

4

The British Columbia Context

Introduction

This chapter of the Atlas provides some background material on the Province of BC from both a physical geography perspective and a demographic perspective. The first section presents a brief overview of some of the major characteristics of BC's physical environment, including several key climate indicators, followed by provincial population indicators. These indicators and maps all provide a context for the rest of the Atlas. Some of the key indicators can be viewed as wellness assets themselves, as they influence the patterns that appear in the maps in later sections of the Atlas.

The first section presents nine maps showing physical and important climatic indicators that can influence wellness. The first three maps provide information on the major physiographic regions of the province, with supporting maps showing days of bright sunlight and precipitation-free days. These two climate-related indicators have been chosen because of their relationship to health and wellness. Sunlight is a wellness asset in many ways. It is an important source of Vitamin D and also important in countering the debilitating effects of Seasonal Affective Disorder Syndrome (SADS). Of course, too much sun can be damaging to the skin. The precipitation-free days indicator was chosen because research has shown that individuals are more likely to engage in outdoor physical exercise on precipitation-free days and in the summer (Canadian Institute for Health Information, 2006a).

A report by the Ministry of Water, Land and Air Protection (2002) provides numerous maps and data related to the "wellness" of the province's environment and ecosystems. Information is provided on human health and environment, toxic contaminants, climatic change,

stewardship, and biodiversity. For interested readers, an updated report by the Ministry of Environment is anticipated in the future.

Given its importance to health and wellness in BC (Ministry of Water Land and Air Protection, 2004), the next set of six maps present key information related to climatic change. These include four maps providing information on changing precipitation patterns over the past 50 years or so, and two maps on temperature changes within the province.

In the second section, there are 10 maps in all that provide key indicators on the population and demographic make-up of the province. The first two maps show population density and where the population lives by HSDA. The second two maps provide similar information on the province's Aboriginal population. While the Aboriginal population is relatively small as a percentage of the BC population, it is an important group in that both the health and wellness status of Aboriginal peoples are substantially less than for the population as a whole (Stephenson, Elliott, Foster, and Harris, 1996; Kendall, 2001, 2002, 2007). Included in various sections of the Atlas are specific data related to Aboriginal peoples, but in many cases, as noted previously, the data can not be mapped geographically because relatively small numbers do not allow their reporting.

These maps are followed by three maps showing information on how the age make-up of the province varies regionally by HSDA. The final three maps show information related to language and recent immigrant data, again at the HSDA level. Over the past two decades, BC's cultural make-up has changed substantially as a result of major immigration from south and east Asia, and these maps show some of the patterns within the province associated with these trends.

Physiography of BC

Geographically, BC is the western-most province of Canada, although parts of the Yukon Territory lie further west. It has a land area of nearly 95 million hectares and has a diverse group of physiographic characteristics, as shown.

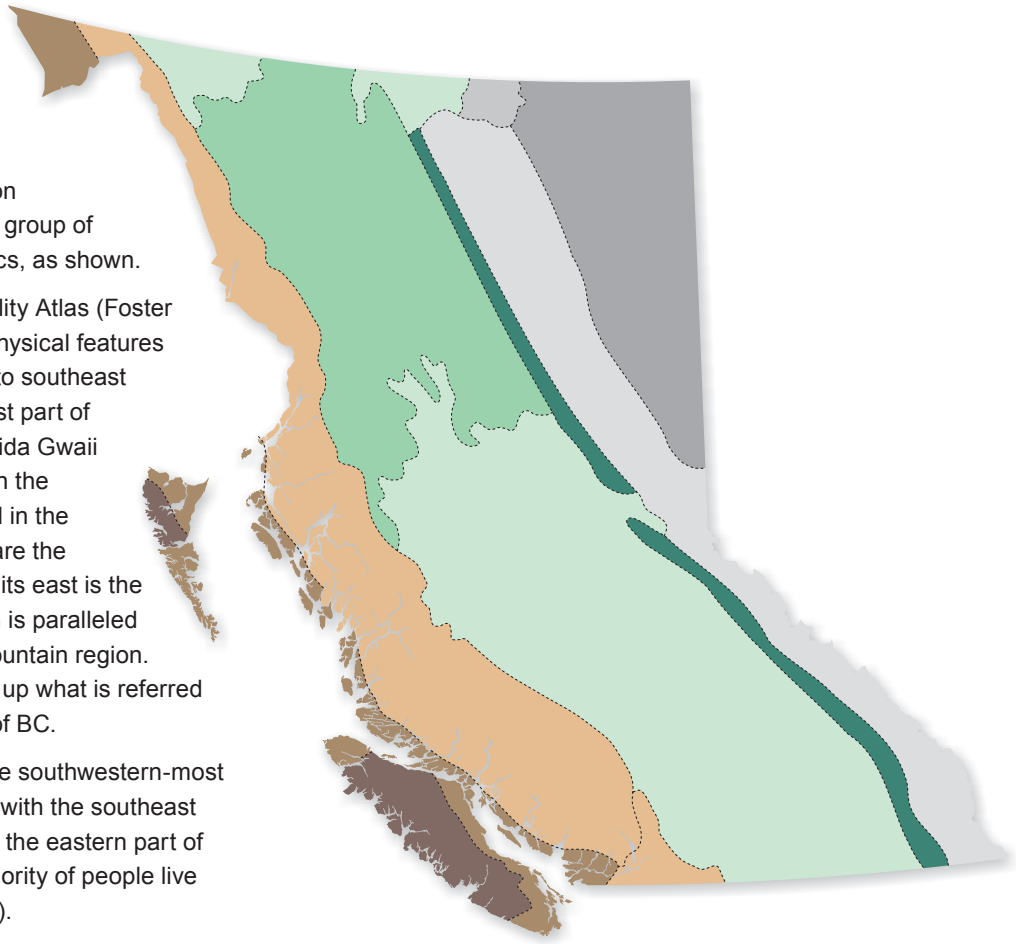
As noted in the 1992 Mortality Atlas (Foster and Edgell, 1992), its key physical features run in a general northwest to southeast direction. The western-most part of the province consists of Haida Gwaii (Queen Charlotte Islands) in the north and Vancouver Island in the south. Both these islands are the Outer Mountain region. To its east is the Coast Trough region, which is paralleled to the east by the Coast Mountain region. These three features make up what is referred to as the Western System of BC.

The Fraser River plain in the southwestern-most part of the mainland, along with the southeast tip of Vancouver Island and the eastern part of the Island, is where the majority of people live (Strohmaier and Burr, 1992).

The Interior System, to the east, consists of three major physiographic groupings.

The Northern and Southern Plateaus and Mountain areas, the Central Plateau and Mountain area, and to the east the very dominant Rocky Mountain Trench. East of the Trench lies the Rocky Mountains which go north to the Mackenzie Mountain area, while the northeast part of the province is part of the Alberta Plateau.

The province is characterized by large river drainage systems, particularly the Fraser and Thompson systems and Columbia system which flow to the south. The Peace system drains eastward while the Liard system flows north. In the northwest, the Stikine, Nass, and Skeena systems flow west to the Pacific Ocean. In addition to these large systems there are numerous lakes and smaller rivers.



- WESTERN SYSTEM**
- Coast Mountain Area
 - Coast Trough
 - Outer Mountain Area

- INTERIOR SYSTEM**
- Northern and Southern Plateaus and Mountain Areas
 - Central Plateau and Mountain Area
 - Rocky Mountain Trench

- EASTERN SYSTEM**
- Rocky Mountain Area
 - Mackenzie Mountain Area
 - Alberta Plateau

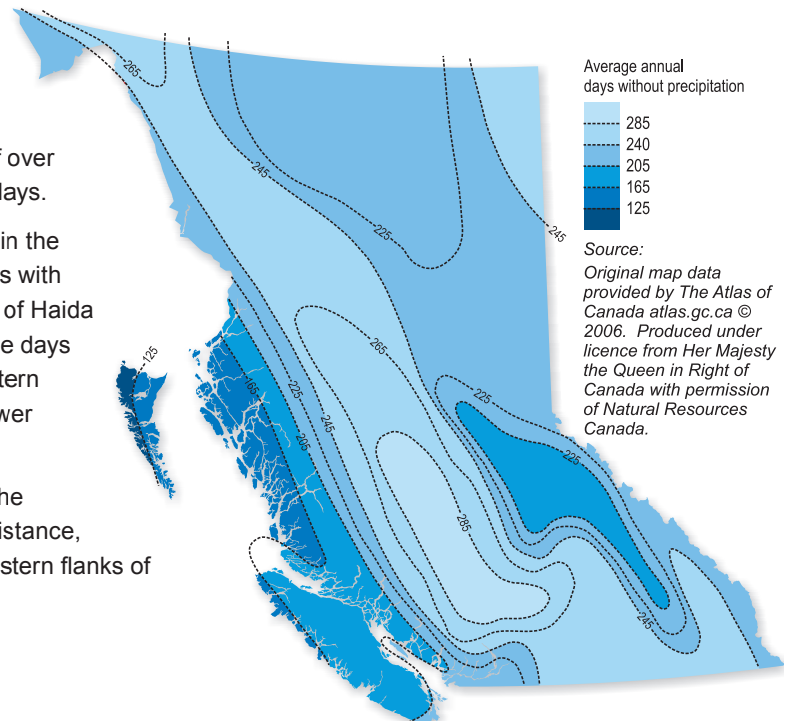
Precipitation in the province exhibits major variations based on its mountainous relief and the generally westerly atmospheric flow of weather patterns. Parts of the interior of the province get 25 centimetres of precipitation annually—rain and snow combined—while over 500 centimetres is not uncommon on the coastal mountains. Precipitation falls mainly in winter, but as Foster (1987) noted, overall climate, like the province’s physiography, is very diverse: “Variations in latitude, elevation, land and sea distribution, and relief combine to create a complex climatic mosaic in BC. Climates range from marine temperate on the coast to continental steppe and subarctic in the interior and north of the province, respectively” (p. 45).

Precipitation-free days

Similar to the previous map, the trend in terms of precipitation-free days shows a northwest to southeast gradient, but the pattern is somewhat more complex than the previous maps. The range varies from a high of over 285 to a low of less than 125 precipitation-free days.

The areas with most precipitation-free days are in the central interior part of the province and the areas with the least occur on the coast. The extreme west of Haida Gwaii has the lowest number of precipitation-free days (darkest blue). There is also a region in the eastern central part of the province (darker blue) with fewer precipitation-free days.

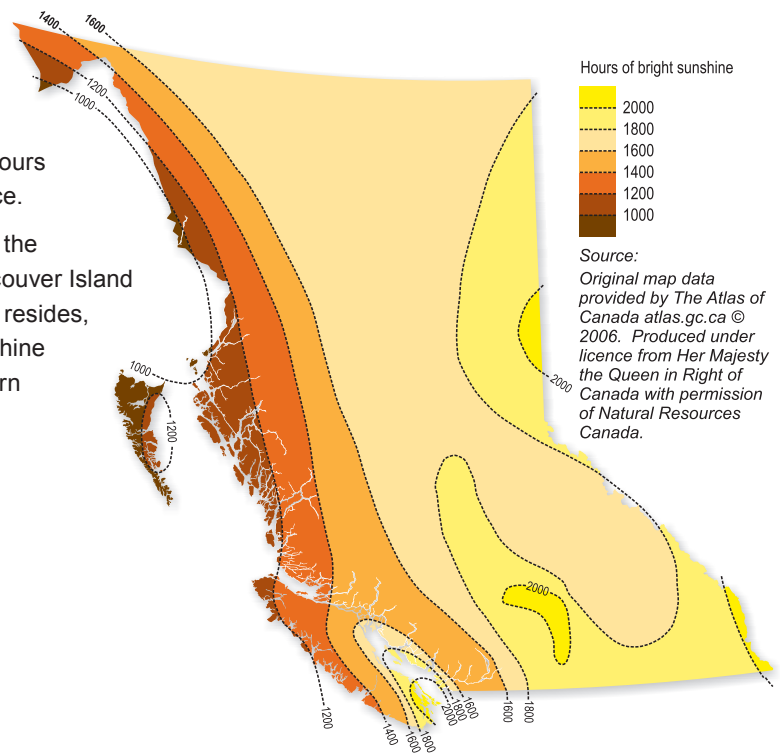
There are very steep gradients, or changes, in the number of precipitation-free days over a short distance, particularly along the coastal mountains and western flanks of the Rocky Mountains.



Hours of bright sunshine

As with the previous two maps, there is a similar northwest to southeast trend with hours of bright sunlight. There is a range from over 2,000 hours per year to less than 1,000 hours per year and, generally, bright sunshine hours increase from the west to the east of the province.

In the southwest tip of the province, and around the Strait of Georgia between the lower half of Vancouver Island and the mainland where much of the population resides, there is an area with higher levels of bright sunshine than areas immediately to the east. The southern central part of the interior also is an "island" of bright sunshine.



Seasonal trends in precipitation

Precipitation, while it can discourage outdoor activities, is important from many other perspectives: a source of water supply; a source for continuing the life of rivers and lakes and the associated aquatic flora and fauna; an important resource for recreation when it falls as snow; an important resource for agriculture; and a source of water for hydroelectric power, to name but a few.

The four maps opposite provide information related to the trends in seasonal precipitation throughout the province between 1961 and 1990. Changes in precipitation patterns can have major effects, both positive and negative, on individuals, communities, and the environment.

Winter

The winter season trends, seen at top left on the opposite page, show a general north to south orientation. The lightest colour area depicts little change in the amount of precipitation. Generally, winter precipitation has decreased over time as one moves west to east. An increase in winter precipitation has occurred in the Dease Lake area in the north and offshore around Haida Gwaii. Areas west of a line from Dease Lake in the north to Quatsino on Vancouver Island have experienced increases (up to 25%), while areas east of that line have seen decreases, some as much as a 45% reduction (east of Summerland in the Okanagan and around Golden in the east of the province).

Spring

Most areas of the province have received increased precipitation during this season as noted on the map at the top right opposite. Only the areas between Ft. Nelson and Ft. St. John in the northeast and the area just east of Prince George show reductions (in the order of 5% to 15%). The southern interior region around Kamloops and the Okanagan shows an increase of 35% and more.

Summer

The map at the bottom left of the page opposite shows that, for the summer period, much of the province has witnessed modest increases in precipitation, except in the northeast of the province, as far south as Prince George. The southern part of Vancouver Island is

also an area that has not seen an increase during this season. Larger increases in precipitation are found in the interior around Kamloops and south, and in the Golden area in the east (both over 35%).

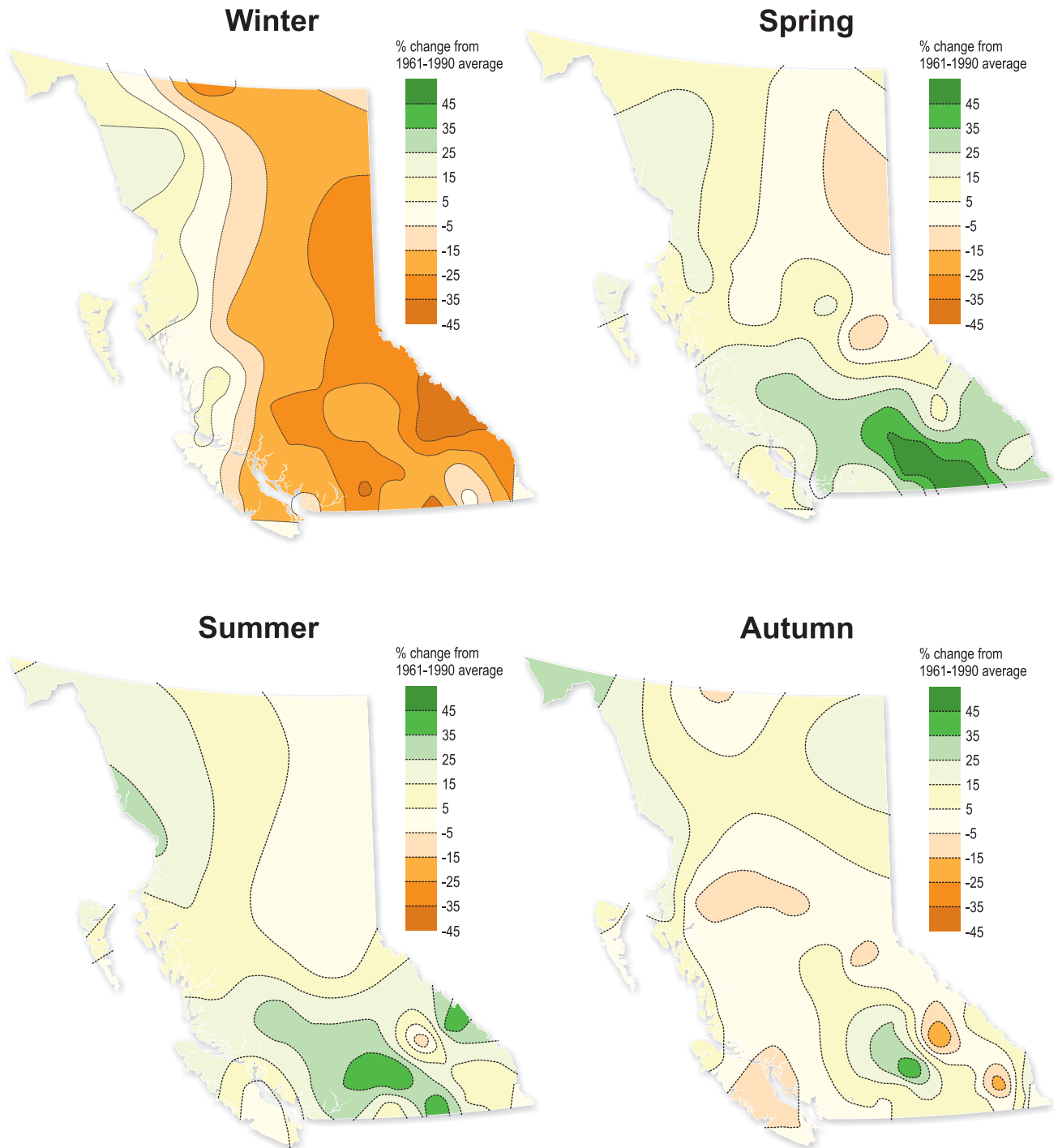
Autumn

For the autumn or fall season, while there are trends throughout the province, they are not as dramatic nor as consistent as in some of the other seasons. Much of the province has witnessed small changes. The areas around Kamloops in the interior (25% plus) and to a lesser extent in the northeast and northwest (15% plus) show increases, while decreases are evident (15% plus) in the area west of Golden in the east of the province.

Summary

The four maps opposite indicate that the climate cannot necessarily be expected to remain stable. Although some of these changes may be due to random fluctuation, evidence is clearly mounting that major changes in climate are occurring globally and that BC is far from immune to such changes and their effects. Most of BC experienced wetter springs and summers and drier winters throughout the second half of the last millennium (Ministry of Environment, 2006).

Seasonal trends in precipitation



Source: Environment Canada, Adjusted Historical Canadian Climate Data, 2004.

Recent changes in temperatures

The maps opposite provide an indication of the recent changes in average temperature in different parts of the province. Over time, people, their institutions, their architecture, and other key factors are constructed, in part, based on the experience of climate.

Changes in climate can have major impacts, not only on individuals but on whole societies. Increasingly, there is major concern about the impact of climate change and global warming on all societies. Few places appear to be immune from these changes given the global nature of ocean and atmospheric currents and systems.

Average temperature increases affect other components of the system of climate. This can include warmer coastal and inland water temperatures, affecting fish habitats, precipitation regimes, and changes in snow pack. Also, increased severe weather events, such as major storms, heat waves, and dry spells, which favour forest fire conditions, or warmer winters, which allow pests to survive, are part of the overall variability in weather beyond what has normally been expected (Ministry of Water, Land and Air Protection, 2002; 2004) .

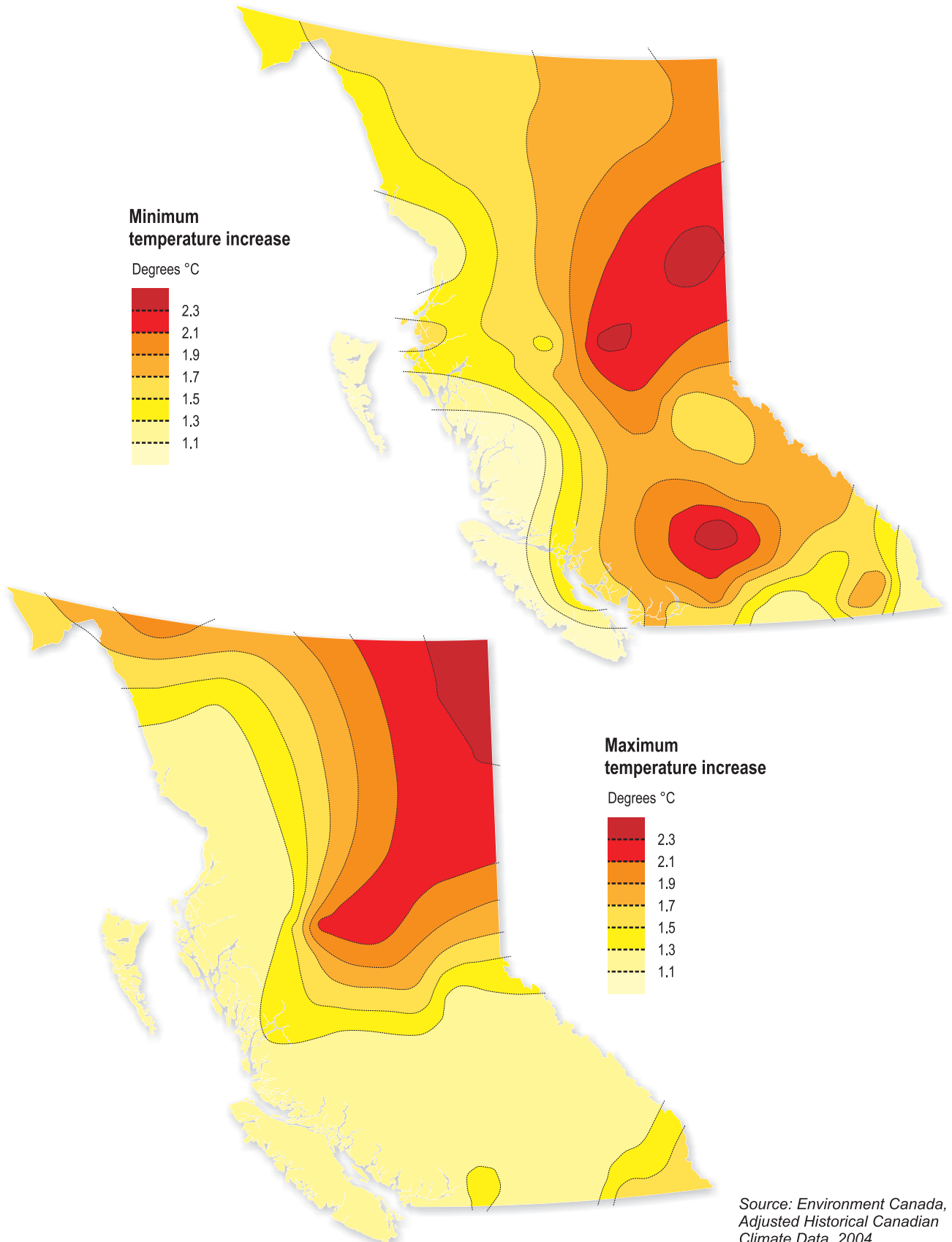
Over the past half-century, all of the province has experienced temperature increases (Ministry of Environment, 2006). The increases have been in both minimum and maximum temperatures. Both winter and spring temperatures appear to be rising faster than summer temperatures.

As the Ministry of Environment (2006) has noted, overnight minimum temperatures have increased faster than daytime maximum temperatures, thus creating a narrower daily temperature range, and a longer growing season. It also results in lower winter heating requirements.

Geographically, as the maps indicate, the rises in temperature are lowest (around 0.5 degrees Celsius) in coastal BC, where the majority of the population lives, and increase as one moves northward and eastward from the coastal area for rises in both maximum and minimum temperatures. The greatest increases occur in the northeast (in excess of 2.5 degrees Celsius), although large increases also occur in minimum temperatures in the interior around Kamloops.

Over time, these changes will create the need for adjustments by individuals and the biosphere.

Recent changes in temperatures



Population distribution within the province

The two maps opposite provide key indicators related to the province's population in terms of its distribution geographically, and the population density by HSDA, and provide an important context for the maps on wellness that follow. They are based on the P.E.O.P.L.E. 30 population projections developed by BC Statistics for 2005.

Percent of total population

Most of the province's population is concentrated in three regions. Nearly 40% of the population resides in three HSDAs in the extreme southwest part of the province. Fraser South (15.08%), Vancouver (13.93%), and Fraser North (13.13%) dominate the population distribution within the province. Neighbouring HSDAs such as North Shore/Coast Garibaldi, Richmond, and, to a lesser extent, Fraser East, are also considered part of the lower mainland area. Together these HSDAs contain nearly half of the province's population.

The second region of importance is South Vancouver Island. This HSDA contains 8.25% of the province's population. The third main region is the Okanagan in the southern interior of the province with 7.78% of the province's total. The northern half and southeastern parts of the province, which cover the largest land mass, contain relatively few people.

Population density per square kilometre

The population density of the Vancouver HSDA dominates the density distribution map and table. At over 4,500 people per square kilometre, it had more than three times the population density of the next highest HSDA (Richmond with 1,420 people/sq. km.). Fraser South, at 760 people per square kilometre, was also prominent, as was Fraser North with 244 people per square kilometre. These are all in the urbanized part of the lower mainland in the southwest.

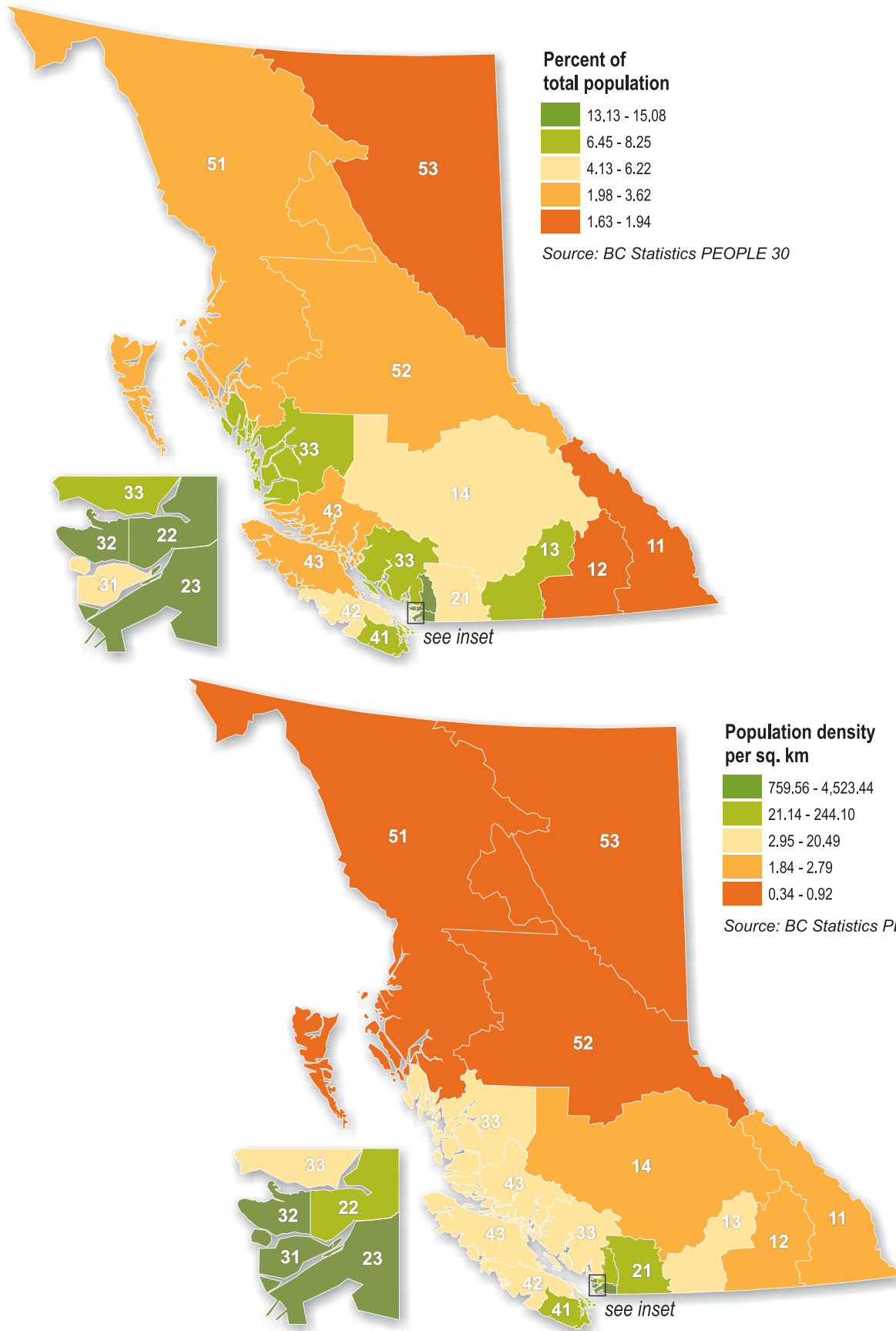
South Vancouver Island also has a relatively high population density and, as with other HSDAs, the population within it tends to be concentrated in only a small part of the region as a whole, and so some caution is required in analysing these data.

The whole of the northern half of the province is very sparsely populated, with small settlements scattered throughout the region. Again, some caution is required

Health Service Delivery Area	Percent of total pop.	Pop. density per sq. km
023 Fraser South	15.08	759.56
032 Vancouver	13.93	4,523.44
022 Fraser North	13.13	244.10
041 South Vancouver Island	8.25	149.09
013 Okanagan	7.78	15.49
033 North Shore/Coast Garibaldi	6.45	5.07
021 Fraser East	6.22	21.14
042 Central Vancouver Island	5.94	20.49
014 Thompson Cariboo Shuswap	5.22	1.85
031 Richmond	4.13	1,420.91
052 Northern Interior	3.62	0.92
043 North Vancouver Island	2.79	2.95
051 Northwest	1.98	0.34
011 East Kootenay	1.94	1.84
012 Kootenay Boundary	1.89	2.79
053 Northeast	1.63	0.37
999 Province	100.0	4.50

given that there are several major towns in which much of the population may be concentrated. Prince George in the Northern Interior, with a population in excess of 77,000, is one such community which dominates the population of the HSDA. The same can be said of other regions: Nanaimo (population of nearly 80,000) for Central Vancouver Island; Kelowna (population of 110,000) in Okanagan; and Kamloops (nearly 83,000) in Thompson Cariboo Shuswap.

Population distribution within the province



Aboriginal population distribution

According to the 2001 census, the Aboriginal population in the province constituted 4.4% of the provincial total, based on self-identification. This may be a slight underestimate, as a few Indian reserves refused to participate in the census exercise, although estimates were made in those instances. Of those identifying themselves as Aboriginal, 70% were North American Indian, and 26% were Metis. If the results of the census are based on Aboriginal ancestry, rather than Aboriginal identity, then the percentage of the BC population with Aboriginal origin (or identity) is higher, at 5.6% (BC Statistics, 2004a)

The Aboriginal population tends to be much younger than the general population (approximately 30% are under 15 years old, almost twice the percentage for the non-Aboriginal population), and the population is reasonably mobile in that many reside on Indian reserves but frequently move between reserve and urban areas.

Percent Aboriginal population

As a percentage of total population by HSDA, there was a major geographic difference in values for percent of Aboriginal populations from more than one-quarter (25.05%) in the Northwest, to less than one percent (0.71%) in Richmond in the lower mainland.

Geographically, the northern half of the province had a greater representation of Aboriginal peoples, with each northern HSDA having more than 10% of its population self-identified as Aboriginal. Northern Vancouver Island and Thompson Cariboo Shuswap, in the interior of the province, also had populations that were approximately 10% Aboriginal.

By contrast, much of the lower mainland urban HSDAs had 2% or less of their population that self-identified as Aboriginal.

Distribution of total Aboriginal population

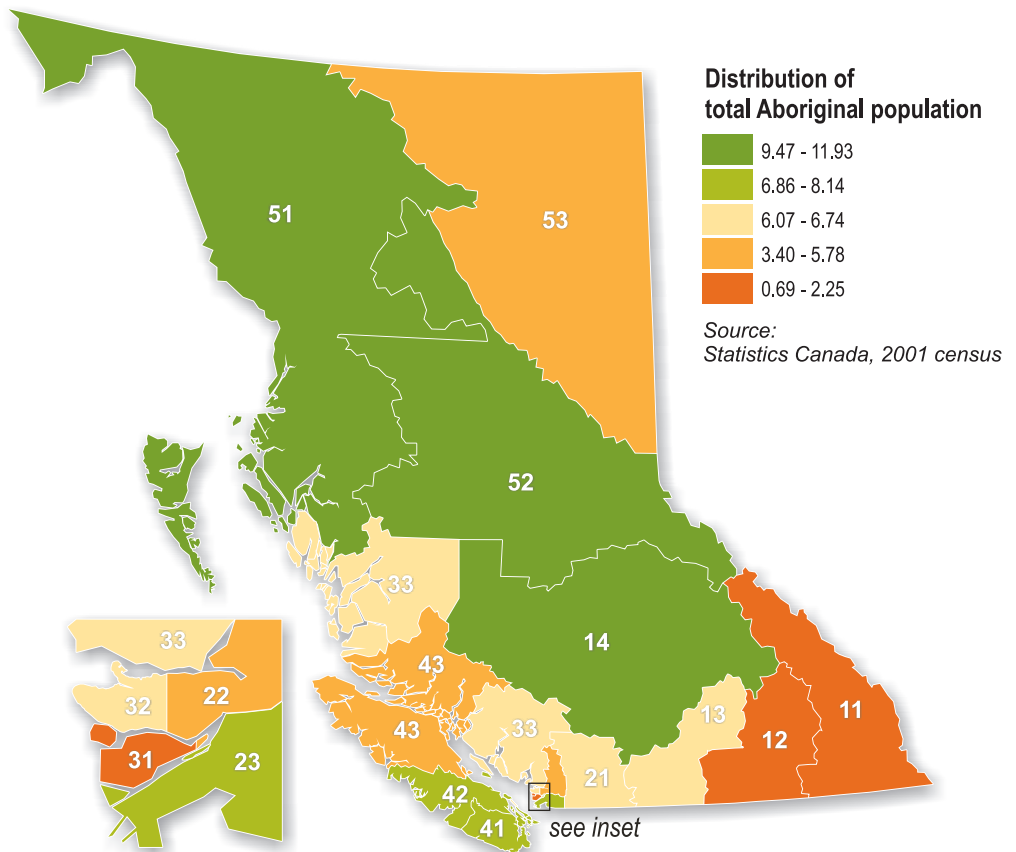
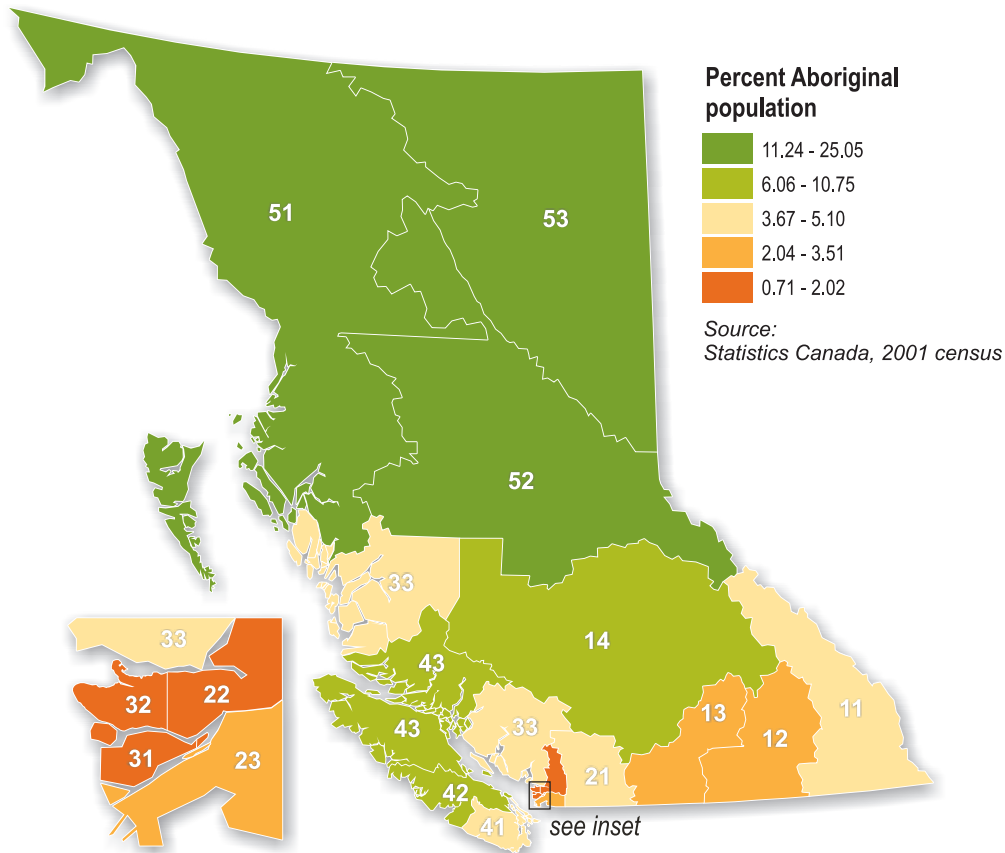
Based on the 2001 Canada census, the Aboriginal population was distributed geographically all around the province. The HSDAs with the largest Aboriginal populations were Thompson Cariboo Shuswap (20,290), Northwest (20,080), and Northern Interior (16,095). Each had approximately 10% or more.

Health Service Delivery Area	Percent Aboriginal	Distribution of Aboriginal population
051 Northwest	25.05	11.81
053 Northeast	13.27	4.70
052 Northern Interior	11.24	9.47
043 North Vancouver Island	10.75	3.40
014 Thompson Cariboo Shuswap	9.95	11.93
042 Central Vancouver Island	6.06	8.08
011 East Kootenay	5.10	2.25
021 Fraser East	4.90	6.74
033 North Shore/Coast Garibaldi	4.17	6.19
041 South Vancouver Island	3.67	8.14
013 Okanagan	3.51	6.07
012 Kootenay Boundary	3.08	1.37
023 Fraser South	2.04	6.86
032 Vancouver	2.02	6.53
022 Fraser North	1.93	5.78
031 Richmond	0.71	0.69
999 Province	4.39	100.00

At the other extreme, Richmond has a mere 0.69% of the province's Aboriginal population and East Kootenay and Kootenay Boundary, with 2.25% and 1.37% of the provincial Aboriginal population respectively, also have small numbers of Aboriginal peoples.

Many Aboriginal peoples live on reserve lands, some of which are quite remote (Elliott and Foster, 1995). In 2001, only one-third of those living on reserve did so in large urban areas. In total, 104,000 of the province's 170,000 Aboriginal people are registered under the Indian Act of Canada and belong to a Band, but only 27% live on reserve. Of those who are registered, over 40% live on reserve. Those living on reserve tend to be older (BC Statistics, 2004b).

Aboriginal population distribution



Population age patterns

The three maps opposite provide a brief summary of the age breakdown of the population in 2005, based on P.E.O.P.L.E. 30 from BC Statistics. The data are provided at the HSDA, or regional, level and show the percentage of each HSDA population in 2005 by three different age categories. The top map looks at the 20 to 64 age cohort in the province and the bottom two maps show the distribution of the population below age 20 and the population in the seniors (age 65 and over) cohort. There are major differences throughout the province in proportions of the population in the three age groups.

Population 20 to 64 years old

This is by far the largest portion of the population, making up nearly two-thirds of the total for the province (63.31%). It consists of the post-war “baby boom” cohort, which is dominant not only in BC but throughout Canada. This group of the population is generally involved in the work environment and raising families. There was a 10 percentage point range between the HSDA with the highest (Vancouver at 68.86%) and lowest (Okanagan at 58.56%) percentage in this age group. Generally speaking, the lower mainland HSDAs in the southwest of the province (Vancouver, Fraser North, and Richmond) had the highest percentage (more than 65%) in the middle age, or 20 to 64 age cohort. Central Vancouver Island, Fraser East, and Okanagan in the interior (all with less than 60%) had the lowest proportion of their population in the 20 to 64 age group. All other HSDAs were between 61% and 64%.

Population below age 20

The percent of total provincial population in this age cohort in 2005 was 22.92%. The range between the highest and lowest HSDAs with population in this age cohort was over 12 percentage points. The northern, more rural HSDAs (Northwest, Northern Interior, and Northeast) all had more than one-quarter of their population in this young age group (more than 27.5%), while Vancouver and Richmond in the lower mainland, and South Vancouver Island, all urban areas, had about one-fifth or less of their population in this category.

Population 65 years or over

This map is almost the opposite of the previous map. The HSDAs with the highest percentage of their

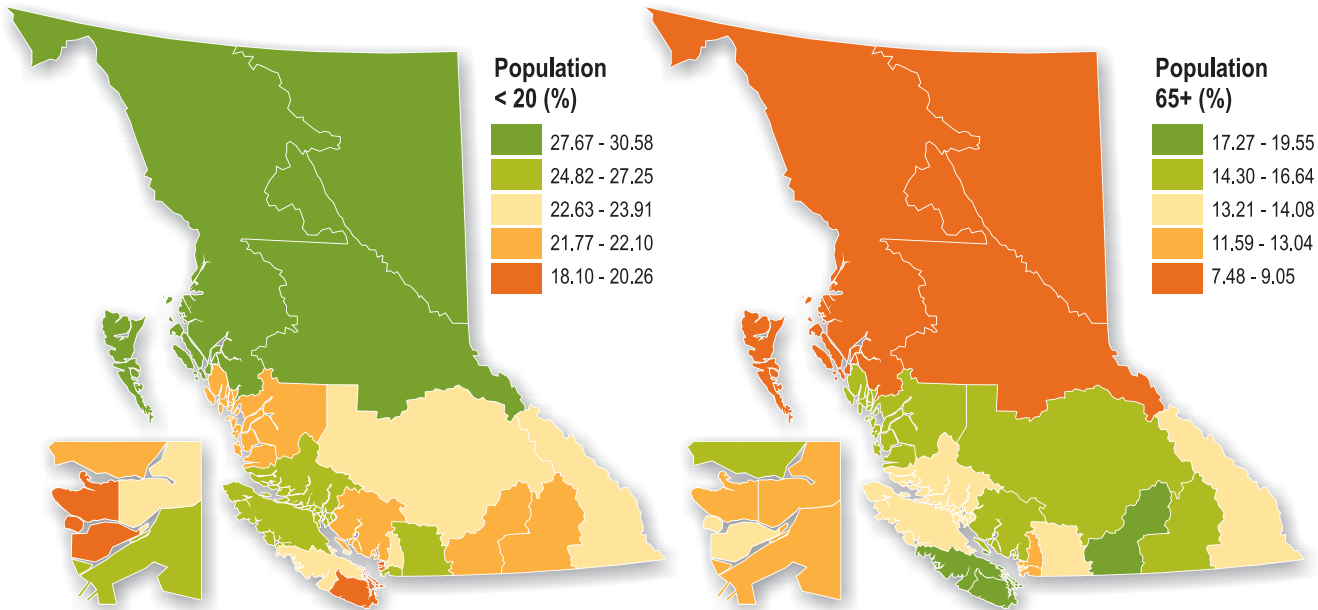
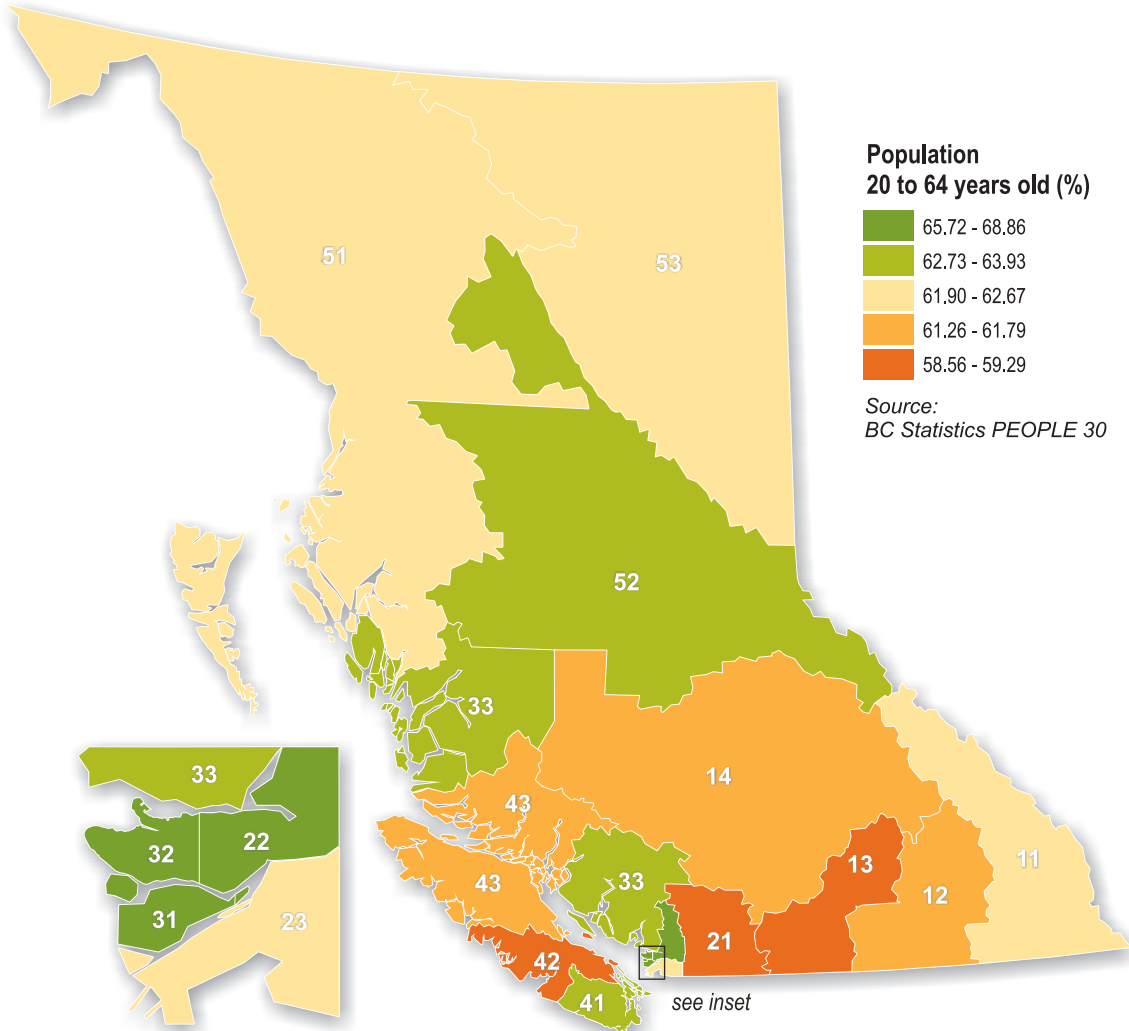
Health Service Delivery Area	Ages <20 (%)	Ages 20-64 (%)	Ages 65+ (%)
032 Vancouver	18.10	68.86	13.04
031 Richmond	20.26	66.52	13.21
022 Fraser North	22.69	65.72	11.59
033 North Shore/Coast Garibaldi	21.77	63.93	14.30
052 Northern Interior	27.67	63.28	9.05
041 South Vancouver Island	20.00	62.73	17.27
023 Fraser South	25.68	62.67	11.66
011 East Kootenay	23.58	62.34	14.08
053 Northeast	30.58	61.94	7.48
051 Northwest	29.77	61.90	8.33
014 Thompson Cariboo Shuswap	23.91	61.79	14.30
043 North Vancouver Island	24.82	61.48	13.70
012 Kootenay Boundary	22.10	61.26	16.61
042 Central Vancouver Island	22.63	59.29	18.08
021 Fraser East	27.25	59.01	13.74
013 Okanagan	21.89	58.56	19.55
999 Province	22.92	63.31	13.77

populations in the seniors group were in the southern part of Vancouver Island and the Okanagan, which have all become favourable places to which people retire, not only from within BC, but also from elsewhere in Canada. By contrast, less than 10% of the northern part of the province were seniors. In total, only 13.77% of the population were seniors in 2005, but it is the fastest growing age group of the three.

Summary

Within the province, there were major variations in the age make-up of the population. The north had a substantial part of its population in the younger age groups, and a relatively small proportion who were seniors. The lower mainland dominated in the 20 to 64 age category, and the southern half of Vancouver Island and the Okanagan had a higher proportion of the seniors population.

Population age patterns



Recent immigrants and language

Over the past couple of decades, BC has had a major influx of new foreign-born individuals. In 2001, there were over one million such immigrants living in BC, accounting for more than a quarter of the total population. The immigrant population has been growing much faster than the Canadian-born population. This trend will have a major effect on the health and wellness attributes of the BC population.

The majority of immigrants in the province have lived in Canada for more than 20 years. A higher percentage of the early immigrants came from Europe (mainly the United Kingdom or Germany) and the United States, and European immigrants make up more than a third of the province's immigrant population, and more than three-quarters of the immigrants that arrived in Canada prior to 1980. Asian immigrants (mainly from Mainland China, Hong Kong, and India), on the other hand, account for over one-half of the immigrant population and more than three-quarters arrived in Canada after 1980. Approximately two-thirds of these later immigrants were between the ages of 25 and 64 years, with females slightly outnumbering males (BC Statistics, 2003).

Approximately 10% of immigrants in 2001 were unable to speak, write, or understand English or French. This puts many new immigrants at a disadvantage in contributing to those parts of the economy that rely on English as the language of communication. Furthermore, it may also disadvantage, at least initially, the progress of younger children in the school system (Kershaw et al., 2005). The most common mother tongues used by non-English speaking immigrants were Cantonese, Mandarin, Punjabi, Tagalog, Korean, and Farsi.

New immigrants tend to be healthier than native-born Canadians. This "healthy immigrant effect" is related to the fact that potential immigrants are screened on health and medical criteria before being admitted to Canada. In addition, there is some degree of self-selection in the originating countries, which also can affect the wellness of new immigrants entering BC (Ng, Wilkins, Gendron, and Berthelot, 2005).

Recent immigrants

The distribution of new immigrants (those entering Canada between 1996 and 2001) is based on data from the 2001 Canada census. Overall, nearly 1 in every 20 people in the province were new immigrants in

Health Service Delivery Area	Recent immigrant (%)	Mother tongue non-official (%)	Foreign language (%)
031 Richmond	14.58	52.72	24.96
032 Vancouver	9.97	47.87	21.68
022 Fraser North	9.43	34.29	13.18
023 Fraser South	5.37	28.01	10.59
033 North Shore/Coast Garibaldi	5.24	19.70	5.25
021 Fraser East	2.58	19.01	5.78
041 South Vancouver Island	1.41	10.57	2.11
013 Okanagan	1.04	12.19	1.71
053 Northeast	1.01	8.49	1.78
042 Central Vancouver Island	0.81	8.30	1.12
011 East Kootenay	0.75	7.59	0.60
014 Thompson Cariboo Shuswap	0.72	9.61	1.41
051 Northwest	0.67	13.01	1.80
012 Kootenay Boundary	0.63	11.66	0.90
043 North Vancouver Island	0.59	8.01	1.25
052 Northern Interior	0.50	9.61	1.61
999 Province	4.95	24.29	8.77

2001. Geographically, there was a major cluster of new immigrants in the lower mainland area in the southwest of the province. In particular, the population of Richmond was comprised of nearly 15%, while Vancouver and Fraser North both had nearly 10% of their population comprised of new immigrants. Other HSDAs in the lower mainland had relatively high levels of new immigrants when compared to the rest of the province. Outside of the lower mainland, most HSDAs had 1% or less of their population who were new immigrants.

Mother tongue

Some parts of the province had very high numbers of residents whose mother tongue was neither English nor French. The lower mainland HSDAs all had populations of approximately 20% or more whose mother tongue was not one of the official two languages. Richmond with 52.72% and Vancouver at 47.87% had by far the largest numbers of residents with a foreign mother tongue. At the other extreme, East Kootenay in the southeast, North and Central Vancouver Island, Northeast, Thompson Cariboo Shuswap, and Northern Interior all had populations less than 10% with a foreign mother tongue.

Foreign home language

A total of 8.77% of the BC population spoke a language other than English or French at home. The pattern was very similar to the previous two maps described, with the lower mainland HSDAs having the highest percentage of foreign language use in the home.

Recent immigrants and language

