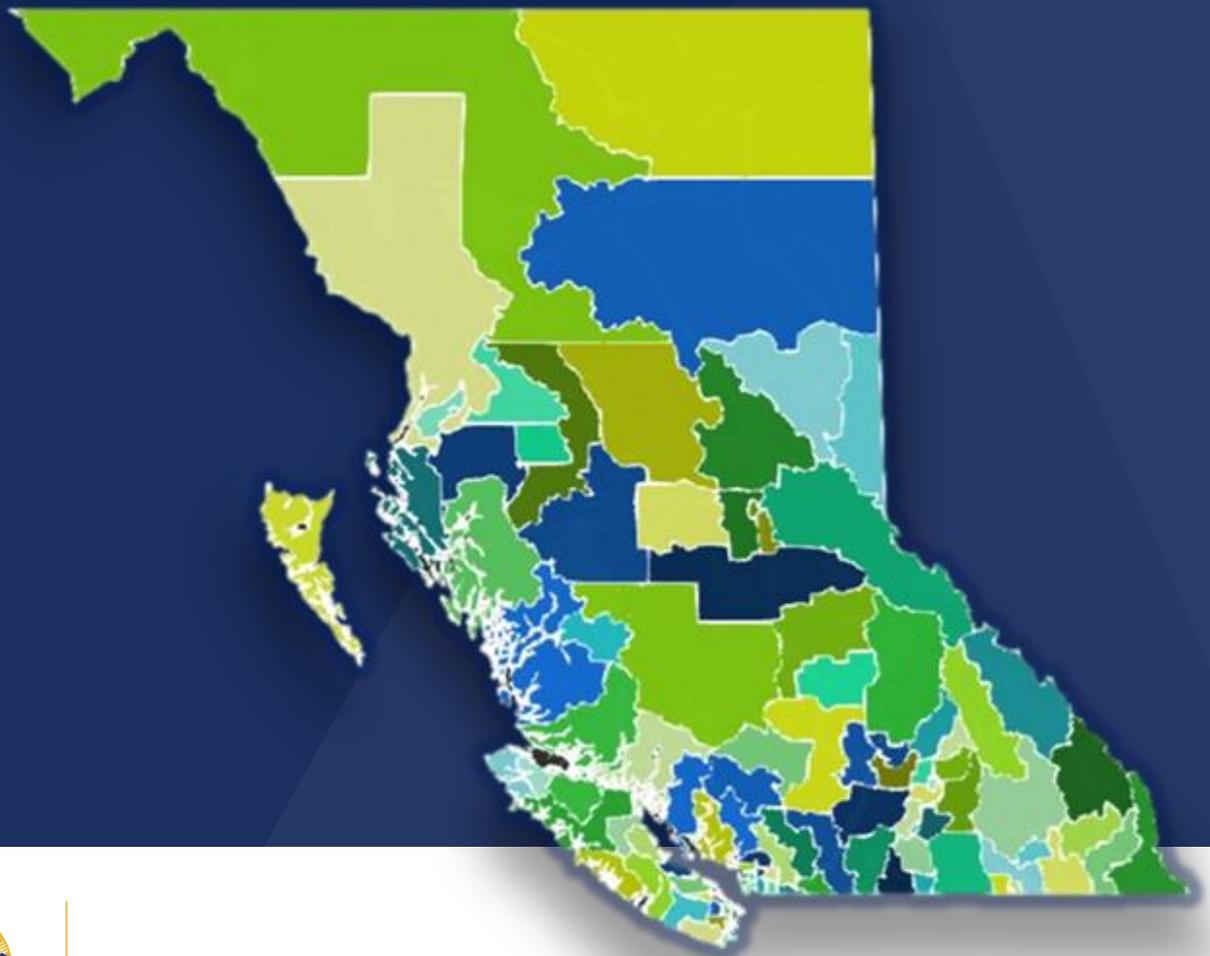


Local Area Economic Profiles

Technical Report

BC STATS

July 2025



BCStats

AUTHORS

Jeff Dean

Economist, BC Stats

ACKNOWLEDGEMENTS

I am indebted to Garry Horne, the author of the previous Local Area Economic Dependency reports. Additional thanks to my colleagues at BC Stats: Rasim Jafarov, Angela Matheson, Andrew Esser-Haines, Tao He, Julie Hawkins, Stephanie Yurchak, Trevor Bowes and Sonya Tomin.

PUBLISH DATE

July 2025

Copyright © 2025, Province of British Columbia. All rights reserved.

This material is owned by the Government of British Columbia and protected by copyright law. It may not be reproduced or redistributed without the prior written permission of the Province of British Columbia. To request permission to reproduce all or part of this material, please complete the copyright permission request form available at <https://www2.gov.bc.ca/gov/content/home/copyright>.

Table of Contents

About this report	4
Executive Summary	6
Background	9
Sources and Methodology.....	10
Main results.....	12
What are the most important income sources?	12
How did the private sector economic base change?.....	24
How was economic diversity reflected in different local areas?	41
Appendix A: Detailed Methodology.....	48
Appendix B: Glossary of Terms	76
Appendix C: Maps of Basic Income Shares for 2020	81
Appendix D: Economic Sector Aggregations	89
Appendix E: Toolkit Use Cases.....	97
Profiles: getting data for an area.....	97
Economic impact assessments	99
Shift-share: analyzing growth and decline	105
Making the most use of the demand sources data.....	108

About this report

Are you looking for a better understanding of your local area?

This report and its dataset give information on the cities, towns, and rural areas of British Columbia. You can use it to find information about the economic well-being of your community and to answer questions like:

- What is the most important industry in my area?
- How much do people's incomes depend on a particular industry?
- Which industries and areas are performing well or poorly?
- What impact will an event have on the area, such as a big investment or a natural disaster?

The Local Area Economic Profiles (LAEP) is the latest in a series of reports published by BC Stats.

It fills a data gap. The LAEP provides sub-provincial data that isn't available anywhere else.

Its purpose is to dig deeper. It lets users investigate any area they're interested in. It's intended for researchers, policy makers, and members of the public who are looking for insights that will help them with specific questions.

The LAEP Toolkit accompanies this report. It is a Microsoft Excel workbook with tables of data and interactive charts and calculators that allow users to create and customize profiles, compare areas, and perform an economic impact assessment.

103 local areas are covered, from the Sunshine Coast to the South Peace Valley. Data is also available for every regional district and for the whole province.

The Census provides the most detailed data available. Custom data from the last three censuses is the basis for information on local incomes, jobs, and industries.

Input-output modelling is used. When combined with the Census data, it provides a consistent model of local economies. Models like this usually only exist for the whole province or country.

Users can forecast the impact of economic events. The report provides Employment Impact Ratios for every local area. These economic multipliers can be used in the LAEP Calculator to quickly generate an Economic Impact Assessment.

It is not an assessment of the B.C. economy as a whole. The report includes statements about controversial issues like dependence on government transfers and government employment, and the latest reference year fell right in the middle of the COVID-19 pandemic. But, while the report allows detailed comparisons between areas of B.C., it lacks comparisons to peer jurisdictions like other provinces or U.S. states, so it's not possible to say whether B.C. as a whole is doing better or worse than our peers.

It defines the economic base of local areas. The report uses economic base theory to identify and analyze the sources of income that communities rely on, where the “economic base” is defined by different kinds of external income, the industries it flows through, and the people who receive it.

Executive Summary

The Local Area Economic Profiles (LAEP) is a new edition of an economic impact model that was previously called the Local Area Economic Dependencies and was last published by BC Stats in 2009. The analysis combines detailed census data with the province's macroeconomic input-output model.

This report outlines the economic structure of local areas by focusing on their external income sources, and how those circulate and sustain the rest of the local economy. In short, it defines and analyses their “economic base”. Detailed data on every local area studied can be found in the LAEP Toolkit, but here we will outline some general conclusions about the B.C. economy.

Employment makes up about two thirds of people’s income and non-employment income sources make up the rest. Whether from government transfers or investment (i.e. market) sources, non-employment income is a major part of the economic base; it makes up 43 per cent of total external income in B.C., though the share varies by area. Retirement income is a major part of this, making up at least half of non-employment income, meaning income from sources such as private pensions and Canada Pension Plan benefits act as a major economic cushion in every area.

The COVID-19 pandemic had a major effect on the economy in the 2020 reference year, given that the 2021 Canadian Census was taken during its height.

Government transfers skyrocketed and employment income fell below what they would have been otherwise. Some indicators in this report are noticeably affected, especially an increased dependence on government transfers and a large reduction in tourism as a share of the economic base. Fortunately, more recent data show some of these indicators returning to normal in subsequent years.

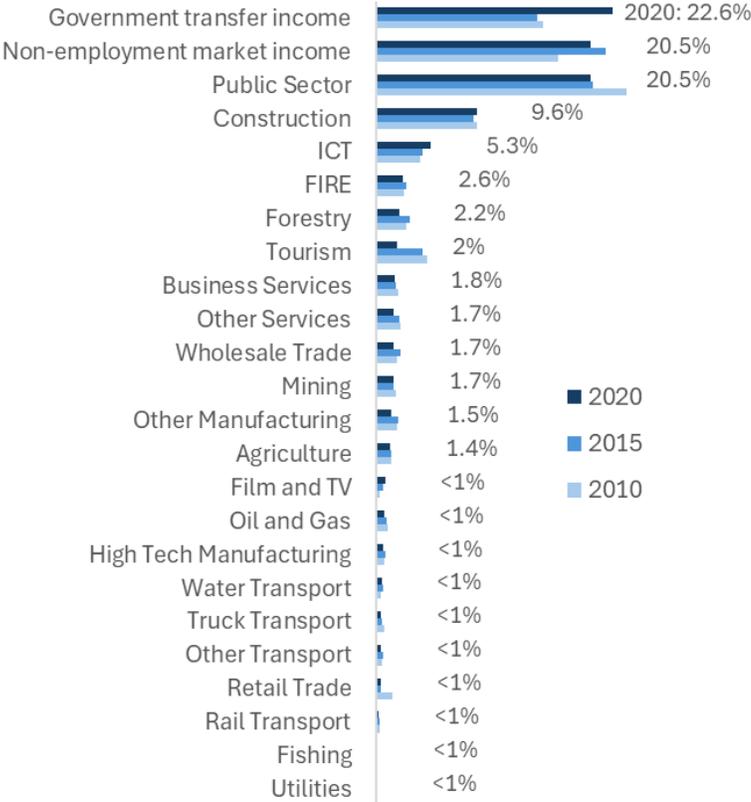
Among types of employment income, the report distinguishes between private sector and public sector sources.

Public sector employment, which includes income from employment in all levels of government and by the health and education sectors, makes up almost one quarter of all jobs in B.C. and is one of the main sources of external income for every community. Though the sector is large, its share of the economic base has

been declining over time as other sources have grown faster. The report analyses how this is broken out by sub-sector and for different local areas.

Among private sector employment sources, construction is the most important part of the economic base in most areas. Construction represents capital investment primarily in residential structures, but investment in commercial and industrial structures is also significant to a greater or lesser extent in different areas.

FIGURE 1: BASIC INCOME SHARES FOR BRITISH COLUMBIA



The Economic Base

Basic income shares, also called Income Dependency Shares, are how this report measures the economic base. Of all the external income sources to an area, what share comes from each one? Presented here are the shares for B.C. overall but the structure of each area's economic base will be different.

The information and communications technology (ICT) sector is the second-biggest part of the province's private sector economic base. It has been growing in importance, even through the pandemic period, but is concentrated in B.C.'s major population centres.

Natural resource extraction and processing sectors – including forestry, mining, oil and gas, fishing, and agriculture and food – have been declining in importance as a share of the province's overall economic base but are still very important in many rural areas. In 2020 there were 29 out of 103 local areas where an individual

resource sector was the single biggest source of external income from private sector employment, but if we consider all resource sectors together, 54 areas depended on natural resources most.

This report and dataset present many more indicators that can be used to profile and analyze B.C.'s local areas and their economic conditions. Coming as it does mainly from the census, the report offers very detailed data that is not available anywhere else, though the trade-off is that it is not very timely, where the latest reference year is already five years out-of-date. The local area economic profiles are best used as a baseline assessment that are updated with more recent and contextual information. Used in this way, BC Stats hopes that it will be a valuable analytical resource for policy makers, local governments, community planners, and for anyone in the general public who wants to learn more about their local area.

Background

The Local Area Economic Profiles (LAEP) is a continuation of a previous series published by BC Stats following each National Census from 1993 to 2009, formerly known as the *Local Area Economic Dependencies*. These reports highlighted the impacts of economic changes on income, employment, and industry within rural communities across the province. After the series was discontinued, the underlying data from the final report—based on the 2006 Census—became increasingly outdated.

Over the years, many people within and outside the B.C. government reached out to BC Stats for updated data. The demand for this information persisted because it filled a key data gap by providing sub-provincial insights not available elsewhere. Access to a community's economic drivers is fundamental for planning and for an economic impact analysis.

BC Stats began updating the report in 2022, with preliminary results released in the fall of 2023. The project expanded beyond rural communities to include all 103 local areas across the province, allowing users to explore any region of interest. Data was also made included for every regional district and for the province as a whole.

Based on user feedback, the methodology and model were refined, and the products were expanded to meet the needs of a broader audience. This report and the accompanying LAEP Toolkit thus represent the second and final phase of the model for this census cycle. Subject to sufficient interest and operational resources, BC Stats intends to update the report when future census data becomes available.

Sources and Methodology

The Local Area Economic Profiles uses two main data sources:

1. The Canadian Census from the past three periods: 2011, 2016 and 2021.
2. The B.C. Input-Output Tables (IOTs) for the relevant reference years.

The Canadian Census provides the most detailed data available on economic conditions down to the very local level. BC Stats obtained custom data on employment and employment income for each area.

The input-output tables (IOTs) are part of the System of National Accounts (SNA), produced by Statistics Canada every year. They describe the structure of the B.C. economy, representing economic relationships between industries, households, government, and the outside world.

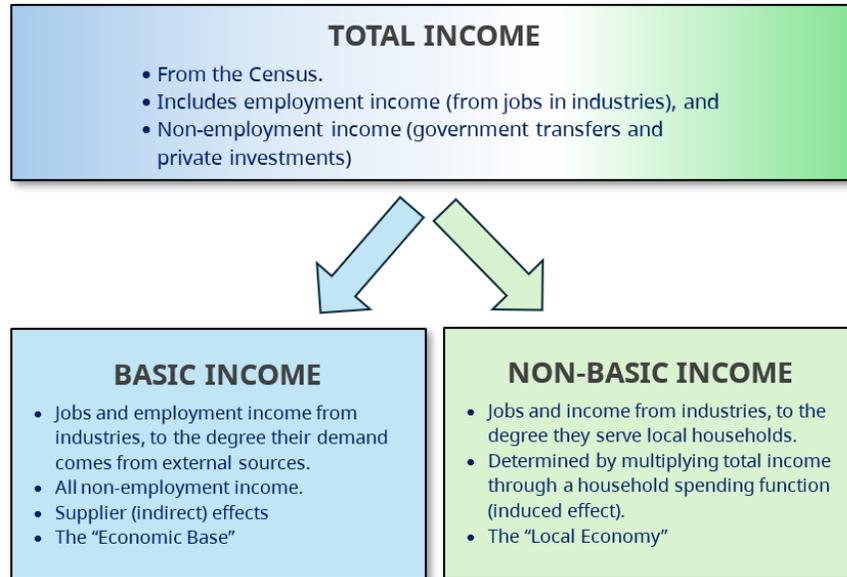
The census and IOTs, when combined together, create a comprehensive set of local macroeconomic models for each area, where otherwise these would only exist at the provincial and national levels. Import and export flows are normally used but the census data acts as a substitute.

This report applied an “**economic base**” methodology in its analysis. The central premise is that a community’s economy can be represented by income flows classified as either “basic” or “non-basic.”

- Basic income flows into a community from external sources, while
- Non-basic income is generated within the community — primarily through sectors that serve local households such as retail trade.

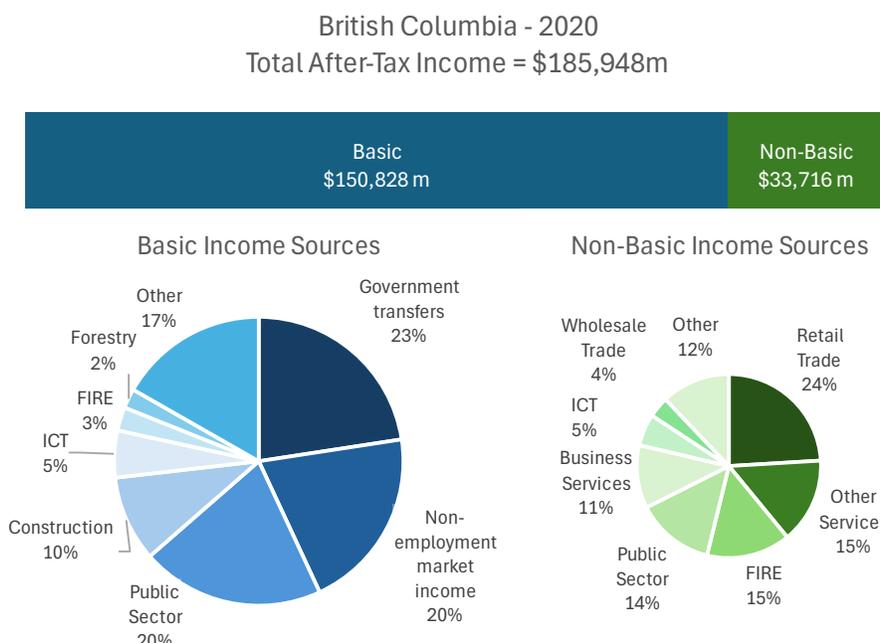
In other words, external income is needed to pay for all the imports that modern life requires. Some of it circulates within the local economy (the “non-basic” sector) to generate more jobs and income, and to make the community a place where people want to live. The basic sector thus earns external income that has a multiplier effect and sustains the rest of the local economy.

FIGURE 2: THE ECONOMIC BASE AND LOCAL ECONOMY



The basic sector is further defined by **basic income shares**, also called income dependencies. They show what sources the area depends on for its external income, whether through employment in industries or from non-employment income. Figure 1 in the Executive Summary shows the shares for all 24 sources. Figure 3, below, shows how these shares can be broken out between basic and non-basic income sources. A chart like the one below can be generated in the LAEP Toolkit for any local area, and each will be different. The higher the basic income share is, the more dependent the area’s economy is on a given source.

FIGURE 3: TOTAL INCOME IS DIVIDED BETWEEN BASIC AND NON-BASIC



Main results

While the primary purpose of this report and the LAEP Toolkit is to allow users to dig deeper into the data for any area, this chapter analyzes the results for the B.C. economy as a whole. It pays special attention to the 2020 reference year and the effects of the COVID-19 pandemic.

Readers are cautioned that this analysis is limited by the fact that it does not include comparisons to other jurisdictions. The model was created for British Columbia only, so while we can compare B.C.'s local areas to one another, we can't say whether B.C. is doing better or worse than peer jurisdictions or U.S. states.

What are the most important income sources?

Government transfers, non-employment market income, and public sector employment were the top sources in most areas.

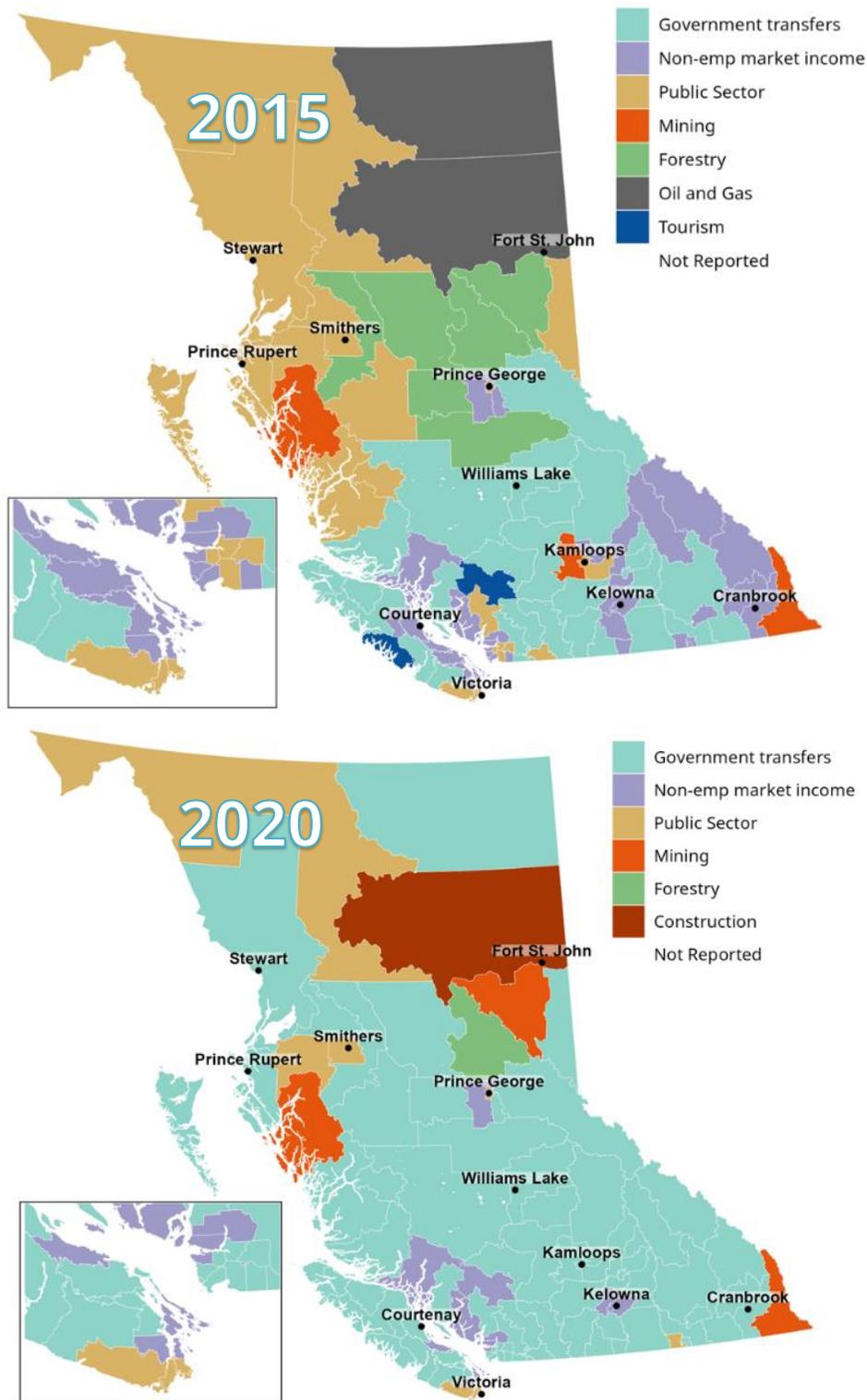
TABLE 1: COUNT OF AREAS BY DOMINANT BASIC INCOME SOURCE

	2010	2015	2020
Government transfers	33	30	74
Non-employment market income	13	36	14
Public Sector	43	24	10
Mining	5	3	3
Forestry	6	6	1
Construction	0	0	1
Tourism	1	2	0
Oil and Gas	2	2	0

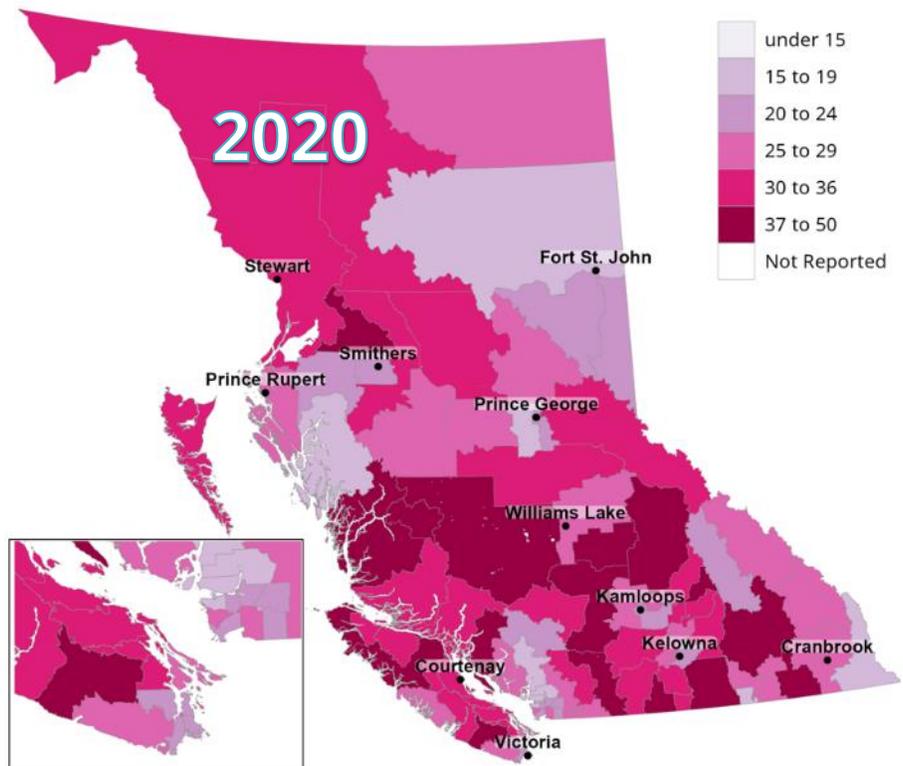
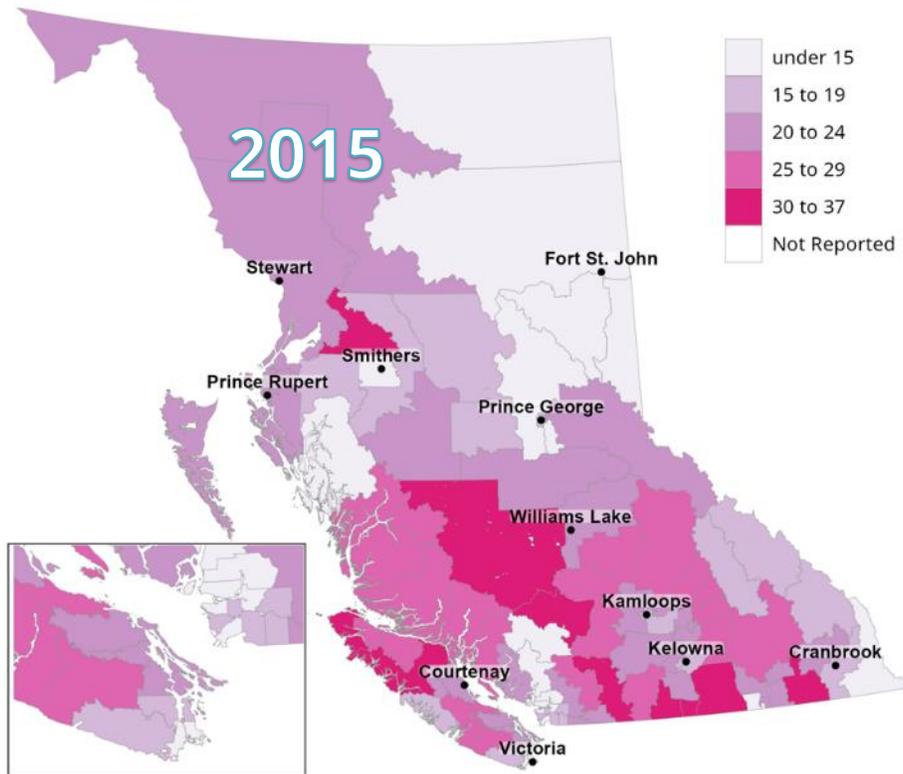
The preceding table shows how many local areas depended most on each external income source. The dominant basic income source is arguably the most important part of the economic base, the single biggest way that external income flows to the local area. But it is not the only source, and users should keep in mind the composition (measured by basic income shares) and diversity (measured by the diversity index) of sources the area depends on.

Figure 4, below, shows that government transfers became the most important source in many more areas in 2020. Figure 5 makes the same point, being a heat map of dependence on government transfers in 2015 and 2020.

FIGURE 4: DOMINANT BASIC INCOME SOURCES



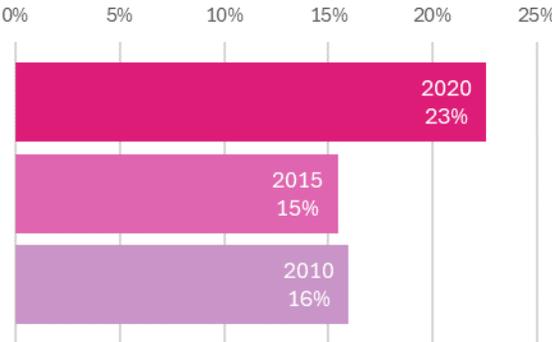
**FIGURE 5: BASIC INCOME DEPENDENCE ON GOVERNMENT TRANSFERS
(% SHARE)**



Government transfers increased during the COVID-19 pandemic

In 2010 and 2015 about 30 out of 103 Local Areas relied most on government transfers. By 2020 it was 74. Similarly, the Income Dependence for all of B.C. rose from about 15 per cent to 23 per cent.

FIGURE 6: BASIC INCOME SHARES FOR GOVERNMENT TRANSFERS, ALL OF B.C.



What are government transfers?

By looking at tax data published by Statistics Canada¹ and presented in Table 2 we can see that they are mostly the retirement-related government transfers of Canada Pension Plan (CPP), Old Age Security (OAS) and the Guaranteed Income Supplement (GIS). In normal times, these retirement-related transfers make up about 65 per cent of the total, but 2020 saw a major increase in other categories.

Other types of government transfers include, Employment Insurance (EI), social assistance benefits (e.g. Income Assistance, rental supplements), and various types of child and family benefits. Table 2 also shows the major increase seen in many of these categories in 2020.

¹ Statistics Canada's T1 tax files, also known as the T1 Family File, are used to produce statistics on the income and financial situation of Canadian tax filers. For more information on types of benefits and how they are classified in tax filer data, see Statistics Canada's Technical Reference Guide for the T1 Family File, 2021, [Glossary of Terms](#).

TABLE 2: COMPOSITION OF GOVERNMENT TRANSFERS IN TAX FILER DATA FOR BRITISH COLUMBIA

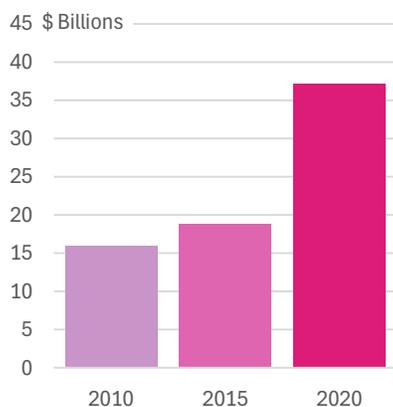
(\$ Billions)	2010	2015	2019	2020	2021	2022	2019-20 % change
Total Government Transfers	16.2	19.9	24.0	38.4	33.1	29.1	60%
Employment Insurance (EI)	2.1	1.8	1.8	2.4	4.5	2.2	35%
Old Age Security (OAS) and net federal supplements	4.6	6.2	7.5	8.3	8.5	9.2	11%
Canada Pension Plan (CPP)	5.2	6.8	8.1	8.5	8.8	9.2	5%
Federal Child Benefits	1.5	2.1	2.7	3.0	2.8	2.7	12%
Goods and Services Tax (GST) Credit	0.5	0.5	0.6	1.2	0.5	0.7	105%
Workers' Compensation Benefits	0.7	0.8	1.0	1.1	1.1	1.2	11%
Social Assistance Benefits	1.0	1.1	1.7	2.2	2.1	2.2	27%
Provincial Refundable Tax Credits and Family Benefits	0.5	0.4	0.4	1.7	1.9	1.0	285%
Other including COVID-19 benefits	0.2	0.2	0.3	10.0	2.9	0.6	3516%

Source: Statistics Canada. Table 11-10-0014-01, Sources of income by census family type.

Increases during the pandemic are returning to normal

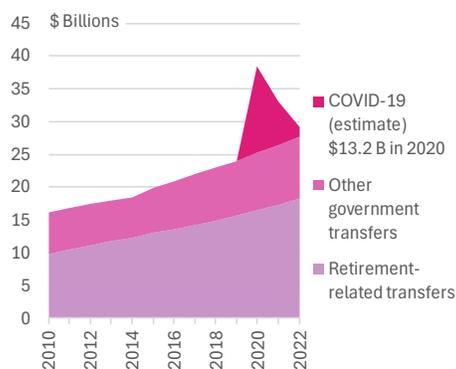
All levels of government sought to replace income lost because of the pandemic, resulting in changes to many benefit programs – whether to the eligibility rules, to the benefit amounts, by creating whole new programs, or simply because more people needed and qualified for them. Figure 7 shows how dramatic the increase was, rising 96 per cent between 2015 and 2020.

FIGURE 7: TOTAL GOVERNMENT TRANSFER INCOME IN BRITISH COLUMBIA



Source: LAEP and Canadian Census.

FIGURE 8: ESTIMATE OF COVID-RELATED GOVERNMENT TRANSFERS IN BRITISH COLUMBIA



Source: BC Stats calculations using Statistics Canada Table 11-10-0014-01.

Figure 8 estimates the counter-factual: what would transfers have been without the pandemic. By assuming historical growth rates for each type of benefit and treating the remainder as the effect of the pandemic, we can estimate that COVID-19 caused a \$13.2 billion increase in government transfers for British Columbians in 2020, or a 52 per cent increase over what it would have been otherwise.

Fortunately, Figure 8 also shows that, as of the most recent data in 2022, transfer levels seem to be returning to normal.

The unusual situation in 2020 skewed economic statistics in many ways, readers should keep this in mind when interpreting results.

Non-employment market income is another major source

Non-employment market income made up 20.5 per cent (\$38.8 billion) of all basic income in 2020 and 22 per cent (\$30.8 billion) in 2015, when it was the largest single source. It includes mainly private investment income, whether that comes from dividends and interest from financial investments, private pensions, or rental property income. Smaller amounts come from miscellaneous income sources like RRSP withdrawals, scholarships, and spousal payments.

Figure 9 maps which areas depend on this source and Figure 10 shows the areas that depend on it most.

FIGURE 9: BASIC INCOME DEPENDENCE ON NON-EMPLOYMENT MARKET INCOME, 2020

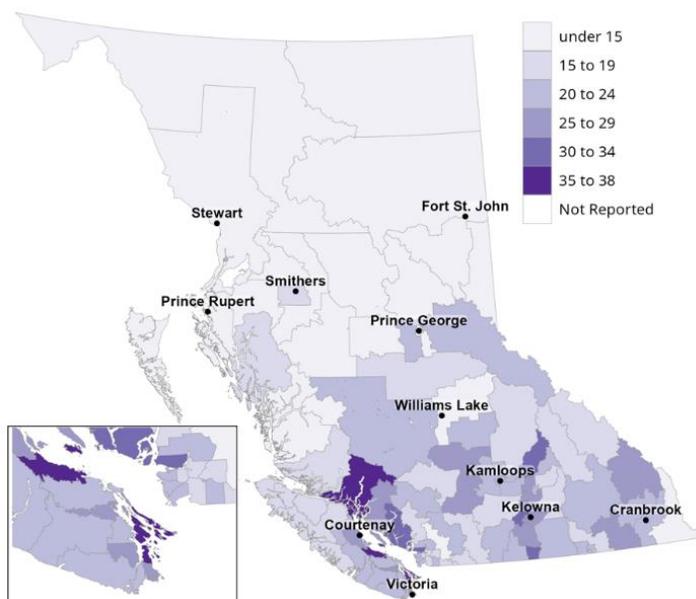
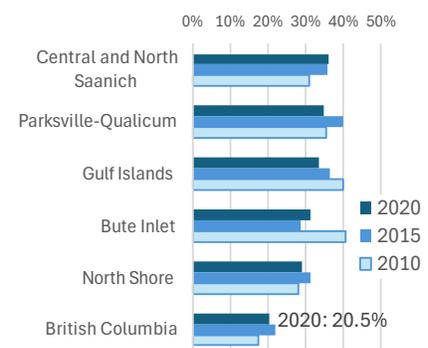


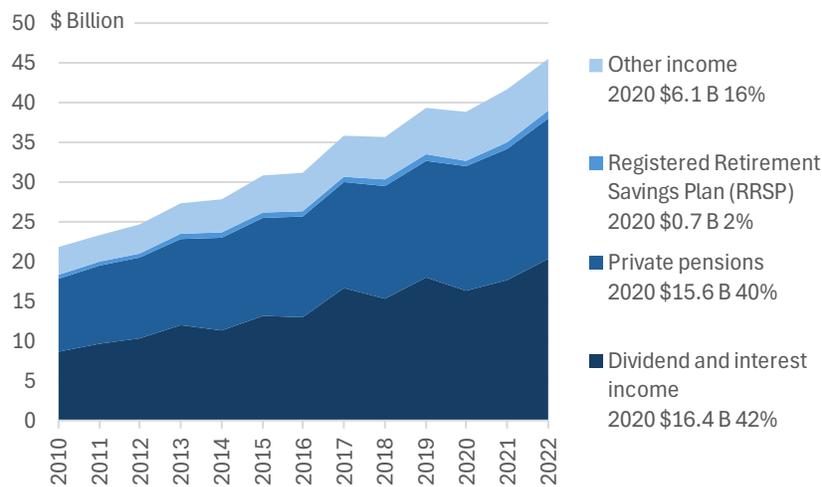
FIGURE 10: TOP FIVE AREAS DEPENDING ON NON-EMPLOYMENT MARKET INCOME



What is non-employment market income?

Once again, tax filer data in Figure 11 can give us a better picture of what this really means. Dividend and interest income made up the biggest share in 2020 (42 per cent) followed closely by private pension income (40 per cent). Other income (which includes net rental income, support payments, retiring allowances, scholarships, and more), made up almost 16 per cent of the total in 2020, while withdrawals from RRSPs made up the remainder, just under two per cent.

FIGURE 11: COMPOSITION OF NON-EMPLOYMENT MARKET INCOME, BRITISH COLUMBIA



Source: Statistics Canada. Table 11-10-0014-01, Sources of income by census family type.

Retirement income is important in all areas

Half of all non-employment income (market and non-market) can be easily attributed to people who have retired, in the form of income from private pensions, RRSPs, and government programs like the Canada Pension Plan (CPP), Old Age Security (OAS) and the Guaranteed Income Supplement (GIS).²

In 2015, 64 per cent of government transfers and 41 per cent of non-employment market income came from retirement-related sources. Put together, 50 per cent of all non-employment income was from these sources in 2015. The figure was

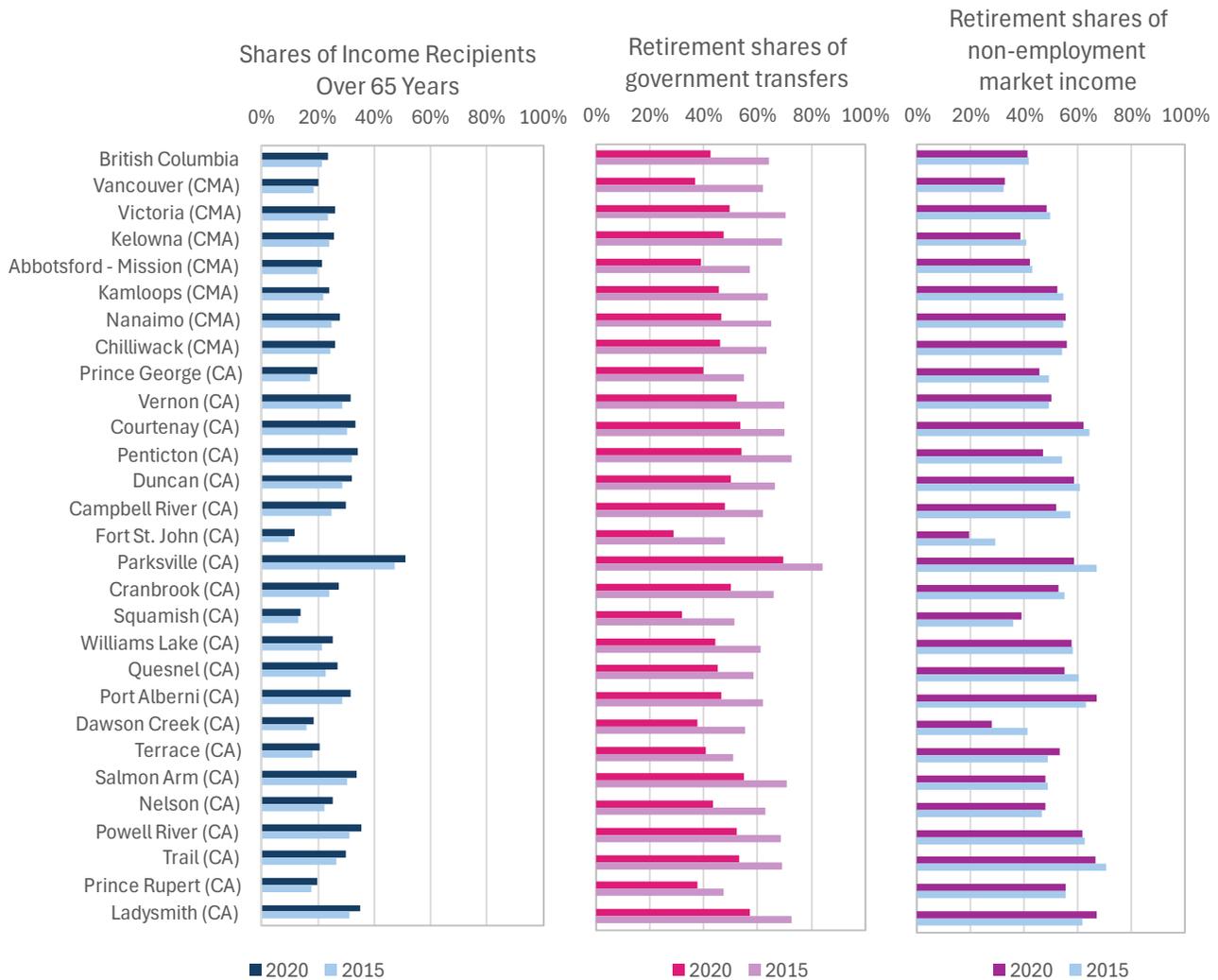
² All figures in this section come from Statistics Canada Census 2021. Table 98-10-0068, Income statistics for detailed income sources. This data is ancillary to the main information in this report, and is based on Census Metropolitan Areas and Census Agglomerations, not the 103 local areas.

somewhat lower (42 per cent) for 2020 because of the increase to non-retirement government transfers.

Figure 12 demonstrates how some areas depend more or less on retirement income. The first column simply shows the share of the population over 65, while the next two columns show what shares of government transfers and non-employment market income, respectively, come from retirement-related sources. While this data is not available on the same geographic basis as the 103 local areas studied in this report, this kind of ancillary data can be used to calculate more precisely how important retirement income is to an area.³

³ For example, in Penticton, government transfers made up 27.8% of the economic base in 2020 and non-employment market income made up 25.8%. If you multiply these by the shares for Penticton in the Figure 12, you get (27.8% dependence on government transfers * 54% government transfers retirement share in Penticton) + (25.8% * 46.8%) = 15.0% + 12.1% = 27.1% income dependence on retirement income.

FIGURE 12: RETIREMENT INDICATORS FOR CENSUS METROPOLITAN AREAS (CMA) AND CENSUS AGGLOMERATIONS (CA)



Source: Statistics Canada. Table 98-10-0068, Income statistics for detailed income sources.

For all of B.C., retirement income represents 18.1 per cent of the economic base in 2020, larger than almost any other source. It is a major part of the economic base and provides an economic cushion in every area of the province.

Public sector employment's share has declined

The public sector was responsible for one quarter (24 per cent) of all jobs in 2020 and 20 per cent of all basic income. It represents employment by all levels of government⁴ and is divided into seven sub-sectors:

- Federal government, including defence
- Provincial government administration
- Health
- Social services
- Education
- Local government
- Aboriginal government

FIGURE 13: BASIC INCOME DEPENDENCE ON PUBLIC SECTOR EMPLOYMENT INCOME, 2020

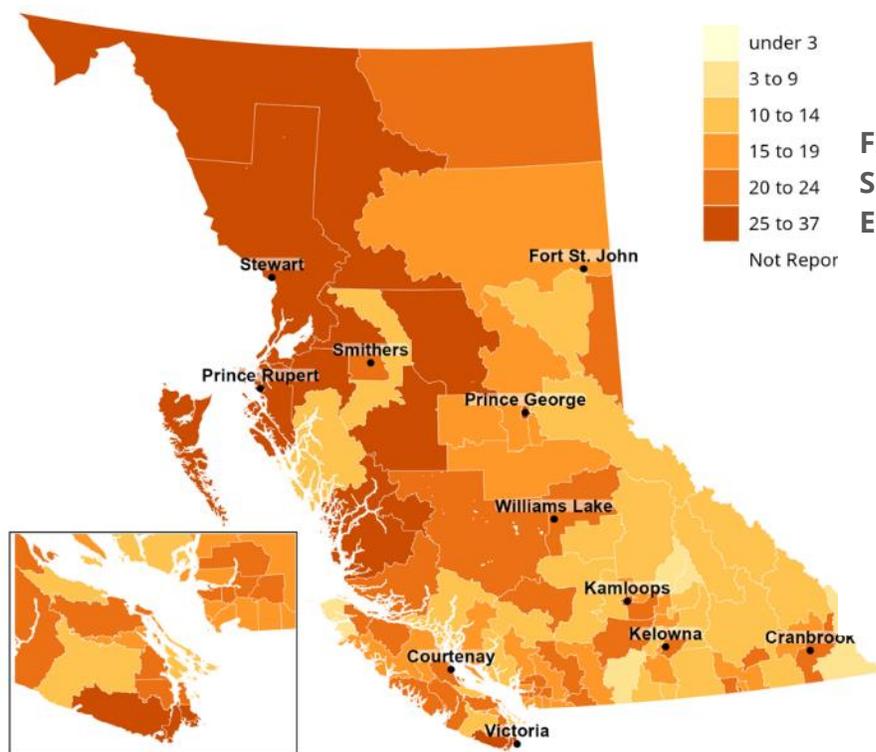
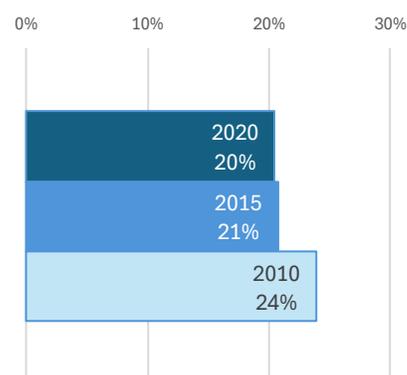


FIGURE 14: BASIC INCOME SHARES FOR PUBLIC SECTOR EMPLOYMENT, ALL OF B.C.



⁴ In the LAEP, the Public Sector includes some industries under the North American Industrial Classification System (NAICS) that include private sector employment. For example, the Education sub-sector includes elementary, secondary and universities, but also technical and trade schools. The Health sub-sector includes hospitals but also offices of physicians and residential care facilities. See the LAEP Toolkit for a complete list.

Figure 14 shows that B.C.'s basic income share from public sector employment has declined over time, because after-tax income from this source has grown at a slower rate than others. Figure 15 shows how the basic income is divided by sub-sector. Health and education together make up almost 60 per cent.

**FIGURE 15: PUBLIC SECTOR EMPLOYMENT
BASIC INCOME SHARES BY SUB-SECTOR, 2020**

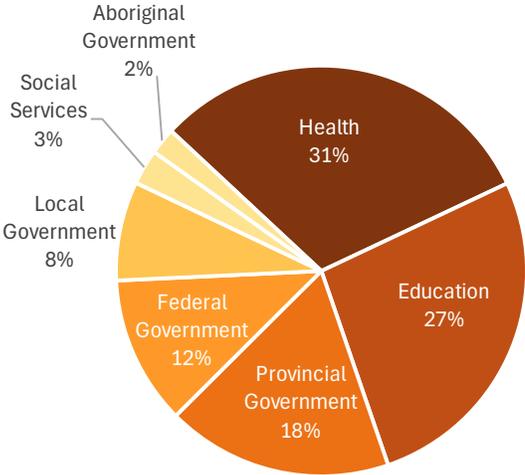
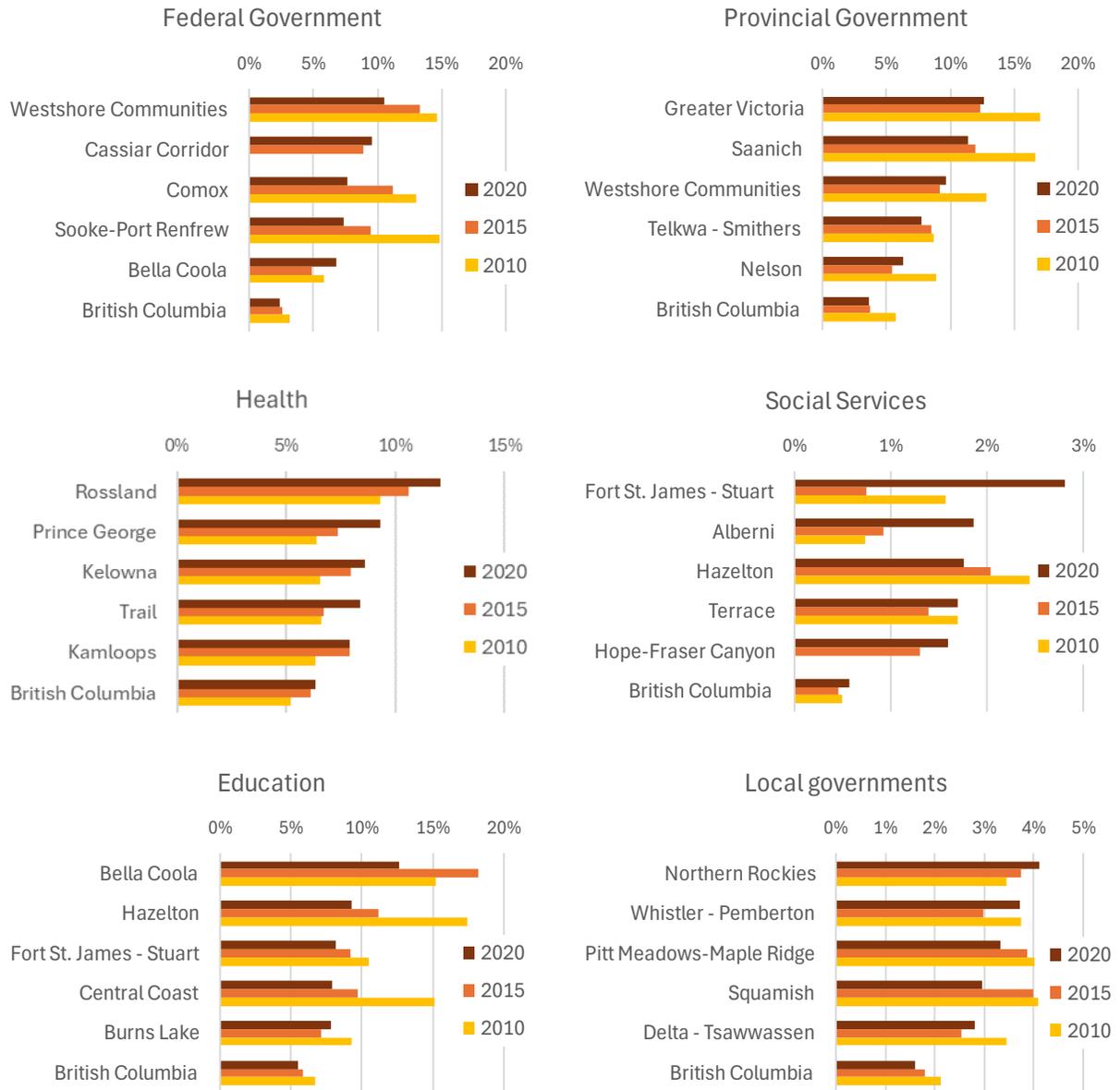


FIGURE 16: BASIC INCOME SHARES FOR EMPLOYMENT IN PUBLIC SUB-SECTORS, TOP FIVE LOCAL AREAS



Why is public sector spending part of the economic base?

Public sector spending is classified as part of the economic base because this report focuses on the perspectives of B.C.'s local areas. To the economy of a small town, employment in schools and hospitals or the receipt of government transfer income, doesn't depend on the performance of local private sector businesses, at least not in the short-term or in a way that is captured in the LAEP model.

From the perspective of the whole province, however, there's a good argument that Provincial and Local Government spending, at least, should be categorized as non-basic. While that argument isn't reflected in the treatment of the model at the provincial level, users can still analyze the performance of private sector industries from the available data.

How did the private sector economic base change?

The economic wellbeing of British Columbia depends ultimately on a strong private sector. While the public sector plays a crucial role, private sector industries provide most of the employment and virtually all the export income that helps support the value of the Canadian dollar and which, in turn, allows us to import the goods and services necessary for modern life.

Private sector employment income rebounded after a decline during COVID

The size of the private sector declined in 2020 as a share of the province's economic base. That is, of all the external income that flowed through B.C. communities, 42 per cent of it came through private sector industries that provided employment in 2015, compared to just 36 per cent in 2020, as is shown in Figure 17 and Figure 18 . Obviously, this has to do with the impact of the COVID-19 pandemic, when many people lost private sector employment income, as will be shown in Figure 19.

FIGURE 17: BASIC INCOME DEPENDENCE ON PRIVATE SECTOR EMPLOYMENT (%)

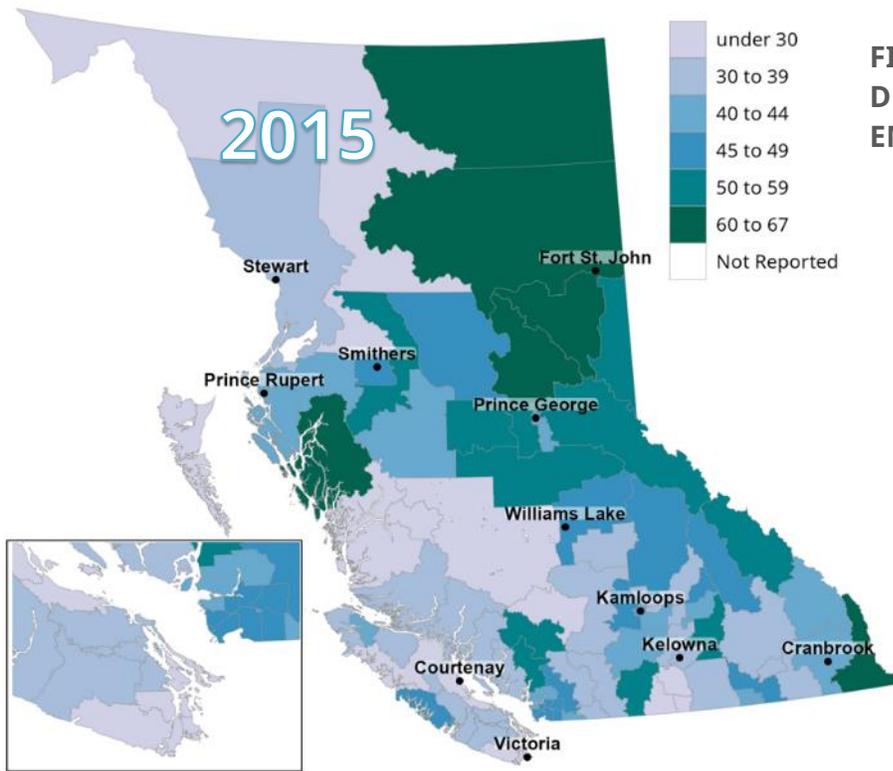
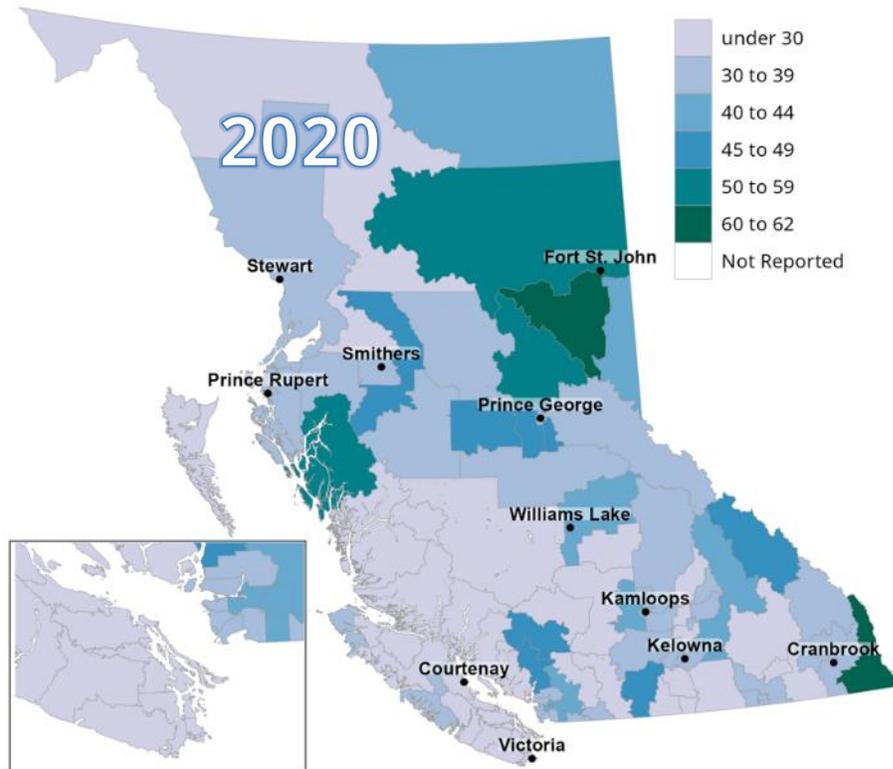
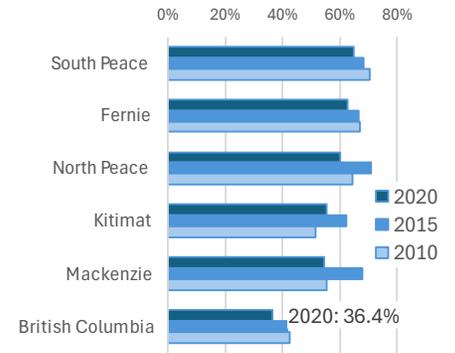


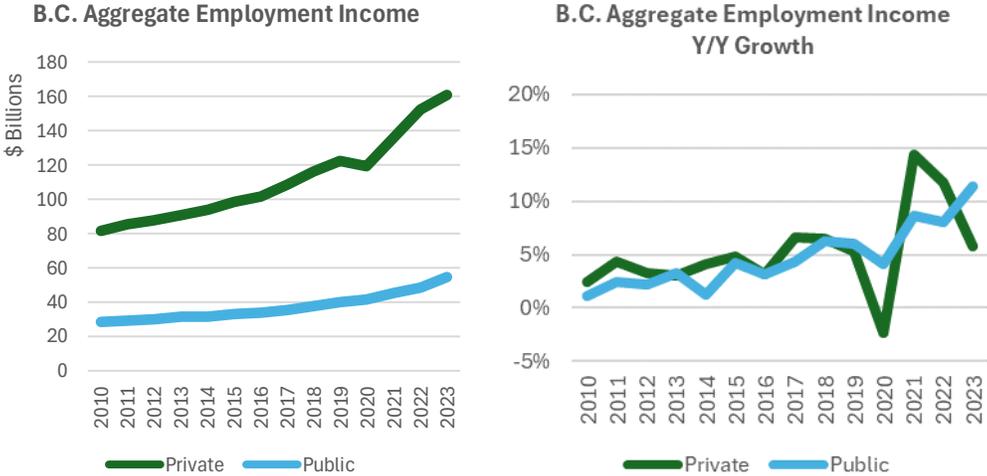
FIGURE 18: TOP FIVE AREAS THAT DEPEND ON PRIVATE SECTOR EMPLOYMENT



Looking at data from the System of National Accounts, Figure 19 shows that employment income from private sector industries fell 2.4 per cent in 2020 whereas it had been growing by about 5.3 per cent per year in the previous five years. This suggests that, had the sector continued to grow at its usual pace rather than decline, total private sector employment income (not just basic income) would have been approximately 7.8 per cent—or \$9.4 billion—higher. This is another way the pandemic will have skewed the results for the 2020 reference year.

In 2021 through 2023, private sector employment income seemed to make up for lost ground, growing at 14.3, 11.8 and 5.8 per cent in the years following the onset of the COVID-19 pandemic.

FIGURE 19: B.C. EMPLOYMENT INCOME BY SECTOR



Source: Statistics Canada. Table 36-10-0498. Labour statistics consistent with the System of National Accounts.

Figure 20, below, shows which are the most important parts of the private sector to B.C.’s economy. Figure 21 maps, for 2015 and 2020, which is most important in each local area. The construction sector was the dominant source by a significant margin in all three census periods.

FIGURE 20: TOP BASIC INCOME SHARES FROM PRIVATE SECTOR EMPLOYMENT, ALL OF B.C.

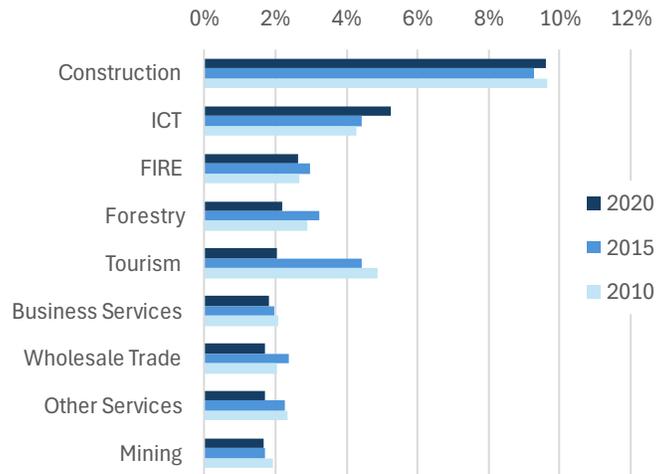
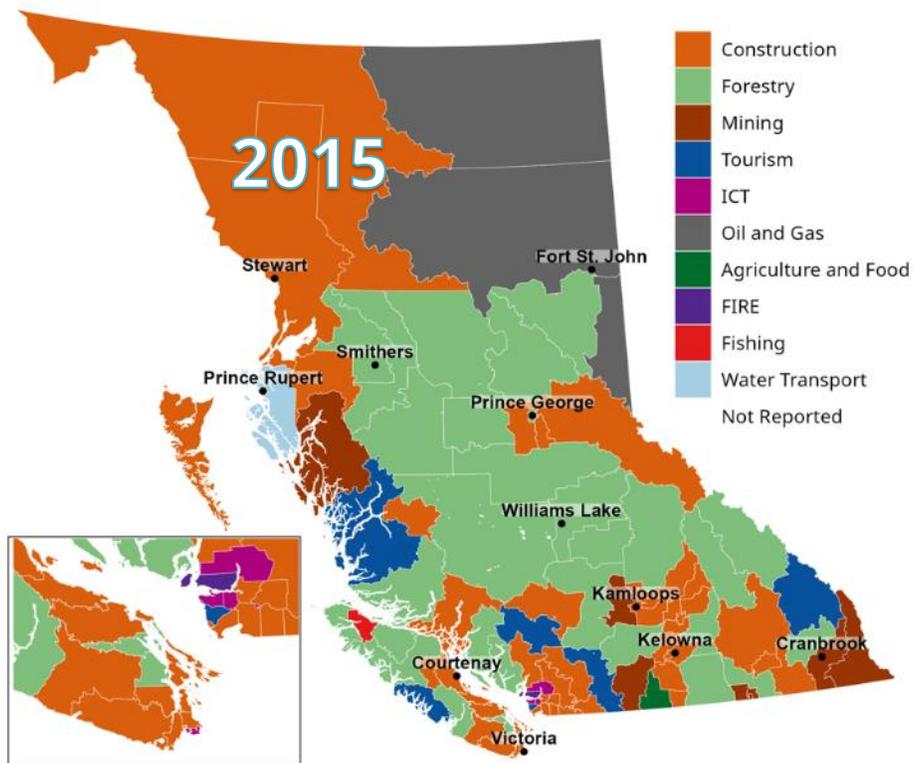


FIGURE 21: DOMINANT BASIC INCOME SOURCE FROM PRIVATE EMPLOYMENT SECTORS



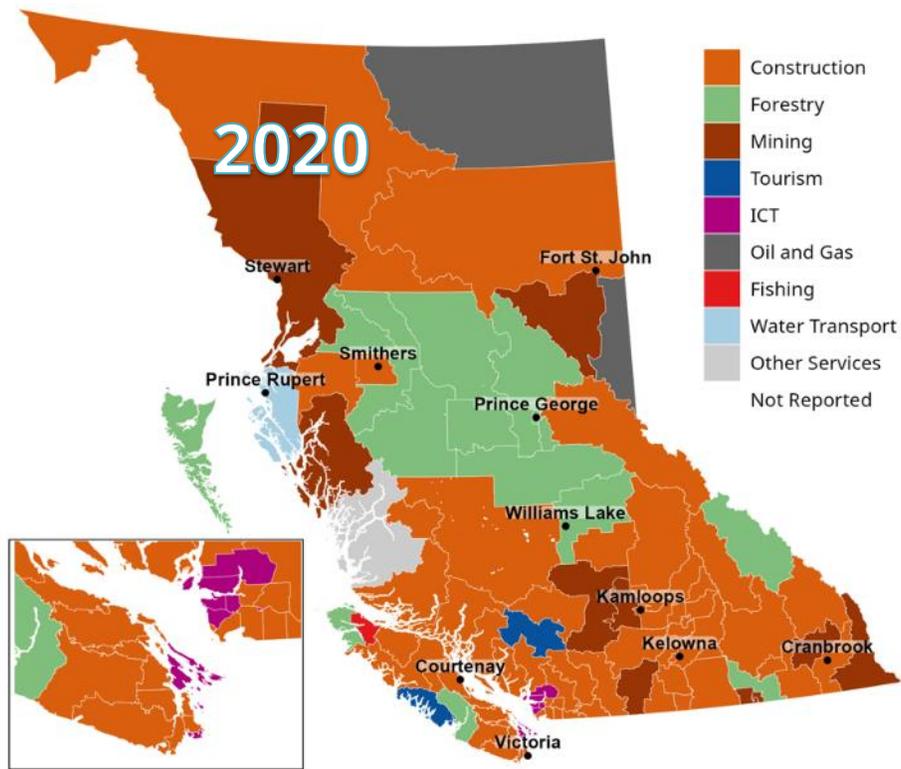


TABLE 3: COUNTS OF LOCAL AREAS BY DOMINANT PRIVATE SECTOR EMPLOYMENT BASIC INCOME SOURCE

	2010	2015	2020
Construction	48	49	63
Forestry	27	30	16
Mining	11	7	10
Information and Communications Technology (ICT)	3	3	6
Tourism	3	6	2
Other Services	1	1	2
Oil and Gas	2	3	2
Fishing, Hunting and Trapping	3	1	1
Water Transport	1	1	1
Agriculture and Food	1	1	0
Finance, Insurance and Real Estate (FIRE)	1	1	0
Retail Trade	1	0	0
Rail Transport	1	0	0

Construction

With almost 10 per cent of the economic base of British Columbia, construction sector employed almost nine per cent of the workforce in 2020 (217,000 people) and was the source of almost six per cent of the total after-tax income of British

Columbians. It was the biggest part of the private sector economic base for 63 local areas in 2020, more than any other (Table 5).

FIGURE 22: BASIC INCOME DEPENDENCE ON CONSTRUCTION, 2020 (%)

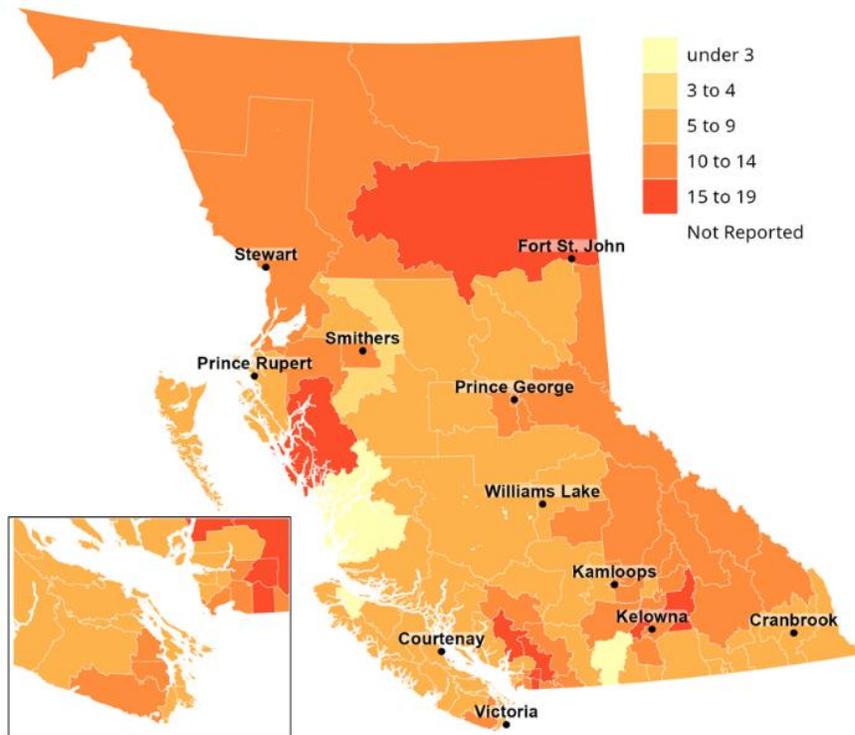
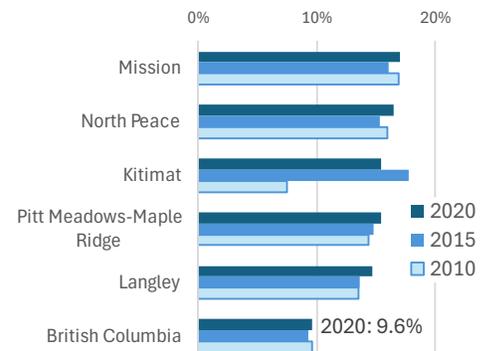


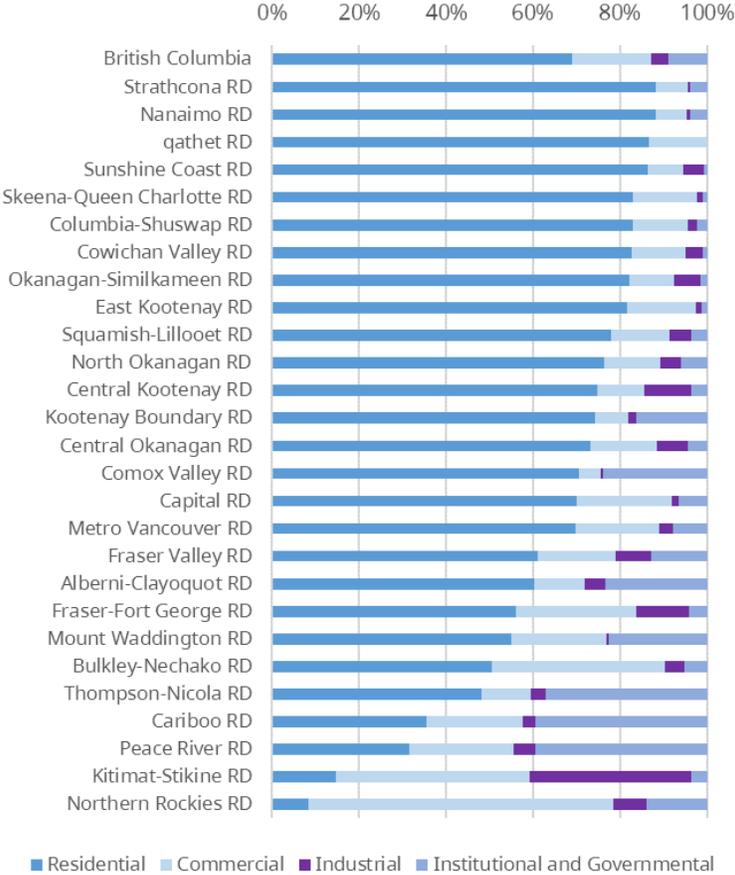
FIGURE 23: TOP FIVE AREAS THAT DEPEND ON CONSTRUCTION



Investment in public and private fixed capital—that is, the construction or improvement of new buildings, facilities, and physical infrastructure—drives 85 to 90 per cent of the construction sector. That investment is considered part of the economic base (i.e., basic income) as if its income was coming from external sources even though that it not necessarily the case.

As shown in the next chart, construction of residential structures makes up most of the output produced by the sector. While demand for residential structures is not normally considered external income for the province or a local area, the LAEP model treats it that way because investment decisions cannot be modelled as if they were non-basic and depended on household or business income.

FIGURE 24: DISTRIBUTION OF BUILDING PERMITS BY VALUE FOR B.C. AND REGIONAL DISTRICTS, 2020



Source: BC Stats Building Permits, from Statistics Canada data.⁵

The natural resource sector is still biggest for half of local areas

Natural resource extraction and related processing industries made up 6.2 per cent of the province’s economic base in 2020. This category adds the basic income shares from five sectors: Forestry, Mining, Oil and Gas, Fishing, Hunting and Trapping, and Agriculture and Food. These are treated separately elsewhere in this report but here they are combined to better show their overall importance.

⁵ For more information about the data, go to: <https://catalogue.data.gov.bc.ca/dataset/45a00be0-d572-4e42-be18-1bbaaf6c85ee>

FIGURE 25: BASIC INCOME DEPENDENCE ON NATURAL RESOURCE EXTRACTION AND PROCESSING SECTORS, 2020 (%)

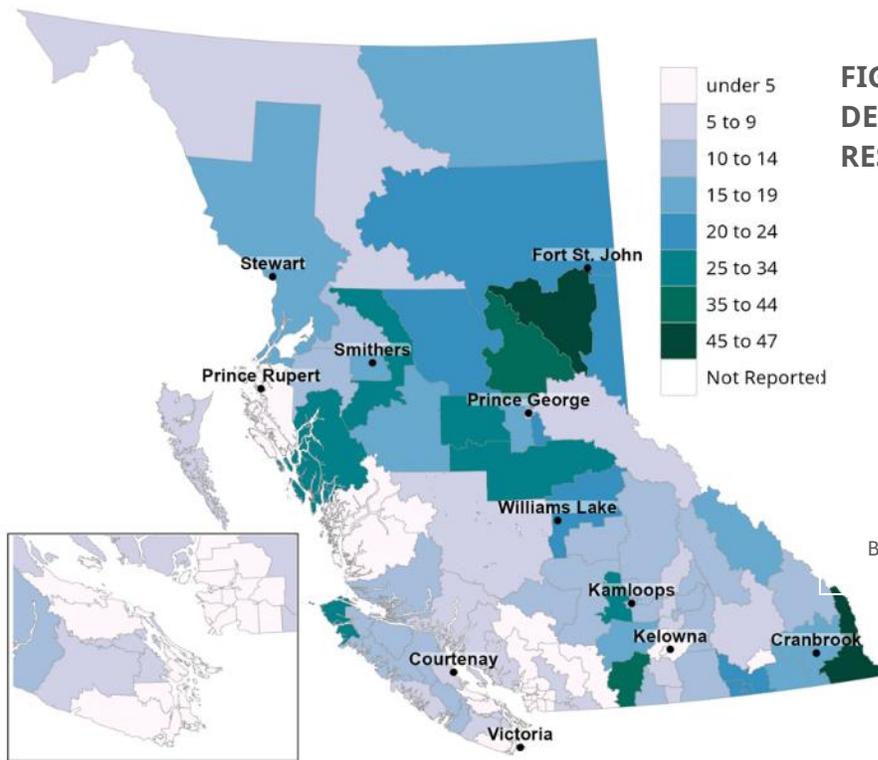
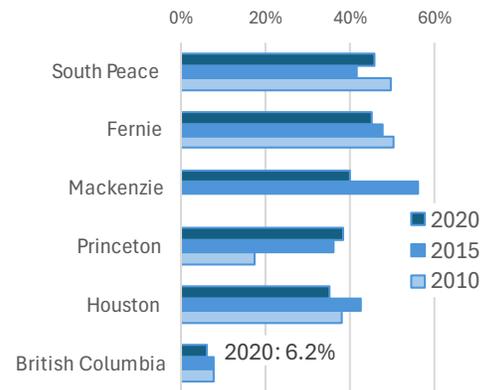


FIGURE 26: TOP FIVE AREAS THAT DEPEND ON NATURAL RESOURCES



There were 29 local areas in 2020 where an *individual* natural resource sector was the most important source of private sector employment (see Table 3). When the five natural resource sectors are considered *together* in the next table, it is the biggest part of the private sector economic base for 54 out of 103 local areas.

TABLE 4: COUNTING THE MOST IMPORTANT PRIVATE SECTOR SOURCES BY COMBINED INDUSTRY GROUPS

	2010	2015	2020
Natural resources and processing	51	52	54
Services	39	41	34
Construction	13	9	14
Transport	0	1	1

Analysis is presented below on Income Dependencies on the top two natural resource sectors in 2020: Forestry and Mining. Data maps for more can be seen in Appendix C: Maps of Basic Income Shares for 2020.

Forestry

Forestry is an important industry in B.C. While its share of the provincial economic base shrank to just 2.2 per cent in 2020 (from 3.2 per cent in 2015), it was still the biggest part of the private sector economic base for 16 of the local areas studied.

FIGURE 27: BASIC INCOME DEPENDENCE ON FORESTRY AND WOOD PROCESSING, 2020 (%)

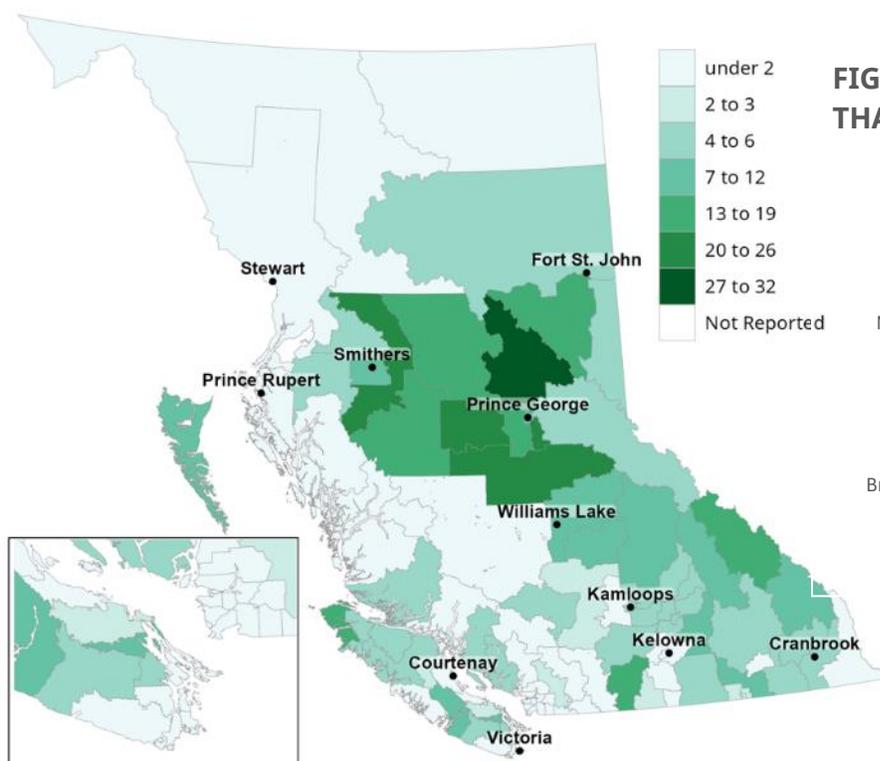


FIGURE 28: TOP FIVE AREAS THAT DEPEND ON FORESTRY

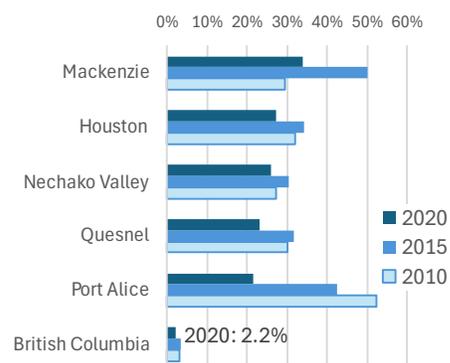


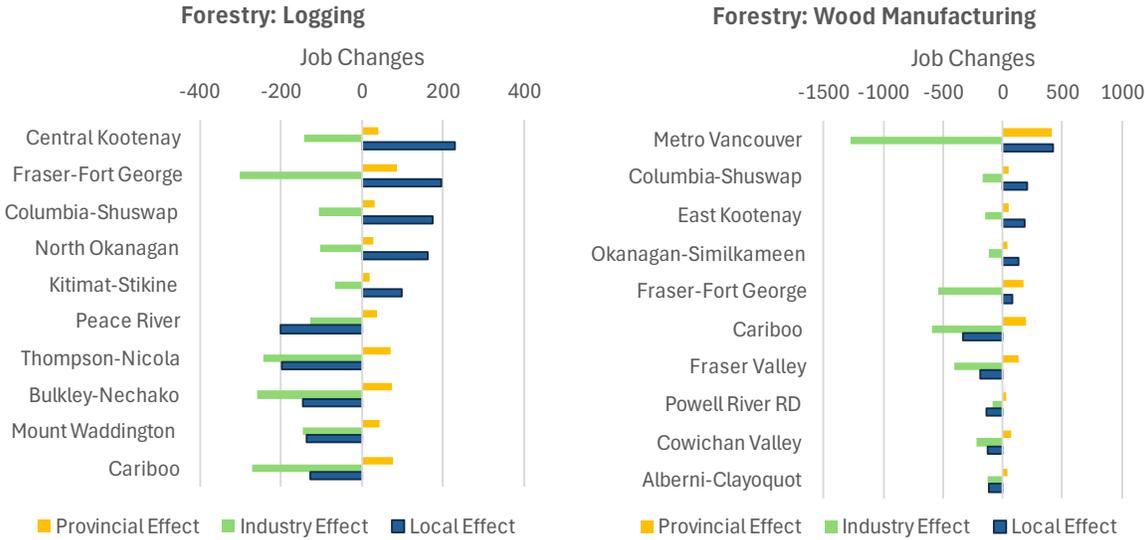
Figure 29, below, shows the shift/share analysis for forestry sub-sectors between 2015 and 2020⁶. Shift/share analysis is described in more detail in Appendix E: Toolkit Use Cases, but here we will describe what it means for B.C.'s logging sector.

Even though these industries shrank between 2015 and 2020, the five top-performing regional districts in Figure 29 somehow bucked the trend and saw job growth, or at least slower job losses, between these years. They did better than expected, compared to the provincial average. It's difficult to say why; for logging it could be that timber supplies declined less than elsewhere after the mountain

⁶ A statistical technique to help understand the sources of growth or decline in a particular region and industry. It breaks down changes in employment into three components: the Provincial Effect (PE), Industry Effect (IE) and Local Effect (LE).

pine beetle epidemic, that more stands of timber remained economically viable because of local manufacturing facilities, or any number of reasons.

FIGURE 29: SHIFT-SHARE ANALYSIS FOR FORESTRY SUB-SECTORS, TOP AND BOTTOM-PERFORMING REGIONAL DISTRICTS FOR JOB GROWTH BETWEEN 2015 AND 2020



Mining

Mining and the processing industries associated with it are big industries in B.C. While the sector made up a modest 1.7 per cent of the economic base of the province overall, it is the biggest part of the private sector economic base for 10 local areas.

Mining includes the extraction of metallic and non-metallic minerals, for example of coal, copper, molybdenum, and gravel. It also includes metal processing and smelting. As with all sectors, its basic income also includes what is earned by its supplying industries (i.e., the indirect basic income). B.C.’s mining sector even includes two major smelters that don’t use metals from B.C.: the Trail nickel smelter and Kitimat aluminum smelter both import their raw materials from abroad but are located here because of their efficiency and low-cost hydroelectric power.

FIGURE 30: BASIC INCOME DEPENDENCE ON MINING, 2020(%)

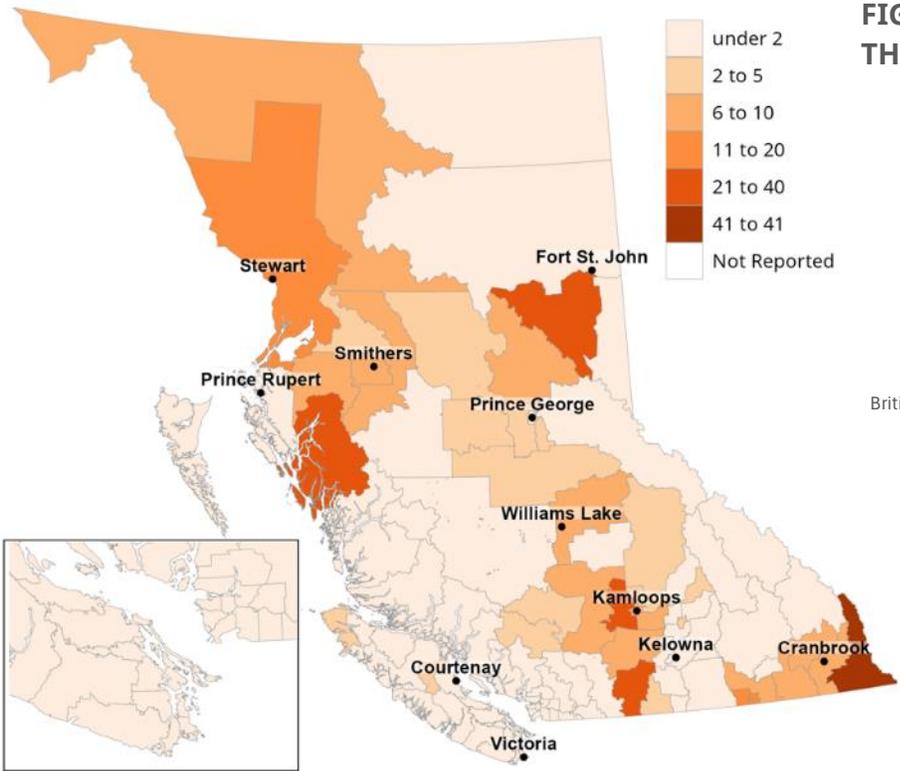
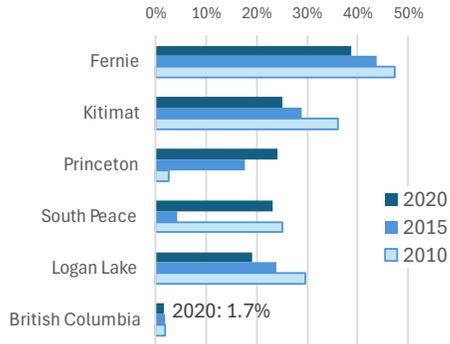


FIGURE 31: TOP FIVE AREAS THAT DEPEND ON MINING



As a sector that includes major industrial facilities, workers commute from near and far, and the economic impact of a large employer is usually spread over several local areas. Readers should keep that in mind and compare the results for the larger regional district.

The service sector was the primary source of private sector employment in one out of every three local areas.

Taken together, service sectors made up 14.3 per cent of the province’s economic base in 2020. This category adds the basic income shares from six sectors (Tourism; Film and TV Production; Business Services; Finance, Insurance and Real Estate (FIRE); Information and Communications Technology (ICT); and Other Services). These are treated separately elsewhere in this report but here they are added to analyze their combined importance.

FIGURE 32: BASIC INCOME DEPENDENCE ON SERVICE SECTORS, 2020 (%)

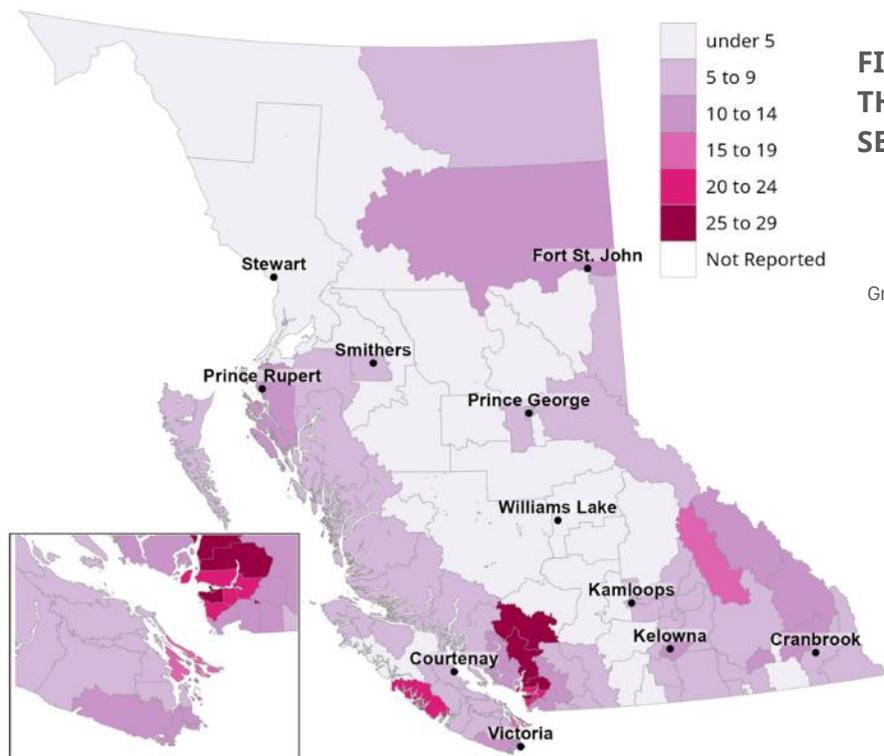


FIGURE 33: TOP FIVE AREAS THAT DEPEND ON SERVICE SECTORS



There were 10 local areas in 2020 that had a particular service sector as the most important source of private sector employment (see Table 3), but when they're combined, it is the biggest part for 34 local areas (as per Table 4).

More information is provided below on some of the most important service sectors, including Tourism, Information and Communications Technology (ICT), Business Services, and Finance, Insurance, and Real Estate (FIRE). These are the service sectors that contribute the most jobs and/or contribute the most to the economic base in many areas. Data maps and charts for more of them can be seen in Appendix C: Maps of Basic Income Shares for 2020, and in the LAEP Toolkit.

Tourism

Tourism is part of the economic base because it earns income that comes ultimately from outside the local area, whether those dollars come from international tourists, people from other provinces, or from elsewhere in B.C. When people come to B.C. or a local area and spend money it is economically equivalent to export revenue.

Tourism made up two per cent of B.C.'s economic base in 2020 but was the sector hit hardest by the effects of the COVID-19 pandemic and lockdown:

- Its basic income share fell from 4.4 per cent in 2015 to 2.0 per cent in 2020.
- Employment associated with tourism fell by 48,000 people between 2015 and 2020, or by 43 per cent.
- The after-tax income associated with jobs supported by tourism (i.e., the basic income) fell by \$1.3 billion, to \$2.2 billion in 2020.

Tourism was the biggest part of the private sector economic base for six local areas in 2015 but, because of the pandemic, only two in 2020: Whistler-Pemberton and Clayoquot (which includes Tofino).

FIGURE 34: BASIC INCOME DEPENDENCE ON TOURISM, 2020 (%)

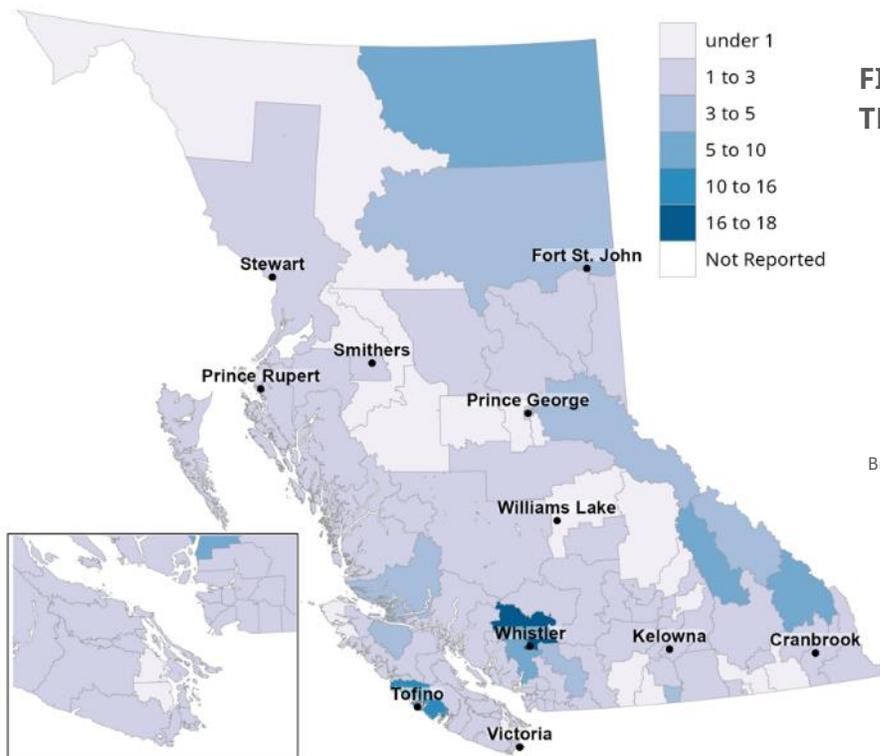


FIGURE 35: TOP FIVE AREAS THAT DEPEND ON TOURISM

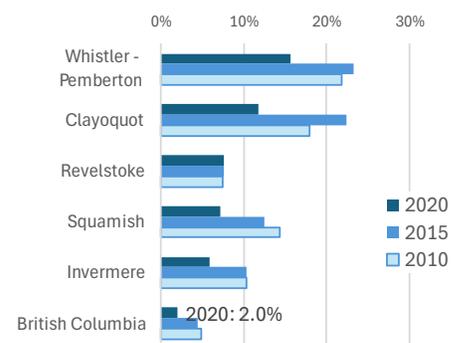
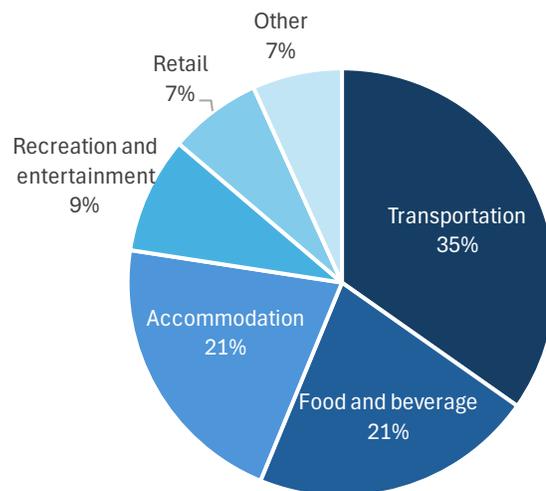


TABLE 5: B.C. TOURISM INDUSTRY PROFILE⁷

	2010	2015	2020
Tourism employment:	108,320	109,650	62,050
Average employment income (\$/yr):	32,700	36,000	40,100
After-tax employment income (\$m):	3,208	3,564	2,245
Income Dependency Share:	4.9%	4.4%	2.0%
Sources of industry demand:			
Domestic tourism	42%	41%	58%
Interprovincial tourism	19%	19%	28%
International tourism	39%	39%	15%

Tourism is measured differently than other economic sectors in that it includes portions of many industries; some are large portions (like those of accommodation and air travel) and many are small. The LAEP model estimates what portion of demand comes from different types of tourists, for different types of tourism-related products, and for different tourism-related industries.⁸ It includes parts of industries that are divided into six sub-sectors, as shown in Figure 36. Transportation, followed by Accommodation and Food/Beverage sectors had the highest basic income shares in 2020.

FIGURE 36: TOURISM AND ITS SUB-SECTORS, DISTRIBUTION OF BASIC INCOME, 2020

⁷ These estimates are based on the methodology developed by the author and might slightly differ from estimates published in other sources.

⁸ The LAEP study replicates the methodology of Statistics Canada's Provincial and Territorial Tourism Satellite Accounts (PTTSA). It uses surveys of international and domestic travellers to estimate total spending in various categories and compares it to overall consumer spending. See Appendix A: Methodology for more information.

Information and Communications Technology (ICT)

Information and Communications Technology (ICT) is the second-biggest part of the province’s private sector economic base, making up 5.3 per cent of it. It encompasses software publishers, computer systems design, radio and television broadcasting, telecommunications providers, scientific and technical consulting services, and R&D. Its external income (i.e., direct basic income) comes primarily from service exports to other provinces and countries, and in the form of capital investments in intellectual property by businesses and organizations in B.C.

FIGURE 37: BASIC INCOME DEPENDENCE ON INFORMATION AND COMMUNICATIONS TECHNOLOGY, 2020 (%)

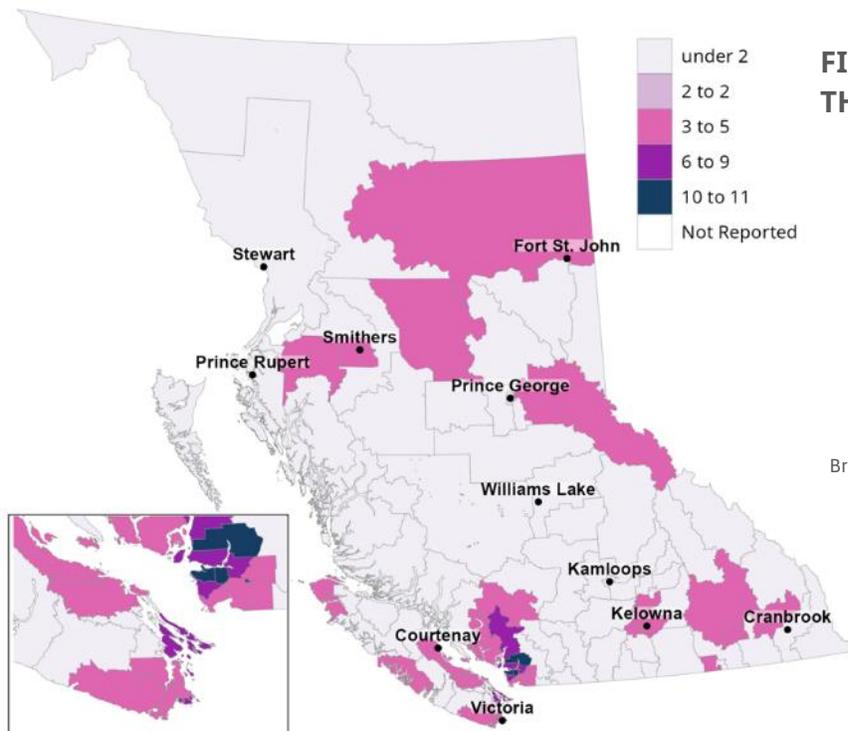
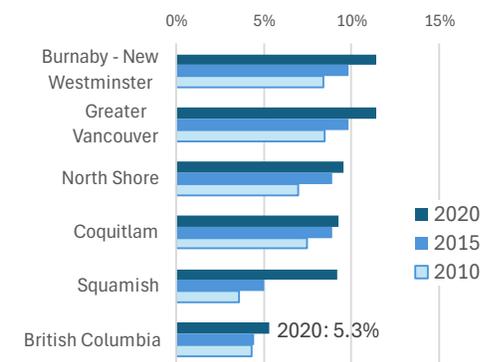


FIGURE 38: TOP FIVE AREAS THAT DEPEND ON ICT



Finance, Insurance and Real Estate (FIRE)

The FIRE sector represents three per cent of the economic base of the province. While its demand comes mostly from the non-basic sector (local households), the direct basic demand for this sector is mostly from real estate services for the purposes of residential building construction which, like the construction sector, is considered external income for the purposes of this study. Interprovincial and international exports by the financial services portion of the sector make up the rest.

TABLE 6: FIRE SECTOR'S SOURCES OF DEMAND IN B.C.

	2010	2015	2020
Total after-tax employment income (\$m)	6,844	7,955	9,599
Basic demand	46%	47%	46%
Direct basic demand	25%	29%	29%
Public and private capital investments	14%	18%	18%
Interprovincial exports	7%	7%	7%
International exports	4%	4%	4%
Indirect basic demand from local industries	22%	18%	17%
Non-basic demand: to local households	52%	51%	52%
Statistical discrepancy ⁹	2%	1%	2%

The FIRE sector also supplies services to many other industries and the indirect basic portion of its activities are therefore part of their contribution to the economic base. Finally, over half of the sector's activity is due to non-basic demand for households, primarily for rent paid to landlords but also other financial and real estate services.

⁹ The statistical discrepancy arises from imperfections in the LAEP model that make it impractical to match supply and demand in every industry and area. The discrepancy measures the amount of a local industry's supply that could not be matched with any type of modelled demand. It will tend to be larger for smaller industries and areas. It is described in more detail in Appendix A: Detailed Methodology.

FIGURE 39: BASIC INCOME DEPENDENCE ON FINANCE, INSURANCE AND REAL ESTATE (FIRE), 2020 (%)

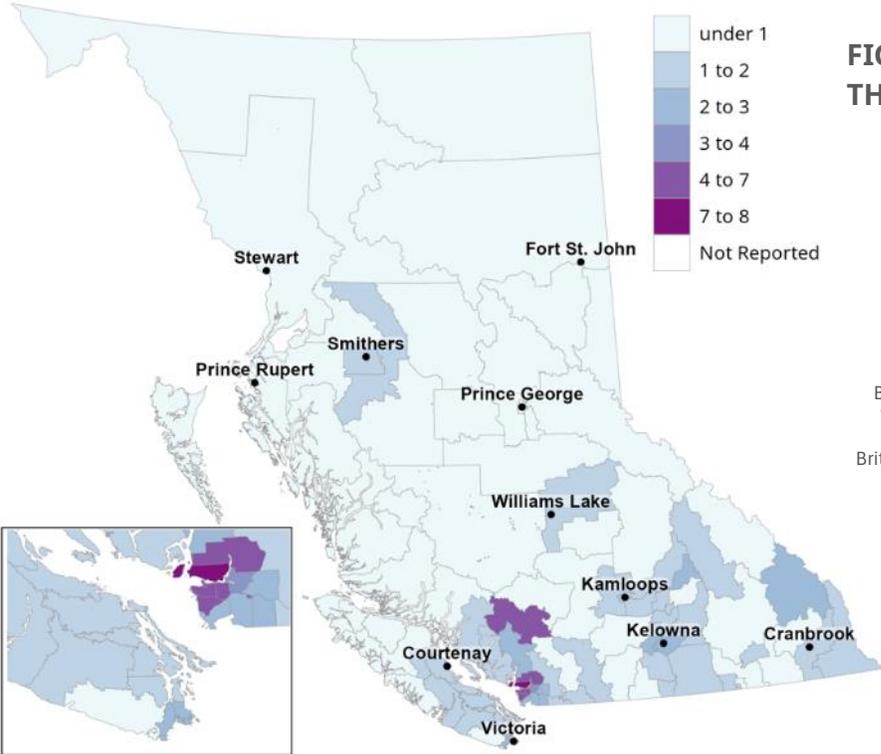


FIGURE 40: TOP FIVE AREAS THAT DEPEND ON FIRE SECTOR



Metro Vancouver has the highest share of employment in the FIRE sectors. Consequently, this area was the main exporter of these services to people and businesses in other areas.

TABLE 7: METRO VANCOUVER FIRE SECTOR PROFILE

	2010	2015	2020
Local employment	88,960	94,700	99,050
Location Quotient	1.22	1.24	1.24 ¹⁰
Basic Income Share	4.7%	5.0%	4.2%
Average employment income (\$/yr)	65,000	73,800	85,900
After-tax employment income (\$m)	4,799	5,619	6,765
Sources of industry demand:			
Non-basic demand: to local households	39%	39%	39%
Public and private capital investments	14%	17%	18%
Trade with the rest of the province	13%	13%	13%
Other	34%	31%	31%

¹⁰ Location Quotient estimates an area’s level of specialization in an economic sector. It measures an industry’s concentration of local jobs, relative to the provincial average.

How was economic diversity reflected in different local areas?

For an economy like British Columbia's that is highly open to trade, a single industry can falter due to factors outside our control. Economic diversity means if one sector declines, others remain to minimizing harm to the overall economy.

In this study, the **Diversity Index** measures the variety of external income sources within a local area. While a community with a dominant industry may be better off than one with several smaller industries, a diversified economic base provides greater stability during volatile economic times.

The Diversity Index ranges from 0 to 100. A score of zero would mean the area is entirely dependent on one basic income source, while a score of 100 would mean it is equally dependent on all the sources defined by this study. In practice, the Diversity Index typically falls between 40 and 70.

Economic diversity fell in 2020

Analysis found that many local areas became more diverse between 2010 and 2015 but the trend reversed by 2020. The next figure displays the Diversity Index maps for all three reference periods and Figure 42 shows that diversity declined overall in B.C. in 2020.

FIGURE 41: REGIONAL DIVERSITY

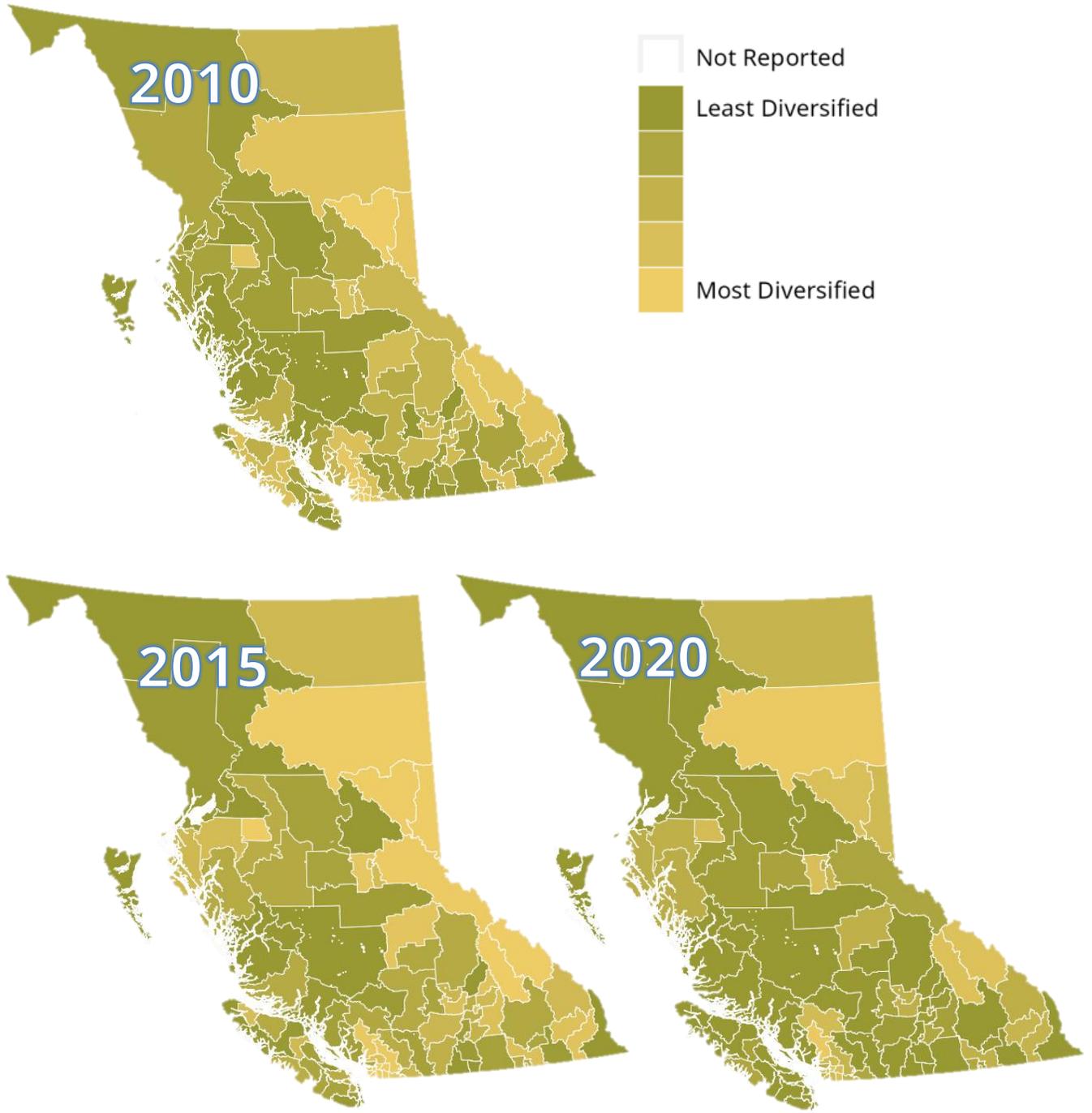
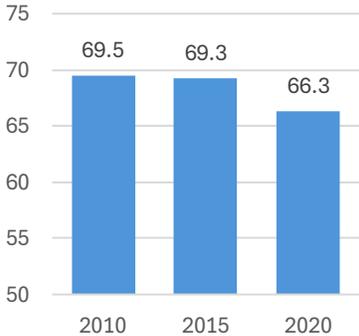
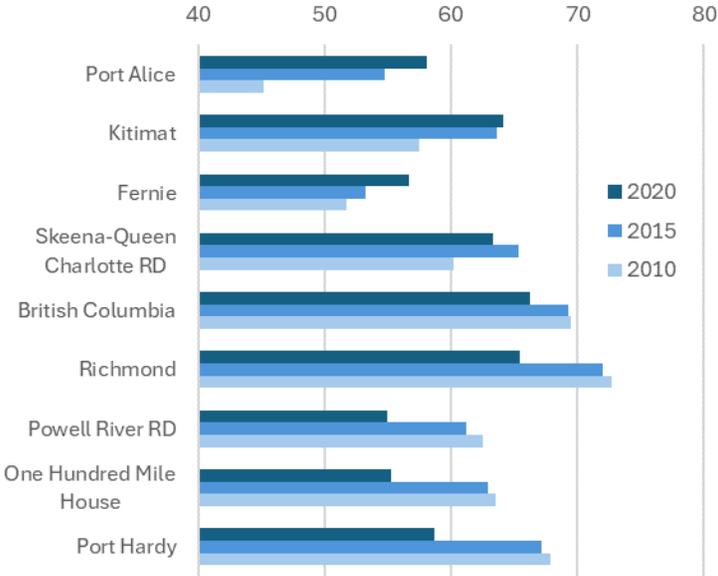


FIGURE 42: B.C. DIVERSITY INDEX DECLINED IN 2020



Economic diversity has improved in some areas because of new sectors, such as in Kitimat where the construction and oil and gas sectors have grown. In other areas, it is primarily the decline of a dominant sector that can increase its Diversity Index, like in Port Alice, where income from forestry has declined, while people reported income from sectors like mining, agriculture and wholesale trade.

FIGURE 43: DIVERSITY INDEXES FOR SELECTED LOCAL AREAS AND REGIONAL DISTRICTS



The local area economies in the province became less diverse between the 2015 and 2020, largely because of the COVID-19 pandemic and the large increase in government transfers. Combined with the long-term decline in resource sector employment income and aging demographics, which naturally skew income

towards non-employment sources, this has caused Diversity Index scores to fall in many rural areas. In other cases, urban areas like Richmond—which had one of the highest Diversity Index scores in 2010—experienced a significant decrease by 2020, due to a decline in sectors such as tourism and an increase in government transfers.

Table 8 provides the complete list of Diversity Index scores in 2020 for all regions and their local areas. To investigate details behind a local area's Diversity Index, like income dependencies and different sources of external income, consult the LAEP Toolkit. For more technical details on the calculation of this index, please refer to the methodology section.

TABLE 8: REGIONAL DISTRICT AND LOCAL AREA DIVERSITY INDEX SCORES, 2020

British Columbia	66	Peachland	59	Kitimat	64	Princeton	59
Alberni-Clayoquot	59	Columbia-Shuswap	63	Cassiar Corridor	57	Oliver-Osoyoos	54
Clayoquot	63	Golden	68	Hazelton	50	Keremeos	52
Alberni	58	Revelstoke	68	Kootenay Boundary	62	Peace River	71
Bulkley-Nechako	65	Salmon Arm	60	Rossland	63	North Peace	70
Telkwa - Smithers	67	Sicamous	58	Trail	62	South Peace	68
Nechako Valley	62	Columbia - Shuswap	57	Grand Forks-		Dawson Creek	67
Houston	61	Comox Valley	59	Greenwood	57	Powell River	55
Burns Lake	61	Courtenay	59	Metro Vancouver	68	Powell River	55
Fort St. James - Stuart	59	Comox	57	Burnaby - New	68	Skeena-Queen	63
Capital	58	Cowichan Valley	60	Westminster	68	Charlotte	63
Sooke-Port Renfrew	60	Ladysmith	61	Coquitlam	68	Prince Rupert	64
Westshore		Malahat - South	60	Delta - Tsawwassen	67	Haida Gwaii	58
Communities	58	Cowichan	60	Greater Vancouver	67	Squamish-Lillooet	68
Greater Victoria	57	Duncan	59	Langley	67	Squamish	70
Saanich	57	Lake Cowichan	58	Pitt Meadows-Maple	67	Whistler - Pemberton	67
Gulf Islands	56	East Kootenay	67	Ridge	67	Upper Squamish -	
Central and North		Kimberley	66	Surrey	67	Lillooet Region	56
Saanich	55	Cranbrook	65	Richmond	66	Stikine Region	53
Cariboo	62	Invermere	64	North Shore	64	Stikine	53
Williams Lake	65	Fernie	57	Mount Waddington	59	Strathcona	61
Quesnel	59	Fraser-Fort George	65	Alert Bay - Port McNeill	59	Campbell River	62
One Hundred Mile		Prince George rural	68	Port Hardy	59	Strathcona	61
House	55	(northwest)	68	Port Alice	58	Bute Inlet	54
Chilcotin	49	Prince George rural	66	Nanaimo	59	Sunshine Coast	60
Central Coast	47	(southeast)	66	Nanaimo	59	Sunshine Coast	60
Bella Coola	48	Prince George	64	Parksville-Qualicum	53	Thompson-Nicola	64
Central Coast	47	McBride-Valemount	62	North Okanagan	62	Kamloops	65
Central Kootenay	61	Mackenzie	59	Spallumcheen	63	Shuswap East	65
Castlegar-Arrow Lakes	65	Fraser Valley	64	Lumby	62	Logan Lake	62
Nelson	60	Matsqui-Abbotsford	65	Vernon	61	Merritt	61
Creston	56	Mission	65	Enderby	60	North Thompson	59
Slocan Valley	55	Chilliwack	63	Northern Rockies	65	Ashcroft - Copper	
Central Okanagan	63	Kent-Harrison	59	Northern Rockies	65	Desert Country	56
Kelowna	63	Hope-Fraser Canyon	57	Okanagan-			
West Bank - West		Kitimat-Stikine	64	Similkameen	59		
Kelowna	63	Terrace	65	Penticton	59		

Forest Sector Vulnerability

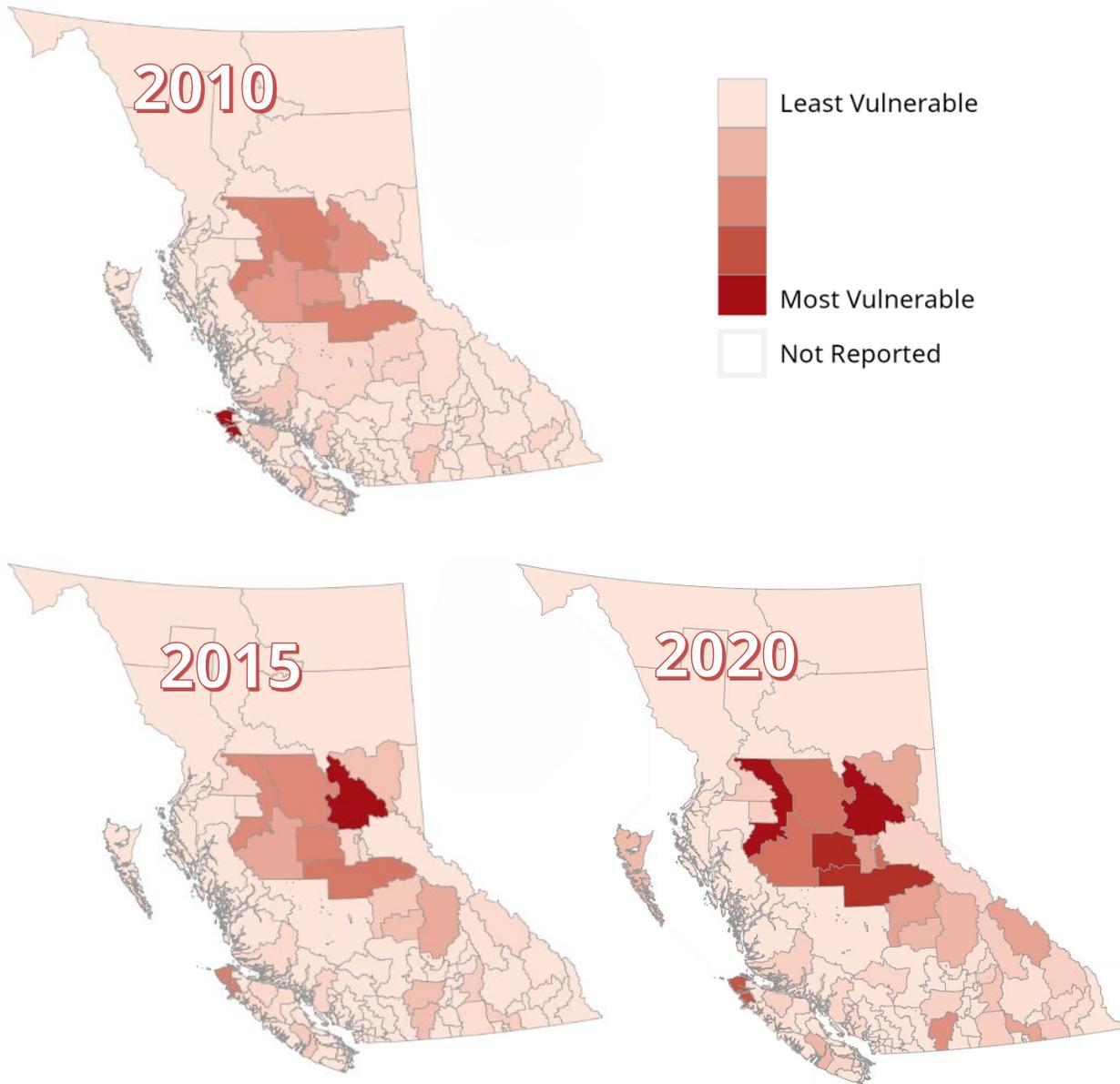
A community is vulnerable to a downturn in the forest sector if its dependence on that sector is high and its diversity is low. The **Forest Vulnerability Index (FVI)** was developed to measure this dependence using Income Dependency and Diversity Index Scores.¹¹

FVI is a scale that's only relative to other areas of the province. A local area with an FVI of 50 is not five times more vulnerable than one with a score of 10, and a score of 100 does not mean a region is 100 per cent vulnerable, just that it is the highest in the province. Figure 44 provides FVI profiling for BC between regions over time.

To investigate details behind a local area's FVI, like income dependencies and different sources of external income, consult the LAEP Toolkit. For more technical details on the calculation of this index, please refer to the methodology section.

¹¹ The first step in calculating the FVI is to multiply each local area's income dependence on Forestry by (100 - its Diversity Index). The second step is to normalize the index across all regions of the province, where FVI will be zero for the areas with the lowest forest sector income dependence and highest diversity index, and will be 100 for the area with the opposite combination.

FIGURE 44: FOREST SECTOR VULNERABILITY



Conclusion

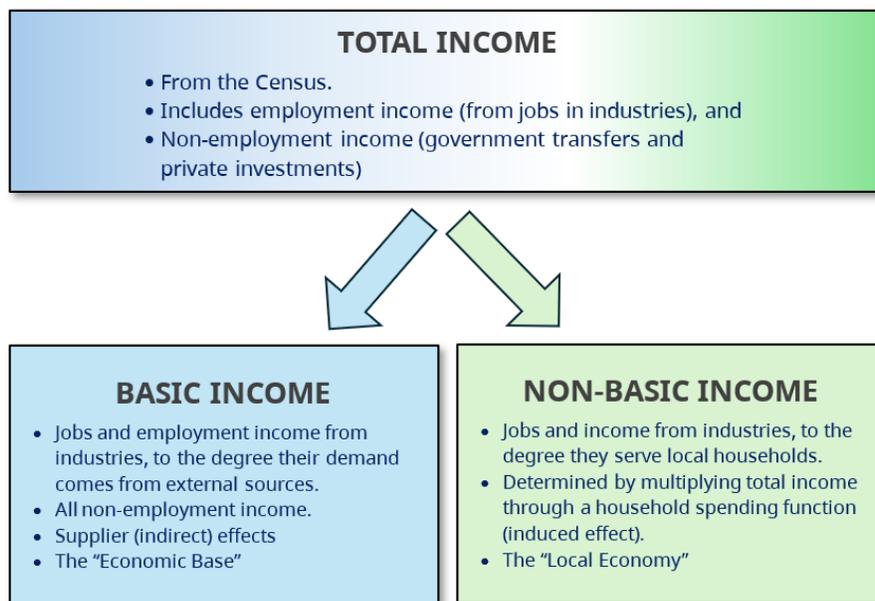
British Columbia is a small and open economy, dependent on trade and impacted by global trends. But we also have stabilizing factors such as a diverse economy and a social safety net that helps people through hard times. As we experience events like the COVID-19 pandemic, resource sector booms and busts, and progress in the digital economy, the data and framework of the Local Area Economic Profiles can help understand the impacts and how they are felt differently throughout the province.

Appendix A: Detailed Methodology

Theoretical framework

The fundamental premise of this work is from **economic base theory**: that the engine that drives an economy is its exports and other external income sources. For a region, like a country, external income is needed to pay for the many imports that modern life requires. It began in the 1950s as a theory of export-led development describing the short-term factors that influence a region's economic development. It originally stated that a region's economic growth is driven by increases in exports from the region. Modern applications of the theory, including by this report, have evolved to include economic activities such as tourism, retirement, public spending and capital investment. Under this theory, the economy of a community can be represented by income flows classified as basic or non-basic, depending on the source of the income.

FIGURE 45: THE ECONOMIC BASE AND LOCAL ECONOMY



Basic income comes from outside the local area. It flows through businesses and industries and is received in the form of wages and salaries or self-employment income.

With respect to employment income, every industry is partly basic to the degree that its revenue comes from these **external demand sources**:

- Exports;
- Tourism;
- Public spending;
- Fixed capital investment; and
- Trade with the rest of the province.

The external revenue is called **direct basic demand** and the share of an industry's revenue that comes from them is its **direct basic demand share**.

Indirect basic demand results from industry-to-industry relationships in the local area, also called **Supplier Impacts**. For example, for a truck logging company that supplies logs to wood product mills, its workers' incomes are part of the indirect basic income attributed to the wood processing sector.

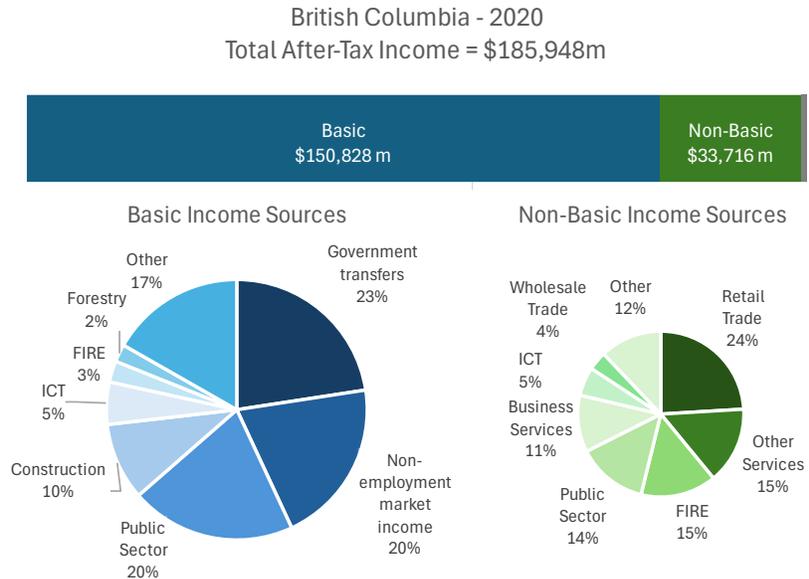
Non-employment income, such as government transfers, investments, and retirement income, is also considered basic.

The census aggregates it into two groups:

1. Transfer payments from senior governments, such as Canada Pension Plan, Old Age Security, Guaranteed Income Supplements, Child Tax benefits, Employment Insurance benefits, Income Assistance payments, and more. In 2020, COVID-19 emergency and recovery benefits were a major source.
2. Non-employment market income that includes investment income such as dividends, interest and property income, private retirement pensions, annuities, alimony, child support payments, etc.

Non-basic income and jobs are generated from local household spending. For example, at grocery stores, dentists' offices and for local financial services. These jobs are also referred to as induced employment, in the sense that a person's income, when spent in the local community, induces employment in local shops and businesses. The purpose of this distinction is to show how the economic base supports the rest of the local economy.

FIGURE 46: BASIC AND NON-BASIC INCOME PROFILE FOR B.C.



Note: ICT = Information and Communications Technology; FIRE = Finance, Insurance and Real Estate.

The LAEP model calculates these dynamics to create profiles of the local areas in B.C. The basic vs. non-basic income profile for B.C. is shown in the figure above, and similar figures can be generated for any area by the Profile Generator tool in the LAEP Toolkit.

An area’s **economic base** is the blue pie chart: all the various external income sources. The shares in the blue pie chart are the Income Dependencies, describing the composition of the economic base, which we also refer to as basic income shares.

The economic base supports the rest of the local economy. For example,

- demand for exports employs workers directly in export industries and
- indirectly in suppliers.
- The after-tax income from those workers is spent in the local economy, generating income and employment in the non-basic sector.

These relationships are quantified by economic multipliers called **Employment Impact Ratios (EIRs)**. Employment Impact Ratios (EIRs) provide a measure of the interdependence between an industry and the rest of the economy. They estimate

how each job in each sector supports jobs in others. When used in an economic impact analysis, EIRs predict the impacts of job losses or gains, estimating how many spin-off jobs would be created or lost elsewhere.

Data Sources

The data in this study came from the long-form Census which is given to only 25% of the population. BC Stats used data from the 2011, 2016 and 2021 Censuses but the reference years used throughout are for 2010, 2015 and 2020. The discrepancy has to do with the census reporting people's income from the tax year before the census was administered, and employment income is more important for input-output modelling purposes. The Census questionnaire that was administered in May to July 2021 asked people about their employment status on a specific reference week in May 2021, but about their incomes in the previous calendar year, 2020. Strictly speaking, statistics referring to the number of jobs should have a reference year that is one year ahead, but for the sake of simplicity the LAEP report and Toolkit use 2010, 2015 and 2020 throughout.

The LAEP's macroeconomic modelling uses employment income, not jobs, as the fundamental indicator that is translated into economic output, which is the measure needed for input-output modelling. Owing to differences in where full-time and part-time employees may live, or to where higher- and lower-paid employees may be, total employment income was considered the better indicator of a local area's output for a given industry.

Also, statistics referring to the number of jobs and to location quotients have a reference date that is one year ahead – 2011, 2016 and 2021. Some people that were employed in 2021 were not employed in 2020, were employed in different industries, and vice versa. In normal years there isn't a large discrepancy between employment in the Census year and the previous calendar year. The Covid-19 pandemic; however, made 2020 and 2021 abnormal. Many more people lost or changed jobs, worked reduced hours and lost income, or received increased government transfers.

Each year's LAEP model is derived from the B.C. Input-Output Tables, which are built by Statistics Canada and reflect the structure of the economy at that time.

They can be expected to change somewhat as the area grows (or declines) in population and because of technological changes or restructuring in the industry. Readers should keep these changes in mind in the interpretation of findings.

Approach

Step One — Data processing

BC Stats obtained custom census data of employment, employment income and average employment income for each local area, broken down according to the most detailed industry aggregations available, which are approximately 303 industries consistent with the North American Industry Classification System (NAICS) at the 4-digit (industry group) level.

Since Statistics Canada randomizes the last digit and suppresses very small results to protect people’s privacy, this data also needed to be cleaned and to have missing values imputed. Generally, this is done by using parent industry (i.e., 3-digit NAICS and above) as evidence or residuals with parent geographies (i.e., local areas in census divisions). This can result in data quality issues for areas with a small amount of employment or income in an industry. At a later stage of the process, the detailed 303 industries were aggregated into 22 economic sectors used in this report. The LAEP model suppresses data at this aggregated level if its final estimate differs 30 per cent or more from the raw data.

Step Two — Generating multipliers by industry and area

The next step involves identifying multipliers to convert employment income, as reported in the census data, into gross output—the variable used in subsequent input-output modeling. This is done by constructing output multipliers at the provincial level, where:

$$\text{Multiplier} = \frac{\text{Official provincial industry output in reference year}}{\text{Industry employment income in census for the whole province}}$$

The multiplier, constructed at the level of the whole province, is then applied to each area’s employment income data to obtain local estimates of output by NAICS industries. This operates on the assumption that each unit of employment income, rather than each job, produces the same output for a given industry, no matter where it is happening in the province. Employment income was chosen rather than

jobs to avoid discrepancies between part-time and full-time employment or productivity per hour, which is data we do not have.

Step Three — Customizing B.C.'s Input-Output Table

Step three converts the official domestic use Input-Output Table (IOT) for British Columbia into the NAICS industry classification used in the census data. The resulting converted and custom IOT is subsequently used in three primary ways:

1. To calculate basic demand shares using the final use categories.
2. To calculate indirect effects using the intermediate input portion of the custom IOT.
3. To calculate the household spending function using the Personal Expenditure Categories (PEC).

Additional adjustments were made, for example BC Stats:

- Combined or split the 234 industries in the Input-Output Industry Classification (IOIC) into approximately 303 4-digit NAICS industries, according to a detailed concordance system, and to weight certain operations to avoid double-counting. Adjustments also were made to combine the business, government and non-profit sector concepts used in the IOIC into NAICS, which didn't have those distinctions.
- Made adjustments related to net changes in inventory and consumption of used goods. Consumption from inventories and used goods generated revenue for an industry but was not counted as production or output in the current reference year. While it was removed during the compilation of the IOTs, it was added back in to align with the available census data on employment income.
- Added expenditures for owner-occupied housing to the household consumption function. The input-output tables treat homeowners as if they paid an imputed rent to an unincorporated business that is part of a fictitious "owner occupied housing" industry, and which represents many expenses related to home ownership. These expenses were brought directly into the household spending function.

Step Four — Modelling the Tourism Sector

The next step involves constructing a tourism model to estimate demand from tourists in the LAEP model, which is considered part of direct basic demand. Tourism is a non-standard industry, not part of the NAICS or IOIC industry classifications, and is difficult to estimate. Since tourists and non-tourists may spend at the same businesses, the tourism industry is represented as small or large portions of many industries. This is accomplished by replicating the methodology of Statistics Canada's Provincial and Territorial Tourism Satellite Account (PTTSA), which is a method to estimate, based on surveys of travellers, what portions of products and services tourists buy and to thereby estimate how important it is to the B.C. economy.

The LAEP tourism model starts with Statistics Canada's Table 12-10-0004, Tourism Supply and Expenditures, which estimates tourists' demand and the economy's supply of various tourism-related categories of products and services. These provincial estimates are split by domestic tourists (British Columbians travelling within the province), interprovincial tourists and international tourists. The LAEP uses the supply-use tables to replicate the methodology at a detailed level, calibrated to achieve the same tourism demand shares as in Table 12-10-0004. Once this is done, it calculates tourists' demand shares for each NAICS industry, or what share of each industry's output is used by tourists.

At the provincial level, these tourism demand shares are simple. To estimate better regional variation, the LAEP model makes the share relative to a local area's accommodation sector. This operates on the assumption that if an area, like Tofino or Whistler, has a larger accommodation sector, it will have more tourists and relatively more tourism demand than the provincial average for other industries. Essentially, the accommodation sector acts like a tourism multiplier on the local area's tourism demand for the non-accommodation industries.

The tourism model must pay special attention to trade and transport margins and to frequently convert between purchaser prices and basic prices. The tourism satellite account reports demand for products and services at purchaser prices. If we used these figures directly, tourists buy only from manufacturing industries or directly from farms, with no involvement of retail, wholesale, or transportation

industries. In the input-output tables, retail, wholesale and transport industries don't produce the things they sell, they only produce margins, so the tourism model must find the shares of producer prices which are for margins and to ascribe them to the correct industries. It must find the wholesale, retail, and transport margin rates and the tax rates to convert the products to basic prices.

Step Five — Converting the Construction Sector

BC Stats then performed a special adjustment or conversion method for the construction sector. This is necessary because in the NAICS system, construction is subdivided between industries as an employer or worker would perceive them—industries like residential or non-residential construction, various types of civil engineering, and many types of skilled trades contractors. In the input-output tables and the system of national accounts; however, the construction industry is subdivided according to the type of final use the work is for: buildings, civil engineering (infrastructure), and repair and maintenance. The main difference is that the skilled trades contractors in the NAICS system, which are a large portion of the total employment and output, does not translate directly into the other system because a tradesperson can work on any kind of product: a house, a skyscraper, a prison, on repair and maintenance, or a renovation. There is no easy concordance so a special one is constructed, using various indicators and calibrated to achieve certain results at the provincial level, and which can be repeated for each local area. The alternative would have been to collapse all construction industries into one, but this would have erased differences between local areas. For example, one whose construction employment is in residential construction versus one that mainly has to do with commercial or industrial construction.

Step Six — Estimating Tax Rate Coefficients

The census data provides before-tax employment income, but the LAEP model converts it to after-tax income, since individuals spend their after-tax earnings locally—and this is what feeds into the household spending function. The next step estimates average tax rates for industries with different average incomes by identifying coefficients using the Least Squares statistical regression method.

When you graph Statistics Canada data on average tax rates for people with different income in the reference year, you get a curve that approaches an upper limit. As your income goes up, the marginal tax rate increases but the average tax rate approaches a limit. You can convert it into a more-or-less straight line by taking the reciprocal of both sides of the equation, which turns it into a $Y = MX + B$ style equation. The line doesn't fit perfectly, though, so we need to find the best line that gives the closest result for the data we're working with, which are thousands of observations of average incomes for different local areas and industries.

It is important to calibrate these coefficients so that modelled taxes are as close as possible to the observed tax data. The consequence of getting it wrong would be to have a slightly larger or smaller imputed effect for each job in each industry or calculating a slightly larger or smaller economic dependency for non-employment income sources. Remember that the final estimates the model is trying to reach are how much of local after-tax income depends on jobs in manufacturing, or tourism, or high-tech employment? How much does it depend on government transfers or on investment income and private pensions? Finding reasonable tax rates for each of these, which converts before-tax to after-tax incomes, is important to be confident about the results.

Note that this step finds coefficients that will be applied to employment income only because the census gives estimates of average employment income for each industry and area. We don't have estimates of average amounts of non-employment income sources, so estimates of those tax rates come at a later stage and are much simpler.

Step Seven — Assembling the LAEP Model

The next step assembles the previous parts into a model of supply and demand that can be applied to any geographic level:

- Data from the custom IOT are used to estimate direct basic demand shares for each industry; that is, what share of demand comes from “external” sources such as exports, tourism (from the tourism model), government and non-profit spending, and fixed capital investment.

- Local after-tax income data are run through the household spending function to estimate household demand on each industry.
- Direct basic demand and household demand are multiplied through the intermediate input portion of the custom IOT to estimate the indirect impact of that demand, keeping track of the original source.

Many adjustments must be made, especially for tourism-related industries. This is because the concepts in the input-output tables and the system of national accounts don't conform to the concept of tourism in Statistics Canada's methodology for the Provincial and Territorial Tourism Satellite Account (PTTSA). For example, the IOTs contain non-resident Personal Expenditure Categories, representing spending by non-residents in British Columbia and spending by British Columbians abroad. This includes spending by non-residents who are not tourists, such as foreign students and temporary foreign workers. The PTTSA also estimates spending by domestic tourists and when these estimates are replicated in the LAEP model, it requires negative adjustments to the household spending function. Non-resident expenditures in B.C. represent exports, requiring a negative adjustment to other export categories.

The results are calibrated so that, when run at the provincial level with three rounds of indirect impacts, supply = demand to within less than five per cent for any individual industry and one per cent overall. This operates on the idea that if the model achieves reasonable results at the provincial level, we can repeat its functions for each local area with confidence. In other words, at the provincial level we have a "correct answer" to compare our results to, whereas no such answer exists for local areas.

Step Eight — Compiling Initial Results for Each Area

Once the model is balanced at the provincial level, it runs for each local area with a single round of indirect effects, and the results are compiled. This is done for each geographical dimension: the whole province, 29 census divisions, and 103 local areas.

Step Nine — Incorporating a Rest of Province Model

The next step imports the initial results into a new model, called the **Rest of Province (ROP) model**, which is used to calculate the remaining rounds of indirect effect and to calculate the economic interactions between local areas.

In any given area, supply will not equal demand; an area that specializes in one sector, like logging in Port Alberni, will have too much supply from that industry while another area will have too much demand for that industry's output. The model reapportions its excess demand to areas with excess supply through multiple rounds of indirect effects.

For each round of indirect effects, it is necessary to record when an area has excess demand. Excess demand ultimately factors into the Rest of Province Employment Impact Ratios which include the impact a local industry has on jobs in the rest of the province. After each round of indirect effect, excess demand amounts are pooled and reapportioned to other areas of the province. When an area receives excess demand because it has excess supply, it is recorded as intra-provincial exports or trade with the rest of the province.

Trade with the rest of the province is thereby estimated in the model but this estimate should not be taken with any certainty, it is just a modelled interaction and not based on direct evidence. It operates on the assumption that households and businesses have a preference to find suppliers locally, if available, whereas the truth is that it probably varies by industry, and areas are even more interdependent. Estimates of trade with the rest of the province are based on indirect evidence, using census data on local industries to infer which products and services can be met locally.

The ROP model runs the calculations once to reapportion amounts and reconcile supply and demand, making sure that any area's industry does not have more than 100 per cent of its supply attributed. This first set calculates the effect on each area's industry. It runs the calculations a second time to record the impacts of each initial type of demand. For example, the local and rest of province spin-off demand created by tourism demand for Whistler's accommodation sector. The first set records the indirect effects of any/all industries *on* each industry while the second set records the indirect effects *of* each industry on any/all other industries. This second set needs to be done to estimate the Income Dependency statistic for a

given sector, where the contribution it makes to the area’s economic base includes the indirect impact it has on other local industries. It is also needed to calculate Employment Impact Ratios (EIRs) for the same reason. The calculations are done a third and fourth time, converting the results to after-tax income and jobs.

Step 10 — Producing Descriptive Statistics

Step 10 exports the results from the ROP model, compiles them into the 22 economic sectors and calculates the various descriptive statistics and indicators for each area. Concepts and formulas for the key indicators from descriptive statistics are discussed below.

Diversity Index

The Index measures the standard deviation of the income dependence on each basic income source, compared to the standard deviation of a region which was 100 per cent dependent on just one source. There are 24 basic income sources. It would be zero if the area were entirely dependent on one source and 100 if it was equally dependent on each of the defined basic income sources. In practice it tends to be between 40 and 70 in BC.¹²

$$Diversity\ Index = 100 \times \left(\frac{SD(100\% \text{ on one}) - SD(\text{area's 24 basic income shares})}{SD(100\% \text{ on one})} \right)$$

Where SD(100% on one) is the standard deviation of an area that depends 100% on one basic income source, or SD(1,0), i.e. 0.1998.

Forest Vulnerability Index

A community is vulnerable to a downturn in the forest sector if its dependence on that sector is high and its diversity is low. The Forest Vulnerability Index (FVI) was developed to measure this using Income Dependency and Diversity Data.

¹² Diversity Indexes in the current report are not directly comparable with previous editions such as the 2009 Local Area Economic Dependencies because the number of defined economic sectors has increased, changing the calculation of the index.

FVI is a scale that's only relative to other areas of the province. An area with an FVI of 50 is not five times more vulnerable than one with a score of 10, and a score of 100 does not mean a region is 100 per cent vulnerable, just that it is the highest in the province.¹³

To investigate the Forest Vulnerability Index, look at the area's income dependency score for forestry and see whether it has other major sources of external income. See how it compares to other areas in those respects.

Income dependency share

The Income Dependency share, also called the basic income share, measures direct and indirect basic income using the formula:

$$\frac{\text{Direct basic income from a given sector} + \text{Indirect basic income from suppliers to that sector}}{\text{Total basic income for the area}}$$

Where:

- Income is measured **after taxes**, since this is the amount that people must spend in their local areas.
- **Direct basic income** is from the industries that directly export or otherwise earn external income, and from non-employment income sources.
- **Indirect basic income** is from other local businesses that provide intermediate inputs to the direct basic industry.

For example, a manufacturing exporter directly earns external income, but its local suppliers indirectly earn it too. These may include local businesses that supply raw materials, transportation, utilities, or professional services. To the degree that they supply the initial industry with the goods and services it needs to function, part of the activity of those supplying industries is considered indirect basic income.

Note that all basic income shares sum to 100 per cent. This is done so the non-basic sector can be proportionally attributed to each.

¹³ The first step in calculating the FVI is to multiply each local area's income dependence on Forestry by (100 – its Diversity Index). The second step is to normalize the index across all regions of the province, where FVI will be zero for the areas with the lowest forest sector income dependence and highest diversity index, and will be 100 for the area with the opposite combination.

The Location Quotient The Location Quotient (LQ) is a different way of estimating an area's level of specialization in an economic sector. In simple terms, it measures an industry's concentration of local jobs, relative to the provincial average.

$$\text{Location Quotient} = \frac{(\text{Local employment in sector A} / \text{Total local employment})}{(\text{Provincial employment in sector A} / \text{Total provincial employment})}$$

If a local industry employs 100 out of 1,000 total local jobs, the concentration is 10 per cent. If in the whole province that industry employs 100,000 out of two million total jobs, its concentration is five per cent. The location quotient would be two, indicating there are twice as many jobs there compared to the provincial average. A location quotient of 0.5 indicates there are half as many.

A low LQ value means that the local area is not very active in the sector, while a high value indicates it is very active relative to the rest of the province. Areas with a high LQ will tend to have a relatively high Income Dependency score for the same sector, especially if the sector is an export sector or otherwise a large source of basic income.

Note areas with small populations can have huge variations in location quotients. Commuting can also have an effect: the census measures employment by the respondents' residence, not their place of work. For this reason, it is a good idea to compare an area's statistics to those of its surrounding areas and to its parent regional district.

An advantage of the Location Quotient is that it is easy to calculate and doesn't depend on fancy economic modelling. By contrast, the Income Dependency statistic relies on input-output modelling to determine what portion of an industry is basic or non-basic, while LQ can be calculated by anyone. In fact, LQ was the original way that Economic Base Theory estimated the basic portion before powerful computers were available. Economists at that time estimated that the portion of LQ > 1 was presumed to export its product out of the local area.

Table 9 shows the local areas with the highest location quotients for each industry.

TABLE 9: LOCAL AREAS WITH THE HIGHEST LOCATION QUOTIENTS

Industry	Local Areas
Forestry	Mackenzie (19.0), Houston (15.2), Nechako Valley (12.7)
Mining	Fernie (30.6), Princeton (24.5), Kitimat (22.8)
Oil and Gas	North Peace (34.5), Dawson Creek (29.4), Northern Rockies (24.4)
Fishing	Port Hardy (38.2), Haida Nation (29.5), Central Coast (28.2)
Agriculture	Keremeos (8.5), Chilcotin (6.9), Oliver-Osoyoos (5.8)
Tourism	Whistler - Pemberton (8.3), Clayoquot (6.6), Revelstoke (4.3)
Public Sector	Central Coast (2.0), Stikine (1.9), Hazelton (1.8)
Construction	Cassiar Corridor (2.0), Columbia - Shuswap (2.0), Stikine (1.9)
Film and TV	Greater Vancouver (2.9), Port Alice (2.6), North Shore (2.2)
High Tech Manufacturing	Richmond (2.0), Burnaby - New Westminster (1.9), Salmon Arm (1.8)
Other Manufacturing	Sicamous (2.0), Matsqui-Abbotsford (1.9), Mission (1.9)
Utilities	Stikine (5.1), Trail (4.3), Rossland (4.1)
Truck Transport	South Peace (3.5), Cassiar Corridor (3.5), Matsqui-Abbotsford (3.4)
Water Transport	Prince Rupert (24.8), Cassiar Corridor (6.4), Central Coast (6.0)
Rail Transport	Revelstoke (20.9), Golden (15.6), Telkwa - Smithers (11.5)
Other Transport	Central Coast (2.9), Delta - Tsawwassen (2.2), Prince Rupert (2.1)
Retail Trade	Cranbrook (1.4), Vernon (1.3), Lake Cowichan (1.2)
Wholesale Trade	Prince George rural (northwest) (1.7), Langley (1.7), Prince George rural (southeast) (1.7)
Business Services	Sicamous (1.3), Peachland (1.3), Enderby (1.3)
Finance, Insurance and Real Estate (FIRE)	North Shore (1.7), Richmond (1.6), Greater Vancouver (1.4)
Information and Communications Technology (ICT)	Greater Vancouver (1.7), North Shore (1.6), Burnaby - New Westminster (1.5)
Other Services	Clayoquot (2.2), Whistler - Pemberton (2.1), Revelstoke (2.0)

Employment Impact Ratios (EIRs)

Employment Impact Ratios (EIRs) provide a measure of the interdependence between an industry and the rest of the economy. They estimate how each job in a given sector supports jobs in others. When used in an economic impact analysis, EIRs predict the impacts of job losses or gains, estimating how many spin-off jobs would be created or lost elsewhere.

The LAEP model presents two main types of EIRs:

1. Indirect EIRs, measuring the jobs created by business-to-business interactions; and
2. Induced EIRs, including the jobs created when workers spend their incomes.

A third type of impact ratio is the Income Impact Ratio (IIR), which measures the impact of a change in non-employment income. It is discussed at the end of this section.

There are also two levels of geographic impacts that are estimated:

1. Local EIRs, which estimate the impact on the local area or regional district only; and
2. Total EIRs, which include jobs created in other parts of British Columbia.

Finally, the Induced EIRs each have two variations involving the social safety net (SSN):

1. Induced EIRs without SSN, where workers who lose jobs are presumed to eventually move away and their spending goes to zero; and
2. Induced EIRs with SSN, where workers who lose jobs do not lose all their income. Impacts with SSN are always smaller.

In total, the LAEP presents six types of Employment Impact Ratios (EIRs). They are listed below with the formulas used to calculate and interpret the specific impact:

1. **Local indirect EIR** × direct jobs gained = direct jobs + local indirect jobs
2. **Total indirect EIR** × direct jobs gained = direct jobs + local indirect jobs + indirect jobs in the rest of the province
3. **Local induced EIR no SSN** × direct jobs gained = direct jobs + local indirect jobs + local induced jobs (no SSN)
4. **Total induced EIR no SSN** × direct jobs gained = direct jobs + local indirect jobs + indirect jobs in the rest of the province + local induced jobs (no SSN) + induced jobs in the rest of the province (no SSN)
5. **Local induced EIR with SSN** × direct jobs gained = direct jobs + local indirect jobs + local induced jobs (with SSN)
6. **Total induced EIR with SSN** × direct jobs gained = direct jobs + local indirect jobs + indirect jobs in the rest of the province + local induced jobs (with SSN) + induced jobs in the rest of the province (with SSN)

Over 100,000 Employment Impact Ratios are presented in a table in the LAEP Toolkit. The LAEP Calculator, a spreadsheet in the Toolkit, retrieves the correct ratios to automatically generate an economic impact analysis of the user's specifications and includes instructions on how to interpret results.

The **indirect ratios** are entirely concerned with employment generated in the community because of supplier effects. For example, an industrial plant may have 100 direct employees. However, the plant may also make other local purchases which lead to related employment. It might buy supplies from local retail stores, hire local accountants or lawyers, or contract local trades people for special jobs that their employees are not trained to handle. All these hired services generate indirect employment. Strictly speaking, it is not the direct employees themselves that generate the indirect employment, but rather the non-wage spending by the industry employing the direct workers. Nevertheless, we assume no effects of scale, or that the ratio remains constant even if the scale of plant changes; direct employment means a bigger or smaller plant and indirect employment.

The **induced ratios** are based on the same formula, but in addition to the indirect employment they assign some portion of the non-basic employment in the community to the income source generating the direct employment. This is done in a very simple proportional way. Suppose, for example, that our allocation procedures have identified 1000 non-basic jobs in each community, and that Industry X's share of the after-tax basic income is 20 per cent. The model will then assign 20 per cent or 200 non-basic jobs to Industry X, increasing the employment impact ratio accordingly.

The **local ratios** only measure jobs that are created or supported in the local area. Where the model calculates that demand for an industry is created by the local economic activity, but the census data indicates that industry is not present in the local area or is not big enough, that excess demand is assigned to other areas of the province that have excess supply. The **total ratios** include the jobs supported in this way locally and in the rest of the province.

The **social safety net (SSN)** models the situation where workers who lose jobs have some of their income replaced, specifically by the criteria of Canada's employment insurance benefits. In the opposite case, new jobs created in the presence of the social safety net assumes the workers had been previously unemployed and receiving those benefits. The ratios with SSN are what is likely to happen in the short term (up to a year) while the ratios without SSN are what is likely to happen in the long term, where workers who lose jobs move away and the

community loses the economic impact of all their spending. Since it has to do with household spending, the SSN only affects induced ratios.

The LAEP Calculator shows how those jobs can be broken down between local indirect, local induced, and indirect and induced jobs in the rest of the province. For example, the table shows Campbell River’s local indirect ratio of 1.43 for forestry. This implies that, for each 100 direct jobs in the forestry sector, 43 more local jobs are supported indirectly in local industries that supply intermediate inputs to the forestry sector.

TABLE 10: THE LAEP CALCULATOR (FROM THE TOOLKIT)

	Scenario 1	Scenario 2
<i>1. Select reference year</i>	2020	2020
<i>2. Select local area or regional district:</i>	Campbell River	East Kootenay
<i>3. Select basic sector which is directly impacted:</i>	Forestry	Mining
<i>4. Social safety net or no social safety net?</i>	No SSN	No SSN
Local Indirect EIR	1.43	1.39
Local Induced EIR no SSN	1.80	1.86
Local Induced EIR with SSN	1.64	1.71
Total Indirect EIR	1.86	2.22
Total Induced EIR no SSN	2.43	3.03
Total Induced EIR with SSN	2.18	2.74
<i>3. Enter direct jobs lost (or gained):</i>	100	-100
Indirect jobs lost/gained locally	43	-39
Induced jobs lost/gained locally	37	-47
Induced adjustment b/c of SSN locally	-	-
Indirect jobs lost/gained in the rest of the province	43	-84
Induced jobs lost/gained in the rest of the province	20	-33
Induced adjustment b/c of SSN in the rest of the province	-	-
Total employment impact	243	-303
<i>Of which: local jobs</i>	180	-186
<i>Of which: jobs in the rest of the province</i>	63	-117

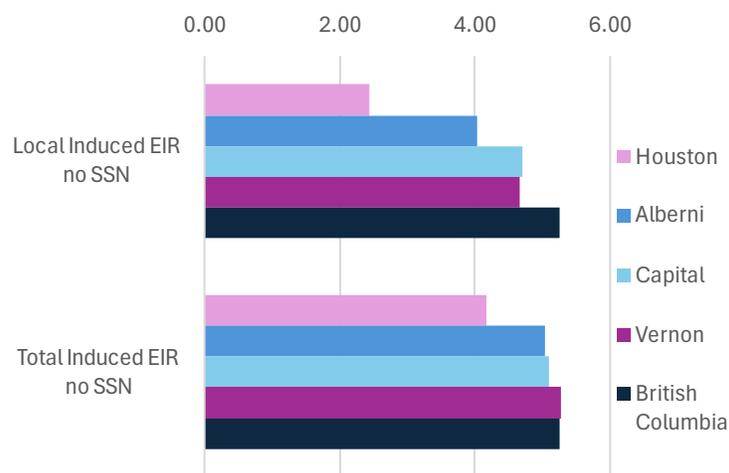
To continue the example, Campbell River’s local induced EIR (with no Social Safety Net) for forestry is 1.80, indicating that those 100 forestry jobs support 80 more in the community. Since we already know 43 are supported through the indirect effect, 37 remaining jobs come from the induced effect. The induced effect here calculates the household spending from all the people employed in those 143 direct and indirect jobs.

Income Impact Ratios (IIRs)

The **income impact ratio** is used to calculate the spin-off effect of a change in non-employment income. It is measured in terms of millions of dollars of after-tax income per non-basic job. As this models a change in income independent of employment in an industry, it only affects household spending and not an industry's suppliers. Therefore, it has an induced effect and no indirect effect.

The local ratio is calculated as the area's total basic income/local non-basic jobs, where basic income is measured in after-tax income (and this is why the LAEP Calculator requires the user to subtract taxes). The total ratio is measured as the area's total basic income/ (local non-basic jobs + non-basic jobs induced in the rest of the province).

FIGURE 47: INCOME IMPACT RATIOS



The local income ratios range from about one to five jobs per \$1 million in the 2020 reference year. The main reasons for the differences are:

- For small areas with small or absent non-basic sectors, the LAEP model calculates that there are many goods and services a household needs but can't get there.¹⁴ Only a small portion of their household income can

¹⁴ The LAEP model uses a single profile of household spending derived from the input-output tables, and which ultimately comes from Statistics Canada's Household Spending Survey. That is, the model is unable to recognize a difference between spending patterns for different types of

therefore be spent locally and most of the induced effect will happen in the rest of the province. The opposite is true for large areas with diverse economies.

- For areas where the average income is low in non-basic sectors, the model calculates more non-basic jobs are supported by \$1 million of household spending. The total income ratios range from about 3.5 to 5.5 jobs per \$1 million.
- For areas where the average income is low in non-basic sectors, more jobs are supported locally, as mentioned above, but each of those jobs is associated with less economic output. The model will calculate that a large share of household consumption still needs to be satisfied elsewhere, leading to a higher induced impact in the rest of the province and overall.

Considerations & Limitations

Uniform production and household spending functions

Indirect basic demand from local industries is calculated by multiplying local direct basic demand through industry production functions which are derived from the Statistics Canada's input-output tables. Production functions describe the distribution of input costs for an industry. By necessity, each production function is the same in every area, equal to the average for all of B.C. Regional differences only occur in how much of the indirect impact is felt locally or distributed to the rest of the province.

This has two implications:

- Each industry is assumed to act the same in any region of the province, and
- There are also no effects of scale, or no differences in efficiency between a large versus small or established versus new operation (i.e., in the case of interpreting an economic impact assessment). The production function remains constant even as the scale of the plant changes: increased or

families, ages of people, different income levels, or different areas. For more on this, see the chapter on Methodology.

decreased direct employment results in a larger or smaller plant, along with corresponding changes in indirect employment.

The calculation of non-basic demand acts the same. The area's total income (from the census) is converted to after-tax income, then multiplied by a household spending function that converts it to demand for specific industries. The function is derived from the Personal Expenditure Categories (PEC) of the input-output tables, based on Statistics Canada's Survey of Household Spending. Like production functions, the household function is uniform across the province, presuming by necessity that every dollar is distributed to the same industries in the same ratios, no matter the area.

Modelling Intra-Provincial Trade

Trade with the rest of the province is modelled in the LAEP, whereby indirect and induced demand for individual industries may be more than local supply. Where this is the case, excess demand is reapportioned to areas of the province with excess supply. Trade with the rest of the province is supplier impacts (indirect demand) and household (induced) demand that couldn't be satisfied in the same area it was generated in.

This is recorded as trade with other areas of the province, and for an area with exports to the rest of the province (excess supply), this amount contributes to its direct basic demand. In the concept of the LAEP, basic income comes from outside the local area even if it is still from inside British Columbia.

The estimate of trade with the rest of the province should not be taken with any certainty, it is just a modelled interaction and not based on direct evidence. It is based on indirect evidence in the sense that local supply can only come from the industry employment that exists there, according to the Census data.

For an economic sector in an area with a large amount of estimated trade with the rest of the province, we can say it has supplied more than its local needs and must be satisfying indirect or household demand for other areas of the province.

The modelled trade with the rest of the province will tend to be smaller for areas with large populations and diverse economies, for regional districts compared to their constituent local areas, and it is zero at the level of the whole province.

Data Quality and Suppression

Statistics Canada modifies census data in two ways: it rounds the last digit of employment and income data, randomly up or down; and suppresses very small results. These measures are needed to protect people's privacy and to reflect the uncertainty in results that are generated by a very small number of respondents.

The LAEP model, however, must have a complete set of data so cleans it and imputes missing values. The process of "cleaning" the data involves altering results so that estimates at the detailed industry level add up to the values for their parent industries. For areas with a very small amount of employment in each industry, this can result in data quality issues. In these cases, the LAEP model suppresses data at the aggregated level (giving it an "F" data quality rating) if its final estimate differs 30 per cent or more from the raw data.

Statistical Discrepancies

The statistical discrepancy arises from imperfections in the LAEP model that make it impractical to match supply and demand in every industry and area. The discrepancy measures the amount of a local industry's supply that could not be matched with any type of modelled demand. It will tend to be larger for smaller industries and areas.

In economic theory, supply equals demand. Put another way: when a business sells a product, there is a buyer. In practice, the LAEP model is not perfectly balanced for a variety of reasons. The main ones are:

1. Economic interactions between industries and households are primarily derived from the input-output tables which are built by Statistics Canada to be balanced and to represent the economic structure at the level of the whole province. The LAEP model assumes by necessity that each local area has the same structure of economic interactions for each industry's intermediate supply, household spending, and industry shares going to final

demand (exports, government spending, etc.), as for the average of the whole province. In other words, they have uniform production and consumption functions. But that is not necessarily true and will lead to discrepancies when the provincial map is applied to local areas.

2. Tourism demand needs to be reconciled with other types of demand in the LAEP model, where it is not in the input-output tables. For example, adjustments subtract from household and intermediate demand to make room for domestic tourism demand; and other adjustments subtract from exports to make room for international and interprovincial tourism demand (which is treated as an export). Statistics Canada's input-output tables and tourism satellite accounts are not fully integrated and reconciled, but the LAEP model endeavors to do so.
3. Many other adjustments are made to convert between the different definitions and classification systems used. For example, the Census uses the North American Industry Classification System (NAICS) at the 4-digit level of detail, representing just over 300 individual industries. The IOTs use the Input-Output Industry Classification (IOIC) system, with about 230 industries which are further subdivided between business, government and non-profit sectors. Converting between systems introduces additional discrepancies.
4. The LAEP model is calibrated so that, when run at the provincial level with three rounds of indirect impacts, supply equals demand to within less than five per cent for any individual industry and one per cent overall. This operates on the idea that if the model achieves reasonable results at the provincial level, we can repeat its functions for each local area with confidence. In other words, at the provincial level we have a “correct answer” to compare our results to (the input-output tables), whereas no such answer exists for local areas. Statistical discrepancies will be larger for smaller industries and areas as a result.
5. More broadly, data is not absolute truth. Every effort to collect it has a degree of uncertainty and potential bias. Fusing two types of data collection—the census and the supply-use tables—adds additional sources of error. The LAEP model is an attempt to represent economic conditions in British Columbia, but it can never be perfect. Recognizing this, BC Stats has

chosen to acknowledge these statistical discrepancies rather than imply a level of precision that the data cannot support.

Comparing the Economic Base and Local GDP

The LAEP model did not estimate local Gross Domestic Product (GDP) because we considered local after-tax income to be more relevant since that is what is spent locally. Other components of GDP, like net taxes on production and gross operating surplus typically leave the jurisdiction; though they are part of the GDP produced by the local area, they don't necessarily benefit the residents there in a way we can model.

Concepts used in the LAEP are closer to Gross National Product, which measures income earned by domestic residents from both domestic and foreign sources. The economic base identifies and measures all the external sources and links them to the local economy.

Still, in GDP by industry, labour is typically the largest share of GDP, at about 64 per cent on average in B.C., but ranging from 19 to 95 per cent, depending on the industry, as shown in Table 11.

TABLE 11: LABOUR SHARE OF GDP FOR BRITISH COLUMBIA (%)

	2020	10 yr avg (2012 to 2021)
All industries (except owner occupied dwellings)	64.3	63.8
Government health services	89.9	90.3
Federal government services	81.3	83.1
Educational services	71.8	82.3
Accommodation and food services	90.4	79.9
Government educational services	78.5	79.9
Other private services	82.4	79.2
Professional, scientific and technical services	71.3	74.3
Arts, entertainment and recreation	76.7	73.2
Retail trade	73.3	73.1
Administrative and support, waste management and remediation services	76.3	72.4
Provincial and territorial government services	73.3	72.3
Wholesale trade	72.4	69.9
Construction	66.0	67.8
Local, municipal and Indigenous government services	65.3	66.8
Health care and social assistance	63.3	65

	2020	10 yr avg (2012 to 2021)
Manufacturing	65.8	64.9
Transportation and warehousing	69.6	62.7
Finance and insurance, and holding companies	55.8	59.6
Information and cultural industries	60.0	57.2
Agriculture, forestry, fishing and hunting	49.5	51.1
Non-profit institutions serving households	95.1	44.6
Mining and oil and gas extraction	30.4	27.4
Utilities	22.7	24.2
Real estate, rental and leasing	18.7	19.4

Source: Statistics Canada, table 36-10-0480, Labour productivity and related measures

To estimate local GDP, one could divide the before-tax income of a sector by the labour share of GDP for the industry (taking the most appropriate share, since the industry classification is different). This would need to be done individually for each industry affected since the same amount of income changes for an industry with a small labour share, like real estate, produces more GDP than for an industry with a large labour share, like accommodation and food services.

The per cent change in the economic base is a better indicator for how the GDP would change. Since one industry's share of the economic base includes the indirect impact it has on other industries, this is imprecise to the extent that those other industries have different labour-to-GDP ratios.

Comparing the LAEP and Statistics Canada Multipliers

The Total Employment Impact Ratios (no Social Safety Net) are analogous to Statistics Canada's input-output jobs multipliers when limited to the impacts within the province, as per Table 36-10-0595.

The LAEP's total indirect EIR (no SSN) is equivalent to Statistics Canada's simple jobs multiplier, within province. The simple multiplier measures the total value of production required from all industries across all stages of production (i.e., direct + indirect) to produce one unit of output for final use. The LAEP's total induced EIR (no SSN) is equivalent to Statistics Canada's total jobs multiplier, within province. The total multiplier measures the sum of the direct, indirect and induced multipliers.

The LAEP multipliers are jobs-to-jobs multipliers whereas Statistics Canada's jobs multipliers are in terms of jobs per millions of dollars of direct output. To convert Statistics Canada's multipliers into the same jobs-to-jobs terms, divide the simple or total multiplier by the direct (jobs/\$m) multiplier. For example, performing the calculation on Statistics Canada's multipliers for forestry and logging (BS113), within province, British Columbia, 2020:

$$\frac{4.96 \text{ (Simple multiplier, } \frac{\text{jobs}}{\$m})}{2.09 \text{ (Direct multiplier, } \frac{\text{jobs}}{\$m})} = 2.37 \left(\frac{\text{direct} + \text{indirect jobs}}{\text{direct job}} \right)$$

Transformed into the same terms, Table 12 compares Statistics Canada's input-output multipliers to the LAEP's Employment Impact Ratios. Keep in mind that the economic sectors used in LAEP are industry aggregations that do not match exactly, and that the LAEP results (here showing the ratios for all of B.C.) were calculated by the custom LAEP input-output model.

TABLE 12: COMPARING STATISTICS CANADA AND LAEP MULTIPLIERS FOR 2020 REFERENCE YEAR

Input-Output Industry Classification	Statistics Canada's IO Multipliers		Analogous Economic Sector	LAEP Employment Impact Ratios	
	Simple Jobs-to-Jobs Multiplier	Total Jobs-to-Jobs Multiplier		Total indirect EIR	Total induced EIR
Crop and animal production [BS11A]	1.50	1.73	Agriculture: Farming, Greenhouses and Aquaculture	1.38	1.62
Forestry and logging [BS113]	2.37	2.95	Forestry: Logging	2.09	2.71
Utilities [BS220]	1.81	2.37	Utilities	1.67	2.31
Residential building construction [BS23A]	1.61	1.91	Construction	1.53	1.94
Wholesale trade [BS410]	1.28	1.58	Wholesale Trade	1.33	1.75
Retail trade [BS4A0]	1.18	1.35	Retail Trade	1.33	1.60
Finance, insurance, real estate, rental and leasing and holding companies [BS5B0]	2.12	2.56	FIRE	1.55	1.98
Professional, scientific and technical services [BS540]	1.32	1.65	Business Services	1.30	1.62
Government education services [GS610]	1.08	1.30	Public Sector: Education	1.09	1.39

Statistics Canada's IO Multipliers			LAEP Employment Impact Ratios		
Input-Output Industry Classification	Simple Jobs-to-Jobs Multiplier	Total Jobs-to-Jobs Multiplier	Analogous Economic Sector	Total indirect EIR	Total induced EIR
Government health services [GS620]	1.40	1.66	Public Sector: Health	1.65	2.12
Other federal government services [GS911]	1.36	1.73	Public Sector: Federal Government	1.28	1.69
Other provincial and territorial government services [GS912]	2.10	2.57	Public Sector: Provincial Government	2.48	3.25
Other municipal government services [GS913]	1.49	1.84	Public Sector: Local Government	1.60	2.12
Other food manufacturing [BS311900]	1.83	2.15	Agriculture: Food Processing	1.97	2.40
Sawmills and wood preservation [BS321100]	2.68	3.33	Forestry: Wood Manufacturing	2.66	3.50
Rail transportation [BS482000]	1.82	2.39	Rail Transport	1.59	2.16
Water transportation [BS483000]	2.07	2.59	Water Transport	2.01	2.73
Truck transportation [BS484000]	1.75	2.09	Truck Transport	1.62	2.02
Traveler accommodation [BS721100]	1.33	1.53	Tourism: Accommodation	1.38	1.66
Food services and drinking places [BS722000]	1.13	1.25	Tourism: Food and beverage	1.17	1.35

Appendix B: Glossary of Terms

Basic income: Income that comes from external sources, outside the local area. “Basic income” and “external income” are used interchangeably. Basic income = direct basic income + indirect basic income. The sources and dynamics of basic income define the economic base of an area.

Basic income share: See Income Dependence.

Census Division: There are 29 Census Divisions in B.C. 28 of them are equivalent to Regional Districts, plus the Stikine Region which is an unincorporated region in northern B.C. The analysis in this report focuses primarily on the 103 local areas but all data is also available for Census Divisions/Regional Districts.

Direct basic: An industry’s direct basic demand is the degree to which it depends on the following external income sources:

- Exports,
- Tourism,
- Fixed capital investment in buildings, infrastructure, machinery and equipment, and intellectual property;
- Government spending and spending by the non-profit sector; and
- Trade with other areas of the province.

The shares of an industry’s demand that comes from these sources are determined by data in B.C.’s input-output tables, adjusted by the LAEP model.

The two non-employment income sources, government transfers and non-employment market income, are also considered to be direct basic income sources.

Diversity Index: In the LAEP, the Diversity Index measures whether an area has many or few sources of external income.

Economic base: All the external sources of income for an area, also called basic income. External demand flows through local industries to produce basic employment income. Non-employment income is also considered external or

basic. The composition of the economic base is all the different kinds of external income and the industries it flows through.

The premise of this report is that it is the economic base which supports the non-basic sectors and jobs, where the external income is circulated locally in the non-basic sectors serving local households. Each job in the basic sector supports some number of non-basic jobs, as defined in the Employment Impact Ratios (EIRs).

Economic sector: The 22 industry groupings used in this report, such as Forestry, Tourism, and Film and TV. Several are divided into sub-sectors, with the complete list shown in Appendix D: Economic Sector Aggregations.

All employment and employment income statistics fall under one of these sectors, except tourism which is a special case.

Employment Impact Ratios (EIRs): Economic multipliers used to calculate the impact of job losses or gains in one industry on the rest of the economy. They are typically used in an economic impact analysis to calculate the spin-off effects of job losses or gains in a particular industry, following the general formula:

$$\text{Direct jobs gained or lost} \times \text{EIR} = \text{total jobs gained or lost}$$

Employment income: Income earned through employment in one of the 22 economic sectors. It is usually measured in the LAEP as after-tax income.

Forest Sector Vulnerability: A community is vulnerable to a downturn in the forest sector if its dependence on that sector is high and its diversity is low. The Forest Vulnerability Index (*FVI*) was developed to measure this using a composite of Income Dependence and Diversity Index statistics.

Income Dependence: The Income Dependence is the degree to which an area's economic base depends on a given source, whether from employment income in an economic sector (e.g. mining) or from non-employment income. Also called the basic income share.

This measure addresses questions like:

- What are the most important industries for this area?
- How much will the area be affected if an industry rises or declines?
- How much will the rest of the province be affected?

- What income sources would remain if one declines?

Indirect basic: Indirect basic demand happens when firms purchase goods and services from other industries. Indirect basic income is the workers' employment income that depends on that demand. In the LAEP model, the direct basic impact happens on a particular sector, while the indirect basic impact can happen on any sector.

Induced effect: The results of household income spent in the local area. The induced effect is calculated based on a household spending function derived from B.C.'s input-output tables and is measured in the induced Employment Impact Ratios. See also the definition of non-basic income.

Industry: Used interchangeably with economic sector.

Input-Output Table (IOT): A table that shows the relationships between the sale and purchase of goods and services between producers and consumers within an economy. Statistics Canada builds and publishes them each year for the national economy and each province. Each year's table reflects the structure of the economy at that time and forms the basis of input-output modeling. The LAEP model adapts B.C.'s official IOTs to match the format of Census data for each reference year.

LAEP Calculator: A spreadsheet in the Toolkit that uses the Employment Impact Ratios (EIRs) to automatically generate an economic impact analysis of the user's specifications and includes instructions on how to calculate and interpret results.

LAEP model: A custom input-output model created for this report, combining Census data with B.C.'s input-output tables to create models of local (sub-provincial) areas. The LAEP model is used to calculate various economic interactions and generate the descriptive statistics in this report.

LAEP Toolkit: A Microsoft Excel Workbook meant to be used in conjunction with this report. It contains sortable tables of descriptive statistics, the LAEP Calculator, Area Profile Generator, explanatory notes, and more.

Local area: 103 custom local areas are defined in this report, covering the whole province. They typically represent a town and its surrounding areas, or one or more municipalities in a metropolitan area. They are sometimes called Economic

Dependency Areas (EDAs). For a complete list of the areas and precise definitions of their boundaries, see the LAEP Toolkit.

Location Quotient: Estimates an area's level of specialization in an economic sector. It measures an industry's concentration of local jobs, relative to the provincial average.

Multipliers: In the LAEP, Employment Impact Ratios (EIRs) are economic multipliers that measure job-to-job impacts. Multipliers are based on the idea that a change in one part of the economy can have a ripple effect on other parts. For example, an increase in employment in one area can increase demand for other local goods and services. This can lead to a continuing chain of demand, product, and income increases.

Non-basic income: Generated from jobs in the community that provide goods and services to the people living there. Principally it is in industries that provide services to local households.

Non-employment income: Includes income from government transfers (e.g. from Income Assistance, Canada Pension Plan, Child Tax benefits, and more) and non-employment market income (e.g. investment income, property income, dividends and interest, private pensions, alimony and child support payments).

Reference year: This study is based on data from the 2011, 2016 and 2021 Canadian Censuses. Reference years are for the prior years: 2010, 2015 and 2020, because the Census reports incomes for the prior year and employment income is used most frequently in the LAEP model.

Shift/Share Analysis: A statistical technique to help understand the sources of growth or decline in a particular region and industry. It breaks down changes in employment into three components: the Provincial Effect (PE), Industry Effect (IE) and Local Effect (LE). A shift/share analysis can be generated in the LAEP Toolkit for any area, finding the top and bottom-performing industries, or for any industry, finding the top and bottom-performing areas.

Spin-off: Jobs that may be lost or gained in other parts of the economy because of changes in one direct industry. For example, when 100 jobs are created in a new food processing operation, the spin-off effect is the jobs that will be created in

supplying industries (the indirect effect) and because of the household spending of those workers (the induced effect).

Tourism Sector: Tourism is a portion of many industries, but primarily in accommodation, air travel, recreation and entertainment, and food service. The portions are determined by the industry's demand that comes from international, interprovincial and domestic tourists.

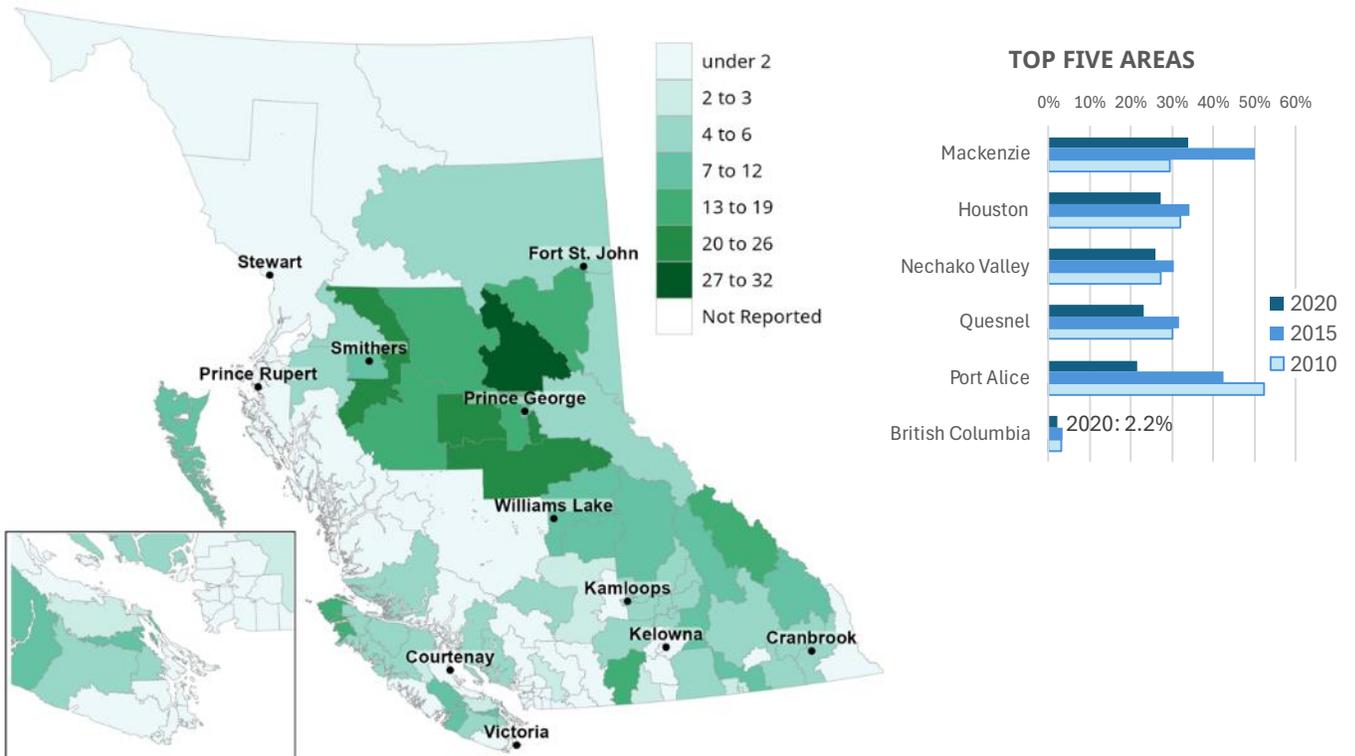
See a detailed list of which industries are partially included in Appendix D: Economic Sector Aggregations or in the LAEP Toolkit.

Among the economic sectors studied in this report, tourism is a special case. So that there is no double counting in the composition of the economic base, basic income shares for other sectors do not include the portions supported by demand from tourists. For the sake of simplicity, employment estimates for non-tourism sectors are not adjusted downward in this way and tourism job estimates should not be added to other sectors.

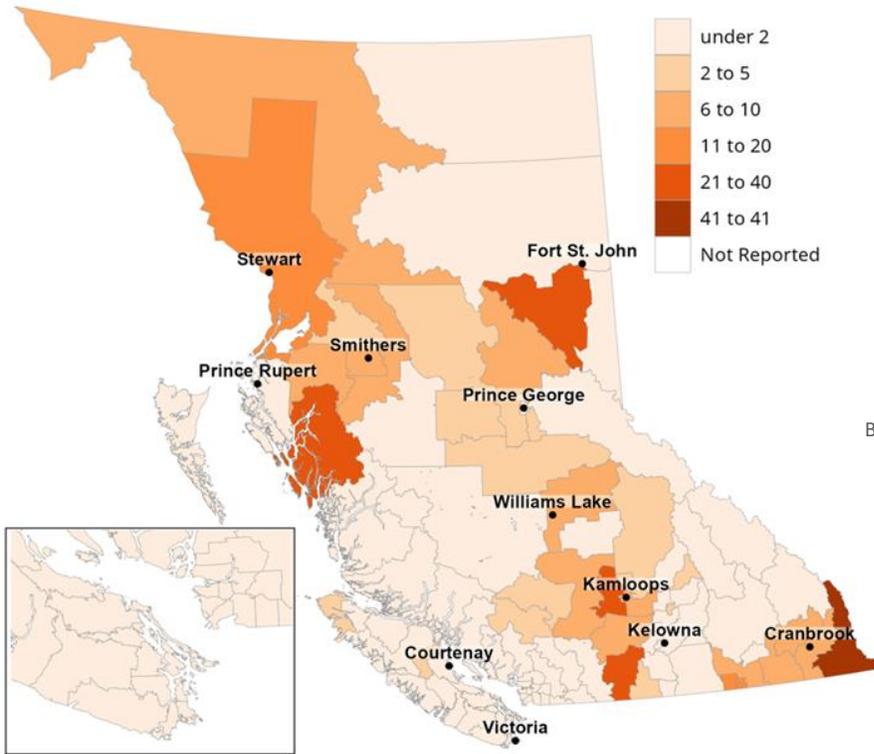
Tourism is modelled in the LAEP by replicating and adapting the methodology of Statistics Canada's Provincial and Territorial Tourism Satellite Accounts (PTTSA). It is discussed in more detail in the chapter on Methodology and in explanatory notes in the Toolkit.

Appendix C: Maps of Basic Income Shares for 2020

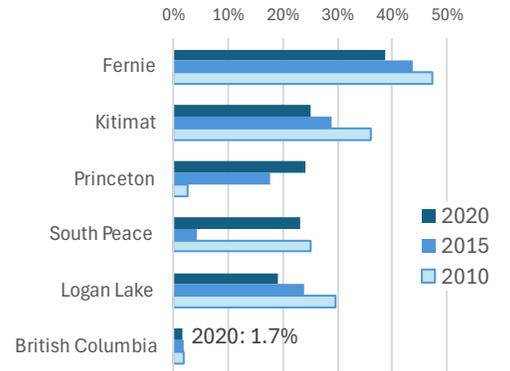
FORESTRY AND WOOD PROCESSING



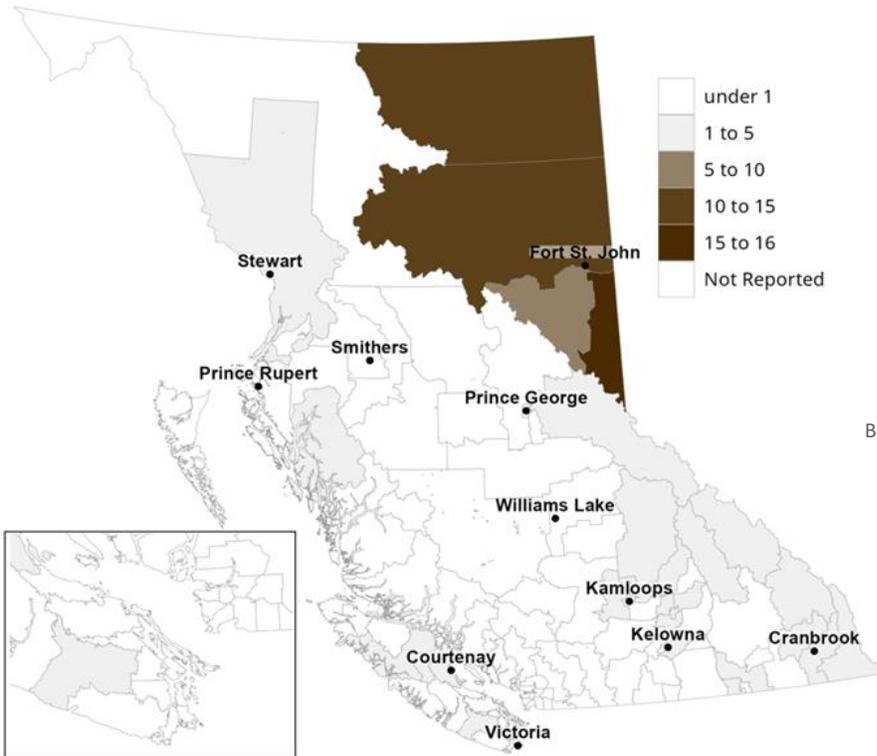
MINING AND RELATED PROCESSING



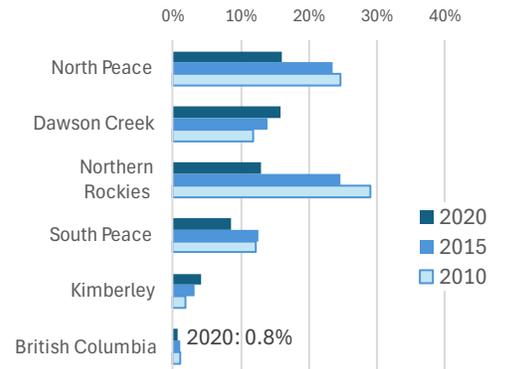
TOP FIVE AREAS



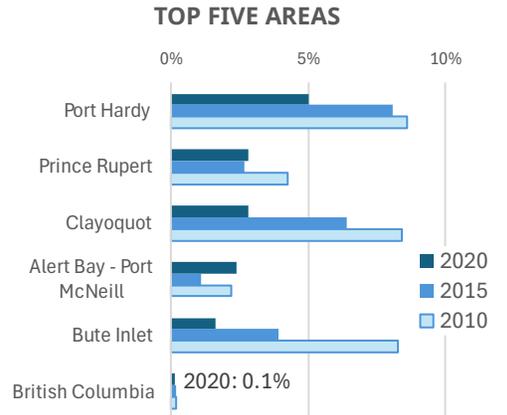
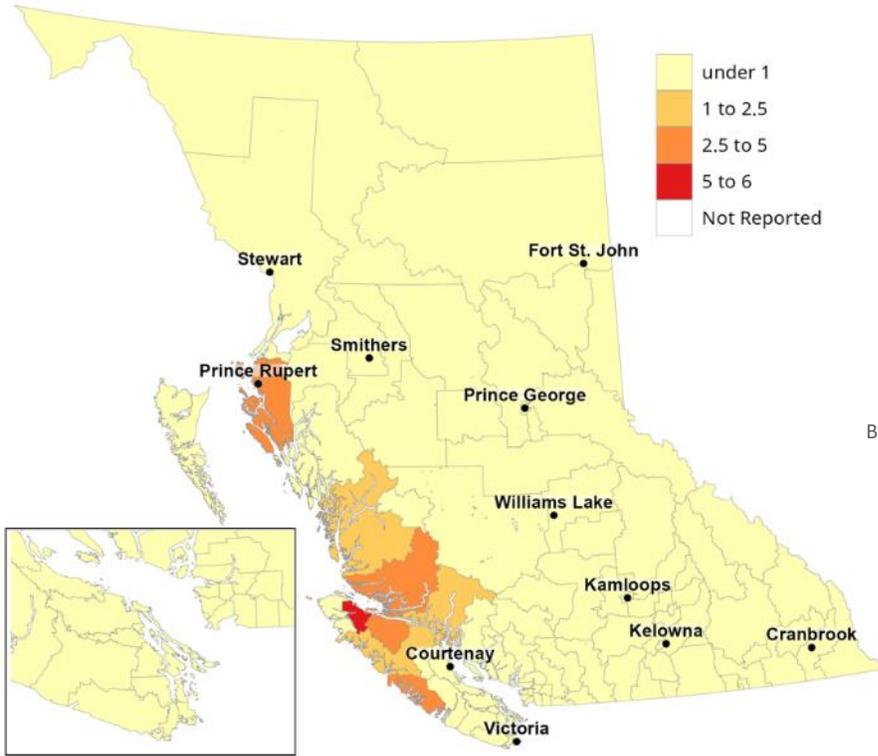
OIL AND GAS AND RELATED PROCESSING



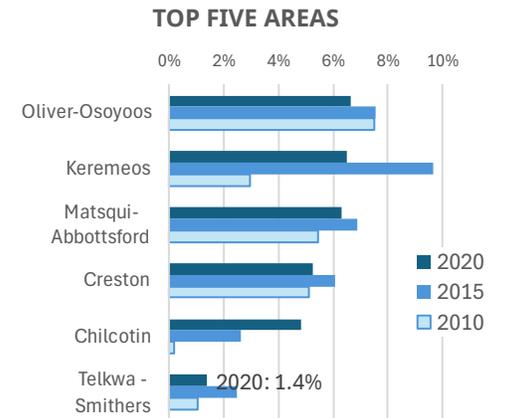
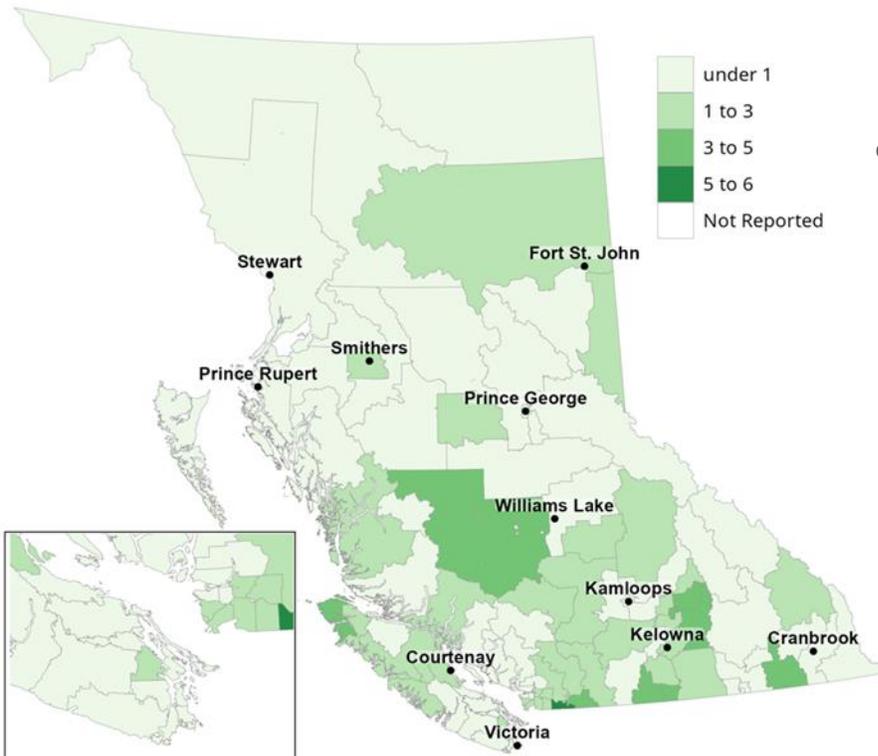
TOP FIVE AREAS



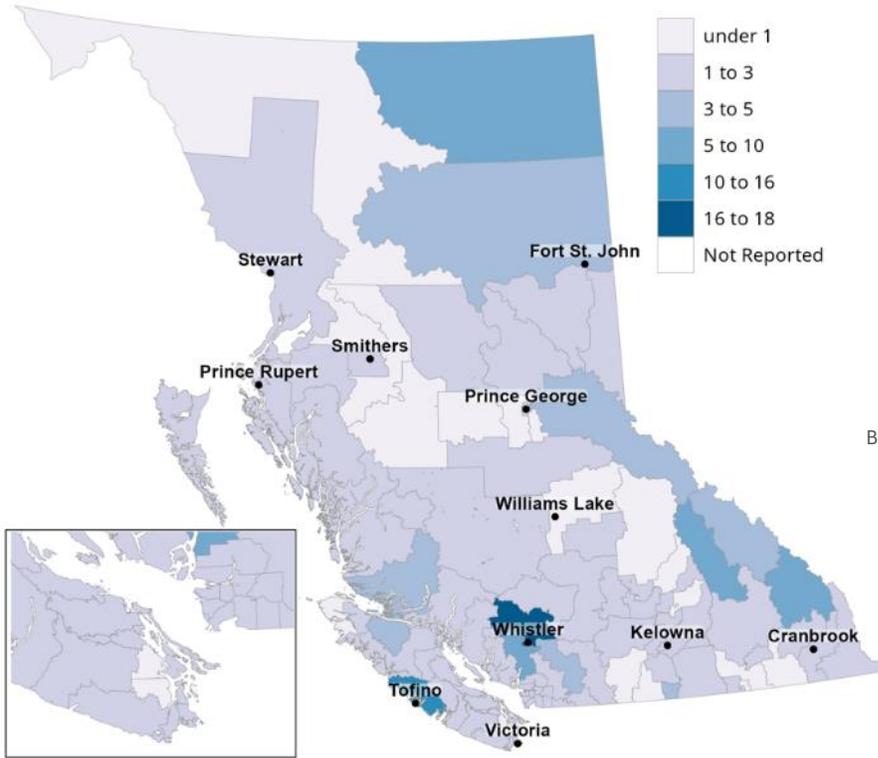
FISHING, HUNTING AND TRAPPING



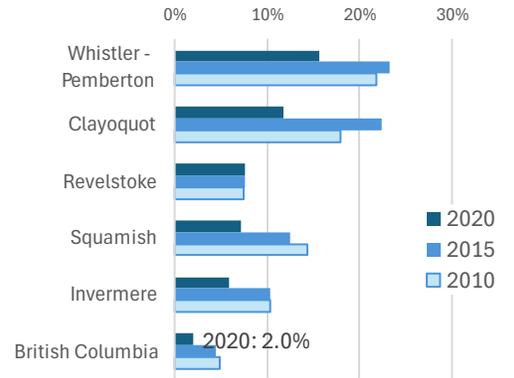
AGRICULTURE AND FOOD PROCESSING



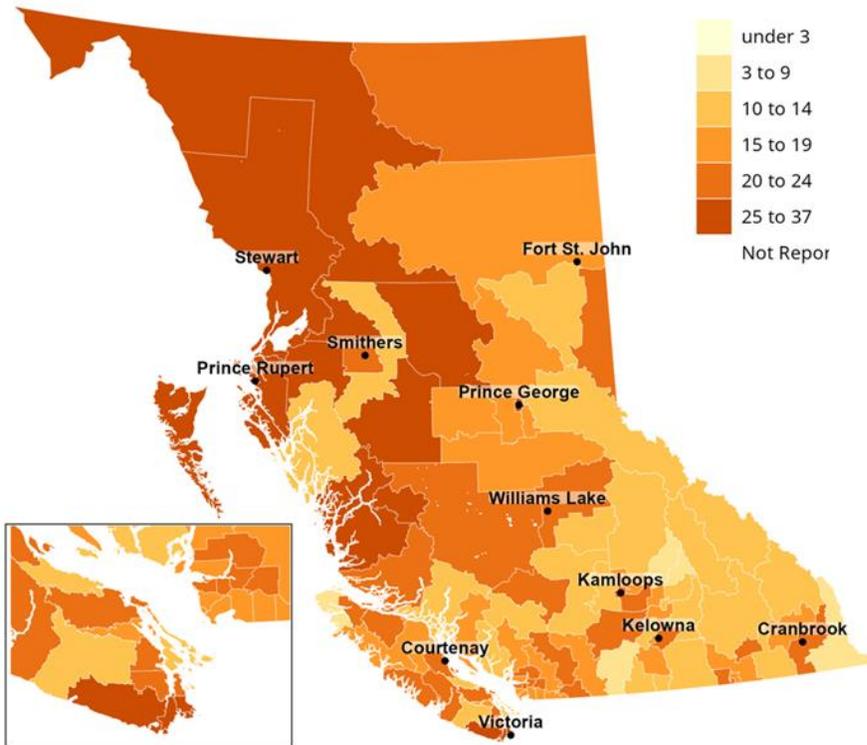
TOURISM



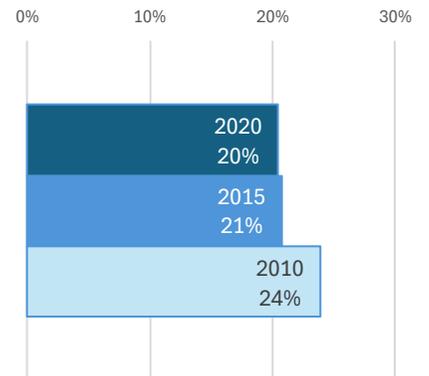
TOP FIVE AREAS



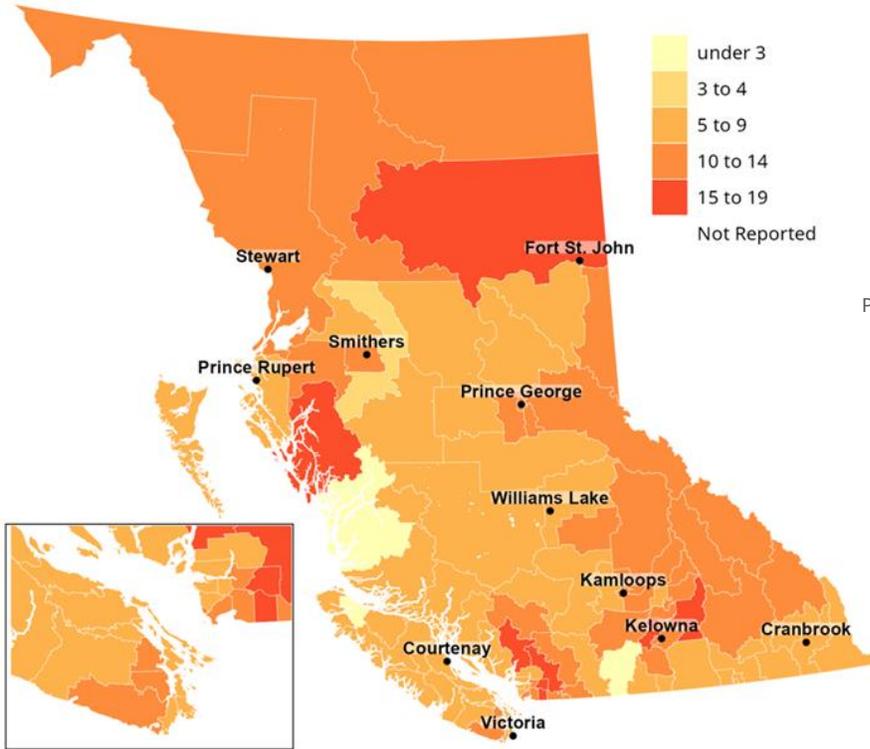
PUBLIC SECTOR EMPLOYMENT



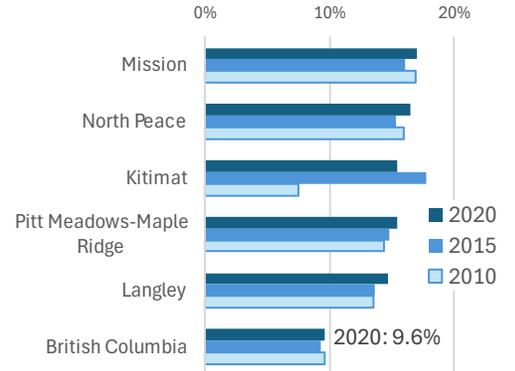
BASIC INCOME SHARES, ALL OF B.C.



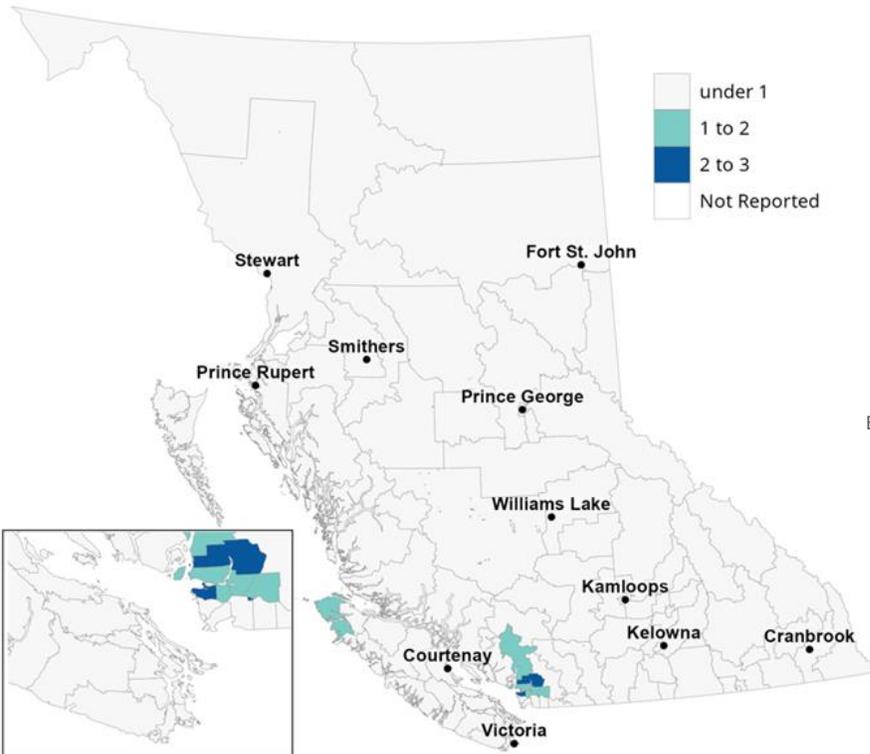
CONSTRUCTION



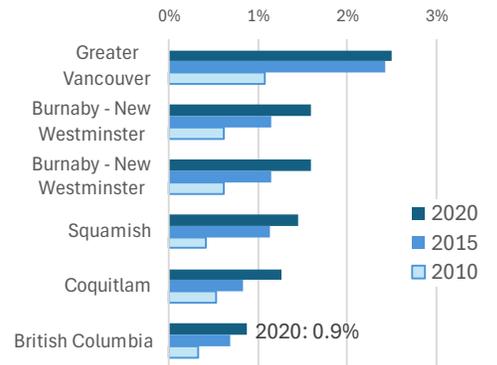
TOP FIVE AREAS



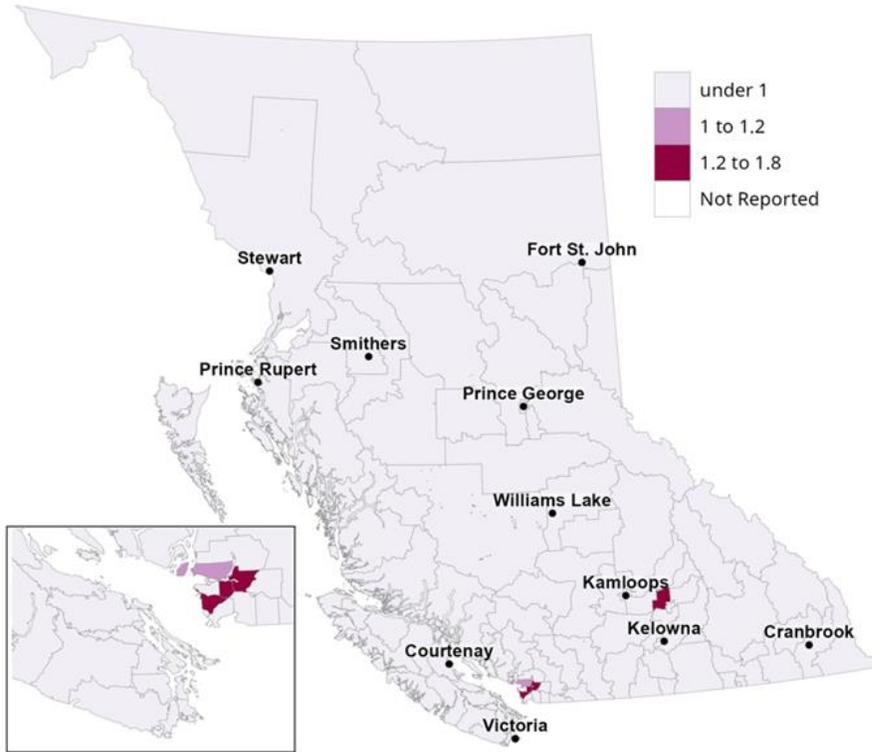
FILM AND TV PRODUCTION



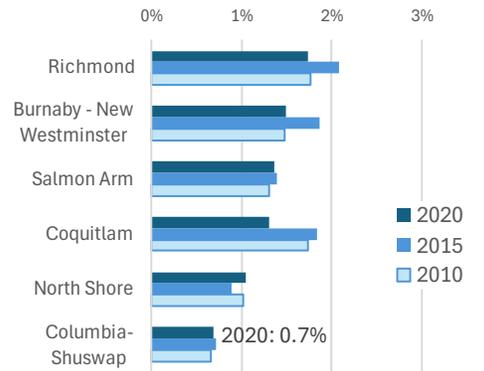
TOP FIVE AREAS



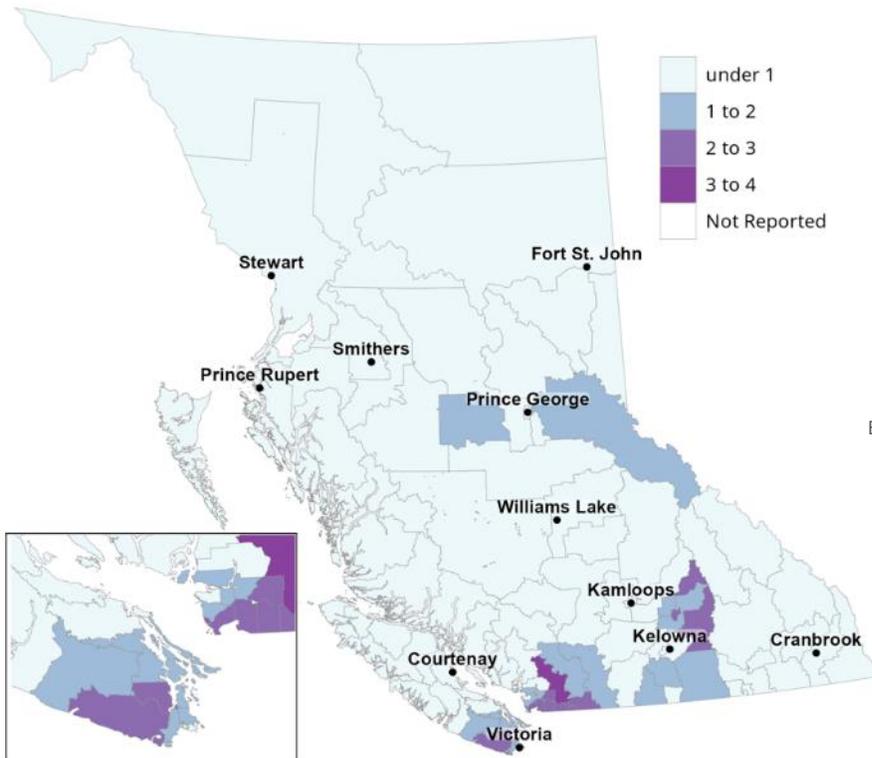
HIGH TECH MANUFACTURING



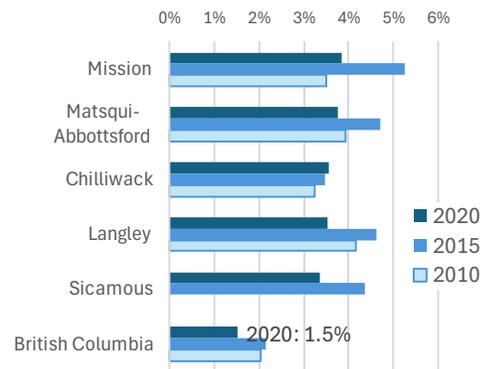
TOP FIVE AREAS



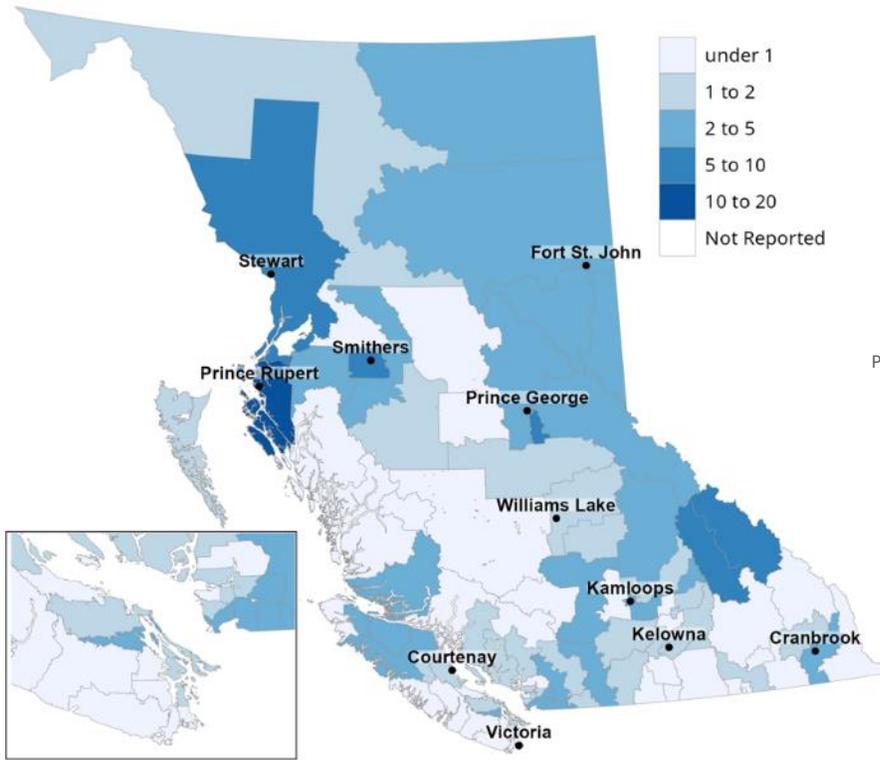
OTHER MANUFACTURING



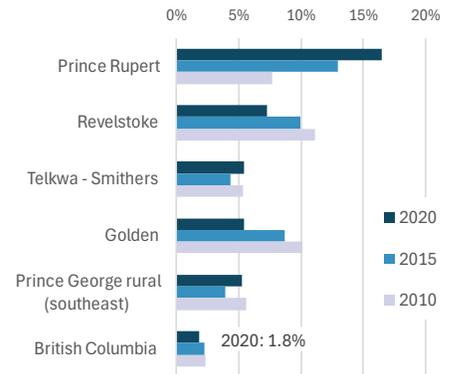
TOP FIVE AREAS



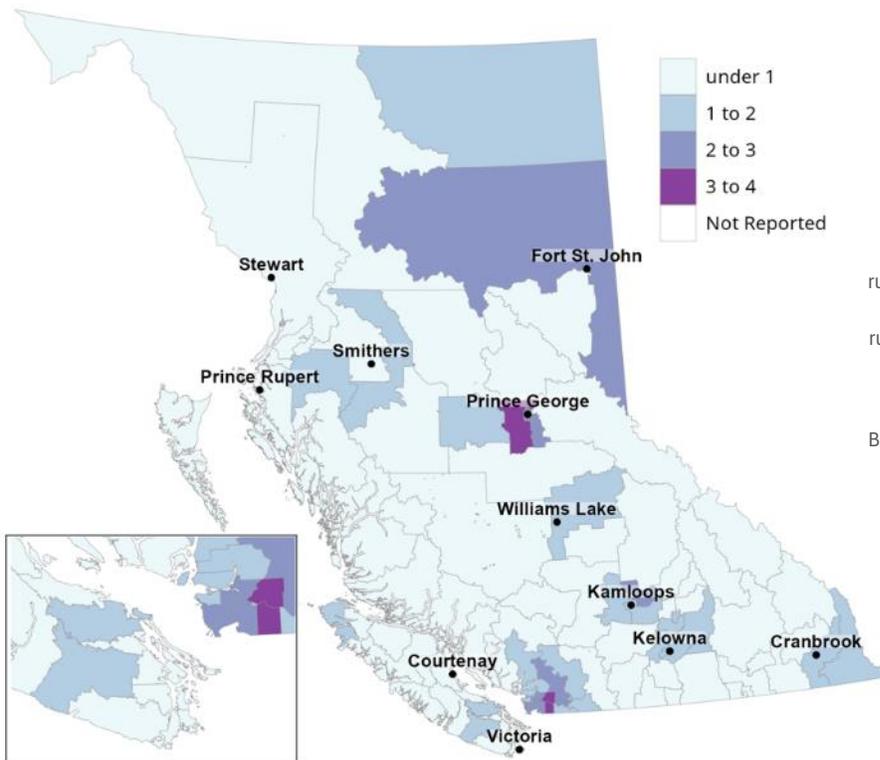
TRANSPORTATION



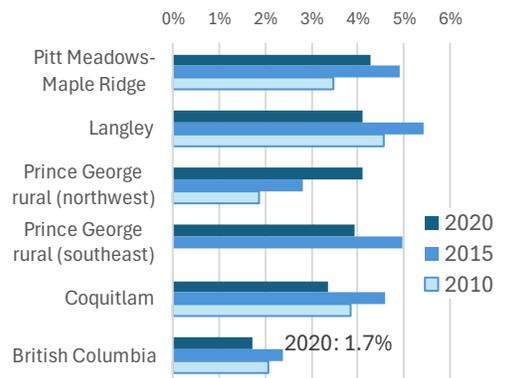
TOP FIVE AREAS



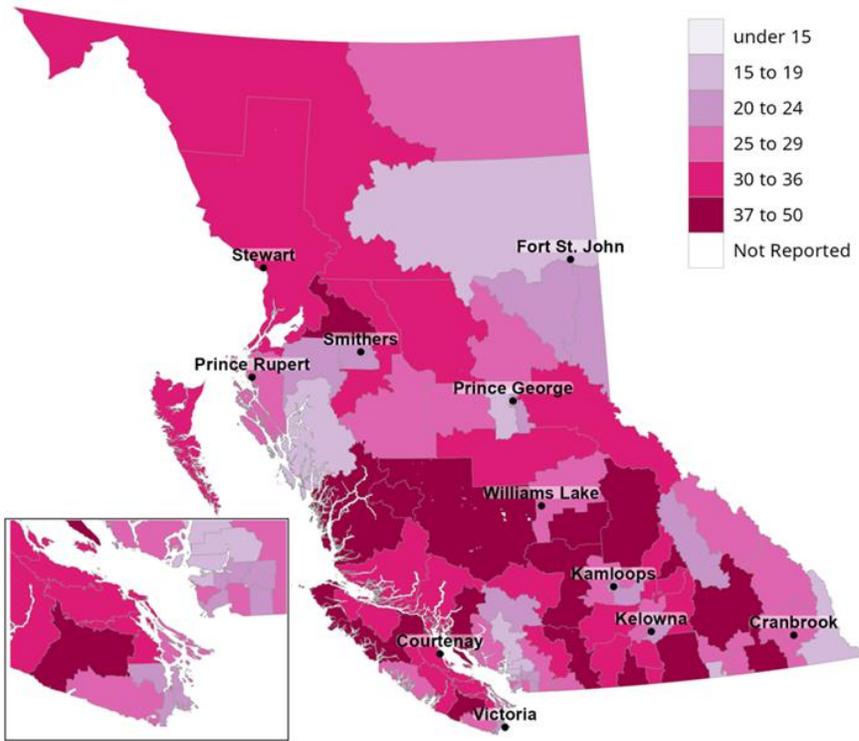
WHOLESALE TRADE



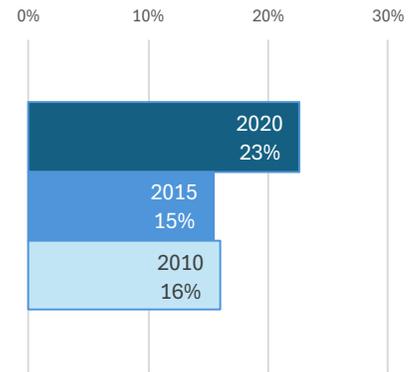
TOP FIVE AREAS



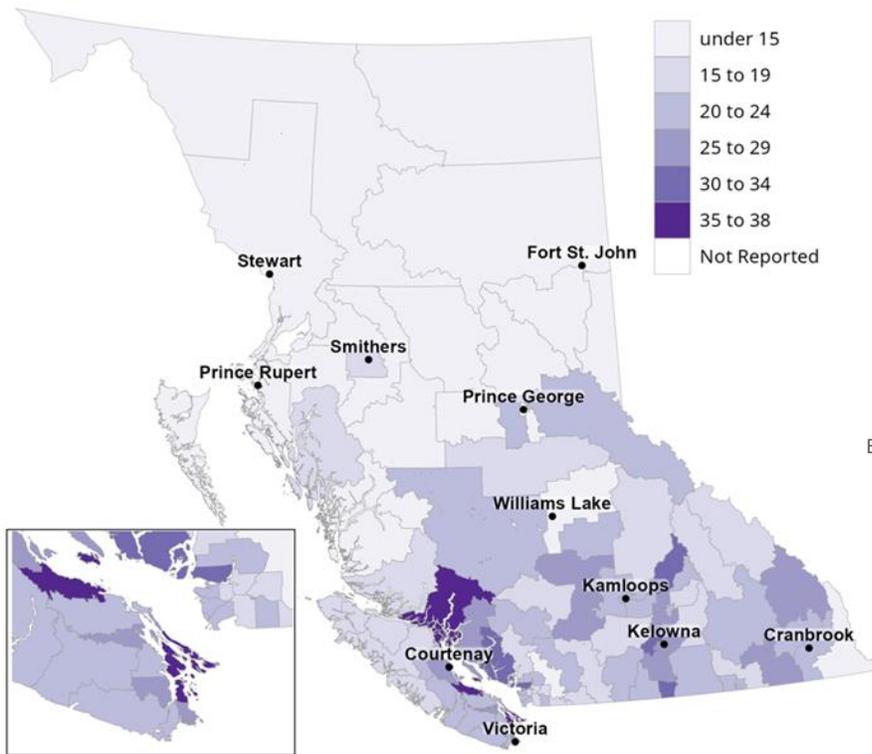
GOVERNMENT TRANSFERS



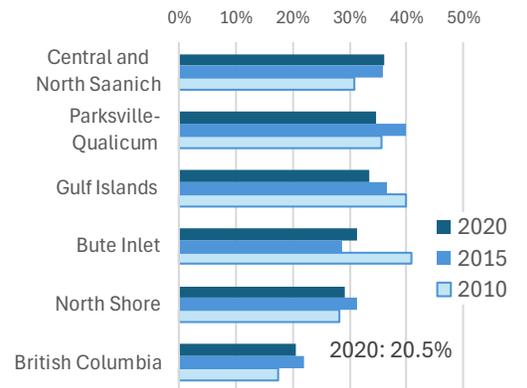
BASIC INCOME SHARES, ALL OF B.C.



NON-EMPLOYMENT MARKET INCOME



TOP FIVE AREAS



Appendix D: Economic Sector Aggregations

BC Stats obtained Census data classified at the 4-digit North American Industry Classification System (NAICS) level (304 industry groups) and aggregated them into the 22 Economic Sectors used in this report. Listed here is the concordance to the 2021 Census data using the 2017 North American Industry Classification System. The concordances for the 2011 and 2016 Censuses are given in the LAEP Toolkit.

FIGURE 48. 22 ECONOMIC SECTORS AND SUB-SECTORS

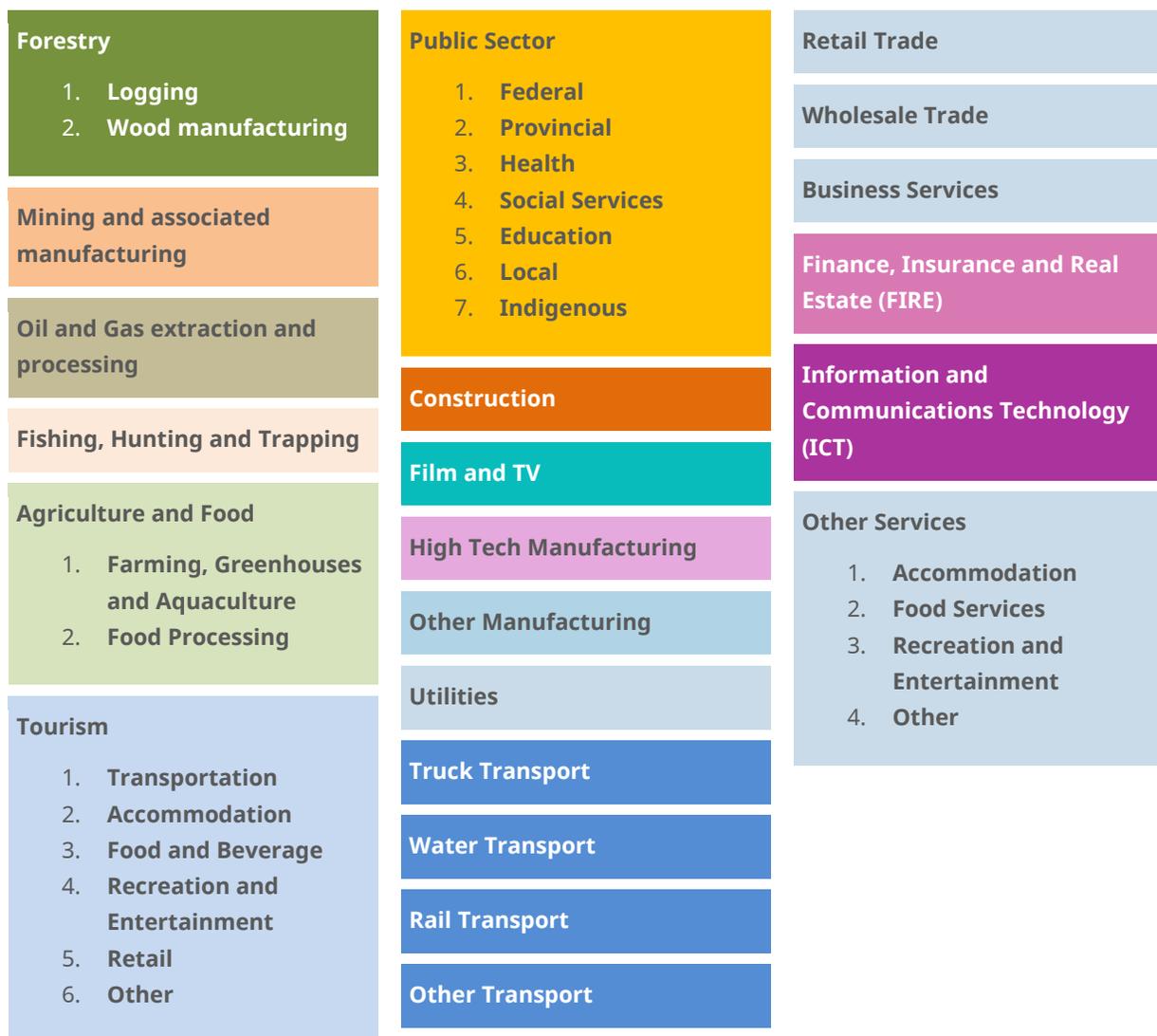


TABLE 13: NAICS AGGREGATIONS INTO SECTORS

Economic Sectors
<p>Forestry</p> <p>Logging 1131 Timber tract operations, 1132 Forest nurseries and gathering of forest products, 1133 Logging, 1153 Support activities for forestry</p> <p>Wood Manufacturing 3211 Sawmills and wood preservation, 3212 Veneer, plywood and engineered wood product manufacturing, 3219 Other wood product manufacturing, 3221 Pulp, paper and paperboard mills, 3222 Converted paper product manufacturing</p>
<p>Mining</p> <p>2121 Coal mining, 2122 Metal ore mining, 2123 Non-metallic mineral mining and quarrying, 3311 Iron and steel mills and ferro-alloy manufacturing, 3312 Steel product manufacturing from purchased steel, 3313 Alumina and aluminum production and processing, 3314 Non-ferrous metal (except aluminum) production and processing, 3315 Foundries</p>
<p>Oil and Gas</p> <p>2111 Oil and gas extraction, 3241 Petroleum and coal product manufacturing</p>
<p>Fishing, Hunting and Trapping</p> <p>1141 Fishing, 1142 Hunting and trapping, 3117 Seafood product preparation and packaging</p>
<p>Agriculture and Food</p> <p>Farming, Greenhouses and Aquaculture 1110 Farms (except Greenhouses and Aquaculture)(1111 to 1124 and 1129), 1114 Greenhouse, Nursery and Floriculture Production, 1125 Aquaculture, 1150 Support activities for farms (1151 and 1152)</p> <p>Food Processing 3111 Animal food manufacturing, 3112 Grain and oilseed milling, 3113 Sugar and confectionery product manufacturing, 3114 Fruit and vegetable preserving and specialty food manufacturing, 3115 Dairy product manufacturing, 3116 Meat product manufacturing, 3118 Bakeries and tortilla manufacturing, 3119 Other food manufacturing, 3121 Beverage manufacturing, 3122 Tobacco manufacturing</p>
<p>Tourism</p> <p><i>Note: Tourism estimates include portions of many industries, some large but most very small. The LAED's tourism model is based on Statistics Canada's Tourism Satellite Accounts. It estimates the shares of products which are bought by tourists and divides them between the industries producing those products. Industries here are grouped into sub-categories of tourism based on the primary tourism product they produce.</i></p> <p>Transportation <i>Top industries, by order of tourism-related output:</i></p>

Economic Sectors

4811 Scheduled air transportation, 4812 Non-scheduled air transportation, 8111 Automotive repair and maintenance, 3241 Petroleum and coal product manufacturing, 5321 Automotive equipment rental and leasing, 4471 Gasoline stations, 4832 Inland water transportation, 4831 Deep sea, coastal and Great Lakes water transportation, 4853 Taxi and limousine service, 4854 School and employee bus transportation, 4851 Urban transit systems, 4859 Other transit and ground passenger transportation, 4121 Petroleum and petroleum products merchant wholesalers, 4151 Motor vehicle merchant wholesalers, 4152 New motor vehicle parts and accessories merchant wholesalers, 5222 Non-depository credit intermediation, 4855 Charter bus industry, 4821 Rail transportation, 3262 Rubber product manufacturing, 2111 Oil and gas extraction

Accommodation

By order of tourism-related output:

7211 Traveller accommodation, 7212 Recreational vehicle (RV) parks and recreational camps, 7213 Rooming and boarding houses

Food and beverage

Top industries, by order of tourism-related output:

7225 Full-service restaurants and limited-service eating places, 4451 Grocery stores, 7223 Special food services, 3121 Beverage manufacturing, 3116 Meat product manufacturing, 3119 Other food manufacturing, 4131 Food merchant wholesalers, 3115 Dairy product manufacturing, 3118 Bakeries and tortilla manufacturing, 1110 Farms (except greenhouses, nurseries, floriculture and aquaculture), 3114 Fruit and vegetable preserving and specialty food manufacturing, 4453 Beer, wine and liquor stores, 7224 Drinking places (alcoholic beverages), 1114 Greenhouse, nursery and floriculture production, 4452 Specialty food stores, 3113 Sugar and confectionery product manufacturing, 3117 Seafood product preparation and packaging, 4132 Beverage merchant wholesalers, 1125 Aquaculture, 3112 Grain and oilseed milling, 1141 Fishing

Recreation and entertainment

Top industries, by order of tourism-related output:

7139 Other amusement and recreation industries, 7132 Gambling industries, 7115 Independent artists, writers and performers, 7111 Performing arts companies, 7121 Heritage institutions, 7112 Spectator sports, 7113 Promoters (presenters) of performing arts, sports and similar events, 5121 Motion picture and video industries, 7131 Amusement parks and arcades, 4872 Scenic and sightseeing transportation, water, 7114 Agents and managers for artists, athletes, entertainers and other public figures, 4879 Scenic and sightseeing transportation, other, 4871 Scenic and sightseeing transportation, land

Retail

Top industries, by order of tourism-related output:

4461 Health and personal care stores, 4481 Clothing stores, 4539 Other miscellaneous store retailers, 3254 Pharmaceutical and medicine manufacturing, 4529 Other general merchandise stores, 4511 Sporting goods, hobby and musical instrument stores, 4145 Pharmaceuticals, toiletries, cosmetics and sundries merchant wholesalers, 3399 Other miscellaneous manufacturing, 4532 Office supplies, stationery and gift stores, 4521 Department stores, 5111 Newspaper, periodical, book and directory publishers, 4533 Used merchandise stores, 4181 Recyclable material merchant wholesalers, 4141 Textile, clothing and footwear merchant wholesalers, 3231 Printing and related support activities, 4483 Jewellery, luggage and leather goods stores, 4144 Personal goods merchant wholesalers, 4531 Florists, 4184 Chemical (except agricultural) and allied product merchant wholesalers, 4143 Home furnishings merchant wholesalers, 4482 Shoe stores

Economic Sectors

Other

Other tourism includes travel arrangement services and major pre-trip expenses purchased by British Columbians, including luggage, camping equipment and recreational vehicles like boats and RVs. By order of their tourism-related output, these industries are:

5615 Travel arrangement and reservation services, 3366 Ship and boat building, 4411 Automobile dealers, 4413 Automotive parts, accessories and tire stores, 3261 Plastic product manufacturing, 4412 Other motor vehicle dealers, 4841 General freight trucking, 3363 Motor vehicle parts manufacturing, 3362 Motor vehicle body and trailer manufacturing, 3361 Motor vehicle manufacturing, 3369 Other transportation equipment manufacturing

High Tech Manufacturing

3254 Pharmaceutical and medicine manufacturing, 3259 Other chemical product manufacturing, 3333 Commercial and service industry machinery manufacturing, 3341 Computer and peripheral equipment manufacturing, 3342 Communications equipment manufacturing, 3343 Audio and video equipment manufacturing, 3344 Semiconductor and other electronic component manufacturing, 3345 Navigational, measuring, medical and control instruments manufacturing, 3346 Manufacturing and reproducing magnetic and optical media, 3359 Other electrical equipment and component manufacturing, 3364 Aerospace product and parts manufacturing, 3391 Medical equipment and supplies manufacturing

Public Sector

Federal Government

9111 Defence services, 9112-9119 Other federal government public administration, 9191 International and other extra-territorial public administration

Provincial Government

9120 Provincial and territorial public administration (9121 to 9129)

Health

6211 Offices of physicians, 6213 Offices of other health practitioners, 6214 Out-patient care centres, 6215 Medical and diagnostic laboratories, 6216 Home health care services, 6219 Other ambulatory health care services, 6220 Hospitals(6221 to 6223), 6230 Nursing and residential care facilities(6231 to 6239)

Social Services

6241 Individual and family services, 6242 Community food and housing, and emergency and other relief services, 6243 Vocational rehabilitation services

Education

6111 Elementary and secondary schools, 6112 Community colleges and C.E.G.E.P.s, 6113 Universities, 6114 Business schools and computer and management training, 6115 Technical and trade schools, 6116 Other schools and instruction, 6117 Educational support services

Local Government

9130 Local, municipal and regional public administration (9131 to 9139)

Aboriginal Government

9141 Aboriginal public administration

Economic Sectors

Construction

2361 Residential building construction, 2362 Non-residential building construction, 2371 Utility system construction, 2372 Land subdivision, 2373 Highway, street and bridge construction, 2379 Other heavy and civil engineering construction, 2381 Foundation, structure, and building exterior contractors, 2382 Building equipment contractors, 2383 Building finishing contractors, 2389 Other specialty trade contractors

Film and TV

5121 Motion picture and video industries, 5122 Sound recording industries

Other Manufacturing

3131 Fibre, yarn and thread mills, 3132 Fabric mills, 3133 Textile and fabric finishing and fabric coating, 3141 Textile furnishings mills, 3149 Other textile product mills, 3151 Clothing knitting mills, 3152 Cut and sew clothing manufacturing, 3159 Clothing accessories and other clothing manufacturing, 3161 Leather and hide tanning and finishing, 3162 Footwear manufacturing, 3169 Other leather and allied product manufacturing, 3231 Printing and related support activities, 3251 Basic chemical manufacturing, 3252 Resin, synthetic rubber, and artificial and synthetic fibres and filaments manufacturing, 3253 Pesticide, fertilizer and other agricultural chemical manufacturing, 3255 Paint, coating and adhesive manufacturing, 3256 Soap, cleaning compound and toilet preparation manufacturing, 3261 Plastic product manufacturing, 3262 Rubber product manufacturing, 3271 Clay product and refractory manufacturing, 3272 Glass and glass product manufacturing, 3273 Cement and concrete product manufacturing, 3274 Lime and gypsum product manufacturing, 3279 Other non-metallic mineral product manufacturing, 3321 Forging and stamping, 3322 Cutlery and hand tool manufacturing, 3323 Architectural and structural metals manufacturing, 3324 Boiler, tank and shipping container manufacturing, 3325 Hardware manufacturing, 3326 Spring and wire product manufacturing, 3327 Machine shops, turned product, and screw, nut and bolt manufacturing, 3328 Coating, engraving, cold and heat treating and allied activities, 3329 Other fabricated metal product manufacturing, 3331 Agricultural, construction and mining machinery manufacturing, 3332 Industrial machinery manufacturing, 3334 Ventilation, heating, air-conditioning and commercial refrigeration equipment manufacturing, 3335 Metalworking machinery manufacturing, 3336 Engine, turbine and power transmission equipment manufacturing, 3339 Other general-purpose machinery manufacturing, 3351 Electric lighting equipment manufacturing, 3352 Household appliance manufacturing, 3353 Electrical equipment manufacturing, 3361 Motor vehicle manufacturing, 3362 Motor vehicle body and trailer manufacturing, 3363 Motor vehicle parts manufacturing, 3365 Railroad rolling stock manufacturing, 3366 Ship and boat building, 3369 Other transportation equipment manufacturing, 3371 Household and institutional furniture and kitchen cabinet manufacturing, 3372 Office furniture (including fixtures) manufacturing, 3379 Other furniture-related product manufacturing, 3399 Other miscellaneous manufacturing

Utilities

2211 Electric power generation, transmission and distribution, 2212 Natural gas distribution, 2213 Water, sewage and other systems

Truck Transport

4841 General freight trucking, 4842 Specialized freight trucking, 4884 Support activities for road transportation

Economic Sectors

Water Transport

4831 Deep-sea, coastal and great lakes water transportation, 4832 Inland water transportation, 4883 Support activities for water transportation

Rail Transport

4821 Rail transportation, 4882 Support activities for rail transportation

Other Transport

4811 Scheduled air transportation, 4812 Non-scheduled air transportation, 4851 Urban transit systems, 4852 Interurban and rural bus transportation, 4853 Taxi and limousine service, 4854 School and employee bus transportation, 4855 Charter bus industry, 4859 Other transit and ground passenger transportation, 4861 Pipeline transportation of crude oil, 4862 Pipeline transportation of natural gas, 4869 Other pipeline transportation, 4881 Support activities for air transportation, 4885 Freight transportation arrangement, 4889 Other support activities for transportation

Retail Trade

4411 Automobile dealers, 4412 Other motor vehicle dealers, 4413 Automotive parts, accessories and tire stores, 4421 Furniture stores, 4422 Home furnishings stores, 4431 Electronics and appliance stores, 4441 Building material and supplies dealers, 4442 Lawn and garden equipment and supplies stores, 4451 Grocery stores, 4452 Specialty food stores, 4453 Beer, wine and liquor stores, 4461 Health and personal care stores, 4471 Gasoline stations, 4481 Clothing stores, 4482 Shoe stores, 4483 Jewellery, luggage and leather goods stores, 4511 Sporting goods, hobby and musical instrument stores, 4513 Book stores and news dealers, 4521 Department stores, 4529 Other general merchandise stores, 4531 Florists, 4532 Office supplies, stationery and gift stores, 4533 Used merchandise stores, 4539 Other miscellaneous store retailers, 4541 Electronic shopping and mail-order houses, 4542 Vending machine operators, 4543 Direct selling establishments

Wholesale Trade

4111 Farm product merchant wholesaler, 4121 Petroleum and petroleum products merchant wholesalers, 4131 Food merchant wholesalers, 4132 Beverage merchant wholesalers, 4133 Cigarette and tobacco product merchant wholesalers, 4141 Textile, clothing and footwear merchant wholesalers, 4142 Home entertainment equipment and household appliance merchant wholesalers, 4143 Home furnishings merchant wholesalers, 4144 Personal goods merchant wholesalers, 4145 Pharmaceuticals, toiletries, cosmetics and sundries merchant wholesalers, 4151 Motor vehicle merchant wholesalers, 4152 New motor vehicle parts and accessories merchant wholesalers, 4153 Used motor vehicle parts and accessories merchant wholesalers, 4161 Electrical, plumbing, heating and air-conditioning equipment and supplies merchant wholesalers, 4162 Metal service centres, 4163 Lumber, millwork, hardware and other building supplies merchant wholesalers, 4171 Farm, lawn and garden machinery and equipment merchant wholesalers, 4172 Construction, forestry, mining, and industrial machinery, equipment and supplies merchant wholesalers, 4173 Computer and communications equipment and supplies merchant wholesalers, 4179 Other machinery, equipment and supplies merchant wholesalers, 4181 Recyclable material merchant wholesalers, 4182 Paper, paper product and disposable plastic product merchant wholesalers, 4183 Agricultural supplies merchant wholesalers, 4184 Chemical (except agricultural) and allied product merchant wholesalers, 4189 Other miscellaneous merchant wholesalers, 4191 Business-to-business electronic markets, and agents and brokers

Economic Sectors

Business Services

4911 Postal service, 4921 Couriers, 4922 Local messengers and local delivery, 4931 Warehousing and storage, 5191 Other information services, 5321 Automotive equipment rental and leasing, 5322 Consumer goods rental, 5323 General rental centres, 5324 Commercial and industrial machinery and equipment rental and leasing, 5331 Lessors of non-financial intangible assets (except copyrighted works), 5411 Legal services, 5412 Accounting, tax preparation, bookkeeping and payroll services, 5418 Advertising, public relations, and related services, 5511 Management of companies and enterprises, 5611 Office administrative services, 5612 Facilities support services, 5613 Employment services, 5614 Business support services, 5615 Travel arrangement and reservation services, 5616 Investigation and security services, 5617 Services to buildings and dwellings, 5619 Other support services, 5621 Waste collection, 5622 Waste treatment and disposal, 5629 Remediation and other waste management services, 8111 Automotive repair and maintenance, 8112 Electronic and precision equipment repair and maintenance, 8113 Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance, 8114 Personal and household goods repair and maintenance

FIRE

5211 Monetary authorities central bank, 5221 Depository credit intermediation, 5222 Non-depository credit intermediation, 5223 Activities related to credit intermediation, 5231 Securities and commodity contracts intermediation and brokerage, 5232 Securities and commodity exchanges, 5239 Other financial investment activities, 5241 Insurance carriers, 5242 Agencies, brokerages and other insurance related activities, 5261 Pension funds, 5269 Other funds and financial vehicles, 5311 Lessors of real estate, 5312 Offices of real estate agents and brokers, 5313 Activities related to real estate

Information and Communications Technology

5112 Software publishers, 5151 Radio and television broadcasting, 5152 Pay and specialty television, 5171 Wired telecommunications carriers, 5172 Wireless telecommunications carriers (except satellite), 5174 Satellite telecommunications, 5179 Other telecommunications, 5182 Data processing, hosting, and related services, 5413 Architectural, engineering and related services, 5414 Specialized design services, 5415 Computer systems design and related services, 5416 Management, scientific and technical consulting services, 5417 Scientific research and development services, 5419 Other professional, scientific and technical services

Other Services

Other Services are those industries that tend to serve households.

Accommodation

7211 Traveller accommodation, 7212 Recreational vehicle (RV) parks and recreational camps, 7213 Rooming and boarding houses

Food Services

7223 Special food services, 7224 Drinking places (alcoholic beverages), 7225 Full-service restaurants and limited-service eating places

Economic Sectors

Recreation and Entertainment

4871 Scenic and sightseeing transportation, land, 4872 Scenic and sightseeing transportation, water, 4879 Scenic and sightseeing transportation, other, 7111 Performing arts companies, 7112 Spectator sports, 7113 Promoters (presenters) of performing arts, sports and similar events, 7114 Agents and managers for artists, athletes, entertainers and other public figures, 7115 Independent artists, writers and performers, 7121 Heritage institutions, 7131 Amusement parks and arcades, 7132 Gambling industries, 7139 Other amusement and recreation industries

Other

5111 Newspaper, periodical, book and directory publishers, 6212 Offices of dentists, 6244 Child day-care services, 8121 Personal care services, 8122 Funeral services, 8123 Dry cleaning and laundry services, 8129 Other personal services, 8131 Religious organizations, 8132 Grant-making and giving services, 8133 Social advocacy organizations, 8134 Civic and social organizations, 8139 Business, professional, labour and other membership organizations, 8141 Private households

Appendix E: Toolkit Use Cases

This report offers only a glimpse of the information available to communities. BC Stats developed the LAEP Toolkit in Microsoft Excel to help more users find meaningful economic insights tailored to their local area or region.

The Readme sheet in the Toolkit includes full instructions on how to use its features.

This toolkit can be downloaded from [BC Stats' website](#). This section demonstrates how to get the most out of key toolkit features through several use cases.

Profiles: getting data for an area

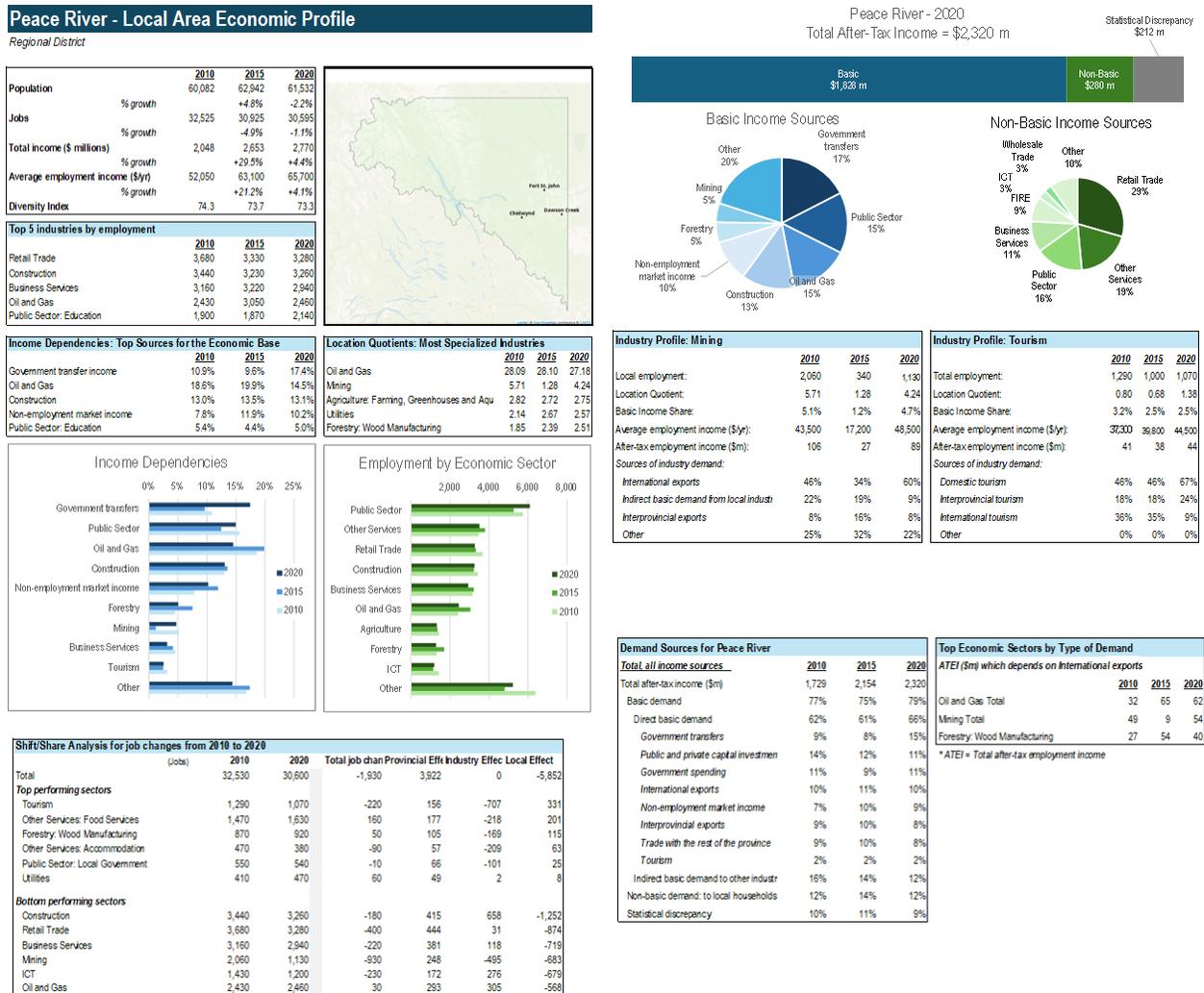
The Microsoft Excel workbook has a tab called **Profile Generator**. This sheet lets users find economic profiles and produce reports for each of the 103 local areas, 29 regional districts, or for the entire province. The tab includes instructions and rollover notes to explain the steps and assist in the interpretation. Users can copy and customize the tables and charts as needed. The profile is designed for printing and can be self-generated based on information needs. For those who prefer not to use Excel, general profiles are available on BC Stats' website.

The economic profile gives users a local snapshot of:

- **Community characteristics:** population, employment and income statistics.
- **What the area is known for:** Top industries and sources for the economic base; industry specialization and more granular industry analysis.
- **Where the money is coming from:** A breakdown of basic vs. non-basic income sources.
- **What is bringing money in:** information on the which types of basic demand (e.g. exports, government spending, etc.) are most important for the area and which industries these flow through.
- **What industries are growing or struggling:** A Shift/Share analysis shows the top and bottom-performing sectors.
- **How is area doing overall:** comparisons to other similar local areas and over time.

The following figure is a sample of a user-generated profile report for Peace River.

FIGURE 49: SAMPLE REPORT (FROM THE TOOLKIT)



The sample report, for example, shows that Government transfers, followed by Public and Oil/Gas sectors, are the biggest basic income sources in Peace River. The Public sector is also the biggest employer in the area, while Retail, Construction and Services (including Business Services) industries were the biggest private sector employers in the area.

The profiles in the Toolkit include rollover notes that explain the concepts in context.

Economic impact assessments

The Microsoft Excel workbook has a tab called the **LAEP Calculator**. This sheet enables users to automatically generate **Economic Impact Assessments** using the indicators and descriptive statistics from data in the profiles. The roll-over notes guide users through a few steps and gives advice on how to interpret the results.

Users create scenarios by selecting the local area in question, the sector impacted, and the number of jobs directly gained or lost by the event being modelled. The calculator retrieves the area’s **Employment Impact Ratios (EIRs)** and calculate the impacts. To illustrate how the calculator works we will use an example.

In January 2023, Canfor announced it would be shutting down mills in Chetwynd and Houston.¹⁵ News articles stated that it meant the loss of up to 333 jobs in Houston and 157 in Chetwynd. The LAEP Calculator can give us an idea of what is economically in store for these two communities in terms of the loss of income and jobs.

TABLE 14: THE LAEP CALCULATOR (FROM THE TOOLKIT)

	Scenario 1	Scenario 2
1. Select reference year	2020	2020
2. Select local area or regional district:	Houston	South Peace
3. Select basic sector which is directly impacted:	Wood Manufacturing	Wood Manufacturing
4. Social safety net or no social safety net?	With SSN	Half SSN
Local Indirect EIR	1.61	1.56
Local Induced EIR no SSN	1.86	1.79
Local Induced EIR with SSN	1.75	1.70
Total Indirect EIR	2.19	2.32
Total Induced EIR no SSN	2.72	2.95
Total Induced EIR with SSN	2.48	2.69
3. Enter direct jobs lost (or gained):	-333	-157
Indirect jobs lost/gained locally	-204	-89
Induced jobs lost/gained locally	-83	-36
Induced adjustment b/c of SSN locally	39	7
Indirect jobs lost/gained in the rest of the province	-191	-119
Induced jobs lost/gained in the rest of the province	-95	-63
Induced adjustment b/c of SSN in the rest of the province	44	14

¹⁵ Canfor closure of Chetwynd mill ‘a kick in the gut’. Prince George Citizen, by Matt Preprost. January 26, 2023.

	Scenario 1	Scenario 2
Total employment impact	-824	-443
<i>Of which: local jobs</i>	-582	-274
<i>Of which: jobs in the rest of the province</i>	-242	-168

The LAEP Calculator, shown above, indicates that in addition to the 333 jobs lost directly:

- Houston could lose 204 more jobs from local contractors and suppliers (the indirect effect), and
- 83 in local shops and businesses because households have less money to spend.
- The social safety net lessens the effect of the induced job losses by 39. This means that, in the short-term, workers are figuring out what to do and part of their lost income and local spending power is being replaced by Employment Insurance (EI) benefits.
- In the rest of the province, 242 more jobs would be lost: 191 indirect jobs and 95 induced jobs, but the induced job losses are offset by 44 because of the social safety net.

The Calculator provides additional context for users, shown in the green table below. Focusing again on Houston, descriptive statistics from the data shows that:

- The loss of 333 jobs represents 95 per cent of its entire wood manufacturing industry. It is probably 100% of the sector because the 2023 news article and 2021 census data only differ slightly, and we know that there are no other wood manufacturing facilities nearby.
- Houston has about 1,900 jobs in total and the combined 582 direct, indirect and induced local job losses could reduce total employment there by 31 per cent if nothing else comes in to replace those jobs or mitigate the impact.
- In terms of income, the wood manufacturing industry represents 22.9 per cent of the area’s economic base (i.e., its Income Dependency score, representing also the indirect jobs that rely on it). If it all went away, so would 22.9 per cent of the non-basic jobs and income in the area. This is the amount we would expect the local economy to shrink or grow as a result.

TABLE 15: CONTEXT TO THE ECONOMIC IMPACT ASSESSMENT (FROM THE TOOLKIT)

Reference year:	<i>2020</i>	<i>2020</i>
Local area or regional district:	<i>Houston</i>	<i>South Peace</i>
Basic sector which is directly impacted:	<i>Wood Manufacturing</i>	<i>Wood Manufacturing</i>
Jobs		
Total local jobs:	1,885	3,710
Total local jobs in the impacted sector:	350	390
Jobs gained/lost in directly impacted sector:	-333	-157
% of jobs gained/lost in impacted sector:	-95%	-40%
Total jobs gained/lost (direct + indirect + induced):	-824	-443
<i>Of which: local jobs</i>	-582	-274
<i>Of which: jobs in the rest of the province</i>	-242	-168
Local jobs gained/lost as % of total:	-30.9%	-7.4%
Income		
Area's total after-tax income (\$m)	148	310
Area's total after-tax basic income (\$m)	133	280
Impacted sector's basic income share:	24.0%	12.8%
Average employment income in the affected sector (\$/yr, before tax):	62,400	79,900
Amount of basic income gained or lost: (\$m)	-30	-14
% of total basic income gained or lost:	-22.9%	-5.2%
Amount of non-basic income gained or lost: (\$m)	-2.8	-1.2
% of total after-tax income gained or lost:	-22.4%	-5.1%
Top five basic income sources in the area:	Forestry (27%)	Mining (23%)
	Government transfers (25%)	Government transfers (17%)
	Public Sector (12%)	Forestry (13%)
	Non-employment market income (10%)	Non-employment market income (9%)
	Mining (7%)	Oil and Gas (9%)

Lastly the LAEP Calculator allows users to estimate spin-off effects on non-employment income. For example, Houston has other sources of income to rely on: government transfers, public sector employment, non-employment market income, and employment in the mining sector. The non-employment income ratio can be used to calculate the spin-off effect of this change in non-employment income. For example, consider this hypothetical scenario: Half of the workers in

Houston can retire when the mill closes on an income of \$30,900.¹⁶ That would be equivalent to \$5.14 million of non-employment income (166.5 people * \$30,900 per person). The next table shows how the LAEP Calculator would find the economic impact of this. Assuming an average income tax rate of 10 per cent on that income, it would mitigate the impact of 11 job losses in the local area and eight more in the rest of the province.

TABLE 16: MODELLING CHANGES TO NON-EMPLOYMENT INCOME IN THE LAEP CALCULATOR (FROM THE TOOLKIT)

	<i>Income Scenario 1</i>
1. Select a reference year:	2020
2. Select a local area or regional district:	<i>Houston</i>
3. Enter the income change to model, in \$ millions before-tax:	5.1
4. Enter the average income tax rate for this income:	10%
Non-employment after-tax income change:	4.6
Local non-employment income ratio:	2.44
Total non-employment income ratio:	4.16
Local induced jobs from income change:	11
ROP induced jobs from income change:	8

Interpreting Impact Assessments

Economic impact assessments using the Employment Impact Ratios (EIR) in the model used to perform calculations are based off many assumptions. Users should treat them as a guide, and a best-case or worst-case scenario. What follows is advice on how to interpret the results, and warnings about specific limitations.

¹⁶ \$30,900 is the median total income for persons not in a census family who lived in a non-CMA area of B.C. in 2022 and were over the age of 65. See Statistics Canada. Table 11-10-0012-01 Distribution of total income by census family type and age of older partner, parent or individual.

Regional Impacts: Local vs. Total

Local EIRs limit the indirect and induced impacts to the local area. Total EIRs include the jobs in the local area and the rest of the province.

When an impact assessment includes jobs impacted in the rest of the province, we can interpret that as the local area importing goods and services and thereby supporting jobs in the rest of the province.

This is related to the modelled trade with the rest of the province which will be discussed more in the section on Employment Impact Ratios.

Social Safety Net

With a social safety net, the model calculates that people who lose jobs do not lose all their income and as a result the induced impact - the effect of household spending - is less.

In the case of modelling a new jobs scenario, including the social safety net represents a situation where the jobs are taken by unemployed people who previously had some income from the social safety net.

The social safety net situation is what is likely to happen in the short term, where people who lose jobs still retain some income and remain in the community. The no social safety net situation is what is likely to happen in the long term, where people who lose jobs eventually move away and therefore don't spend their incomes in the local area.

"Half SSN" is an option to use when you don't know what will happen to workers who lose jobs and want to assume that half remain in the community on benefits and half move away. Conversely, in a scenario where new jobs are created, half the workers come from the local unemployed population and half are new.

The amount of the social safety net is modelled on the federal Employment Insurance benefits. It does not include other sources of replacement income such as severance packages, early retirement, disaster financial assistance, etc. If those are present, users can use the Income Impact Ratios to model the induced impact of changes in household income that is not tied to employment (i.e. changes in non-employment income, like government transfers, retirement income, etc.).

Short-term vs. Long-term

Direct job losses (or gains) would be felt immediately; this is the event being modeled.

Indirect job losses would be felt in the short run - probably a few months to a year - as supplying businesses lose a client that is not replaced.

Induced job losses, if calculated with the social safety net, would also be felt in the short run for the same reasons as for indirect jobs. In the short run, employment income is lost for affected workers but is partially replaced by the social safety net.

Over the longer run - a year or more later - the no safety net case is more appropriate as workers are assumed to have moved away or otherwise moved on with their lives.

Commuting

The Census records people's jobs, industries of employment, and incomes based on the location of their residence. The LAEP model has no other evidence so makes calculations under the assumption that people work in the same areas they live. Many people, however, commute.

This was the main reason the profiles were modelled at multiple levels of geographical aggregation, so results could be compared when commuting might be a factor.

When interpreting results, care needs to be taken regarding this issue. Users should consider the effects of commuting when modelling impacts in large metropolitan areas and for large industrial facilities.

- For large metropolitan areas like Metro Vancouver or the Capital Regional District, users would be advised to perform an impact assessment using the EIRs for the regional district, not local areas. A new business opening in the Richmond local area may easily hire workers living in any part of the Lower Mainland.
- Large industrial facilities are important economic drivers for many remote areas, but their impacts will often be spread out in the data when workers commute. It can be a good idea for users to investigate other data about the

facility and compare it to the data in the LAEP. For example, other information about the Trail nickel and lead refinery implies that the workforce is large enough that, according to the census, only about half of the workers could possibly reside in Trail itself. The census data indicates that the rest of the workers mostly come from neighbouring areas which are, in fact, only a 10- or 30-minute drive away.

Shift-share: analyzing growth and decline

The LAEP Toolkit includes a feature that generates a shift/share analysis for any local area or regional district. It is a statistical technique to help understand the sources of growth or decline for an industry. This analysis is included in two places in the toolkit: in the **Profile Generator**, where it ranks industries in an area; and in the **Comparison Charts** tab, where it ranks areas with respect to a particular industry. Shift/share analysis is explained here and in the explanatory notes of the toolkit.

If a particular industry is growing or declining in a local area, one may ask if the change is "natural" in the sense that it is also growing or declining elsewhere. Shift/share analysis attempts to answer this question by attributing or "shifting" the change in employment to three components, or "shares":

1. The **Provincial Effect (PE)**¹⁷, or whether employment is increasing in the province overall.
2. The **Industry Effect (IE)**, or whether the sector is expanding or declining in the province generally, at a rate faster than overall job growth in the province.
3. The **Local Effect (LE)**, is the remainder, or the growth or decline that can only be attributed to the specific conditions of the sector in the local area.

The Local Effect is most interesting for analysis purposes. It is used to identify and rank the top and bottom-performing local sectors because it implies that the local area is somehow over- or under-performing with respect to that sector.

¹⁷ Equations for these are given in a rollover note in the LAEP Toolkit.

As an example, the next table shows the shift/share analysis for Kelowna. The toolkit enables users to identify the top- and bottom-performing sectors between 2015 and 2020 using this function, as measured in job numbers.

TABLE 17: SHIFT/SHARE ANALYSIS OF KELOWNA FOR JOB CHANGES BETWEEN 2015 AND 2020

	Total job change	Provincial Effect	Industry Effect	Local Effect
Total, all sectors	10,710	8,901	0	1,809
<i>Top-performing sectors</i>				
Public Sector: Education	1,370	602	114	654
Wholesale Trade	220	266	-525	478
FIRE	780	475	-138	443
ICT	1,720	498	798	424
Tourism	-1,310	463	-2,103	330
<i>Bottom-performing sectors</i>				
Construction	1,770	928	1,472	-630
Oil and Gas	-170	72	75	-318
Film and TV	50	31	256	-237
Other Services: Food Services	-390	679	-837	-232
Public Sector: Social Services	280	129	359	-208

If the Local Effect is positive for a particular industry, it means employment is increasing here faster than it is for the province. Local conditions are somehow favoring employment in that sector:

- It could be that new businesses opened here, or existing businesses expanded (the same goes for jobs in public sector organizations).
- It could be that businesses expanded nearby but the people who live here take these jobs and commute (or telecommute), possibly because the cost of living is lower here, or for other quality of life reasons. (Remember that the census measures employment by the location of where people live.)
- It could be that the area was already specialized in a sector that's growing and became even more specialized (i.e., network effects). You would expect to find that the Location Quotient (LQ) has also increased.
- It could be that the area's population is growing faster overall and/or that incomes are rising faster here, leading to more non-basic demand from local households.

- It could be because of demographics or immigration: maybe there are more working-age people to take jobs, more school-age children, or people are retiring and requiring different types of services.
- It could be random chance or measurement errors in the census data, especially if local employment for the sector is very small.

If the local area has lost jobs in this sector but the Local Effect is positive, it means that the industry has declined in the province overall but not as much for this area. If the Local Effect is negative, local conditions are somehow making things worse compared to the rest of the province. The reasons will be similar but opposite of the ones suggested above for the top-performing sectors.

Shift/share analysis can also find the top and bottom-performing local areas with respect to a particular economic sector. The next table shows the five top and bottom performing local areas in terms of employment changes over ten years (2010 to 2020) in the information and communications technology (ICT) sector within the province.

TABLE 18: SHIFT/SHARE ANALYSIS OF THE INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SECTOR, RANKED BY JOB CHANGES BETWEEN 2010 AND 2020

	Total job change	Provincial Effect	Industry Effect	Local Effect
British Columbia	46,240	17,765	28,475	0
Top-performing areas				
Surrey	4,890	1,551	2,486	854
Squamish	1,010	63	101	847
Westshore Communities	1,260	223	358	679
Langley	1,570	358	574	638
Kelowna	1,770	492	789	489
Bottom-performing areas				
Richmond	1,290	977	1,566	-1,252
North Shore	2,590	1,275	2,043	-727
Matsqui-Abbotsford	130	288	462	-620
North Peace	-170	124	199	-493
Delta - Tsawwassen	560	395	634	-469

Making the most use of the demand sources data

The **Demand Sources** for each area and industry is available in the LAEP toolkit. It is a very detailed “peek under the hood” of the LAEP model’s results. The LAEP model focuses first on the perspective of the local area, defining its economic base by the Income Dependency statistic, or the industries that basic income flows through. Another way to look at it is from the perspective of each industry. What types of demand drive the sector? And how much of local people’s income can be traced back to each type of demand?

The Demand Sources tab in the toolkit lays out the conceptual hierarchy of demand sources for each industry. There are three levels in the table, and each level is visible by expanding or minimizing grouped columns. The next table illustrates the three levels using the wholesale trade sector as an example.

TABLE 19: BASIC AND NON-BASIC DEMAND SOURCES (FROM THE TOOLKIT)

Level 1

Wholesale Trade Total			
Total after-tax employment income (\$m)	Basic demand	Non-basic demand: to local households	Statistical discrepancy
Column367	Column368	Column377	Column378
3,145	65%	21%	14%
360	64%	21%	15%
348	63%	17%	20%

Level 2

Wholesale Trade Total					
Total after-tax employment income (\$m)	Basic demand	Direct basic demand	Indirect basic demand from local industries	Non-basic demand: to local households	Statistical discrepancy
Column367	Column368	Column369	Column376	Column377	Column378
3,145	65%	46%	19%	21%	14%
360	64%	45%	19%	21%	15%
348	63%	45%	17%	17%	20%

Level 3

Wholesale Trade Total											
Total after-tax employment income (\$m)	Basic demand	Direct basic demand	International exports	Interprovincial exports	Trade with the rest of the province	Government spending	Public and private capital investments	Tourism	Indirect basic demand from local industries	Non-basic demand: to local households	Statistical discrepancy
Column367	Column368	Column369	Column370	Column371	Column372	Column373	Column374	Column375	Column376	Column377	Column378
3,145	65%	46%	16%	21%	12%	0%	8%	1%	19%	21%	14%
360	64%	45%	16%	20%	12%	0%	8%	1%	19%	21%	15%
348	63%	45%	16%	21%	17%	0%	8%	1%	17%	17%	20%

The data in the Demand Sources tab allows us to answer more nuanced questions, such as: What demand sources are driving local industries? The next use case demonstrates what drives the Water Transport sector in Metro Vancouver.

The table below shows a profile of the Water Transport sector in Metro Vancouver regional district. In 2020, that sector provided \$714 million of after-tax employment income to the 7,810 workers who live there.

TABLE 20: INDUSTRY PROFILE FOR WATER TRANSPORT IN METRO VANCOUVER

	2010	2015	2020
Local employment	5,760	7,690	7,810
Location Quotient	0.92	1.00	1.03
Average employment income (\$/yr)	70,800	92,800	110,600
After-tax employment income (\$m)	337	592	714
Sources of industry demand			
Indirect basic demand from local industries	28%	25%	25%
International exports	28%	24%	24%
Trade with the rest of the province	12%	15%	18%
Other	32%	35%	33%

- Since 24 per cent of that sector's demand came from international exports in 2020, the model estimates about \$170 million of people's after-tax income in 2020 there depends on the services that industry provides to international customers, representing payments by non-residents for the purpose of transporting their goods to, from or through B.C.
- 25 per cent of its demand comes from indirect basic demand from other local industries, which is to provide water transport services to industries in Metro Vancouver such as importers and exporters. That activity supports about \$182 million of the area's after-tax income.
- 18 per cent of its demand comes from trade with the rest of the province. This is a modelled component of the LAEP model and is discussed more in

the chapter on methodology, but it estimates the demand that businesses and households in other parts of the province make on the water transport sector of Metro Vancouver.

The final use case illustrates how demand sources data in the LAEP Toolkit can be used to answer other questions, such as: Which local areas depend most on direct natural resource exports?¹⁸

FIGURE 50: AFTER-TAX INCOME THAT DEPENDS ON NATURAL RESOURCE EXPORTS, TOP 10 LOCAL AREAS

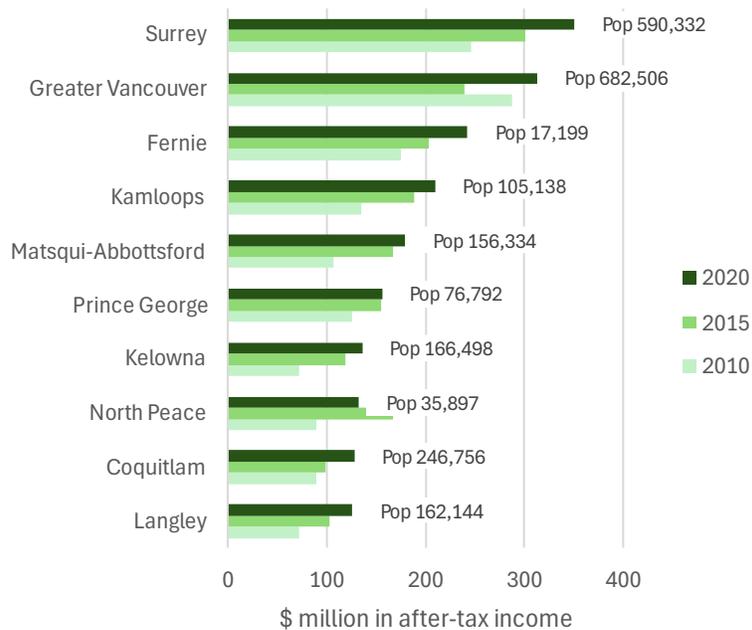


Figure 50 shows that even urban areas depend on natural resource exports, whether that means they commute, work in local plants, or in company headquarters. On a per-capita basis, Fernie receives a much larger share of its employment income from this source (\$14,100 per person) than Surrey (\$590), which would be reflected in higher Income Dependency scores. Users can customize a chart like this in the Comparison Charts sheet of the LAEP Toolkit.

¹⁸ For the purposes of this section, natural resource exports are international and interprovincial exports from the forestry, mining, oil and gas, fishing, and agriculture sectors, including their respective processing industries.



BCStats

BC Stats is the provincial government's leader in statistical and economic research, information and analysis essential for evidence-based decision-making. The goal is to increase overall business intelligence—information decision makers can use.

9410 Stn Prov
Govt Victoria, B.C.
V8W 9V1

Contact us: www.bcstats.gov.bc.ca/requests
Web: www2.gov.bc.ca/gov/content/data/statistics