SUMMERLAND BENCH GEOGRAPHICAL INDICATION

March 2020

Technical Documentation

Documentation in support of a formal application to the BC Wine Authority for the creation of a new Geographical Indication named Summerland Bench a sub-division of the Okanagan Valley Geographical Indication.

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Cover photo: The undulating glaciofluvial landscape of the mid-elevation of Summerland Bench GI. Photo taken from Thornhaven Winery looking south toward Mount Nkwala.

Summerland Bench Geographical Indication

TECHNICAL DOCUMENTATION

EXECUTIVE SUMMARY

The central concept of this GI is to encompass the landscape composed of terraces and undulations of primarily glaciofluvial sediments that surround Giant's Head Mountain. The vineyards are located at mid-elevation and experience a range of climatic conditions that are determined by elevation, aspect and topography. These conditions generate an array of sites suitable for a wide range of both red and particularly white *Vitis vinifera* cultivars. Tree fruits, predominantly apples and cherries, dominate the cultivated landscape. Vineyards cover a relatively small area, about 60 ha with most vineyards located east and south of Giant's Head Mountain.

Most of the soils used for wine grape production in the GI are coarse textured, either formed in sandy sediments or are stratified with a loamy surface texture underlain by gravel at some depth. These coarse textured, well drained soils enable vigour control through deficit irrigation, which balances fruit yields relative to vigour and optimizes the exposure of developing clusters to sunlight.

At Summerland the frost-free period usually begins in the middle of April and runs until late October and produces a growing season length of over 190 days, long enough for most vinifera grape varieties. The occurrence of frost is very site-specific. Interannual variation is significant but with a trend toward slightly longer growing seasons in recent years.

Within the context of the Okanagan Valley, the 21year average growing-degree-day total average of 1334 represents intermediate growing season heat, cooler than the south Okanagan (where degree-day totals typically exceed 1500) but warmer than areas in Kelowna and to the north.

Noble white wine cultivars (primarily Pinot Gris and Gewürztraminer) suited to the moderately cool climate of the GI predominate plantings, covering more than two thirds of the area in production. These cultivars produce aromatic wines with abundant body and acidity. The climate is also suited to production of several red wine cultivars, especially Pinot noir which is planted in about two thirds of the red wine grape area and produces elegant table wines. Merlot and Syrah are also suited to the GI's climate and produce fine fruit forward table wines, especially in warmer vintage years.

BACKGROUND

This document follows the conceptual framework presented in April 2019 to the Bottleneck Drive Association for the creation of several Geographic Indications within the boundaries of the District of Summerland, British Columbia. The framework concept was developed following discussions with Rick Thrussell of Sage Hills Winery who provided vision for the initial work and acted as liaison with the Association and local grape growers.

This is one of a series of technical reports that outline the extent and character of proposed Summerland Geographical Indications (GIs) which are subdivisions of the Okanagan Valley Geographic Indication (GI). This document describes the extent and rationale for a Summerland Bench GI. It follows the proposed framework with adjustments to the topographic positioning of the boundary based on detailed topographic and cadastral information.

This work was initiated in response to the release of a set of recommendations prepared by industry representative to the BC Wine Authority and the BC Ministry of Agriculture (Appellation Task Force 2015). The intent of this report is to provide the required technical documentation for the formal application to the BC Wine Authority for GI status.

GEOGRAPHIC EXTENT AND BOUNDARY

The Concept

The central concept of this GI is to encompass the landscape composed of terraces and undulations of primarily glaciofluvial sediments that surround Giant's Head Mountain between 420 and 600 m elevation (Figure 1). These sediments are predominantly gravelly with soil surface coverings of sandy or silty materials. The vineyards located in this GI experience a range of climatic conditions that are determined by elevation, aspect and topography. These conditions generate an array of sites suitable for a wide range of both red and particularly white *Vitis vinifera* cultivars.

Figure 1. Vineyards at Thornhaven Winery typify landscape conditions within the GI. Vineyard sites are situated up to 3km away from Okanagan Lake. Elevations are several hundred metres higher, and the landscape undulates.

Extent and Boundary

The geographic extent of the GI is shown as the shaded area in Figure 2. It is the largest of the Summerland area GIs at 1800 ha in area. However, much of this land area is either non-arable bedrock (Giant's Head Mountain, Mount Conkle and other rocky uplands) or urbanized land around the downtown core of town. About 500 ha of agricultural land lies in the southern portion of the GI at elevations from 430 to 600m. North of downtown Summerland lies another 300 ha of largely

level land at approximately 500 m elevation. Tree fruits, predominantly apples and cherries, dominate the cultivated landscape. Vineyards cover a relatively small area, about 60 ha with most vineyards located in the southern portion of the GI east and south of Giant's Head Mountain.

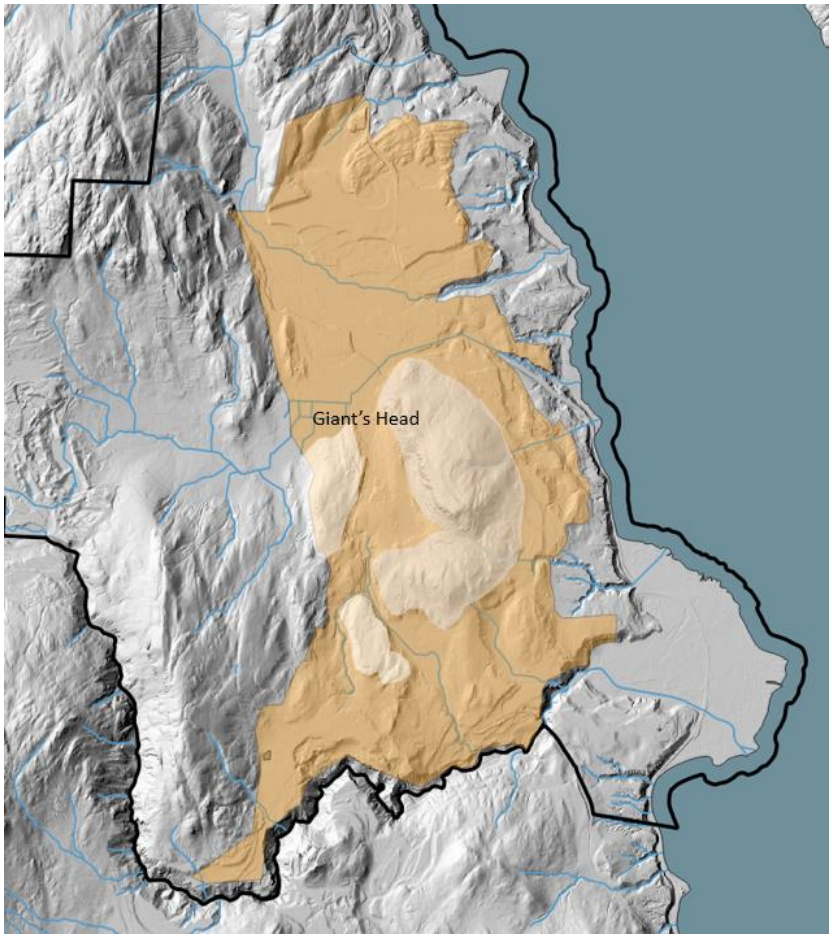

Figure 2. The municipal boundary of the District of Summerland (black line) and the extent of the Summerland Benches GI (dark yellow shading). Base map is a hi-resolution topographic map derived from LIDAR. The light yellow shading outlines areas of rock outcrops and non-arable land within the GI.

The southern extent of the GI is defined by the escarpment overlooking the Trout Creek canyon which is deeply incised into bedrock. The eastern boundary is coincident with the Summerland Lakeshore GI. This eastern boundary is placed along the break in soil type between the silty glaciolacustrine soils that define the extent of the Summerland Lakeshore GI and the strongly contrasting gravelly soils of this GI and is based on detailed soil mapping for the Summerland area (Wittneben 1986).

One of the guiding principles in boundary placement is to try and avoid crossing individual property boundaries, a situation that would leave some vineyards partially in and partially out of a given GI. So, while it is soil type that defines the eastern boundary, we use either nearby road right-of-way or prominent natural features to place the exact boundary. In this way the boundary is easily discernable on the ground. The western boundary is placed along the bedrock wall of the

Okanagan Valley except for a short distance of boundary that is shared with the Summerland Prairie Valley GI. The following figures show in more detail the boundary placement and rationale.

The southern boundary of the GI (Figure 3, segment 1 to 2), follows the edge of the Trout Creek canyon westward to the Summerland golf course. At this point the boundary runs northward following the bedrock outcrop along the base of the main Okanagan Valley wall (segment 2 to 3) until it intersects with Fyffe Rd at point 3.

Figure 3. The southern portion of the GI hosts extensive agriculture on an undulating landscape of glaciofluvial gravels and sands. The GI boundary, shown in black, follows prominent natural breaks in this landscape. Segment numbers shown in white are described in the text. Gray areas highlight the non-arable extents of bedrock outcrops.

In segment 3 to 4 shown on Figure 4, the boundary is shared with that of the Summerland Prairie Valley GI where the boundary cuts across the Dale Meadows and angles across the valley floor to the intersection on Prairie Valley Rd and Cartwright Ave. From this point northward, the boundary is once again set as the base of the bedrock valley wall up to a point opposite Jones Flat Rd where the boundary is coincident with that of the Garnet Valley GI (point 5 on Figure 4). The boundary runs along the ridge which separates Garnet Valley from the main valley then across a grassy slope to its intersection with Hwy 97 at point 6.

Figure 4 shows the boundary placement in the northern portion of the GI. The numbers in white are locations referred to in the text. Gray shaded areas are non-arable bedrock outcrops within the area of the GI.

The eastern boundary of the GI along segment 6 to 7 is again coincident with the boundary for the Summerland Lakeshore GI. For the most part, the boundary in segment 6 to 7 is set back from the lake by 1 to 2 km except for the boundary immediately east of Giant's Head Mountain which is set along Hespeler, Walters and Front Bench Roads which run near to the top of the escarpment overlooking Hwy 97 and Okanagan lake.

SURFICIAL GEOLOGY AND LANDFORMS

The Summerland Bench GI surficial geology is dominated by gravelly glaciofluvial sediments. These come in various forms: level outwash terraces, pitted glaciofluvial plains, undulating ice-contact materials. In localized areas, the glaciofluvial sediments are sandy and without gravels. Often, these sediments are stratified, meaning that the sand and gravel contents vary by depth. Understanding the origin and nature of these materials is important as they form the parent materials upon which the soils of the GI are formed. A description of these as they occur in the GI is given below.

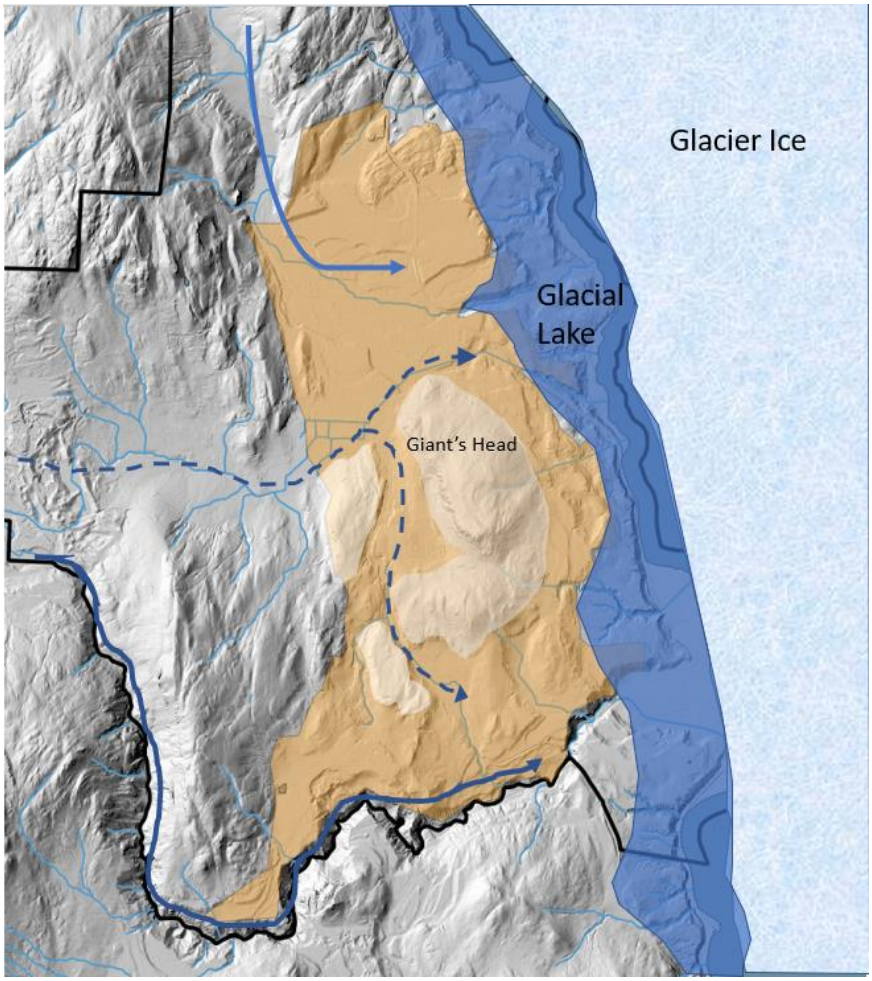

Figure 5. Conceptual illustration of the formation of meltwater flows (blue arrows) and marginal glacial lake formation during late de-glaciation in the Summerland area. The extent of the GI is shown in orange shading. Solid flow lines represent late glacial flows into the marginal glacial lake. The dashed lines represent earlier possible sub-glacial meltwater flows. Together, these flows generated the gravelly soils and varied landforms of the Summerland Bench GI. (adapted from Nasmith 1962 and Lesemann and Brennand 2009).

The general north to south lineation of rounded bedrock summits in the region such as Giant's Head and Mount Conkle, were formed by glacier ice moving over the landscape from the north and

northwest some 15,000 to 25,000 years ago. In addition, several rock drumlins exist within the GI, again formed by erosion beneath the main advancing ice sheet (Lesemann and Brennand 2009). It is also speculated when the ice sheet still covered the entire region, large volumes of subglacial meltwater impacted the Summerland landscape, craving out some of the canyons seen today and depositing gravels to create undulating terrain (Figure 5).

In contrast, the very level glaciofluvial plain underlain by gravels that comprise the Jones Flat landscape (Figure 6) in the northern portion of the GI likely formed during late stages of deglaciation from meltwater flows emanating from the Eneas Creek watershed via Garnet Valley. At this time, some 9,000 to 12,000 years ago, a glacial lake formed as a result of meltwater being trapped between a remnant ice tongue occupying the valley bottom and the adjacent valley sidewalls (Figure 5). This led to the deposition of gravelly sediments at elevations above the lake level while silts and clays in the meltwater were carried out into the glacial lake, forming thick deposits of lake bottom sediments that define the extent of the adjacent Summerland Lakefront GI (Figure 7). However, because the level of the lake changed over time, pockets of glaciolacustrine sediments can be found at higher elevations (in the Summerland industrial park area off Victoria Rd and the floor of Prairie Valley) where they have not been overlain by later glaciofluvial deposits. Ultimately, it was the complex array of glacial ice, meltwater flow, changing levels of meltwater impoundment and bedrock topography that produced the arrangement of sediments that form the parent materials for the soil types that exist today.

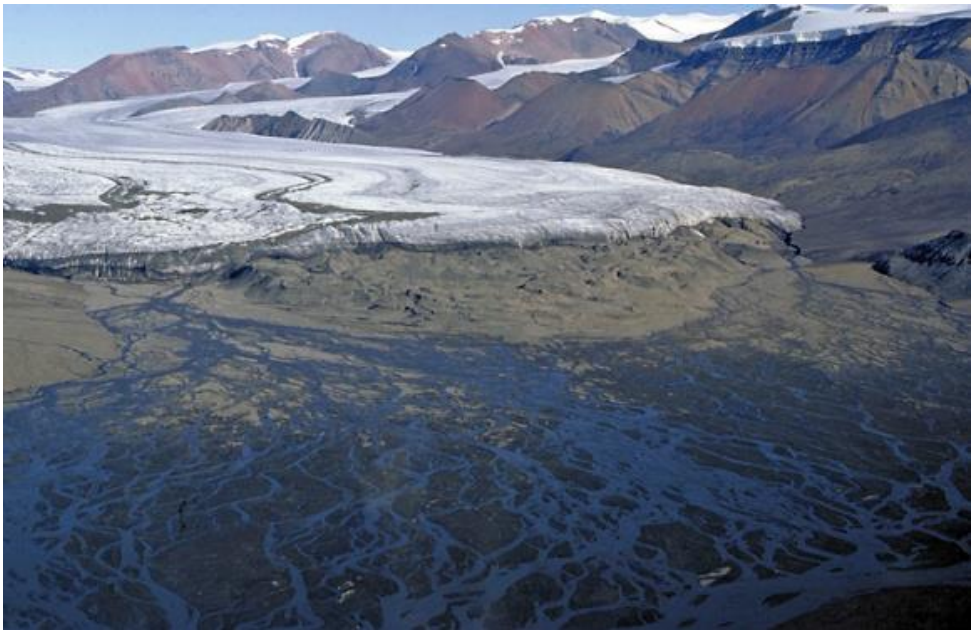

Figure 6. Meltwater emanating from the front of a retreating glacier. The meltwater carries a large sediment load derived from material incorporated into or under the glacier. Deposition occurs over a braided floodplain made up of many small interconnected fast-flowing streams. This material, termed ‘outwash’ forms a level, gravelly landform like that of the Jones Flat area of the northern portion of the GI.

Figure 7. Vineyards located on gullied glaciolacustrine deposits within the Summerland Lakefront GI (a) in contrast to the higher elevation undulating glaciofluvial deposits in the southern portion of the Summerland Bench GI (b). Both landscapes are utilized for wine grape production.

SOIL DEVELOPMENT AND SOIL PROPERTIES

In the report *Soils of the Okanagan and Similkameen Valleys,* Wittneben (1986) mapped a half dozen or so common soil series on the landscapes within the extent of the Summerland Bench GI. Soil series are soil mapping units defined by the nature of the soil profile and the type of surficial material within which the soil has formed. Unconsolidated surficial geologic deposits act as what are termed “soil parent materials”. Parent materials weather over time to form soil horizons, layers of soil with differing colours and properties such as amount of organic matter and water holding capacity. Almost all the soils utilized for viticulture on the Summerland Bench are formed from glaciofluvial sediments. The soils found at lower elevations have formed under a semi-arid climate under shrub and grassland vegetation. As a result, they all share the same properties of having an organic matter enriched topsoil layer (unless eroded), and all the soils belong to the Chernozem taxonomic Order according to the Canadian System of Soil Classification (Soil Classification Working Group 1998). Soils formed at slightly higher elevation under coniferous forest vegetation belong to the Brunisol taxonomic Order. These soils (Parkill and Trout Creek soil series, Table 1) lack the humus-rich topsoil and are characterized by having a reddish brown soil colour.

The most common soils used for wine grape production in the GI are presented in Table 1. The soil series are organized according to the nature of the surficial geological sediments that make up the parent materials for soil formation.

Around the base of Giant’s Head mountain are soils of various origin that are covered by wind-blown sediments. These are sandy in texture, likely derived from the sandy glaciofluvial sediments that dominate the landscape. This deposition of wind-blown sands likely occurred in the early post glacial time when there was little vegetation established. Geologists refer to this wind-blown

material as eolian sediments. Soil series names are usually taken from the geographic location where the soil was first identified. So, not surprisingly, the Giant's Head soil name was established for the soil formed on glacial till covered by eolian sands in the vicinity of Giant's Head Mountain. Glacial till, material deposited directly beneath a glacier is not common on the valley floor but is found in limited area on the lower flanks of Giant's Head Mountain.

Table 1. The major vineyard soil types of the Summerland Bench GI. Soils are grouped according to parent material characteristics.

Soil Series Name	Location	Profile Characteristics	Viticultural Use
		Soils formed on sandy wind-blown parent materials	
Giant's Head	Base of east and south sides of Giant's Head Mountain	Sandy surface horizon overlying gravelly sandy loam till	Commonly used for viticulture in southern portion of the GI
Olhausen	Patchy occurrence on gently sloping surfaces, east of Giant's Head Mountain	Surface cover 10-50 cm of fine sandy loam wind-blown sediment overlying a calcareous silt loam glaciolacustrine subsoil	Soil has limited distribution and therefore minor use for viticulture in the GI. However, this soil has widespread use in the adjacent Summerland Lakefront GI and across Okanagan Lake in the Naramata Bench GI.
		Soils formed on undulating glaciofluvial parent materials	
Osoyoos	Found throughout the southern portion of the GI	Stone-free loamy sands	The uniform sandy texture is well suited to irrigated viticulture. Widespread distribution and use throughout the Okanagan Valley.
Parkill	Upper Canyonview	Largely stone-free sands and loamy sands	The uniform sandy texture is well suited to irrigated viticulture.
Trout Creek	Upper Canyonview	Loamy sands over gravel	Limited distribution and use, always found in association with Parkill soil
Skaha	Sporadic occurrence throughout the southern portion of the GI	Sandy loam over gravel	Well suited to irrigated viticulture. Widespread distribution and use throughout the southern Okanagan Valley.
		Soils formed on level glaciofluvial parent materials	
Dartmouth	Northern portion of GI, Jones Flat area	Sandy loam to loam over gravel	Well suited to irrigated viticulture. Distribution limited to central Okanagan Valley.
Rutland	Northern portion of GI, Jones Flat area	Thin cover of sandy loam over gravel.	Widespread distribution and viticultural use elsewhere in the Okanagan Valley.

The Olhausen soil formed in a similar way but the underlying geologic material is glaciolacustrine. Olhausen has widespread distribution on the glaciolacustrine landscapes of the southern

Okanagan. While it is common along the Naramata Bench and Summerland Lakefront GIs, its occurrence within this GI is limited mainly to the area along the east side of Giant's Head Mountain.

In the southern portion of the GI, soils have formed on undulating glaciofluvial deposits. There are two pairs of similar soils present. There is a uniform sandy soil paired with a stratified soil of loam over gravel. At higher elevation in the Canyonview area of the GI, is the Parkill and Trout Creek pairing. These soils formed under open forest conditions and have slight differences in their profiles as a result. At lower elevations is the Osoyoos – Skaha pair, these soils formed under grassland conditions and have more organic matter in their topsoil layers (Figure 9).

Figure 8. On the left panel is the soil profile of the Skaha soil series showing the topsoil layers (designated as Ap and Bm), and gravelly, calcareous subsoil layer (Cca). This is a good example of a stratified soil. Yellow dashed line shows break between sandy loam topsoil and gravelly sand subsoil. On the right panel is the profile of the Osoyoos soil series composed on uniform stone-free sand. The sharp boundary between the dark Ap horizon and the brown sand below is the result of land sculpting where the top soil is removed and later replaced on the soil surface. In both soils, the topsoil layers have been leached of soluble materials, have a neutral pH and contain appreciable amounts of humus. The subsoil is calcareous., meaning that it contains free lime. This gives the subsoil an alkaline pH.

The northern portion of the GI is underlain by a level very gravelly glaciofluvial plain. Where there is a cover of loamy topsoil the soils are classified as Dartmouth, where the gravels are close to the

surface or at the surface, the soils are classified as belonging to the Rutland soil series. Both soils formed under grassland vegetation.

In summary, all the soils used for wine grape production in the GI are coarse textured, either formed in sandy sediments or are stratified with loamy surface texture underlain by gravel at various depths. All of the soils are well drained and well suited to irrigated viticulture.

CLIMATE

While there is no long-term weather station within the GI, the nearby weather station located on the grounds of the Summerland Research and Development Centre (SRDC) provides a good approximation for the weather conditions on the mid elevations of the Summerland Bench. This long-term station, operated by Environment and Climate Change Canada, is supplemented by several small research-oriented temperature monitoring stations located on private property within the agricultural areas of the District of Summerland.

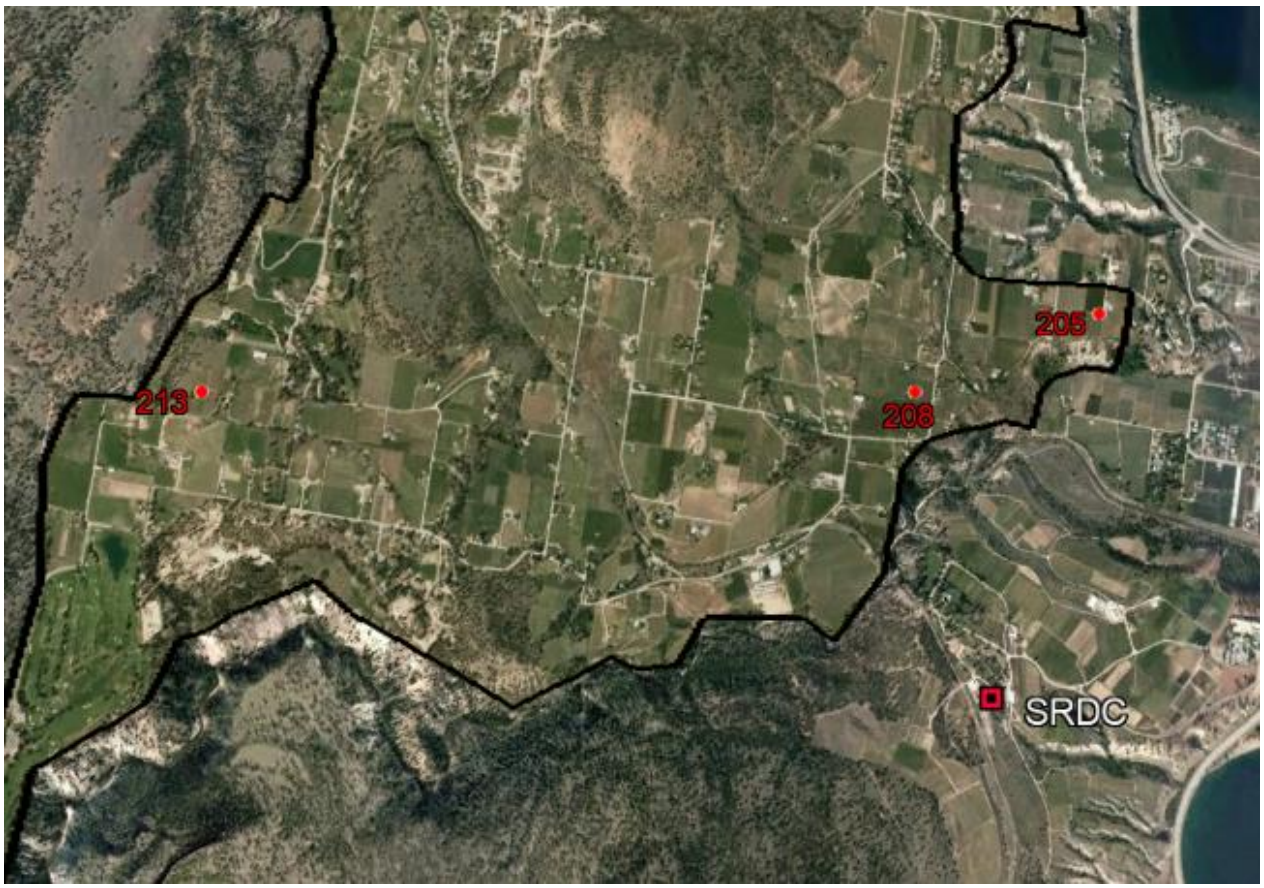

Figure 9. Location of weather stations in the southern portion of the GI. The long term station SRDC is located at 460 m elevation, station 205 at 430 m, station 208 at 475 and station 213 at 600 m.

Three such monitoring stations exist within the southern portion of the GI (Figure 9) To evaluate how well the long-term weather data from the Research Centre applies to the southern portion of

the GI, daily temperature data were compiled and compared for the period 2008 to 2016 (Table 2). The growing degree day accumulations >10°C (GDD) and the frost free period (FFP) are indices calculated from daily temperatures and used to evaluate climate conditions for viticulture. The GDD values are largely controlled by elevation. Site 205 located at the lowest elevation has the largest GDD values on average, site 213 the lowest values. The FFP values, which are calculated as the number of days between the last frost in the spring and the first frost in the fall, are more a function of landscape position. Slight depressions and gulley systems in the landscape will suffer frost more often and affect the length of growing season.

Table 2. Daily temperature data for two weather stations, one located within the boundaries of the GI (research monitoring site 206) and the second from the long-term station on the Summerland Research and Development Centre (SRDC), were compiled for two seasonal agricultural weather indices.

Year	GDD>10°C				FFP (days)			
	SRDC[1]	205 [2]	208 [2]	213 [2]	SRDC[3]	205 [2]	208 [2]	213 [2]
2008	1,241	1,251	1,043	1,105	nd	175	165	168
2009	1,427	1,422	1,204	1,266	169	186	167	nd
2010	1,238	1,280	1,146	1,100	194	189	189	189
2011	1,195	1,235	1,135	1,071	186	188	184	174
2012	1,333	1,367	1,282	1,193	196	214	184	195
2013	1,415	1,390	1,158	1,232	190	195	162	181
2014	1,389	1,429	1,389	1,316	206	231	196	205
2015	1,520	1,584	1,474	1,404	203	212	202	202
2016	1,363	1,482	1,328	1,262	197	206	196	206
Mean	1,347	1,382	1,240	1,216	193	200	183	190

[1]Data provided by Brad Estergaard, SRDC

[2] Data provided by Steve Losso, SRDC

[3] Data compiled by the author from Environment and Climate Change Canada (2019)

At Summerland the frost-free period usually begins in the middle of April and runs until late October and produces a growing season length of over 190 days, long enough for most vinifera grape varieties. The occurrence of frost is very site-specific, showing up in some years and causing a significantly longer frost-free period at site 205 than at SRDC (Table 2). Interannual variation is significant but with a trend toward slightly longer growing seasons in recent years.

Annual total GDD measured at SRDC for the period 1998 to 2019 is shown in Figure 10. Within the context of the Okanagan Valley, the 21year GDD average of 1334 at SRDC represents intermediate growing season heat, cooler than the south Okanagan (where GDD totals typically exceed 1500) but warmer than areas in Kelowna and to the north.

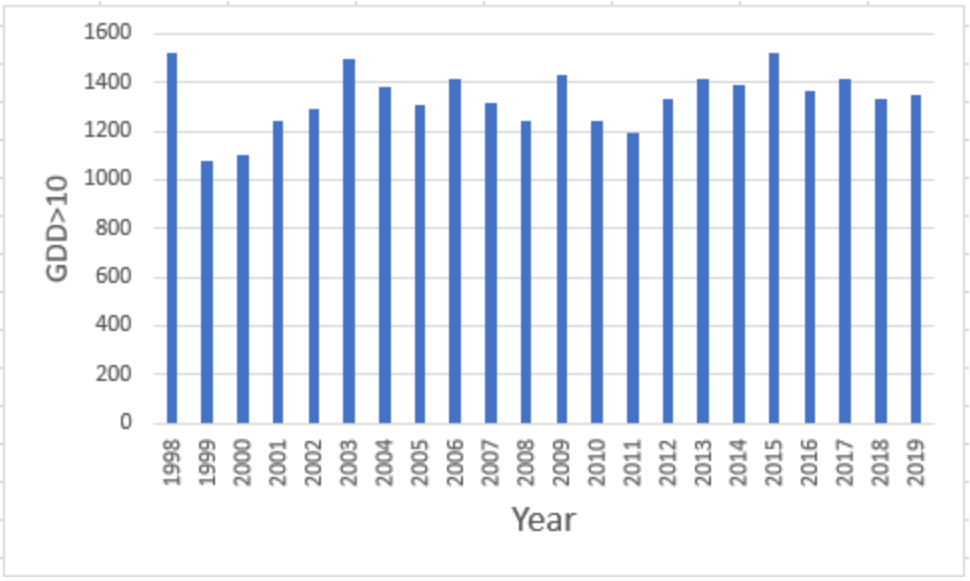

Figure 10. Chart of growing degree day accumulations through the growing season for the years 1998 to 2019 as recorded at SRDC. Data provided by Brad Estergaard, SRDC.

The warmest years were 1998 and 2015 with over 1500 GGD>10. Coolest year was 1999 with an accumulation of 1074 GDD. The significant interannual variation in accumulated heat remains an on-going challenge to viticulture in the region.

VITICULTURAL CHARACTERIZATION

Vineyards currently cover a small portion of the land suited to viticulture in the GI. In 2019 there were 60 ha of producing vineyards, and about 10 ha of vineyards newly planted or under development. The coarse textured, well drained soils that dominate the GI enable vigour control through deficit irrigaton, which balances fruit yields relative to vigour and optimizes the exposure of developing clusters to sunlight.

Noble white wine cultivars (primarily Pinot Gris and Gerwurztraminer) suited to the moderately cool climate of the GI predominate plantings, covering more than two thirds of the area in production. These cultivars produce aromatic wines with abundant body and acidity. The climate is also suited to production of several red wine cultivars, especially Pinot noir which is planted in about two thirds of the red winegrape area, and produces elegant table wines. Merlot and Syrah are also suited to the GI's climate and produce fine fruit forward table wines, especially in warmer vintage years.

Table 3. Cultivars and their proportional distribution within the vineyards of the Summerland Bench GI. Data source: BC Wine Authority.

Cultivar	% Growing Area
Reds	
Pinot Noir	21.1
Merlot	6.9
Syrah	1.3
Pinot Meunier	1.1
Cabernet Sauvignon	<1
Malbec	<1
Total	31.5
Whites	
Gewurztraminer	25.1
Pinot Gris	13.4
Chardonnay	9.8
Riesling	7.0
Pinot Blanc	5.5
Viognier	4.6
Sauvignon Blanc	2.2
Muscat	<1
Oraniensteiner	<1
Total	68.5

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