Cowichan Valley Sub-Geographical Indication

February 2019

Technical Description and Geographic Extent

Documentation in support of a formal application to the BC Wine Authority for the creation of a new sub-GI named Cowichan Valley.

Scott Smith, Eterrna Consulting

Elizabeth Kenney, Elizabeth A. Kenney Consulting

Pat Bowen, Summerland Research and Development Centre, Agriculture and Agri-Food Canada

Cowichan Valley Sub-Geographical Indication

TECHNICAL DESCRIPTION AND GEOGRAPHIC EXTENT

EXECUTIVE SUMMARY

The fundamental approach used by the BC Wine Authority to define the geographic extent of sub-GIs is to use, wherever possible, natural features to place boundaries. In the Cowichan Valley we used several different natural features to delineate the extent of the proposed sub-GI, an area of approximately 350 km2. The sub-GI extends from the coast between Maple Bay and Mill Bay in the east to Cowichan Lake in the west and from the Cowichan estuary watershed boundary in the north to Cobble Hill in the south. Detailed maps and the rationalization for boundary placement are given in the report along with descriptions of the surficial geology, soils, climate and viticulture of the valley.

The Cowichan Valley landscape was formed as the result of Pleistocene glacial advances and retreats, sea level changes and more recent erosional processes. Surficial deposits of till, glaciofluvial sands and gravels, marine silty clays and recent floodplains provide the parent materials upon which the soils of the valley are formed. Vineyards are located on a range of soil types and soil textures. Soils are generally acidic in nature and of mixed mineralogy. When cultivated they provide a suitable growing medium for wine grapevines.

The Cowichan Valley is a cool climate wine region. The valley has a Mediterranean-like climate with cool, wet winters and warm, dry summers. A strong maritime influence moderates seasonal temperature variation, unlike the more continental conditions in the major grape-growing areas of the southern interior of British Columbia. Average maximum summer temperature in the Cowichan Valley is 25°C. Historically, less than 10 days per year experienced temperatures over 30 °C. Historically the area has received between 900 and 1000 growing degree days (base 10°C) of heat between April 1 and October 31, the seasonal period of accumulation used in viticulture. The most suitable *Vitis vinifera* cultivars for the Cowichan Valley are currently those requiring <1000 GDD to mature although future climate warming may change that. Principle cultivars grown are Pinot noir and Pinot gris which produce premium sparkling and table wines. The cool growing season is particularly well suited to producing classic aromatic white *V. vinifera* cultivars such as Gewurztraminer, Ortega, and Bacchus. Also grown are cultivars developed by Valentin Blattner, including Petite Milo, Cabernet Foch and Cabernet Libre. These cultivars perform moderately well in the cool, humid climate of Cowichan Valley.

BACKGROUND

In August 2018 Scott Smith was retained by Blue Grouse Estate Winery and Vineyards on behalf of a group of neighboring wineries to help define the extent of a proposed Cowichan Valley sub-Geographical Indication (sub-GI) on Vancouver Island and to compile technical (biophysical) information to describe and define its nature. Elizabeth Kenney was retained to provide soil information given her experience and knowledge of the area, and Dr. Pat Bowen of the Summerland Research and Development Centre agreed to contribute a viticultural characterization section for the technical report.

A field inspection of the proposed sub-GI area and a meeting with several Cowichan Valley growers was completed in September 2018. At that time, several soil profiles were examined and photographed in support of this technical document. A preliminary report outlining a suggested boundary configuration and rationale was completed and sent to Bailey Williamson of Blue Grouse Estate Winery for distribution and discussion in October 2018. There was general support among area growers for the suggested boundary. That boundary, and the biophysical environment of the proposed Cowichan Valley sub-GI, are presented herein.

The intent of this document is to support the submission of an application to the British Columbia Wine Authority seeking formal establishment of this proposed sub-GI.

GEOGRAPHIC EXTENT

The fundamental approach used by the BC Wine Authority to define the geographic extent of sub-GIs is to use wherever possible natural features to place boundaries. In the Cowichan Valley we used several different natural features to delineate the extent of the proposed sub-GI, an area of approximately 350 km^2. The details of how the boundary was established based on natural features are described in the following section on boundary rationalization.

Figure 1. Overview of the boundary configuration for the proposed sub-GI. The boundary shown in white is described in more detail in Figures 2-4. The Cowichan watershed boundary defines the northern extent. The eastern boundary is defined as the coast line from Mill Bay to Maple Bay. The western limit is Cowichan Lake. The southern boundary is based in part on climate as mapped in the BC government's biogeoclimatic ecological classification system. The upper elevational limit of the sub-GI extent is set at 250 m above sea level, the current upper limit to viticulture. Vineyards are marked in purple.

Boundary Rationalization

The details of the boundary placement are shown in Figures 2, 3 and 4. Boundary segments are numbered on the figures and described.

Figure 2. The boundary configuration with segment numbers for the southern portion of the sub-GI. Vineyards are marked in purple.

The southern boundary between markers 1 and 2 is defined by the extent of the Coastal Douglas Fir moist maritime (CDFmm) biogeoclimate subzone. Within this ecological zone lies the warmest and driest climate of the region. To the south of this line, there is elevation gain that produces slightly cooler and wetter conditions generally less suited to viticultural production. The portion of the boundary that runs from Mill Bay toward Shawnigan Lake roughly follows the road between them. The boundary set in this way effectively captures all existing vineyards in the Cobble Hill area of the sub-GI.

Figure 3. The western portion of the sub-GI between segment markers 2, 3 and 4. Vineyards are marked in purple.

Between segment markers 2 and 3 the boundary follows along the lower slope of the Cowichan Valley toward the lake. The boundary runs along the lower slope just above the valley floor. Above this line is largely steep, commercial forest land. Between markers 3 and 4 the boundary follows the lower south-facing slopes. Where the topography is not too steep, the boundary runs up to a maximum elevation of 250 m above sea level. This upper elevation limit is based on the highest elevation where viticulture currently occurs in the valley, an elevation that is considered to mark the extent of suitable climatic conditions for wine grape production. However, it is important to note that in many parts of the valley, the landscape at this upper elevation is steep, rocky and often non-arable and/or falls under some form of commercial forest management.

It is recognized that there is a climate gradient along the floor of Cowichan Valley toward the lake. The climate cools and becomes wetter moving westward. This climate difference is reflected in the forest ecology, whereby the relatively warm and dry Coastal Douglas Fir zone is replaced by the cooler, wetter Coastal Western Hemlock zone. However, it is likely that these cooler, wetter climate conditions will ameliorate in the future to potentially support viable viticultural production. The boundary is drawn out to the lake to capture the full extent of the Cowichan Valley proper.

Figure 4. The northern boundary between segment markers 4 and 5. Vineyards are marked in purple.

The northern boundary is essentially defined by the watershed divide between water flowing into Maple Bay and the Cowichan River system to the south and water flowing northward toward Bonsall Creek and Solly Lake to the north.

Finally, the eastern boundary of the proposed sub-GI runs along the coast from Maple Bay to Mill Bay. Within the confines of the sub-GI as delineated, there are steep, rocky mountainous areas, urban development areas and industrial areas that are non-agricultural. This is typical of sub-GI areas elsewhere in the province as well.

Climate

The region has a Mediterranean-like climate with cool, wet winters and warm, dry summers. A strong maritime influence moderates seasonal temperature variation, unlike the more continental conditions in the major grape-growing areas of the southern interior of British Columbia. Average maximum summer temperature in the Cowichan Valley is 25°C (Figure 5). Historically, less than 10 days per year experienced temperatures over 30 °C (Environment and Climate Change Canada 2019). During the period 1987 to 2007, total growing degree days (GDD) averaged approximately 940 between April 1 and October 31, the seasonal period of accumulation used in viticulture.

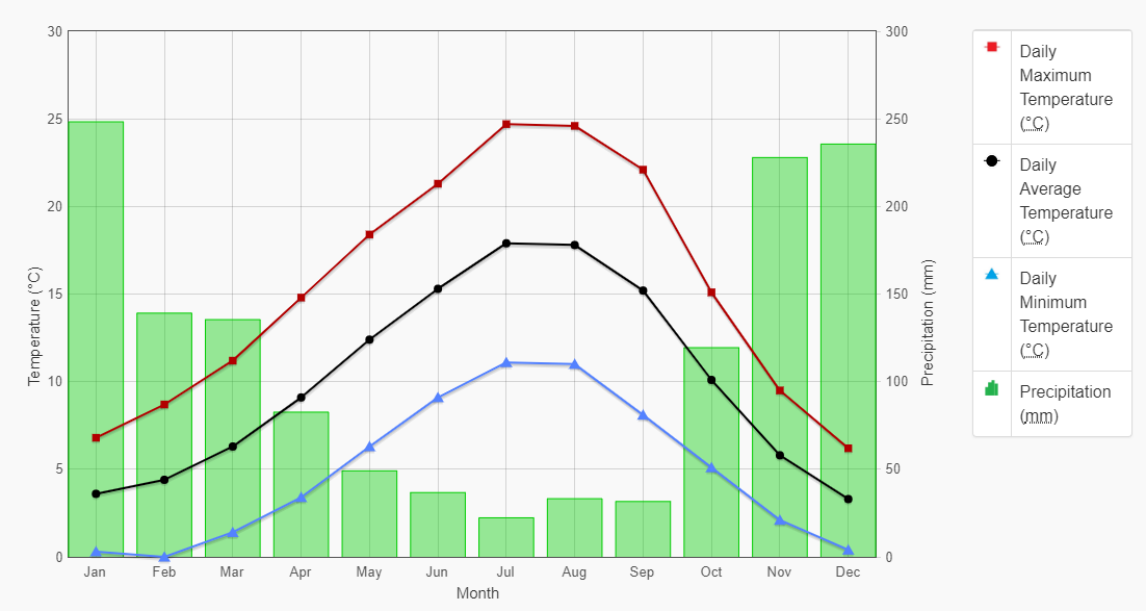

Figure 5. Graph of monthly temperature and precipitation for Duncan area, 1987 to 2007. Data are 20-year climate normals calculated for the Duncan-Kelvin Creek weather station.

Over the last decade, summers have been warmer, to the benefit of Cowichan Valley grape growers allowing for an extended ripening period which enhances the quality of most wine grapes. Figure 6 shows annual total GDD values for 2012 to 2018. Except for 2012, all years have GDD values exceeding the historical average of 940 GDD. The current five-year running average is approximately 1040 GDD.

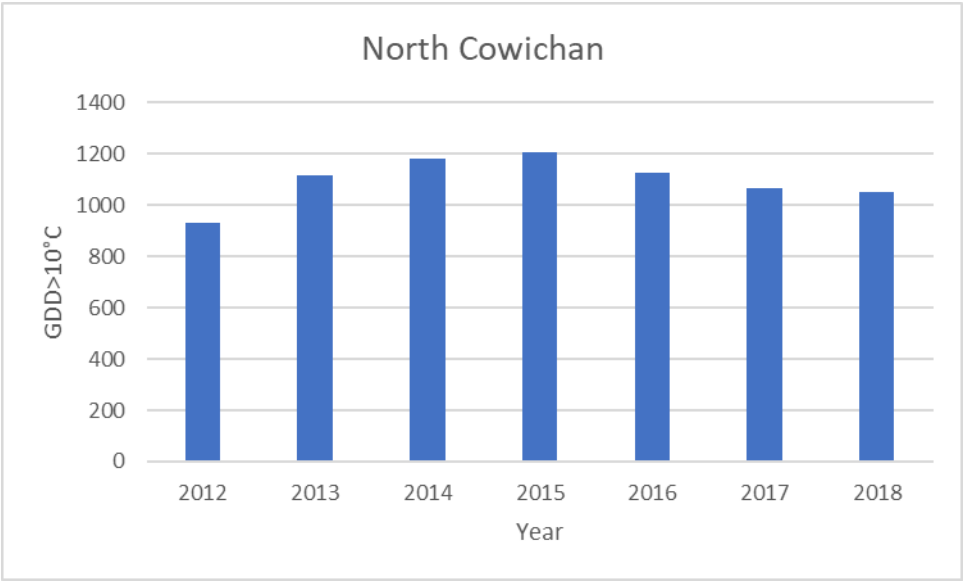

Figure 6, Annual GDD totals for 2012 to 2018 based on observations at the North Cowichan weather station. These annual values are only 5 to 10 GDD higher than the growing season (Apr – Oct) GDD totals as little heat is accumulated outside of the growing season.

Unfortunately, there is no single, long-term weather station record for the Valley. Over the years different stations have recorded weather conditions in different locations within the Cowichan Valley. Long-term trends for the region are best examined based on observations over 100 years at the Victoria airport which is located only 10 km south of the proposed sub-GI boundary, and 25 km from Duncan. When viewed over this time period, there appears to be little trend in either rainfall or GDD totals, a condition also seen in the interior of the province. Precipitation has varied between 200 and 400 mm during the growing season. Mean and maximum temperatures have risen since 1980 and are projected to do so into the future (Figure 8). Projections of future precipitation are quite uncertain but with rising temperatures, it is likely that soil moisture deficits will increase, and irrigation will be increasingly important in the years ahead.

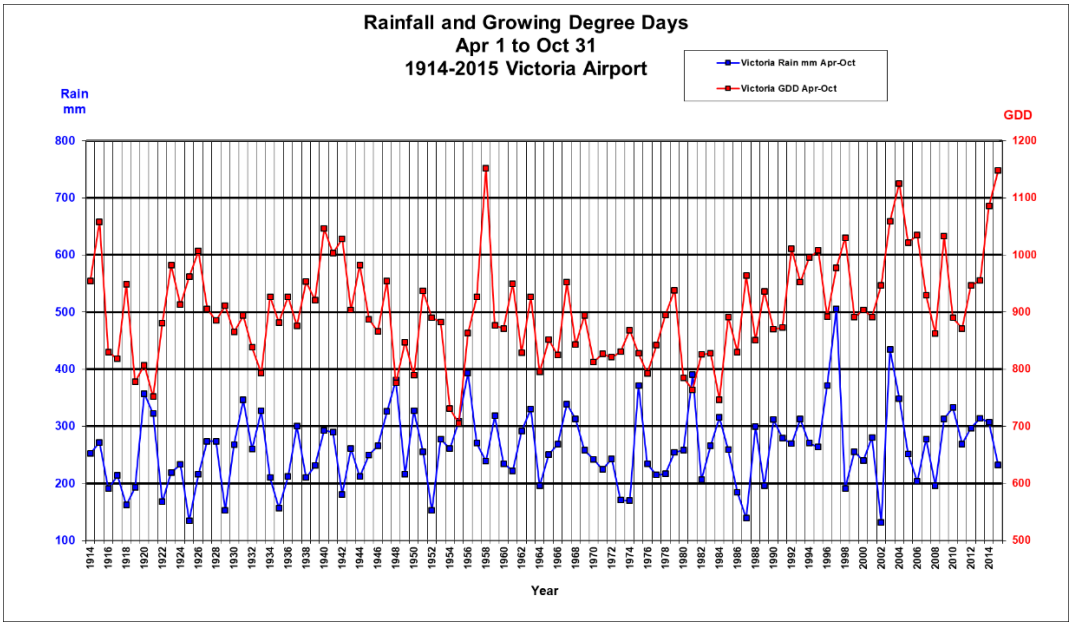

Figure 7. Long term record of rainfall and GDD totals from Victoria airport (data compilation courtesy of the Wine Islands Growers Association).

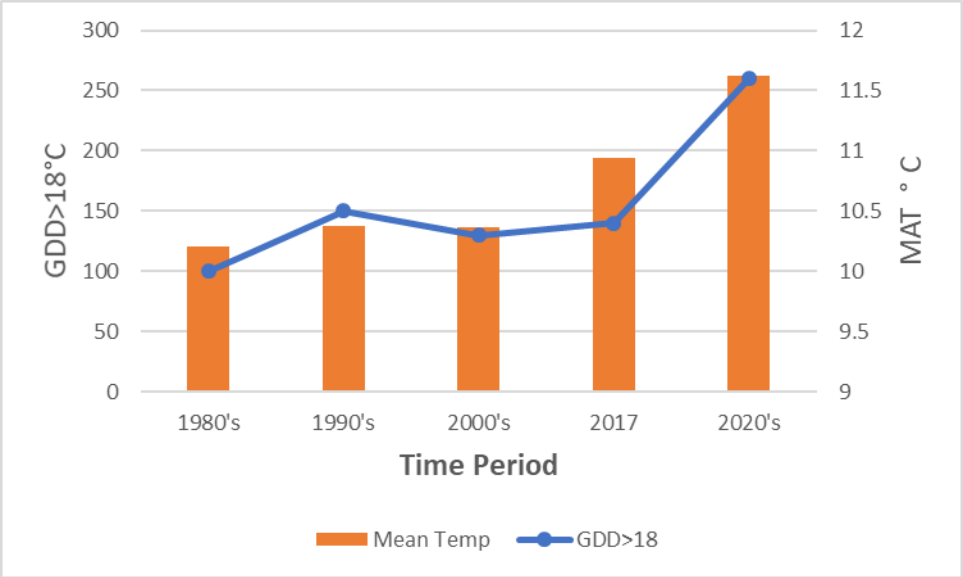

Figure 8. Mean annual temperature changes over the period 1980 and projected into the 2020's for the Duncan area of the Cowichan Valley. Also depicted are GDD>18°C accumulations, a measure of very warm days. Both mean annual temperatures and summer temperatures are projected to change significantly in the decades ahead. Historical values are modeled from local weather stations, projections are averaged from the CanESM2 and HadGEM2 rcp45 scenarios sourced from ClimateBC (2019).

Winters in the Cowichan Valley are rainy, with 75% of the annual precipitation falling between October and April which can pose certain challenges to grape growers. High soil moisture in the spring can lead to excess grapevine vigor and disease pressure which are carefully managed to maintain vineyard performance. On the other hand, the region has a long frost-free period, and winter minimum temperatures have rarely dropped below levels lethal for grapevine tissues (i.e. < -21°C). In more recent years, winter temperatures have remained above -10°C (Environment and Climate Change Canada 2019).

Surficial Geology and Landforms

The following summary of the events that led to the creation of the landforms and sediments seen today in the Cowichan Valley is taken from the soil report of Jungen et al. (1985).

> "The landscape of southern Vancouver Island has been considerably modified by glaciation during the Pleistocene epoch. The Fraser glaciation, the most recent of these major glaciations, has resulted in the most extensive surficial deposits. This event began with the advance of glacial ice from the mainland Coast Mountains down the Strait of Georgia. Approximately 18,000 to 19,000 years ago, this ice sheet crossed the southeastern part of Vancouver Island.

Prior to the overriding of the study area by the Strait of Georgia Ice, an Ice tongue originating in the Vancouver Island ranges advanced eastward down the Cowichan Valley. Near Duncan, the ice tongue was controlled by several high points (Mt. Prevost, Mt. Richards, Maple Mountain and Mt. Tzuhalem) and eroded the basins of Somenos and Quamichan Lakes in the soft shale bedrock. As the ice tongue advanced between Cobble Hill and Saltspring Island, local ponding occurred at its margin, depositing marine sediments northeast of Cobble Hill. Meltwater flowing from the glacier deposited fluvioglaclal gravels along its sides and terminus.

When the Strait of Georgia glacier reached the study area, the Cowichan ice tongue was overridden and incorporated in the larger ice sheet. Many of the earlier deposits were either removed or reworked. Downwasting and retreat of the ice followed. At that time (13-12,000 BP), the sea level was approximately 90 m higher in the Duncan area than at present.

Meltwater from the ice tongue built a series of Ice-contact deltas south of Duncan. These deposits, resting on glacial till, were subsequently covered by marine deposits. With glacial retreat, uplift of the land occurred rapidly and a sea level near to that of the present was reached about 12,000 years ago. Another brief submergence occurred along eastern Vancouver Island, climaxing about 11,500 years ago, followed by rapid emergence. As a result, marine deposits accumulated along the coastal region up to an elevation of approximately 100 m.

Post-glacial erosion has entrenched numerous creeks and rivers draining the area and large deltas have formed in the Strait of Georgia from the Nanaimo, Chemainus and Cowichan Rivers."

Figure 9. Aerial view of Cowichan Valley looking west toward Cowichan Lake. In the foreground are agricultural fields located on marine sediments. These sediments are composed mainly of clay and silt. Lower right shows the Cowichan estuary and delta.

These glacial and post-glacial events left behind sediments that today form the parent materials for the soils of the region. The vineyards of the Cowichan Valley lie on three main geologic parent materials as mapped by Jungen (1985). These are:

Marine sediments - cover significant areas south and west of Duncan and around Sonemos and Quamichan Lakes at elevations below 100 m above sea level. The sediments were deposited during periods of marine submergence after deglaciation. They are composed of silts and clays with lesser amounts of sand. The landform tends to be level, slightly undulating or depressional.

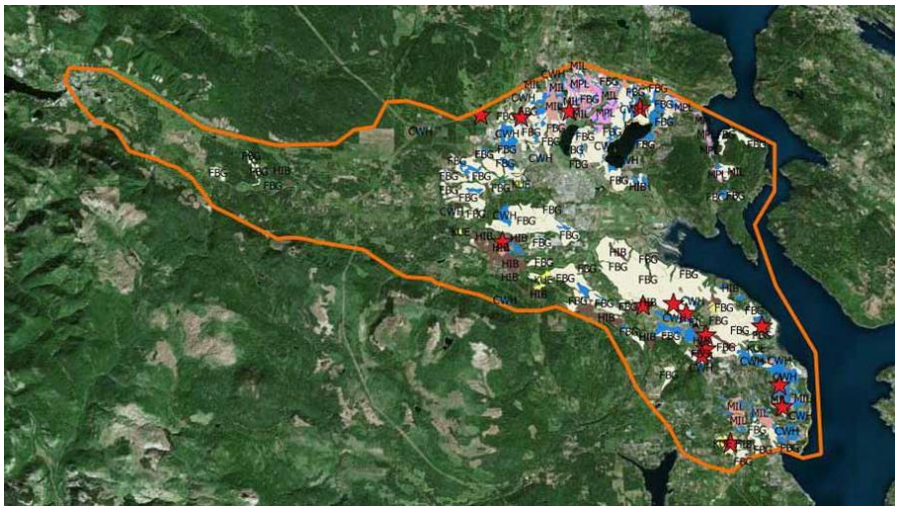

Figure 10. The distribution of marine sediments shown as coloured areas within the proposed sub-GI. Red stars denote locations of wineries in the valley. Sub-GI boundary is approximate.

Glaciofluvial sediments – are the gravels and sand deposits laid down by swiftly moving glacial meltwater during deglaciation. While less common than the marine sediments they occur sporadically throughout the valley. The landforms tend to be level to undulating or composed of escarpments and ridges.

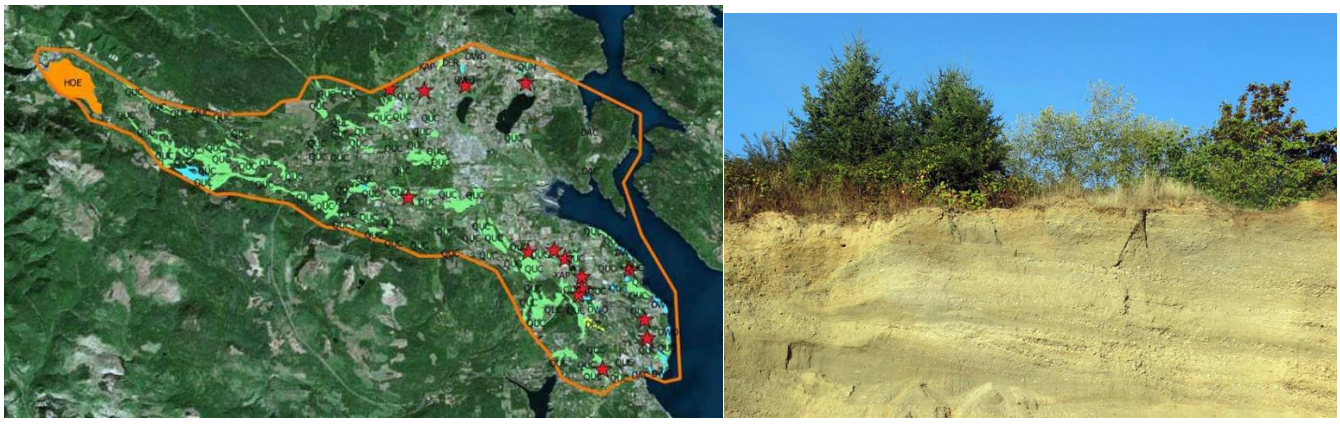

Figure 11. The distribution of glaciofluvial sediments shown as light green within the proposed sub-GI (a). Typical exposure of bedded sands and gravels (b).

Morainal (till) sediments - are deposited directly from glaciers and usually are poorly sorted (i.e. contain sand, silt, clay and gravel). These deposits generally occur above 100 m elevation. Below 100 m, they are often covered by marine deposits.

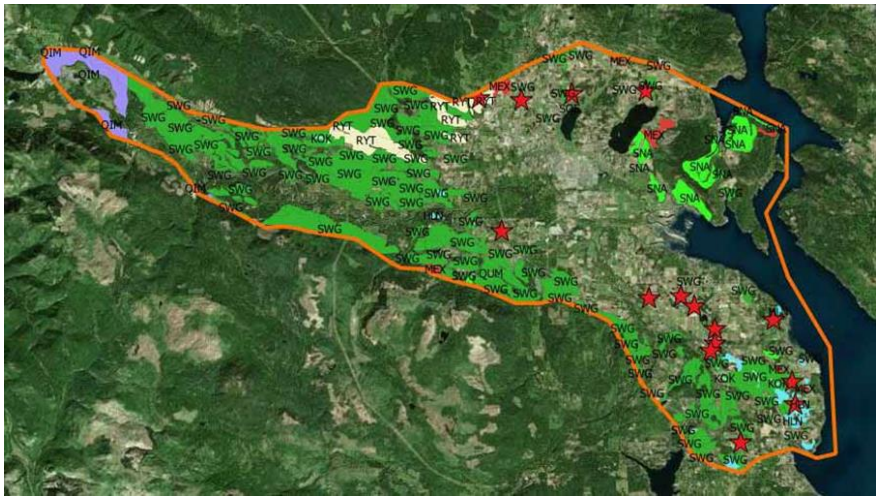

Figure 12. Distribution of morainal materials shown as coloured areas. Few vineyards (illustrated by stars) are located on the morainal materials although they are well enough suited to viticultural production.

Soil Development and Properties

Soils form as the result of the weathering of the surficial geological parent materials. This weathering is controlled by climate, topography, biological activity and time. Different parent materials generate different soil types, but all hold a few common properties. They are typically acidic, contain appreciable organic matter which is often coupled with iron and aluminium in surface horizons and are of mixed minerology. Many soils have chemically cemented subsoils. Under conditions of extended waterlogging, peat soils may develop. Because of the complex post-glacial sea-level history and surface deposits of the region, soil properties can vary over short distances. A detailed soil survey was conducted in the agricultural portions of the Cowichan Valley in the 1980's (Jungen et al. 1985). When soils were mapped, they were assigned names which are linked to the parent materials upon which they form and the soil taxonomic class they belong to. Following is a description of the characteristics of the dominant named soil types (called soil series) organized by their geological parent material that were defined during the soil survey of the area.

Soils formed on marine sediments

There is a large area dominated by fine to medium textured soils derived from marine sediments within the proposed sub-GI (Figure 10). The landscape is often level or gently undulating and at an elevation of less than 100 m above sea level (Figure 13). Of most importance to viticulture are the imperfectly drained Fairbridge and well-drained Hillbank soil series which occur where the marine deposits are greater than one meter thick (Figure 14). These soils have silt loam to silty clay loam texture. The deeper unaltered parent material tends to occur at between 80 - 100 cm depth and is typically quite compact and slowly permeable. There also maybe a higher clay content with depth. Cowichan soils are poorly drained and tend to occur in the lower landscape positions relative to the Fairbridge soils.

Figure 13. Undulating marine landscape dominated by the Fairbridge soil which is the main soil of this landscape.

In areas where the silty clay marine sediments are shallow (typically 50 to 100 cm thick) and overlie other materials, a different set of soils occur. For example, the Kulleet soil series is underlain by coarse-textured, gravelly, sandy marine materials, the Maple Bay soils are underlain by shale bedrock and the Mill Bay soils are underlain by cemented, gravelly, sandy till. Detailed definitions for these soil series are given in Jungen et. al. (1985). It is important to note that wherever land leveling has occurred as part of vineyard development, actual thicknesses of the surface layer may differ markedly from what was mapped based on field work in the early 80's.

Figure 14. Fairbridge Soil on the left and the better drained Hillbank soil on the right. Both soils are > 1 m in depth and are therefore considered to be marine blankets.

Soils formed on glaciofluvial sediments

There is a large area dominated by coarse textured (sandy and gravelly) soils derived from glacial fluvial sediments. (Figure 11).These glacial fluvial soils occur mainly on level to undulating terraces but can also be found on steeping sloping and moderately to strongly rolling landforms (9 – 30% slopes). Qualicum is the dominant soil series. Qualicum soils tend not to have cemented subsoil layers, although discontinuous weakly cemented layers may occur at depths of 60 – 100 cm. These soils have typically developed in deep sandy gravelly glacial fluvial materials and are rapidly drained (Figure 15). There are other soils formed on glaciofluvial sediments differentiated by soil drainage, the thickness of the glacial fluvial sediments, soil classification, as well as the presence/absence of a strongly cemented horizon at depth (~ 60 cm depth). Typically, these soils have surface and subsurface textures of gravelly to very gravelly coarse-textured materials. The coarse fragment content (gravels and cobbles 2- 25 cm in diameter) ranges from 25 – 75 % of the soil volume. Definitions for all soil series are given in Jungen et. al. (1985) and Jungen (1985).

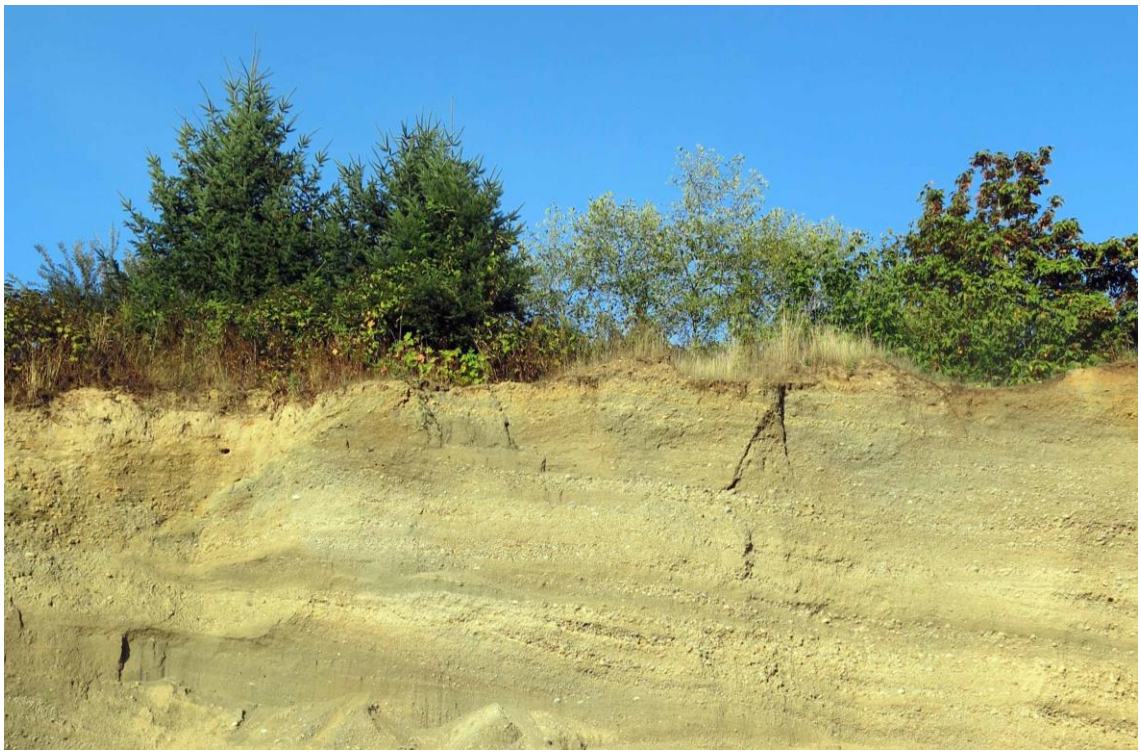

Figure 15. Exposure of Qualicum soils in gravel pit. The glaciofluvial parent materials are usually quite thick and the content of coarse fragments (gravels, cobbles and stones) is variable both horizontally and vertically.

Figure 16. Recent vineyard planting on glacial fluvial soils consisting of the Qualicum soil series.

Soils formed on morainal materials

There is a large area of coarse textured (sandy and gravelly) soils derived from morainal (till) sediments. (Figure 12). These soils occur on strongly to steeping sloping and moderately to strongly rolling landforms (9 – 30% slopes). Shawnigan is the dominant soil series (Figure 17). Shawnigan soils have cemented subsoil layers at depths of 70 – 100 cm. These soils have developed in gravelly sandy loam till materials and are moderately well drained. The coarse fragment content (gravels, cobbles and stones) is generally between 20 – 50 % of the soil volume.

Figure 17. The Shawnigan soil and the Shawnigan soil landscape. (Photos courtesy of J. Jungen)

Another important soil series within this group is Royston. Typically, these soils have surface and subsurface textures of gravelly loam materials. The soil volume may be made up of 25 – 75 % of shale, siltstone and claystone gravels and cobbles. The Royston soils do not contain cemented horizons in the subsoils. Royston soils are common along the lower southern slopes of Mount Prevost.

A summary of the most commonly occurring vineyard soils is given for many of the Cowichan Valley wineries in Table 1. Vineyard property boundaries were intersected with the soil map using Google Earth. Some of the vineyards occurred on multiple soil map polygons. For a given soil polygon up to 3 soil series may occur so only the dominant soil series are listed.

Table 1: A generalized listing of soils identified for the wineries and vineyards of the proposed sub-GI area based on mapping by Jungen et al. (1985).

Winery/Vineyard	Dominant vineyard soil series
Averill Creek	Royston
Zanatta Vineyards	Hillbank, Fairbridge, Mill Bay, Cowichan
Blue Grouse	Fairbridge, Qualicum and Hillbank
Rocky Creek	Fairbridge , Qualicum
Venturi Schulze Vineyards	Fairbridge
Divino	Fairbridge , Cowichan
Cherry Point	Cowichan, Kulleet, Qualicum
Damali	Shawnigan, Cowichan and Faribridge
Enrico	Shawnigan
Glenterra	Hillbank
Unsworth	Fairbridge,Hillbank and Rumsley
Alderlea	Shawnigan, Fairbridge
Emandare	Fairbridge, Cowichan
Deol	Cowichan, Fairbridge

Viticultural Characterization

Modern commercial wine grape production in the Cowichan Valley dates back to the early 1990s, and today there are an estimated 60 to 70 ha (150 to 175 acres) of vines grown. Most wineries are supported by relatively small vineyards, the largest being Averill Creek which covers12 ha (30 acres). The average size of winery-associated (estate) vineyards is about 4 ha (10 ac). With over a dozen wineries, the Cowichan Valley has established itself as the heart of Vancouver Island wine production.

With few very warm days and limited total growing season heat, the most suitable *Vitis vinifera* cultivars for the Cowichan Valley are currently those requiring <1000 GDD to mature although climatic conditions have warmed in recent years. A listing of the principle red and white grapevine cultivars based on field survey work undertaken by the Wine Research Group of Agriculture and Agri-Food Canada and from informal grower reported cultivars and their acreages is presented in Table 2.

The principle *Vitis vinifera* cultivars grown are Pinot noir and Pinot gris which produce premium sparkling and table wines. The cool growing season is particularly well suited to producing classic aromatic white *V. vinifera* cultivars such as Gewurztraminer, Ortega, and Bacchus. Also grown are cultivars developed by Valentin Blattner, including Petite Milo, Cabernet Foch and Cabernet Libre. These cultivars perform moderately well in the cool, humid climate.

Table 2. Listing of the principle grape cultivars currently grown in the Cowichan Valley.

Red wine cultivars		
Pinot Noir*	Cabernet Libre	Cabernet Foch
Marechal Foch	Agria	
White wine cultivars		
Pinot Gris*	Castel	Viognier
Siegerrebe	Auxerrois	Muller-Thurgau
Ortega	Bacchus	Petite Milo
Gewurztraminer	Madeleine Sylvaner	

*most common cultivars

References

BC Soil Information Finder (2018): https://www2.gov.bc.ca/gov/content/environment/air-land-water/land/soil/soil-information-finder Accessed Sept 2018.

BEC dataset for Vancouver Island https://catalogue.data.gov.bc.ca/dataset/biogeoclimatic-ecosystem-classification-bec-map Accessed Sept 2018.

Environment and Climate Change Canada 2019. Canadian climate normals. 1981 to 2010. Duncan Kelvin Creek Station. http://climate.weather.gc.ca/climate_normals/ Accessed January 2019.

Jungen, J. 1985. Soils of Southern Vancouver Island, MOE Technical Report 17, BC Ministry of Environment and Ministry of Agriculture and Food, Victoria, BC. 198 pp. plus maps.

Jungen, J., Sanborn, P., and Christie, P.J. 1985. Soils of Southeast Vancouver Island Duncan-Nanaimo , MOE Technical Report 15, BC Ministry of Environment and Ministry of Agriculture and Food, Victoria, BC. 188 pp. plus maps.