

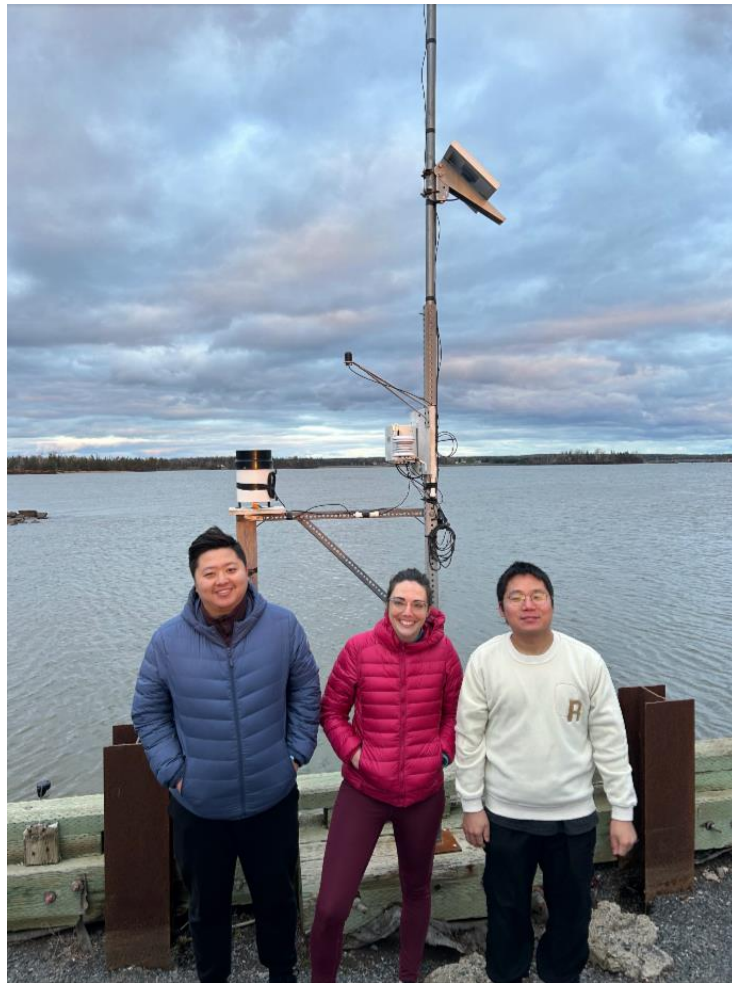
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UPEI Canadian Centre for Climate Change and Adaptation (*Climate Centre*)

## Prince Edward Island Climate Summary – November, 2023

### Introduction

The average monthly temperatures in November were slightly below normal across most of the province. Precipitation was mostly below normal to normal in Prince County but above normal in Queens and Kings Counties. The average wind speeds were slightly higher than the previous month across the province with 4 stations reaching an average over 20 km/h.



**Figure 1: Tianze Pang, Genny Keefe, Zhu Zhang Reinstalling UPEI Climate and Tidal Station at MacAulay's Wharf, Nov. 5, 2023**

## Climate Data

Table 1 summarizes data from 84 climate stations across the province which reported in November of 2023. The stations at Georgetown Wharf and MacAulay's Wharf were reactivated during the month with help from graduate students at the UPEI Climate School as shown on Figure 1.

**Table 1: Instrumented Climate Data for November 2023**

Location	Owner	T <sub>mean</sub> (°C)	T <sub>max</sub> (°C)	T <sub>min</sub> (°C)	Ppt total (mm)	Max Wind Gust (km/h)	Avg. Wind Speed (km/h)	Avg. Daily Solar Rad. (W/m <sup>2</sup> )
Abney	UPEI	2.9	16.3	-9.1	89	57	7.4	52.7
Abram's Village	UPEI	2.9	12.2	-7.2	79.6	71	23.0	52.2
Albany	UPEI	2.1	13.1	-7.8	69.2	53	13	53.4
Alberry Plains	UPEI	2.3	16.7	-8.6	105	72.1	11.2	57.7
Alliston	UPEI	2.2	16.2	-9.2	76.2	57.9	5.1	
Annandale	UPEI	3.3	14.4	-6.3	102	83.0	16.7	56.8
Arlington	UPEI	1.6	14.0	-9.3	99	50.5	1.5	50.7
Baltic	UPEI	2.3	13.8	-7.9	70.2	66.1	15.7	65.8
Belmont	UPEI	2.5	14.2	-8.2	78.2	56.5	13.2	62.5
Bideford	MCPEI	1.8	12.8	-8.8	73.4	49.9	8.3	37.4
Bothwell	UPEI	3.1	13.2	-8.1	81.6	74.2	11.5	
Brockton	UPEI	2.0	13.0	-7.9	64.5	48.3	6.3	
Brookvale	UPEI	1.9	14.1	-8.7	96	61	11	47.3
Brudenell	UPEI	2.3	17.1	-9.7	127.2	60	7.2	53.1
Cable Head E	EC	2.6	16.6	-7.7	122.8	75		
Cardigan Head	Private	m	m	m	52.4	m	m	m
Cavendish GG	UPEI	2.7	14.7	-8.1	101	69	12.3	50.9
Ch town Air	NAV Can	1.9	14.2	-8.2	110.6	72		
Ch town VK	Private	2.6	14.4	-7.7	110	59.5	7.3	42.3
Ch town YC	UPEI	3.3	12.9	-7.0	92.6	58	12.2	79.3
Darlington	UPEI	2.1	14.5	-9.8	113.2	59	10.5	48.3
Dingwells	UPEI	2.6	16.3	-10.7	105.7	70.8	7.3	n
East Baltic	UPEI	m	12.3	-4.2	m	46	7.1	50.9
East Point	EC	3.4	13.5	-8.0	101.3	87		
Elmwood	Private	2.5	15.0	-7.8	91.2	33.8	5.2	
Fanning Brook	UPEI	3.0	16.7	-7.9	131.3	61.2	8.1	
Flat River	UPEI	3.1	16.1	-6.9	90.9	57.9	9.4	
Fox Island	UPEI	2.5	13.8	-7.3	63.4	58.9	10.5	57.7
Foxley River	UPEI	2.4	13.3	-6.8	56.9	64.4	8.3	
Georgetown Wharf	UPEI	4.1	17.3	-6.3	*	75	8.0	*
Glen Valley	UPEI	1.5	14.3	-8.9	118.4	42.1	57	6.2
Graham's Pond	UPEI	3.3	15.3	-7.2	90	76	13.7	60.9
Graham's Road	UPEI	1.9	13.6	-8.0	92	63	15.4	46.3

Location	Owner	T <sub>mean</sub> (°C)	T <sub>max</sub> (°C)	T <sub>min</sub> (°C)	Ppt total (mm)	Max Wind Gust (km/h)	Avg. Wind Speed (km/h)	Avg. Daily Solar Rad. (W/m <sup>2</sup> )
Grand Tracadie	UPEI	2.8	15.4	-7.9	106.4	52.2	7.3	
Greenwich	PC	3.1	16.5	-7.2	100	58	8.6	48.6
Hampton	UPEI	2.7	13.4	-7.6	85	63	15.1	57.1
Harrington	EC	1.9	14.1	-8.3	114.4	72		
Heatherdale	UPEI	2.1	16.7	-9.8	123	48	7.3	51.9
Hog Island	MCPEI	2.7	13.0	-7.2		60	15.9	59.6
Iona	UPEI	2.5	16.6	-7.8	115.6	59	9.1	48.8
Johnstons R	UPEI	2.9	15.3	-7.6	106.2	57	10.3	53.8
Lennox Island GH	MCPEI	3.2	12.6	-3.8	78.4	49	9.1	61.1
Lennox Island Wharf	MCPEI	2.9	12.1	-6.7	73.6	77	15.5	61.2
Little Sands	UPEI	3.3	14.5	-7.0	72.8	69	13.1	54.3
Lower Freetown	UPEI	2.2	14	-7.9	77.8	55.3	11.7	52.2
Maple Plains	EC	1.1	13.5	-8.8		65		
MacAulay's Wharf	UPEI	2.9	14.7	-6.5	68.4	73	17.4	50.8
Mt. Vernon	UPEI	2.6	16.2	-7.4	102.2	76	10.4	55.3
Naufrage	Private		16.4	-7.8	96	83.7		
Naufrage Harbour	UPEI	3.4	16.3	-7.4	100.6	72	14	44.6
New Glasgow	UPEI	2.0	14.5	-8.5	113	65	7.9	52.3
New Zealand	UPEI	2.5	15	-10.6	115.6	71	10.9	48.4
Newton Rd	UPEI	2.1	14.0	-8.0	73.8	63	12.0	
North Cape	EC	3.0	12.9	-6.7	67	81		
North Lake	PEIEMO	3.9	14.7	-6.9	110.2	66.1	14.4	46.2
North Milton	UPEI	2.1	14.5	-8.5	102.6	55.3	10	58.1
North Rustico	PC	3.0	14.8	-7.1	85.6	50	11	55.9
Norway Onset	UPEI	3.0	12.9	-6.8	74	70	20.3	
Norway VP	UPEI	2.8	12.8	-6.8	52.2	72.4	20.8	
Norway VV	UPEI	2.8	12.8	-6.8	52.2	70.8	19.6	
O'Leary	UPEI	1.9	13.0	-8.0	85.6	61	11.9	55.3
Orwell	UPEI	3.0	16.7	-7.7	104.4	73	11.3	56.6
Pt Prim	UPEI	3.5	14.5	-6.7	92.4	55	11.7	50.7
Riverdale	UPEI	2.2	14.6	-8.3	107.4	53	7.3	57.6
Rocky Pt	MCPEI	2.8	13.9	-7.4	66.3	48.3	5.6	
Savage Harbour	ACS	3.3	15.9	-7.2	75.8	62.7	13.3	48.7
Scotchfort	MCPEI							
Shamrock	UPEI	1.9	13.4	-8.7	81.6	60.1	16.3	55.7
Skinnners Pond	UPEI	3.1	13.0	-6.0	73.4	67	20.3	47.5
Souris	PEIEMO	4.0	13	-6.5	77	72	14.2	10.9*
South Rustico	UPEI	2.2	14.9	-9.4	114.8	54.7	4.8	

Location	Owner	T <sub>mean</sub> (°C)	T <sub>max</sub> (°C)	T <sub>min</sub> (°C)	Ppt total (mm)	Max Wind Gust (km/h)	Avg. Wind Speed (km/h)	Avg. Daily Solar Rad. (W/m <sup>2</sup> )
SSide Airport	EC	1.8	13.5	-7.5	72.4	73		
SSide Wharf	PEIEMO	2.9	12.4	-7.0	54	60.1	5.4	58.7
St. Catherine's	UPEI	2.7	14.4	-7.9	78.7	49.9	6.8	
St. Peters CS	UPEI	2.9	16.8	-7.8	111.4	75	10	53.2
Stanhope	EC	2.6	15.2	-7.6	126	73		
Stanley Bridge	UPEI	2.9	14.4	-7.3	95.6	64	12.4	50.2
Stratford	UPEI	2.8	13.5	-7.6	52.8	64	12.7	53.2
Sturgeon	UPEI	2.3	17.2	-9.6	106	52	6.7	53.5
Tignish Acadian	UPEI	2.2	12.9	-7.1	53.4	49.9	5.7	49.8
Tignish Wharf	PEIEMO	2.7	12.5	-6.8	m	64.9	17	
Tracadie Wharf	UPEI	3.1	14.9	-7.3	m	75	16.9	49
Upton	UPEI	2.1	17.1	-10.7	126	38	3.1	44.5
Victoria Visser	UPEI	3.2	13.9	-5.3	66.6	60.1	15	58.5
Victoria Wharf	UPEI	2.9	12.7	-7.3	71.8	61	12.7	54.2
Warren Grove	UPEI	2.3	15.1	-9.2	115.4	59	6.2	52.1
Waterside	UPEI	3.0	13.2	-4.7	m	76	13.2	46.8
West Cape	UPEI	2.4	13.5	-8.2	43.4	67	21.3	81
White Sands	Private	3.1	14.6	-7.3	92.2	85.3	16.5	
Winsloe South	UPEI	1.9	14	-8.5	135.6	40.2	8.3	
York	UPEI	2.3	14.3	-9.1	112.8	46	6.3	51.4

\*Partial data

m = data missing (typically measured by the station but not available for this period)

n = not available/ or measured by the station

## Temperature

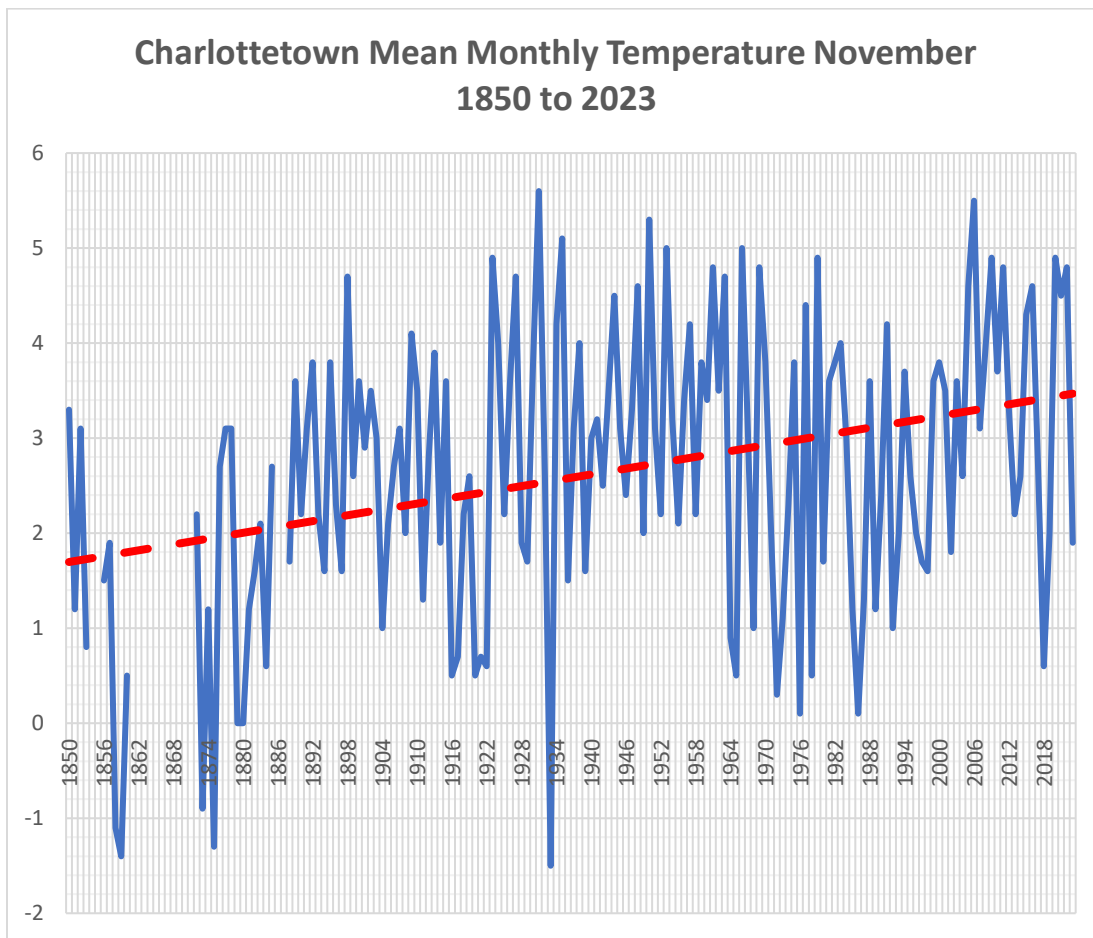
The average monthly temperatures ranged from 1.1°C at Maple Plains to 4.1°C at the UPEI Station at Georgetown Wharf and these were slightly below to slightly above the 30-year climate normal, which ranges from 2.6°C at Alberton and Summerside to 3.4°C at Monticello for the 1981 to 2010 period.. At Charlottetown this was below the trend line from 1850 to 2023 as shown on Figure 2 by over one degree Celsius. The average monthly temperature in November has warmed by an average of 1.7°C in the past 173 years or an average of 1.0°C per century confirming global warming has been occurring during the month of November in the province.

The coldest November on record was 1933 when the average monthly temperature dipped to -1.5°C at Charlottetown as shown on Figure 2. Scott Cairns of Lower Freetown who was 38 years old, noted the cold conditions in November of 1933 in his diary entry for November 30<sup>th</sup>.

*30. (Thu) To New Annan with potatoes on sleigh. With wagon afternoon. Very icy. Price: 2 1/4in@35 cents, 1 7/8in@30 cents/bu. Very cold stormy month with near continual*

*frost, never before known in my time. A great many farmers have very little plowing done. We have 2-3 days of plowing to do.*

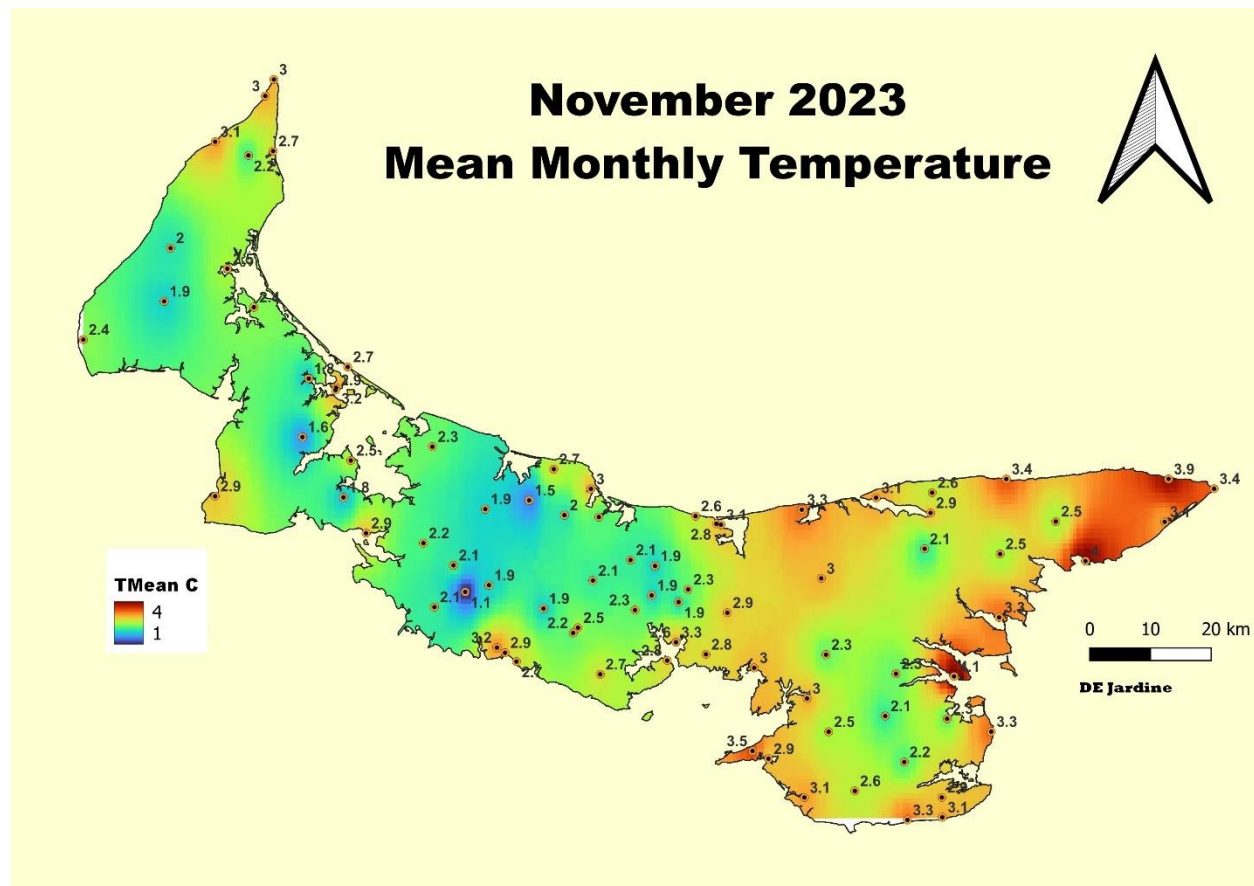
In a report on provincial agricultural activities for 1933 in late December, Deputy Minister J. W. Boulter mentions the cold November weather. “Unfortunately, heavy frost set in on November 4<sup>th</sup>.... Winter closed down and during the month of November most severe frosts prevailed. The losses to farmers and shippers cannot be estimated. Hundreds of acres of turnips remained unharvested.” The early heavy frost also impacted the shipment of potatoes in November due to the late arrival of streamers and storage of the crop in outbuildings and box cars subject to the winterish conditions.



**Figure 2: Charlottetown Monthly Average Temperature for November in °C (EC records only)**

Figure 3 plots the mean monthly temperature for 84 stations across the province using QGIS. The highest mean monthly temperatures were observed in the dark orange areas which are concentrated in the eastern part of the province, particularly in Eastern Kings as shown on Figure 3. The coldest monthly temperatures shown in blue and blue green areas mainly at inland areas in Queens and Prince County,

The highest daily temperature for the month was recorded at the UPEI Climate Station at Georgetown Wharf with a reading of 17.3°C, measured on November 6th. The extreme low temperature of -10.7°C was observed on November 25<sup>th</sup> at Upton and at Dingwells Mills in Kings County.



**Figure 3: Interpolated Average Monthly Temperature, November, 2023**

## Precipitation

Monthly total precipitation is mapped in Figure 4, using data from 92 selected stations, including manual volunteer measurements made by CoCoRaHS observers detailed in Table 2. Thirty-year normal total precipitation for November during the 1981 and 2010 period ranges from 97.7 mm at Summerside to 129.3 mm at New Glasgow.



The highest precipitation total was reported at the CoCoRaHS Station at Bayfield in Eastern Kings County with a total of 170.2 mm for the month. The maximum daily precipitation reported during the month was 75.9 mm on November 28<sup>th</sup> at the CoCoRaHS station at Two Rivers Farm in Flat River. The highest daily snowfall event of the month was on November 21<sup>st</sup> when a total of 7.6 cm of snowfall was measured at the CoCoRaHS station at Winsloe South. The most snowfall for the month was 27.4 cm of snow which fell at Winsloe South.

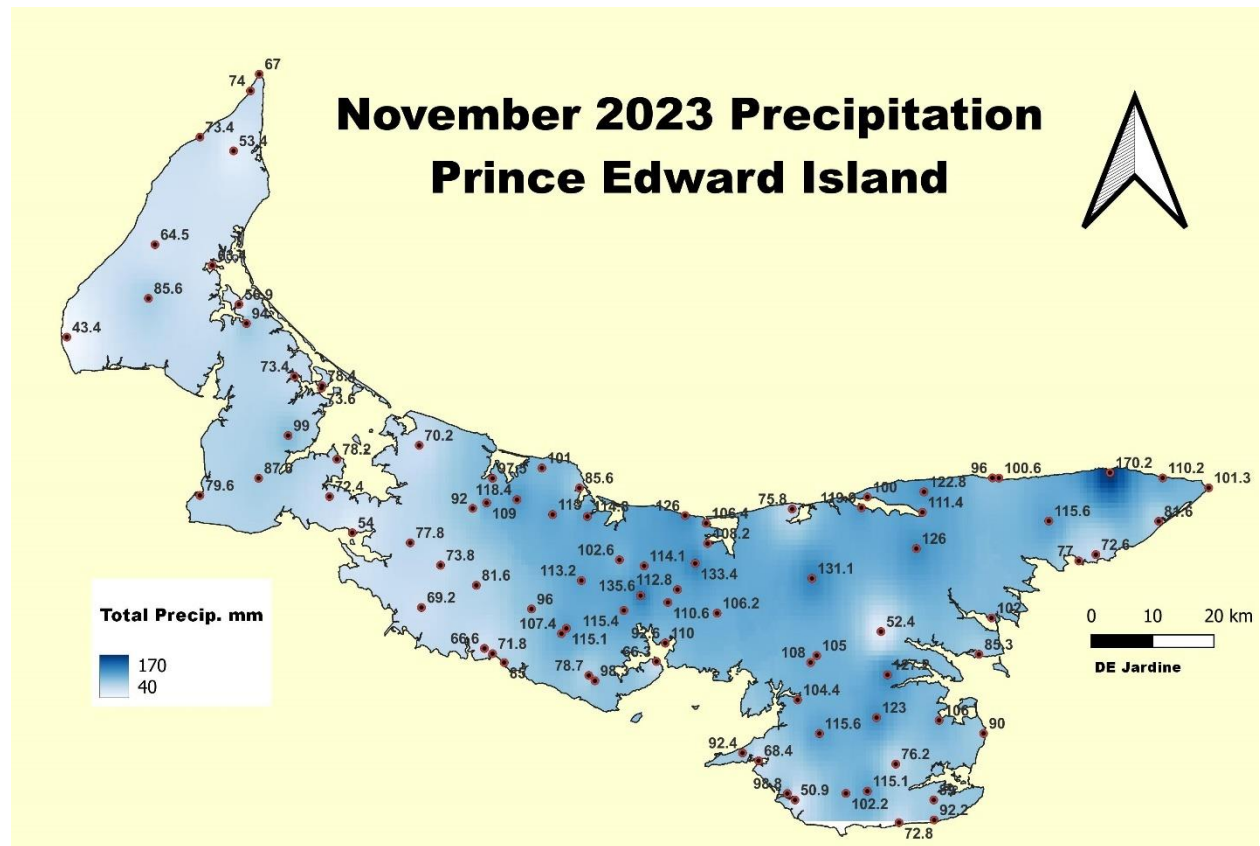


Figure 4: November Precipitation, PEI Stations

### Volunteer Observer Precipitation Data

Precipitation data from 21 CoCoRaHS (stands for “Community Collaborative Rain, Hail and Snow Network”) volunteer observers plus one other private volunteer observer using manual rain gauges is compiled in table 2 and is included in the data presented in Figure 4.

The most precipitation recorded at a CoCoRaHS station was at Bayfield near North Lake in eastern Kings County as noted in the previous section of this report.



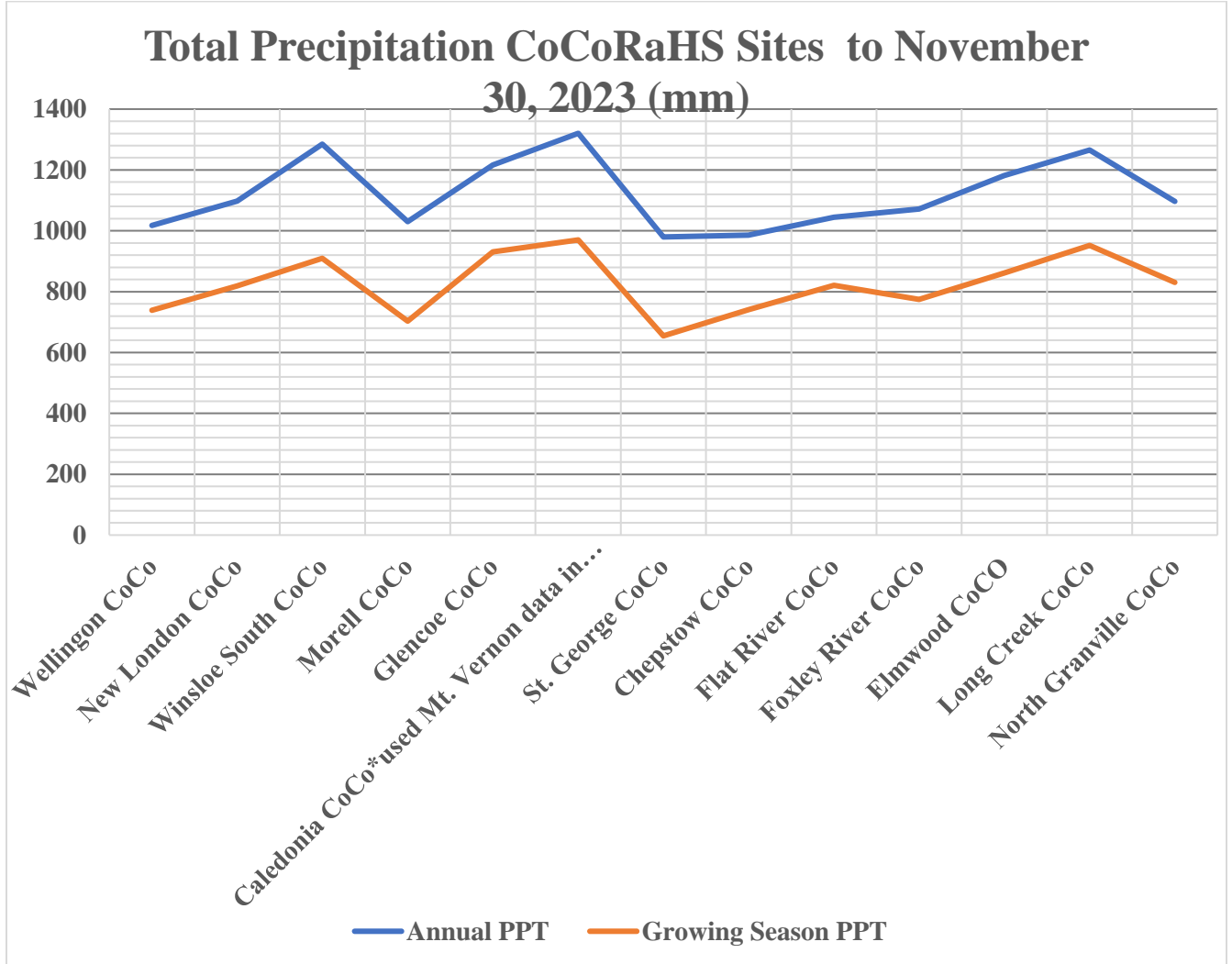
**Table 2: CoCoRaHS Volunteer Observed Precipitation Amounts for November 2023**

CoCoRaHS Station	Total Precipitation (mm)	Snow (cm)
87.6CAN-PE-3 Wellington	87.6	7.4
CAN-PE-7 Morell	119.9	18.5
CAN-PE-10 New London	97.5	2.8
CAN-PE-19 Winsloe South	135.6	27.4
CAN-PE-20 Bonshaw	115.1	4.8
CAN-PE-25 Caledonia	102.2*	
CAN-PE-26 – Grand Tracadie	108.2	7.1
CAN-PE-38 - Chepstow	72.6	
CAN-PE-42 Vernon Bridge	115.8	
CAN-PE-43 Glencoe	108	12.2
CAN-PE-46 Iris	115.1	
CAN-PE-47 Long Creek	98.3	3.6
CAN-PE-50 Bedford Corner	133.4	9.1
CAN-PE-54 Foxley River	94	0.5
CAN-PE-66 Wigmore Road	109	
CAN-PE-70 – Flat River	98.9	5.1
CAN-PE-74-St. Georges	85.3	3.0
CAN-PE-75 – Fox Island	74.2	
CAN-PE-77-Norway	155.4	
CAN-PE-78- Bayfield	170.2	3.3
Can-PE-79- Crapaud	84.8	3.0
Private Station - Montague		

\* : data from a station at Mount Vernon was used as surrogate data for the Caledonia station.

Total precipitation data for 13 CoCoRaHS sites in the province were collated for the year to the end of November and the growing season precipitation from April 1<sup>st</sup> to November 30<sup>th</sup> is plotted on Figure 5. There are 4 stations which have accumulated over 1200 mm of precipitation to the end of November. The Caledonia station didn't report in November so data from a nearby UPEI station at Mount Vernon was used as surrogate. The site at St. George continues to report the lowest precipitation to date from the CoCoRaHS locations in 2023.





**Figure 5: Total Precipitation CoCoRaHS Locations in 2023 up to November 30<sup>th</sup>.**

### Wind Data

The peak wind gust speeds at 85 stations during November are shown on Figure 6. The peak wind speeds were higher than the previous months at most locations and the peak wind gust speed of 87 km/h was reported at the Environment Canada station at East Point on November 27<sup>th</sup>.

The highest average wind speed of 23.0 km/h was reported from the UPEI station at Abram's Village Wharf. There were 3 other stations reporting an average wind speed over 20.0 km/h during November. These were all in Prince County:

- West Cape at 21.3 km/h
- Norway at 20.8 km/h
- Skinners Pond at 20.3 km/h

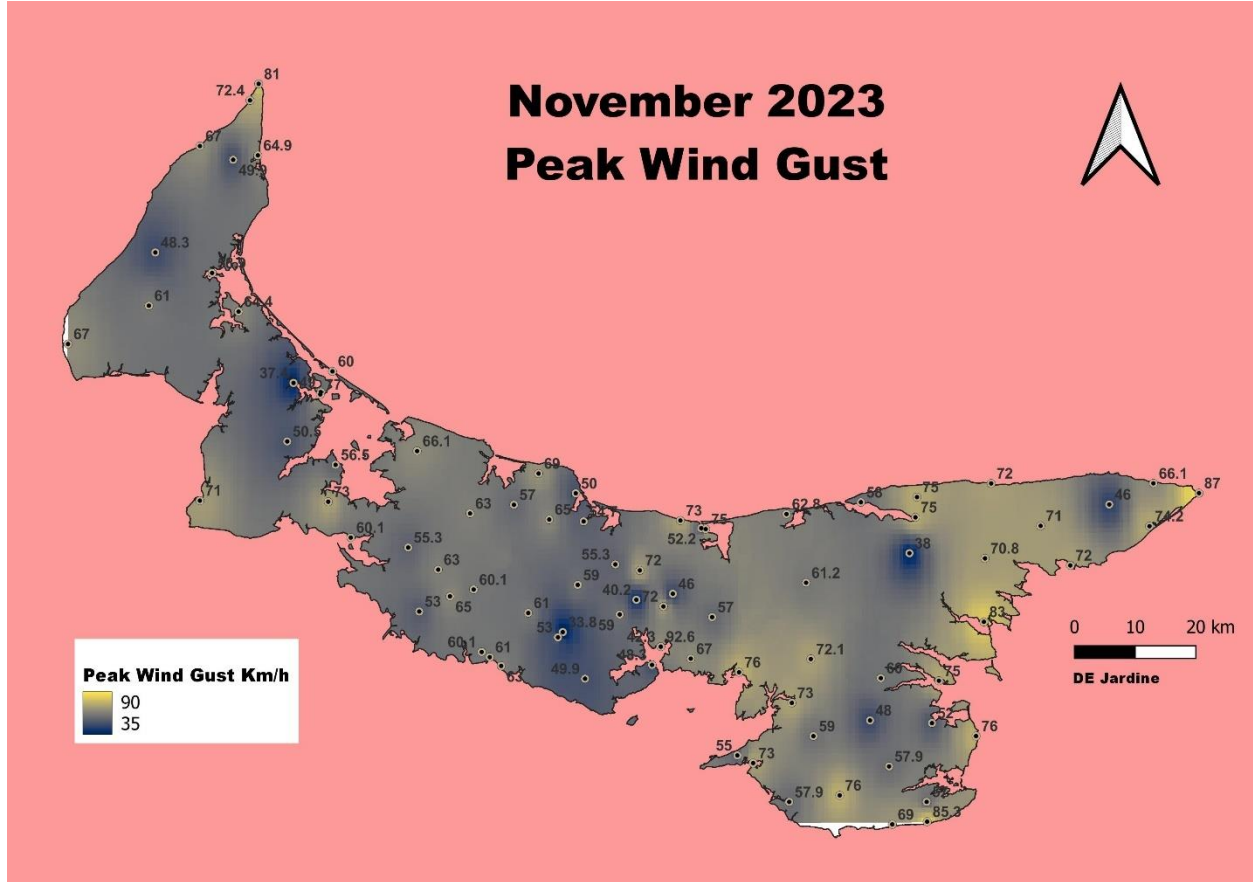


Figure 6: Peak Wind Gust, November 2023

### Seawater and Tidal Data

A summary of tide gauge data for all active reporting locations is provided in table 3. The water level and temperature sensors at the wharf locations are located inside a stilling well attached to the side of the wharf and the sensors placed so there is at least 0.5 m of water at low tide.

Table 3: Tidal gauge sensor data for October 2023 (water levels CGVD2013).

Location	Water $T_{\text{mean}}$ (°C)	Avg. Monthly Water Level (m)	Peak Water Level (m)	Min. Water Level (m)	Tidal Range (m)
Abram's Village Wharf	3.8	-0.26	0.48	-1.25	1.73
Charlottetown Yacht Club	6.7	-0.08	0.99	-1.52	2.51
Georgetown Wharf	5.2*	-0.53	0.21	-1.62	1.83
Graham's Pond Wharf	7.7	0.40	1.31	-0.70	2.01

<b>Lennox Island</b>	*	*	*	*	-
<b>MacAulay's Wharf</b>	6.0	-1.04	0.85	-1.53	2.38
<b>Naufrage Harbour</b>	3.4	0.26	1.15	-0.42	1.57
<b>North Lake Harbour</b>	6.4	0.46	1.24	-0.24	1.48
<b>North Rustico Harbour</b>	6.5	0.14	0.99	-0.37	1.36
<b>Skinner's Pond</b>	5.1	-0.06	0.91	-0.63	1.54
<b>Souris Harbour</b>	8.4	0.50	1.37	-0.55	1.92
<b>Summerside</b>	4.5	0.26	1.24	-1.07	2.31
<b>Tignish Harbour</b>	6.0	0.14	0.88	-0.51	1.39
<b>Tracadie Harbour</b>	4.8	0.47	1.59	-0.77	2.36**
<b>Victoria Harbour</b>	6.0	-0.11	0.91	-1.70	2.61

\*- No records, Lennox Island Wharf tide gauge not reporting.

\*\*- Water level reference adjusted during the month,

The average seawater temperature for the month ranged from a high of 8.4 °C at Souris Harbour to a low of 3.4°C at Naufrage in Kings County. The tidal range varied from 1.36 m at North Rustico Harbour to 2.62 m at Victoria Wharf. There were no major storm surges during the month.

The monthly seawater temperature for Souris Harbour at the Harbour Authority building is plotted on Figure 7 and shows the water temperature dropped steadily during the month with the occasional spike during the month. The warmer te

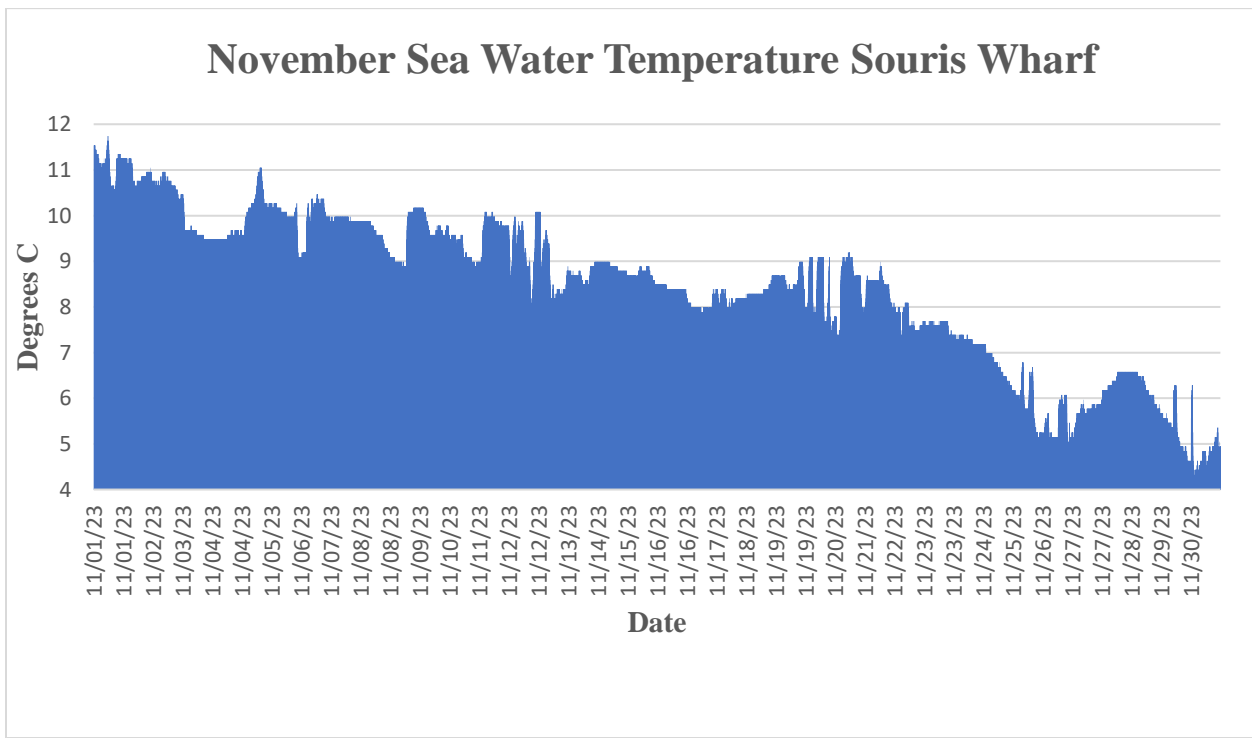
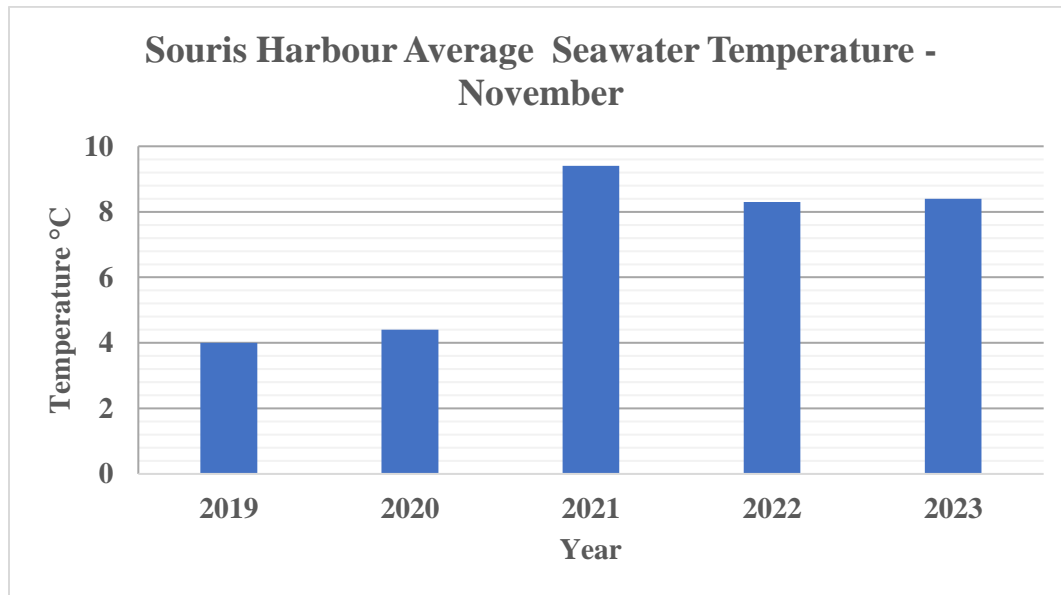


Figure 7: Sea Water Temperature at Souris, November 2023

The seawater temperature at Souris has been measured at the PEI EMO Climate and Tidal Station from April of 2019 to the present year and the average monthly temperature for November at the Souris Harbour Authority Wharf from 2019 to 2023 is plotted on Figure 8



**Figure 8: Souris Seawater November Average Monthly Temperature 2019 to 2023**

November water temperatures in 2019 and 2020 averaged near 4°C but were significantly higher the following 3 years reaching a high of 9.4° C in 2021. Art MacDonald of the Souris Harbour Authority believes that the warmer temperatures in November are helping to extend the season for some species such as tuna and groundfish in the area.



**Figure 9: Halibut Being Landed at Tracadie Wharf July 14, 2023**



## Summary

November had below to slightly above temperatures across the province with below normal precipitation in the western part of the province to above normal precipitation in some eastern areas. Winds were higher than previous months but no severe storms. Hurricane season ended on November 30<sup>th</sup> with no major wind events causing serious damage during the season.

Sea water levels were in the normal range and sea water temperatures remained well above freezing and this appears to have helped keep inland air temperatures higher than normal especially in the eastern part of the province.

Farmers fought wet conditions and some snow as they tried to harvest the remaining few thousand acres of potatoes during the month. It is estimated that nearly 98% of the crop was able to put into storage or onto the fresh market.

Some farmers such as Alan Miller of Kingston harvested soybeans in November for the first time in his farming career. By the end of November there was still about 20% of the corn crop still in the fields across the province.

Drying of grains such as canola, soybeans, wheat, barley, and corn was a challenge according to Neil Campbell of the PEI Grain Elevator Corporation. Dryers were working hard to remove moisture from storage bins, and it is projected drying would continue until Christmas at the 3 PEI Grain Elevators. According to Mr. Campbell these conditions were caused by a mixture of hot, cold, wet weather resulting in the quality of grains being quite variable. A lack of sunshine during the months of August and September would also been a factor.

The mean monthly temperatures for 12 locations scattered across the province for the year up to the end of November are shown in Figure 10. Normal temperatures in November are usually similar to those in April but the graphic shows that November temperatures were cooler than April by about 1 degree Celsius.

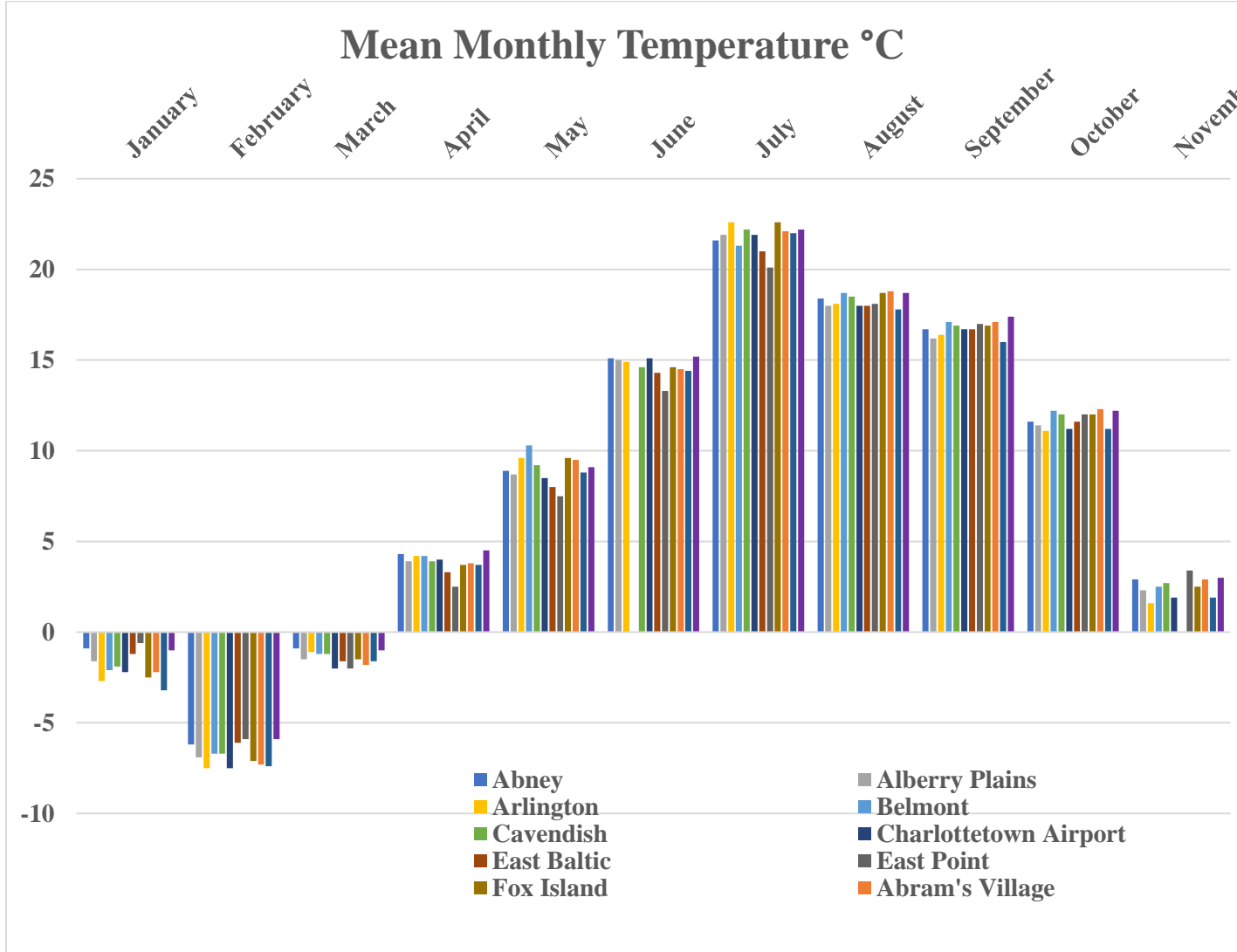


Figure 10: Mean Monthly Temperature at Select Locations January to November 2023

**Sources:**

Environment and Climate Change Canada Climate Data, 2023; UPEI Climate Data, 2023; MCPEI Climate Data, 2023; PEIEMO Climate Data, 2023; CoCoRaHS data, Cocorahs.org, 2023; WillScott Farm Diaries, 1933; Guardian, December 30, 1933; CBC News, December 4, 2023; Art MacDonald, December 8, 2023.

December 10 , 2023

Prepared by D. E. Jardine