



STATE OF THE BASIN: 2013 LONG REPORT

UNDERSTANDING WELL-BEING IN THE BASIN BOUNDARY REGION OF BRITISH COLUMBIA

OCTOBER 2013 (UPDATED MARCH 2014)



The Columbia Basin Rural Development Institute, at Selkirk College, is a regional centre of excellence in applied research and information provision focused on strengthening rural communities in the Columbia Basin Boundary Region. Visit www.cbrdi.ca for more information.

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THE STATE OF THE BASIN INITIATIVE

The State of the Basin is an indicator and monitoring program originally developed by Columbia Basin Trust (CBT). Now a project of the Columbia Basin Rural Development Institute (RDI), the State of the Basin initiative involves collecting, analyzing and reporting on indicators in order to build an up-to-date and dynamic picture of the vitality of communities in the Basin Boundary region.

OBJECTIVES

When originally envisioning the State of the Basin, CBT developed the following four objectives. These objectives collectively define how the initiative will achieve the overarching goal of supporting research based decision making in the region:

- **inform** citizens and organizations about the people, natural environment, communities, and economy of the region by providing access to accurate, credible, and timely information,
- **encourage** understanding of complex issues and trends over time, including into the future when possible,
- **signal** whether conditions are similar or different within the region, and in comparison to other areas to highlight and celebrate areas of achievement, and to identify significant issues, ideally before they become critical, and
- **motivate** discussion, information sharing, strategic evidence-based decisions and collective action.

HISTORY

In 2006, CBT responded to long-standing requests for information on economic, social, environmental and other trends in the region by launching the State of the Basin initiative. Resulting from the work of project consultants, a volunteer working group, CBT staff and more than 50 expert advisors, the first State of the Basin report was released in 2008. Response to the 2008 project indicated that the State of the Basin initiative addressed an important need for information in the region, and that future iterations would be of benefit to local communities and organizations.

Acknowledging the links between the objectives of the State of the Basin project and the mandate of the Regional Innovation Chair in Rural Economic Development at Selkirk College, CBT entered into a partnership with Selkirk College to establish the Columbia Basin Rural Development Institute and transferred responsibility for the State of the Basin project to the RDI in 2011. Because the RDI's service area includes the entire Basin Boundary region of BC, the geographic scope of the State of the Basin has expanded beyond the area defined by CBT as "the Basin" to include a portion of the Regional District of Kootenay Boundary referred to as "the Boundary region".

Since the RDI began work on the State of the Basin project, researchers have released two annual 'snapshot' reports. The 2012 snapshot provided updated information for the indicators that were monitored in the original 2008 State of the Basin report. The 2013 snapshot reports on the RDI's most up-to-date research, which involves a revised suite of indicators that track

issues that Basin Boundary organizations have identified as current priorities. This long form report provides an expanded account of indicators reported on in the 2013 snapshot report.

INDICATOR MODEL

The State of the Basin uses an indicator model to report on the status of well-being in the Basin Boundary region. Indicator reporting is a growing trend among organizations that operate at various geographic scales (from global to neighbourhood-specific) and with varying scopes of interest (from those as broad as well-being to those as specific as financial performance). By distilling complex information into easily understandable measures, indicators help diverse audiences, with widely ranging backgrounds, to understand important trends.

As part of the 2013 State of the Basin update, the RDI completed research on best practices in indicator reporting and on lessons learned from the 2008 report development process. That research has provided important guidance for the RDI’s indicator work.

RESEARCH FRAMEWORK

The RDI has developed a new State of the Basin research framework which, similar to the 2008 framework, is centred on the concept of well-being. The new framework organizes research efforts into four “pillars” –the economy, society, culture, and the environment—each of which have several defined sub-themes (Figure 1).



Figure 1: Revised State of the Basin research framework

Many indicator projects adopt a similar approach to research, understanding that “well-being” is a difficult concept to measure in itself. Instead, progress toward achieving well-being can be measured through an assessment of conditions in more narrowly-defined realms of influence.

INFORMATION PRODUCTS, TOOLS & SUPPORT

In addition to the snapshot and long reports, State of the Basin research will be published on an online portal called the Digital Basin (www.cbrdi.ca). The portal will provide the most up-to-date research available, and include the following web-based data tools:

- an interactive and customizable map displaying spatial features of all relevant indicators, as well as economic, social and cultural, and environmental assets in the region,
- a data viewer that allows for analysis and comparison of indicator data over time and space,
- ongoing Trends Analysis reports exploring one or more indicator data sets over time, and
- a resource library that will allow users to download supporting documents (plans, reports by other organizations, etc.) for independent analysis.

The RDI will support development and use of State of the Basin research in Basin Boundary communities by:

- liaising with key economic, social, cultural and environmental stakeholders to better understand their information needs and research capacity,
- identifying opportunities for local data collection by key stakeholder groups,
- providing direct research support, standardized data templates, training and support materials focused on the collection and use of indicator data,
- promoting and facilitating the sharing of information and best practices across key stakeholder groups, and
- exploring opportunities to link the State of the Basin initiative with K-12 and post-secondary student learning.

State of the Basin research is supported by the Selkirk Geospatial Research Centre (SGRC). The SGRC is a leading-edge research centre specializing in the use of geospatial technologies to aid in understanding critical issues pertaining to the environment, society and economy. The application of geomatics to State of the Basin research creates information-rich products for better decision-making.

RESEARCH METHODS

DATA SOURCES

State of the Basin research relies on a variety of data sources, from government records, to research completed by local non-profits, to surveys conducted by RDI researchers. In some cases raw data is analysed by the RDI research team, and in others the analysis is provided by a project partner.

This report identifies the data source for each indicator. For indicators that rely on publically available information, links are provided to help readers access the data for their own research purposes.

PERCEPTUAL DATA

Statements that refer to the perceptions of Basin Boundary residents or businesses were drawn from one of two sources. The first source is a telephone poll of 400 households (a randomly selected, statistically significant sample) that was completed in August 2013. Questions were designed by RDI researchers and the poll was conducted by a contracted research firm. The second source is the [Basin Boundary Business Retention and Expansion Project](#) which, to date,

has surveyed 543 businesses in the region, including 59 in the Boundary, 6 in Castlegar, 9 in the Columbia Valley, 10 in Creston, 13 in Fernie, 111 in Golden, 10 in Kimberley, 151 in the Lower Columbia area, 46 in Nakusp, 32 in Nelson, 2 in Revelstoke, and 58 in the Slokan Valley. The RDI provides support to communities (in the form of standard questionnaires, research training, data analysis and reporting) wishing to participate in the Business Retention and Expansion Project.

GEOGRAPHIC SCALES OF ANALYSIS

In order to understand geographic trends in indicators, this report often compares data across the Basin Boundary region and to other regions in BC. The geographic divisions used vary by indicator and depend on the issue being measured. While census divisions may provide for meaningful analysis of demographic data, an analysis of protected areas, for example, is more meaningful if it uses alternative geographic boundaries.

Some geographic scales are used repeatedly in this report. Where reference is made to trading corridors, these Basin Boundary sub-regions have been defined by the RDI, with input from community representatives (Figure 2).

Consult the BC Stats website for information on other common geographies:

- [Local Health Areas](#)
- [School Districts](#)
- [Development Regions](#)
- [Regional Districts](#)

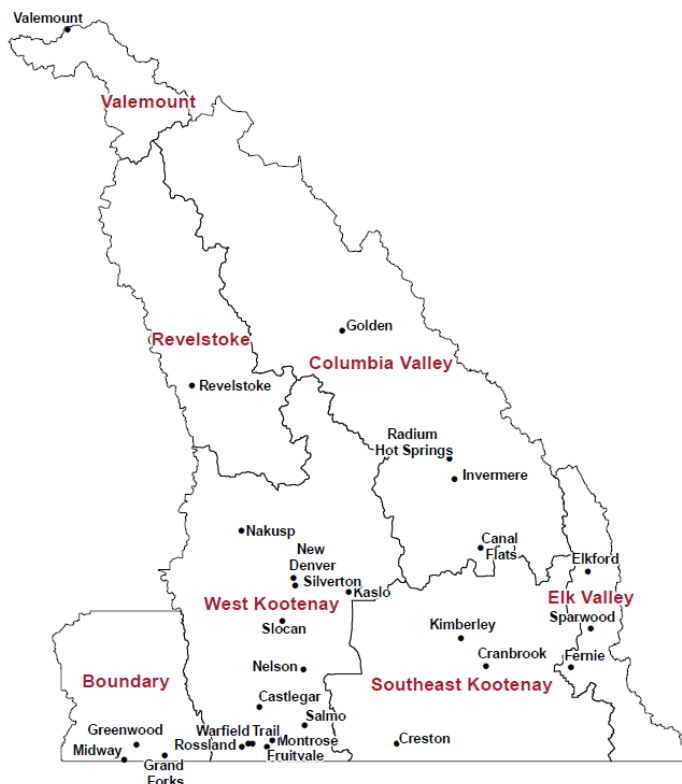


Figure 2: Basin Boundary trading corridors

COMMUNITY ENGAGEMENT

In an attempt to enhance the relevance and utility of State of the Basin research, RDI researchers have consulted with economic, social, cultural, and environmental organizations in the region. In many cases, the results of this consultation helped determine which indicators to track, how best to analyse data, and how to interpret findings. The RDI thanks all advisory committee members, technical advisors and other contributors for their input.

REPORT OUTLINE

For each State of the Basin indicator included in this report, the RDI team has provided a discussion of what the indicator measures, why the issue is important to the region, and what current data reveal about the subject. Perceptual data is aggregated at the end of each pillar-specific section.

The report begins with the economic research pillar. In this section, a review of macroeconomic conditions at provincial and national scales sets the stage for discussion of the Basin Boundary business climate and job market, as well as infrastructure and housing trends. The social section begins with a review of fundamental characteristics of the Basin Boundary population. Then, the discussion moves to the wellness, education, civic engagement and safety of our communities. The section on the cultural research pillar is organized somewhat differently from the rest of the report. Since this pillar is new to the State of the Basin, and research directions are still being established, only a few indicators are reviewed. A discussion of the RDI's attempts to map the cultural assets of the Basin Boundary region forms the second portion of this section. Finally, the environmental section begins with indicators of well-being for our watersheds, air and climate. Discussions of data relating to land, food, and biodiversity complete the results section of this report. The conclusion reviews the RDI's objectives for future State of the Basin research.

THE ECONOMIC RESEARCH PILLAR

When discussing the many factors that affect our well-being, few issues resonate as deeply with as many people as the economy. A healthy economy is indicative of a society that is using its resources efficiently and sustainably, leading to community resilience and individual well-being.

The economic research pillar considers levels of activity and diversity in our region's economic sectors and workforce. Qualities of the built environments that support the region's economy are also considered. Economic indicator reporting is a common practice in many areas of the world. Therefore, information on economic trends is generally rich and readily available. The economic data discussed below supports local service organizations in their efforts to build a strong economy that is inclusive of all residents.

BUSINESS CLIMATE & SECTORS

GROSS DOMESTIC PRODUCT (GDP)

What does this measure & why is it important?

Gross Domestic Product, or GDP, measures the quantity of goods and services produced within a region, during a specified period of time. The common metric of currency is used to measure production levels (Stiglitz, Sen & Fitoussi, 2008). Data for this indicator is taken from Statistics Canada's [CANSIM database](#).

Measuring and tracking GDP gives us a sense of how fully a region's resources are being employed and what they are being used to produce. By analysing GDP trends for BC and Canada, we can begin to understand how economic forces from outside the region affect the Basin Boundary economy.

Since population changes every year, analysts typically look at GDP per capita, which is averaged across the population. Using this technique allows for benchmarking of production changes that occur through changes in resource use, rather than simply seeing the results of more or fewer people contributing to production.

Since the value, or purchasing power, of currencies change on an annual basis, GDP figures are typically corrected using a single year's currency. Correcting for inflation produces "real" values and accounts for currency trends that could make GDP levels seem artificially higher or lower.

Finally, when sufficient data is available, it is possible to break down production into contributions by different sectors of the economy. This allows for an examination of the sectors that are growing faster or slower than others, and for a better understanding of the spectrum of goods and services we choose to produce.

What are the trends & current conditions?

BC GDP

The global financial crisis of 2008/2009¹ slowed production around the world. Neither Canada, nor British Columbia, was immune. The Great Recession of 2009 is clearly visible in Figure 3, which depicts BC's GDP measured at market prices (also called Nominal GDP) and compares it to

¹ Often referred to, in this report, as the Great Recession.

BC's Real (inflation corrected) GDP, using 2007 Canadian prices as its point of reference. The two lines nearly converge in 2009, illustrating a fall in overall price levels. This is typical of recessions, when aggregate demand (for all goods) falls and price levels thus stagnate or fall. The rapidly growing gap between GDP and Real GDP following 2009 indicates that inflation has been occurring over the same period. This is typical of periods of growth, when increased aggregate demand puts upward pressure on overall prices.

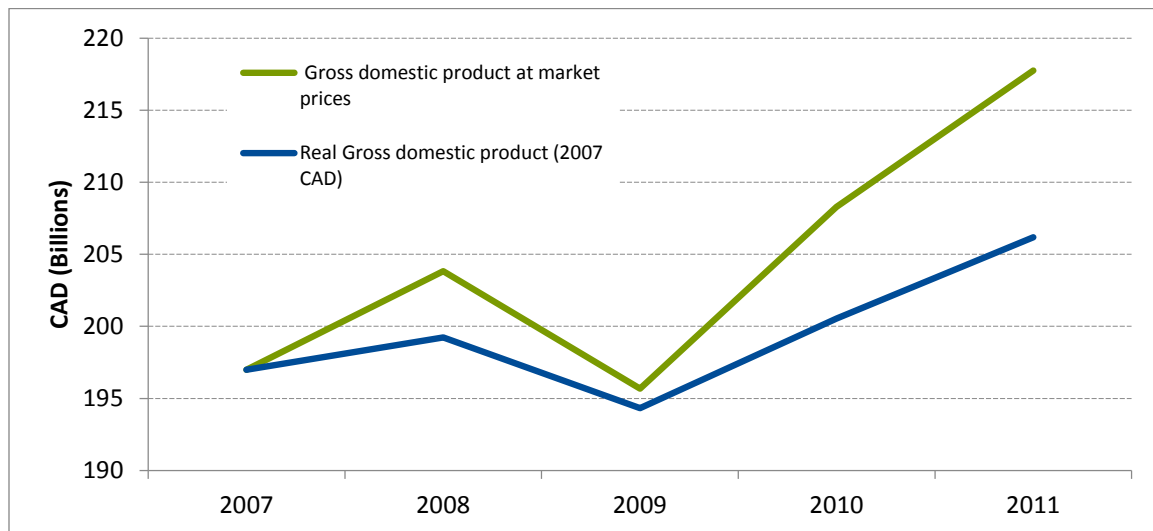


Figure 3: Nominal and real GDP for BC
Source: Statistics Canada, 2012a

As of 2011, real per capita GDP stood at \$45,051 (2007 CAD) in BC. This is lower than 2007 (\$45,712), but higher than 2009 (\$43,574). BC per capita GDP is consistently lower than that for Canada. This suggests that, on average, the province of BC produces goods and services of less commercial value than the rest of the country, contributing to generally lower levels of wealth.

GDP by Sector

2012 GDP for BC's service-producing sector was approximately \$145 billion (2007 CAD), roughly three times the GDP for the goods-producing sector, \$47 billion. This fits with the trend for many regions of North America, which are gradually moving from manufacturing based economies to service based economies (Baumol, 1967, Rowthorn & Ramaswamy, 1997).

It is worth noting that goods production in BC suffered from slowdowns during the Great Recession. By 2012, many goods producing industries had recovered to pre-recession levels, but no higher (Figure 4). The service sector suffered a greater set-back during the Great Recession. However, by 2012, many service industries had grown from their pre-recession levels (Figure 5).

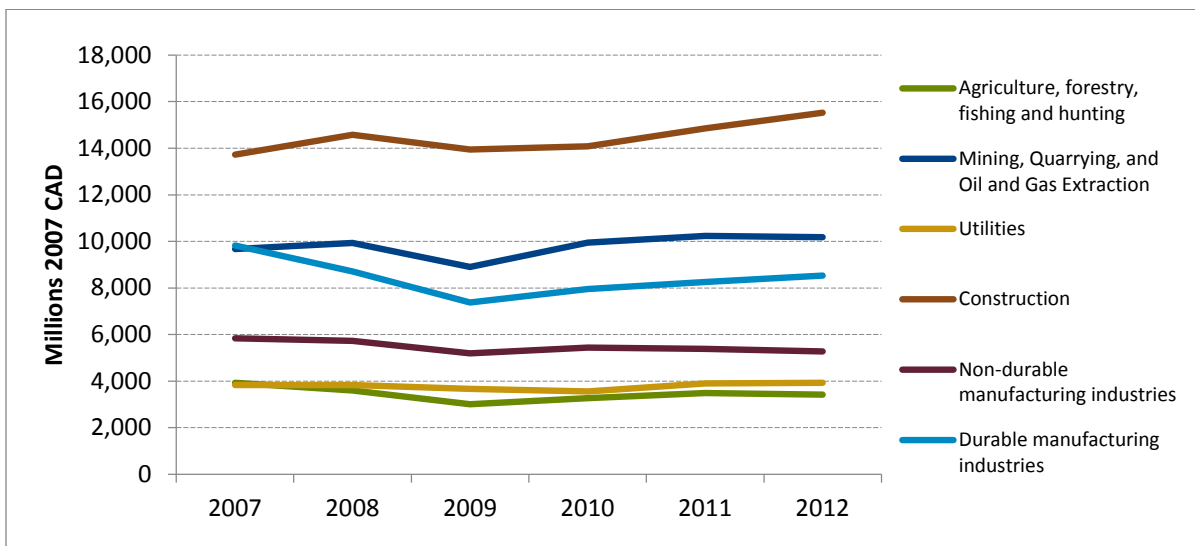


Figure 4: Real GDP of BC goods producing industries

Source: Statistics Canada, 2012a

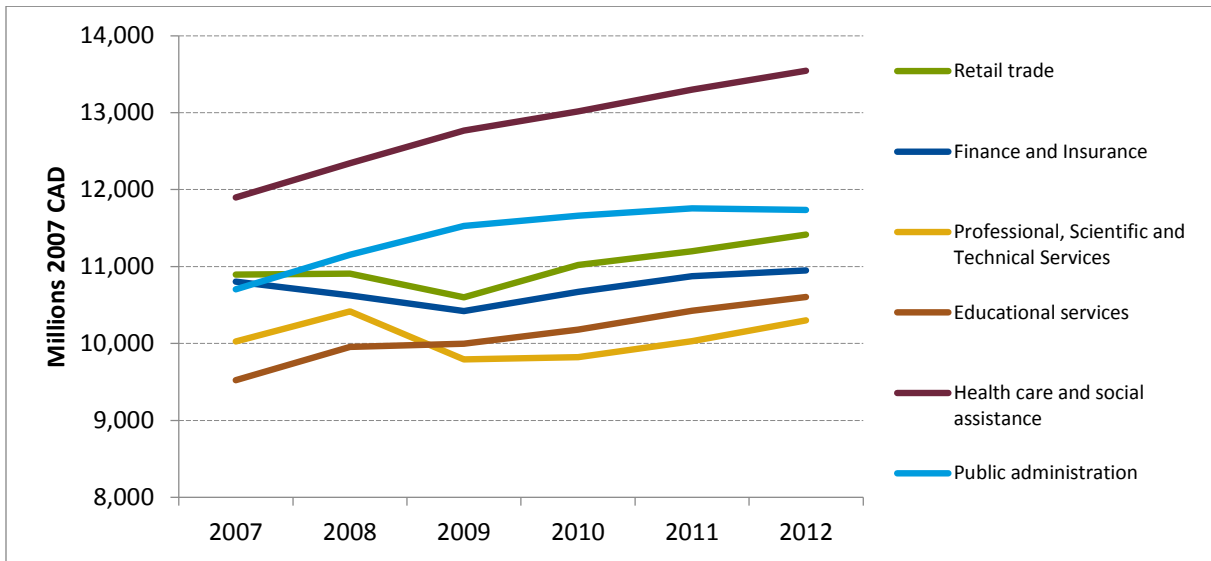


Figure 5: Real GDP of BC service industries

Source: Statistics Canada, 2012a

RESOURCE SECTOR

What does this measure & why is it important?

This indicator measures global prices for commodities that are important to the Basin Boundary economy. Data for this indicator were sourced from the [World Bank](#), [International Monetary Fund](#), and the [BC Ministry of Energy and Mines](#). Commodities prices are given in nominal, or market, levels. These are uncorrected for changes in overall price level (inflation). Production is measured in relevant units to the commodity (i.e. lumber in milled board feet, gold in grams and/or troy ounces)².

² For ease of comparison, the units are suppressed in this analysis. What we are examining is overall trends in levels of activity.

Given the weight of primary industry in the Basin Boundary economic make-up, commodity prices provide an indication of the level of influence of the global economy on our region. These prices combined with the level of production indicate the prosperity of those involved with resource industries. The importance of these sectors, at least as perceived by Basin Boundary residents, was confirmed through the RDI's 2013 poll of residents. When asked to list which sectors are most important to the regional economy, the highest number of respondents referred to resource sectors, including forestry and mining.

What are the trends & current conditions?

Forest Products

Saw log prices peaked in 2006 and were already on the decline when the Great Recession hit in 2009. Saw log prices have not fully recovered to their 2006 peak. However, the price response during the Great Recession was muted compared to many other commodities. Pulp, on the other hand, saw a significant price drop in 2009 (Figure 6). Since 2009, prices have largely recovered.

Production levels in the forest industry have roughly followed price trends. Forestry production began falling in 2007, hitting a low point in 2009. Forestry production, like forest-product prices, has not recovered to recession levels, but they are on a modest upward trend.

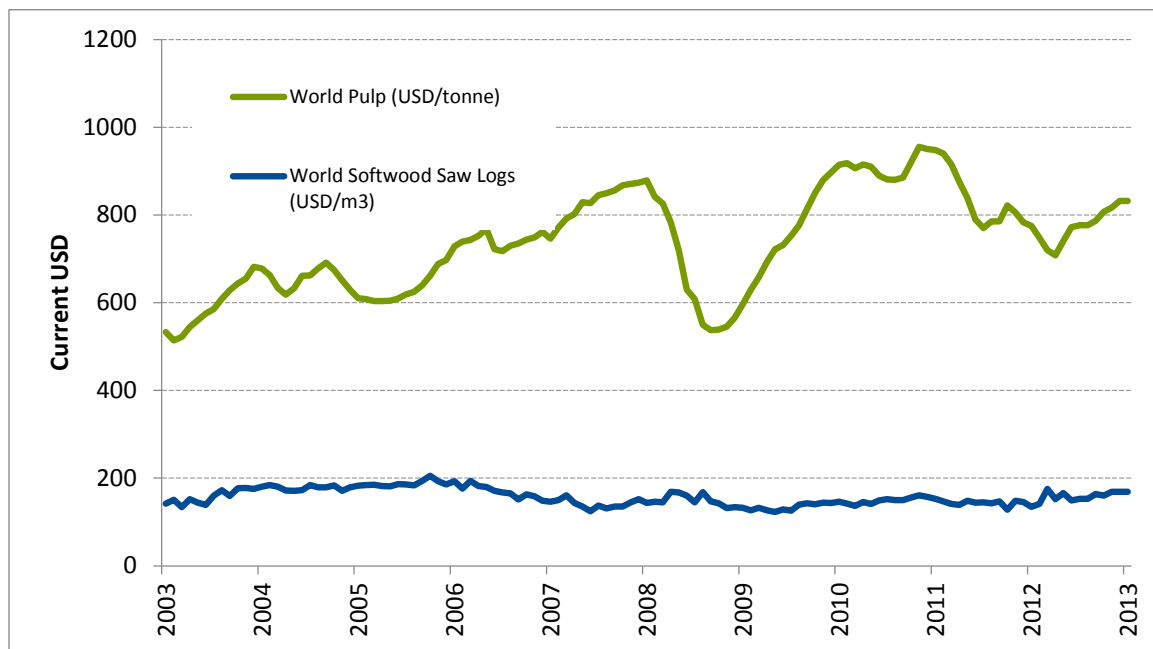


Figure 6: Global saw log and pulp prices

Source: World Bank, 2013; IMF, 2013

Metals

Metals pricing followed a more predictable course through the Great Recession, dropping in 2009, followed by recovery, with a general decline after 2011 (Figure 7). Many of these prices have not yet recovered to peak levels. Of notable exception are coal and silver. Both coal (Figure 8) and silver prices had muted reactions to the 2009 crisis.

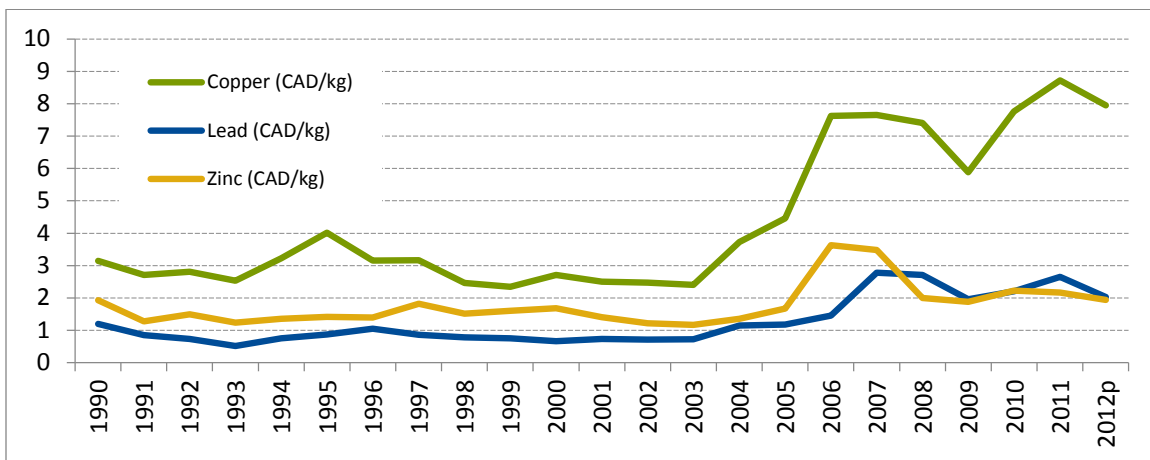


Figure 7: Select metals prices
Source: BC Ministry of Energy and Mines, 2013a

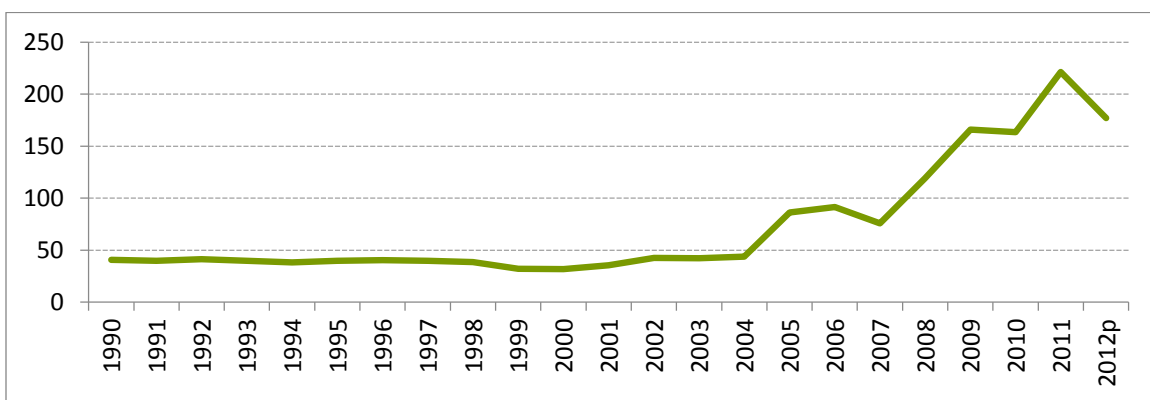


Figure 8: Coal prices
Source: BC Ministry of Energy and Mines, 2013b

Production in the metals market is slightly more complicated than other commodities markets because of the global integration of the production system. The reduction in Canadian metals production (BC Ministry of Energy and Mines, 2013c) was a response to reduced market demand, the global financial crisis and resultant market trepidation as people recovered from the damage. However, at the same time, China (along with other developing nations) was continuing to grow rapidly. Chinese raw material demands maintained high global commodities prices, which likely hastened the modest recovery of North American minerals markets (Yam, 2012).

JOB CREATION

What does this measure & why is it important?

This indicator tracks the total number of people employed in the Kootenay Development Region, broken down by the goods producing sector and the service sector. Also considered in this analysis are comparative employment rates in the different regions of British Columbia. The employment rate measures the percentage of Canadian adults (15 years of age and over) working for pay. Data for this indicator were sourced from Statistics Canada’s [Labour Force Survey](#).

Total employment indicates whether there are increasing opportunities for the people of the region, and in which sectors they will find them. An examination of rates, rather than absolute numbers, adjusts for changes in the population. Both indicators are important to understanding how the regional economy is providing for its residents.

What are the trends & current conditions?

In our region, both the goods producing sector and the services producing sector reacted to the Great Recession (Figure 9). Goods producing sectors began their downward slide as early as 2007/2008 with the early stages of the Great Recession. Our industrial base in the region, being heavily weighted in raw materials and industrial manufacturing, reacted very quickly to global trends. Capital-intensive industries, such as ours, tended to react quickly and strongly to the Great Recession since it affected the global financial sector so severely (Chor & Manova, 2012). This may have led to the early and more dramatic change in the more primary markets and their employment levels.

The Kootenay Development Region goods producing sector was quick to bounce back in 2010 with indications of economic recovery, but levelled off when the slow pace of the American recovery was becoming evident. Goods production employment is still below peak levels from 2007, with the exception of the forestry, fishing, mining, quarrying, and oil and gas sectors, which have now exceeded pre-recession levels.

The service sector reacted late to the Great Recession, beginning its downturn in 2010. This time lag likely resulted from the fact that the population driving demand for the service sector is far larger and more diverse than that population driving demand for the goods producing sector in the region.

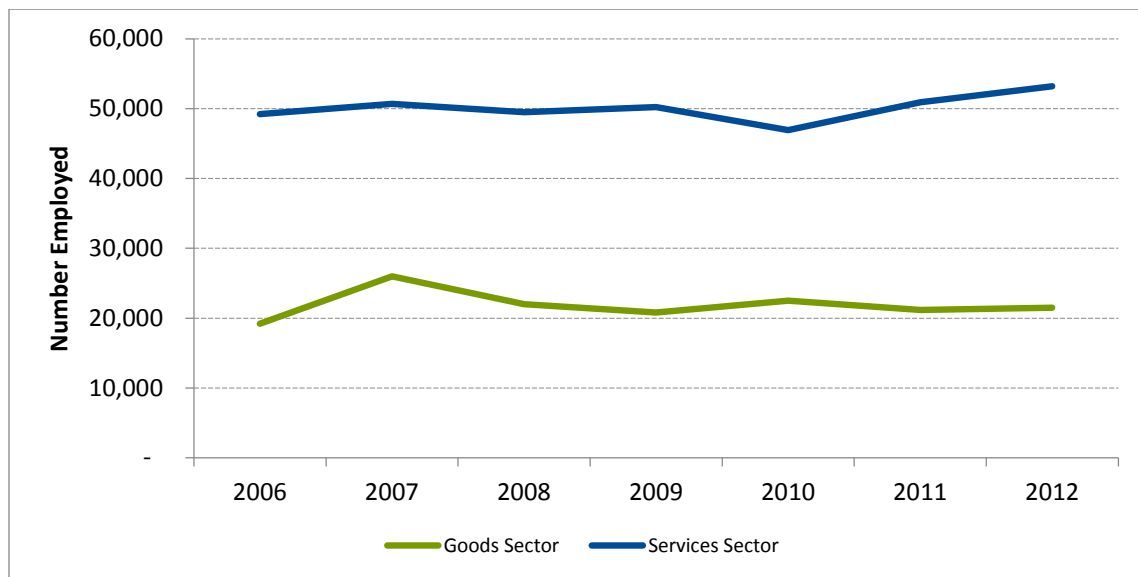


Figure 9: Total employment in the Kootenay Development Region

Source: Statistics Canada, 2013a

There was a significant jump in the Kootenay Development Region employment rate in 2007. This corresponds with the increase in total employment in the goods producing sector. Our employment rates have been lower than most other Development Regions for the past six years (Figure 10).

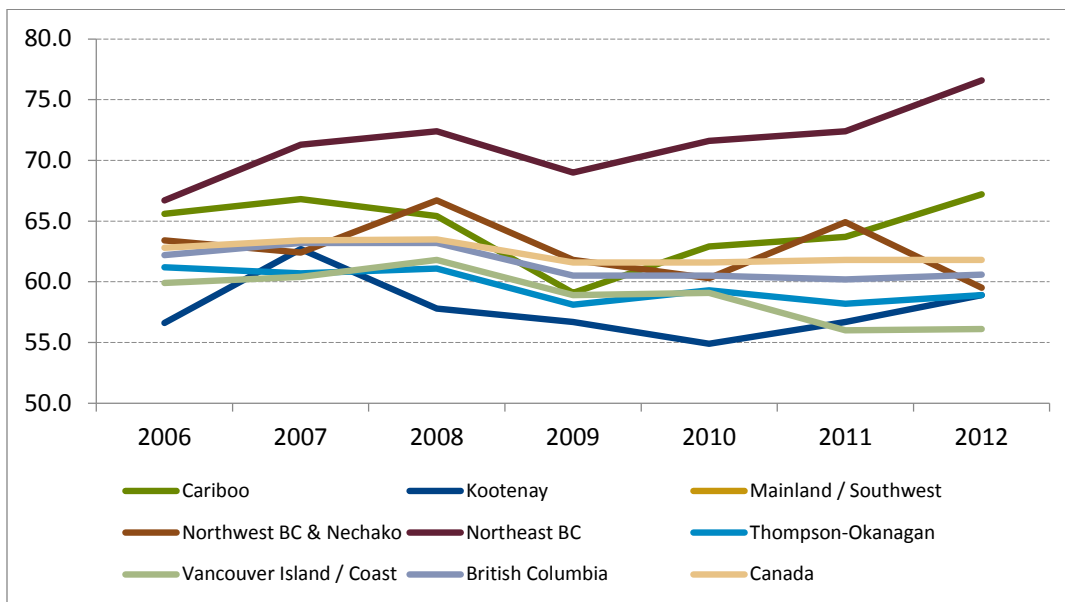


Figure 10: Employment rate in BC Development Regions
Source: Statistics Canada, 2013a

Increasing employment in forestry and mining has been offset by losses in the manufacturing and construction sectors (Table 1). The gains in primary resource sector employment are due to increased exploration and development triggered by promising price increases (Institute of Chartered Accountants of BC, 2013a). These primary industry increases have resulted in employment gains for primary production and for professional, scientific, and technical services. Meanwhile, the manufacturing and construction sectors have not yet recovered from the Great Recession.

Also of note in the service sector, over the last year, educational services, trade and health care and social assistance experienced job creation. During the same period, the region experienced losses in ‘finance, insurance and real-estate’, ‘business, building and support’ and transportation, with slight decreases in hospitality and public administration. These losses are focused in small business and sectors heavily affected by the Great Recession.

Total Employment by Sector (figures given in 000s)								
Sector	2007	2008	2009	2010	2011	2012	5 Year Change	1 Year Change
Total, all industries	76.7	71.6	71	69.4	72.1	74.8	-1.90	2.70
Goods-producing sector	26	22	20.8	22.5	21.2	21.5	-4.50	0.30
Agriculture	2.5	2.4	2.3	1.7	-	-	-2.50	0.00
Forestry, fishing, mining, quarrying, oil & gas	5.4	6.9	4.8	5	5.3	7	1.60	1.70
Utilities	-	-	-	-	-	-	n/a	n/a
Construction	9.1	8	8.5	7.4	8.2	7.7	-1.40	-0.50
Manufacturing	8.3	4.7	4.6	7.7	6.1	4.9	-3.40	-1.20
Services-producing sector	50.7	49.5	50.2	46.9	50.9	53.2	2.50	2.30
Trade	11.3	12.7	14	11.8	10.1	10.8	-0.50	0.70
Transportation &	3.3	3.3	3	2.4	3.3	2.6	-0.70	-0.70

warehousing									
Finance, insurance, real estate & leasing	3.2	2.3	2.7	2.3	2.8	1.8	-1.40	-1.00	
Professional, scientific & technical services	3.3	3.5	2.3	2.3	2.7	4	0.70	1.30	
Business, building & other support services	2.4	1.6	2.7	3.2	3.2	2.1	-0.30	-1.10	
Educational services	4.9	4.9	3.4	2.9	3.5	5.9	1.00	2.40	
Health care & social assistance	8.3	6.1	9.5	8.2	9.2	9.8	1.50	0.60	
Information, culture & recreation	3.4	3.1	1.9	2.7	2.4	2.6	-0.80	0.20	
Accommodation & food services	6	7.4	5.6	5.7	6.9	6.4	0.40	-0.50	
Other services	3.1	2.8	3.1	2.9	4	4.5	1.40	0.50	
Public administration	1.8	1.8	1.9	2.6	2.8	2.7	0.90	-0.10	

Table 1: Employment in the Kootenay Development Region, by sector

Source: Statistics Canada, 2013a

BUSINESS STARTS & CLOSURES

What does this measure & why is it important?

This indicator measures the number of business starts and closures, by year and Regional District or Development Region. Consumer bankruptcy rates are also considered. Data for this indicator were gathered from BC Stats' [business formations and failures statistics](#). Business starts refer to new business incorporations, and bankruptcies refer to the number of people or businesses, out of 1,000, that have filed for bankruptcy in a given year.

Business starts and closures indicate the overall business climate in the region. If conditions are favourable, we may expect to see businesses forming faster than they close, and vice versa. This indicator gives a sense of whether the business climate is supporting the development of an expanding or contracting economy.

What are the trends & current conditions?

Business formations peaked in 2006/2007 for Basin Boundary Regional Districts, followed by a significant drop in the number of incorporations in 2009 (Figure 11). While formations have not yet recovered to 2007 levels, they are generally higher than pre-peak levels. This corresponds to the lack of market confidence associated with the general slowdown in 2009 and the more cautious global expectations that have been the norm since 2009.

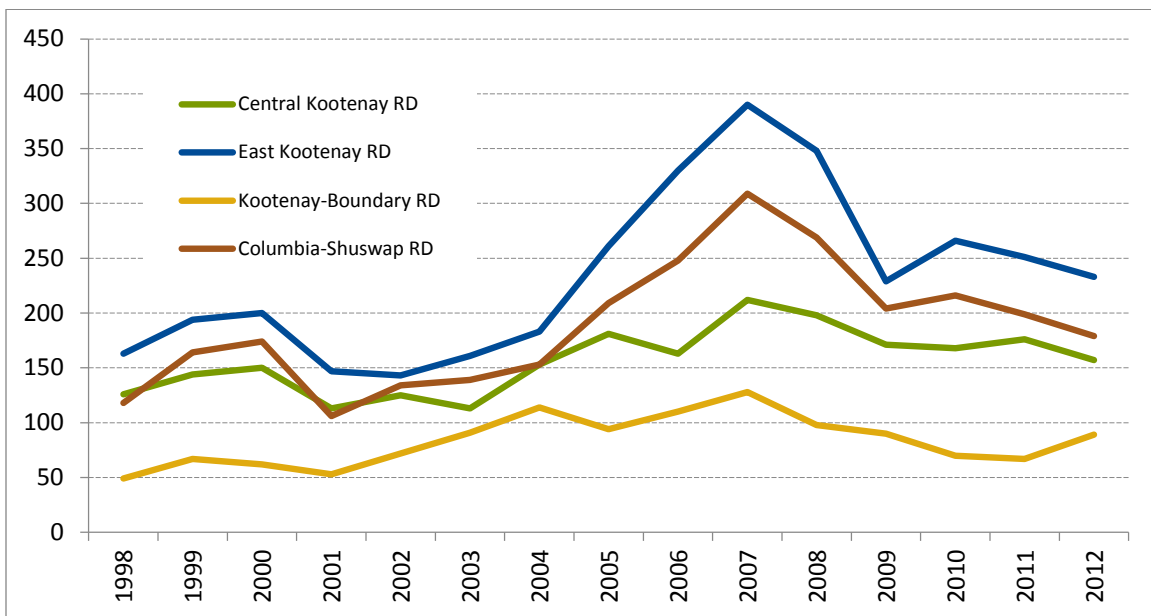


Figure 11: Business starts in Basin Boundary Regional Districts
 Source: BC Stats, 2012a

The number of personal and business bankruptcies generally declined in the period leading up to the Great Recession. However, personal bankruptcies spiked in 2009 (Figure 12) while corporate bankruptcies (Figure 13) continued on their downward trend. This suggests that the Canadian business community was capable of protecting itself against the poor performance of the economy while individual citizens bore the brunt of the Great Recession. Since 2010, this trend seems to be stabilizing back to normal levels.

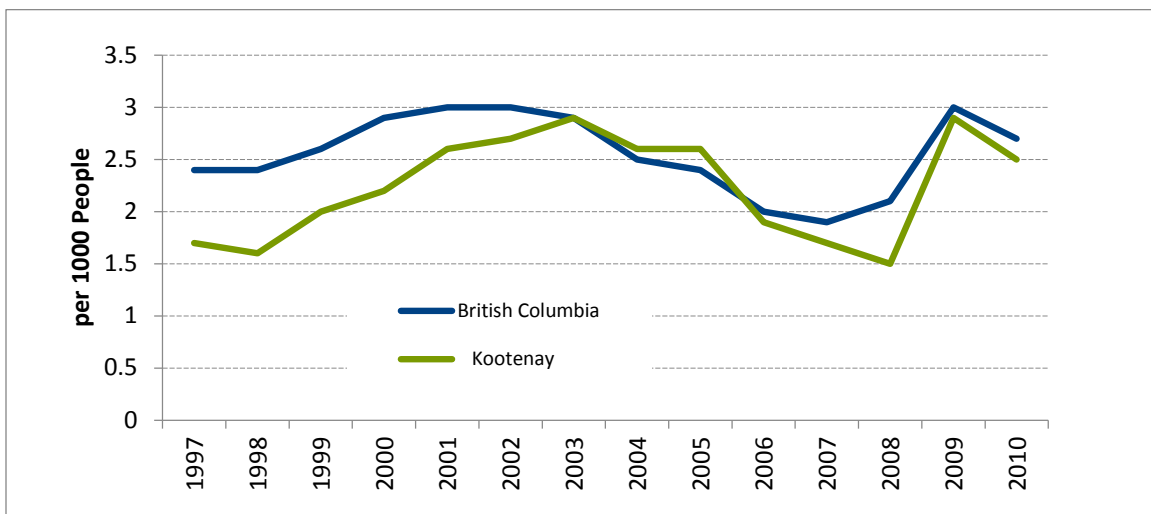


Figure 12: Personal bankruptcy rates in the Kootenay Development Region and BC
 Source: BC Stats, 2012b



Figure 13: Business bankruptcy rates in the Kootenay Development Region and BC
Source: BC Stats, 2012c

More recent data suggest investment climate volatility. The Kootenay Development Region experienced the largest increase in business bankruptcies of all Development Regions in BC (57.1%) over the last year while also experiencing a decline in business incorporations (-3.0%) (Table 2).

Region	2007	2008	2009	2010	2011	2012	5 Year Change	1 Year Change
Business Incorporations	730	644	490	504	494	479	-34.4%	-3.0%
Business Bankruptcies	14	16	9	7	7	11	-21.4%	57.1%

Table 2: Business incorporations and bankruptcies in the Kootenay Development Region, 2007 to 2012
Source: Institute of Chartered Accountants of BC, 2013a

MAJOR INVESTMENT

What does this measure & why is it important?

This indicator measures proposed and active investments greater than \$15 million in the region. [The Major Projects Inventory](#), which is tracked by the BC Ministry of Jobs, Tourism and Skills Training, provided data for this indicator. Major investments create local jobs, update the capital stock, and provide a barometer of business sector expectations.

What are the trends & current conditions?

Currently major projects underway within the Kootenay Development Region are valued at just under \$3.8 billion. Additional projects valued at \$1.6 billion are on hold. Of the \$3.8 billion in current projects, just over \$1 billion are hydro-electric projects with the remainder being resort projects. Projects that are on hold are generally being delayed by regulatory issues or as a result of uncertainty in the face of American economic conditions (Institute of Chartered Accountants of BC, 2013b).

WORKFORCE

UNEMPLOYMENT

What does this measure & why is it important?

The unemployment rate measures the percentage of the labour force (those over 15 and legally allowed to work) that is not able to find work. Data for this indicator were sourced from Statistics Canada's [Labour Force Survey](#).

The unemployment rate is a strong indicator of economic health. If our economy's purpose is to allocate our resources to the best uses, then unemployment rates give us a good indication of how well the economy is using one of our most important resources—people.

What are the trends & current conditions?

The impacts of the Great Recession were clearly experienced in unemployment rates (Figure 14). Unemployment levels remain higher than pre-recession levels. Further, unemployment in the Kootenay Development Region has been second or third highest for most of the past six years, with Northwest & Nechako consistently the highest and a significant spike in the Cariboo during the Great Recession.

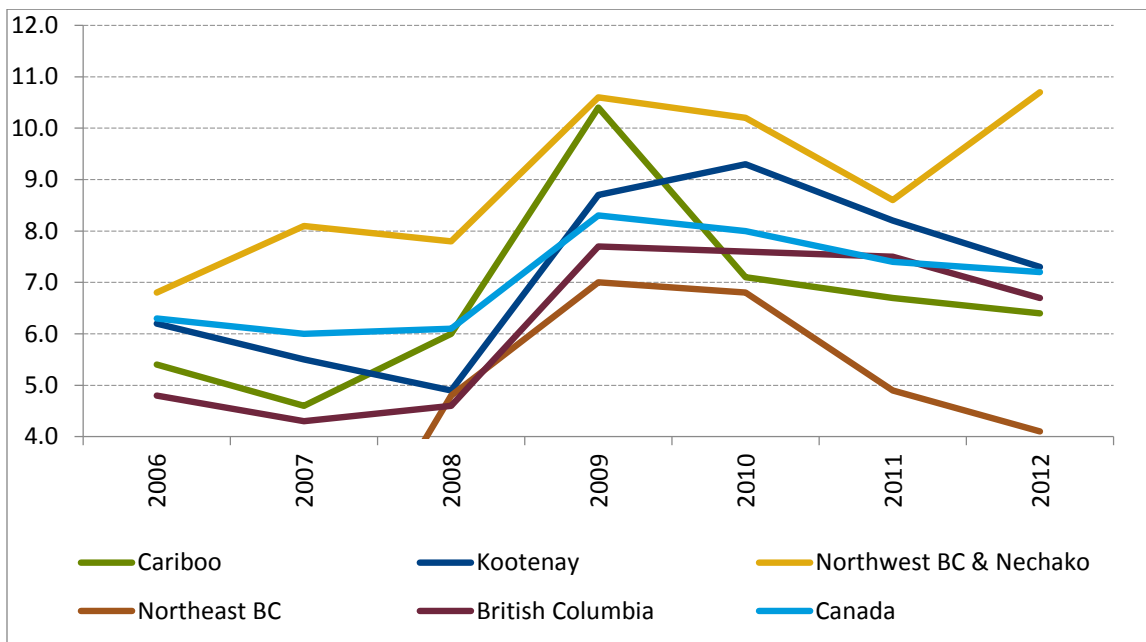


Figure 14: Unemployment rate in rural BC Development Regions
Source: Statistics Canada, 2013a

Within the Kootenay Development Region, the most dramatic changes to the unemployment rate have occurred in the Accommodation, Forestry & Mining, and Mining & Quarrying sectors (Figure 15). Accommodation depends, to a high degree, on tourism. As a luxury item, vacations tend to be one of the first cut-backs people make in hard times. Forestry and the mineral based sectors are primary in nature. As described earlier in this report, primary industries usually react very quickly to general macroeconomic conditions.

It is notable that both the Retail & Wholesale Trade and Education sectors reacted to the Great Recession with a time lag of roughly one year. Again, this is likely due to their 'downstream' nature in the macro-production chain³.

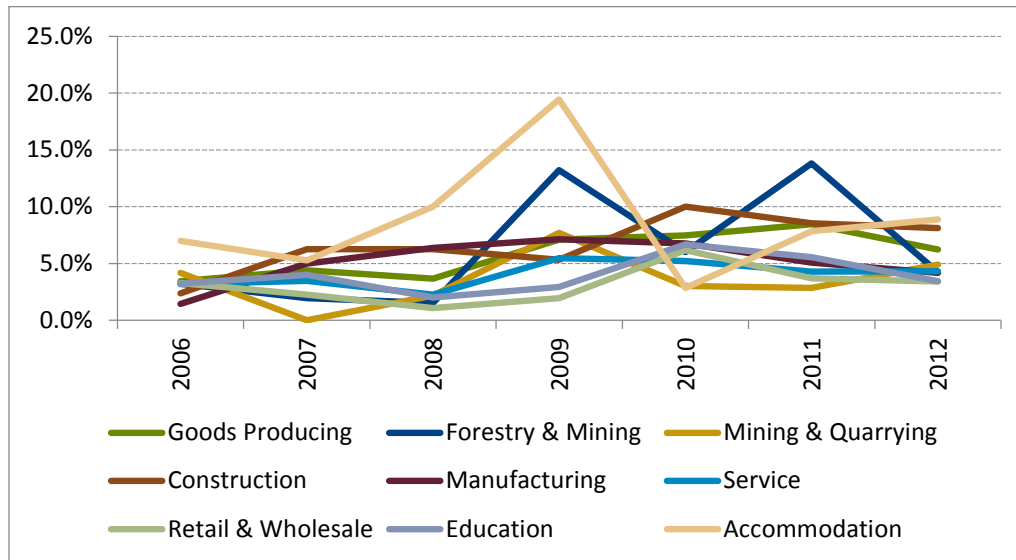


Figure 15: Unemployment rates in Kootenay economic sectors
Source: Statistics Canada, 2013a

Youth Unemployment

Youth unemployment in the Kootenays has remained lower than the provincial average for most of the last five years (Table 3) (Institute of Chartered Accountants of BC, 2013a). However, more recently the Kootenay Development Region experienced the largest youth unemployment rate increase in the province, now at 10.4%⁴. It is also important to note the outflow of young people from our region over the last two years. We've lost 23% of our youth population.

Region	2007	2008	2009	2010	2011	2012	5 Year Change (percentage points)	1 Year Change
Kootenay Development Region	6.0%	15.9%	8.6%	9.6%	6.8%	10.4%	4.4	3.6
British Columbia	6.1%	6.8%	11.1%	11.3%	11.5%	10.9%	4.8	-0.6

Table 3: Youth unemployment
Source: Institute of Chartered Accountants of BC, 2013a

EMPLOYMENT INSURANCE & INCOME ASSISTANCE RECIPIENTS

What does this measure & why is it important?

This indicator measures employment insurance (EI) and income assistance dependency ratios in Basin Boundary Regional Districts. Data for this indicator were acquired from Canada Revenue Agency's [Income Database](#).

³ this phenomenon is referred to as the Bullwhip Effect

⁴ These figures are based on information gathered with low sample rates, and should therefore be used with caution.

These dependency ratios⁵ measure the proportion of a person’s employment income that comes in the form of benefits. They therefore provide an indication of how dependent a population is on the social safety net.

What are the trends & current conditions?

EI Dependency

British Columbia’s EI Dependency Ratio has been lower than the Canadian average since 2002. This is an indication of solid labour market performance. However, all of the Basin Boundary Regional Districts have under-performed as compared to Canadian and BC averages for almost all periods (Figure 16). While data is not currently available beyond 2009, if EI dependency follows other labour market trends, we should expect a downturn after the upward spike in 2009.

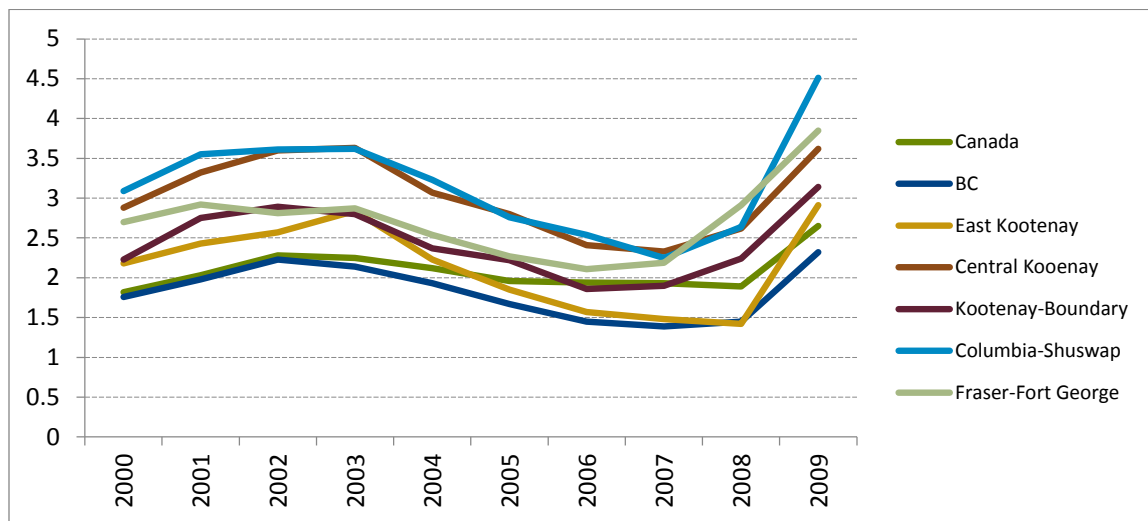


Figure 16: Employment insurance dependency ratios for Basin Boundary Regional Districts
Source: BC Stats, 2012d

Basin Boundary EI dependency ratios also show a gender bias, with females being consistently more dependent on EI (Figure 17). The only exception to this trend appears in the early part of the 2000s, where Central Kootenay males had higher EI dependency for a period of three years. Central Kootenay males seem to have been harder hit by the Great Recession as well.

⁵ Data was only available up to 2009 at the time of writing.

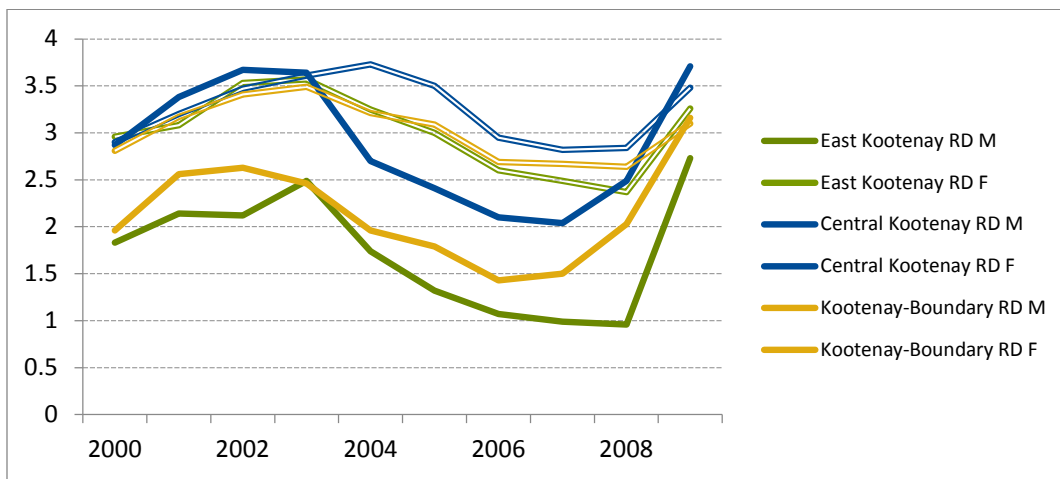


Figure 17: Employment insurance dependency ratios for Kootenay Regional Districts, by gender
Source: BC Stats, 2012d

Income Assistance Dependency

An examination of the Income Assistance Dependency Ratios illustrates the differing economic opportunities in the different regions (Table 4). While the Kootenay Development Region, as a whole, mirrored the performance of the province fairly closely, the East Kootenay Regional District experienced lower ratios while the Central Kootenay and Kootenay Boundary Regional Districts experienced higher ratios. In fact, the East Kootenay Regional District was one of the top performers in the province in this respect. The Central Kootenay and Kootenay Boundary required far more income assistance by comparison.

Region	2007	2008	2009	2010	2011	2012	5 Year Change (percentage points)	1 Year Change
East Kootenay	0.9	1.0	1.6	1.5	1.5	1.2	0.3	-0.3
Central Kootenay	1.8	1.8	2.5	2.6	2.7	2.2	0.4	-0.5
Kootenay Boundary	1.5	1.7	2.4	2.5	2.5	2.2	0.7	-0.3
Kootenay Development Region	1.4	1.5	2.1	2.1	2.1	1.8	0.4	-0.3
British Columbia	1.4	1.5	1.9	2.0	2.0	1.7	0.3	-0.3

Table 4: Income assistance dependency ratios
Source: Institute of Chartered Accountants of BC, 2013a

WORKFORCE EDUCATION

What does this measure & why is it important?

This indicator measures the portion of the workforce aged 25 to 54 who have some level of post-secondary education (trades, college, or university level). Data for this indicator were sourced from Statistics Canada’s [Labour Force Survey](#).

The education level of a local workforce influences the types of industries and economic sectors that develop and the ability of individuals and communities to adapt to changes. Most businesses today require a workforce with some level of advanced education.

What are the trends & current conditions?

The percentage of the Kootenay Development Region labour force with post-secondary education has been on an upward trend since the onset of the Great Recession (Figure 18). This trend seems to support the idea that people will be more inclined to pursue post-secondary education when employment opportunities are scarce. Generally, the Kootenay Development Region (which includes the Regional Districts of Central Kootenay, Kootenay Boundary and East Kootenay) has been in the middle of the pack with respect to comparisons between the provincial Development Regions.

Recently, the Kootenay Development Region experienced a sizable decline in the component of the labour force with a post-secondary certificate or diploma. This followed a sizable gain in 2011. This fluctuation might suggest labour force volatility as skilled workers may be leaving our region to pursue higher paying employment opportunities elsewhere. It is important to note that Statistics Canada's estimates are derived from sample surveys and readers are cautioned that while the reliability of the Labour Force Survey is adequate at the provincial level, the margin of error increases in smaller sub-groups. Some of what appears to be volatility in our skilled labour force may also be explained by margin of error. The important trend to recognize is that, over time, the overall education level of the Kootenay Development Region workforce is increasing faster than the provincial or national level.

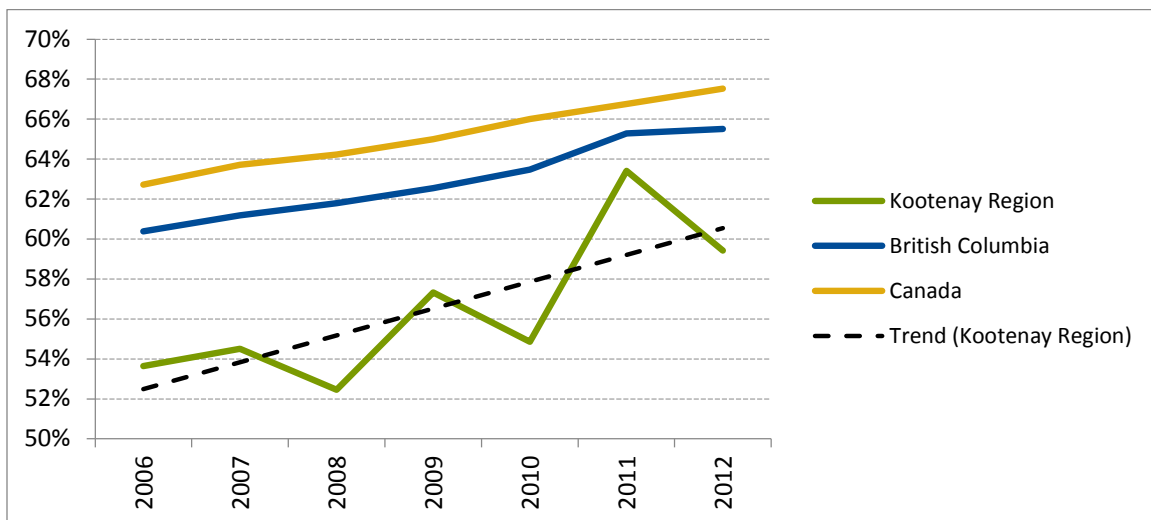


Figure 18: Percentage of labour force with post-secondary education
Source: Statistics Canada, 2013a

INCOME

What does this measure & why is it important?

This indicator measures the average and median income of the Basin Boundary population. Data are sourced from the [National Household Survey](#) and BC Stats' [income and taxation statistics](#). At the time of writing, current income data were not available from Canada Revenue Agency, the source used for previous State of the Basin reports. Income information for 2010 is not directly comparable to data reported previously since NHS data collection methodologies differ from those used by Canada Revenue Agency.

Median income values differ from average income values in that they represent the mid-point in an income distribution, meaning half of the population has incomes above that point and half

below. Income levels reflect relative opportunities in a local economy and income is a significant determinant of personal well-being (see the Social Research Pillar section for more information).

What are the trends & current conditions?

Average Income

Average income in 2010 was \$39,415 in BC, roughly \$1,200 less than the national average of \$40,650. The average income in the Kootenay Development Region was \$36,633 indicating that people in the Kootenay region have less earning potential than the average Canadian and average BC resident.

Median Income

Median income in 2010 was \$28,765 in BC, compared to the national average of \$29,878. This difference is similar to that shown for average income. However, some stark differences are reported across the Basin Boundary region. Median incomes are very high in some East Kootenay communities, with many of the more rural communities displaying significantly lower median income levels. Gender differences can also be seen in Basin Boundary income profiles. In 2009, for example, female incomes were lower than the provincial average in all Basin Boundary jurisdictions (Figure 19).

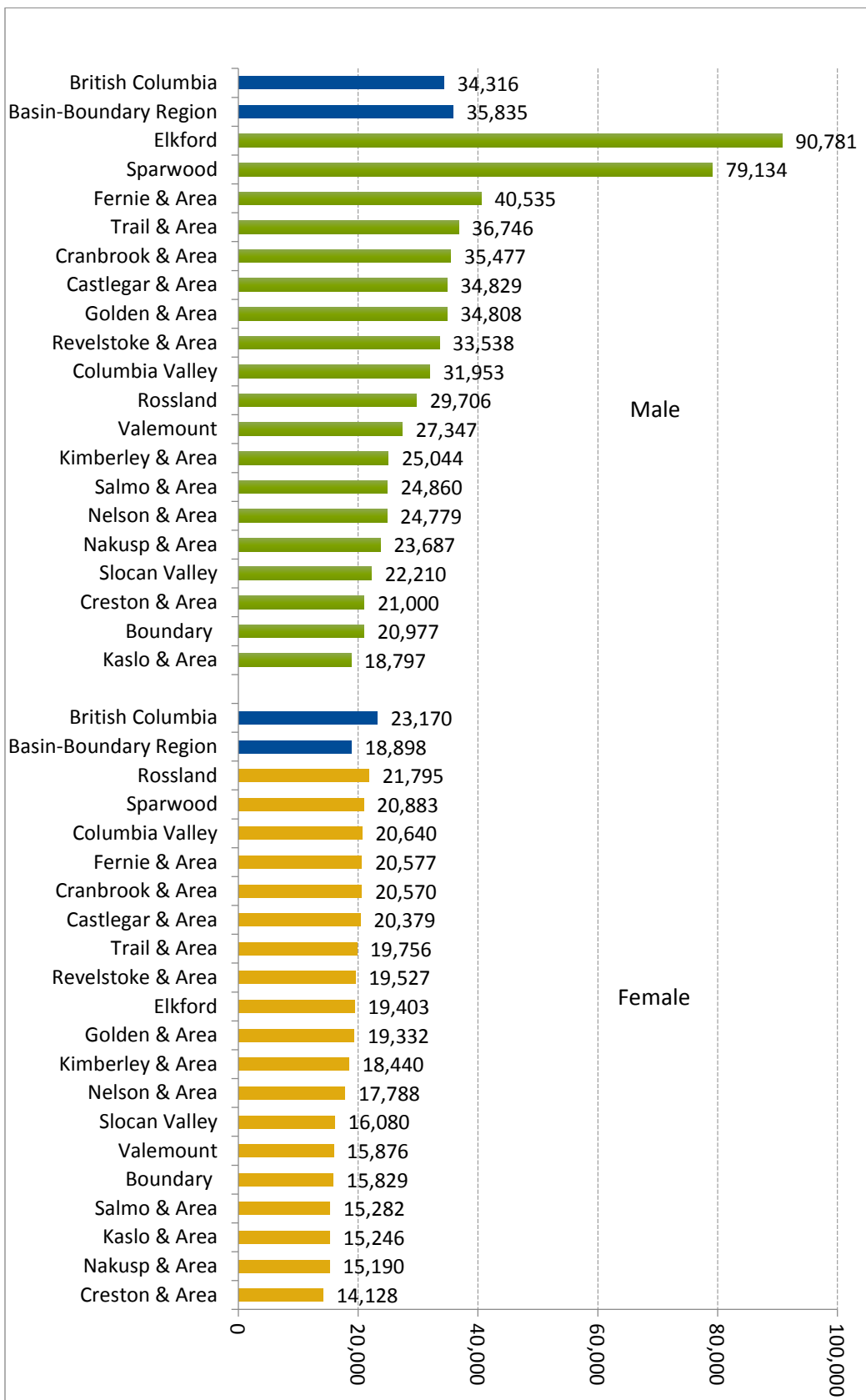


Figure 19: Median income by gender, 2009

Source: BC Stats, 2012d

INFRASTRUCTURE

DRINKING WATER QUALITY

What does this measure & why is it important?

This indicator measures the number of Basin Boundary drinking water systems for which Interior Health had issued a drinking water advisory as of June 10, 2013. Drinking water advisories (“Water Quality Advisories” or “Boil Water Notices”) are issued by health authorities when there is concern over the safety of the water supply. For this report, June 10 was selected as a sample date because of its correlation with spring freshet, which tends to affect turbidity (cloudiness) in surface water sources, potentially challenging the effectiveness of water treatment systems (Emelko, Silins, Bladon & Stone, 2011). The list of active water quality advisories was gathered from Interior Health’s [Water Notifications database](#), and data on water systems regulated by Interior Health were provided by Ministry of Health staff (J. Edwards, pers. comm., 2013).

The Basin Boundary region has a high number of small water systems, many of which struggle to consistently meet regulatory guidelines for drinking water quality. There are several reasons for this challenge, including the affordability of modern water treatment systems, aging infrastructure, and increasingly stringent regulations. Access to clean, reliable drinking water is one of the most important factors affecting human health and the ability of rural regions to achieve their development goals (RDCK, 2010).

What are the trends & current conditions?

As of June 10, 2013, there were 130 drinking water advisories issued for 123 unique Basin Boundary water systems (Figure 20). Within Interior Health’s East Kootenay and Kootenay Boundary Health Service Delivery Areas, which comprise the majority of the Basin Boundary region, approximately 16% of the more than 700 water systems were on some form of advisory. As an interesting comparison, in RDI’s 2013 poll of residents, 86% of respondents agreed with the suggestion that the water from their tap was safe to drink, 6% disagreed and 8% were unsure.

The presence of a drinking water advisory was most prevalent among systems serving between 15 and 300 connections. In the East Kootenay and Kootenay Boundary Health Service Delivery Areas, 26% of these systems were on advisory, while 22% of systems with over 300 connections, and 12% of systems with less than 15 connections were on advisory. The most common reasons for the advisories were inadequate disinfection/treatment (57 occurrences) and source water contamination (45 occurrences).

Due to the availability of data, this analysis does not differentiate between residential and commercial water systems. Edwards, Henderson, Struck and Kosatsky (2012) reported that residential systems regulated by Interior Health are twice as likely to be on advisory as commercial systems.

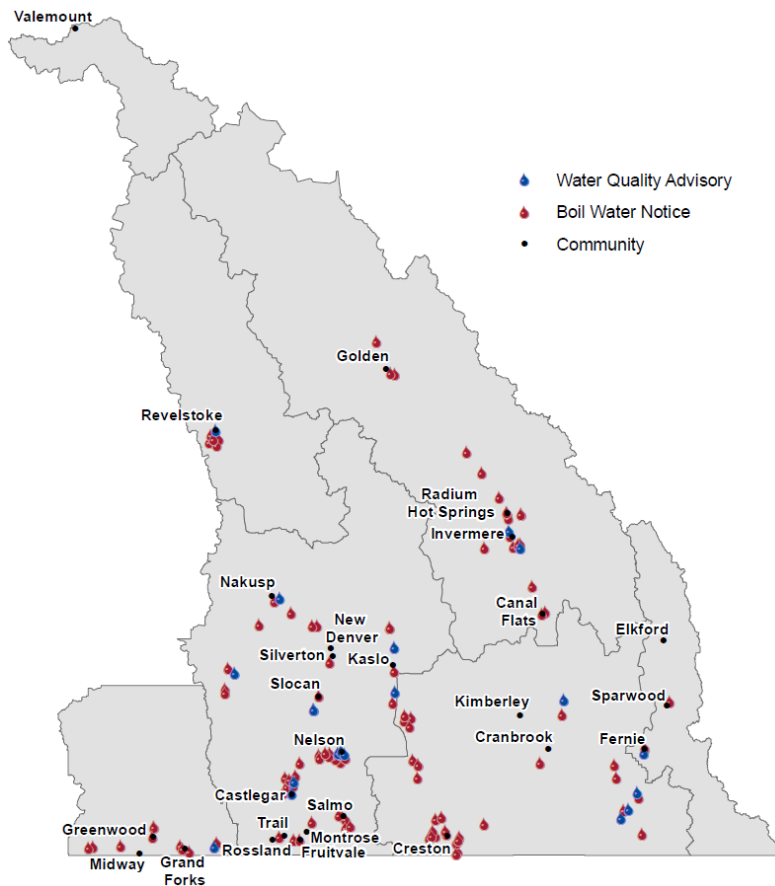


Figure 20: Approximate location of active drinking water advisories as of June 10, 2013
Source: Interior Health, 2013

TRAFFIC

What does this measure & why is it important?

This indicator measures the change in mean annual daily traffic volumes at 19 traffic count sites in 11 Basin Boundary communities. For this analysis, 2006 is used as a baseline year. Values are adjusted for annual variability using a three year moving average, centred on the year in question. Data were acquired from the BC Ministry of Transportation and Infrastructure's [Traffic Data Program](#).

Traffic rates indicate demand on a component of our publically-funded infrastructure, helping planners to properly design and construct transportation networks. Our roads are used for commuting, tourism, and transport of goods, among other purposes. Traffic data can therefore help us understand how shifts in the economy affect our communities.

What are the trends & current conditions?

Across the region, traffic increased by 4.7% between 2006 and 2011, an average of 1% per year. However, trends vary widely depending on the specific community in question (Figure 21). At Crowsnest Pass, for example, traffic has increased over 15% since 2006, while at Radium Hot Springs, traffic has decreased almost 7% over the same time period. The Ministry of Transportation characterizes traffic at the Radium Hot Springs site as highly seasonal, suggesting that tourism accounts for a significant component of traffic through that community. The

recession of 2009 significantly affected the tourism sector in our communities, likely explaining the decline in Radium traffic.

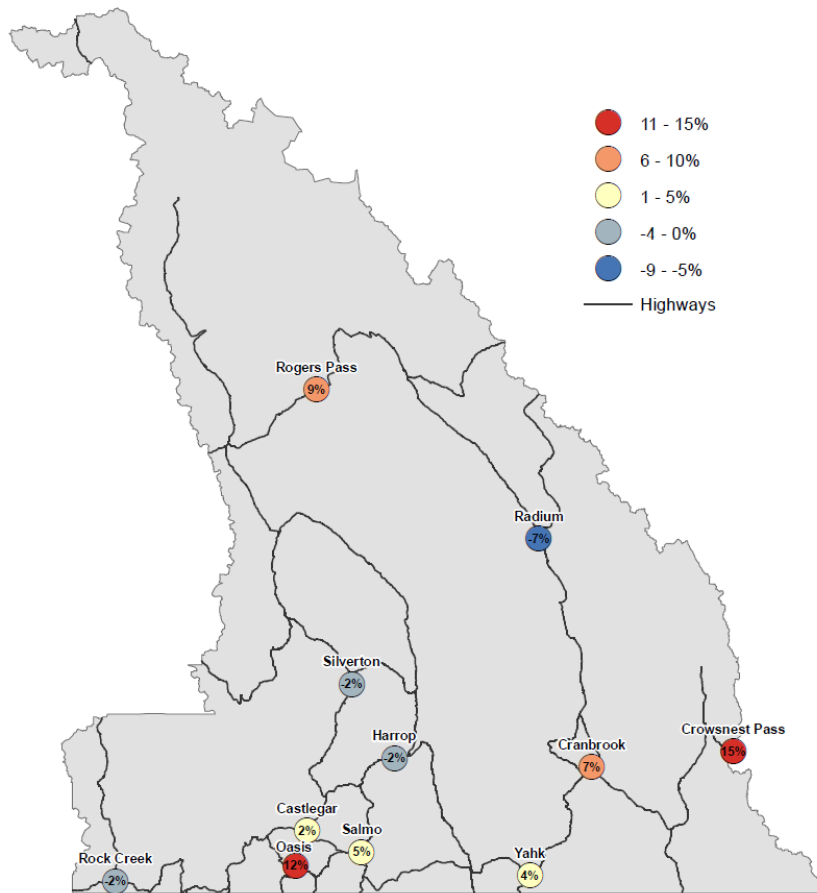


Figure 21: Change in mean annual daily traffic volumes, 2006 - 2011.

Source: BC Ministry of Transportation and Infrastructure, 2013

TRANSIT SERVICE

What does this measure & why is it important?

This indicator measures the percentage of total land area in the region that is within one or five kilometres of a fixed route operated by BC Transit. Spatial data for this indicator were provided by BC Transit and analysed by the Selkirk Geospatial Research Centre.

Public transit provides an important service to Basin Boundary residents that cannot, or prefer not to, drive to the places where they live, work, go to school or recreate. Since users of transit often include vulnerable citizens (including low income and differently-abled individuals), transit services encourage inclusive communities. They also enable energy-efficient commuting, which can help reduce greenhouse gas emissions.

Note that this indicator only considers fixed transit services—those that operate on a set schedule with a predictable route. Some Basin Boundary transit systems also include handyDART services, which offer flexible schedules and routing to meet the needs of residents who cannot otherwise access conventional services.

Because this indicator compares transit service areas to the total land area in our region (much of which is uninhabited), caution should be exercised when using this information to assess service levels. The value of this indicator will improve with either long term tracking (which will indicate how overall service levels are changing over time) or improved spatial data relating to the developed portion of the Basin Boundary region.

What are the trends & current conditions?

As of mid-2013, 2.3% of the region was within 1 kilometre of a fixed transit route, and 10.5% was within 5 kilometres. The serviced area was highest in the West Kootenay (5.2% within 1 km) and Elk Valley (3.5% within 1 km) corridors, and lowest in the Valemount (no transit service), Revelstoke (0.2% within 1 km) and Columbia Valley (0.6% within 1 km) corridors (Figure 22).

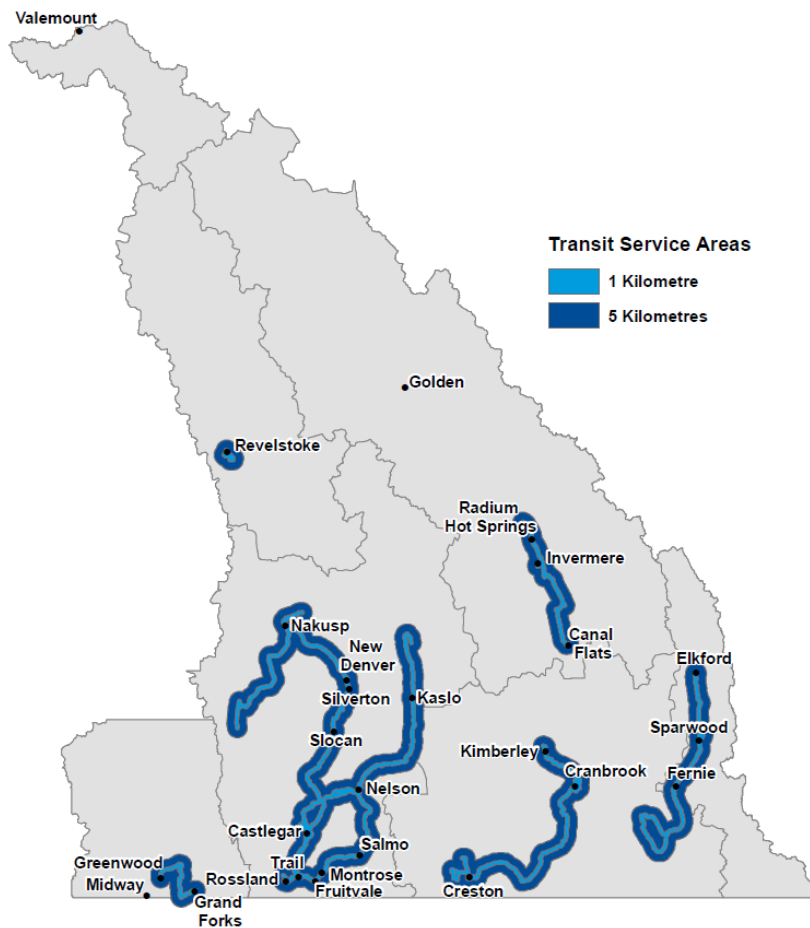


Figure 22: Transit service areas as of 2013
 Source: BC Transit, pers. comm., 2013

COMMUTING TIME

What does this measure & why is it important?

The Commuting Time indicator measures the average duration of Basin Boundary residents' commute to work. Data is compared by Regional District. Data for this indicator were acquired from the 2011 [National Household Survey](#). Some caution should be exercised when using these figures, as depending on the Regional District, non-response rates for the National Household Survey were up to 46%.

Data on commuting patterns can help economists assess connections between regional job markets. They can also help us understand the economic, social, cultural, and environmental impacts of residents having to travel farther to work.

What are the trends & current conditions?

Commuting times in the region are lower than the BC average of 25 minutes, with the shortest average commute being reported in the Regional District of Kootenay Boundary (16 minutes) and the longest commute being reported in the Regional District of East Kootenay (19 minutes) (Figure 23).

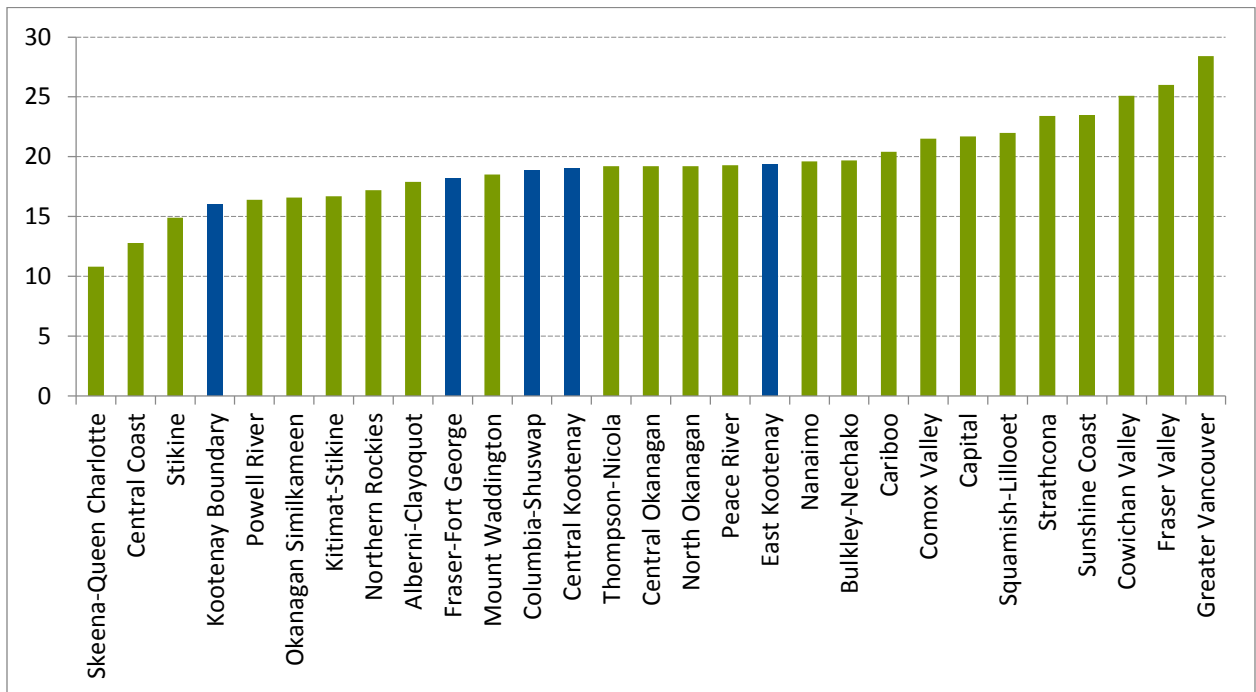


Figure 23: Average commuting time by Regional District

Source: Statistics Canada, 2013b

Our short commutes are likely related to the small and relatively isolated nature of our communities. Most Basin Boundary residents work close to home. For example, Statistics Canada reports that of the 3,655 commuters living in Nelson, only about 8% leave the city for work. Similarly, of the 7,325 commuters in Cranbrook, about 12% leave the city for work (Statistics Canada, 2013c).

HOUSING

OCCUPATION BY USUAL RESIDENTS

What does this measure & why is it important?

This indicator measures the number of private dwellings in the region that, as of census time, were occupied by usual residents. Results are reported by RDI trading corridor. Raw data for this indicator were gathered from the [2006 Census](#) and the [2011 Census](#).

Dwellings that are not occupied by usual residents are either vacant or occupied by “non-usual residents” (foreign workers or temporary residents, such as second home owners). Both of

these issues are important to Basin Boundary communities. Second home ownership can be both beneficial and detrimental for rural regions. While it can bring outside money into the community, it can also result in a reduction in the affordability of housing for permanent residents, and strain infrastructure through significant seasonal fluctuations in demand. Vacant dwellings signal a struggling economy and out-migration of permanent residents.

What are the trends & current conditions?

Across the region, approximately 79% of private dwellings are occupied by usual residents. However, this statistic varies significantly across trading corridors. The Columbia Valley and Boundary corridors have the lowest levels of usual residency, at 55% and 59%, respectively. The West Kootenay and Revelstoke corridors have the highest levels, at 90% and 89%, respectively.

All corridors saw a drop in usual residency from 2006 to 2011 (Figure 24). This change was most significant in the Columbia Valley, where over 25% fewer dwellings are now occupied by usual residents.

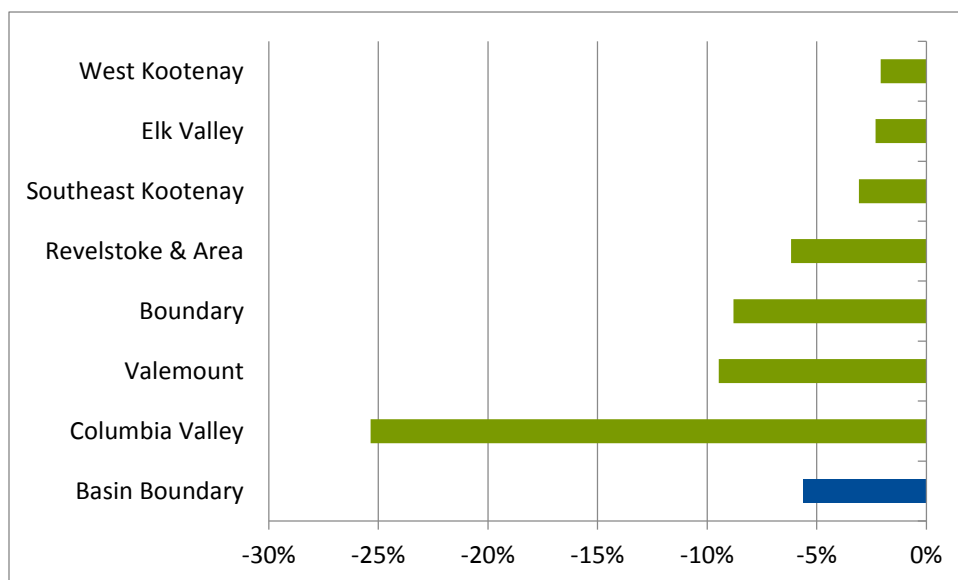


Figure 24: Change in percent of dwellings occupied by usual residents, 2006-2011
Source: Statistics Canada, 2012b; Statistics Canada, 2007

HOUSING STOCK DIVERSITY

What does this measure & why is it important?

This indicator measures the relative size of the single detached component of the housing stock in Basin Boundary communities. Results are reported by trading corridor. Data for this indicator were gathered from the [Census of Canada](#).

People in various economic situations and stages of life have different housing needs. Providing a mix of housing types that meets these needs has been shown to help revitalize small towns and enable economic growth (Daniels et al., 2007). High ratios of single detached homes in a housing stock may indicate that younger or lower-income households are not being accommodated.

What are the trends & current conditions?

Across the region, approximately three quarters of private dwellings are classified as single detached houses. That rate is highest in the Boundary corridor (84%) and lowest in the Elk Valley (63%) (Figure 25). All corridors have significantly higher ratios of single family dwellings than the BC and Canadian averages, which stand at 48% and 55%, respectively.

There appears to be no clear trend in the prevalence of single detached housing over time. As a region, the ratio was lowest in 1996, at 71%. The 2001 value (77%) was significantly higher, before dropping again in 2006 (73%), and rebounding slightly in 2011 (75%).

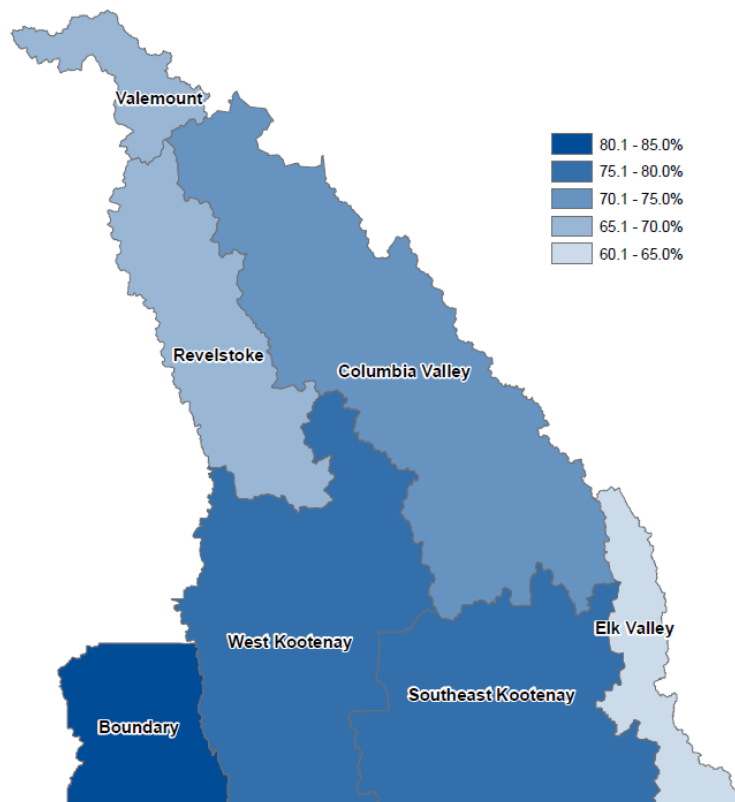


Figure 25: Single detached component of housing stock, 2011

Source: Statistics Canada, 2012b

RENTING HOUSEHOLDS

What does this measure & why is it important?

This indicator measures the percentage of households that rent the dwelling they live in. Results are reported by trading corridor. Data were acquired from the 2011 [National Household Survey](#). Some caution should be exercised when using these figures, as non-response rates for the National Household Survey sometimes exceeded 40%.

Home ownership is not a goal that all families aspire to, nor is it an option for lower-income households. In the same manner that populations require diversity in the structural housing stock, diversity in housing tenure options is also required.

What are the trends & current conditions?

Across the region, approximately 22% of households rent their home (Figure 26). This ratio is highest in Valemount (27%) and lowest in the Southeast Kootenay Corridor (20%). It is interesting to note that the three corridors with the lowest percentage of renting households (Boundary, Southeast Kootenay and West Kootenay) also had the highest percentage of single detached dwellings. All Basin Boundary corridors have a lower percentage of renting households than the BC average, 30%.

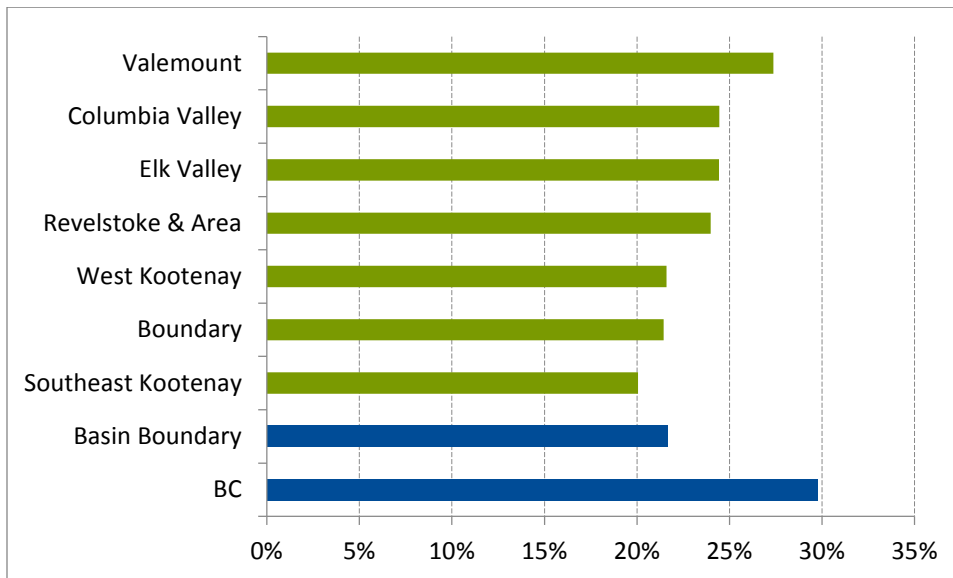


Figure 26: Percent of households that rent their home, 2011.

Source: Statistics Canada, 2013d

HOME OWNERSHIP AFFORDABILITY

What does this measure & why is it important?

This indicator measures the average home sale value in the Kootenay Development Region in relation to average before-tax household income. Data is current as of 2010, the most recent year for which income data are currently available. Home sale values are reported by [BC Stats](#), and are based on Multiple Listing Service sales. Income data were sourced from the [National Household Survey](#).

Home ownership is, by far, the most common housing tenure option for Basin Boundary residents (see above). Since home sale values tend to be more volatile than incomes, home ownership affordability is a persistent area of interest for most communities.

What are the trends & current conditions?

In the Kootenay Development Region (which includes the Regional Districts of Central Kootenay, Kootenay Boundary and East Kootenay,) the average home sale to household income ratio currently stands at 4.0, roughly the same as in 2006. This ratio is lower than the BC average, 6.5 (Table 5), however that statistic is heavily influenced by sales in the Lower Mainland, which are not representative of the remainder of BC (BC Stats, 2012e).

	Average Household Income	Average Home Sale Value	Ratio
Basin Boundary	\$69,046.62	\$273,723.00	4.0
BC	\$77,378.00	\$505,178.00	6.5

Table 5: Home sale to income ratio, 2010.

Source: BC Stats, 2012e; Statistics Canada, 2013d

In our region, average home sale values peaked in 2008 but have remained relatively constant since dropping back down in 2009. Different types of housing markets display various pricing trends, however. The condominium and attached housing markets show more volatility than the detached market (Figure 27).

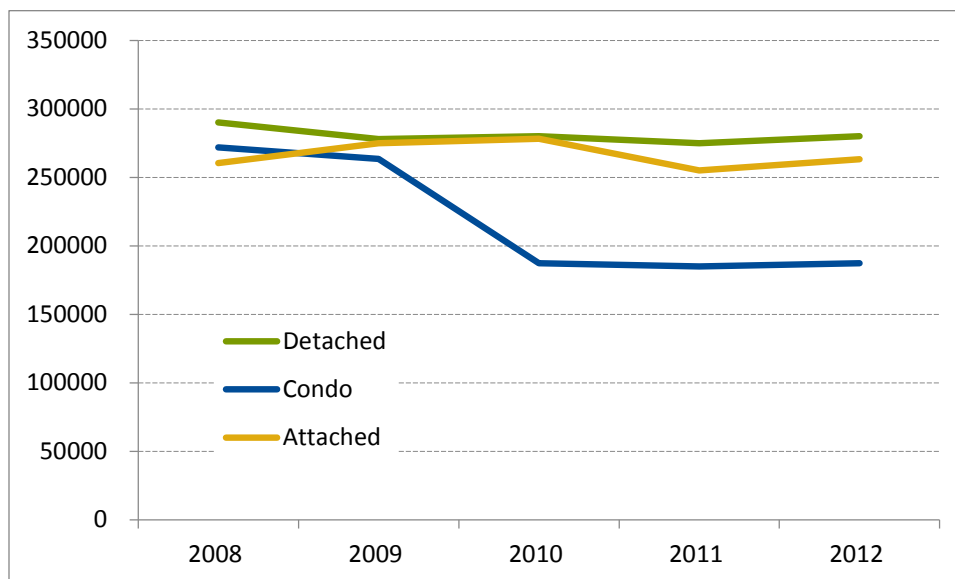


Figure 27: Average home sale values in the Kootenay region, 2008-2013

Source: Landcor, 2012; Landcor, 2011; Landcor, 2010

The discussion in this section provides interesting context to the results of the RDI’s 2013 poll of residents, which asked for residents’ agreement with the statement, “housing in my community is affordable”. Across the region, only 27% of respondents agreed.

ECONOMIC PERCEPTIONS

The following section highlights results from some of the economic questions included in the RDI’s 2013 poll of residents, and current statistics generated from the Basin Boundary Business Retention and Expansion Project.

- More households disagreed (35%) than agreed (27%) with the suggestion that their household is financially better off now as compared to six months ago. These results contrast employment rates which have been on the rise in this region for two years.
- Respondents’ predictions for future financial well-being were similar. Thirty-eight percent did not think their household would be better off in six months, and only 24% did.
- Perceptions around housing were similarly mixed. Twenty-seven percent of respondents believe that housing in their community is affordable, and 29% believe that there is adequate available housing in their community to support the needs of all residents.

These results support the general concern regarding housing issues in the Basin Boundary region.

- Respondents expressed great concern over job opportunities. Only 16% of residents agreed with the suggestion that there are sufficient job opportunities available in their community, while the majority (61%) disagreed.
- Perceptions around wages were more balanced, with 36% of respondents agreeing that their wage is sufficient, and 39% disagreeing. Notably, 72% of Basin Boundary businesses believe their wages are competitive with others in the region.
- Only 15% of residents feel that now is a good time for the average household to make a major purchase such as a car or house. These results suggest that consumer confidence is low in the region.
- The availability of broadband service is a concern for a sizable number of residents. Thirty seven percent reported that their household's use of the internet is limited by the quality of service available in their community.

THE SOCIAL RESEARCH PILLAR

Social structures lay the foundation for our interaction with the world. There are undeniable links between social issues like education, poverty and health and the overall well-being of residents and communities. Mirroring national and international trends in social indicator reporting, the RDI's social research themes include demographic characteristics, education levels, early childhood development, civic engagement, and wellness.

Careful analysis of social data can help us better understand the issues and trends that face residents and communities every day. Social indicators are valuable for identifying and anticipating trends and setting organizational, agency and program targets for excellence (Edmonton LIFE, 2002). The feedback derived from social indicators is assisting communities and policy makers in assessing the value of existing social strategies in order to inform effective planning and action for the future.

DEMOGRAPHICS

TOTAL POPULATION

What does this measure & why is it important?

This indicator measures the total number of residents in the Basin Boundary region. Data for this indicator were gathered from the [2011 Census](#).

Total population figures indicate the size of a community and the types of services that are likely to be available. Changes in total population over time signal potential shifts in community needs, give us a sense of where we are retaining and attracting residents to our rural communities, and help us understand how we measure up against other regions in BC.

What are the trends & current conditions?

According to the 2011 Census, a total of 161,741 people resided in the Basin Boundary region, representing 3.3% of the provincial population of 4.4 million people. The Basin Boundary population increased by 2.4% from 2006, while the provincial population grew by 7%.

The Kootenay Development Region (which includes the Regional Districts of Kootenay Boundary, Central Kootenay and East Kootenay) is the 5th largest in the province. There are substantial differences in population concentration and growth in local areas across the region. The largest proportion, about 40% of the population, lives in the West Kootenay corridor. Eighty-eight percent of the region's population lives in the combined areas of the West Kootenay, Southeast Kootenay, Columbia Valley and Elk Valley corridors.

At the community level, between 2006 and 2011, population decline was greatest in the Invermere & Canal Flats area followed by Revelstoke & Area. Population growth was greatest in Cranbrook & Area followed by Nelson & Area. The populations of Valemount & Area and Nakusp & Area remained fairly steady (Figure 28).

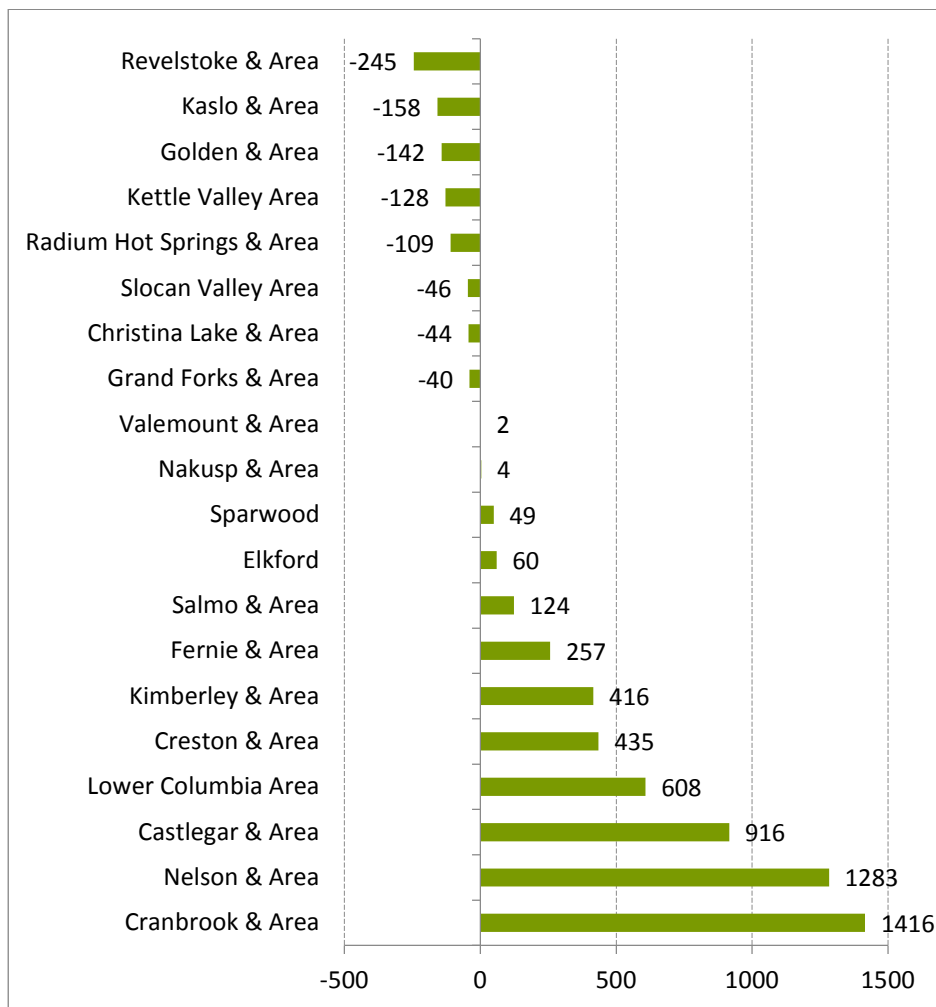


Figure 28: Population change by sub-corridor, 2006 – 2011
Source: Statistics Canada, 2012b

POPULATION BY AGE & GENDER

What does this measure & why is it important?

This indicator measures the total number of people in the region in five-year age groups, or ‘cohorts’, reported by gender. Data for this indicator were gathered from the [2011 Census](#) and [population estimates](#) produced by BC Stats.

As we age our needs change. Young people need family care, schooling and recreation services, while working people are concerned about employment opportunities and childcare. In addition, some retirees need community supports to maintain health and live independently at home. Substantial differences between the sizes of age groups may signal a need to significantly change service priorities and economic opportunities.

What are the trends & current conditions?

The Basin Boundary population pyramid shows fewer children under 10 years old than in the 10 to 20 year old age group in 2011. This may explain the declining enrolment trend in six of the seven school districts in the region (see the Education and Learning section for more information). The relatively small size of the young adult cohort aged 20-24 suggests a youth

'out-migration' trend possibly explained by young adults seeking employment or educational experiences outside of the region. From 25-49 years the cohort sizes rebound incrementally. The relatively large number of 'boomers' aged 50 to 65 who have retired or will be retiring over the next 10-15 years is shown, followed by much smaller, older cohorts. There are a relatively even number of men and women across age cohorts, with a higher number of women 85 year and older (Figure 29).

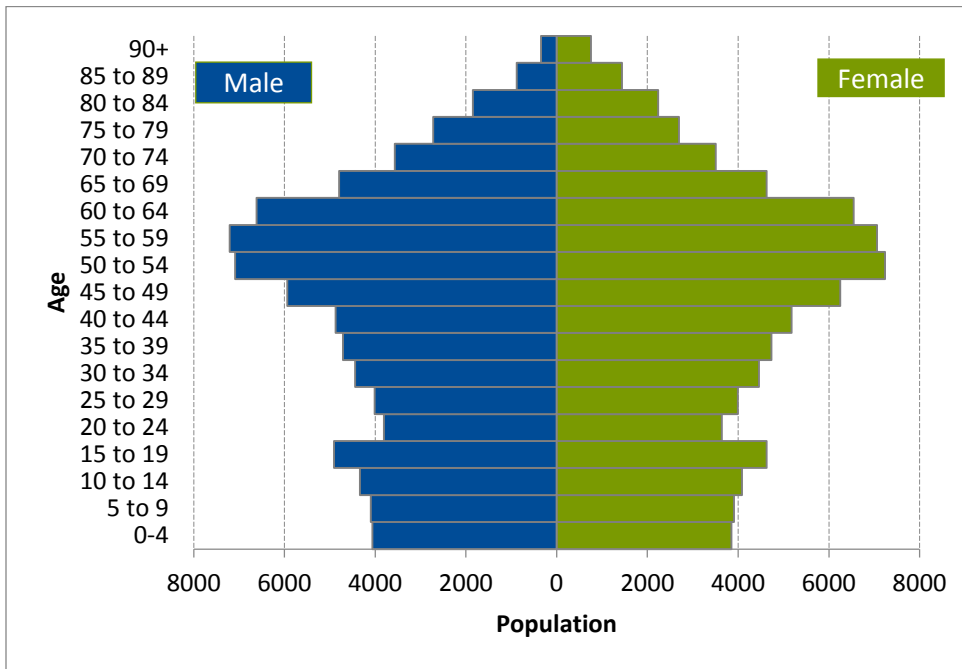


Figure 29: Basin Boundary population pyramid, 2011

Source: Statistics Canada, 2012b

In comparison to other Development Regions in the province, the Kootenay Development Region had the oldest median age at nearly 47 years. Median ages of other Development Regions include the Northeast (34.2), Nechako (39.5), Lower Mainland (40.2), North Coast (40.2), Cariboo (41.6), Thompson Okanagan (46.4), and Vancouver Island (46.5) (Government of British Columbia, 2013).

According to the 2011 Census, there was nearly an 18-year difference in median age between the Kettle Valley Area (55.9) and Elkford (38.0) (Figure 30). For every three residents aged 19 and under in the Basin, there were four residents aged 60+.

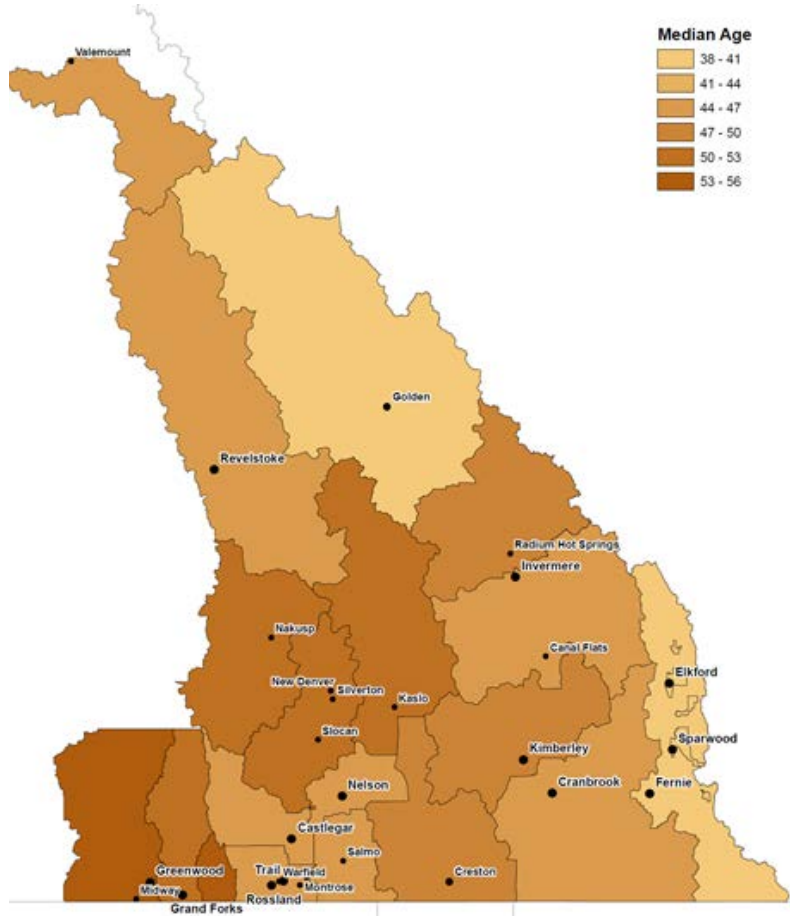


Figure 30: Median age of Basin Boundary communities, 2011

Source: Statistics Canada, 2012b

DEPENDENCY

What does this measure and why is this important?

This indicator compares the percentage of residents who are not likely in the workforce to those who are in the workforce. Data for this indicator were gathered from the 2011 [Census of Canada](#).

Both child (under 15 years) and senior (over 65 years) dependencies are discussed below. The workforce includes residents aged 15-64. The dependency level is calculated by dividing the dependent population by the workforce population. For example, in a population with 1,000 children, 600 elders and 3,000 people of working age, the child dependency rate would be 33% and the senior dependency rate would be 20%, with a total of 53% of the population 'dependent' on the workforce.

Many of the supports provided to children and seniors such as personal care, parenting, education, playgrounds, health care, activity programs, and facilities are supported by personal time and tax dollars contributed by those who are in the workforce. As dependency increases the greater the challenge may be for the workforce to maintain these supports and services.

What are the trends & current conditions?

Creston & Area has the highest senior dependency ratio and combined senior/child dependency ratio at almost 71%. This means that for every ten residents in the community, seven are dependent and three are in the workforce. In Elkford, Fernie, Golden and Revelstoke, about four out of ten residents are dependent, and about six out of ten residents are in the workforce. The provincial dependency ratio is 45% (Figure 31).

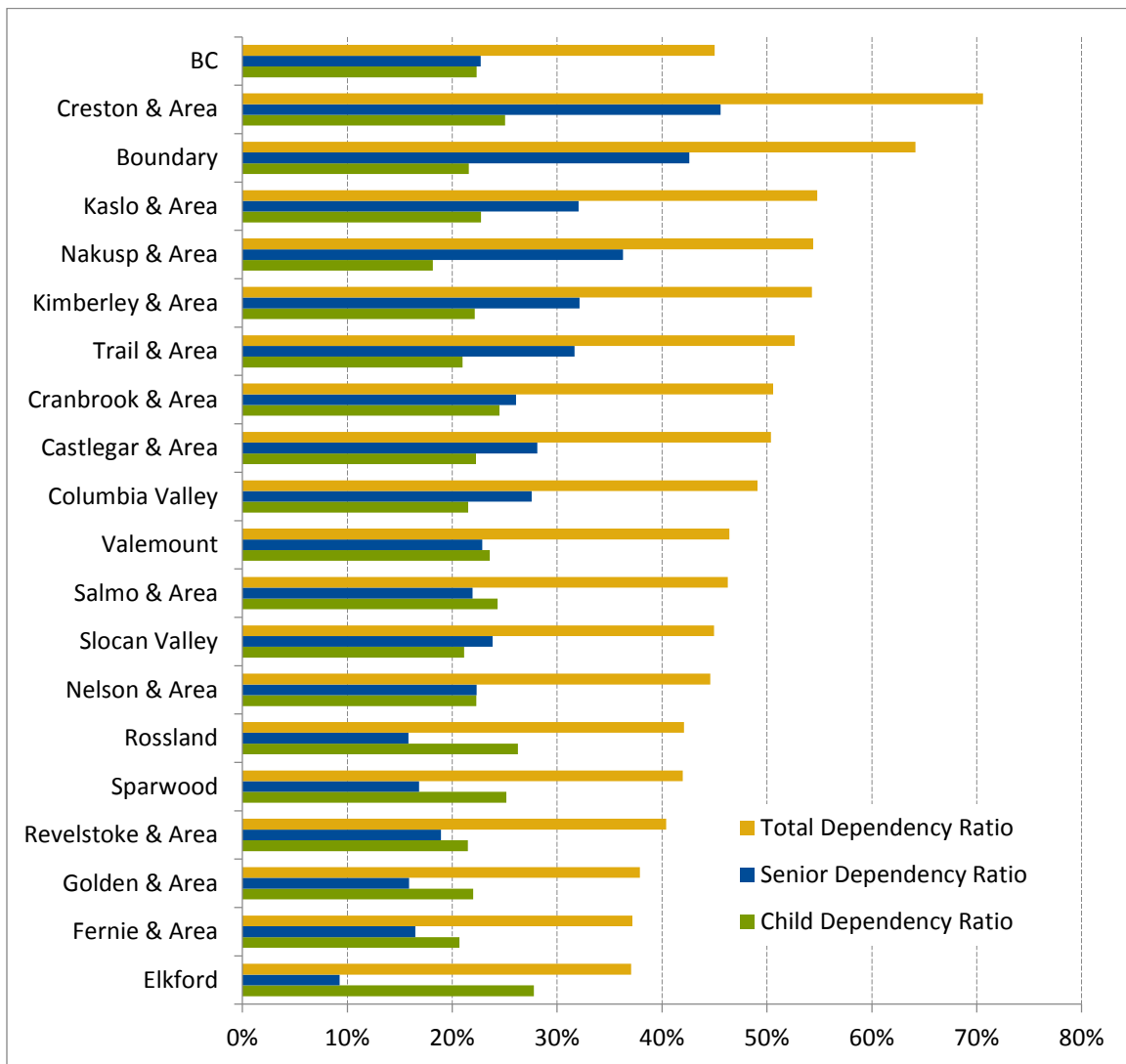


Figure 31: Dependency ratios by community, 2011

Source: Statistics Canada, 2012b

It is interesting to note that there was wide variation in the type of dependents in each area of the region. For example, Creston and Area had the highest dependency ratio for seniors (46%) and Elkford had the lowest at 9%. Conversely, Elkford had the highest child dependency ratio, likely related to the fact that Elkford also had the lowest median age in the region, suggesting that many Elkford residents are families raising children. The high dependency ratios in some Basin Boundary communities are better understood in the context of the RDI's 2013 poll of residents, which indicated that only 50% of residents feel their community is supportive of vulnerable residents such as elders, young children, and people with disabilities.

Of the eight Development Regions in the province, the Kootenay Development Region saw the largest drop in overall dependency between 2006 and 2011 (-3.6%). This was followed by the Northeast (-1.6%), and the Mainland / Southwest (-1.4%).

WELLNESS

LIFE EXPECTANCY

What does this measure & why is it important?

This indicator reports on the number of years a person is expected to live, starting from birth, based on mortality statistics for a given period of time for a defined area. Data for this indicator were gathered from BC Stats' collection of [vital statistics](#).

Life expectancy measures quantity rather than quality of life and is a widely used indicator of the health of a population. The trend to longer life expectancy continues in Canada, and much of the developing world. While a longer life does not automatically mean a better life, it is generally understood to be an important and positive trend. This indicator also informs us about trends, such as more citizens living to older ages. Changes in life expectancy affect social and other community services.

What are the trends & current conditions?

According to 2011 Statistics Canada data, life expectancy for the Kootenay Development Region was 80 years, one year less than the provincial average. There was a five year difference across Basin Boundary Local Health Areas, with the lowest life expectancy seen in Grand Forks (79) and the highest in Windermere (84) (Figure 32). Provincially, the Northwest Health Services Area had the lowest life expectancy at 78 years and Richmond had the highest at 86 years. Of all BC Development Regions, the Kootenay Development Region ranked third in life expectancy behind the Mainland / Southwest (81) and Vancouver Island (81), the same as Thompson-Okanagan (80), and ahead of Northeast (79), Nechako (79), Cariboo (78), and the North Coast (78).

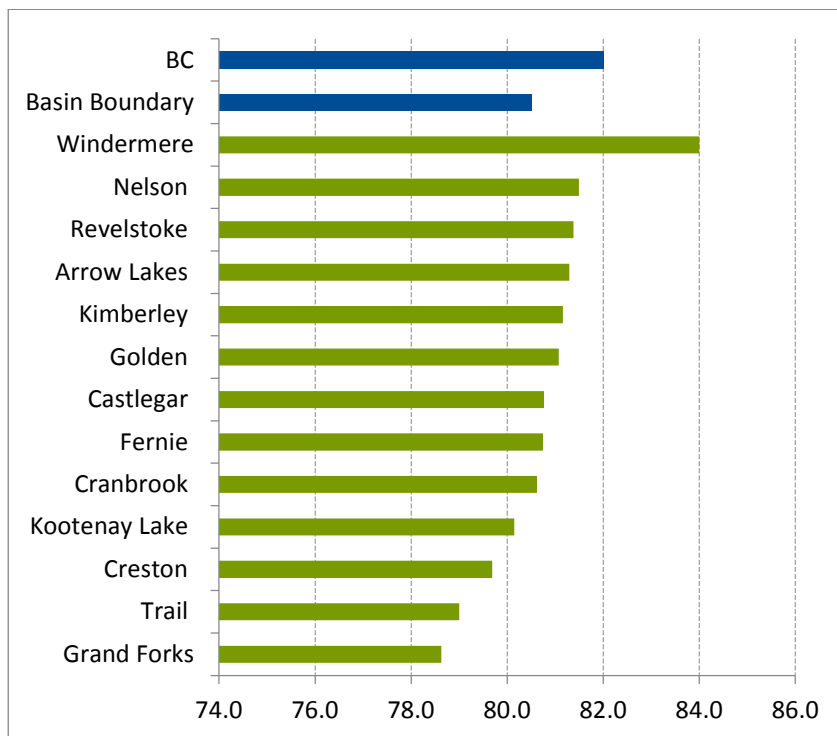


Figure 32: Life expectancy by Local Health Area, 2011

Source: BC Stats, 2012f

Between 2002-2006 and 2007-2011 the life expectancy of residents in the region increased by 0.7%, less than the provincial average of 1.5%. The Kootenay Development Region ranked sixth in life expectancy increases behind the Mainland / Southwest (1.8%), Thompson-Okanagan (1.7%), Vancouver Island (1.2%), Cariboo (1.0%), and Nechako (0.9%).

MORTALITY RATIOS & CAUSES

What does this measure & why is it important?

This indicator measures mortality ratios for Local Health Areas (LHAs) in the Basin Boundary region. Data were acquired from the BC Vital Statistics Agency's 2011 [annual report](#).

Mortality ratios represent the ratio of the number of actual deaths to the number of expected deaths of residents in a geographic area based on provincial age-specific mortality rates. A mortality ratio greater than one indicates that more people died than expected while a mortality ratio less than one indicates that fewer people died than expected. Mortality ratios are useful in identifying health service priorities and opportunities to improve the health of individuals and the population as a whole.

The Standardized Mortality Ratio (SMR) takes into account all causes of death and is a good measure for comparing mortality causes for geographic areas, particularly with a relatively small number of deaths. The alcohol related SMR considers alcohol related causes of death and the motor vehicle SMR considers causes of death related to motor vehicles.

What are the trends & current conditions?

Between 2006 and 2010, the region as a whole had a slightly higher SMR (1.06) than the provincial average (1.0). The SMR for LHAs in the region varied from a low of 0.76 in the

Windermere area to a high of 1.21 in the Castlegar area. Two of the 14 LHAs in the region had SMRs lower than 1.0 (Windermere and Kettle Valley) and the remainder had SMRs greater than 1.0 (Figure 33).

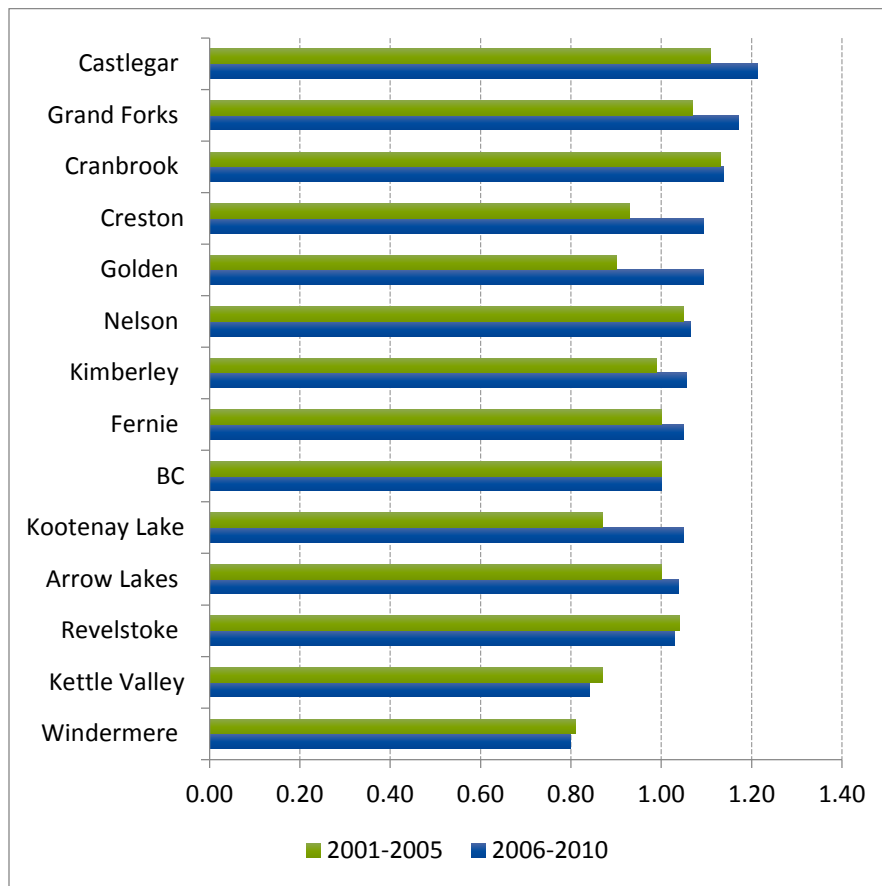


Figure 33: Standardized mortality ratio by Local Health Area
Source: BC Vital Statistics Agency, 2012

The Golden LHA saw the largest increase in its SMR between 2001-2005 and 2006-2010 at 21.5%, followed by Kootenay Lake at 20.5% and Creston at 17.6%. Reductions in SMRs during this same time period were most significant in Kettle Valley (-3.3%), followed by Windermere (-1.3%) and Revelstoke (-1.1%).

From 2006 to 2010, the region experienced a higher ratio than expected for both motor vehicle accident deaths (1.77) and alcohol related deaths (1.32) (Figure 34). Three of our 14 LHAs experienced lower than expected motor vehicle accident deaths, including Arrow Lakes, Golden, and Revelstoke. This was an improvement from the ratios reported in the 2008 State of the Basin report, when no LHAs experienced a ratio of less than one. A slight improvement was also observed with the Creston LHA reporting fewer alcohol related deaths than expected from 2006 to 2010.

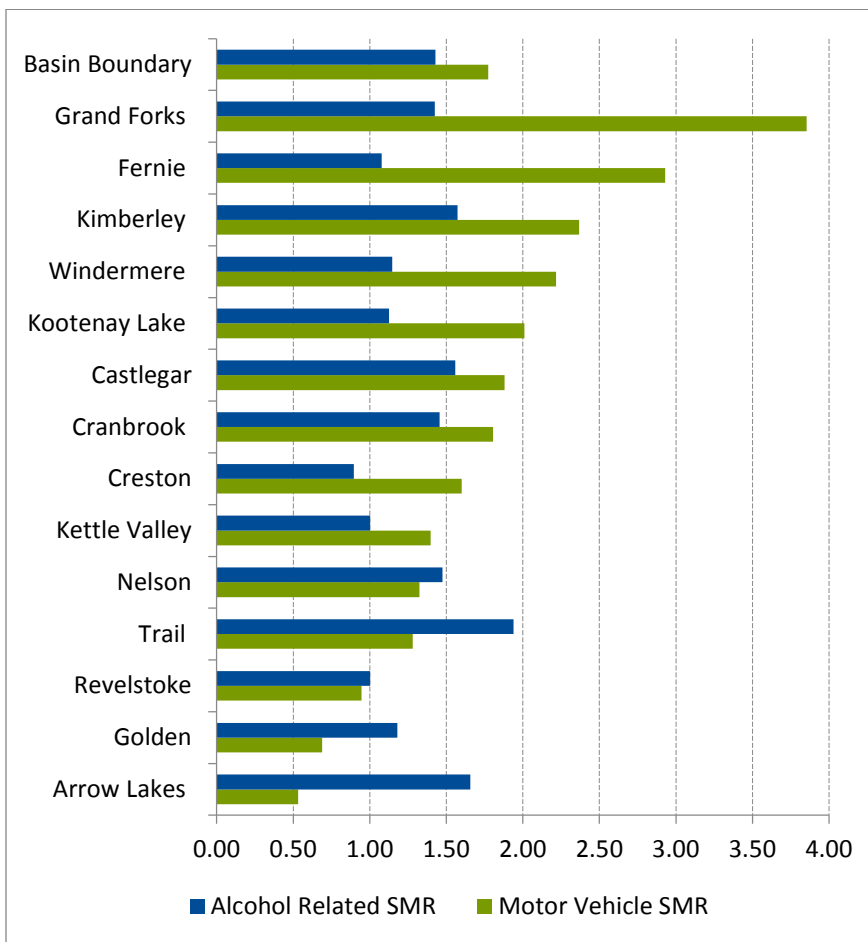


Figure 34: Alcohol related and motor vehicle SMRs by Local Health Area, 2006 – 2010
 Source: BC Vital Statistics Agency, 2012

EDUCATION & LEARNING

EARLY CHILDHOOD VULNERABILITY

What does this measure & why is it important?

The Early Development Instrument (EDI) is administered by kindergarten teachers, and assesses the developmental readiness of a group of children. Children are considered vulnerable when some aspect of their development (physical, social/emotional or intellectual) is delayed at kindergarten entry. Examining EDI results over time allows us to assess trends in the percentage of kindergarten children in the region’s school districts who are vulnerable (Human Early Learning Partnership, 2013). Data for this indicator were acquired from the [University of British Columbia Human Early Learning Partnership](#).

The early years are crucial in influencing a range of health and social outcomes throughout one’s life. Research shows that many challenges in adult society – mental health problems, obesity, heart disease, criminality, competence in literacy and numeracy – have their roots in early childhood. Understanding where young children live who are most vulnerable allows us to allocate our resources and adjust policies to most effectively support all children in their early years.

What are the trends & current conditions?

Between 2006 and 2011 the number of kindergarten students who were vulnerable on at least one aspect of their development decreased in three of the seven school districts in the region (Revelstoke, Southeast Kootenay, and Kootenay-Columbia) (Figure 35). This trend countered the provincial upward trend in vulnerability. Currently, all seven school districts⁶ in the region have a lower percentage of vulnerable kindergarten students than the provincial average (31%), including Revelstoke (10%), Arrow Lakes (23%), Kootenay Lake (24%), Rocky Mountain (27%), Southeast Kootenay (28%), and Boundary (29%).

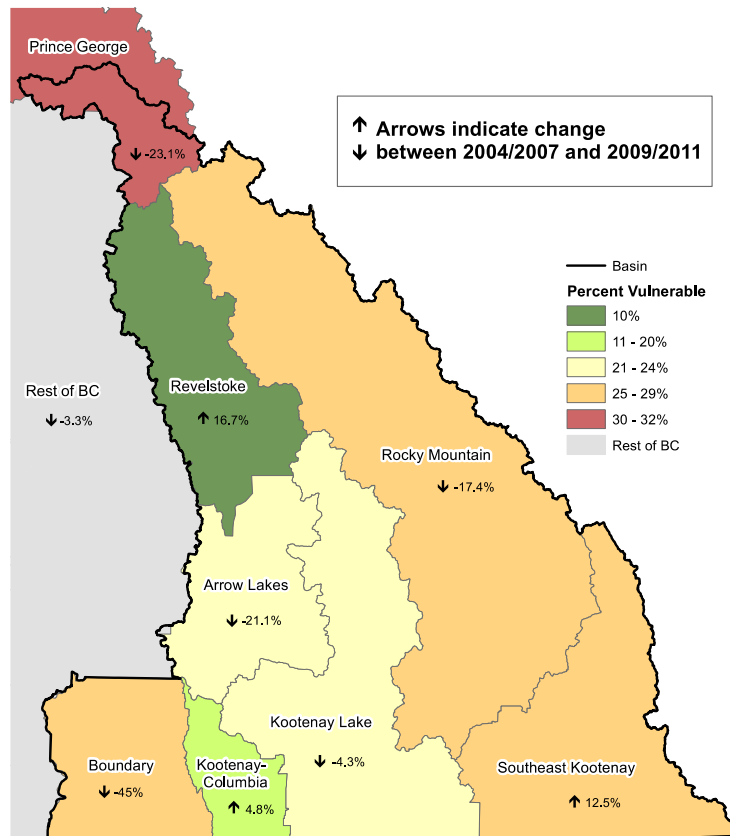


Figure 35: 2004 - 2011 change in early childhood vulnerability, by School District
Source: Human Early Learning Partnership, 2011.

HIGH SCHOOL COMPLETION

What does this measure & why is it important?

This indicator measures the percentage of Grade 8 students in public schools who complete high school within six years. Results are reported for the last six years by school district. Data for this indicator were acquired from the BC Ministry of Education's [provincial reports](#).

High school completion rates indicate how successful our schools, families and communities are in supporting young people in achieving high school graduation. High school graduation is now

⁶ The Prince George School District 'Neighbourhood' of Upper Fraser was used to represent Valemount. This neighbourhood experienced an increase (23.1%) in vulnerable kindergarten students and is currently 1% above the provincial average.

the minimum education level for most employment options and thus an important foundation for future employment success and well-being.

What are the trends & current conditions?

Between 2006 and 2012 the high school completion rate increased in three of seven Basin Boundary school districts, with two out-pacing the provincial rate of increase (2.1%) (Table 6). Most notable was the Boundary School District with nearly a 16% increase. In 2011-2012, three of the region’s seven school districts experienced better completion rates than the provincial average (82%). Again, the Boundary School District far exceeded the provincial average (94%), followed by Arrow Lakes (92%) and Revelstoke (88%). There are 109 public schools in the Basin Boundary region, 14 independent schools and 4 colleges, each with multiple campuses.

High School Completion Rate (%)							
District	06-07	07-08	08-09	09-10	10-11	11-12	% Change
Southeast Kootenay	81.5	84.2	74.2	80.8	75.0	76.9	-5.6%
Kootenay Lake	80.3	75.5	77.8	74.0	76.0	78.5	-2.2%
Kootenay-Columbia	82.2	78.7	82.8	83.9	80.1	77.4	-5.8%
Rocky Mountain	82	85.7	78.0	79.3	81.3	78.8	-3.9%
Revelstoke	82.6	80.2	88.2	97.9	87.4	88.4	7.0%
Arrow Lakes	90.9	75.1	84.5	88.1	93.7	92.2	1.4%
Boundary	81.1	84	83.8	85.4	94.2	93.7	15.5%
BC Public Schools	80.1	78.8	79.2	79.7	81.0	81.8	2.1%

Table 6: 6-year high school completion rate by School District

Source: BC Ministry of Education, 2013

STUDENT ENROLMENT

What does this measure & why is it important?

This indicator measures the number of all adults and school-age persons who are working towards graduation. Registered homeschooled children are not included. Data for this indicator were acquired from the BC Ministry of Education’s [provincial reports](#).

Observing trends in the numbers of students enrolled in BC public schools provides important information about changing demography and movement of people in and out of the region. It is important information for school districts to incorporate into longer term planning.

What are the trends & current conditions?

Since 2008, there has been a downward trend in student enrolment in six of seven Basin Boundary school districts (Table 7). The Kootenay Lake School District has seen a slight increase in enrolment since 2008 (91 students).

Student Enrolment (# of students)						
District	08-09	09-10	10-11	11-12	12-13	% Change 2008-2013
Arrow Lakes	601	580	562	519	504	-16.1%
Boundary	1,473	1,484	1,424	1,405	1,317	-10.6%
Kootenay-Columbia	4,279	4,112	4,045	3,968	3,870	-9.6%
Revelstoke	1,114	1,057	1,027	1,036	1,022	-8.3%
Rocky Mountain	3,359	3,320	3,274	3,178	3,086	-8.1%
Southeast Kootenay	5,543	5,378	5,365	5,331	5,259	-5.1%
Kootenay Lake	5,367	5,460	5,471	5,217	5,458	1.7%

Table 7: Student enrolment by School District
Source: BC Ministry of Education, 2013

CIVIC ENGAGEMENT & SAFETY

VOTER TURNOUT

What does this measure & why is it important?

This indicator measures the percent of eligible Basin Boundary voters who participate in local government elections. Data for this indicator were gathered from CivicInfoBC's [compendium](#) of local election results.

Voter turnout is one indicator of citizens' level of engagement with their community. According to the Tamarack Institute (2010), community engagement can be defined as "citizens working collaboratively, through inspired action and learning, to create and realize bold visions for their common future" (p. 3). Other important citizen engagement issues include rates of volunteerism, and participation in community problem solving and priority setting.

What are the trends & current conditions?

In the 2011 municipal election, Greenwood had the highest voter turnout in the province at almost 70%. Golden had the lowest turnout of Basin Boundary communities, at 25%. Most Basin Boundary jurisdictions had higher voter turnout than the BC average (Figure 36).

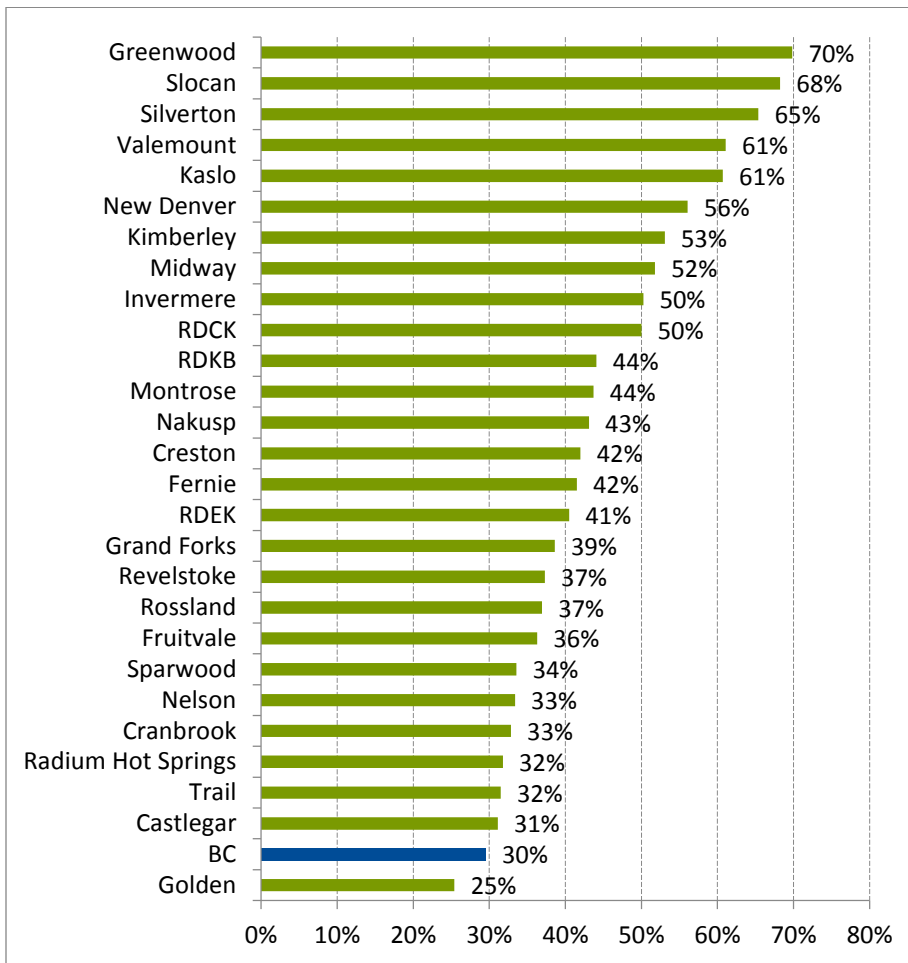


Figure 36: Voter turnout, 2011 local government elections

Source: CivicInfoBC, 2011

In Basin Boundary Regional Districts, twice as many voters cast ballots for BC municipal elections in 2011 as compared to 2008 (Table 8). Voter turnout in the Regional District of Central Kootenay increased from 24.4% in 2008 to 50.0% in 2011, voter turnout in the Regional District of Kootenay Boundary increased from just 22% in 2008 to 44.1% in 2011, and the East Kootenay Regional District saw an increase in voter turnout from 24.2% in 2008 to 40.5% in 2011.

Regional District	Average Voter Turnout	
	2008	2011
Central Kootenay	24.4%	50.0%
Kootenay Boundary	22.0%	44.1%
East Kootenay	24.2%	40.5%

Table 8: Average voter turnout for Basin Boundary Regional Districts, 2008 and 2011 local government elections

Source: CivicInfoBC, 2011

SERIOUS CRIME

What does this measure & why is it important?

This indicator measures the number of reported property and violent crime offences for every 1,000 people. Property crimes include motor vehicle theft, breaking and entering, fraud, theft and possession of stolen goods. Violent crime includes homicide, attempted murder, sexual offences, assault, robbery and abduction. Only crimes reported to or by the police are included. Data for this indicator were sourced from BC Stats' [Socio-Economic Indices](#).

Crime rates provide an indicator of how safe our communities are. They help measure the effectiveness of law enforcement and community engagement initiatives and inform decision-making about law enforcement policies. Crime rates can also be a contributing factor to perceptions of safety in communities.

What are the trends & current conditions?

The average serious crime rate in the 2009-2011 reporting period was 7.0 incidents per 1,000 people, down from the 2008-2010 average rate of 7.6. The Basin Boundary average was well below the provincial average of 11.1. Lowest total serious crime rates were reported in the Kootenay Lake (3.9) and Nelson (4.5) Local Health Areas (LHAs). Two of the region's LHAs, Kettle Valley and Windermere, reported total serious crime rates above the provincial average, at 14.6 and 12.3, respectively (Figure 37).

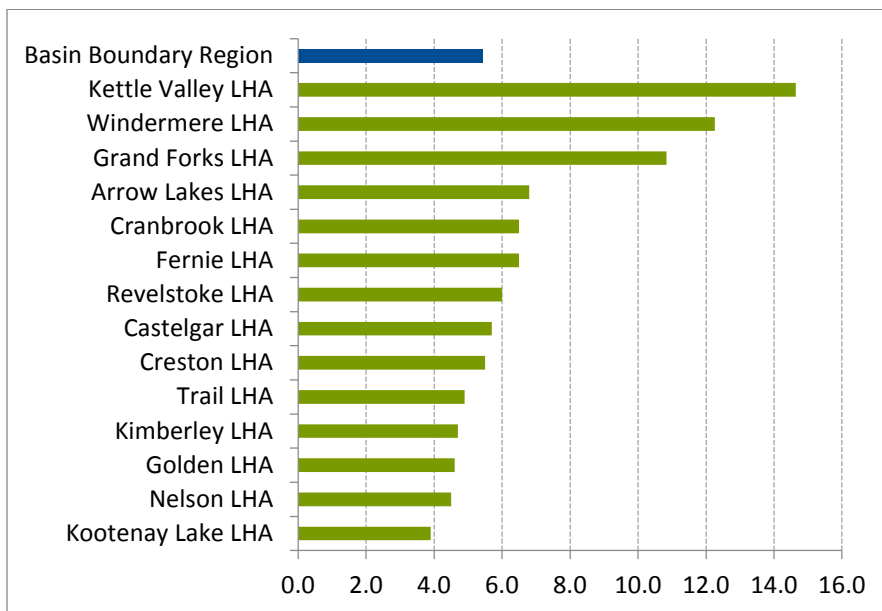


Figure 37: Total serious crime rate by Local Health Area, average of the years 2009 – 2011

Source: BC Stats, 2011

Property crimes made up the majority of serious crimes, although the average property crime rate in the region (5.5) was well below the provincial average of 7.8. Three LHAs had a higher rate of property crimes than the provincial rate of 7.8, including the Kettle Valley (12.2), Windermere (10.6), and Grand Forks (9.4). The lowest property crime rates were reported in Nelson (3.0), Kootenay Lake (3.0), Trail (3.4) and Kimberley (3.7) LHAs.

The region's violent crime rate (1.4) was also well below the provincial average of 3.3. Lowest violent crime rates were reported in Golden (0.8), Kimberley (0.9) and Kootenay Lake (1.0) LHAs. Though the highest violent crime rates were reported in Kettle Valley (2.4) and Cranbrook (1.9), these figures were still below the provincial average.

Based on BC Stats' Composite Index of Crime, 11 of the region's 14 LHAs rank in the top ten safest LHAs in the province, including Kootenay Lake (3rd), Golden (6th), Kimberley (7th), Nelson (8th), and Trail (9th) (BC Stats, 2011).

SOCIAL PERCEPTIONS

The following section highlights results from some of the social questions included in the RDI's 2013 poll of residents.

- Eighty-nine percent of residents feel safe in their community. This may be related to the fact that our region's serious crime rate is well below the provincial average.
- Eighty-six percent of residents reported possessing a positive sense of well-being. It is possible that these Basin residents consider their health in broad terms (including physical, mental and social wellness), and not merely the absence of disease. Sixty-nine percent of residents report being active and in good physical shape.
- Sixty-nine percent of residents report feeling a strong sense of belonging to their community. This is demonstrated by the fact that 34% have given unpaid help to social groups, clubs or organizations in their community.
- Fifty-five percent of residents feel they have a range of lifelong learning opportunities available.
- Fifty-four percent of residents agree that their household can afford necessities and still have money left over for extras. Twenty-one percent of residents disagreed with this suggestion. Income is a key determinant of one's health, and organizations like the Golden Food Bank Society and the Creston Valley Gleaners Society are working hard to support residents living in poverty.
- Fifty percent of residents feel their community is supportive of vulnerable residents such as elders, young children, and people with disabilities. With 15% of residents feeling their community is not supportive of vulnerable residents, and 47% reporting not giving unpaid help to any organizations in their community, there appears to be a case for efforts to strengthen social networks.

THE CULTURAL RESEARCH PILLAR

Culture is multi-faceted and dynamic, embracing a diversity of aspects that describe and shape our way of life and quality of life. The RDI supports a broad and inclusive definition of culture, and recognizes cultural well-being as both:

- the vitality that individuals and communities enjoy through participation in recreation and creative and cultural activities, and
- the freedom to retain, interpret, and express their arts, history, heritage, and traditions.

The cultural pillar includes four main themes: arts, culture, heritage, and recreation.

The year 2013 marks the first that the State of the Basin research framework has included a distinct cultural pillar. The subject of culture is now integral to RDI's research activities, but building a research program from the ground up takes time. For that reason, at this stage, RDI's cultural indicators are limited in scope, providing just a small sample of the type of data our region's residents may find useful. The RDI research team will continue to engage the cultural sector to develop a more comprehensive set of indicators that measure the issues that are most important to our region.

The cultural component of this report is organized differently as compared to the rest of this document. It is comprised of two sections. The first describes the results of preliminary analyses of cultural data and includes an expanded discussion of relevant results from the RDI's 2013 poll of residents. The second section provides a description of the RDI's efforts to establish a baseline understanding of our region's cultural landscape through a cultural asset mapping initiative.

PRELIMINARY INDICATORS

LANGUAGE SPOKEN MOST OFTEN AT HOME

What does this measure & why is it important?

This indicator measures the percentage of Basin Boundary residents that speak English, French or "other" languages most often at home. "Other" languages include Aboriginal languages and selected non-Aboriginal languages. This indicator also measures the number of languages that are spoken across the region. Data for this indicator were gathered from the [2011 Census of Canada](#).

These data provide insight into the cultural diversity of our region. Linguists and anthropologists around the world are studying the rapid demise of languages as it is a concern regarding cultural identity in an increasingly globalized culture (Crystal, 2000). In 2001 the United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted the Universal Declaration on Cultural Diversity. This document discusses cultural diversity as a "common heritage of humanity" (UNESCO, 2002, p. 11) and considers its safeguarding to be a concrete and ethical imperative, asserting cultural diversity "as necessary for humankind as biodiversity is for nature" (*Ibid*, p. 11). While cultural diversity is difficult to quantify, a good indication is thought to be the count of the number of different languages spoken in a region (Crystal, 2000).

What are the trends & current conditions?

The majority (96.7%) of Basin Boundary residents speak English most often at home. The proportion of Basin Boundary residents speaking French most often at home (0.5%) is similar to British Columbia (0.4%), but is much lower than Canada (20.6%). Our region has a much lower percentage of people who speak other languages most often at home—only 2.9% compared to BC (19.1%) and Canada (14.6%) (Figure 38). This is an indication that our region is less culturally diverse than BC or Canada. This is likely related to the fact that there are no large cities in our region which tend to support a higher diversity of language and culture.

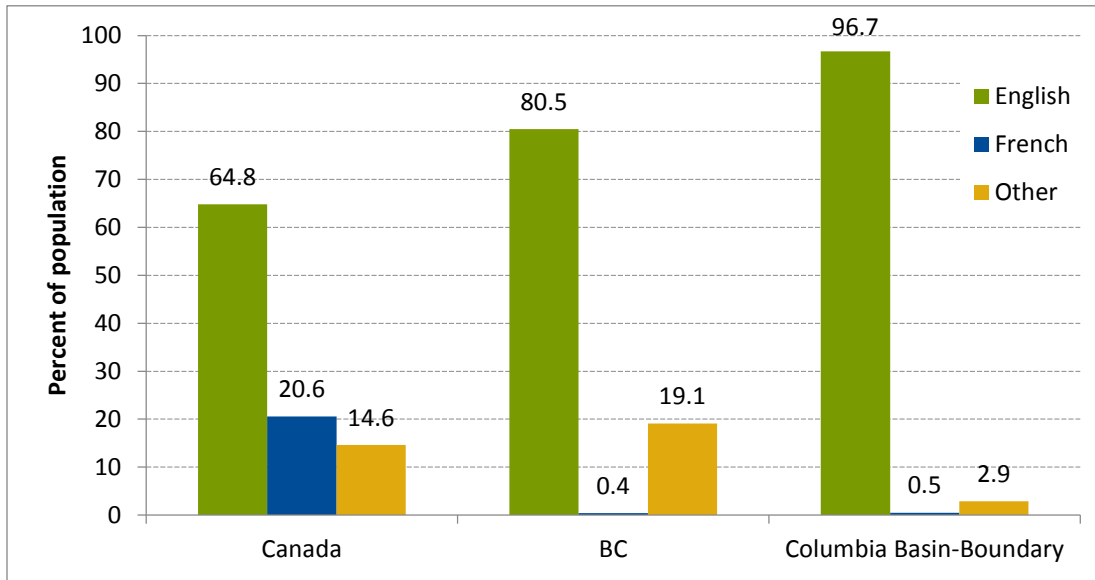


Figure 38: Language spoken most often at home
Source: Statistics Canada, 2012b

Census data indicates that there are at least 60 different languages spoken most often at home in our region. These include languages such as Afrikaans, Cantonese, Chinese, Croatian, Czech, Danish, Dutch, German, Hungarian, Italian, Japanese, Korean, Panjabi, Polish, Russian, Spanish, Tagalog, and Ukrainian. Higher numbers of people who speak other languages are generally found in the larger communities, such as Castlegar, Nelson, Cranbrook, Revelstoke, Golden, and Trail. The communities of Rossland, Revelstoke, and Nelson are also home to most of our region’s French speakers. There are also Aboriginal languages spoken across our region which are not explicitly captured in the census form.

Language, as well as religion and traditional practice, is an indicator of cultural diversity that could be further investigated for our region, and compared to other rural regions across Canada. Investigating cultural identity is another possibility, especially given the strong sense of belonging expressed by residents (see Social Perceptions above) and the percentage of people who stated the importance of our “culture” as a reason to live in this region (see Cultural Perceptions below).

GOVERNMENT SPENDING ON PARKS, RECREATION & CULTURE

What does this measure & why is it important?

This indicator measures the percentage of total municipal spending dedicated to parks, recreation and culture. Data were gathered from the Ministry of Community, Sport and Cultural Development's [Local Government Statistics](#).

Spending is important because it provides an indication of the financial resources that are dedicated to supporting the cultural amenities in a community or region. With adequate resourcing, cultural initiatives are more likely to succeed. The cultural sector has been identified as a driver of economic prosperity, including the creation of new jobs, as well as a means to attract new residents, tourists, and investors (Stanborough, 2011). Research also suggests that investments in culture contribute to the development of a healthy 'creative economy', and can increase the chances of success of an economic development strategy (Singh, 2006).

What are the trends & current conditions?

The trend over the past 27 years is similar in our region as compared to all municipalities in BC (Figure 39). The average of total spending for Basin Boundary local governments from 1985 to 2011 was 11.2% while the average for all BC municipalities was 11.5%. Municipal spending on parks, recreation and culture has increased over time, peaking in 2008 (16.5% for all BC and 15.3% for Basin Boundary municipalities). This may be related to a greater interest in spending on cultural amenities or possibly increasing costs to maintain assets and activities. Increased spending at the municipal level may also be related to a decrease in federal and/or provincial funding.

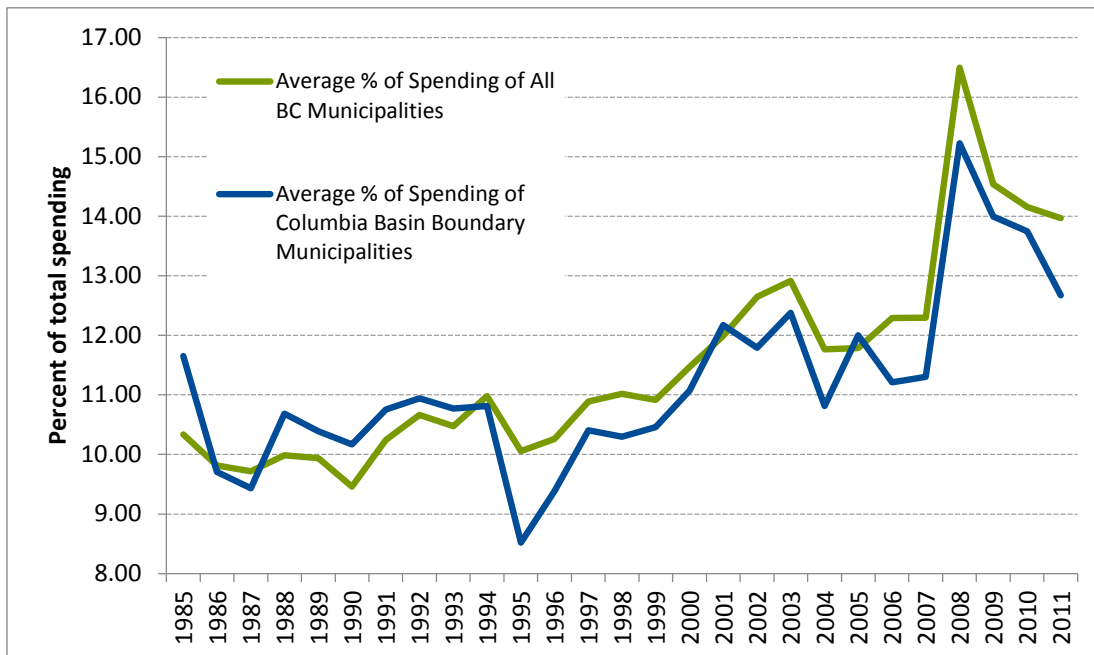


Figure 39: Municipal spending on parks, recreation and culture, 1985-2011

Source: BC Ministry of Community, Sport & Cultural Development, 2013

Several communities in our region show above average spending on parks, recreation and culture, including the communities of Elkford, Kimberley, Midway, Nakusp, Sparwood, Trail, and Valemount, but this trend is not consistent over time. Some communities with consistently

higher spending may have more parks, recreational or cultural facilities, which require more funding to maintain. In some years, communities may spend more because of capital projects or cultural developments, while in other years there may be different needs and priorities. It is important to note that each community is unique and different variables influence municipal spending on parks, recreation, and culture.

CULTURAL PERCEPTIONS

Results from the RDI's 2013 poll of residents offer insight into the views of residents regarding cultural well-being, and also trigger a variety of intriguing potential future research questions, some of which are discussed below. This poll is a starting place for building an understanding of perceptions, and may prove useful as RDI further develops the cultural research pillar.

Recreation

Results of the 2013 poll of residents clearly indicate that recreation is an important part of Basin Boundary culture. The vast majority (92%) agreed that spending time outside is an important part of their quality of life (Figure 40).

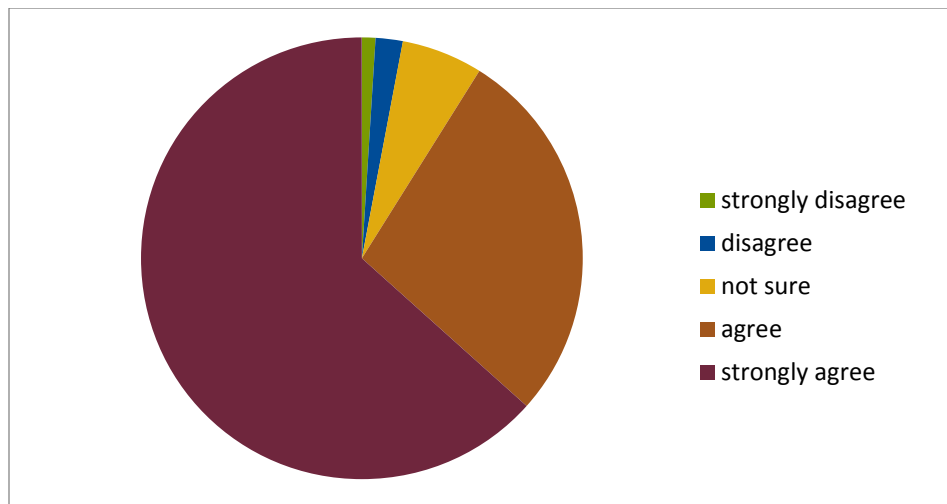


Figure 40: Residents' agreement with the statement, "spending time outside is an important part of my quality of life"

The poll also asked about accessibility of outdoor recreation opportunities. The majority of respondents (87%) agreed that outdoor recreation experiences and opportunities are accessible.

The combination of these two questions highlights a strong positive sense of well-being with respect to outdoor recreation. This positive perception may also associate with a cultural identity of "mountain culture". Investigating this notion of mountain culture and connection to place could prove a fruitful research direction for the RDI. What are the traits of a mountain culture and how does it flourish? How does a strong sense of place in our region contribute to the resiliency of our rural communities? Researchers in other regions are pursuing these questions and recent investigations show that sense of place has a strong connection to economic and community development (Loflin, 2013).

Arts, Culture & Heritage

The majority (61%) of residents agreed that arts and cultural activities are important to quality of life in their community, 9% disagreed and 29% weren't sure (Figure 41).

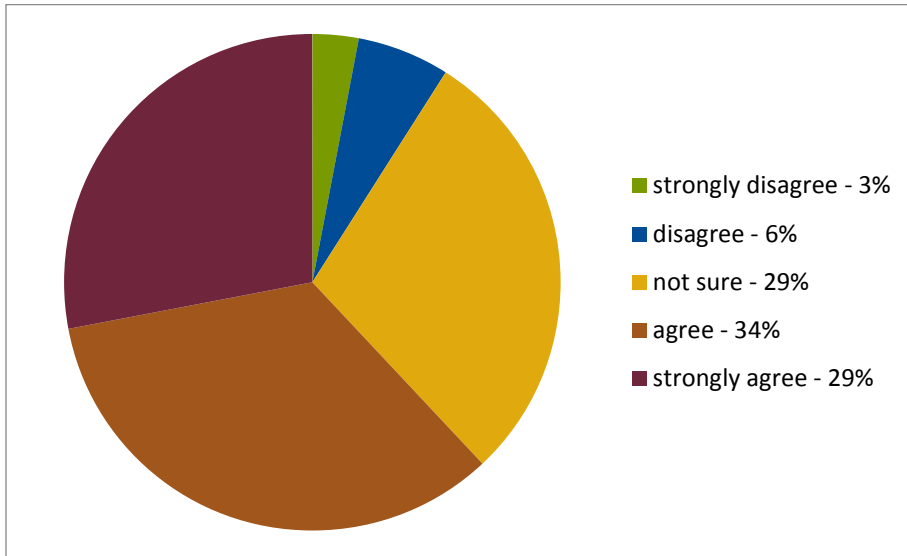


Figure 41: Residents' agreement with the statement, "arts and cultural activities are important to quality of life in my community"

It is interesting to note that almost one third expressed no clear opinion on whether arts and cultural activities are important to quality of life in their community. There are several potential reasons for this finding:

- respondents do not participate in activities, and thus are uncertain of their importance,
- residents may not realize or have not reflected on the importance of cultural activities, or
- respondents had a difficult time making judgement about the importance of arts and cultural activities to the community as a whole.

Further research could explore why many residents believe arts and cultural activities are important, why some do not, and what makes people feel unsure.

The poll of residents also asked if adequate and diverse arts and cultural opportunities are available. Forty-seven percent of residents agreed that there are adequate and diverse arts and cultural opportunities available in their community, 35% were not sure, and 18% disagreed. Again, the reasonably high percentage of people responding "not sure" raises several questions. Are people unsure about whether activities are adequate? Or unsure about whether they are diverse? Do residents not know about the opportunities available in their community? These are the types of questions that the RDI may seek to address in future cultural research.

The third main question to residents was related to arts and cultural participation. Across the entire region, 53% agreed that residents in their community participate in artistic and cultural activities.

Volunteerism in the Cultural Sector

Poll respondents were asked if in the past 12 months they had given unpaid help to any groups, clubs or organizations in their community or region. While 47% had not given any unpaid help, the majority of respondents who had volunteered helped either social groups (34%) or arts, cultural or recreational groups (24%).

Volunteers play an integral role in many aspects of our personal and community well-being. Many arts, cultural, heritage, and recreation organizations depend on volunteers for their continuation. Investigating the existing capacity and potential needs of arts, cultural, heritage, and recreation organizations in our region would be a worthy focus for future research.

Importance of the Cultural Industry

Another question that provided insight into the value and importance of culture related to the most important industries in our region. Thirteen percent of respondents said that “arts, entertainment, and recreation” is one of the most important industries. This ranked higher than other industries including manufacturing, retail trade, and construction. This ranking is an indication of the value people place on the cultural sector and the potential economic importance the cultural industry plays.

This perception is complimented by results from RDI’s Business Retention and Expansion research which asked businesses to rate business climate factors. Sixty-three percent of businesses indicated arts and cultural amenities are important business climate assets, which is a signal that businesses believe the cultural sector plays an important role in generating a positive business climate.

Studying the economic contribution of arts and culture is an active area of research, and a few studies have already been completed in our region, with particular interest in cultural tourism. The economic contribution of this sector could be a future research direction for the RDI’s cultural pillar.

The Culture in our Region

Almost 1-in-3 respondents (31%) agreed or strongly agreed with the statement, “the culture in this region is a significant reason why I live here.” What is it that distinguishes the culture in the Basin Boundary region? Does it relate to this idea of a mountain culture, or give indication of a particular regional cultural identity? Are we different than mainstream culture, and if so, how? “Culture” is inherently subjective and the definition of culture is as diverse as the people and processes it attempts to describe. How did respondents interpret “the culture in our region”?

INVENTORY & MAPPING

Inventory and mapping of cultural assets is seen as an important companion to developing cultural indicators (Duxbury, 2007). Cultural mapping is regarded as the first step in any cultural planning and policy development, and is widely used as a tool by different levels of government and non-profit organizations (Stewart, 2007). Inventory and mapping helps increase knowledge, gain perspective, identify key players and networks, locate gaps, needs, and overlaps, and assess the distribution of resources. It creates a baseline of information, and offers the potential for tracking over time. Mapping cultural assets also increases the accessibility of cultural activities for residents.

Through the RDI’s partnership with the Selkirk Geospatial Research Centre (SGRC), researchers have conducted an initial inventory and spatial analysis of the region’s cultural assets. To date, this work has resulted in the mapping of several assets within each of the four cultural themes. The maps below illustrate a sample of the data collected thus far. Related cultural indicators and asset inventories will be available on the Digital Basin portal.

Figure 42 shows the total cultural assets per corridor, and the total of each of the assets for the entire region.

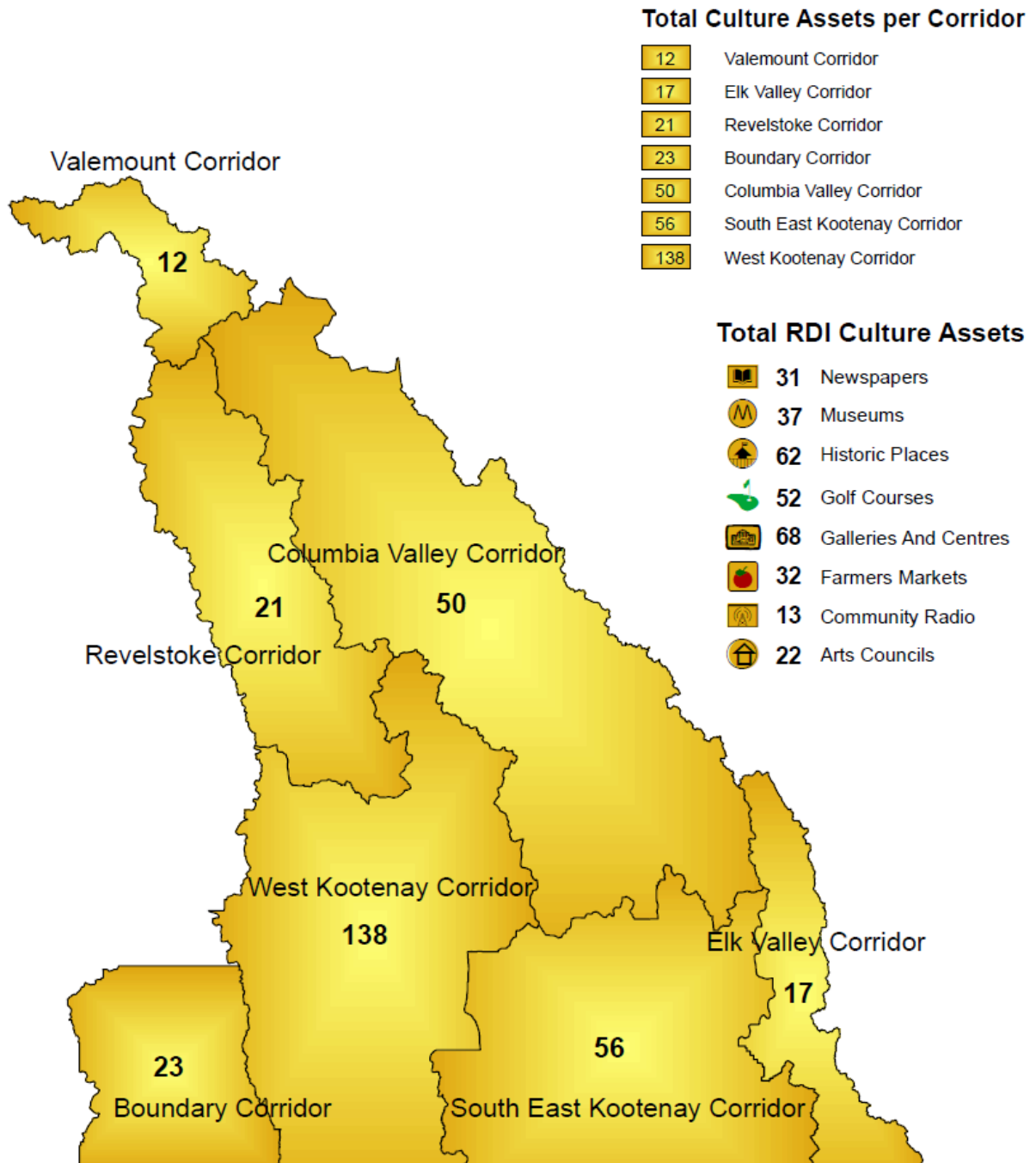


Figure 42: Cultural inventory by corridor and cultural asset category

Figure 43 shows a detailed sample of the cultural map to date, using Invermere as an example.

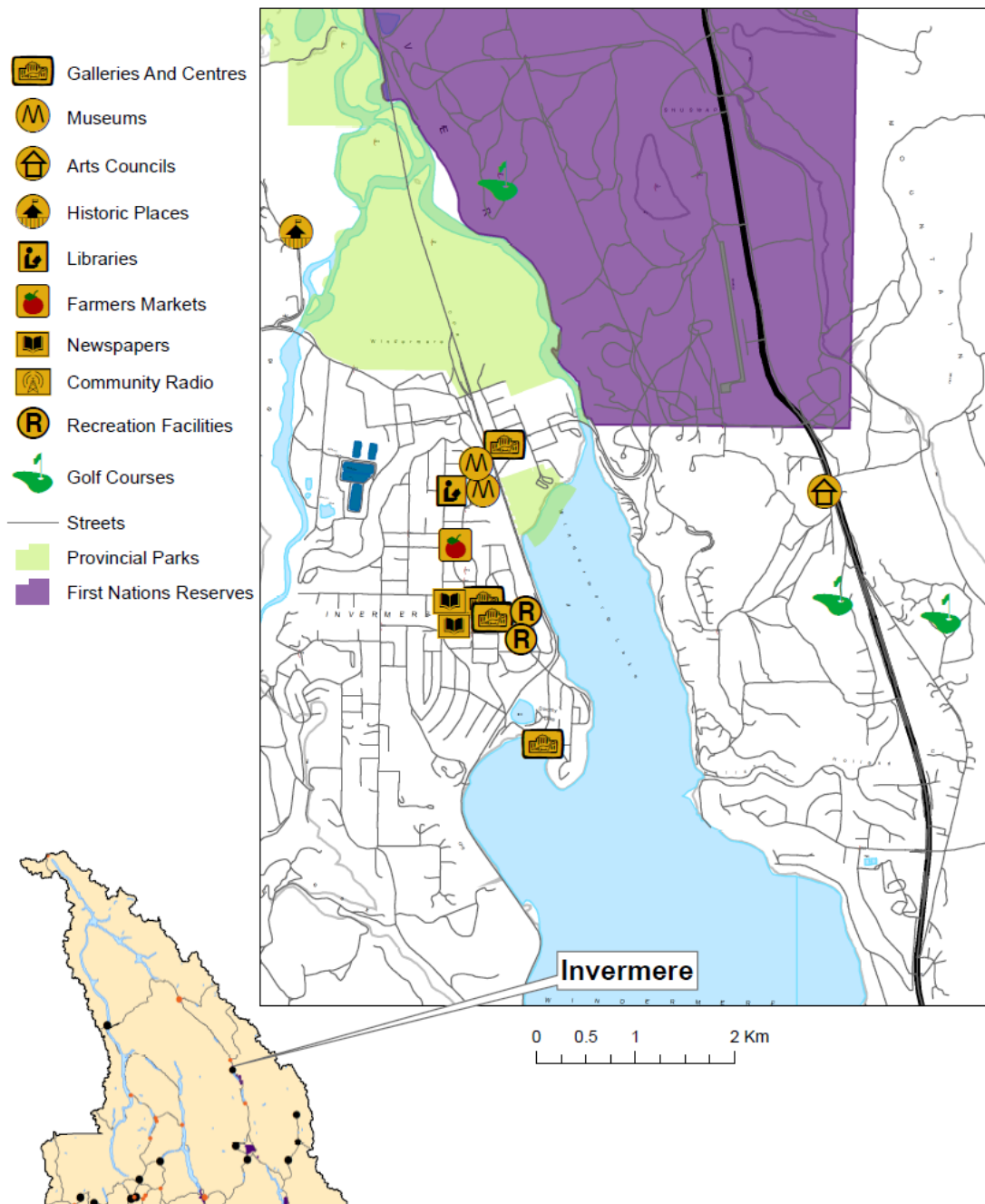


Figure 43: Cultural inventory by community - sample map of Invermere

As other inventories are completed and added to the database of cultural assets, a more complete picture of the cultural landscape will develop. This baseline will provide a foundation of cultural information on which to build potential indicators and the cultural research pillar. It will also offer an inventory for others within the cultural sector or others conducting cultural research in our region.

To learn more about cultural pillar research and development efforts please refer to the cultural indicators literature review at www.cbrdi.ca.

THE ENVIRONMENTAL RESEARCH PILLAR

The unique, diverse natural landscapes and resources of the Basin are the foundation for many aspects of well-being. These landscapes provide habitat for a multitude of species, land to grow food, clean air and water, and the backdrop for economic, social and cultural pursuits. Though the environment in which we live is in very good shape when compared to many parts of the world, it is not without its problems. We are fortunate that many Basin Boundary residents are passionately working to maintain and improve the well-being of our environment.

The indicators described below are intended to provide an overall description of the well-being of our environment. They identify trends that are positive, and highlight areas that need improvement. This type of environmental data can help prioritize issues that need our attention, contribute to our understanding of the effectiveness of environmental initiatives, and allow us to identify achievements that should be celebrated.

WATER

CONSUMPTIVE WATER USE

What does this measure & why is it important?

This indicator considers two measures of consumptive water use:

- gross annual supply (total fresh water withdrawal per water utility), and
- average per capita daily supply (gross annual supply per person serviced).

2009 is used as a baseline year for comparison. Seventeen Basin Boundary municipalities are included in the analysis, all of which participate in Columbia Basin Trust's [Water Smart Initiative](#). Data and contextual information for this indicator were provided by the Water Smart team (M. Hamstead, pers. comm, 2013). This indicator will be expanded over time as data become available for Boundary communities.

Consumptive water use is an important issue in the Basin Boundary region for several reasons. First, rates of water use in this region are typically higher than the averages for BC and Canada (Environment Canada, 2011). Second, certain areas of the region sometimes experience water shortages during periods of peak demand. In one such area, the Kettle River basin, a watershed planning process was recently initiated in part due to water users' concerns regarding late-summer water availability (Summit Environmental Consultants, 2012). In other areas that are currently less prone to water shortages, demand reduction can help improve our region's potential to adapt to projected future changes in climate and stream flow patterns. Third, the diversion, treatment, and delivery of drinking water has costs—both financial (e.g., infrastructure operations, maintenance, and expansion costs) and environmental (e.g., drawdown of water sources). These costs increase with growing water demand.

What are the trends & current conditions?

Most reporting communities reduced their consumptive water use over the period 2009-2012 (Figure 44). Gross annual supply (which includes commercial, industrial, institutional, and residential consumption as well as water loss in the distribution system) dropped by an average of 13.5%. Despite increases in some communities, all are making significant steps toward water

conservation. These actions, which may not yet be reflected in gross annual supply profiles, are primarily taking the form of infrastructure repairs, maintenance and improvements.

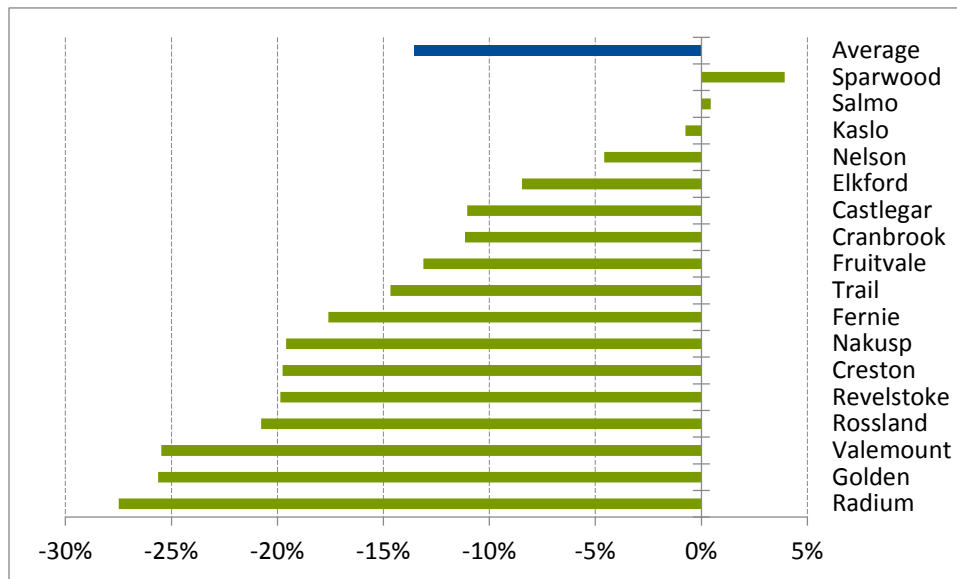


Figure 44: Change in gross annual water supply, 2009-2012

Source: M. Hamstead, pers. comm., 2013

Across all reporting municipalities, average per capita daily supply stands at 828 litres per person per day (Figure 45). That's roughly 1.4 times the BC Average of 606 litres per person per day (Environment Canada, 2011). The most probable reasons for this variation are related to:

- the size of lots (and corresponding outdoor irrigation demand) in predominantly rural areas such as the Basin Boundary region, and
- the condition of water distribution infrastructure in the region, which is generally aging and therefore prone to leakage.

Per capita daily supply dropped an average of 5% over the past three years. Again, in those cases where this figure remains very high, the utilities are implementing significant efforts to reduce water loss in the distribution system – a major contributing factor to high demand volumes. In this region, the other important contributor to high per capita daily demand is irrigation.

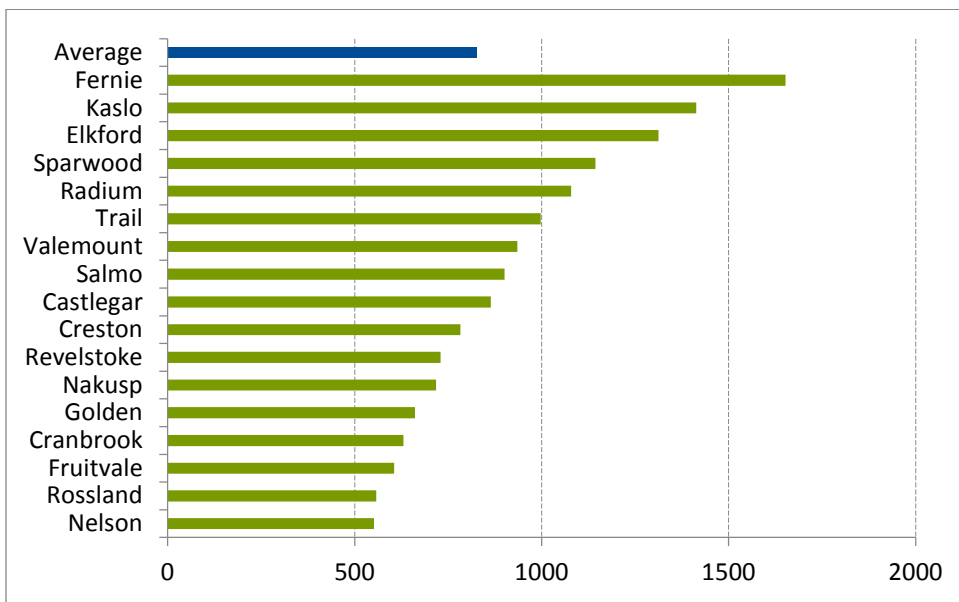


Figure 45: Per capita daily water supply, 2012
Source: M. Hamstead, pers. comm., 2013

STREAM FLOW TIMING

What does this measure & why is it important?

This indicator compares median half total flow dates for the past 20 years (1992-2011) with those of the preceding 20 year period (1972-1991). ‘Half total flow date’ refers to the day of the year when half of the total annual volume passes through a monitoring station on a stream. Twenty-seven active Basin Boundary monitoring stations measuring unregulated flows were included in the calculation. Raw data were gathered from the [Water Survey of Canada](#).

Stream flow timing influences the ecological processes in each stream and the availability of water for human use. A trend to earlier half total flow generally suggests longer periods of low flows in the late summer and fall. In addition to impacts on human use, low flows can contribute to higher water temperatures with implications for species that require cold-water habitats.

What are the trends & current conditions?

Stream flow monitoring data indicates that half total flow dates in the region have generally shifted earlier over the past 40 years, but that the magnitude of that shift is small. The average median date of half total flow for the years 1972-1991 was the 13th of June and, for the years 1992-2011, the 12th of June. Sixty-three percent of monitoring stations showed earlier median half total flow dates and one third showed later half total flow dates. One station showed no change (Figure 46).

These findings generally support past studies suggesting that the timing of flow in our rivers is shifting earlier. However, some of these past studies imply a more dramatic rate of change than is supported by this analysis. For example, one study found that, in South Central BC, including the Columbia Basin, spring freshet occurred 20 days earlier over the period 1984-1995 as compared to the period 1970-1983 (CBT, 2007). Since stream flow timing is highly dependent on weather, which can change dramatically from year to year, analyses using relatively short timelines should be expected to produce varying results. In addition, different types of analysis

(e.g., half total flow vs. peak flow) can generate different results. Long-term tracking of flow data will provide a more reliable indicator of change over time.

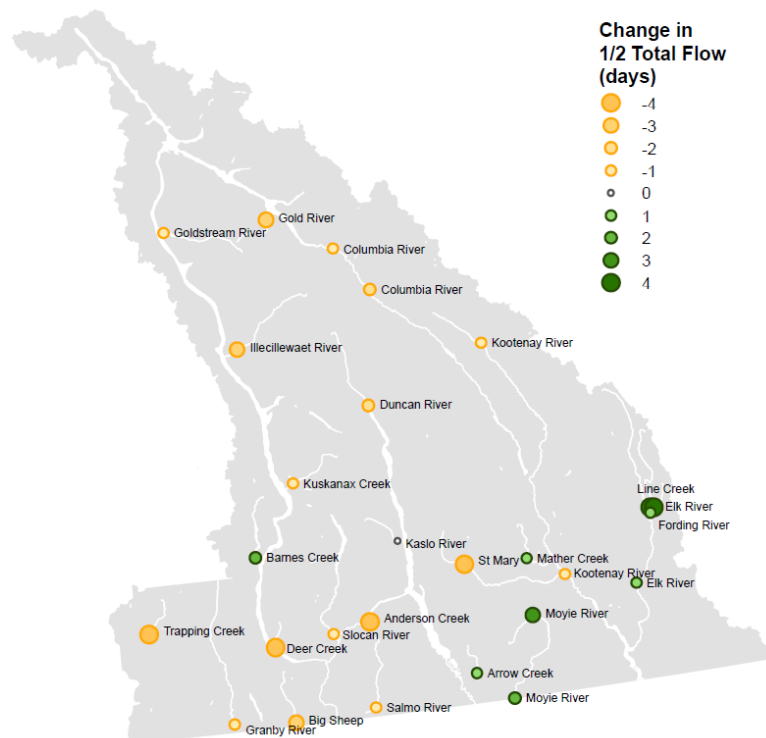


Figure 46: Change in 1/2 Total Flow Date, 1972-2011
Source: Environment Canada, 2013a

GLACIER EXTENT

What does this measure & why is it important?

This indicator measures the 20-year change (1985-2005) in the extent of all glaciers in the Basin Boundary region. ‘Extent’ refers to the amount of land that is covered by glacial ice. Some analyses of glacial change use ‘mass balance’ as an indicator. These two measures should not be compared to one another. Data for this indicator were provided by researchers at the University of Northern British Columbia, who have completed a remote-sensing based inventory of all glaciers in Western Canada (see Bolch, Menounos, & Wheate, 2010). Additional analysis by the Selkirk Geospatial Research Centre provides supplementary information.

Glaciers provide essential flow and storage services in Basin Boundary watersheds. As glaciers recede, so does the resilience of our aquatic ecosystems in the face of the shifting precipitation patterns that are anticipated with climate change (Murdock & Werner, 2011). The contribution of glaciers to regional stream flow patterns is also an important local economic driver; hydroelectric generation potential, especially in the late summer, will very likely be affected by the recession of glaciers (Jost & Webster, 2012).

What are the trends & current conditions?

On average, the extent of glaciers in our region dropped 14% over the period 1985-2005. That’s an average rate of change of 0.7% per year. The trend for this region is more pronounced than the average for Western Canada—11% over the entire study period, or 0.6% per year.

The rate of glacial melt is higher in certain parts of the region. Glaciers in the south are receding the fastest, while glaciers in the north are receding the slowest (Figure 47).

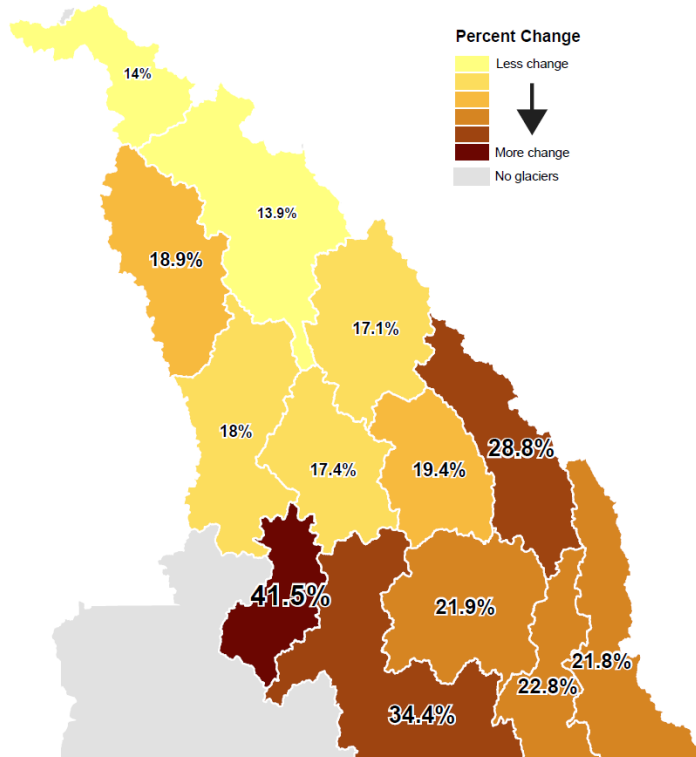


Figure 47: 1985-2005 change in extent of Basin Boundary glaciers, by major watershed
 Source: R. Wheate, pers. comm., 2013; DataBC, 2011

Research suggests that glacier size is an important factor affecting rates of recession. In our region, one of the smaller glaciers, the New Denver glacier, is receding at an alarming pace. Over the period 1999 to 2010, the extent of the New Denver glacier dropped by 54%, a rate of almost 5% per year (Figure 48).

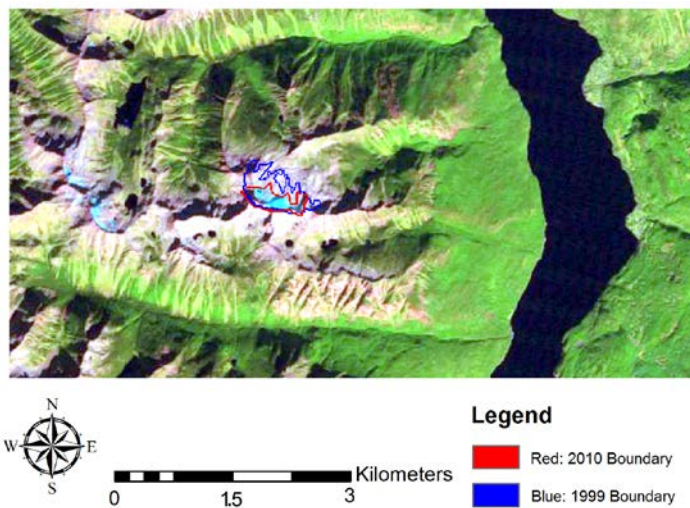


Figure 48: Change in extent of New Denver Glacier, 1999-2010
 Source: Zhang, 2013

AIR & CLIMATE

AIR QUALITY

What does this measure & why is it important?

This indicator tracks annual average hourly readings of fine airborne particulates (referred to as PM_{2.5}), using 2005 as a baseline year. Six monitoring stations track PM_{2.5} levels in the region, though not all of them have been active for the full five years. Data were acquired from the BC Ministry of Environment's [air data archive](#) and processed using Ministry of Environment guidelines.

Sources of fine particulate matter include wildfires, agriculture and unpaved roads. High concentrations of PM_{2.5} can have negative effects on human health and the environment. Because the particles are small enough to enter the deepest part of human lungs, PM_{2.5} can cause respiratory problems and contribute to cardiovascular disease. Fine particulates can also impair visibility, affect the climate and damage property (BC Lung Association, 2012).

What are the trends & current conditions?

In 2012, the community with the lowest recorded levels of PM_{2.5} was Nelson, at 3.7 micrograms per cubic metre. The highest readings were recorded in Castlegar, through caution should be exercised when comparing Castlegar readings to the remainder of the region. The Castlegar station uses new technology that is not yet in place at other sites. The new instruments tend to record higher PM_{2.5} levels than older instruments. All annual average values were below the provincial air quality objective of 8.0 (Figure 49). In general, PM_{2.5} readings at Basin Boundary stations are lower than they were in 2005.

PM_{2.5} readings tend to peak in our region at two times of the year: wildfire season, and during the colder winter months, when wood stove use is high and temperature inversions can trap smoke in valleys (BC Lung Association, 2012). Efforts involving local organizations (e.g., the Wood Stove Exchange Program) are underway to help address air quality issues related to wood burning.

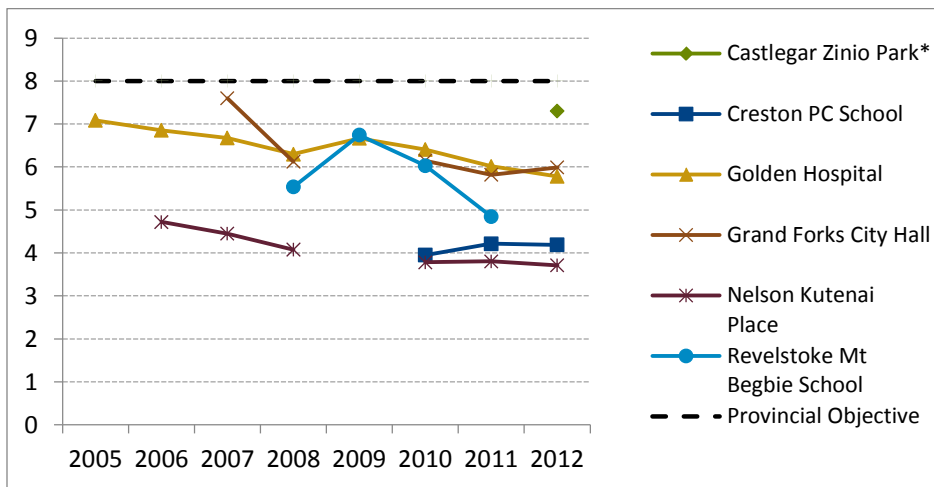


Figure 49: Average PM_{2.5} readings (µg/m³) at monitoring stations in the region (*The Castlegar station relies on new technology that typically records higher readings than the old technology)

Source: BC Ministry of Environment, 2013a

CLIMATE EXTREMES⁷

What does this measure & why is it important?

This indicator tracks occurrences of extreme weather events at Basin Boundary weather stations. Only stations with at least 100 years of climate data are referenced. Two indices are analysed: the annual percent of days that are classified as “warm” and the annual amount of rain falling on “very wet days”. “Warm days” are defined as days when the maximum temperature exceeds the 90th percentile for a given day of the year in a baseline period. “Very wet days” are defined as days when one-day rain values exceed the 95th percentile for all days in a baseline period. These methodologies were established by the CLIMDEX project. The annual index values used to develop this indicator were acquired from the CLIMDEX [data portal](#). Trend analysis was completed by the RDI research team using [ProUCL software](#), a statistical package developed by the US Environmental Protection Agency.

Climate change has the potential to significantly impact all aspects of well-being, sometimes positively and sometimes negatively. The 2008 State of the Basin report indicated that, between 1913 and 2002, average annual temperatures in the Columbia Basin increased by 1.4 degrees Celsius, and average annual precipitation amounts increased by 26 percent. This analysis of extremes adds a new perspective to how our climate is changing. Studies predict that certain types of extreme weather will become more common both globally (Kharin et al., 2007) and locally (Murdock & Sobie, 2012). An increase in the frequency or severity of extreme weather can have significant consequences for our natural and built environments.

What are the trends & current conditions?

Frequency of warm days

For three of the five stations, the 100-year analysis shows a trend toward more frequent warm days (Table 1). The magnitude of this trend is greatest in Kaslo, where the percentage of days that are warm increased by 7.8 points over the past century. Two stations (Golden and Fauquier) show a decreasing trend over the past century. However, if the calculation is limited to data from only the last 40 years, all stations show an increasing trend, and in all cases the magnitude of that trend is greater. Climate scientists place value on these shorter term trends because many studies show that the impact of human-induced climate change became more evident around the mid-1970s. It is important to note that some of the 40-year trends described in Table 1 are not statistically significant, meaning that confidence in the trends is lower than necessary for researchers to say with 95% certainty that the trends are attributable to change in the climate, rather than just chance.

Station	100-Year Trend	40-Year Trend
(% of days per century)		
Creston	5*	21.6*
Fauquier	-3.3*	19.3*

⁷ A previous version of this report described findings that were calculated using methodologies that differed slightly from those used by CLIMDEX. That variation had a notable impact on analysis results. CLIMDEX recently published up-to-date index values which were calculated using the established methodologies. This report has been updated to reflect those calculations. An additional station (Golden) has also been incorporated.

Fernie	6.6*	12
Golden	-3.8*	4.7
Kaslo	7.8*	12.2*
Region	1.5	21.1*

*statistically significant trend (at 0.95 confidence level)

Table 9: Trend in annual frequency of warm days at Basin Boundary weather stations

Source of index values: CLIMDEX, 2014

Annual index values vary significantly as demonstrated in Figure 1, which plots a regional average from all five stations. However, at a regional scale, both 100-year and 40-year analyses showed an increasing trend. The magnitude of these trends was calculated at 1.5 days per century and 21.1 days per century, respectively.

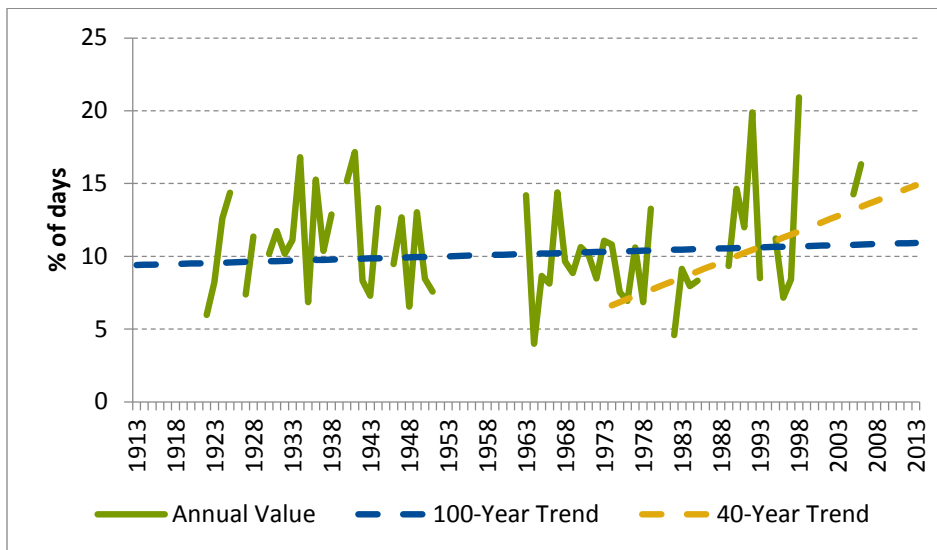


Figure 50: Trend in frequency of warm days (average of five Basin Boundary stations)

Source of index values: CLIMDEX, 2014

Amount of rain falling on very wet days

Data show a trend toward more frequent and severe rain events at all but one station over the past century. When 100 years of data are considered, the magnitude of the increasing trend is greatest in Fernie, where the amount of rain falling annually during very wet days has increased at a rate of 160 mm per century (Table 2). In Golden, the 100-year analysis shows a decreasing trend of -25 mm per century; however, the 40-year analysis shows an increasing trend of 121 mm per century.

At the regional scale, the 100-year trend is an increase of 98 mm per century, but the magnitude of the 40 year trend is much greater, at 267 mm per century (Figure 2).

Station	100-Year Trend	40-Year Trend
	(annual mm of rain per century)	
Creston	65*	257*
Fauquier	55*	98
Fernie	160*	665*
Golden	-25	121*

Kaslo	41*	-81
Region	98*	267*

*Statistically significant trend (at 0.95 confidence level)

Table 10: Trend in annual millimetres of rain falling on very wet days at Basin Boundary weather stations

Source of index values: CLIMDEX, 2014

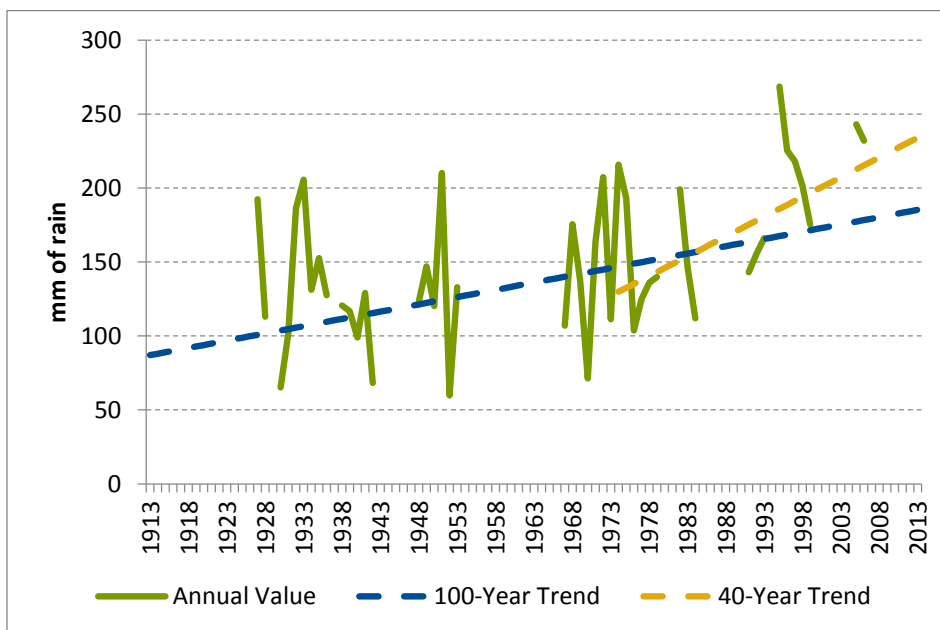


Figure 51: Trend in amount of rain falling on very wet days (average of five Basin Boundary stations)

Source of index values: CLIMDEX, 2014

The discussion above provides interesting context to the results of the RDI’s 2013 poll of residents, which indicated that roughly half of Basin Boundary residents (51%) believe that extreme weather events are occurring more frequently in the region.

GREENHOUSE GAS EMISSIONS

What does this measure & why is it important?

The greenhouse gas emissions indicator measures the 2007 – 2010 change in our region’s direct emissions (measured in tonnes of carbon dioxide equivalent, or CO₂e) attributable to energy use in buildings, on-road transportation, and solid waste. Emissions data is included for all sources, including residents, businesses, and government. However, only emissions originating from within the Regional Districts of Kootenay Boundary, Central Kootenay, and East Kootenay are included in the calculation. Equivalent data were not available at the community scale. Data were acquired from the BC Climate Action Secretariat’s [Community Energy and Emissions Inventories](#).

Greenhouse gasses trap heat in our atmosphere, contributing to climate warming. The international scientific community now generally acknowledges the role of human-caused greenhouse gas emissions in recently observed changes to our climate (IPCC, 2007). Greenhouse gas emissions reductions are therefore a critical component of our local and global attempts to address climate change.

What are the trends & current conditions?

Direct greenhouse gas emissions in our region were measured at approximately seven tonnes per person in 2010. Compared to 2007, total emissions increased approximately eight percent. Emissions increased in relation to on-road transportation and solid waste, but decreased in relation to energy use in buildings (Figure 52).

Direct greenhouse gas emissions vary from year to year for a number of reasons, including weather trends and economic performance. For this reason, caution should be exercised when comparing one year's figures with another's. Long term tracking of greenhouse gas emissions will provide a better understanding of our region's commitment to emissions reduction.

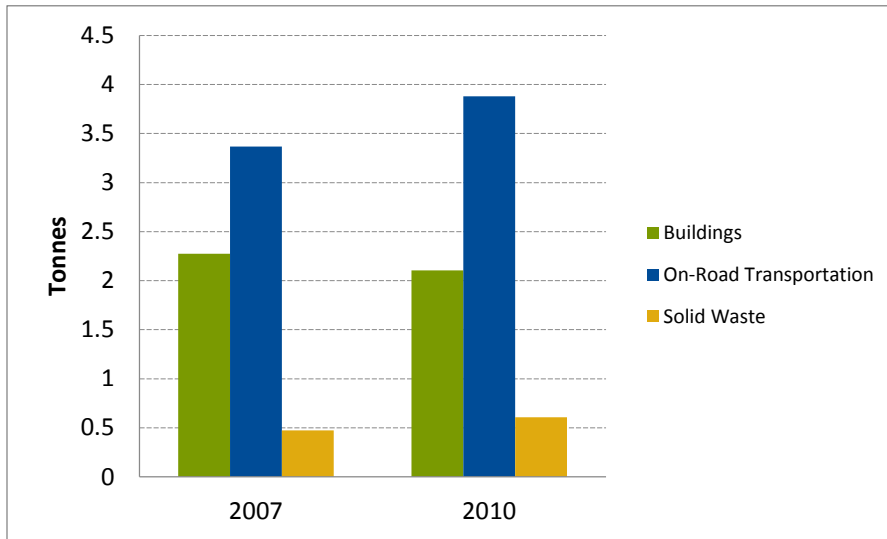


Figure 52: Average per capita tonnes of CO₂e from buildings, on-road transportation and solid waste
Source: Climate Action Secretariat, 2013

LAND & FOOD

AGRICULTURE

What does this measure & why is it important?

This indicator looks at the trends in the amount of land in our region that is being farmed, as well as the number of farm operators and their average age. All data comes from the [Census of Agriculture](#) conducted by Statistics Canada in 2001, 2006 and 2011. Due to the way census subdivisions are geographically defined, this analysis does not include the Valemount and Revelstoke trading corridors.

Interest in local food has increased in recent years, and results of the RDI's 2013 poll of residents indicate that 75% of Basin Boundary residents prefer to buy food that is grown locally. However, there are significant challenges for both producers and consumers of food. These challenges include increased land cost, intense competition from global markets, limited agricultural land base, growing fuel costs, negative impacts of invasive weeds, and unpredictable weather. Agriculture plans aimed at supporting local agriculture systems have recently been completed for the RDKB (Russell, 2011) and RDCK (Brynne, 2011) and are under development for the RDEK.

Functional and sustainable farms require a healthy environment that provides clean air and water, pollinating birds and insects, biological pest controls, and nutrient cycling. In turn, agriculture can impact many aspects of our environment in either positive or negative ways, depending on the farming practices. For example, farms can provide ecosystem services such as wildlife habitat, pollution control, carbon sequestration, and regulation of water and air quality (Power, 2010). On the other hand, intensive farming can degrade soil conditions and negatively affect the quality of nearby water bodies.

What are the trends & current conditions?

Between 2001 and 2011, the area being farmed in our region decreased by 18.6% and the number of farms decreased by 9.4%. Most areas showed a modest decline in area farmed, with the Rocky Mountain Trench from north of Cranbrook to north of Radium and all of the Kootenay Boundary region showing the steepest declines. There were moderate increases in area farmed around Cranbrook, Salmo, Nelson, the Slocan Valley, and north of Kootenay Lake (Figure 53).

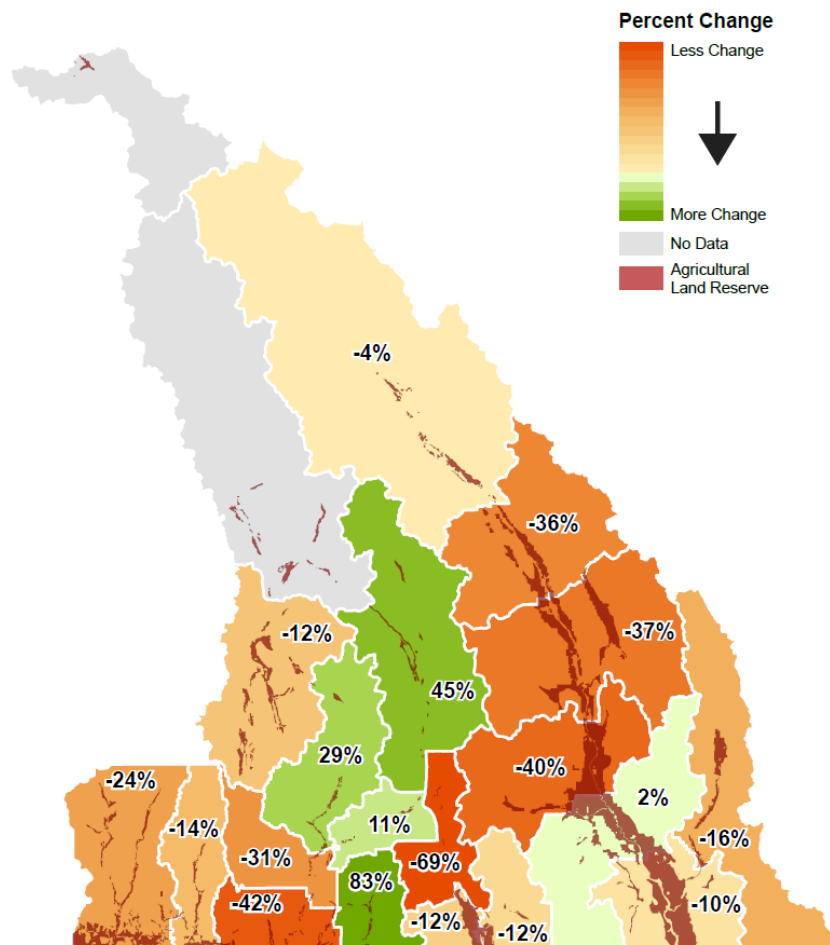


Figure 53: Percent change in area being farmed by census subdivision, 2001 - 2011.
Source: Statistics Canada 2012c

Between 2006 and 2011 the average age of farm operators increased from 54.2 years to 56.6 years, indicating that young people are either choosing not to farm, or are having difficulty entering the agricultural sector. The decrease in number of farms and area being farmed corresponds with a 9% decrease in the number of farm operators (or 185 fewer operators in

2011 compared to 2006). These job losses do not consider the associated decrease in full or part time labour on farms or employment in associated support sectors.

WILDFIRE

What does this measure & why is it important?

This indicator measures the average area burned each year by wildfires, based on [records](#) of fires since 1919 from the Wildfire Management Branch of the BC Ministry of Forests, Lands and Natural Resource Operations. The area burned from year to year is highly variable, and is closely correlated with both temperature and precipitation (Utzig, Boulanger & Holt, 2011). Therefore, data has been analysed using a ten year moving average which measures the average area burned over the previous ten years. The indicator also determines how many fires over five hectares in size have come within two kilometres of the boundaries of the 28 municipalities in our region.

Wildfires can cause economic, social, cultural, and environmental losses by destroying buildings, forests, heritage sites, or even communities. They can cause respiratory problems, affect water quality in community watersheds, close transportation routes, and in the worst cases, cause loss of life. Due to the significant risks associated with wildfire, in recent years, Community Wildfire Protection Plans have been written for most communities in the region. These plans include an assessment of the forests immediately surrounding the communities. The risk of catastrophic fire in forests that have high fuel loads can be mitigated through fuel reduction treatments. Those high risk areas around our communities have been mapped, and options to treat those areas to reduce the hazards have been described. To date, few communities have been able to carry out the necessary treatments due to lack of funding and staff resources.

What are the trends & current conditions?

The ten year moving average shows that the area burned per year has changed little since provincial fire suppression efforts began in earnest following World War II (Figure 54). An analysis of historic fires shows that, since 1919, of the 28 communities found in our region, 24 have had a large wildfire (at least 5 hectares) come within 2 km of their municipal boundaries. Of the four municipalities that are not on this list, Invermere and Radium Hot Springs have both had large fires within 5 km of their boundaries, and Silverton and New Denver have areas identified as having a high probability and high consequence of wildfire in the immediately surrounding area (Blackwell, 2008).

RDI's 2013 poll of residents found that 47% of Basin Boundary residents agree that wildfire is a threat to their community, while 22% disagree and 30% neither agree nor disagree. The continued build-up of forest fire fuels combined with a projected increase in area burned in the near future due to climate change (Utzig et al., 2011) suggests that fires are a more immediate threat than is perceived by residents in our region. It is possible that the threat is underestimated because evidence of fire, and the reminder of its threat, fades with forest regeneration. However, the longer an area goes without burning, the greater the risk of damaging fire.

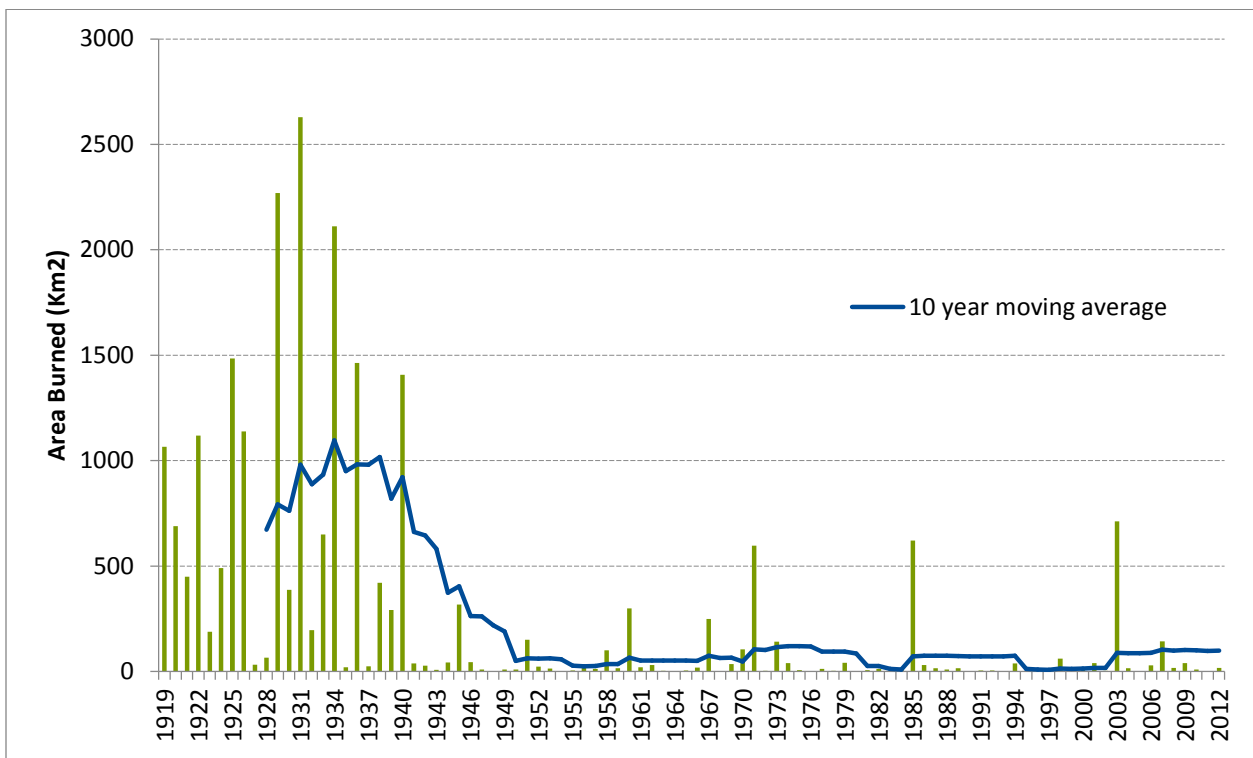


Figure 54: Area burned by wildfires in the Basin Boundary region 1919 - 2012, with a 10 year moving average.

Source: DataBC, 2013a

PROTECTED AREAS

What does this measure & why is it important?

This indicator measures the percentage of public land in the region that is protected as a national park, provincial park, ecological reserve, recreation area or conservancy. The indicator also uses the Biogeoclimatic Ecosystem Classification (BEC) system to assess the degree to which different ecosystems are protected. Data for this indicator were derived from spatial analyses of the Ministry of Environment’s [Biogeoclimatic Ecosystem Classification Map](#), [Conservancy Areas Map](#), and [Protected Areas Map](#).

The BEC system identifies 16 different zones within BC that share similar ecological characteristics. ‘Bio’ refers to the biological nature of the ecosystem, ‘geo’ refers to the classification of the soils and geology and ‘climatic’ identifies the predominant climate factors in which the ecosystem exists. The BEC zones in the Basin include Engelmann Spruce - Subalpine Fir (ESSF - 49% of the land base), Interior Cedar – Hemlock (ICH - 28%), Montane Spruce (MS - 9%), Interior Mountain Heather Alpine (IMA - 7%), Interior Douglas Fir (IDF - 6%), Ponderosa Pine (PP - 1%) and Sub-Boreal Spruce (SBS - 0.2%).

Habitat destruction is a major threat to biodiversity worldwide, and protected areas provide landscapes that guard against this destruction. Protected areas also provide us with recreational opportunities, clean air and water, spiritual rejuvenation, and reference ecosystems for long-term research and monitoring.

What are the trends & current conditions?

Across BC, an average of 14.8% of land is protected by federal or provincial governments. We are fortunate that four of the seven terrestrial National Parks in BC are found within the Basin Boundary region (Yoho, Kootenay, Mt. Revelstoke and Glacier National Parks). These four National Parks account for 5% of the land in the region. There are also 85 provincial parks that collectively cover an additional 8% of land, bringing the total area protected by parks to 13.3%, which is slightly lower than the provincial average.

However, the distribution of ecosystems protected by Parks Canada and BC Parks in the Basin Boundary region is very uneven. Protected areas are over represented in higher-elevation zones and under-represented in lower elevation zones. For example, 25% of the highest elevation Alpine BEC zone is protected, while only 1% of the lowest elevation zones are protected (Table 11). The relative lack of protection in the low elevation zones may explain some of the mixed results in the RDI's 2013 poll of residents around the need for more protected areas. Some residents may be aware of this disparity, and others are either unaware or feel that additional protection is not necessary (see the Environmental Perceptions section for more detail).

Private land conservation organizations are working hard to balance disparities in ecosystem protection by focusing on protecting lands in the low-elevation zones within the Basin Boundary region. A more detailed analysis of protected areas that include both public and private land conservation is available through the RDI website.

BGC Zone	Maximum elevation	% Protected	# of red listed species per 1000 km ²
Interior Mountain Heather Alpine	Over 2300m	25%	2.0
Engelmann Spruce- Subalpine Fir	2300	17%	1.0
Montane Spruce	1700	10%	3.7
Interior Cedar - Hemlock	1500	6%	3.3
Interior Douglas Fir	1450	1%	16.0
Ponderosa Pine	900	1%	42.7

Table 11: Protection of BEC Zones and concentration of red listed species in the Basin
Source: DataBC, 2012; DataBC, 2013b; DataBC, 2013c; BC Conservation Centre, 2013

BIODIVERSITY

SPECIES AT RISK

What does this measure & why is it important?

This indicator measures the number of species that are red listed in the Basin (meaning they are extirpated, endangered or threatened), and provides a summary of what types of species are most threatened, and what habitats they are found in. Data were gathered from the British Columbia Conservation Data Centre's [database](#) of species at risk, and supplemented with additional research on specific species.

The diversity of plant and animal communities affects their resilience in the face of change. There are thousands of different species whose range includes the Basin Boundary region. The vast majority of these demonstrate healthy population counts. However there are some species that are declining in numbers, or are threatened by habitat loss, disease, or competition from

non-native species. An important aspect of environmental well-being is our society's concern for all native species, regardless of how well we understand the roles they play in the ecosystem.

What are the trends & current conditions?

There BC Conservation Data Centre currently reports 151 species that are red listed in the Basin Boundary region. Of these 151 species, 79 are only found within our region in BC. The list includes 13 birds, eight mammals, four fish and three amphibians (Figure 55). Also on the list are 14 species that are possibly extirpated, meaning that there are no recent records of their presence in our region. The list of extirpated species does not include the millions of Steelhead, Sockeye and Chinook salmon that used to migrate up the Columbia River prior to the construction of hydroelectric dams. These salmon runs were completely eliminated with the construction of the Grand Coulee Dam in 1941.

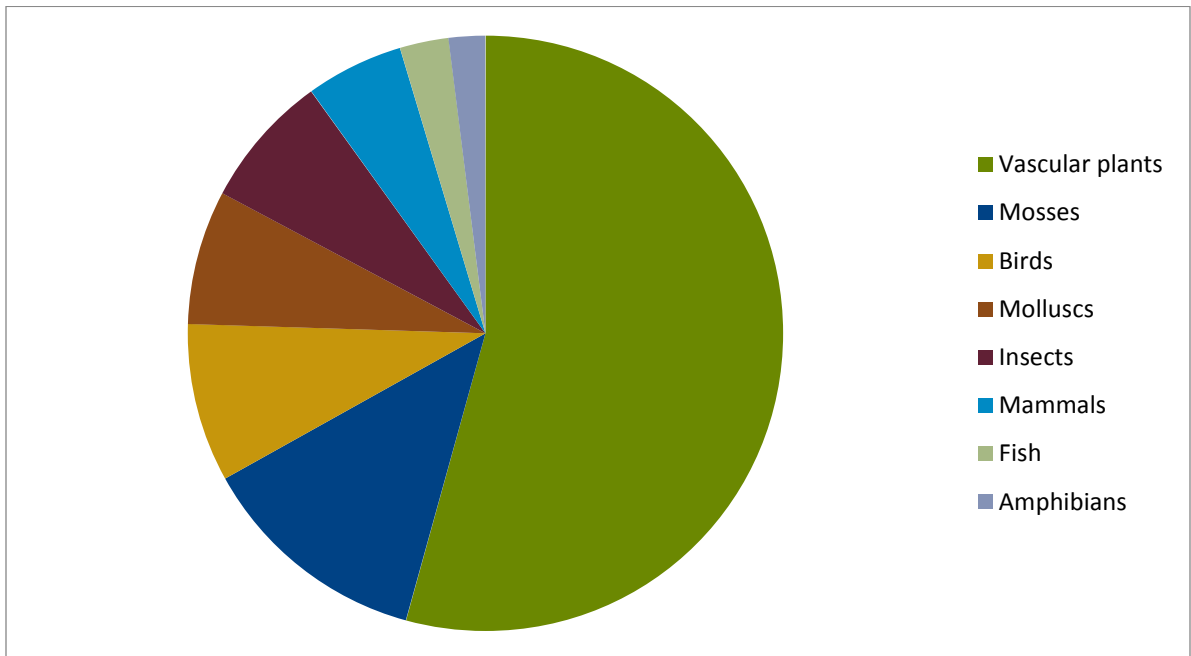


Figure 55: Percent of red listed species in the region, by type of species
Source: BC Conservation Data Centre, 2013

Conservation and restoration efforts are underway for many red listed species. Some efforts involve protecting specific areas that a species relies upon, such as the creation of Wildlife Habitat Areas in known breeding habitat for the Rocky Mountain Tailed Frog (CDC, 2013). Other recovery programs involve captive breeding. For example, in 2013 the Upper Columbia White Sturgeon Recovery Initiative celebrated the 12th annual release of hatchery-raised juvenile sturgeon.

Red listed species tend to be found in the lowest elevation BEC zones where the level of protection by Federal or Provincial parks is the lowest. For example, while there is a roughly equal number of red listed species in the high elevation ESSF zone (41 species) and the low elevation PP zone (44 species), the ESSF is almost 40 times larger. This means that on an area basis there are more than 40 times the number of red listed species in the low elevation zone where the level of protection is the lowest (Table 11, above).

While it is difficult to track the population status of all the red listed species, and there is surprisingly little data on some of these species, several are being closely followed. The status of mountain caribou is closely monitored by government biologists, and their decline has been well documented.

Caribou rely on large areas of old growth forest and do not tolerate human disturbance. The decline in caribou numbers is due to a variety of factors (Wittmer et al., 2005; Parks Canada, 2011) and they are now confined to high elevation areas in small, scattered populations. The same changes in habitat that have led to the decline in caribou numbers may also have resulted in shifts to other ungulate⁸ population numbers. For example, elk numbers have increased significantly over the past century (Szkorupa & Mowat, 2010).

Between 1996 and 2013, the total population of mountain caribou declined from 2,325 to 1,477 (Hatter, 2006; Ministry of Environment, 2013b). During this time, significant efforts to reverse this trend have taken place including snowmobile closures in caribou habitat, transplanting animals, and predator control. Some projects have showed good results, while others have had limited success. While the numbers in Table 12 show a continued decline, there is some evidence to suggest these efforts are starting to pay off. The rate of decline between the mid-1990s and 2002 was over 6% per year, which then decreased to 2.5% per year between 2002 and 2006, and then to just 1.6% decline per year to 2013. While most herds are still declining in numbers, the estimates for the South Purcells and North Columbia herds have increased in recent years.

Efforts to recover caribou are continuing with a new project set to begin in the spring of 2014. Pregnant cows from the North Columbia herd near Revelstoke will be relocated to a specially constructed secure enclosure in their native habitat. This will allow for rearing calves in a safe environment when they are most vulnerable to predation (RCRW, 2013).

Herd	Mid 1990s Estimate	2002 Estimate	2006 Estimate	2013 Estimate
South Selkirks	52	34	37	33
South Purcells	77	17	20	25
Nakusp	211	103	85	77**
Monashee	12	5	8	3*
Duncan	29	23	9	7**
Frisby Boulder	24	24	19	7
South Columbia	114	34	29	7
Groundhog	48	19	30	11
Central Rockies	25	5	2	3***
North Columbia	280	145	138	196
Wells Gray (incl. Allan Creek)	620	516	455	376
Total	1492	925	832	745

*2011 population estimate **2010 population estimate ***2008 population estimate

Table 12: Mountain caribou population estimates for Basin Boundary herds
Source: Hatter, 2006; DataBC, 2013d

⁸ Mammals with hooves

INVASIVE SPECIES

What does this measure & why is it important?

This indicator tracks the number of invasive plants found in our region, as well as the number of noxious weeds, the number of biocontrols used, and the number of invasive fish in our waterways. Data were acquired from the [Invasive Species Council of BC](#) and the Ministry of Forests, Lands and Natural Resource Operations' [Invasive Alien Plant Program](#). This program includes the [Report-A-Weed tool](#), which allows members of the public to report invasive plant sightings.

Invasive species are a serious threat to the Basin Boundary environment and economy. They can displace native species, degrade habitats, change nutrient cycles, change wildfire cycles, and damage infrastructure (August et al., 2012). Invasive plants negatively impact agriculture by reducing quality forage for livestock, reducing crop yields and increasing the need for expensive pesticide and herbicide applications. Some plants can also be damaging to human health, such as Giant Hogweed (IPCBC, 2008).

The best way to control invasive species is prevention and early action. Several Basin Boundary organizations (including sub-regional Invasive Species Councils) can be consulted for additional information on invasive species.

What are the trends & current conditions?

Invasive Plants

In the Basin Boundary region, 114 species of invasive plants are recorded in the Invasive Alien Plant Program database. This number continues to increase over time as new species become established in our region. Of 114 invasive plants, 28 are listed as noxious weeds under the BC Weed Control Act meaning that all land occupiers must control these designated noxious plants due to their highly destructive nature (BC Ministry of Agriculture, 2013).

A variety of control methods are employed to reduce the impact of invasive weeds and to control their spread. This includes manual removal, herbicide applications, reducing soil disturbance and biocontrols. Biocontrols are typically natural enemies (insects, parasites or pathogens) of the targeted invasive weeds that infect or feed on various parts of the plants to reduce their vigour or seed production. In the Basin Boundary region, 18 different biocontrol agents have been used on 13 invasive weed species. More than one biocontrol agent has been released for some invasive weeds, and the same agent may work on several species. For example, six different agents work on several different species of knapweed, which have shown to be effective in reducing knapweed densities (Gayton & Miller, 2012).

Invasive Mussels

Invasive plants and animals are much harder to control once they get into our waterways. Therefore the focus must be on preventing their introduction. For example, zebra mussels and quagga mussels have yet to be confirmed in BC, and efforts to ensure that they do not become established are underway. Invasive mussels have the potential to cause millions of dollars of damage to infrastructure (Robinson et al., 2013).

Invasive Fish

There are at least 12 species of non-native fish in our waterways, ranging from species that are stocked for recreational fisheries (brook trout) to predatory fish that are recent invaders (northern pike) and that can disrupt freshwater systems.

ENVIRONMENTAL PERCEPTIONS

The following section highlights results from some of the environmental questions included in the RDI's 2013 poll of residents.

- Forty-two percent of residents agreed with the suggestion that more parks and protected areas should be created in this region. Twenty-six percent did not and 32% were not sure, suggesting that support for outright protection of land in our region is mixed.
- Only 47% of residents believed that wildfire is a threat to their community, suggesting that many residents are unaware of the fire history of this region.
- Seventy-five percent of residents reported that they prefer to buy food that is grown locally, while only 10% do not. These findings are consistent with the growing interest in local food production in the region.
- Fifty-four percent of residents believed that human-wildlife conflict in the region is increasing over time. Organizations like Wild Safe BC are working to help our communities live more cooperatively with wildlife.
- Fifty-one percent of residents agreed that extreme weather events are occurring more frequently in our region. With scientists predicting that our climate will become more extreme over time, perceptions may also shift.
- Sixty-eight percent of residents believed that they have a good understanding of important regional environmental issues like air and water quality, climate change and invasive species. Only 9% did not, suggesting that our self-rated environmental literacy is high.
- Only 6% of residents reported that they had volunteered for an environmental organization in the past year. This rate is much lower than that reported for social organizations (34%) or arts, cultural or recreational organizations (24%).

CONCLUSION & FUTURE DIRECTIONS

State of the Basin indicators will continue to evolve as new data become available, new types of analysis are performed, and the RDI furthers its understanding of regional information needs. For the latest research on well-being in the Basin Boundary region, or to provide your input on this report, be sure to visit the RDI's website at www.cbrdi.ca. The Digital Basin, which includes a spatial indicator viewer and data hub, can also be accessed through the RDI website (Figure 56).

Links between the economic, social, cultural and environmental research pillars are a key area of interest for the RDI. In the future, research will focus on these connections in order to better understand how the residents and organizations of the Basin Boundary region can work collaboratively to further our collective well-being.

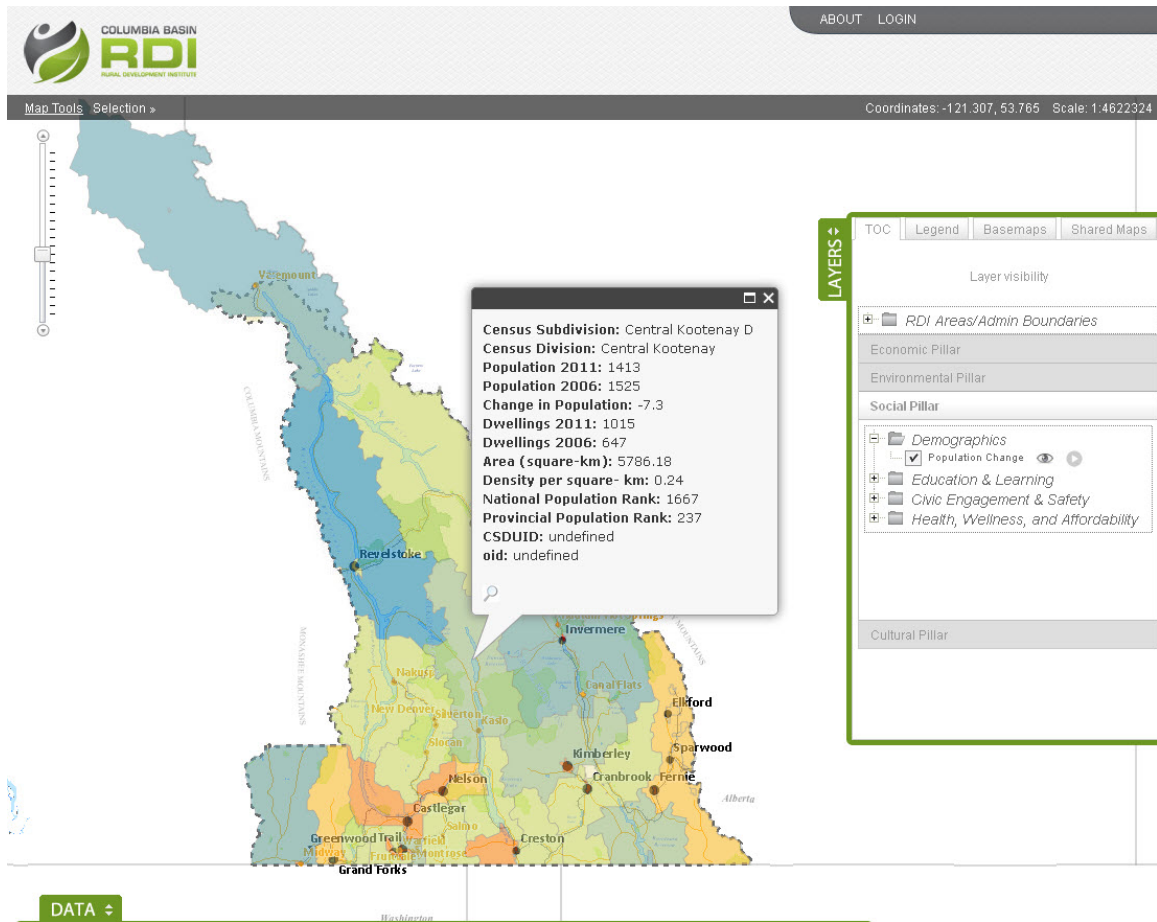


Figure 56: Initial design of the Digital Basin (www.cbrdi.ca)

DATA SOURCES & REFERENCES

- August, D., Craig, J., Heise, B., Hook, F., Husband, L., Miller, V., Mohammed, P., Richardson, J., Sigg, D., & Wardrop, T. (2012). *Invasive species strategy for British Columbia*. Environment Canada and Investment Agriculture Foundation of BC.
- Baumol, W.J. (1967). Macroeconomics of unbalanced growth: The anatomy of urban crisis. *The American Economic Review*, 57(3), 415-426.
- BC Conservation Data Centre (CDC). (2013). *BC Species and Ecosystems Explorer*. B.C. Ministry of Environment. Retrieved September 16, 2013 from <http://a100.gov.bc.ca/pub/eswp/>.
- BC Lung Association. (2012). *State of the Air 2012*. The Lung Association of British Columbia. Retrieved from <http://www.bc.lung.ca/airquality/stateoftheair-report.html>.
- BC Ministry of Agriculture. (2013). *BC Weed Control Act*. Retrieved September 18, 2013 from <http://www.agf.gov.bc.ca/cropprot/noxious.htm>.
- BC Ministry of Community, Sport and Cultural Development. (2013) *Local Government Statistics 1985 – 2011*. Retrieved September 9, 2013 from http://www.cscd.gov.bc.ca/lgd/infra/municipal_stats/municipal_stats2011.htm.
- BC Ministry of Education. (2013). *Provincial Reports*. Retrieved September 30, 2013 from <http://www.bced.gov.bc.ca/reporting/province.php>.
- BC Ministry of Energy and Mines. (2013a). *BC Producer Prices*. Retrieved August 18, 2013 from <http://www.empr.gov.bc.ca/Mining/MineralStatistics/MineralSectors/Metals/MarketsandPrices/Pages/BritishColumbiaProducerPrices.aspx>.
- BC Ministry of Energy and Mines. (2013b). *BC Coal Prices 1980 – 2012*. Retrieved August 18, 2013 from <http://www.empr.gov.bc.ca/Mining/MineralStatistics/MineralSectors/Coal/MarketsandPrices/Pages/BCCoalPrices.aspx>.
- BC Ministry of Energy and Mines. (2013c). *Production and Values (Metals)*. Retrieved August 18, 2013 from <http://www.empr.gov.bc.ca/Mining/MineralStatistics/MineralSectors/Metals/ProductionandValues/Pages/default.aspx>.
- BC Ministry of Environment. (2013a). BC Air Data Archive [database]. Available from: <http://envistaweb.env.gov.bc.ca/>.
- BC Ministry of Transportation and Infrastructure. (2013). Traffic Data Program [database]. Retrieved from <http://www.th.gov.bc.ca/trafficData/index.asp>.
- BC Stats. (2011). *Socio-Economic Indices. Indicators of Crime, 2012*. Retrieved September 30, 2013 from <http://www.bcstats.gov.bc.ca/StatisticsBySubject/SocialStatistics/SocioEconomicProfilesIndices/SocioEconomicIndices/LHAREports.aspx>.
- BC Stats. (2012a). *British Columbia Incorporations by Development Region, Regional District and Municipality*. Retrieved September 4, 2013 from

<http://www.bcstats.gov.bc.ca/StatisticsBySubject/Economy/BusinessFormationsandFailures.aspx>.

BC Stats. (2012b). *Annual Consumer Bankruptcy Rates by British Columbia CMA and Economic Region*. Retrieved September 4, 2013 from <http://www.bcstats.gov.bc.ca/StatisticsBySubject/Economy/BusinessFormationsandFailures.aspx>.

BC Stats. (2012c). *Annual Business Bankruptcy Rates by British Columbia CMA and Economic Region*. Retrieved September 4, 2013 from <http://www.bcstats.gov.bc.ca/StatisticsBySubject/Economy/BusinessFormationsandFailures.aspx>.

BC Stats. (2012d). *Income and Taxation Statistics*. Retrieved August 18, 2013 from <http://www.bcstats.gov.bc.ca/StatisticsBySubject/LabourIncome/OtherData/IncomeTaxation.aspx>.

BC Stats. (2012e). *British Columbia Multiple Listing Statistics* [data file]. Retrieved from <http://www.bcstats.gov.bc.ca/Files/bf9f1438-815f-410b-8211-1a90683b8ed4/MultipleListingStatistics.pdf>.

BC Stats. (2012f). *Life Expectancy*. Retrieved September 30, 2013 from <http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/VitalStatistics.aspx>.

BC Vital Statistics Agency. (2012). *Selected Vital Statistics and Health Status Indicators: 2011 Annual Report*. Retrieved from <http://www.vs.gov.bc.ca/stats/annual/2011/>.

Blackwell, B.A. (2008). *New Denver / Silverton Protection Area. Community Wildfire Protection Plan Part 2*. Report prepared for the RDCK.

Bolch, T., Menounos, B., & Wheate, R. (2010). Landsat-based inventory of glaciers in western Canada, 1985-2005. *Remote Sensing of Environment*, 114, 127-137.

Brynne, A. (2011). *Regional District of Central Kootenay Agriculture Plan*. Report prepared for the Regional District of Central Kootenay.

Chor, D., & Manova, K. (2012). Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of International Economics*, 87(1), 117-133.

Civic Info BC. (2011). *2011 Local Government and School District Elections*. Retrieved from <http://www.elections.civicinfo.bc.ca/2011/index2.asp?logintype=RD>.

Climate Action Secretariat. (2013). *Community Energy and Emissions Inventory Reports* [data file]. Retrieved from http://www.env.gov.bc.ca/cas/mitigation/ceei/excel/CEEI_SummaryAll_jan23_2013.xls.

Climdex. (2014). *Station Datasets* [data file]. Retrieved from: http://www.climdex.org/view_download.html

- Columbia Basin Trust (CBT). (2007). *Climate Change in the Columbia Basin: Starting the Dialogue*. Retrieved from http://www.cbt.org/uploads/pdf/Climate_Change_in_the_Canadian_Columbia_Basin_-_Starting_the_Dialogue.pdf.
- Crystal, D. (2000). *Language Death*. Cambridge: Cambridge University Press.
- Daniels, T., Keller, J., Lapping, M., Daniels, K., & Segedy, J. (2007). *The Small Town Planning Handbook* (3rd ed.). Chicago: Planners Press.
- DataBC. (2011). WSA – BC Watershed Groups (50,000) [Spatial Dataset]. BC Ministry of Environment. Retrieved from: <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=43753&recordSet=ISO19115>
- Data BC. (2012). Biogeoclimatic Ecosystem Classification (BEC) [Spatial Dataset]. Retrieved from <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?from=search&edit=true&showall=showall&recordSet=ISO19115&recordUID=51819>.
- Data BC. (2013a). Fire Perimeters – Historical [Spatial Dataset]. Retrieved from <http://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=57060&recordSet=ISO19115>.
- Data BC (2013b). TANTALIS - Conservancy Areas [Spatial Dataset]. Retrieved from <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?from=search&edit=true&showall=showall&recordSet=ISO19115&recordUID=54219>.
- Data BC (2013c). BC Parks, Ecological Reserves, and Protected Areas [Spatial Dataset]. Retrieved from <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?from=search&edit=true&showall=showall&recordSet=ISO19115&recordUID=54259>
- Data BC (2013d). Caribou Herd Locations for BC [Spatial Dataset]. Retrieved from <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?from=search&edit=true&showall=showall&recordSet=ISO19115&recordUID=42953>.
- Duxbury, N. (2007). *Cities and Communities: Cultural Indicators at the Local Level*. Workshop Report. Vancouver: Creative City Network of Canada, Centre of Expertise on Culture and Communities.
- Edwards, J., Henderson, S., Struck, S., & Kosatsky, T. (2012). Characteristics of small residential and commercial water systems that influence their likelihood of being on drinking water advisories in rural British Columbia, Canada: a cross-sectional study using administrative data. *Journal of Water and Health*, 10(4), 629-649.
- Edmonton LIFE. (2002). *Edmonton LIFE: Local Indicators for Excellence*. Available from: http://edmontonsocialplanning.ca/images/stories/pdf/EdmLIFE_2002.pdf.
- Emelko, M., Silins, U., Bladon, K., & Stone, M. (2011). Implications of land disturbance on drinking water treatability in a changing climate: Demonstrating the need for “source water supply and protection” strategies. *Water Research*, 45, 461-472.

- Environment Canada. (2011). *2011 Municipal Water Use Report*. Government of Canada. Retrieved from <http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=B77CE4D0-80D4-4FEB-AFFA-0201BE6FB37B>.
- Environment Canada. (2013a). Water Survey of Canada Hydrometric Data [database]. Retrieved from <http://www.wsc.ec.gc.ca/applications/H2O/index-eng.cfm>.
- Gayton, D. & Miller, V. (2012). Impact of biological control on two knapweed species in British Columbia. *Journal of Ecosystems and Management*, 13(3), 1-14.
- Government of British Columbia. (2013). *Economic Region Profiles*. Retrieved September 30, 2013 from <https://tools.britishcolumbia.ca/Invest/Pages/Region.aspx>.
- Hatter, I. (2006). Mountain Caribou 2006 survey results, subpopulation trends and extinction risk. Draft for technical review prepared for B.C. Ministry of Environment.
- Human Early Learning Partnership. (2011). *EDI Data Tables*. Retrieved September 30, 2013 from <http://earlylearning.ubc.ca/maps/edi/data/>.
- Intergovernmental Panel on Climate Change. (IPCC). (2007). *A report of Working Group I of the Intergovernmental Panel on Climate Change: Summary for Policy Makers*. Retrieved from http://www.ipcc.ch/publications_and_data/ar4/syr/en/spm.html.
- Interior Health. (2013). Water Notifications [database]. Retrieved from <http://www.interiorhealth.ca/YourEnvironment/InspectionReports/Pages/WaterNotifications.aspx>.
- International Monetary Fund (IMF). (2013). Softwood Log Export Price. International Monetary Fund. Retrieved August 18, 2013 from <http://www.indexmundi.com/commodities/?commodity=soft-logs&months=120>.
- Invasive Plant Council of BC (IPCBC). (2008). Targeted Invasive Plant Solutions bulletin #13: Giant Hogweed. Retrieved from: http://www.bcinvasives.ca/publications/TIPS/Giant_Hogweed_TIPS.pdf
- Jost, G. & Webster, F. (2012). *Potential impacts of climate change on BC Hydro-Managed water resources*. BC Hydro. Retrieved from <http://www.bc.lung.ca/airquality/stateoftheair-report.html>.
- Kharin, V., Zwiers, F., Zhang, X., & Hegerl, G. (2007). Changes in Temperature and Precipitation Extremes in the IPCC Ensemble of Global Coupled Model Simulations. *Journal of Climate*, 20, 1419-1444.
- Landcor. (2010). *2010 Residential Sales Summary*. Landcor Data Corporation. Retrieved from <http://www.landcor.com/market/market.aspx>.
- Landcor. (2011). *2011 Residential Sales Summary*. Landcor Data Corporation. Retrieved from <http://www.landcor.com/market/market.aspx>.
- Landcor. (2012). *2012 Residential Sales Summary*. Landcor Data Corporation. Retrieved from <http://www.landcor.com/market/market.aspx>.

- Loflin, K. (2013). *The Importance of Placemaking in Community Building*. Presentation at the Association of Kootenay Boundary Local Governments Conference, April 2013. Invermere, BC.
- Murdock, T. & Sobie, S. (2012). *Climate Extremes in the Canadian Columbia Basin: A Preliminary Assessment*. Pacific Climate Impacts Consortium.
- Murdock, T., & Werner, A., (2011). *Canadian Columbia Basin Climate Trends and Projections*. Pacific Climate Impacts Consortium. Retrieved from http://cbit.org/uploads/pdf/PCIC_Basin_Climtate_Trends_Projections.Jul2011.pdf.
- Parks Canada. (2011). *Conservation Strategy for Southern Mountain Caribou in Canada's National Parks*. Available from: http://www.pc.gc.ca/pn-np/mtn/caribou/~media/pn-np/mtn/pdf/caribou/Caribou_Conservation_Strategy_ENG_lowres.ashx
- Power, A.G. (2010). Ecosystem services and agriculture: trade-offs and synergies. *Philosophical transactions of the Royal Society Biological Sciences*, 365, 2959-2971.
- Regional District of Central Kootenay (RDCK). (2010). *Regional Water Management Plan*. Retrieved from: http://rdck.bc.ca/publications/pdf/WaterPlan_72_DPI.pdf.
- Revelstoke Caribou Rearing in the Wild (RCRW). (2013). *Background*. Retrieved September 18, 2013 from <http://rcrw.ca/background/>.
- Robinson, D.C.E., Knowler, D., Kyobe, D., & Bueno, P.C. (2013). *Preliminary damage estimates for selected invasive fauna in BC*. Ministry of Environment. Available from: http://www.aquaticnuisance.org/wordpress/wp-content/uploads/2010/06/InvasiveFauna_EconomicImpacts_Prelim-BC_2013.pdf
- Rowthorn, R.E. & Ramaswamy, R. (1997). *Deindustrialization – Its Causes and Implications*. International Monetary Fund. Available from: <http://www.imf.org/external/pubs/ft/issues10/issue10.pdf>
- Russel, R. (ed.). (2011). *Boundary Area Agriculture Plan*. Regional District of Kootenay Boundary.
- Singh, V. (2006). Rural Employment in the Culture Sector. *Rural and Small Town Canada Analysis Bulletin*, 6(8), 1 – 16.
- Stanborough, M. (2011). The link between: Culture and sustainability in municipal planning. *Culture and Local Governance*, 3(1-2), 95 – 100.
- Statistics Canada. (2007). 2006 Community Profiles [table]. Catalogue no. 92-591-XWE. Retrieved June 10, 2013 from <http://www12.statcan.gc.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E>.
- Statistics Canada. (2012a). *Gross Domestic Product*. Retrieved from <http://www5.statcan.gc.ca/subject-sujet/subtheme-soustheme.action%3bjsessionid=785D964DB04526FC05BB48FC65E4C663?pid=3764&id=3012&lang=eng&more=0>.

- Statistics Canada. (2012b). Census Profile 2011 [table]. Catalogue no. 98-316-XWE. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E>.
- Statistics Canada. (2012c). Census of Agriculture 2001, 2006, 2011. Retrieved from <http://www.statcan.gc.ca/ca-ra2011/>.
- Statistics Canada. (2013a). Labour Force Survey [custom table]. Based on catalogue nos. 282-0002, 282-0004, 282-0008, 282-0072.
- Statistics Canada. (2013b). 2011 National Household Survey: Mode of Transportation [table]. Catalogue no. 99-012-X2011050. Retrieved from <http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/dt-td/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=0&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=0&PID=105623&PRID=0&PTYPE=105277&S=0&SHOWALL=1&SUB=0&Temporal=2013&THEME=96&VID=0&VNAMEE=&VNAMEF=>.
- Statistics Canada. (2013c). 2011 National Household Survey: Commuting Flow [table]. Catalogue no. 99-012-X2011032. Retrieved from <http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/dt-td/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=0&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=0&PID=106036&PRID=0&PTYPE=105277&S=0&SHOWALL=1&SUB=0&Temporal=2013&THEME=96&VID=0&VNAMEE=&VNAMEF=>.
- Statistics Canada. (2013d). 2011 National Household Survey Profile [table]. Catalogue no. 99-004-XWE. Retrieved from: <http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E>.
- Stiglitz, J., Sen, A. & Fitoussi, J. (2008). *Issues Paper - July 25, 2008*. Commission on the Measurement of Economic Performance and Social Progress. Available from: http://www.stiglitz-sen-fitoussi.fr/documents/Issues_paper.pdf.
- Stewart, S. (2007). *Cultural Mapping Toolkit*. Vancouver: Creative City Network of Canada. Available from: http://www.creativecity.ca/database/files/library/cultural_mapping_toolkit.pdf
- Summit Environmental Consultants. (2012). *Kettle River Watershed Management Plan: Phase 1 Technical Assessment*. Regional District of Kootenay Boundary. Retrieved from http://kettleriver.ca/wp-content/uploads/2012/11/summit_2012_krwmp-phase-1.pdf.
- Szkorupa, T. and Mowat, G. (2010). *A population review for Elk in the Kootenay Region*. Ministry of Environment. Retrieved from: [http://a100.gov.bc.ca/appsdata/acat/documents/r19918/Kootenayelkpopulationreview\(final\)_1285775784097_07e42d4aa8a5250c8c78393ef8c2e364ae445a38927592438753b2d06e1117c.pdf](http://a100.gov.bc.ca/appsdata/acat/documents/r19918/Kootenayelkpopulationreview(final)_1285775784097_07e42d4aa8a5250c8c78393ef8c2e364ae445a38927592438753b2d06e1117c.pdf).
- Tamarack Institute. (2010). *Approaches to Measuring More Community Engagement*. Retrieved from http://tamarackcommunity.ca/downloads/index/Measuring_More_Community_Engagement.pdf.

- United Nations Educational, Scientific, and Cultural Organization (UNESCO). (2002). *UNESCO Universal Declaration on Cultural Diversity*. France: UNESCO.
- Utzig, G., Boulanger, J., & Holt, R.F. (2011). *Climate change and area burned: Projections for the West Kootenays*. Report #4 from the West Kootenay climate vulnerability and resilience project. Retrieved from <http://www.kootenayresilience.org>.
- Wittmer, H.U., McLellan, B.N., Seip, D.R., Young, J.A., Kinley, T.A., Watts, G.S., & Hamilton, D. (2005). Population dynamics of the endangered mountain ecotype of woodland caribou (*Rangifer tarandus caribou*) in British Columbia, Canada. *Canadian Journal of Zoology*, 83, 407-418.
- World Bank. (2013). *Wood Pulp Prices*. Retrieved August 18, 2013 from <http://www.indexmundi.com/commodities/?commodity=wood-pulp&months=120>.
- Yam, P. (2012). *China to resume stockpiling base metals soon*. Retrieved September 15, 2013 from <http://www.reuters.com/article/2012/11/06/china-metals-stockpiling-idUSL3E8M64KY20121106>.
- Zhang, K. F. (2013). New Denver Glacier surface reduction study using Landsat imagery, 1999 - 2010. Unpublished manuscript.