Summerland Research & Development Centre
Wine Grape Research

Climate Characteristics for *Vitis vinifera* Production Regions in Canada: 1965-2019

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The success of the grape and wine industries in British Columbia and Ontario is largely due to the production of premium quality wines made from noble *Vitis vinifera* cultivars such as Chardonnay, Merlot and Pinot noir. This has spurred efforts to expand the Canadian wine industry into new regions, but climate is the main constraint on acreage expansion. Sustainable production of *V. vinifera* requires sufficient growing-season heat, a long frost free period, and winter temperatures that rarely dip to below bud-lethal (< -22 °C) or vine-lethal (< -25 °C) levels. Precipitation also affects the performance of *V. vinifera* as it contributes to soil moisture, air humidity, and disease pressure.

Historical weather data can be used to assess climatic suitability for grape growing. Using data from Environment Canada (https://weather.gc.ca/), we produced summaries of the historical climate characteristics for a selection of Canadian *V. vinifera* growing locations: Osoyoos, Summerland, Abbotsford and Duncan (BC), Vineland (ON), and Kentville (NS). The summary statistics and indices derived from the data include growing degree days (GDD, base 10 °C), consecutive frost free days (FFD), annual minimum temperature, and daily record low temperature for periods spanning several decades (see charts).

GDD and consecutive FFD were derived as:

- Seasonal (Apr 1 to Oct 31) GDD = $\Sigma_{daily}((T_{max} + T_{min})/2 - 10)$, including only values > 0.
- Consecutive FFD = number of consecutive days having $T_{min} > -1^{\circ}C$.

The record of annual minimum temperatures shows the frequency of lethally cold winters at each location. Daily record low temperatures, from October 1 to April 30, indicate the potential for low-temperature exposure and damage risk during this damage-prone period. Utility of the data for risk assessment is dependent on the length of the data record and whether climate change trends have been detected. In addition, as a result of cold air drainage and pooling, temperatures can vary within a vineyard or a region by as much as +/- 5˚C. This topography-related variation in climate emphasizes the importance of site selection for the long term success of a vineyard.

For precipitation, monthly averages reveal the seasonal variations within and across regions. In addition to the record of total annual precipitation for each region, average totals for the growing season (Apr 1 to Oct 31) and harvest period (Sep 1 to Oct 31) are provided.

TABLES AND CHARTS

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Growing Degree Days, Consecutive Frost Free Days, and Minimum Temperatures, 1965-2019

Growing Degree Days (˚C)

	Osoyoos BC	Summerland BC	Abbotsford BC	Duncan BC	Vineland ON	Kentville NS
Average	1474	1251	973	897	1413	1034
Max	1768	1541	1271	1200	1773	1338
Min	1235	958	734	659	1113	801

Consecutive Frost Free Days

	Osoyoos BC	Summerland BC	Abbotsford BC	Duncan BC	Vineland ON	Kentville NS
Average	186	197	226	193	195	164
Max	224	243	324	253	231	204
Min	142	160	150	151	160	118

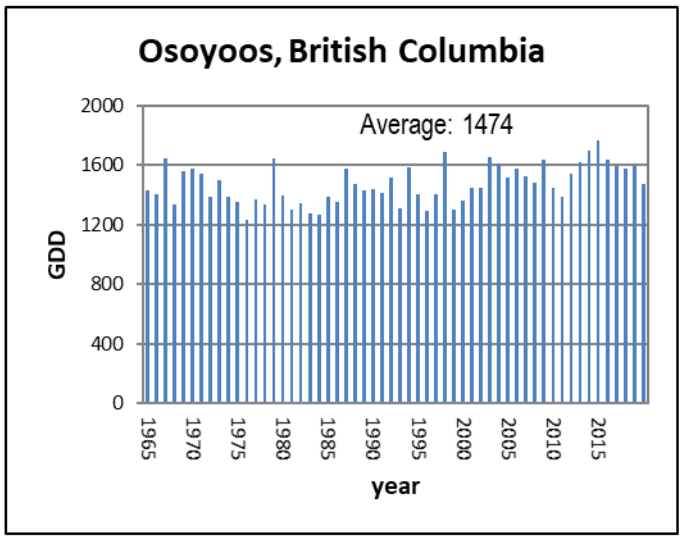
Minimum Temperature Frequencies

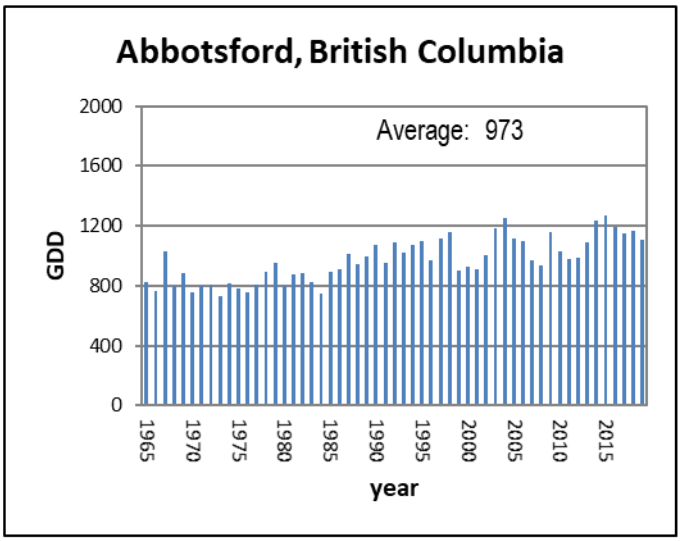
Number of days below -	Osoyoos BC	Summerland BC	Abbotsford BC	Duncan BC	Vineland ON	Kentville NS
-21˚C	24	28	0	2	24	115
-23˚C	9	8	0	0	10	27
-25˚C	3	5	0	0	1	7

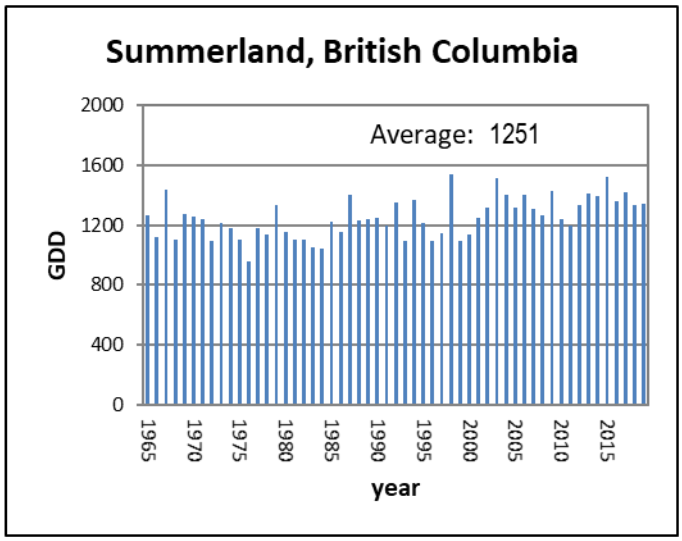
Record Minimum Temperature (˚C)

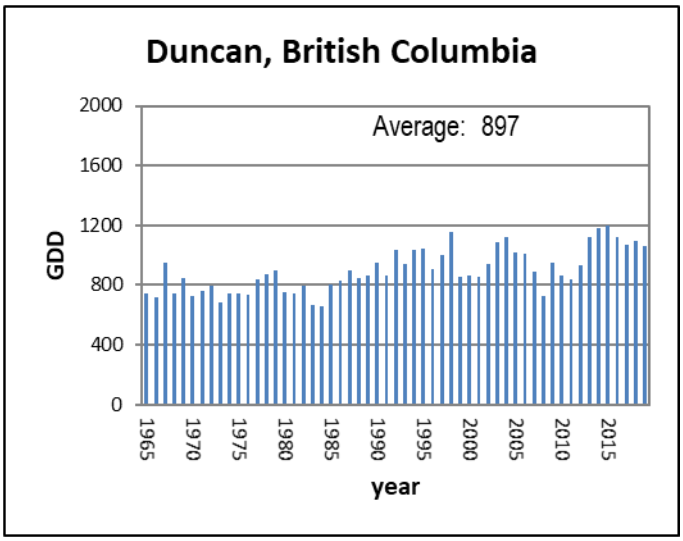
Month	Osoyoos BC	Summerland BC	Abbotsford BC	Duncan BC	Vineland ON	Kentville NS
Oct	-10.5	-14.0	-7.5	-6.1	-6.7	-7.2
Nov	-22.5	-23.0	-16.7	-17.0	-11.1	-13.0
Dec	-26.5	-29.4	-20.0	-21.7	-26.0	-23.0
Jan	-26.1	-24.4	-20.0	-21.1	-24.5	-28.0
Feb	-24.4	-21.0	-15.3	-15.0	-24.8	-30.0
Mar	-14.0	-16.7	-11.7	-10.0	-24.4	-22.0
Apr	-7.8	-6.3	-4.4	-5.2	-9.0	-13.2

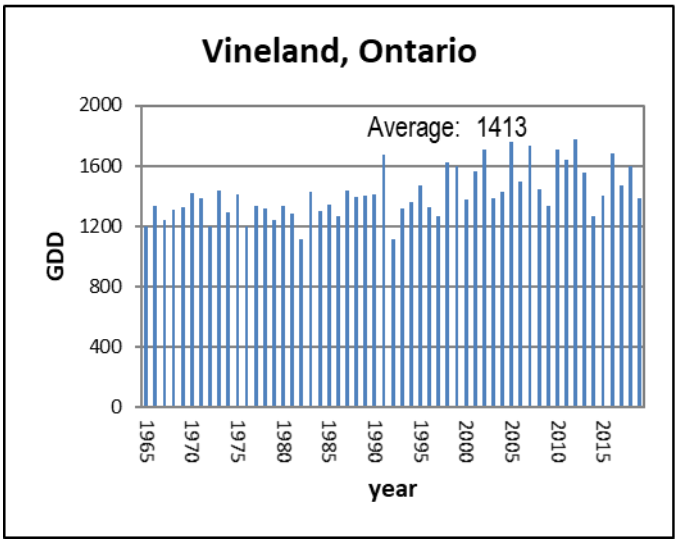
Annual Growing Degree Days, 1965-2019

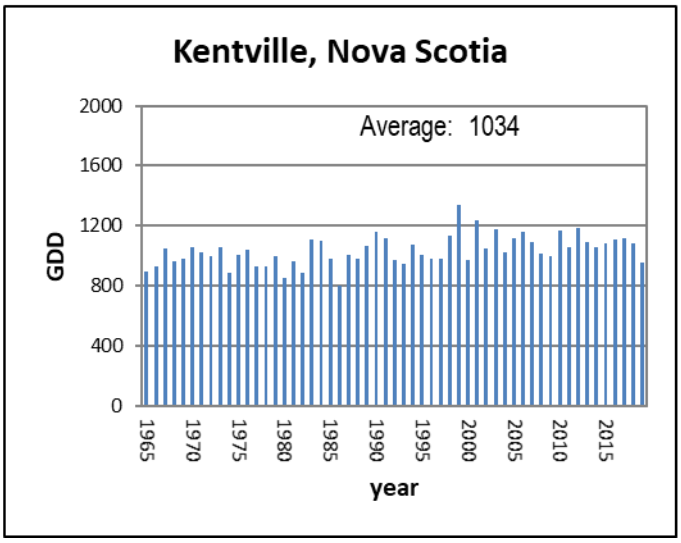




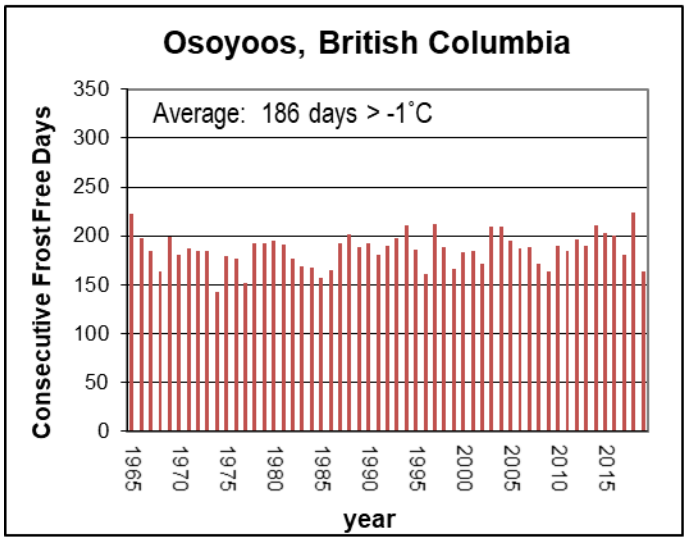


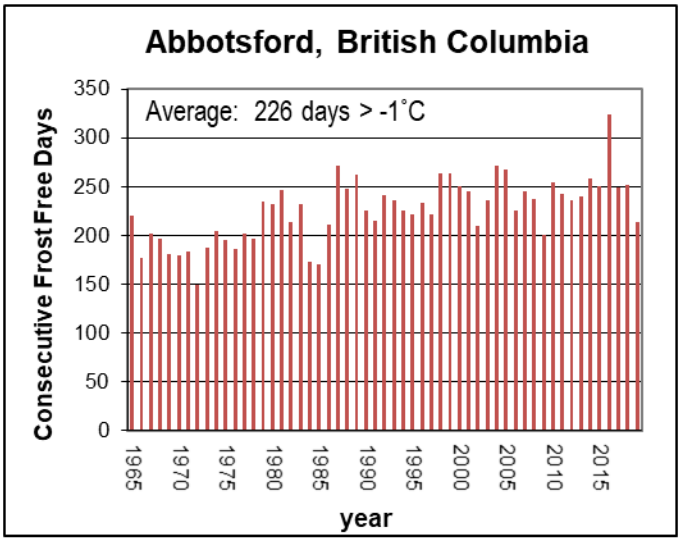


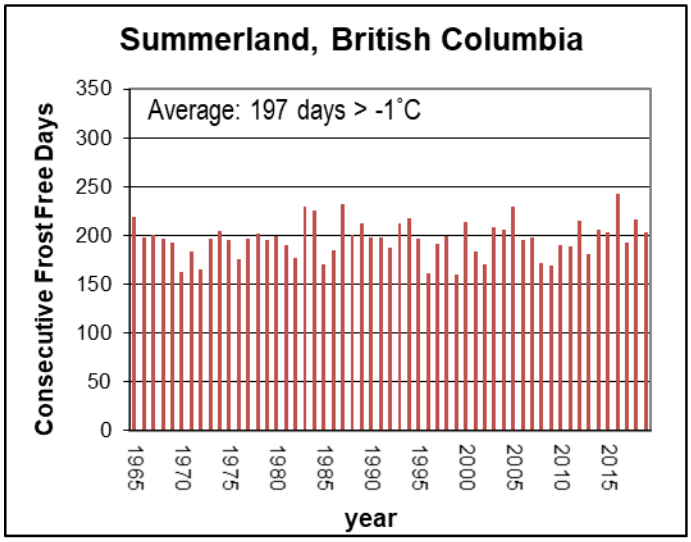


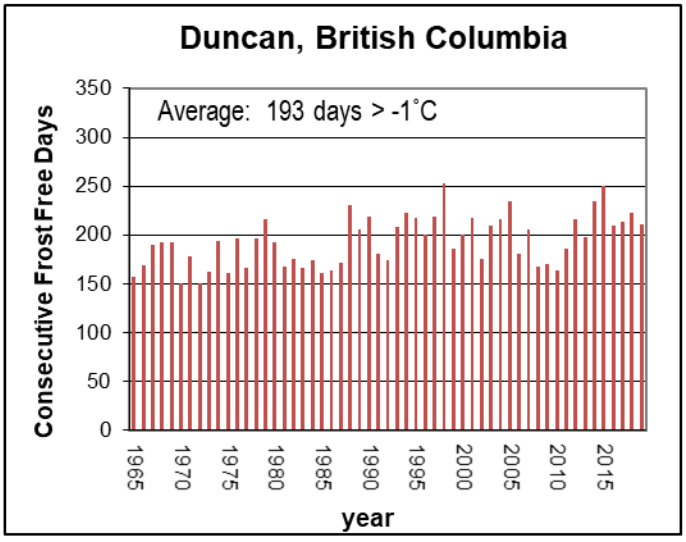


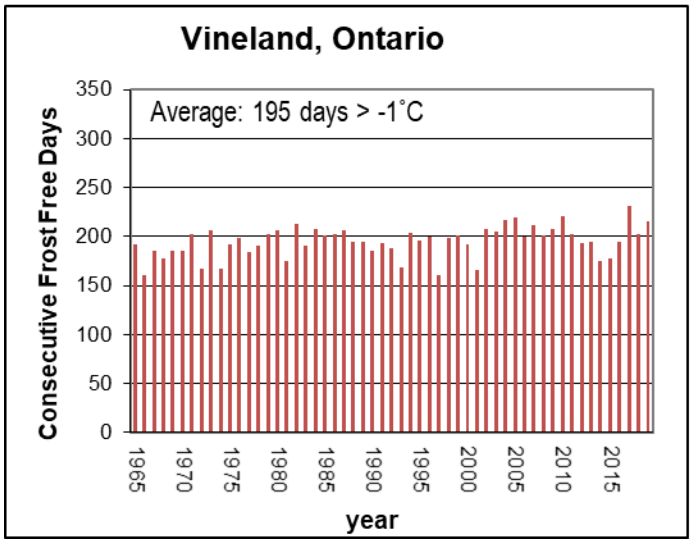
Annual Consecutive Frost Free Days, 1965-2019

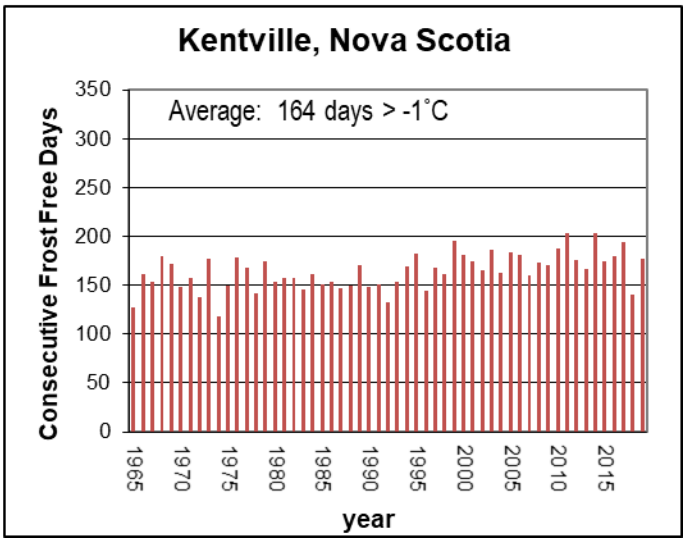




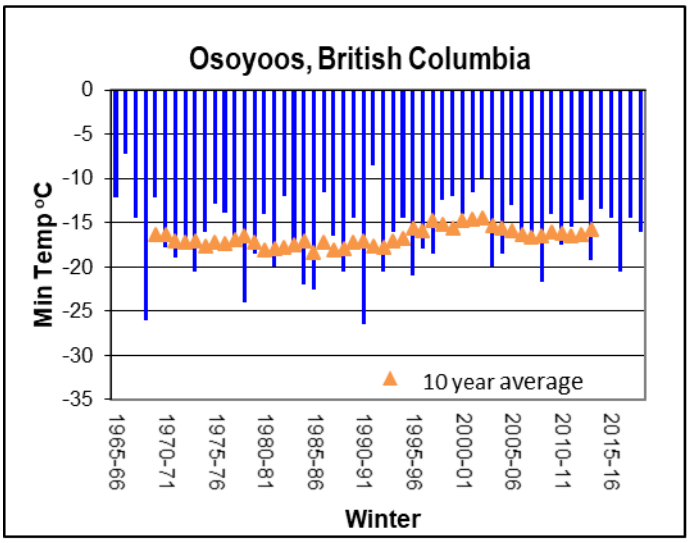


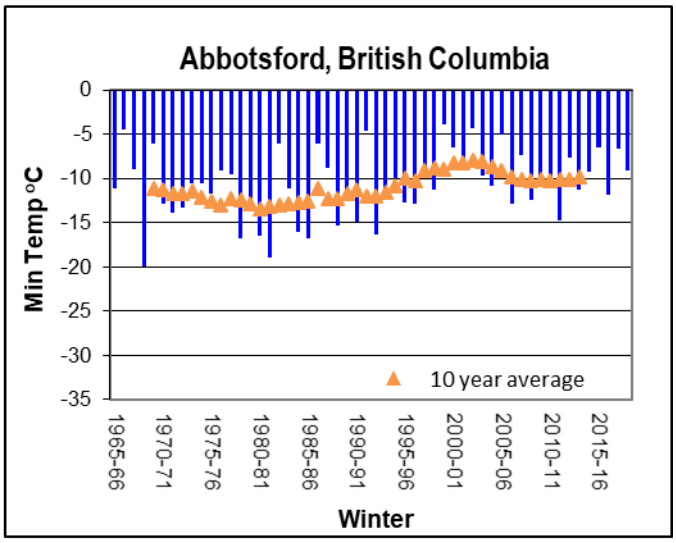


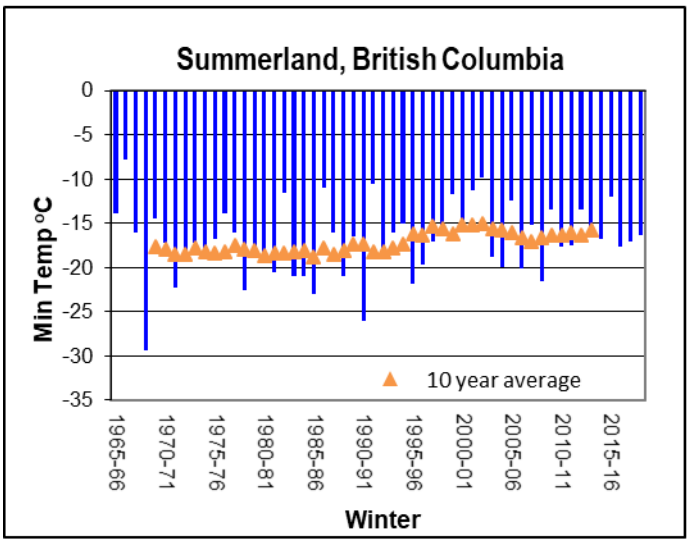


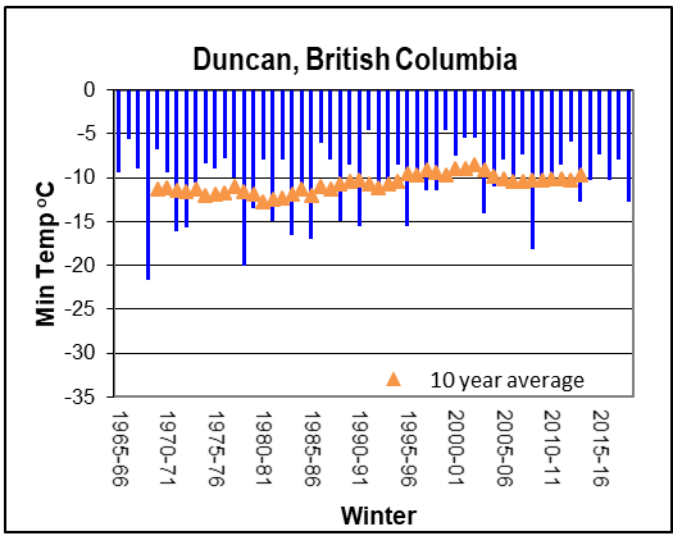


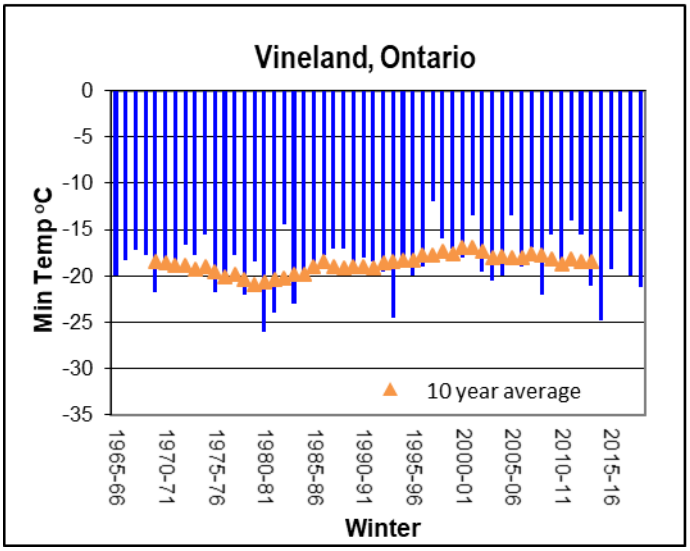
Annual Minimum Temperatures, 1965 - 2019

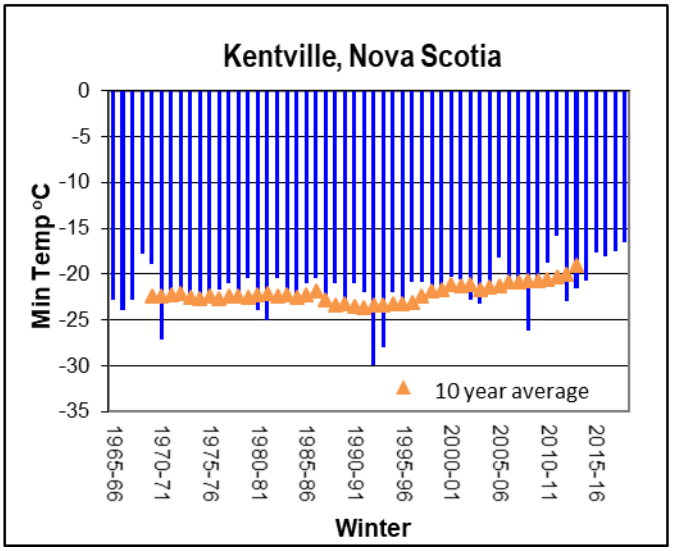




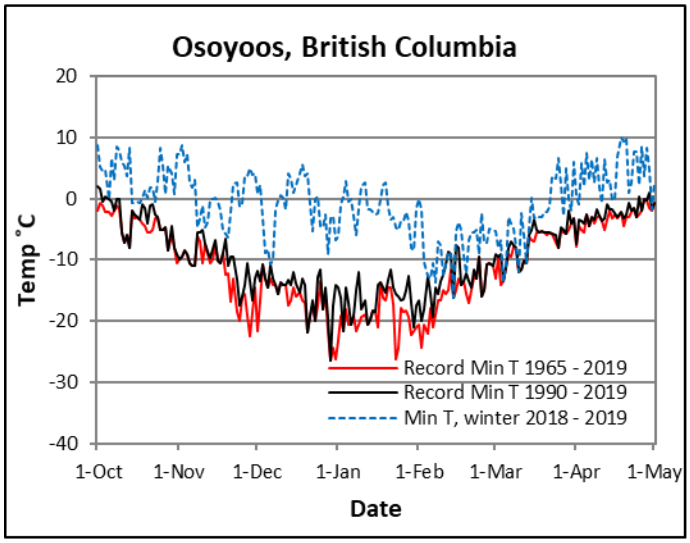


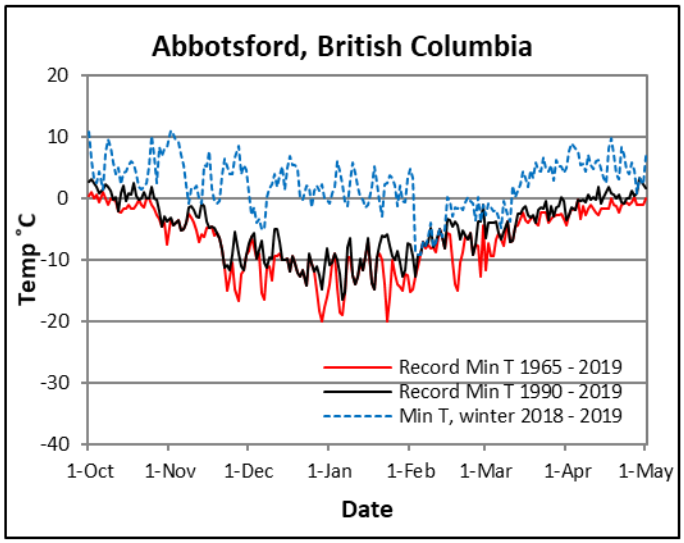


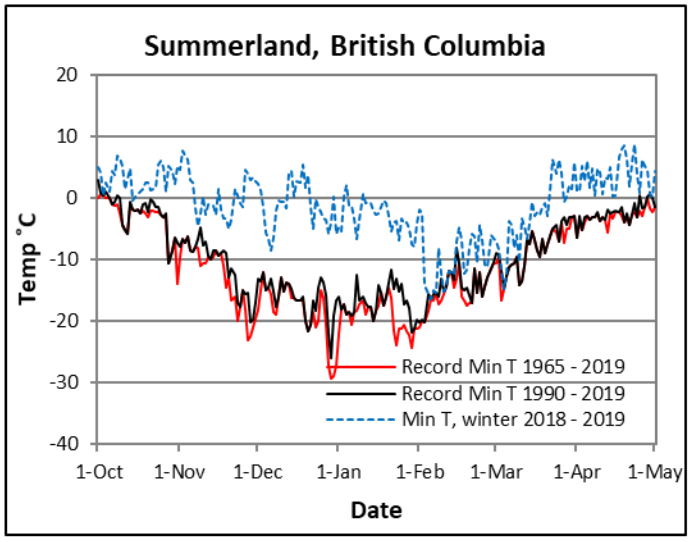


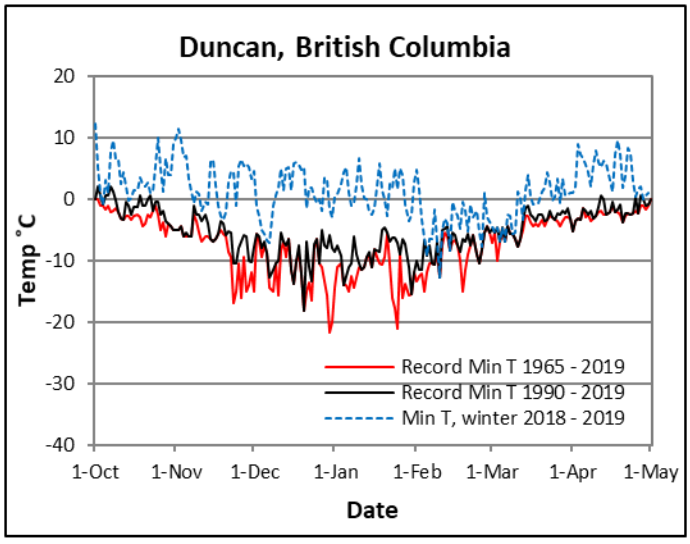


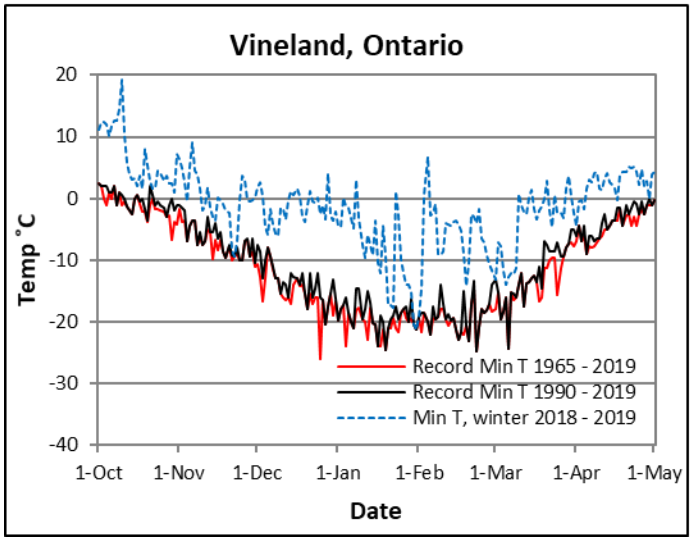
Record Minimum Temperatures, 1965 - 2019

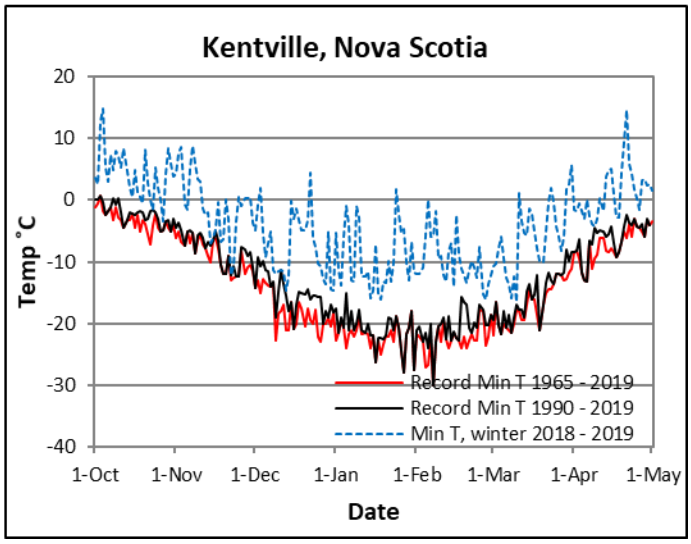




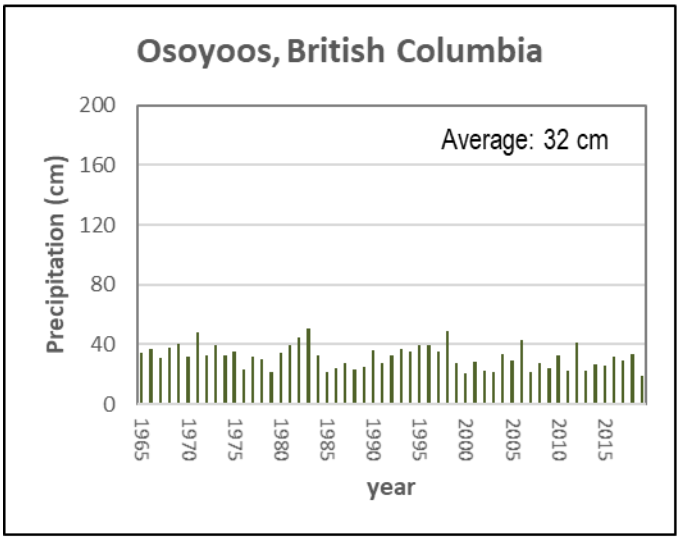


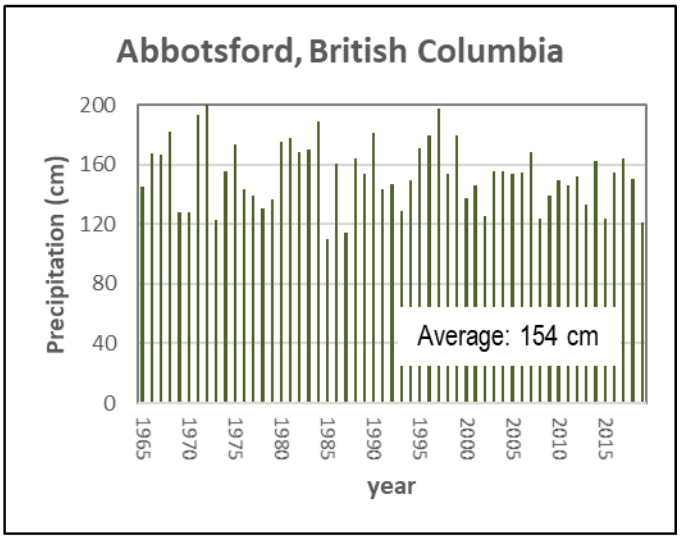


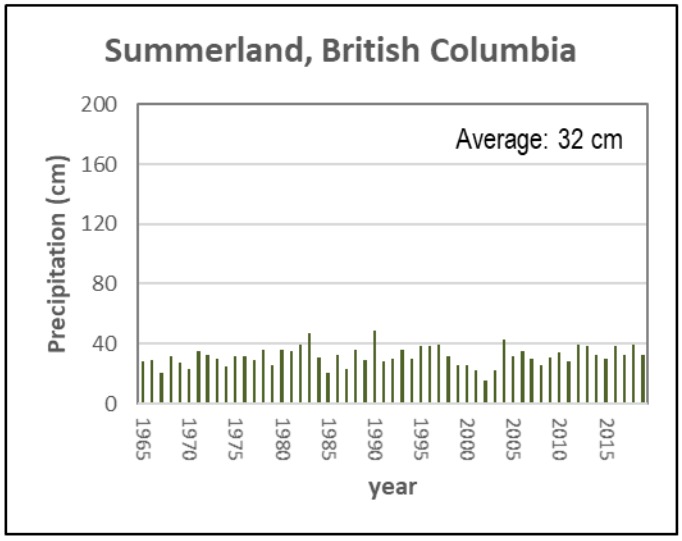


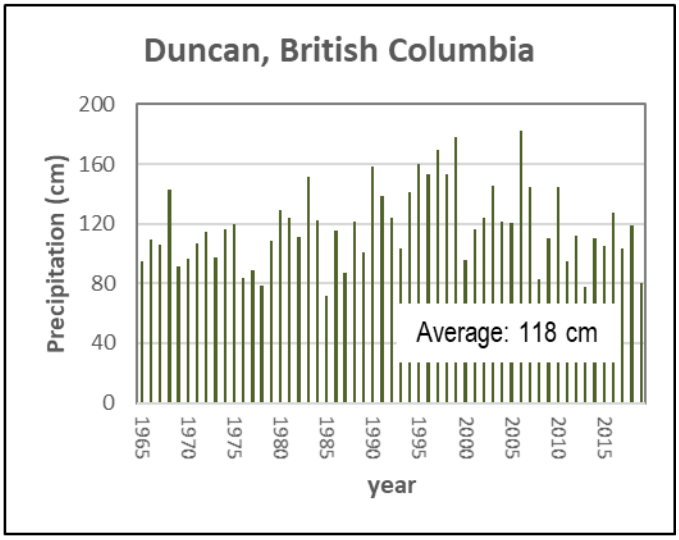


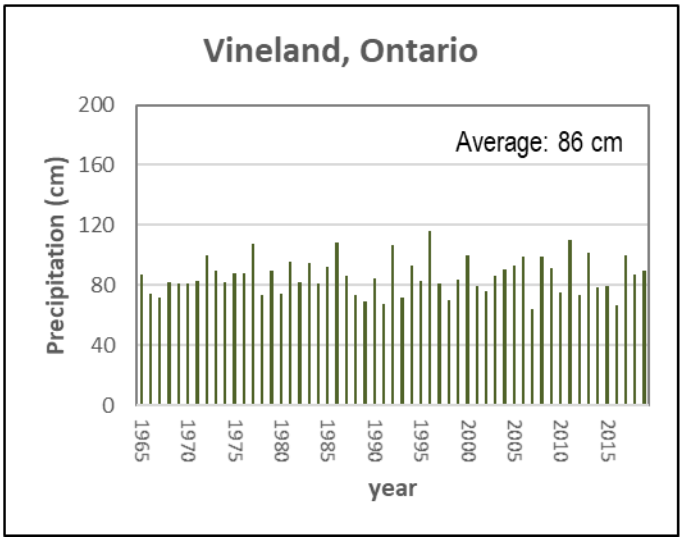
Annual Precipitation, 1965-2019

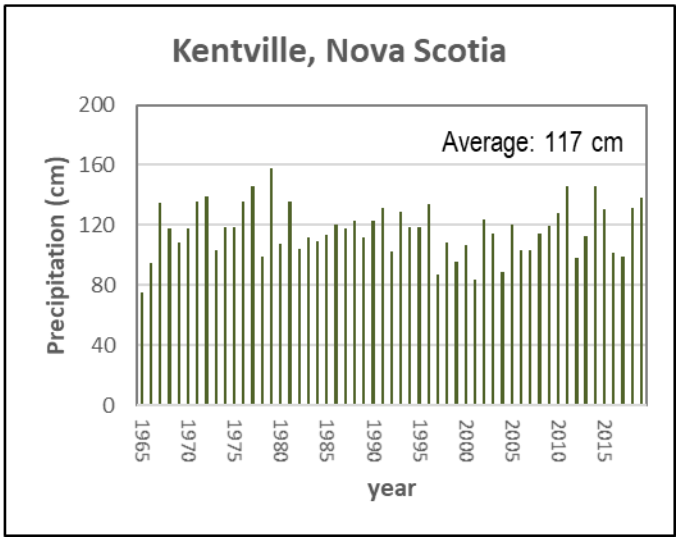












Seasonal Precipitation, 1965-2019

Total Precipitation (cm)

	Osoyoos BC	Summerland BC	Abbotsford BC	Duncan BC	Vineland ON	Kentville NS
Annual Jan 1 - Dec 31	31.6	31.6	153.5	118.0	86.1	116.6
Growing season Apr 1 - Oct 31	16.7	19.1	60.3	34.3	53.4	62.0
Harvest Sep 1 - Oct 31	3.6	4.4	23.9	15.6	15.5	20.3

Monthly Precipitation, 1965-2019