

CIRC

The Cumulative Impacts
Research Consortium

Environment

Community

Health

Observatory

Network

Integrated Regional Profiles:

Preparing integrated regional profiles to
explore connections across environment,
community and health values



This document outlines the process undertaken by CIRC staff to develop an informational tool capable of communicating information across the themes of environment, community and health in a concise, user-friendly format. This activity was documented for the purpose of sharing tools and processes with researchers, practitioners and communities seeking ways to document, integrate and share data and information with a wide variety of collaborators.

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Authorship statement

Madeline Wilson led the writing of this report, including the supervision of the original draft; Bunu Gauli-Sharma drafted an outline that comprised the first version of this document; Ryan O’Toole provided support for the regional profile data collection process; and, Chris Buse oversaw the process of developing the integrated regional profiles and provided editorial comments and suggestions on the report.

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About the Cumulative Impacts Research Consortium (CIRC)

The Cumulative Impacts Research Consortium (CIRC) is a research and community outreach initiative at the University of Northern British Columbia that is dedicated to enhancing the understanding of the cumulative environmental, community, and health impacts of resource development. For more information on our ongoing research and initiatives, please visit <https://www.unbc.ca/cumulative-impacts>.

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1. Introduction

1.0 Background information

Throughout 2016-2018, the Cumulative Impacts Research Consortium (CIRC) developed a tool that integrated a variety of environment, community, and health information into a single, pamphlet-style document. The “integrated regional profile” tool was initially developed using data for the Peace River Region, an area in northeast British Columbia (BC) that has experienced the cumulative impacts from multiple forms of resource extraction and development. CIRC subsequently developed integrated regional profiles for the Bulkley-Nechako and Northern Rockies regions in northern BC. This document will utilize the Peace River Regional Profile as a case study to discuss how CIRC developed these integrated regional profiles.

The Peace River Region lies within the large geographic area now encompassed by Treaty 8, the territories of the Sicannie (Sikanni), Slavey, Beaver (Dane-Zaa), Cree, and Saualteau ethno-linguistic groups (Treaty 8 Tribal Association, 2018). CIRC developed an integrated regional profile for the Peace River Region in order to inform a community conversation around environmental, community, and health values in the region, and the ways in which these values have been both positively and negatively impacted by resource development. This approach reflects the broader orientation and goals of CIRC’s research and community outreach activities, which seek to better understand the positive and negative cumulative impacts of resource development across northern BC by integrating environmental, community, and health values and perspectives. Informed by our community outreach and engagement, CIRC seeks to enhance on the ground capacity to respond to issues related to cumulative impacts.

1.1 What are cumulative impacts?

“Cumulative impacts” refer to both the short- and long-term implications of resource extraction and development activities for people, their communities, and the broader environments in which those communities are located. This includes both direct and typically observable effects of a single resource development project, along with the longer-term impacts that may flow from a single project or combination of projects. Cumulative impacts are experienced over large geographic areas beyond the footprint of a single resource development project, and occur across long time scales, including the impacts of past, present, and potential future land use activities. CIRC takes an integrative approach to considering both the positive and negative cumulative impacts of resource development from environmental, community, and health perspectives. This approach recognizes that cumulative impacts are experienced differently according to those perspectives, and may also interact, leading to more complex outcomes for environments and communities (Halseth, et al., 2016, p.13).

1.2 What is an integrated regional profile?

Integrated regional profiles are short documents that provide regional-level data and information pertaining to environment, community, and health values that may be impacted by one or more resource development projects (an electronic version of the Peace River Regional Profile can be found in Appendices A and B). It is a tool to communicate and foster discussion related to cumulative impacts and can:

- Provide a mechanism to integrate information reflecting a variety of values;
- Help make connections between seemingly disparate regional characteristics (i.e. housing prices and self-reported health status);
- Be adapted to inform a variety of land use decision-making and planning processes that occur at various jurisdictional scales;
- Provide baseline information and trajectories of change for a range of positive and negative impacts of resource development; and,
- Surface gaps in data that may aid in better understanding and addressing cumulative impacts.

1.3 Tools and processes: Using integrated regional profiles to inform data-driven storytelling

We view integrated regional profiles as useful tools that have inherent value in communicating information. However, tools are often only as effective as the processes to which they are attached. The Peace River Regional Profile was specifically designed to facilitate a “data-driven storytelling” process during a series of five community workshops held throughout the Peace River Region in June 2017, in which participants were invited to share stories or reflections in response to the information presented in the integrated regional profile, and to the following question: *Resource development activities across northern BC have direct and indirect impacts on environment, community, and health values. Can you think of a time where those connections seemed most apparent to you?*

Used in combination with the integrated regional profile tool, the data-driven storytelling process seeks to:

- Explore areas of convergence and divergence between narratives, and other kinds of data or information that represent community, environmental, and health values;
- Explicitly recognize that many decision-making processes are driven by quantitative information, and to provide a mechanism to collect narratives, lived experiences, and local wisdom for public reporting;
- Make sense of cumulative impacts across different areas of northern BC, and to integrate past experiences with present realities and visions for the future; and,
- Provide a space for participants to share issues they feel go unnoticed in conventional land use decision-making processes, holding space for both researchers and community

members to hear and hold multiple perspectives of a region's lived reality at the same time, in dialogue with one another.

Both the integrated regional profile *tool* and data-driven storytelling *process* were designed to facilitate data integration and knowledge exchange. Taken together, the integrated regional profile and data-driven storytelling workshops were designed to help inform a more complex understanding of cumulative impacts that merges conventional data sources with stories that reflect the lived experiences of cumulative impacts for people and communities. In order to facilitate this process, the Peace River Regional Profile was specifically framed as a “snapshot” of the Peace River Region in time, and as a sample method for integrating data and information across the domains of environment, community, and health over a 25-year time period. These workshops provided an opportunity to seek feedback on the kinds of data and information displayed in the Peace River Regional Profile, and the kinds of information missing from this document. As an additional resource, a more detailed description of the data-driven storytelling workshop design is included in Appendix C.

1.4 Purpose of this guide

This document outlines the process used by CIRC to develop an integrated regional profile for the Peace River Region. It outlines the various environment, community, and health information points included in the profile, and includes references and web-links for all data sources utilized. This guide should be used as a reference only, as relevant themes and information points will be significantly shaped by the purpose and geographic scope of each unique integrated regional profile. The following sections will:

- Provide an overview of the information points included in the integrated regional profile developed for the Peace River Region;
- Provide an outline of potential sources of publicly available data and information (most relevant in the Canadian context); and,
- Give examples of how a variety of data sources and information points can be condensed and integrated within a single document.

2. Designing an integrated regional profile

2.0 Defining the purpose

The intended purpose of an integrated regional profile should be clearly defined. As this information tool is user-oriented, the current and future potential purpose(s) of the tool should be defined in conversation with people and organizations that may be able to use this kind of tool and associated information in their ongoing work. This process should seek to clarify important thematic elements, the kinds of information that should be included, and the potential utility of this tool for multiple user groups. As described previously, the informational tool will be most effective when paired with a process that helps to facilitate further knowledge integration and exchange. Discussing potential processes and desired outcomes with collaborators will help define the purpose of an integrated regional profile.

2.1 Defining the scale

Integrated regional profiles could potentially display information at a variety of scales, including a city or town, regional district, health service delivery area, national census division, watershed, or biogeoclimatic zone. The scale and availability of information should be taken into consideration in defining the scale, as some information points will only be available at a specific scale (i.e. most Statistics Canada data is available at the level of census divisions, whereas data from the Canadian Community Health Survey is only available at the level of Local Health Areas).

While CIRC staff initially considered producing profiles for five specific communities located throughout the Peace River Region, it was difficult to access information at the local scale. In addition, much of the literature around cumulative impacts assessment frameworks stresses the importance of considering the impacts of multiple forms of resource extraction at the *regional* scale (Johnson et al., 2016, 218-19). Due to both the scale of available data and the benefits of considering cumulative impacts at the regional scale, CIRC staff decided to focus data collection and reporting on the Peace River Region as a whole. However, in using the Peace River Regional Profile to facilitate workshops at the community level, CIRC heard from workshop participants that information at the regional level can obscure more nuanced and locally specific contexts. The advantages and disadvantages of various potential scales should therefore be considered in relation to the intended purpose of the document.

2.2 Design elements

The content and design of an integrated regional profile will be significantly shaped by its intended purpose. The following design elements were considered in producing the Peace River Regional Profile:

- The general design should be simple and include limited text. Figures, graphs, and tables were used to depict information wherever possible;
- All information and figures were designed to fit on a double-sided legal sized piece of paper, folded in half;
- The profile should contain a combination of quantitative and qualitative information. Qualitative information is presented in the form of narrative synopses of past research pertaining to a particular value or information point;
- The profile should include approximately 8-10 information points pertaining to each of the environment, health, and community values; and,
- In order to conserve space, all references were footnoted and detailed citations were included in a separate document, or hyperlinked in the 'about this document' section in the event those documents become separated.

2.3 Key themes and information selection

After establishing the particular topical and geographic focus of an integrated regional profile, relevant information points can be selected. The process of selecting key themes and information points should be done in collaboration with people and organizations that will potentially use this tool, wherever possible.

The Peace River Regional Profile was designed with a deliberately integrative focus, and included a variety of environmental, socioeconomic, and human health information. Key literatures on cumulative impacts assessment frameworks underscore the importance of identifying and assessing the cumulative impacts of resource development in relation to regionally-specific valued socioecological components (Johnson, et al., 2016, 232). As the cumulative environmental, community, and health impacts of resource development are place-specific, frameworks and approaches for assessing cumulative impacts must meet the unique social and environmental values and characteristics facing any given region (Johnson, et al., 2016, 220).

CIRC's process of identifying key themes, values, and information points has been informed by ongoing community engagement with people who could potentially use the integrated regional profiles as tools to help address issues related to cumulative impacts. Through these ongoing processes, CIRC has received feedback around what is important for communities and their supporting environments. For the purposes of the Peace River Regional Profile, 8-10 information points were selected for inclusion for each of the environment, community, and health themes in order to help better understand and assess the positive and negative impacts of resource extraction and development for community and environmental health. Wherever possible, comparative information was provided for both the Peace River Region and the Province of BC in order to provide additional context for each information point.

2.4 Data identification and sourcing

It is important to establish the state of baseline information for each information point. This process will help to establish what kinds of publicly available information are accessible, and whether any other organizations have taken on similar processes of data collection. This process can be utilized to historically represent changes to values over time. CIRC staff used three main strategies to establish the state of baseline information pertaining to environment, community, and health values in the Peace River Region:

- Literature reviews of both published and grey literatures;
- Free public workshops in which participants engaged in value prioritization exercises; and,
- Community surveys and ongoing communication with various individuals and organizations around both value prioritization, and the kinds of information that would be most helpful in understanding the past, current and potential future state of those values.

Through ongoing work with communities, CIRC also received important feedback and insights into the kinds of information sources various community partners are either already using or collecting, and the kinds of information gaps that exist. As a general principle, information was selected for inclusion based on geographic relevance, temporal relevance, and quality of information sources. All information points included, along with all data sources utilized and associated web-links are included in Appendix D.

3. Conclusion

3.0 Benefits and limitations of integrated regional profiles

Presenting data and information on environment, community and health in integrated regional profiles can be helpful and strategic, and can also present particular challenges and limitations. Based on our experience, the benefits of this kind of tool include:

- Communicating an assortment of information on a wide variety of topics at once, including patterns and relationships of change over a period of time;
- Presenting information on regional values in a visually appealing manner;
- Facilitating conversations around issues of local or regional importance; and,
- Raising awareness of publicly available data sources, thereby enabling users of integrated regional profiles to seek out more information around particular information points that may be relevant to them.

Based on our experience, integrated regional profiles may present the following limitations:

- The identification and selection of information points will be significantly impacted by data availability and the robustness of engagement processes with potential audiences for such a document;
- Available information is not always current, and the best available information may be dated and not entirely reflective of current conditions; and,
- Granularity of available information may not always correspond with the desired level of analysis (i.e. particular data sets may cover larger regional areas than the analyst may be interested in).

3.1 Future directions

Integrative regional profiles can be useful tools to integrate, communicate, and track information related to environment, community, and health values. This kind of data integration tool is highly adaptable, and could potentially focus on different themes and information points than the Peace River Regional Profile. The authors understand communication tools such as integrated regional profiles to be most effective when combined with processes that enable a variety of users to respond to data and information with meaningful action. While an integrated regional profile could be developed as a stand-alone communication tool, it can also be usefully combined with a variety of processes in order to provide context, clarity, and to necessarily seek and receive user-feedback that could be incorporated into future communication tools (including potentially a future iteration of an integrated regional profile). As previously discussed, the Peace River Regional Profile was developed as a communication tool, and was used to facilitate a “data-driven storytelling” workshop process during a series of five community workshops held throughout the Peace Region (see Appendix C).

While the contexts in which this tool and process could be utilized are numerous, these kinds of tools and processes can:

- Provide a mechanism to integrate information reflecting a variety of values, helping to make connections between seemingly disparate components of the same system;
- Be adapted to various scales of landscape analysis, and can thus be adapted to inform a variety of land use decision making processes;
- Provide baseline information—and trajectories of change—for a range of positive and negative impacts of resource development;
- Surface gaps in data that may aid in better understanding and addressing cumulative impacts; and,
- Assist in making connections to other organizations and potential collaborators.

References

- Halseth, G.R., Gillingham, M.P., Johnson, C.J., and Parkes, M.W. (2016). Cumulative effects and impacts: the need for a more inclusive, integrative, regional approach. In M.P. Gillingham, G.R. Halseth, C.J. Johnson and M.W. Parkes (Eds.), *The Integration Imperative* (pp.3-20). Springer International Publishing.
- Johnson, C.J., Gillingham, M.P., Halseth, G.R., and Parkes, M.W. (2016). A revolution in strategy, not evolution of practice: towards an integrative regional cumulative impacts framework. In M.P. Gillingham, G.R. Halseth, C.J. Johnson and M.W. Parkes (Eds.), *The Integration Imperative* (pp.217-242). Springer International Publishing.
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List of Appendices

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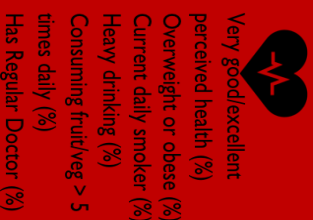
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Health³

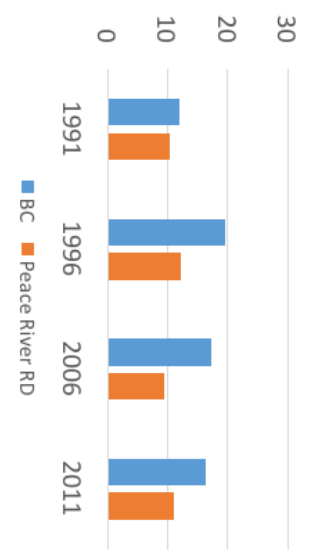
- Chronic conditions (e.g. arthritis, diabetes, asthma, high blood pressure) are similar to provincial averages
- Leisure-time physical activity rates, perceived mental health, and self-reported life stress are similar to provincial averages
- Higher incidence of smoking, drinking, poor diets: access to adequate care a challenge



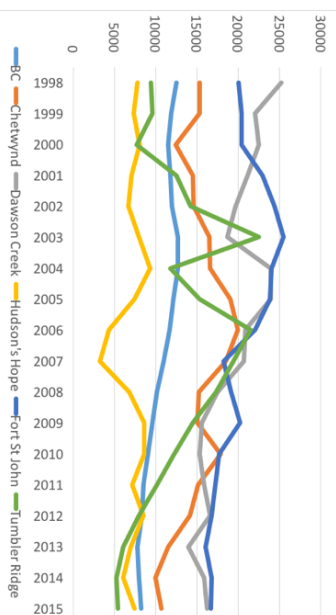
	2001	2009	2013
Northeast BC	55.4	49	55.6
BC	57.2	56.9	59.9
Northeast BC	47.6	45.1	46.6
BC	60.9	18.6	11.1
Northeast BC	23.5	17	22.6
BC	19.7	15.5	16.3
Northeast BC	35.1	34.6	34.6
BC	39.1	42.4	41.3
Northeast BC	87.6	88	83.6
BC	89.1	86.8	86

Social Services^{1,16} and Crime¹⁷

% Prevalence of Before Tax Low Income Individuals, 1991-2011



Crime Rate per 100 000 for all Criminal Code Violations (excluding traffic violations)



- Frontline services in NE BC are stretched to meet community needs
- Difficult to retain staff when competing with high wages of resource sector
- During economic downturn, foodbanks and shelters report increased service demand

About this project

CIRC—with funding from the Real Estate Foundation of BC—is focused on broad and inclusive public engagement. This project seeks to build new tools to support regional cumulative impacts assessment and enhance natural resource decision-making.

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Add a project to our living library of resources:

cumulativeimpactslivinglibrary.ca

About the CIRC

The CIRC is a pan-UNBC initiative and a platform for original research and community dialogue on the cumulative environmental, community and health impacts of resource development. We are located in Prince George.

Exploring the Cumulative Impacts of Resource Development A Regional Profile of the Peace River Region, British Columbia

About this document

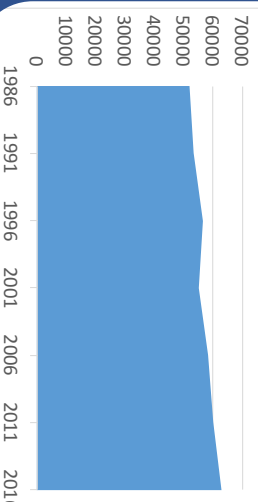
Resource development is a primary driver of local economies and social development in northern communities across British Columbia. However, there is an increasing need to understand the long-term positive and negative impacts of development activities for environments, communities and human health. This regional profile integrates a variety of data sources to provide a 'snapshot' of change in the Peace River Region over time. While this is one tool to understand cumulative impacts of development, the perspectives and lived experiences of communities are an equally important source of information. UNBC's Cumulative Impacts Research Consortium (CIRC) hopes this document, and the stories it elicits, will inform a collective conversation on the following question:

“How do we make better land-use decisions that account for long-term impacts to environmental, community and health values?”

Regional Demographics¹⁻²



Peace Region Census Population has grown 21% since 1986

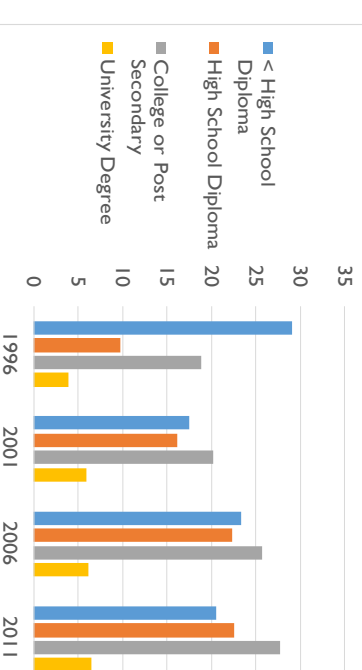


- The region typically grows 2-5% per year
- Between 1996-2001 there was a 2.5% decrease in regional population

% of Census Population Identifying as Indigenous, Aboriginal, First Nations or Metis

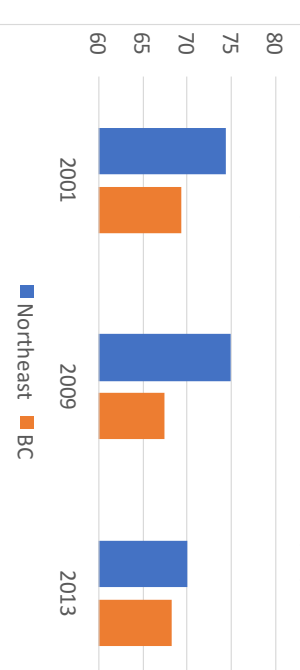
Year	Peace Region	BC
1996	9.1%	3.7%
2001	13%	4.4%
2006	12%	4.8%
2011*	13.5%	5.3%

% of Census Population by Education



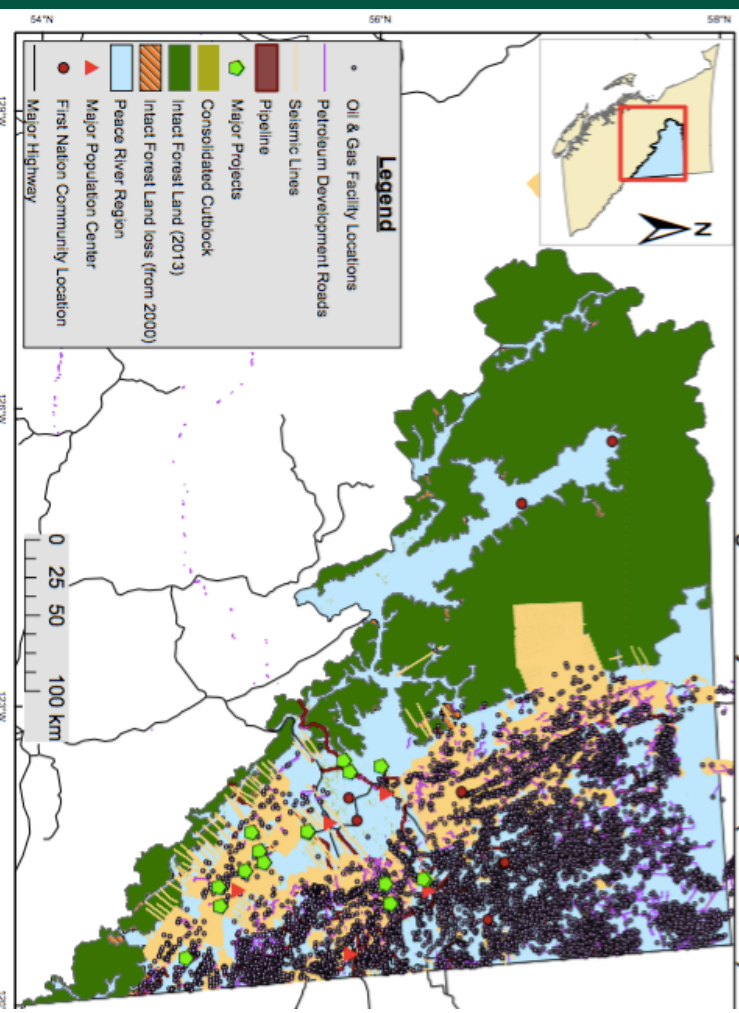
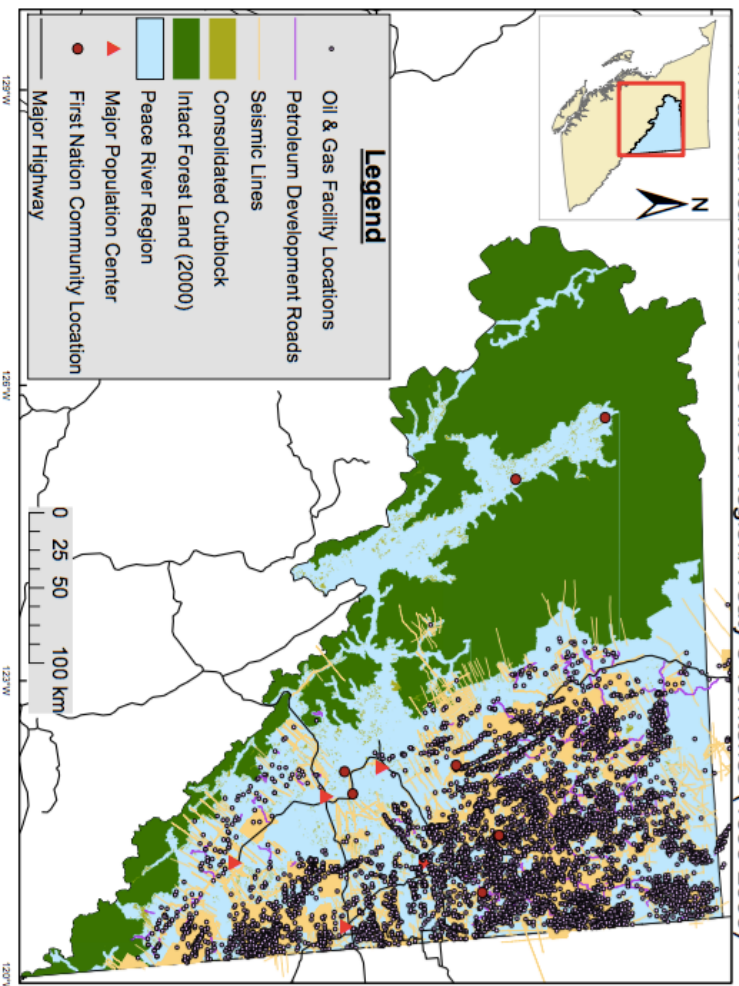
- Education levels are rising in the Peace, but are not as high as provincial averages

% of people indicating a 'strong' or 'somewhat strong' sense of community belonging



Treaty 8 was signed in 1899, encompasses 840,000 sq. km, and is home to 8 BC First Nations each with a rich cultural heritage.

Residents of the Peace have a strong sense of connection and belonging to their communities.³



Climate Change (2030)⁵

- Warmer winters, hotter summers
- More consecutive days of rain in the fall
- Increase in extreme rainfall and other severe weather events (drought, fire risk)

Air Quality⁶⁻⁷

- Between 1988-2013, 15 monitoring stations in the region found few exceedances of provincial air quality standards for SO₂, NO₂, H₂S and PM_{2.5}
- PM_{2.5} exposure continues to be a health concern from increased traffic patterns and fire activity

Water Quality⁸⁻¹⁰

- General worsening of water quality over time, but no present health risks
- Data on ground water quality is limited in terms of natural and human impacts

Wildlife¹¹

- Net cumulative impacts on grizzly bear, lynx, fisher, wolf, wolverine and caribou is significant
- Absolute reductions in regional landscape effectiveness among species range from 7-47% at present to a projected loss of 11-55% in 25 years

Agriculture Land Reserve (ALR)¹²

- 11% of the Peace is within the ALR, the Peace comprises 27% of the provincial ALR
- Farm size and operating expenses have increased over the past 25 years
- 7% decline in productivity from 2006-2011

Employment Profile¹⁻²

Peace Region		BC		
1996	2011	1996	2011	
Median Income	\$20,298	\$36,538	\$19,982	\$28,765
Unemployment Rate	9.7%	6.4%	9.6%	7.8%
Employment Growth	12.4%		20.0%	

- The regional workforce distribution across sectors stayed consistent between 1991-2011
- Labour demands outpace local workforce availability leading to low unemployment rates, but some workers are precariously employed raising concern for long-term job security
- In 2011, Oil and gas employed about 13% of the region's workforce

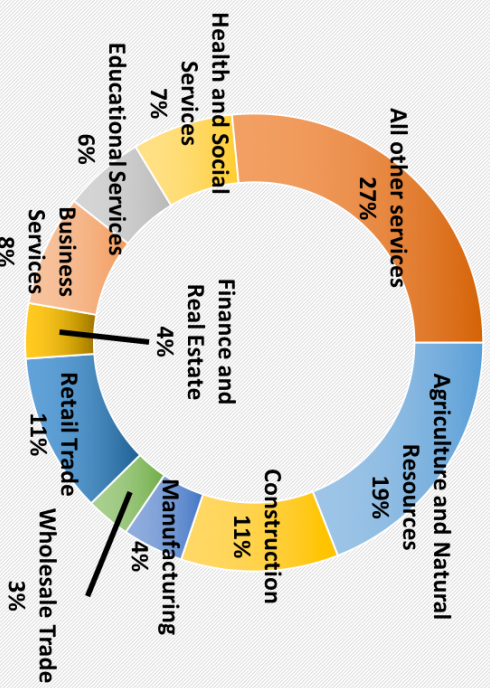
Housing Profile¹⁻²

	1991	2011
Average House Value	\$68,074	\$04,936
Average Rent	\$485	\$952
Median Owner Major Payments on Housing	\$575	\$1,145
% of owners spending 30% or more of household income on shelter costs	8.2%	15.4%
% of tenants spending 30% or more of household income on shelter costs	19.8%	35.4%

- As of 2016, housing prices have consistently grown 2-5% annually for many communities throughout the Peace¹⁵
- Fort St John home prices are higher on average than most communities in the Peace, and Tumbler Ridge has been witness to significant declines in housing prices over the past several years due to coal industry slowdown

“How government and the ministry will use the Cumulative Effects Framework assessments in the decision-making process for future natural resource development proposals has not yet been determined. This is concerning because if the assessments are to be of value, they must inform and support decisions about if and how development should proceed” (BC Auditor General 2015).¹³

Workforce Profile (Aged 15+), 2011¹⁻²



Appendix C. CIRC data-driven storytelling workshop facilitator guide from Peace River Region community workshops (held June 19-23, 2017)

The past, present and future of natural resource communities in the Peace River Region

A community workshop to learn and share stories about the positive and negative impacts of resource development

Overview

The Cumulative Impacts Research Consortium (CIRC) will be facilitating a series of workshops in relation to the project “Developing new tools for assessing the cumulative impacts of resource development across northern BC: Integrating environmental, socioeconomic and human health assessment methods”. This project is specifically oriented towards broad and inclusive public engagement to conceptualize the next generation of cumulative impact assessment tools capable of integrating environmental, community, and health values to support local and regional monitoring activities and associated decision-making processes, and help address on the ground capacity issues.

This workshop intends to create space for various community members to share stories around their lived experience of cumulative impacts in relation to environmental, community, and health values. These conversations are part of an ongoing dialogue around how the CIRC can best support ongoing work around the issue of cumulative impacts by helping to address on the ground capacity issues.

In this workshop, CIRC staff will share a suite of information around socioeconomic, health and environmental indicators for each community. This “integrated regional profiles” will be used to illustrate that there are many different narratives embedded in these data sets, and that these narratives may resonate more or less closely with participants own lived experience. Through this process, facilitators will create space in which alternative or counter narratives that help to illustrate the complexity of values, information, and realities related to cumulative impacts in the Peace River Region can emerge. It will also be an opportunity to get feedback around the kinds of information not reflected in the integrated regional profiles, and the knowledge gaps that make understanding, monitoring, and assessing the state of community, health, and environmental values difficult.

The **primary goals** of this workshop include:

- 1) Relationship building: to provide a platform to build and strengthen existing relationships across diverse perspectives located throughout communities in northeast BC.
- 2) Share local knowledge and experiences: share stories and lived experiences of various individuals living and working in the Peace River Region in relation to community, health, and environmental values.
- 3) Foster conversations that inform a holistic understanding of cumulative impacts: facilitate discussion around the kinds of information that are most useful in understanding and integrating environmental, community, and health values, and the ways in which we might begin to understand the past, present, and potential future states of these values.

Workshop Agenda

5:45 – 6:00 PM	Registration + food, coffee and tea
6:00 – 6:10 PM	Orientation to the Cumulative Impacts Research Consortium (CIRC) and the overall project goals Provide overview of feedback we have received from northern communities thus far and how CIRC is attempting to respond to those issues, emphasizing the user-oriented, community-based, and iterative nature of this project. This explanation will include the various ways we will solicit input and feedback on an ongoing basis.

6:10- 6:25	<p>“Icebreaker” group discussion Group discussion with all participants oriented towards the following broad question: <i>What brought you here today?</i></p>
6:25 – 6:35	<p>Orient to “integrated regional profile”</p> <ul style="list-style-type: none"> • Reiterate the goal of finding ways to understand <i>regional</i> cumulative impact; • Emphasize this is just a story, not <i>the</i> story of the region. The data that we’ve used is as objective as it can be (bringing back to importance of cultivating a value neutral platform for conversation); • Emphasize that we want participants to reflect on the information shared, but also to use these profiles as a starting point to drive their own stories, which may support or run counter to the information provided from Census sources, BC Health Data, and BC MOE and MFLNRO data on regional change over the past 25 years; • Highlight “known unknowns”, and the need to solicit additional data gaps/data sources from people in the room.
6:35-7:35	<p>Story sharing circles and report back Depending on the number of participants and facilitators in the room, decide whether the story-sharing circle will occur in one large group (ideal for up to 20 participants, with 2-3 facilitators), or multiple smaller groups (each with their own facilitator and a recorder in the middle of the table). Once the groups have been established and the activity has been explained, go around the circle once and ask participants to share a story in response to the information presented in the integrated regional profiles and in response to the following question:</p> <p><i>Resource development activities across northern BC have direct and indirect impacts on environment, community and health values. Can you think of a time where those connections seemed most apparent to you?</i></p> <p>Additional discussion prompts:</p> <ul style="list-style-type: none"> • Are there stories that you can share about the meaning/importance of the environment, your community and health from your personal experience? • Do the figures and maps resonate with these stories/your experience? Why or why not? • What kinds of changes have you noticed in the place you live over the last ten/twenty/fifty years? • If you haven’t lived here for that long, can you tell a story about how this place is different from somewhere you’ve lived previously? • Do you feel these changes are positive or negative? Has the pace of change shifted? • Are those changes experienced differently by different people? • Are there mechanisms taking notice of these changes? <p>After participants have all had the chance to share one story each, open it up to broader discussion:</p> <ul style="list-style-type: none"> • What’s missing from the data and information on this sheet? • Do any particular data points evoke a strong feeling/reaction/response? • Does the concept of cumulative impacts feel relevant? Are you concerned about it? <p>If the story-sharing discussions occurred in more than one group, then each facilitator will briefly report back on some of the main things that stood out from the small group discussions in plenary (focusing on key themes shared from stories, but not attributing specific stories to any individual). Each facilitator should allow participants to share anything else that comes to mind or things they thought were important that were not captured in the reporting back.</p>
7:35 – 7:55	<p>Integrative discussion and debrief The workshop will conclude with an integrative discussion and debrief in plenary. This will be an opportunity to share thoughts and reflections in response to the integrated regional profiles and story-</p>

	<p>sharing circle, and to reflect on the following question:</p> <p><i>How might we collectively begin to make better decisions that protect the environment, community and health, while also providing meaningful employment, and economic and cultural development opportunities?</i></p> <p>Additional discussion prompts:</p> <ul style="list-style-type: none"> • Is this kind of tool helpful in taking notice of local values? • We've heard a lot about integration and the value of having a more holistic approach to understanding large scale changes to our communities, environments and health. Is there value to this approach? • Is there anything else you would like to discuss?
<p>7:55 – 8:00</p>	<p>Evaluation, Closing Remarks</p> <p>This workshop is part of an ongoing conversation; we will be continuing to reach out to communities in the Peace, and returning in a year's time to share some insights and propose some potential directions for this research project to hear whether or not these initial project directions seem helpful. Between now and then, we will be looking for other ways to engage and get feedback. We have evaluation forms here today, and also have an online evaluation form for anonymous feedback; please feel free to get in touch; Living Library submissions</p>

Appendix D. Environment, community and health information points included in the Peace River Regional Profile

1. Environment

This section outlines the environmental information points included in the Peace River Regional Profile, and the data and information sources that were accessed. It also includes a description of the geospatial data layers included in the “Industrial Activities in the Peace River Region/Treaty 8 Territory” maps, and the data sources used to compile these maps. Environmental data sources and associated web-links are summarized in Table 1.

- 1.0 Climate Change: Information summarizing 2030 regional climate change projections for the Peace River Region was obtained through web searches of scholarly and grey literatures.
- 1.1 Air Quality: Overall trends in regional air quality for the “Northeast Air Zone”, especially with regards to SO₂, NO₂, H₂S and PM_{2.5}, was obtained from the BC Air Data Archive (Omineca-Peace Region), and from an air quality characterization study for the Peace Region.
- 1.2 Water Quality and Quantity: Information on overall water quality and quantity, and the state of information with regards to groundwater resources, was summarized based on information from three government and non-government reports.
- 1.3 Wildlife Health: Information pertaining to overall impacts to grizzly bear, lynx, fisher, wolf, wolverine and caribou populations, and overall impacts to wildlife habitat effectiveness, was obtained from a report assessing cumulative impacts to wildlife species across the Peace Break.
- 1.4 Agricultural Land Reserve (ALR): The ALR is a provincial land use zone in which agriculture is recognized as a priority use, farming is encouraged, and non-agricultural uses are restricted to some extent. Information pertaining to the percent of land in the Peace River Region designated as ALR lands, and the overall productivity of regional agriculture activity, was included.
- 1.5 “Industrial Activities in the Peace River Region/Treaty 8 Territory between 1996-2006; 2006-2016” Maps: These maps were produced using ArcGIS by including several different data layers pertaining to various industrial activities in the Peace River Region. These data layers were obtained from multiple sources, as outlined below:
 - Major Population Centres: The latitude and longitude of major population centres located throughout the Peace River Region were obtained from the Peace River Regional District Profile.
 - First Nations Community Locations: Latitude and longitude information of some First Nations community locations were also obtained from the Peace River Regional District Profile. It should be noted that these information sources do not reflect Indigenous territories, and more likely provide information on Reserve locations.
 - Oil and Gas Facility Locations; Petroleum Development Roads; Seismic Lines; Pipelines: This information was obtained from the BC Oil and Gas Commission Open Data Portal. This data is publicly available for the entire province, and can be previewed as a map and downloaded as a spreadsheet, shapefile, and KML file. For the Peace River Regional Profile, the shapefile of each of dataset was downloaded and clipped by the Peace River Regional District (PRRD) shapefile using ArcGIS. Data was

further categorized based on the date of operation indicated in its attribute table. Thus, comparative data for two different time periods, 1996-2006 and 2006-2016, was extracted.

- Major Projects: Major project locations were obtained from the BC Data Catalogue (2017) under the section “Natural Resource Sector Major Projects-Points”. The dataset is managed by the BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development (MoFLNRORD) Major Projects Office, and includes large-scale mines, clean energy projects, pipelines, LNG facilities, major resorts, and hydro transmission lines. The dataset is available for the entire province. Data for the PRRD was clipped using GIS.
- Consolidated Cutblocks: Information on consolidated cutblocks in BC is available from the BC Data Catalogue under the section “Harvested Areas of BC (Consolidated Cutblocks)” published by the MoFLNRORD, Forest Analysis and Inventory. This dataset was clipped by the PRRD shapefile.
- Intact Forest Land (IFL) (2000 and 2013): The spatial database (scale 1:1,000,000) of intact forest land for the years 2000 and 2013 can be downloaded in ESRI Shape (.shp) and Google Earth KMZ (.kmz) file formats. This dataset was clipped using the PRRD shapefile. The 1996-2006 map included IFL data up to 2000; the 2006-2016 map was produced based on the difference between IFL in 2013 and 2000.

Overall, environmental information was collected from a wide variety of sources. Each source was evaluated based on quality of data and geographic relevance, but it should be noted that it was difficult to obtain environmental information at the regional district level in any single location, due to the level of analysis of available data (e.g. data collections happens according to affected areas of projects, at the watershed scale, biogeoclimatic zone, or at another scale of relevance that does not necessarily correspond to regional district, or other political jurisdictions). Ecological information, including environmental and lifestyle values of a community, is poorly represented in Statistics Canada data.

Table 1. Environmental data sources.

Data point	Sources
Climate Change	<p>Donahue K. (2014). Climate Stressor Scenarios: Regional Economic Impact of Climate Change in BC Examined Through Scenario Analysis. Victoria, BC: Ministry of Agriculture. https://pics.uvic.ca/sites/default/files/Climate%20Stressor%20Scenarios-%20Final%20Report%20pdf.pdf</p> <p>Pacific Climate Impacts Consortium (PCIC) (2017). Summary of Climate Change for Peace River in the 2050s. https://pacificclimate.org/analysis-tools/plan2adapt</p>
Air Quality	<p>BC Ministry of Environment. (2016). Northeast Air Zone. http://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-quality/current-air-quality-data/northeast-air-zone</p> <p>Taylor E. (2015). Air quality characterization of the Peace region of Northeast BC. Victoria, BC: Ministry of Environment. http://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports/pub/air_quality_characterization_of_peace_region_ne_bc.pdf</p>
Water Quality	<p>Government of British Columbia. (2016). <i>Northeast Water Strategy</i>. Victoria, BC: Government of British Columbia. http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/northeast-water-strategy/2015-northeast-water-strategy.pdf</p> <p>Fraser Basin Council. (2013). <i>Workshop on Water Issues in BC's Peace Region</i>, May 30, 2013, Fort St John, BC. Vancouver, BC: Fraser Basin Council. http://www.fraserbasin.bc.ca/Library/Water/ws_report_peace_water_issues_may-2013.pdf</p> <p>GW Solutions. (2016). <i>Peace River Regional District Water Quality Database and Analysis</i>. Prepared for the Peace River Regional District and Treaty 8 Tribal Association, September 2016. http://treaty8.bc.ca/wp-content/uploads/2016/06/PRRD-Water-Quality-Report-Sept-2016-final.pdf</p>

Wildlife Health	Apps, C. (2013). <i>Assessing Cumulative Impacts to Wide-Ranging Species Across the Peace Break Region of Northeastern British Columbia</i> . Version 3.0, Canmore, AB: Yellowstone to Yukon Conservation Initiative. https://y2y.net/work/apps2ypeacebreakcarnivoreceareportfinal.pdf/view
Agricultural Land Reserve	Don Cameron and Associates. (2014). Peace River Regional District Regional Agricultural Plan Background Report. http://prrd.bc.ca/wp-content/uploads/Background-Report-Final-November-2014.pdf Statistics Canada (2013). Census of Agriculture, 1996, 2001, 2006, 2011, unless otherwise specified. Prepared by Ministry of Agriculture, Statistics and Research. January 2013. http://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/statistics/census-of-agriculture
Industrial Activities maps	Major population centres, Peace River Regional District Profile (2017). http://prrd.bc.ca/ First Nation community locations, Peace River Regional District Profile (2017). http://prrd.bc.ca/ Government of Canada (2017). First Nation Profiles Interactive Map. http://fnpim-cipn.aandc-aadnc.gc.ca/index-eng.html The following data was downloaded from the BC Oil and Gas Commission Open Data Portal: Oil and gas facility locations (pre-2016). http://data-bcogc.opendata.arcgis.com/datasets/e2014a76454545abb0509afa2444876b_0 Petroleum development roads (pre-2006). http://data-bcogc.opendata.arcgis.com/datasets/5861465cbe5649de93d521117cdf3a6a_0 Road right-of-ways (permitted). http://data-bcogc.opendata.arcgis.com/datasets/32ca682579374b3b987e1965ef295270_1 Pipelines and pipeline segments. http://data-bcogc.opendata.arcgis.com/datasets/c27b9f1a3754436cb7816b27ece5cb28_0 http://data-bcogc.opendata.arcgis.com/datasets/81d619920b6848e9a3f0f0201d126cae_0 http://data-bcogc.opendata.arcgis.com/datasets/bd0a685c1f614b4b89ace6564e5e3cc4_0 http://data-bcogc.opendata.arcgis.com/datasets/359b7e14fafa4abc84ff873bc55015fb_0 Major projects: BC Data Catalogue (2017). Natural Resource Sector Major Projects-Points. https://catalogue.data.gov.bc.ca/dataset/natural-resource-sector-major-projects-points BC Major Projects Inventory (MPI). http://www2.gov.bc.ca/gov/content/employment-business/economic-development/industry/bc-major-projects-inventory BC Environmental Assessment Office (EAO). https://projects.eao.gov.bc.ca/ Consolidated Cutblocks: BC Data Catalogue (2017). Harvested Areas of BC (Consolidated Cutblocks). https://catalogue.data.gov.bc.ca/dataset/harvested-areas-of-bc-consolidated-cutblocks- Intact Forest Land (IFL) (2000 and 2013). http://www.intactforests.org/data.ifl.html

2. Community

This section outlines the community information points included in the Peace River Regional Profile, and the data and information sources that were accessed. Community data sources and associated web-links are summarized in Table 2.

2.1 Regional Demographics: Several information points pertaining to regional demographics were included based on the Statistics Canada Census of Population information for available census years between 1991 and 2016.

2.2 Total Population of the region between 1986-2016 was compiled and presented in a graph.

- Overall Population Growth Rate in the region between 1986-2016 was calculated as follows:

$$\text{Total population growth rate} = \frac{2016 \text{ total population} - 1986 \text{ total population}}{1986 \text{ total population}} \times 100$$

- Population Growth Rate Per Year was calculated as follows:

$$\text{Population growth rate per year} = \frac{\text{Total population of present year} - \text{Total population of previous year}}{\text{Total population of previous year}} \times 100$$

- Percent Population Identifying as Indigenous, Aboriginal, First Nations or Metis was obtained from the Canadian census for available census years between 1991 and 2006; 2011 data was extracted from the National Household Survey (NHS) of Canada. Percentage of census population identifying as Indigenous, Aboriginal, First Nations or Metis was calculated as follows:

$$\% \text{ of aboriginal population} = \frac{\text{Aboriginal identity population of a census year}}{\text{Total population of same census year}} \times 100$$

2.3 Education: Information describing the highest level of formal education completed was obtained from the Canadian Census for census years 1996 to 2006; 2011 data was obtained from the NHS. The classifications used to describe the highest level of formal education completed varied between census years, and were thus summarized into four main categories to maintain consistency: less than high school diploma, high school diploma, college or post-secondary, and university degree. This information was presented in a bar graph.

2.4 Sense of community belonging: Information describing sense of community belonging was extracted from the Canadian Community Health Survey (CCHS), and reflects the self-described sense of community belonging of survey respondents. As defined by the CCHS, the Peace River Region lies within the BC Northeast Local Health Area. Sense of community belonging in 2009 and 2013 is reflective of the Northeast Local Health Area. In the 2001 CCHS, the Northwest and Northeast Local Health Areas were not distinguished, thus the 2001 data point included in the Peace River Regional Profile reflects sense of community belonging across northern BC.

2.5 Social Service Agencies: Qualitative statements referencing the general capacity level of frontline service agencies in the Peace River Region were largely drawn from a single report. Overall, it was difficult to find information pertaining to marginalized populations in the Peace River Region.

2.6 Crime: Information pertaining to crime rates in BC, Chetwynd, Hudson's Hope, Fort St. John, Dawson Creek, and Tumbler Ridge) between 1998-2015 was obtained from Statistics Canada. This data reflects the yearly crime rate for all criminal code violations (excluding traffic violations) (crime rates were normalized per 100,000 people).

2.7 Workforce Profile: Information reflecting workforce composition by sector was extracted from NHS data. To calculate percent representation per sector, each workforce sector total employment number was divided by the total population in the Peace River Region that was above 15 years of age and active in the workforce, as reported by Statistics Canada. For our purposes, some workforce sectors with very small percent representation were combined.

2.8 Employment Profile: All information included in the employment profile was obtained from the Canadian Census for 1996, and from the NHS for 2011.

- Median income: Extracted directly from census data.
- Unemployment rate: Extracted directly from census data.
- Percent employment growth rate calculation:

$$\text{Employment growth} = \frac{2011 \text{ total employed populaion (both sexes, over 15 year of age)}}{1996 \text{ total employed population (both sexes, over 15 years of age)}}$$

*The result was expressed as a percentage (e.g. 1.32 = 32% growth)

2.9 Housing Profile: All information included in the housing profile for the year 1991 was obtained from the Canadian Census. All 2011 data was obtained from the NHS. Due to unavailability of more recent housing statistics, several qualitative statements regarding housing prices were included. This information was obtained from a BC Northern Real Estate Board report. The housing profile included the following information:

- Average house value
- Average monthly rent
- Median owner major payments on housing per month
- Percentage of owners spending 30% or more of household income on shelter costs
- Percentage of tenants spending 30% or more of household income on shelter costs

2.10 Percent Low Income Population: Information regarding the prevalence of before tax low income individuals in the Peace River Region was obtained from the Canadian Census for census years 1991, 1996, and 2006; 2011 data was obtained from the NHS.

Overall, community information for the Peace River Regional Profile was compiled based on Statistics Canada and Canadian Household Survey data (as a replacement for the 2011 long-form census). In some cases, comparative information was available at both the community, regional and provincial level.

Table 2. Community data sources.

Data point	Source
Regional Demographics	Statistics Canada. (1991, 1996, 2001, 2006, 2011, 2016). Peace River Regional District Profile (Census Division), <i>Census of Canadian Population</i> . Ottawa, ON: Government of Canada. http://www12.statcan.gc.ca/datasets/Index-eng.cfm
Population of Indigenous, Inuit, and Metis People	Statistics Canada. (1991, 1996, 2001, 2006). Peace River Regional District Profile (Census Division), <i>Census of Canadian Population</i> . Ottawa, ON: Government of Canada. http://www12.statcan.gc.ca/datasets/Index-eng.cfm Statistics Canada. 2013. <i>Peace River, RD, British Columbia (Code 5955)</i> (table). <i>National Household Survey (NHS) Profile</i> . 2011 National Household Survey. Statistics Canada Catalogue no. 99-004-XWE. Ottawa. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E
Education	Highest Level Formal Education Completed. http://www12.statcan.gc.ca/datasets/Index-eng.cfm http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E (accessed August 28, 2017)
Sense of community belonging	Statistics Canada. (2003, 2005, 2007, 2009, 2011, 2013). Community Profile, Northeast Local Health Area, <i>Canadian Community Health Survey</i> . Ottawa, ON: Government of Canada. http://www12.statcan.gc.ca/health-sante/82-228/search-recherche/lst/page.cfm?Lang=E&GeoLevel=PR&GeoCode=59
Social Services	Amnesty International. (2016). Out of Sight, Out of Mind: Gender, Indigenous Rights and Energy Development in Northeast BC, Canada. https://www.amnesty.ca/sites/amnesty/files/Out%20of%20Sight%20Out%20of%20Mind%20EN%20FINAL_0

	<p>pdf</p> <p>Statistics Canada. (1991, 1996, 2006). Peace River Regional District Profile (Census Division), <i>Census of Canadian Population</i>. Ottawa, ON: Government of Canada. http://www12.statcan.gc.ca/datasets/Index-eng.cfm</p> <p>Statistics Canada. 2013. <i>Peace River, RD, British Columbia (Code 5955)</i> (table). <i>National Household Survey (NHS) Profile</i>. 2011 National Household Survey. Statistics Canada Catalogue no. 99-004-XWE. Ottawa. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E (accessed August 28, 2017)</p>
Crime Rates	<p>Statistics Canada. (2016). Incident-based crime statistics by detailed violations in BC and selected communities in the Peace (<i>CANSIM tables 252-0081</i>). Ottawa, ON: Government of Canada. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2520081&tabMode=dataTable&p1=-1&p2=9&srchLan=-1#customizeTab</p>
Workforce Profile	<p>Statistics Canada. 2013. <i>Peace River, RD, British Columbia (Code 5955)</i> (table). <i>National Household Survey (NHS) Profile</i>. 2011 National Household Survey. Statistics Canada Catalogue no. 99-004-XWE. Ottawa. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E</p>
Employment and Housing	<p>Statistics Canada. (1991). Peace River Regional District Profile (Census Division), <i>Census of Canadian Population</i>. Ottawa, ON: Government of Canada. http://www12.statcan.gc.ca/datasets/Index-eng.cfm</p> <p>Statistics Canada. 2013. <i>Peace River, RD, British Columbia (Code 5955)</i> (table). <i>National Household Survey (NHS) Profile</i>. 2011 National Household Survey. Statistics Canada Catalogue no. 99-004-XWE. Ottawa. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E (accessed August 28, 2017)</p>
Housing	<p>Statistics Canada. (1991). Peace River Regional District Profile (Census Division), <i>Census of Canadian Population</i>. Ottawa, ON: Government of Canada. http://www12.statcan.gc.ca/datasets/Index-eng.cfm</p> <p>Statistics Canada. 2013. <i>Peace River, RD, British Columbia (Code 5955)</i> (table). <i>National Household Survey (NHS) Profile</i>. 2011 National Household Survey. Statistics Canada Catalogue no. 99-004-XWE. Ottawa. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E (accessed August 28, 2017)</p> <p>BC Northern Real Estate Board. (2016). Canadian Real Estate Association Stats. http://bcnreb.bc.ca/creastats</p>

3. Health

This section outlines the health information points included in the Peace River Regional Profile, and the data and information sources that were accessed. Health data sources and associated web-links are summarized in Table 3.

3.1 The Health Profile was created based on information obtained from the CCHS for the Northeast Local Health Area, which includes both the Peace River Region and Northern Rockies Region. This information was self-reported. For the purposes of the Peace River Regional Profile, CCHS data was both summarized in a table for the years 2001, 2009, and 2013, and in several descriptive statements. Overall, the following health information was referenced in the Health Profile:

- Prevalence of chronic health conditions (arthritis, diabetes, asthma, high blood pressure) in relation to provincial averages
- Leisure-time physical activity
- Perceived mental health
- Self-reported life stress
- Percent reporting very good/excellent perceived health
- Percent reporting overweight/obesity
- Percent reporting current daily cigarette smoking

- Percent reporting heavy drinking
- Percent reporting consuming fruit/vegetables >5 times daily
- Percent reporting having regular access to a family doctor

Overall, it was difficult to obtain health information at either the local or regional district level. Much of northern BC is sparsely populated, which in some cases limits the specificity of health information that is publicly available in order to guarantee personal anonymity. However, information generalized for large geographic areas may have limited applicability for local communities.

Table 3. Health data sources.

Data points	Sources
Chronic Conditions; Leisure-time physical activity; Perceived mental health; Incidence of smoking; Incidence of drinking; Overweight or obese; Consuming fruit/vegetables > 5 times daily; Regular doctor visits	Statistics Canada. (2001). Community Profile, Northeast and Northwest BC Local Health Area, <i>Canadian Community Health Survey, Cycle 1.1, 2000-2001</i> . Ottawa, ON: Government of Canada. http://www12.statcan.gc.ca/health-sante/82-228/search-recherche/lst/page.cfm?Lang=E&GeoLevel=PR&GeoCode=59 Statistics Canada. (2003, 2005, 2007, 2009, 2011, 2013). Community Profile, Northeast Local Health Area, <i>Canadian Community Health Survey</i> . Ottawa, ON: Government of Canada. BC Community Health Atlas contains health related data from 1995 – 2011. http://maps.gov.bc.ca/ess/hm/cha/ BC Vital Statistics contains birth and death related statistics from 2004-2011. http://www2.gov.bc.ca/gov/content/life-events/statistics-reports/annual-reports