	1.2	0.0
31	3.3		0.0	0.0	0.0	0.0	0.2	1.1		0.0		0.0
TOTAL	19.1	9.0	15.2	6.9	17.9	75.7	63.7	37.8	26.3	11.5	31.8	16.6

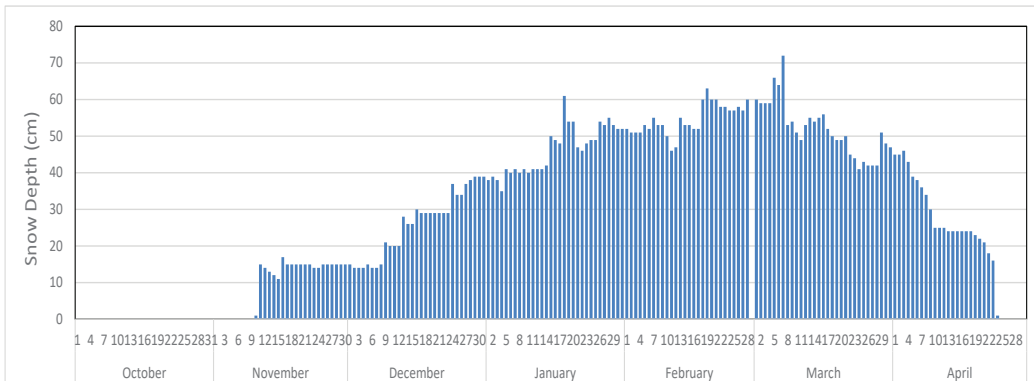
2022 EXTREME PRECIPITATION EVENTS		
PERIOD	DATE (time)	AMOUNT (mm)
0.5 hour*	6/20/2022 15:30 to 16:00	10.6
	7/8/2022 08:00 to 08:30	9.2
1 hour*	6/20/2022 15:30 to 16:30	16.2
	7/8/2022 07:30 to 08:30	14.4
2 hours*	7/8/2022 07:00 to 09:00	18.4
	6/20/2022 15:30 to 17:30	17.8
6 hours*	7/8/2022 03:00 to 09:00	23.0
	6/20/2022 15:30 to 21:30	19.4
12 hours*	7/7/2022 21:00 to 07/08/2022 09:00	23.0
	6/20/2022 14:00 to 6/21/2022 02:00	20.2
24 hours*	6/20/2022 09:00 to 6/21/2022 09:00	24.6
	7/8/2022 03:00 to 07/09/2022 03:00	23.4
Calendar Day	June 08 2022	26.1
	Jun 20 2022	23.0
Greatest amount over more than one day	June 20 to 21 2022	28.0
Longest wet spells	November 1 to 8 2022 (26.4mm)	8 days
	November 27 to December 2 2022 (4.7mm)	6 days
Longest dry spells	September 21 to October 10 2022	20 days
	September 1 to 18 2022	18 days

*recorded by the tipping bucket gauge

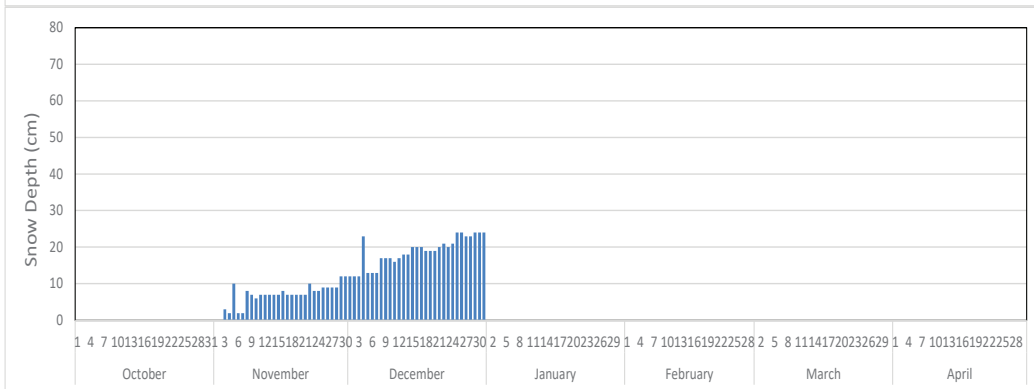
SNOW-ON-THE-GROUND (SOG)



*Snow-on-the-Ground (cm)
on Last Day of Month
(2011 to present)*



*Snow-on-the-Ground (cm)
October 2021 to April 2022
Daily, 9am*



*Snow-on-the-Ground (cm)
October 2022 to December 2023
Daily, 9am*



*Snow Depth Sensor
20 Oct 2022
Photo: K. Babich*

RADIATION

Sunrise/Sunset Tables for Conservation Learning Centre, 2022 & 2023¹

2022 DATE	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET
1	9:16	16:57	8:46	17:48	7:50	18:42	6:36	19:38	5:30	20:32	4:43	21:19	4:42	21:32	5:21	20:57	6:13	19:52	7:04	18:40	8:01	17:31	8:54	16:50
2	9:16	16:58	8:44	17:50	7:47	18:44	6:34	19:40	5:28	20:34	4:43	21:20	4:42	21:32	5:23	20:55	6:15	19:49	7:06	18:37	8:03	17:30	8:55	16:50
3	9:16	17:00	8:43	17:52	7:45	18:46	6:32	19:42	5:26	20:35	4:42	21:22	4:43	21:31	5:24	20:53	6:17	19:47	7:08	18:35	8:05	17:28	8:57	16:49
4	9:16	17:01	8:41	17:54	7:43	18:48	6:29	19:44	5:24	20:37	4:41	21:23	4:44	21:31	5:26	20:51	6:18	19:45	7:10	18:33	8:07	17:26	8:58	16:48
5	9:15	17:02	8:39	17:56	7:40	18:49	6:27	19:46	5:22	20:39	4:40	21:24	4:45	21:30	5:28	20:50	6:20	19:42	7:12	18:30	8:09	17:24	9:00	16:48
6	9:15	17:03	8:37	17:58	7:38	18:51	6:25	19:47	5:20	20:41	4:40	21:24	4:46	21:29	5:29	20:48	6:22	19:40	7:13	18:28	8:11	17:22	9:01	16:47
7	9:14	17:05	8:36	18:00	7:36	18:53	6:22	19:49	5:18	20:42	4:39	21:25	4:47	21:29	5:31	20:46	6:24	19:37	7:15	18:26	8:12	17:21	9:02	16:47
8	9:14	17:06	8:34	18:02	7:34	18:55	6:20	19:51	5:16	20:44	4:39	21:26	4:48	21:28	5:32	20:44	6:25	19:35	7:17	18:23	8:14	17:19	9:03	16:47
9	9:13	17:08	8:32	18:03	7:31	18:57	6:18	19:53	5:15	20:46	4:38	21:27	4:49	21:27	5:34	20:42	6:27	19:33	7:19	18:21	8:16	17:17	9:04	16:46
10	9:13	17:09	8:30	18:05	7:29	18:59	6:15	19:55	5:13	20:47	4:38	21:28	4:50	21:26	5:36	20:40	6:29	19:30	7:21	18:19	8:18	17:15	9:06	16:46
11	9:12	17:11	8:28	18:07	7:26	19:01	6:13	19:56	5:11	20:49	4:37	21:29	4:51	21:25	5:38	20:38	6:30	19:28	7:22	18:16	8:20	17:14	9:07	16:46
12	9:11	17:12	8:26	18:09	7:24	19:02	6:11	19:58	5:09	20:51	4:37	21:29	4:52	21:25	5:39	20:36	6:32	19:25	7:24	18:14	8:22	17:12	9:08	16:46
13	9:10	17:14	8:24	18:11	7:22	19:04	6:08	20:00	5:08	20:52	4:37	21:30	4:54	21:24	5:41	20:34	6:34	19:23	7:26	18:12	8:24	17:11	9:09	16:46
14	9:10	17:15	8:22	18:13	7:19	19:06	6:06	20:02	5:06	20:54	4:37	21:30	4:55	21:23	5:43	20:32	6:35	19:21	7:28	18:09	8:25	17:09	9:10	16:46
15	9:09	17:17	8:20	18:15	7:17	19:08	6:04	20:03	5:04	20:55	4:37	21:31	4:56	21:21	5:44	20:30	6:37	19:18	7:30	18:07	8:27	17:08	9:10	16:46
16	9:08	17:19	8:18	18:17	7:15	19:10	6:02	20:05	5:03	20:57	4:36	21:32	4:57	21:20	5:46	20:27	6:39	19:16	7:31	18:05	8:29	17:06	9:11	16:46
17	9:07	17:20	8:16	18:19	7:12	19:11	5:59	20:07	5:01	20:59	4:36	21:32	4:59	21:19	5:48	20:25	6:41	19:13	7:33	18:03	8:31	17:05	9:12	16:47
18	9:06	17:22	8:14	18:21	7:10	19:13	5:57	20:09	5:00	21:00	4:36	21:32	5:00	21:18	5:49	20:23	6:42	19:11	7:35	18:00	8:33	17:04	9:13	16:47
19	9:04	17:24	8:12	18:23	7:07	19:15	5:55	20:11	4:58	21:02	4:37	21:33	5:01	21:17	5:51	20:21	6:44	19:09	7:37	17:58	8:34	17:02	9:13	16:47
20	9:03	17:26	8:09	18:25	7:05	19:17	5:53	20:12	4:57	21:03	4:37	21:33	5:03	21:15	5:53	20:19	6:46	19:06	7:39	17:56	8:36	17:01	9:14	16:48
21	9:02	17:27	8:07	18:27	7:03	19:19	5:51	20:14	4:56	21:05	4:37	21:33	5:04	21:14	5:54	20:17	6:47	19:04	7:41	17:54	8:38	17:00	9:15	16:48
22	9:01	17:29	8:05	18:29	7:00	19:21	5:48	20:16	4:54	21:06	4:37	21:33	5:06	21:13	5:56	20:14	6:49	19:01	7:42	17:52	8:40	16:59	9:15	16:49
23	8:59	17:31	8:03	18:31	6:58	19:22	5:46	20:18	4:53	21:08	4:37	21:33	5:07	21:11	5:58	20:12	6:51	18:59	7:44	17:50	8:41	16:57	9:15	16:49
24	8:58	17:33	8:01	18:32	6:55	19:24	5:44	20:20	4:52	21:09	4:38	21:33	5:09	21:10	6:00	20:10	6:53	18:56	7:46	17:48	8:43	16:56	9:16	16:50
25	8:57	17:35	7:59	18:34	6:53	19:26	5:42	20:21	4:51	21:10	4:38	21:33	5:10	21:08	6:01	20:08	6:54	18:54	7:48	17:45	8:45	16:55	9:16	16:51
26	8:55	17:37	7:56	18:36	6:51	19:28	5:40	20:23	4:49	21:12	4:39	21:33	5:12	21:07	6:03	20:05	6:56	18:52	7:50	17:43	8:46	16:54	9:16	16:51
27	8:54	17:38	7:54	18:38	6:48	19:29	5:38	20:25	4:48	21:13	4:39	21:33	5:13	21:05	6:05	20:03	6:58	18:49	7:52	17:41	8:48	16:53	9:17	16:52
28	8:52	17:40	7:52	18:40	6:46	19:31	5:36	20:27	4:47	21:14	4:40	21:33	5:15	21:04	6:06	20:01	6:59	18:47	7:54	17:39	8:49	16:53	9:17	16:53
29	8:51	17:42			6:44	19:33	5:34	20:28	4:46	21:16	4:40	21:33	5:16	21:02	6:08	19:59	7:01	18:44	7:56	17:37	8:51	16:52	9:17	16:54
30	8:49	17:44			6:41	19:35	5:32	20:30	4:45	21:17	4:41	21:32	5:18	21:00	6:10	19:56	7:03	18:42	7:57	17:35	8:52	16:51	9:17	16:55
31	8:48	17:46			6:39	19:37			4:44	21:18			5:19	20:59	6:12	19:54			7:59	17:33			9:17	16:56

2023 DATE	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET
1	9:17	16:57	8:46	17:47	7:50	18:41	6:37	19:38	5:30	20:31	4:44	21:19	4:42	21:32	5:21	20:57	6:13	19:52	7:04	18:40	8:01	17:32	8:54	16:50
2	9:16	16:58	8:45	17:49	7:48	18:43	6:35	19:40	5:28	20:33	4:43	21:20	4:42	21:32	5:22	20:55	6:15	19:50	7:06	18:38	8:03	17:30	8:55	16:50
3	9:16	16:59	8:43	17:51	7:46	18:45	6:32	19:42	5:26	20:35	4:42	21:21	4:43	21:31	5:24	20:54	6:16	19:47	7:08	18:35	8:04	17:28	8:56	16:49
4	9:16	17:01	8:41	17:53	7:43	18:47	6:30	19:43	5:24	20:37	4:41	21:22	4:44	21:31	5:25	20:52	6:18	19:45	7:10	18:33	8:06	17:26	8:58	16:48
5	9:15	17:02	8:40	17:55	7:41	18:49	6:28	19:45	5:22	20:38	4:41	21:23	4:45	21:30	5:27	20:50	6:20	19:43	7:11	18:31	8:08	17:25	8:59	16:48
6	9:15	17:03	8:38	17:57	7:39	18:51	6:25	19:47	5:20	20:40	4:40	21:24	4:46	21:30	5:29	20:48	6:21	19:40	7:13	18:28	8:10	17:23	9:00	16:48
7	9:15	17:04	8:36	17:59	7:36	18:53	6:23	19:49	5:19	20:42	4:39	21:25	4:47	21:29	5:30	20:46	6:23	19:38	7:15	18:26	8:12	17:21	9:02	16:47
8	9:14	17:06	8:34	18:01	7:34	18:55	6:20	19:51	5:17	20:44	4:39	21:26	4:48	21:28	5:32	20:44	6:25	19:36	7:17	18:24	8:14	17:19	9:03	16:47
9	9:13	17:07	8:32	18:03	7:32	18:56	6:18	19:52	5:15	20:45	4:38	21:27	4:49	21:27	5:34	20:42	6:26	19:33	7:18	18:21	8:16	17:18	9:04	16:47
10	9:13	17:09	8:30	18:05	7:29	18:58	6:16	19:54	5:13	20:47	4:38	21:28	4:50	21:27	5:35	20:40	6:28	19:31	7:20	18:19	8:18	17:16	9:05	16:46
11	9:12	17:10	8:28	18:07	7:27	19:00	6:14	19:56	5:12	20:49	4:37	21:28	4:51	21:26	5:37	20:38	6:30	19:28	7:22	18:17	8:19	17:14	9:06	16:46
12	9:11	17:12	8:26	18:09	7:25	19:02	6:11	19:58	5:10	20:50	4:37	21:29	4:52	21:25	5:39	20:36	6:32	19:26	7:24	18:14	8:21	17:13	9:07	16:46
13	9:11	17:13	8:24	18:11	7:22	19:04	6:09	19:59	5:08	20:52	4:37	21:30	4:53	21:24	5:40	20:34	6:33	19:24	7:26	18:12	8:23	17:11	9:08	16:46
14	9:10	17:15	8:22	18:13	7:20	19:06	6:07	20:01	5:06	20:54	4:37	21:30	4:54	21:23	5:42	20:32	6:35	19:21	7:27	18:10	8:25	17:10	9:09	16:46
15	9:09	17:17	8:20	18:15	7:18	19:07	6:04	20:03	5:05	20:55	4:37	21:31	4:56	21:22	5:44	20:30	6:37	19:19	7:29	18:08	8:27	17:08	9:10	16:46
16	9:08	17:18	8:18	18:17	7:15	19:09	6:02	20:05	5:03	20:57	4:36	21:31	4:57	21:21	5:46	20:28	6:38	19:16	7:31	18:05	8:29	17:07	9:11	16:46
17	9:07	17:20	8:16	18:19	7:13	19:11	6:00	20:07	5:02	20:58	4:36	21:32	4:58	21:19	5:47	20:26	6:40	19:14	7:3					

RADIATION

MONTH	BRIGHT SUNSHINE (HOURS)				BRIGHT SUNSHINE DAYS				
	2022	POSSIBLE SUNSHINE*	% OF POSSIBLE	2022 CUMULATIVE HOURS	2022 NUMBER OF DAYS	2022 CUMULATIVE DAYS	2022 WITH 1 OR MORE HOURS	2022 WITH 5 OR MORE HOURS	2022 WITH 10 OR MORE HOURS
JAN	92.9	255.28	36.4	92.9	22	22	19	10	0
FEB	145.3	277.12	52.4	238.2	26	48	23	14	1
MAR	213.0	369.51	57.6	451.2	30	78	28	20	9
APR	228.3	420.57	54.3	679.5	29	107	25	19	13
MAY	265.4	491.84	54.0	944.9	30	137	29	21	15
JUNE	271.0	505.4	53.6	1212.0	29	166	27	22	15
JULY	308.8	506.38	61.0	1520.8	30	196	29	25	18
AUG	304.0	455.02	66.8	1824.8	31	227	31	27	17
SEP	273.5	379.46	72.1	2098.3	27	254	26	25	18
OCT	212.4	327.50	64.9	2310.7	30	284	27	21	6
NOV	62.0	260.41	23.8	2372.7	18	302	14	5	0
DEC	83.0	237.48	35.0	2455.7	23	325	20	7	0
TOTAL	2459.6	4486.00	54.8		325		298	216	112

* National Research Council, Canada, Hertzberg Institute of Astrophysics

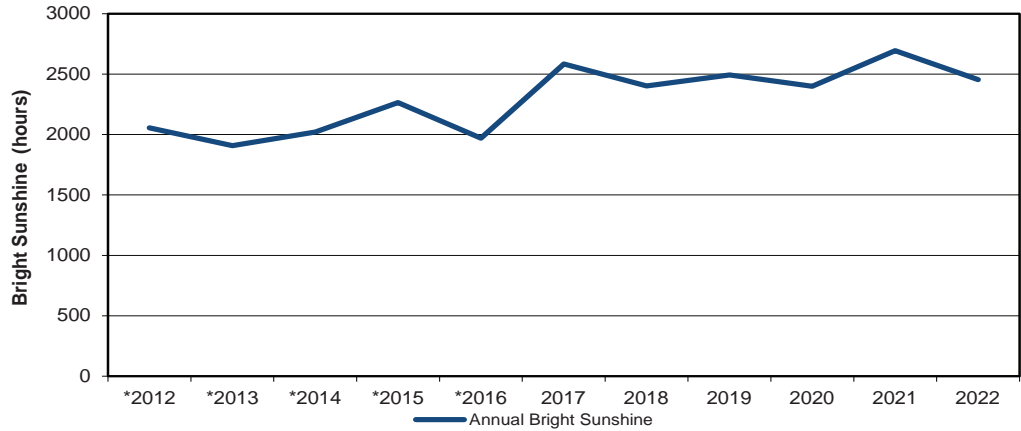
Global and Diffuse Radiation (MJ/m²)

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	5.4	1.4	6.8	1.7	8.2	7.5	14.2	11.9	21.9	9.5	25.5	8.8	6.3	5.6	25.8	3.4	18.8	4.9	11.5	3.8	1.7	1.7	3.0	1.7
2	2.4	2.3	8.5	1.7	13.1	2.2	17.4	10.9	23.7	6.5	30.6	4.3	22.7	11.2	10.5	8.2	19.6	2.4	12.7	1.9	1.5	1.5	3.6	2.0
3	2.0	2.0	7.7	2.0	12.0	5.0	17.7	8.5	16.2	9.6	30.2	3.8	25.5	5.3	22.3	7.3	18.2	4.4	9.9	4.5	3.8	2.8	3.6	1.9
4	1.9	1.9	4.7	4.2	6.5	6.1	19.4	4.2	21.0	7.8	30.4	3.7	24.0	9.5	19.7	9.2	16.8	5.0	11.0	3.6	4.8	2.9	2.9	2.2
5	3.1	2.1	5.0	4.5	11.3	5.2	6.9	6.3	20.9	8.5	25.0	7.9	12.6	10.3	11.2	8.3	14.1	6.7	12.5	2.0	2.2	2.1	3.8	1.6
6	5.0	1.2	4.2	4.1	11.2	5.8	22.3	5.0	14.6	7.8	30.1	5.3	14.1	7.5	25.0	4.0	19.2	2.2	13.5	1.8	3.4	3.2	5.2	1.1
7	2.5	2.4	5.3	4.3	9.2	8.4	21.4	3.8	6.2	5.3	18.2	8.1	28.0	4.9	20.0	8.1	15.5	5.1	11.5	1.9	3.9	3.7	2.5	2.1
8	3.9	1.8	5.0	4.3	11.6	9.2	17.7	7.6	24.4	5.3	24.7	9.0	10.7	7.7	21.3	7.2	12.6	4.7	11.3	2.3	3.5	3.2	3.7	1.1
9	5.3	1.4	6.7	3.7	15.2	2.5	16.6	7.3	26.1	5.2	14.4	9.5	20.4	6.1	24.1	4.4	9.0	6.9	11.0	1.9	4.0	3.8	1.8	1.8
10	2.9	2.7	5.9	3.5	15.0	3.9	11.4	9.5	10.7	8.8	7.7	6.8	21.2	8.7	23.4	4.8	18.1	2.4	11.1	1.9	5.3	3.8	1.8	1.7
11	3.2	2.6	7.5	2.7	14.8	4.9	11.9	10.8	26.2	4.1	17.8	11.4	25.2	6.0	14.9	10.5	16.4	4.0	7.7	3.8	6.8	2.4	2.5	1.6
12	3.6	1.6	4.5	1.8	11.9	5.9	15.4	11.9	23.2	6.0	18.9	9.2	28.4	3.1	16.7	9.0	17.6	2.4	11.2	2.0	4.8	3.2	1.9	1.8
13	1.6	1.6	7.2	3.5	14.7	3.1	12.1	10.7	3.0	2.7	12.4	7.8	20.0	7.9	9.8	7.5	12.6	7.4	11.3	1.5	2.2	2.2	2.0	1.9
14	2.5	2.4	8.0	4.2	10.0	9.1	11.6	10.2	13.5	8.6	3.1	2.7	27.5	3.9	14.1	8.0	13.0	4.3	9.1	2.8	2.7	2.4	2.2	2.1
15	2.5	2.3	6.1	5.5	12.1	9.0	16.6	12.4	28.6	4.1	10.6	9.2	22.6	7.3	18.4	5.1	15.6	3.9	8.6	3.9	3.2	3.1	3.0	1.2
16	3.3	2.4	9.9	1.9	13.3	5.9	18.1	11.1	26.3	5.4	18.2	11.6	27.2	3.6	21.7	3.7	6.0	5.6	4.5	4.0	3.2	3.0	3.7	1.6
17	2.2	2.2	7.4	5.0	16.8	3.2	23.8	5.2	10.8	8.4	24.0	11.6	19.5	7.1	15.1	6.3	13.3	6.3	9.9	1.5	5.2	2.1	3.2	2.1
18	3.8	2.4	10.6	2.2	14.7	5.0	21.8	5.7	23.3	6.5	27.1	7.5	26.4	5.4	22.4	3.4	15.7	2.7	9.5	2.1	2.5	2.4	3.4	2.6
19	6.2	1.2	6.1	5.9	18.0	3.0	11.9	9.5	5.3	4.8	8.0	7.1	24.9	4.8	22.1	3.1	2.4	2.2	8.1	2.2	4.7	1.8	2.1	2.0
20	4.3	3.1	11.2	2.7	10.6	8.3	15.0	11.4	13.3	11.1	10.1	8.9	26.3	6.0	21.5	3.9	5.0	4.6	2.4	2.3	4.6	2.3	3.8	1.3
21	5.3	1.2	10.9	2.3	11.4	8.9	24.1	6.5	25.2	7.6	21.6	7.3	25.6	5.5	18.6	5.8	13.9	2.3	3.2	3.0	2.5	2.4	3.0	2.5
22	2.0	1.0	11.7	2.6	17.7	2.5	9.7	8.5	19.7	10.3	22.2	11.7	21.7	5.7	4.5	4.0	15.6	1.8	6.3	3.9	4.2	2.5	2.8	1.3
23	2.5	2.5	12.2	2.7	12.6	8.7	22.9	6.9	24.4	7.2	15.5	10.7	17.4	10.9	20.6	3.9	12.1	4.4	3.0	2.9	4.4	1.9	3.5	1.9
24	6.6	1.8	12.7	2.7	12.4	6.3	24.9	3.6	26.4	6.8	11.3	8.2	23.4	5.7	17.3	6.4	14.8	1.9	5.1	4.5	3.2	2.9	2.3	2.1
25	5.4	3.0	11.1	4.2	19.1	3.0	25.3	3.9	19.4	9.2	20.7	7.7	13.4	9.6	19.3	4.9	13.2	4.7	5.3	4.0	3.3	2.3	2.3	2.3
26	3.8	2.7	7.5	6.8	19.0	4.1	24.2	5.3	25.0	8.3	28.8	5.1	26.9	5.4	15.5	4.5	14.3	1.5	7.1	3.7	3.4	1.8	1.7	1.6
27	4.2	3.7	7.1	6.6	13.4	10.7	10.3	7.3	22.2	9.0	24.7	9.2	25.4	5.3	17.7	5.1	13.0	3.0	5.6	2.9	2.6	2.4	1.8	1.7
28	3.8	3.6	7.8	7.3	12.9	10.9	20.9	7.1	15.0	9.1	30.3	4.6	26.4	3.5	6.4	5.5	13.5	1.7	6.4	2.7	3.0	2.9	2.0	1.9
29	3.7	3.6			18.1	6.3	21.9	6.4	12.6	9.8	10.5	7.6	24.4	5.3	19.8	3.0	12.6	3.5	7.1	2.0	3.4	2.9	2.4	2.0
30	5.4	2.3			18.9	7.6	23.1	5.6	16.5	12.2	28.5	5.8	6.6	5.9	19.5	3.4	3.4	3.2	7.5	1.3	2.8	2.6	4.2	1.3
31	3.0	2.9			15.1	8.4			30.7	4.2			15.0	7.3	19.3	3.0			5.5	3.9			3.1	1.8
TOTAL	113.3	69.3	219.3	104.6	420.8	190.6	530.5	235.0	596.3	229.7	601.1	232.1	659.7	202.0	558.5	174.9	405.9	116.1	260.4	86.5	106.8	78.2	88.8	55.8

RADIATION

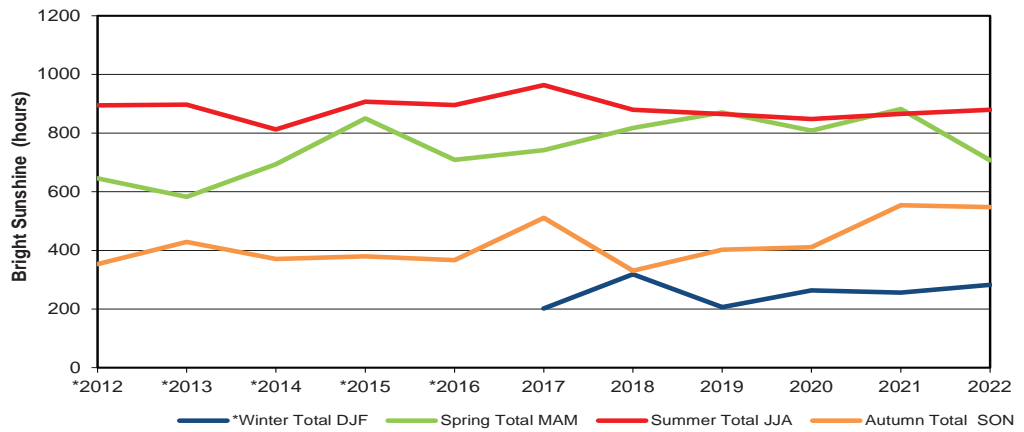
Annual Bright Sunshine Hours

Note: Winter bright sunshine is low for the 2012 to 2016 period due to instrument misalignment

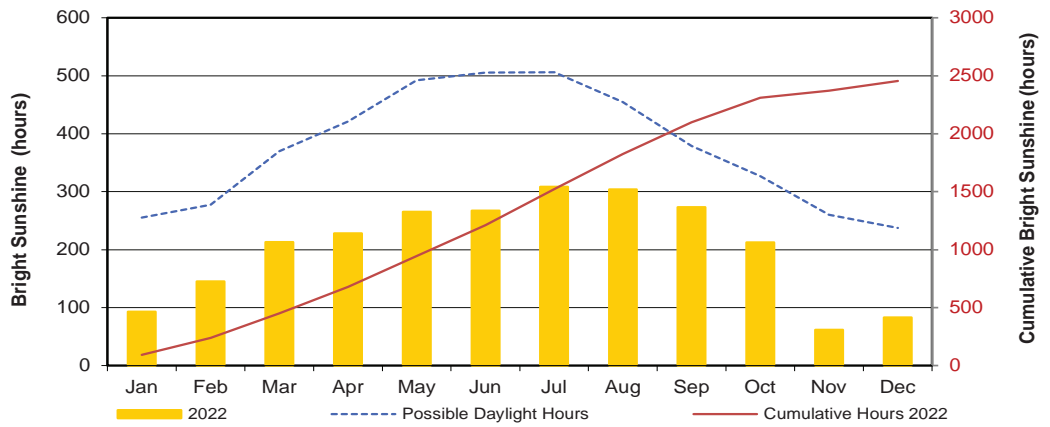


Seasonal Bright Sunshine Hours

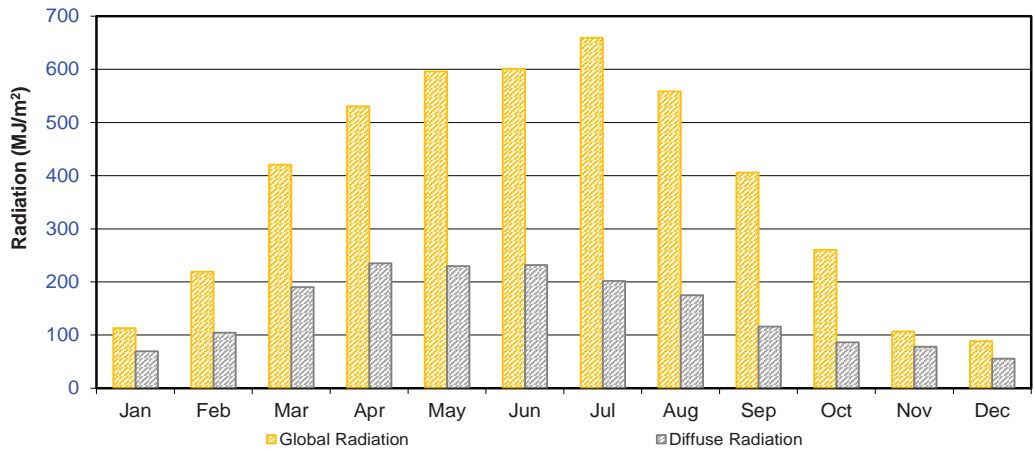
Note: Winter bright sunshine is low for the 2012 to 2016 period due to instrument misalignment



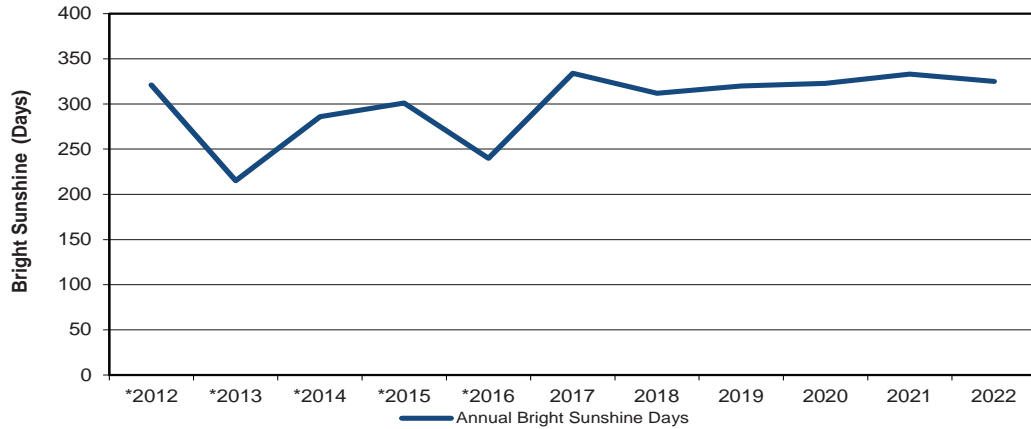
Monthly Bright Sunshine Hours



Monthly Global & Diffuse Radiation

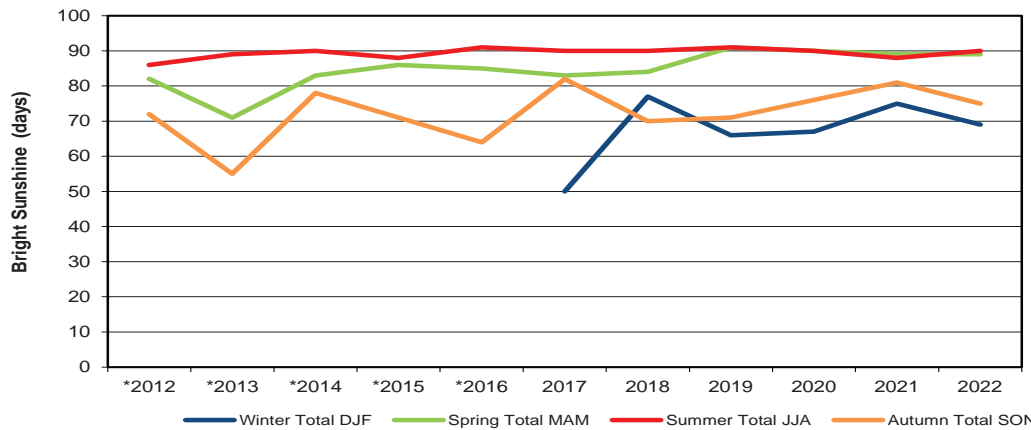


RADIATION



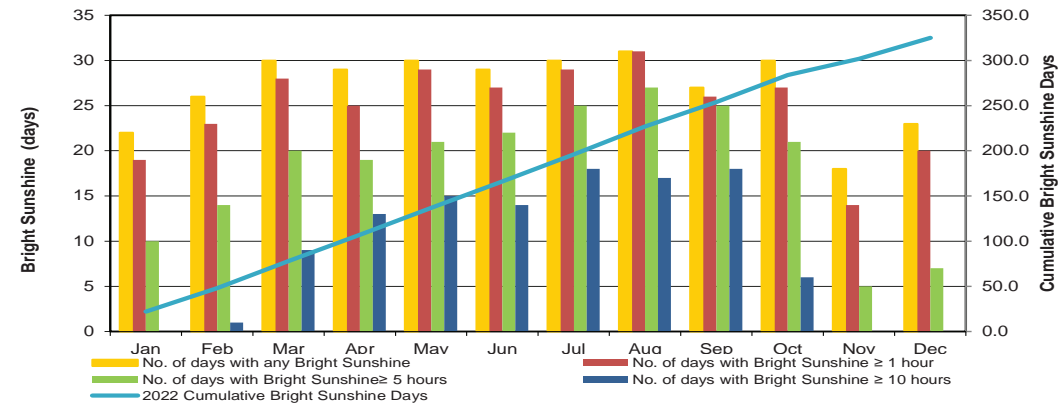
Annual Bright Sunshine Days

Note: Winter bright sunshine is low for the 2012 to 2016 period due to instrument misalignment



Seasonal Bright Sunshine Days

Note: Winter bright sunshine is low for the 2012 to 2016 period due to instrument misalignment



Monthly Bright Sunshine Days

Bright Sunshine Ranking

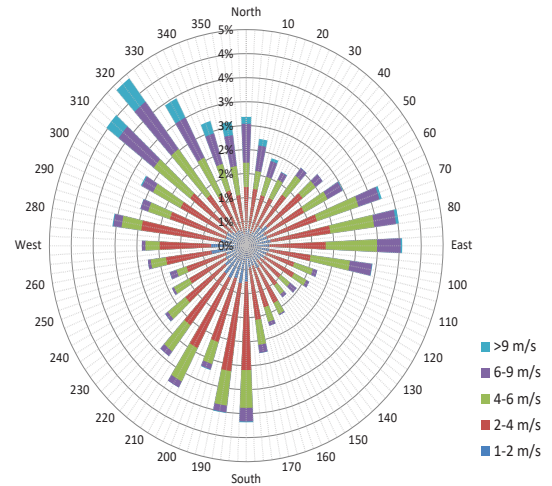
% OF ACTUAL TO POSSIBLE HOURS BRIGHT SUNSHINE				
ANNUAL	WINTER DJF	SPRING MAM	SUMMER JJA	AUTUMN SON
2021 60.1	2018 41.4	2021 68.7	2017 65.7	2021 57.4
2017 57.6	2022 36.7	2019 68.0	2015 62.3	2022 56.6
2015 55.4	2020 34.4	2015 66.7	2013 61.2	2017 52.9
2019 55.3	2021 33.2	2018 63.7	2016 61.1	2015 47.6
2022 54.8	2019 26.9	2020 62.9	2012 61.0	2013 44.4
2020 53.5	2017 26.2	2017 57.8	2022 60.0	2014 43.0
2018 53.5	2012 IF	2016 55.2	2018 60.0	2020 42.6
2012 47.9	2013 IF	2022 55.1	2021 59.1	2019 41.5
2014 46.6	2014 IF	2014 54.0	2019 58.9	2012 39.7
2016 43.9	2015 IF	2012 50.2	2020 57.9	2016 38.0
2013 42.5	2016 IF	2013 45.4	2014 55.3	2018 34.2

DAYS WITH BRIGHT SUNSHINE				
ANNUAL	WINTER DJF	SPRING MAM	SUMMER JJA	AUTUMN SON
2017 334	2018 77	2019 91	2016 91	2017 82
2021 333	2021 75	2020 90	2019 91	2021 81
2022 325	2022 69	2021 89	2014 90	2014 78
2020 323	2020 67	2022 89	2017 90	2020 76
2012 321	2019 66	2015 86	2018 90	2022 75
2019 319	2017 50	2016 85	2020 90	2012 72
2018 312	2012 N/A	2018 84	2022 90	2015 71
2015 301	2013 N/A	2014 83	2013 89	2019 71
2014 286	2014 N/A	2017 83	2015 88	2018 70
2016 240	2015 N/A	2012 82	2021 88	2016 64
2013 215	2016	2013 71	2012 86	2013 55

WIND

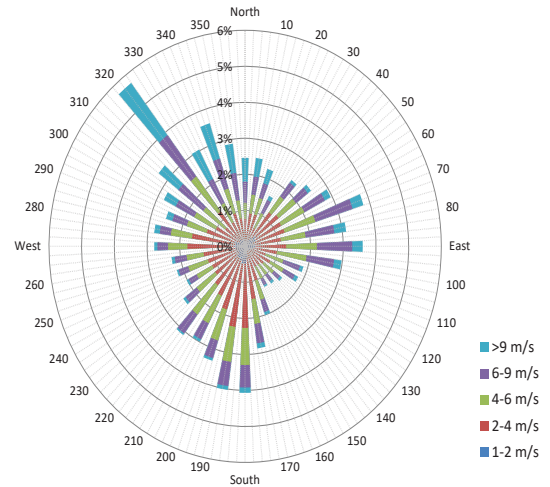
MONTH	AVERAGE WIND SPEED (km/h)		HIGHEST INSTANTANEOUS WIND SPEED (km/h)		
	2022 Average	2022 1/2 Hr. Maximum Average	2022 for CRS @ CLC (Speed / direction / date)		
January	14.0	19.1	65.9	NNW	26
February	12.8	17.3	67.3	NNW	10
March	13.7	18.5	60.8	NNW	8
April	15.8	22.1	52.9	NW	1
May	16.2	23.6	63.2	ENE	19
June	13.1	19.6	58.1	NE	1
July	9.6	15.1	48.7	W	19
August	10.1	15.6	53.8	N	13
September	11.8	17.6	56.7	N	1
October	12.9	18.4	67.7	NNW	12
November	13.9	18.9	67.1	N	5
December	12.0	16.3	47.3	N	4

10 minute Average Wind Speed and Direction CLC 2022



10 meter wind speed and direction tower
April 2022
Photo: R. Jansen

1/2 hr Maximum Wind Speed and Direction CLC 2022



2022	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	8.2	21.7	4.9	29.7	14.2	27.2	6.0	8.5	19.1	9.4	19.0	14.5
2	11.4	12.3	8.2	7.9	20.3	23.6	4.7	17.1	10.4	10.6	6.7	10.7
3	18.1	8.4	4.2	8.7	19.8	9.7	4.6	9.5	13.0	7.5	4.9	15.0
4	21.5	10.7	15.6	18.6	16.1	10.6	9.2	15.6	14.1	5.5	4.8	25.4
5	14.0	9.7	10.3	15.5	12.1	18.6	11.5	17.0	13.6	15.3	22.8	7.9
6	7.8	12.2	9.4	8.1	19.2	11.3	9.5	11.3	13.7	6.3	29.6	8.6
7	12.7	14.7	26.1	7.7	5.7	7.3	9.0	12.3	11.6	12.3	18.8	12.6
8	21.6	22.2	27.7	19.8	17.0	6.2	12.7	9.9	18.6	10.1	14.3	13.0
9	7.8	9.9	15.9	19.0	10.3	8.3	9.2	12.4	12.9	5.3	8.8	8.3
10	11.0	30.6	25.7	23.5	13.3	11.3	8.5	6.4	12.7	13.7	7.6	7.4
11	10.9	8.3	13.3	25.3	9.2	10.7	13.2	14.9	9.5	24.5	6.7	13.0
12	7.6	8.3	17.4	20.9	10.5	8.2	7.0	7.9	12.7	33.3	6.3	11.1
13	11.1	20.3	9.5	26.2	27.2	20.3	16.8	12.1	8.0	25.3	9.0	8.0
14	10.1	5.5	11.9	25.4	20.6	11.0	8.9	10.6	9.7	9.4	5.8	12.3
15	16.7	15.6	8.4	10.7	16.5	8.2	7.9	4.4	6.1	22.0	13.7	17.7
16	9.9	12.3	13.4	7.3	16.6	10.7	9.3	6.2	8.1	7.3	26.0	7.8
17	20.4	10.2	10.5	6.2	16.5	22.4	4.5	7.8	6.7	12.1	18.4	20.0
18	23.7	18.1	8.1	8.4	12.1	15.4	4.6	9.6	9.6	12.0	17.9	16.7
19	11.3	18.3	6.6	21.4	28.4	9.2	10.2	4.8	6.9	7.9	12.6	12.2
20	13.7	8.2	12.6	21.7	22.8	9.5	17.3	11.6	19.5	13.9	12.7	8.7
21	26.6	5.2	15.1	11.2	11.7	9.4	15.6	10.9	8.8	9.5	10.9	15.0
22	6.8	6.5	10.2	9.9	15.4	12.8	10.9	11.2	16.2	10.9	13.5	16.9
23	12.9	9.0	14.7	15.7	11.8	13.9	9.5	9.0	7.5	16.7	9.7	4.6
24	6.4	9.5	27.4	14.5	21.1	15.8	9.0	6.0	15.9	12.9	12.8	10.2
25	16.7	14.3	15.2	16.3	11.6	17.5	7.4	6.9	9.6	7.0	11.1	12.5
26	31.6	11.1	11.0	20.4	9.7	13.3	15.0	8.1	7.7	11.7	12.2	13.1
27	8.7	18.4	14.0	18.9	16.2	14.4	8.8	7.8	13.5	17.4	14.0	18.8
28	10.9	6.8	18.5	11.1	15.1	5.3	5.9	15.2	10.8	10.6	28.1	15.7
29	10.3		15.8	12.0	14.0	13.5	12.8	12.2	8.5	15.3	22.5	3.5
30	7.7		11.0	9.8	23.8	16.3	11.3	8.7	18.1	12.4	15.1	6.2
31	26.2		13.8		24.1		6.4	8.8		12.5		3.5

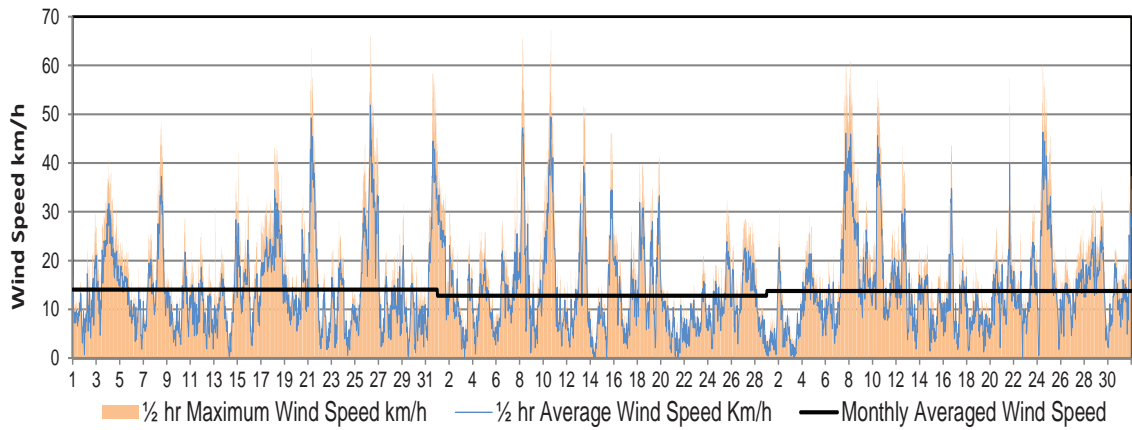
**Wind Speed
Daily Average (km/h)**

2022	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	16.8	42.4	25.7	52.9	28.4	58.1	19.0	20.7	56.7	21.5	41.6	32.8
2	29.5	30.2	30.9	19.2	42.6	50.3	18.2	44.6	27.8	23.5	16.0	27.3
3	36.9	24.0	12.5	25.8	45.4	34.1	15.8	26.2	32.2	27.5	11.1	26.8
4	40.8	25.8	29.1	39.2	39.2	32.9	33.4	40.2	31.6	20.5	10.0	47.3
5	23.8	26.0	18.0	37.2	32.9	40.2	27.6	47.7	52.7	35.6	67.1	31.2
6	18.4	28.1	21.0	22.2	59.7	31.9	22.5	30.7	42.6	19.3	62.6	19.5
7	25.5	39.2	59.7	18.2	13.7	32.5	27.7	32.1	45.2	30.9	48.2	41.3
8	48.3	65.6	60.8	44.4	40.3	25.1	33.3	31.4	41.8	31.6	36.2	29.0
9	17.2	28.2	32.2	38.8	26.3	28.3	24.3	36.1	37.7	19.9	24.3	21.8
10	28.6	67.3	57.1	44.7	49.0	31.8	34.1	23.8	36.9	36.2	18.7	21.2
11	25.7	22.5	26.4	46.2	25.0	28.2	37.5	33.9	23.2	50.5	22.2	30.9
12	21.3	17.9	43.4	38.3	42.1	28.5	17.9	20.7	34.1	67.7	19.4	25.4
13	31.0	51.5	22.1	40.9	53.8	46.9	41.1	53.8	28.5	45.8	18.6	19.1
14	36.2	14.8	23.4	41.1	48.1	35.5	27.2	37.5	32.2	28.4	15.9	36.7
15	42.0	46.1	19.3	25.3	45.7	16.9	25.5	18.7	23.9	46.7	32.0	31.2
16	27.4	27.0	43.6	22.8	34.4	31.4	23.6	20.7	23.9	17.3	48.1	21.8
17	32.4	27.1	24.7	15.2	36.3	48.0	17.8	22.8	23.1	29.1	46.2	37.0
18	43.1	39.8	19.0	23.0	27.7	32.2	17.2	24.9	31.7	28.0	35.0	29.2
19	23.8	41.2	15.1	45.0	63.2	29.2	48.7	16.9	27.6	19.2	29.3	26.1
20	33.1	15.8	26.8	43.1	46.4	46.3	41.0	28.7	46.9	48.0	35.2	15.7
21	63.5	13.2	57.5	30.9	38.4	32.9	41.5	30.4	22.2	30.7	28.1	27.7
22	17.8	14.8	25.4	23.9	38.6	31.1	40.8	25.3	39.0	25.8	27.5	32.9
23	28.0	21.0	31.4	38.6	37.2	39.5	25.4	25.1	18.9	36.4	26.4	16.0
24	20.6	19.2	60.6	32.1	39.5	39.3	46.8	20.8	50.6	30.2	27.4	29.0
25	44.0	32.4	45.8	30.5	38.8	44.0	29.5	21.7	33.4	17.4	24.9	37.1
26	65.9	26.7	22.8	41.8	32.1	33.9	43.9	32.0	22.3	33.0	28.3	39.1
27	25.5	28.6	26.4	43.2	38.4	37.0	24.5	41.7	36.3	32.1	29.8	37.4
28	25.5	21.9	31.7	29.0	31.9	21.2	19.1	41.8	35.9	25.2	45.1	39.5
29	31.6		35.1	32.9	30.3	36.6	26.3	34.0	23.6	46.2	34.7	11.1
30	18.7		22.6	31.8	46.9	42.6	31.8	31.5	35.1	30.3	32.1	14.0
31	58.4		39.6		58.6		26.3	33.3		33.3		10.0

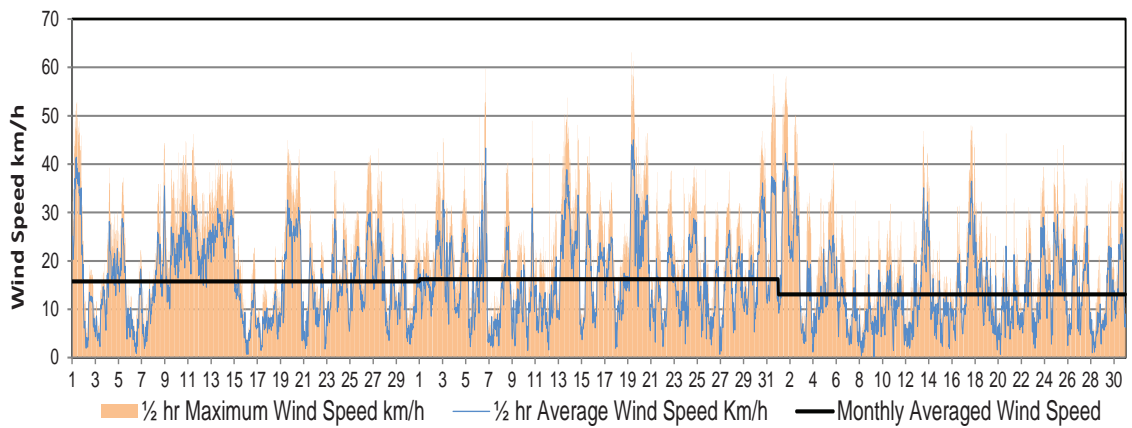
**Wind Speed
Daily Gust (km/h)**

WIND Daily Wind Speed and Maximum Gust Wind Speed

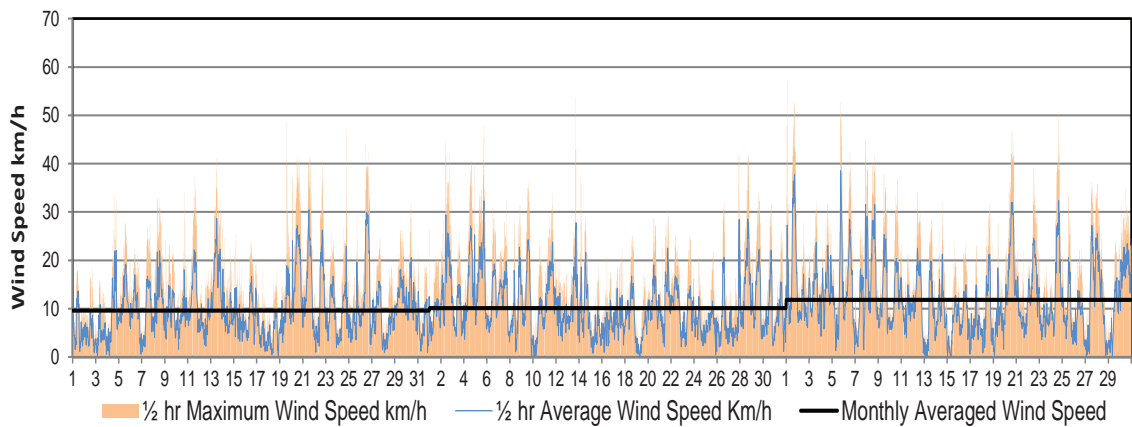
January
February
March



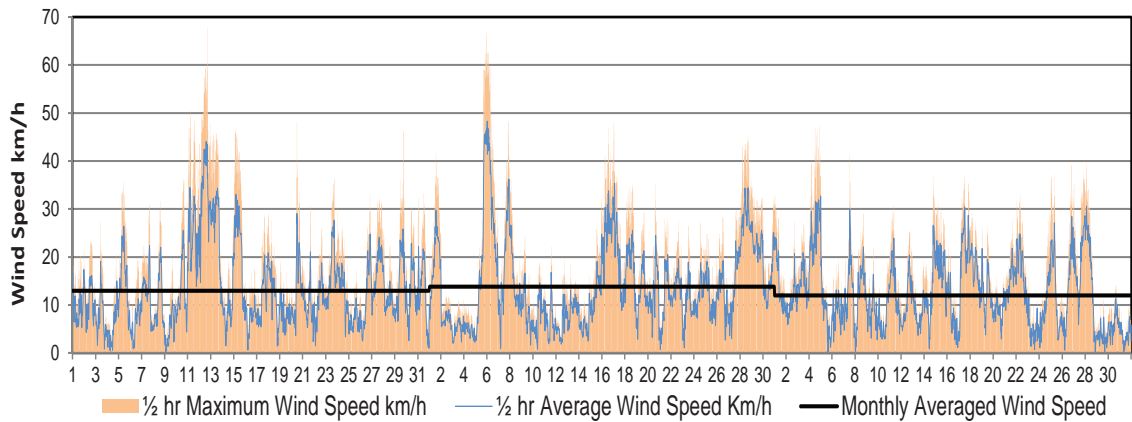
April
May
June



July
August
September



October
November
December



WIND

WINDCHILL CALCULATION CHART ¹												
T°C km/h Speed	T°C											
	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	-30	-37	-43	-49	-56	-62	-67
25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70
30	0	-6	-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	-69	-76
55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77
60	-2	-9	-16	-23	-30	-36	-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	-58	-65	-72	-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

EXTREME DAILY WINDS (km/h)			
Month	Day	WIND SPEED/ DIRECTION	BEAUFORT WIND SCALE DESIGNATION*
January	21	63.5 NW	Gale
	26	65.9 NNW	Gale
	31	58.4 NNE	Near Gale
February	8	65.6 NW	Gale
	10	67.3 NNW	Gale
	13	51.5 NNW	Near Gale
March	7	59.7 NW	Near Gale
	8	60.8 NNW	Near Gale
	10	57.1 NNW	Near Gale
	21	57.5 NW	Near Gale
	24	60.6 NW	Near Gale
April	1	52.9 NW	Near Gale
May	6	59.7 WSW	Near Gale
	13	53.8 NNE	Near Gale
June	1	58.1 NE	Near Gale
	2	50.3 NNW	Near Gale
August	13	53.8 N	Near Gale
September	1	56.7 N	Near Gale
	5	52.7 NW	Near Gale
October	24	50.6 NW	Near Gale
	11	50.5 NW	Near Gale
November	12	67.7 NNW	Gale
	5	67.1 N	Gale
	6	62.6 N	Gale

Environment Canada, Meteorological Service of Canada, 2014.
Beaufort Wind Scale Table

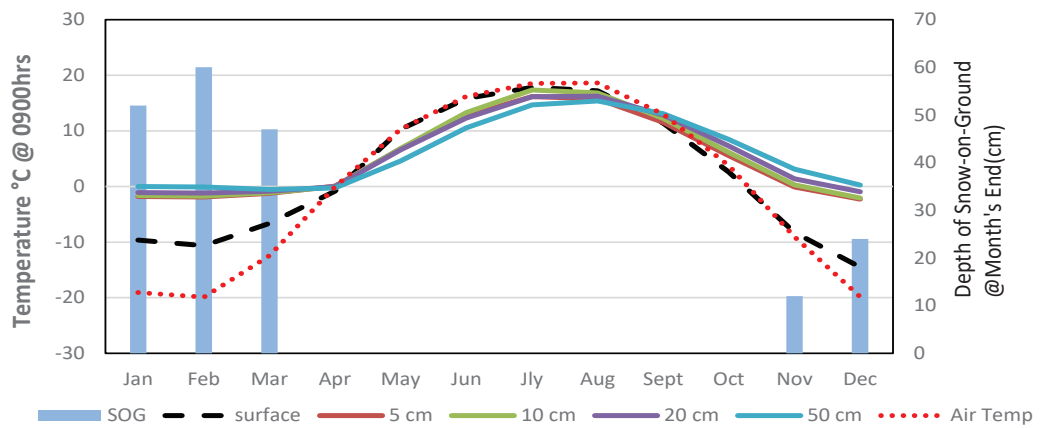
*Near Gale >=50 but < 62	*Gale >=62 but <75
*Strong Gale >=75 but <89	*Storm >=89 but <103
*Violent Storm >=103 but <117	

EXTREME DAILY WIND CHILL WHEN CALCULATED TO < 0												
	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	-48	-39	-19	-13	-6						-9	-37
2	-37	-47	-36	-12	-7						-7	-40
3	-36	-47	-39	-8	-4	-2					-13	-39
4	-40	-47	-23	-6	-7	-1					-13	-29
5	-47	-34	-26	-6						-6	-14	-37
6	-52	-38	-29	-9						-13	-20	-48
7	-50	-15	-22	-11	-1					-6	-25	-49
8	-42	-11	-27	-8						-1	-25	-30
9	-52	-15	-33	-4	-1					-3	-24	-28
10	-40	-30	-35	-15					-3	-1	-30	-23
11	-24	-33	-40	-19	-2						-29	-20
12	-19	-31	-28	-19						-5	-28	-21
13	-21	-26	-20	-22	-3				-2	-7	-18	-20
14	-19	-31	-24	-17	-3					-10	-18	-23
15	-14	-32	-16	-16	-3				-2	-8	-16	-25
16	-15	-41	-11	-13	-2					-8	-22	-30
17	-28	-45	-13	-16					-2	-9	-27	-35
18	-40	-40	-10	-13						-4	-21	-38
19	-44	-31	-16	-10	-5						-20	-39
20	-45	-40	-13	-11	-4						-19	-42
21	-33	-45	-7	-11	-4				-2		-22	-41
22	-31	-50	-9	-5	-4				-1	-5	-15	-40
23	-28	-46	-10	-3						-6	-15	-45
24	-41	-41	-11	-6						-8	-16	-43
25	-48	-39	-21	-11						-5	-6	-29
26	-22	-18	-28	-10						-6	-16	-24
27	-35	-25	-23	-6					-3	-6	-13	-27
28	-23	-27	-17	-3						-6	-19	-30
29	-17		-15	-1					-1	-9	-28	-26
30	-18		-21	-2						-10	-35	-28
31	-34		-14							-15		-28

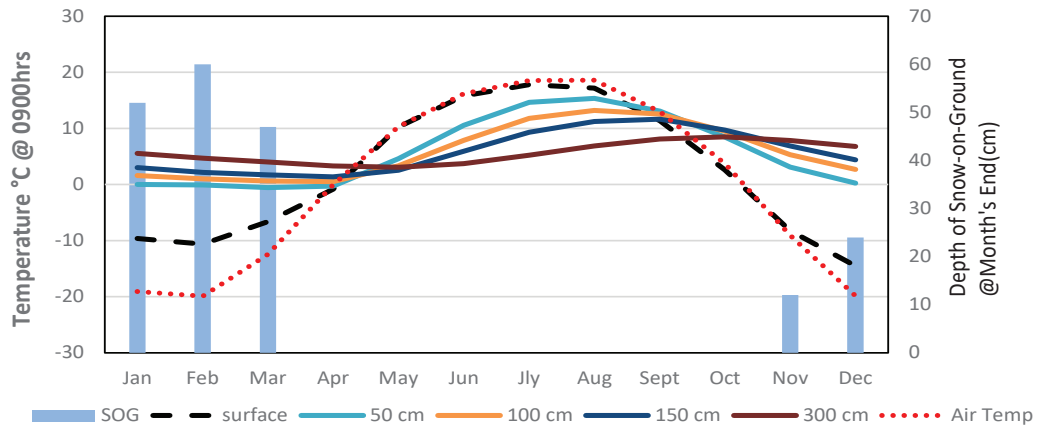
SOIL TEMPERATURES AND DEPTH OF SNOW-ON-THE-GROUND AT MONTH END (2022)

MONTH	Mean Air Temp @ 0900h (°C)	Surface Temp @ 0900h (°C)	SOIL TEMPERATURES (°C) @ 0900h							Mean Air Temp @ 1600h (°C)	Surface Temp @ 1600h (°C)	SOIL TEMPERATURES (°C) @ 1600h			SOG at month's end cm
			5cm	10cm	20cm	50cm	100cm	150cm	300cm			5cm	10cm	20cm	
January	-19.1	-9.6	-1.8	-1.6	-1.1	0.0	1.6	3.0	5.6	-14.6	-9.3	-1.8	-1.7	-1.1	52
February	-19.9	-10.6	-1.9	-1.7	-1.2	-0.1	1.0	2.2	4.7	-13.7	-9.2	-1.9	-1.7	-1.1	60
March	-12.4	-6.6	-1.2	-1.1	-0.8	-0.5	0.7	1.7	4.0	-6.2	-5.4	-1.6	-1.5	-1.0	47
April	-0.1	-0.8	0.1	-0.1	0.0	-0.3	0.5	1.4	3.3	3.9	4.1	0.8	0.4	0.1	-
May	10.3	10.3	6.8	6.8	6.6	4.6	3.4	2.5	3.1	15.9	17.5	10.0	8.7	6.7	
June	16.2	15.8	12.7	13.3	12.4	10.6	7.9	5.9	3.8	19.7	21.1	15.9	15.3	12.5	
July	18.6	17.8	16.2	17.4	16.1	14.7	11.8	9.3	5.2	23.4	25.5	19.5	19.2	16.2	
August	18.6	17.2	15.8	16.8	16.2	15.4	13.2	11.2	6.9	24.8	26.6	18.7	18.5	16.4	
September	13.0	11.4	11.5	12.3	12.8	13.1	12.6	11.7	8.1	20.7	22.3	14.2	13.8	12.8	0
October	3.7	2.6	5.6	6.1	7.3	8.5	9.5	9.7	8.5	12.1	12.9	7.2	6.9	7.2	0
November	-9.1	-8.3	-0.1	0.3	1.4	3.1	5.3	6.9	7.8	-6.2	-6.2	-0.1	0.2	1.4	12
December	-19.9	-14.5	-2.3	-2.0	-0.9	0.3	2.7	4.4	6.8	-17.0	-13.0	-2.3	-2.0	-0.9	24

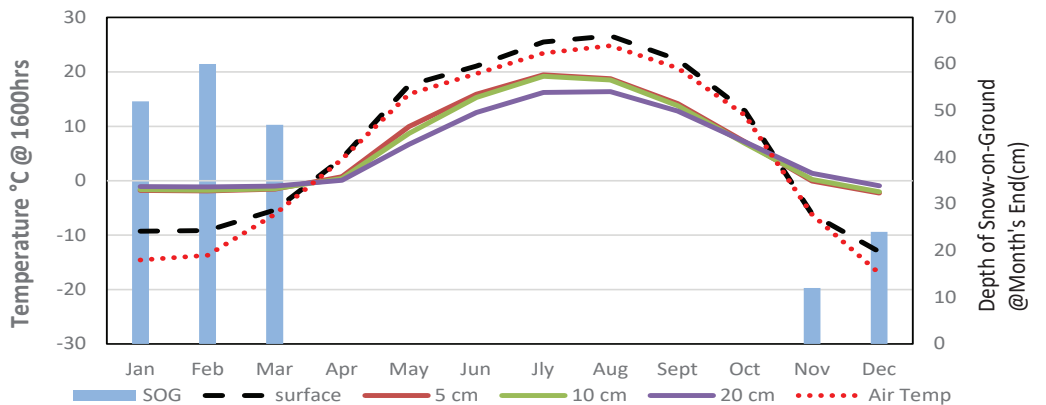
Monthly Soil Temperatures @ 0900h



Monthly Soil Temperatures @ 0900h



Monthly Soil Temperatures @ 1600h



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 (hours of illumination) 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. A temperature base of 24° C is sometimes used as an index of extreme cooling degree-days to indicate potential heat stress. (Environment Canada 2012)

Mathematically: $CDD = (T - 18^{\circ}C)$, 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: $GDD = (T - 5.0^{\circ}C)$, 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:

$HDD = (18^{\circ}C - T)$, 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.

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 the Conservation Learning Centre, 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 period of operation at CLC is not yet long enough to produce normals. (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 of 0000 hours - 2400 hours 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.

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) .

Official precipitation is measured using a weighing gauge, extreme precipitation events are measured using a tipping bucket rain gauge .

Snow depth is measured using a sonic ranging sensor.

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/m²). (To facilitate comparison with past years' data: 1.0 MJ/m² = 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).

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.

Mathematically: $WC = 13.12 + (0.6215 \times T) - (11.37 \times V^{0.16}) + (0.3965 \times T \times V^{0.16})$; where WC = wind chill; T= air temperature °C; V= standard wind speed km/h. (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 2005).

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.

see also **Beaufort Wind Scale**

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