Fraser Basin Council

2004 State of the Fraser Basin Report

SUSTAINABILITY Snapshot 2

NOVEMBER 2004

SUSTAINABILITY INDICATORS

FRASER BASIN REGIONAL PROFILES

Publication Mail Agreement No. 40062742

Sustainability Issues are Headline News!

The word "sustainability" means many things to many people. To some, it simply equals "environmental." Other people add an economic component and talk about "sustainable business" practices, while still others focus on social sustainability issues like health, education and housing.

Whatever the word means to you, one thing is for certain. Sustainability issues are headline news virtually every day. They impact you, your family, your job and your community.

What are some of these issues?

Climate change. Massive urban growth and declining smaller communities. Preserving farmland. The mountain pine beetle epidemic. Safe drinking water. Clean air. Aboriginal and non-Aboriginal relations. Health and physical fitness. Preparing for the next great Fraser River flood. Declining salmon stocks.

At the Fraser Basin Council, our vision for a sustainable Fraser River Basin is a place where "social well-being is supported by a vibrant economy and sustained by a healthy environment." Our mandate is to work with community groups, government, First Nations, businesses, academics, labour and individuals around the Basin to make this vision a reality.

Part of our mandate is to measure the progress we are making to advance sustainability and to report back to you – the 2.6 million residents of the Fraser Basin. To this end, the Council has been working in partnership with government, the private sector and community groups to develop a series of sustainability indicators that provide insight on how well we're achieving sustainability. We published our first *State of the Fraser Basin Report: Snapshot On Sustainability* almost two years ago.

As we prepared our second report, a number of things became very clear.

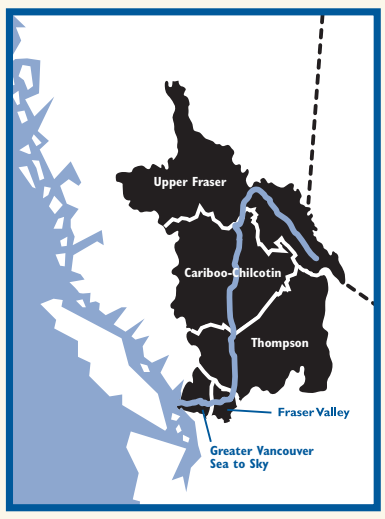
Sustainability encompasses virtually every aspect of our lives. If we protect our environment but have no jobs, our communities will not be sustainable. And if we do not address social issues such as homelessness, life-long education and obesity, our economic prosperity and quality of life could be in jeopardy.

Sustainability issues are all interconnected. Climate change, for instance, is already impacting our lives in myriad ways. Warmer winters have allowed the mountain pine beetle epidemic to explode exponentially, wreaking havoc on both forest ecosystems and local economies. Increased water temperatures in the Fraser River harm salmon survival and spawning rates. Extended periods of drought increase the danger of forest fires and impact agriculture and ranching. Air quality is affected by increased particulate matter from fires, increasing respiratory illness.

Sustainability requires better informed decision-making. However, just when we need more accurate information about how our world is changing to inform our decisions, resources for monitoring and data collection are shrinking in some cases.

Perhaps most importantly, sustainability is everyone's responsibility. If we are to take this responsibility seriously, each of us – as consumers, commuters, employers, policy-makers, investors and families – can and must make informed lifestyle, business and institutional decisions.

We at the Fraser Basin Council believe that sustainability works. Despite all the doom and gloom news we read every day, through our work on programs in all parts of the Basin, we see that progress towards a sustainable future *is* being made. Major issues *are* being addressed and people from all walks of life *are* making a difference. We hope that this *Sustainability Snapshot 2* will provide some key information you need to make sustainability work in your life – at home, at work and at play. ■



BC's Future Flows along the Fraser

One look at the Fraser River Basin and you can see why it plays such a pivotal role in British Columbia's future. Like much of the province, it's bigger than life, stretching 1,400 km from the Rockies to Richmond and covering an area the size of the UK or California. 80% of BC's economy is generated in the Fraser Basin.

The Fraser Basin is also home to two-thirds of British Columbians and their families, neighbourhoods and businesses. That's 2.6 million people today and a projected 4 million in the next 25 years. Managing this growth in ways that enhance the Basin's social, economic and environmental health and wealth is an important responsibility and urgent priority for us all. ■

For more information on the Fraser River Basin, the Fraser Basin Council and our programs, visit our website:

www.fraserbasin.bc.ca

Social well-being supported by a vibrant economy and sustained by a healthy environment

EXECUTIVE SUMMARY

Fraser Basin Council – One of BC's Best Kept Secrets

In 1997, community groups, business and four orders of government came together to create the Fraser Basin Council. Over the past seven years, the Council has tackled more than 50 major sustainability issues and chalked up some impressive accomplishments. To name a few, the Council is working with local governments and federal and provincial agencies to prepare for the next great Fraser River flood and its impact throughout the Basin. It is helping to resolve an important water use conflict in the Nechako, a sensitive issue that has eluded a practical resolution for 50 years. It played an instrumental role in getting the cleanup of the Britannia Mine underway, a project that moved forward in November 2004 when the provincial government selected a company to build and operate a contaminated water treatment plant at the old mine.

The Council has also tackled the rapid spread of invasive plant species that are destroying ecosystems and costing our economy tens of millions of dollars each year. It is working with First Nations to improve Aboriginal and non-Aboriginal relations. It brought federal, provincial and First Nations governments together to reduce conflict around gravel extraction in the lower Fraser River. It is helping to strengthen and diversify the economies of smaller communities throughout the Basin. And it is working on a program to bring all parties together to develop a plan to restore Fraser River fish and fisheries. ■

The Fraser Basin Council Directors and staff in Barkerville.

"I think the Fraser Basin Council is one of BC's best kept secrets. We try to stay away from the rhetoric that so often gets in the way of good decision-making. The 36 board members around our table come from every corner of the Basin and represent a broad cross-section of communities, environmental groups, business and government, including First Nations. Remarkably, we've been able to work together to find practical, common sense and consensus based solutions that work."

— *Patrick Reid*
Chair of the Fraser Basin Council,
Former Commissioner General of Expo 86 and Chair of the Rick Hansen Man In Motion Foundation


Fraser Basin Council Directors are dwarfed by one of the giant electric shovels at the Highland Valley Copper Mine near Kamloops.

Headline News Stories...Connecting the Dots

Most of us get our news in bite-size chunks and sound bites.

Arctic thaw will cause BC crisis. Thousands flee fires. Natives back Nechako plan. Sockeye runs disastrously low. Pine beetles destroy forests. Tsawwassen First Nation signs $47 million deal for port expansion. Flood zone braces for more.

While these headline stories provide information on the specific crisis of the day, rarely is any attempt made to connect the stories. What do they all have in common? How does one crisis relate to the other? And perhaps most importantly, is there anything we can do about them?

On page 1 we gave some examples of how climate change impacts us all, and how this issue is related to many of the headlines listed above. Climate change is, of course, not just a concern to the people, animals and plants that call the Fraser River Basin home. Climate change is a global issue that will affect everyone who lives on planet Earth. In addition to lowering our output of greenhouse gas emissions, it is imperative that we prepare our communities for impending climate variation and the potential natural disasters – and perhaps even opportunities – that may result.

But this report is not a snapshot on climate change. Rather, it presents some key trends on a wide range of economic, social and environmental issues. They are presented in alphabetical order because we believe that all the issues are important. They all relate to each other. And if we are going to advance towards a sustainable future, we need to take them all into account.

Highlights to Whet Your Appetite

Aboriginal and Non-Aboriginal Relations
A survey on Aboriginal and non-Aboriginal relations by the Fraser Basin Council shows that 56% of respondents believe that relations are getting better, while just 13% responded that relations are getting worse.

Agriculture
One-half of all the food we eat is grown right here in BC. The other half is imported, some from regions that are running out of water or cannot expand farmland. Food production takes place on less than 5% of BC's total landmass, and half the farms and ranches are in the Fraser Basin. As BC's population grows, retaining local farmland is crucial for a secure and sustainable food supply.

Air Quality
We each breathe 11,000 litres of air a day. We need clean air to be healthy. Without it, we're at greater risk of respiratory diseases such as asthma, bronchitis, emphysema and lung cancer, as well as heart attacks and stroke. High levels of fine particulate matter, or PM, and Ground Level Ozone, or GLO, can have significant health and economic impacts. While PM_{10} and GLO – a component of smog – are generally getting better, many communities saw increases in 2002.

Business and Sustainability
Business has traditionally focused on profits and the "bottom line". However, there is growing recognition of the need for business practices that support economic, social and environmental sustainability – often referred to as the "triple bottom line" or "corporate social responsibility" (CSR). BC ranks favourably in comparison with Canada as a whole when it comes to sustainability reporting, supporting business sustainability, and growth in research and development spending.

Community Engagement
When people volunteer at their schools, join business groups, take time to vote or help out at their local food bank – when they are engaged in their community – they have better schools, lower crime rates, more racial tolerance, closer involvement in decision-making and better economic opportunities. BC has a high rate of volunteerism: 84% have volunteered in the past and 50% are "habit" volunteers.

Community Sustainability
Many small rural communities are facing low rates of population growth (or even a decline in population), job losses, economic vulnerability and a reduced capacity to provide community services. Urban centres, on the other hand, grapple with pressures associated with intensive growth in population, including planning and density issues and the need for better public transportation, social services and infrastructure.

Economic Diversification
A diverse economy reduces the reliance on, and vulnerability to, changes in any one sector. In general, communities in the Thompson, Fraser Valley and GVSS regions have more diverse economies than those in the Upper Fraser and Cariboo-Chilcotin regions that are more dependent on the forest sector or other single industries. Between 1996 and 2004, five of six key economic indicators experienced net growth, but all six indicators experienced losses in one or more years during this period.


Chilcotin Mountains


Douglas Lake Ranch

Mount Robson near the headwaters of the mighty Fraser River

Vancouver from False Creek

Education
More Fraser Basin residents are attaining post-secondary education than ever before. More than 30% of BC workers have participated in adult and job-related education, and that percentage is increasing. However, class sizes – as measured by the number of students per educator – have increased.

Energy and Climate Change
In BC, we use less energy than the Canadian average and have reduced our per capita energy consumption since 1990 by 4.5%. However, per capita energy efficiency gains are being undermined by population growth, economic production, consumer choices (e.g., larger homes and vehicles), and increased use of fossil fuels. Overall energy use has risen by 19% since 1990. Greenhouse gas emissions have risen by 28%, to a level where, if BC were a country, per capita emissions would be the fourth highest in the world.

Fish and Wildlife
The health of fish and wildlife species influences and is influenced by the health of ecosystems. Trends in Fraser River salmon stocks are mixed and difficult to confirm; however, many species and stocks appear to be declining in the past decade. Fraser River salmon populations have been adversely affected by unpredicted changes to water temperature and quantity, the presence of parasites and other factors. Nearly one in five vertebrates in the Fraser Basin were reported to be endangered, threatened or considered to be at risk in 2004.

Flood Hazard Management
Flood events occur annually in BC and the Fraser Basin, impacting people, property, farms, infrastructure, businesses, community services and the economy. There are more people (327,000) and homes (100,000) in the floodplain of the lower Fraser River today than ever in history. Between 1990 and 1999 in BC, average annual expenditures for flood-related Disaster Financial Assistance by provincial and federal governments were $13.1 million. However, both federal and provincial financial assistance programs for flood mitigation and prevention have "sunsetted," leaving local governments on their own for major capital costs such as repairs and rehabilitation of flood protection works.

Forests and Forestry
There are more than 17 million hectares of forestland in the Fraser Basin, and many interior communities are highly dependent on forestry. Between 1999 and 2002, a smaller area was reforested than was harvested or killed by fires and pests, a reversal from the previous decade. The Mountain Pine Beetle has attacked a huge proportion of the Basin's Lodgepole Pine trees and the epidemic shows no signs of stopping. In BC, 8 million hectares of forest were impacted by fires, disease and pests in 2003.

Health
At 80.7 years, residents in the Basin region have the longest life expectancy in Canada and, next to Japan, the longest in the world. In general, British Columbians rate their health as very good or excellent. However, rates of cancer and cardiovascular diseases continue to be high. Diabetes, largely a lifestyle-related disease, remains a major and growing concern, as are adult and child obesity.

Housing
The availability of adequate, suitable and affordable housing is central to sustainability and influences the health, well-being, quality of life and economic stability of individuals and households. Almost one-quarter (24%) of the Basin population lives in inadequate and/or unaffordable housing, or "core housing need", and the number is much higher for renters (32%) than owners (10%).

Income and Employment
Having adequate income to meet household needs is critical to the well-being of individuals, families and communities. The number of households in the low-income bracket ($20,000 a year or less) declined by 3% between 1995 and 2000, but this number still includes about 500,000 people. Unemployment has declined steadily over the past 20 years, but unemployment rates and households in poverty are still too high for a truly sustainable region.

Population
Population touches every aspect of sustainability. Over the past 20 years, the Fraser Basin's population has grown by 50%, and it is projected to grow by another 50% by 2030. The Basin's population is also aging, and many people – especially youth – are moving from rural to urban centres. These massive changes will have significant impacts on sustainability in communities grappling with high growth, low growth or, in some cases, a declining population. Managing for growth, mobility and an aging population are some of the greatest challenges facing communities and decision-makers in the Basin.

Water Quality and Quantity
A safe, secure water supply is essential to sustainable communities. We need safe drinking water to be healthy, and we need an adequate supply of water for domestic use, agriculture, recreation, tourism, industry and commerce. Clean water is also essential for fish, wildlife and their habitat. Despite reductions in per capita water use, municipalities are using more water, an increase of 18% from 1991 to 1999, largely due to population growth. Data indicate that water quality objectives were met about 60% of the time in 2002, a 13% decrease since 1998. ■

Chilliwack Farm View

New Westminster Quay

2004 State of the Fraser Basin Report

SUSTAINABILITY Snapshot 2

About the Report

The Fraser Basin Council published its first *State of the Fraser Basin Report: A Snapshot on Sustainability* in January 2003. The report's 16 indicators profiled a wide variety of social, economic and environmental sustainability issues and trends.

Sustainability indicators are not decisive measurements or solutions in and of themselves. They can, however, reflect certain trends and help identify areas where progress is being made and where more change is required.

The purpose of the 2004 *Sustainability Snapshot 2* report is to help:
- Increase public awareness and understanding about sustainability issues and trends.
- Identify critical issues and appropriate responses to improve progress towards sustainability.
- Inform and influence decisions and actions to advance sustainability.

What's New in This Report?

The *Sustainability Snapshot 2* includes a number of new features:

Over 12,000 copies of the first *Snapshot* report were distributed.

- **Regional profiles** have been developed to summarize key sustainability issues and initiatives within each of the five Fraser Basin regions: Upper Fraser, Cariboo-Chilcotin, Thompson, Fraser Valley and Greater Vancouver/ Sea To Sky (referred to as GVSS throughout the report).

- **New indicator topics** have been added to broaden the scope of the 2004 *Sustainability Snapshot*. In particular, information is provided on climate change, water use, waste disposal and community sustainability.

- **Updates** have been provided where new data were available, such as the 2001 Population Census, Census of Agriculture and other sources. Indicator updates include population variables, education, income, employment, agriculture, air quality, housing, energy consumption and greenhouse gas emissions. These new data help to track change over time.

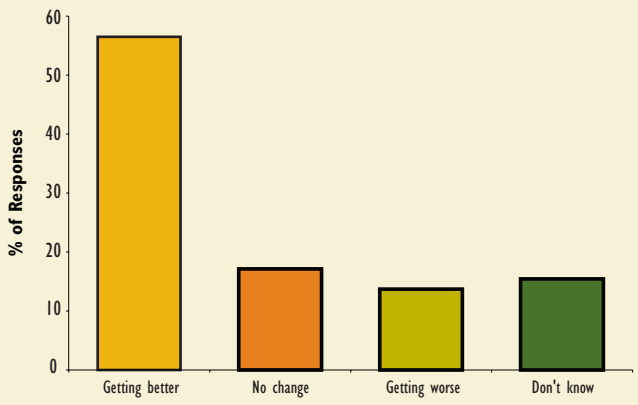
- **New approaches and alternative sources of information** have been developed to measure and report on sustainability. Some examples include a 2004 survey that the Fraser Basin Council conducted on Aboriginal and non-Aboriginal relations, new sources of survey data on volunteerism and charitable giving, attainment of BC water quality objectives, business and sustainability, salmon stocks, the BC Economic Diversity and Forest Vulnerability Indices, and flood hazard management.

- **Indicators and examples of progress** are included for each topic to demonstrate "What are we doing?" to advance sustainability in the Fraser Basin. These examples include various programs, projects and initiatives being undertaken by governments, businesses and community organizations. ■

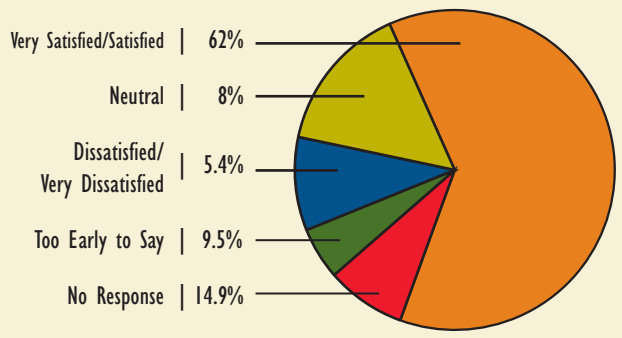
For more information on each topic go to:
www.fraserbasin.bc.ca
(click on Indicators)

ABORIGINAL AND NON-ABORIGINAL RELATIONS

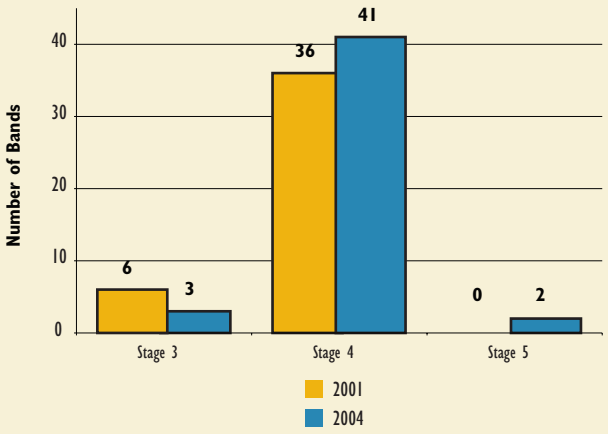
Survey Responses Regarding the State of Relations (2004)



Survey Responses Regarding the Level of Satisfaction with Formal Agreements (2004)



Number of Indian Act Bands at Different Stages of the BC Treaty Commission Process (2001, 2004)



FOOTNOTES

1. Fiduciary responsibility refers to the legal responsibilities of the Government of Canada as defined in the Indian Act.
2. In Canada, Aboriginal people include First Nations/Indians, Inuit, and Metis.
3. First Nations is a term that applies to Indians but does not include Inuit, Dene or Metis people.
4. Indian Act Bands were established by the 1876 Indian Act, which divided Aboriginal nations with a shared traditional territory, identity, culture, language and governing body into separate bands and separate land reserves.

REFERENCES USED

- BC Treaty Commission. 2003 Annual Report. (2004).
- BC Treaty Commission. Website. www.bctreaty.net (2004).
- Laura Brown, Planner, T'ít'q'et First Nation & Karen Mellor, Administrator, Village of Lillooet. Joint presentation at First Nations and Local Governments Technical Workshop, Richmond, BC [First Nations Alliance 4 Land Management] (October 28th, 2004).
- Fraser Basin Council. Survey of Aboriginal and Non-Aboriginal Relationships in the Fraser Basin (2004).

The Sustainability Connection

Building effective relationships between our communities and reconciling issues of Aboriginal self-determination will lead to more certainty, stability and social, economic and environmental sustainability for all Basin residents. Among the most important considerations include fiduciary responsibility[1], accommodation, consultation, compensation, infringement on title and rights, and the roles of parties other than the Crown.

Aboriginal and Non-Aboriginal Relations *Snapshot*

Aboriginal[2] population of Basin in 2001: 115,000
% of total Basin population: 4.4%
% increase in Basin Aboriginal population from 1986 to 2001: 41.7%
# of bands in the Basin participating in the treaty process (September 2004): .....46 of 91

Ineffective Aboriginal/non-Aboriginal relations are the basis for many of the most pressing social, economic and environmental issues facing the Basin today. Developing more constructive relationships between our communities is critical. There are several means and methods for resolving issues of self-determination, title and rights, including community-based initiatives, government policies and programs, legal proceedings through the court system, formal agreements and protocols, the BC Treaty process and informal arrangements between governments, communities, businesses and organizations.

Sustainability Issues and Trends

Survey on Aboriginal and Non-Aboriginal Relations

In the summer of 2004, the Fraser Basin Council conducted a survey on Aboriginal and non-Aboriginal relations as an initial step towards the Council's longer-term goal of better understanding and improved relations. The Council recognizes that the survey results are only a starting point in improving knowledge about these issues. The Council received 62 responses (14% response rate), including 14 from Aboriginal communities and organizations and 48 from non-Aboriginal organizations, including governments, non-governmental organizations and businesses within the Fraser Basin. Overall, 56% of respondents rated Aboriginal and non-Aboriginal relations as "Getting Better" between 1990 and 2004. The remainder of responses was split between "Getting Worse" (13%), "No Change" (16%) and "Don't Know" (15%). This pattern of responses was similar for both Aboriginal and non-Aboriginal respondents and for both the Lower Mainland and Interior.

First Nations board members at the Fraser Basin Council board meeting at the Coldwater Indian Band school.

Formal Agreements

51% of survey respondents indicated they had developed or were in the process of developing formal agreements, while 44% had not. The purposes of the agreements ranged widely, and respondents usually indicated multiple purposes for each agreement. Aboriginal governments and groups were by far the most frequent respondents (68%) on agreements recognizing Aboriginal rights, while local government agreements focused on services. In general, the majority (62%) of respondents were either very satisfied or satisfied with the agreements; only 5% indicated they were dissatisfied or very dissatisfied.

BC Treaty Commission Process

The BC Treaty Commission is responsible for facilitating treaty negotiations among the governments of Canada, BC and First Nations[3] in BC. The process involves six stages that lead to implementation of a Final Agreement. As of September 2004, 46 of the 91 Indian Act Bands (IAB)[4] in the Fraser Basin were represented at 16 treaty tables (up from 42 in 2001). Two tables, representing two IAB (Tsawwassen First Nation and Lheidli T'enneh Band), had reached Stage 5 (up from 0 in 2001). Eleven tables, representing 41 IAB, had reached Stage 4 (Agreement-In-Principle) (up from 36 IAB in 2001). About half of the First Nations in the Basin have chosen not to participate in the BCTC process, and are using other means to assert title and rights and to pursue self-determination.

Young people from the Siska First Nation at the Mid-Fraser Economic Development Conference in Lillooett.

Making Sustainability Work

How are we doing?

- Aboriginal and non-Aboriginal relations – Getting Better (2004 survey respondents).
- Advancing through the treaty process – Getting Better for some treaty tables, while others have stalled.

What are we doing?

- A wide variety of agreements have been signed in recent years between First Nations and federal, provincial and local governments as well as private companies, pertaining to matters including cooperation, communication, land ownership, co-management, utility services, economic development, forest tenure, child and family services, education, 2010 Winter Olympics, and many other issues.
- The Union of BC Municipalities supports community-to-community forums between local and First Nations governments (meetings, shared information sessions, formal/informal gatherings, council-to-council meetings, protocol and MOU development sessions, etc.). As of August 2004, 30 applications had been received for 2004 to 2005 forums. See www.civicnet.bc.ca (see First Nations Relations page).
- In 2003 the T'ít'q'et First Nation and District of Lillooet were concerned about a bark beetle infestation affecting their water supply. After a wildfire destroyed 30% of the targeted forest area in Town Creek, their efforts to secure a Community Forest License were strengthened. After working well together in the Emergency Operation Center, staff developed strong personal bonds which led to a vision for value-added industries that could generate further employment opportunities, improve community morale and return the forest to a healthy state.

What else can we do?

- Extend a personal invitation to local Aboriginal/non-Aboriginal offices if there are any events or planning sessions happening that will impact the community.
- Pick up the phone to introduce yourself to the local Tribal Council/Friendship Centre/Band Office/Local Government/Community Organization.
- When establishing an ongoing relationship, consider developing a protocol or MOU on matters of mutual interest, e.g., communication, information exchange, joint meetings. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

The Sustainability Connection

A secure, safe, reliable food supply is integral to sustainability. Producing and buying locally grown food supports local economies and communities while minimizing environmental impacts and costs such as transportation. BC agriculture generates billions of dollars in economic activity and is a major employer in the province. Protecting scarce agricultural land from urban development is key to a sustainable food supply. Agricultural lands also provide wildlife habitat, improve overall biodiversity and add to our region's green spaces and natural beauty.

Agriculture *Snapshot*

Agriculture in BC

% of our food produced in BC: 50%
Direct employment: 33,000
Food related jobs: 250,000
Total economic value: . . . . . .$22 billion

Agriculture in the Fraser Basin

of farms: 10,000
% of BC farms: 50%
% of BC's net farm income: 89%

One-half of all the food we eat is grown right here in BC. The other half is imported, some from regions that are running out of water or cannot expand farmland. As BC's population grows, retaining local farmland is crucial. Food production takes place on less than 5% of BC's total land mass. The Fraser Valley and Greater Vancouver regions, with just 8% of Fraser Basin agricultural lands, have more than half of the farms, the greatest diversity of food production and substantially greater farm incomes. While total farmland in the Basin has increased 12% since 1986, high quality farmland in the lower Fraser is shrinking under urban development pressures.

The Fraser Valley contains some of Canada's best agricultural lands.

Sustainability Issues and Trends

Agricultural Land Reserve

The Agricultural Land Reserve (ALR) established in 1973 has substantially prevented the conversion of productive farmland in the province into non-farm uses. The ALR in the Fraser Basin increased by 3.3% overall between 1974 and 2003, largely due to inclusions in the Upper Fraser region. The Cariboo-Chilcotin, Thompson, Fraser Valley and GVSS regions have experienced net losses. There are concerns that high quality agricultural lands are being excluded while relatively lesser quality lands are being included in the ALR. In general, urban development is the most common cause for the exclusion of land from the ALR. Speculation drives up land prices, resulting in significant incentives to sell farmland for other uses.

Net Farm Income

The Fraser Basin generated 89% of BC's total net farm income in 2001. The Fraser Valley and GVSS regions accounted for 99% of the Basin's net farm income. Net farm income grew by 163% between 1986 and 2001, with the most significant increases occurring in the GVSS (181%) and Fraser Valley (116%) regions. Many farms, particularly in the Upper Fraser, Cariboo-Chilcotin and Thompson regions, made little profit or operated at a loss.

Agriculture and the Environment

66% of all Basin farms used one or more soil conservation practices in 2001, including permanent grass cover (49%), crop rotation (16%) and mechanical or hand weeding of crops (14%). 39% of Basin farms used a commercial fertilizer, a slight drop from 42% in 1991. Manure management practices have improved dramatically in the last few years, primarily through manure storage expansion and timely application. 24% of Basin farms use an irrigation system. Irrigation trends have remained relatively stable between 1991 and 2001. Five agricultural associations have signed agreements to undertake Environmental Farm Planning in BC and another 10 to 15 groups are likely to do so in the near future. A total of 96 farms in the Fraser Basin were producing certified organic products in 2001. Invasive plants, also known as noxious weeds, cause major economic and environmental damage to agriculture, including reducing crop quality and yields and harming animal health.

Making Sustainability Work

How are we doing?

- Stable or increasing area of high quality productive agriculture land – Getting Worse
- Net farm income – Getting Better in Lower Fraser and Getting Worse in the Thompson and Cariboo-Chilcotin regions.
- Land in ALR: Getting Worse in 4 out of 5 regions.

What are we doing?

- The Ministry of Agriculture, Food and Fisheries' Strengthening Farming Program helps protect farming while helping local governments develop by-laws that benefit agriculture. www.agf.gov.bc.ca/resmgmt/publist/Strength_Farming.htm
- Agricultural Area Plans (AAPs) and Agricultural Advisory Committees (AACs) consider local agricultural interests within municipal planning, and address conflicts between farm and non-farm uses of rural lands. As of 2004 in the Fraser Basin, 10 AAPs and 10 AACs have been established.
- The Canada-BC Environmental Farm Program supports farmers in identifying environmental risks and practicing productive, profitable and sustainable agriculture. www.bcac.bc.ca/efp_programs.htm
- The BC Farmland Watch Network monitors and protects farmland in the ALR through a province-wide network of volunteers to educate citizens. www.smartgrowth.bc.ca/
- The FBC helped develop the Invasive Plant Strategy for British Columbia. www.fraserbasin.bc.ca/programs/basin_wide.html#plant

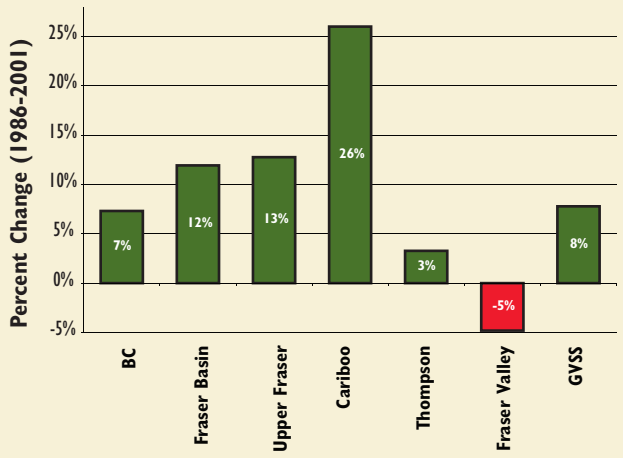
What else can we do?

- Consumers can support local farmers by buying local farm products.
- Local governments and the Agricultural Land Commission can support the protection of high quality agricultural lands from urban development.
- Local governments can continue to establish and support AACs and AAPs to reduce conflict between farm and non-farm land uses.
- Producers can participate in the Canada-BC Environmental Farm Program to help address nutrient management, riparian protection, grazing strategies, irrigation planning, wildlife issues and biodiversity. ■

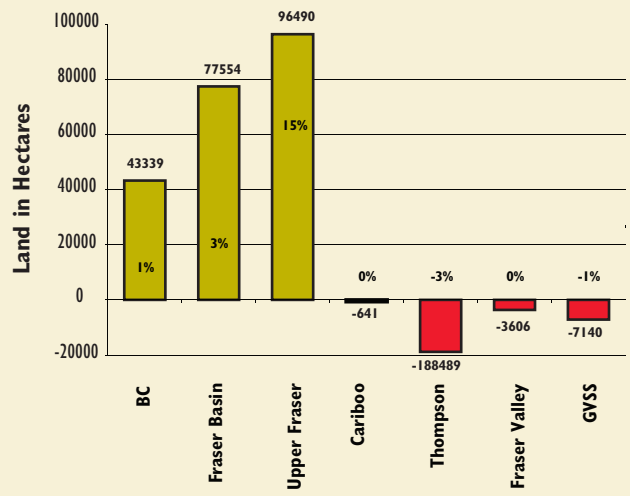
Land development puts pressure on prime agricultural land.

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

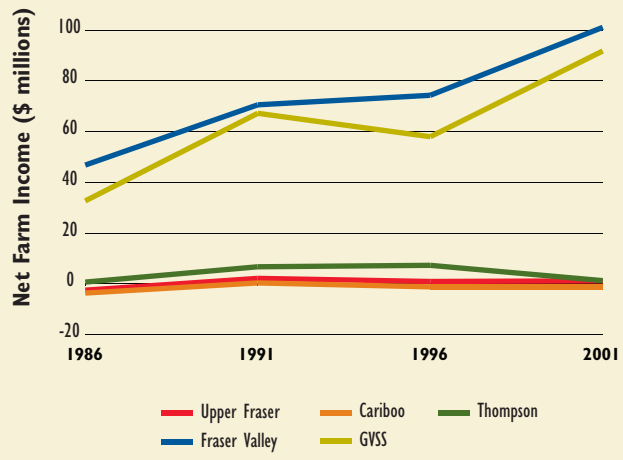
Percent Change in Productive Agricultural Land in the Fraser Basin (1986–2001)



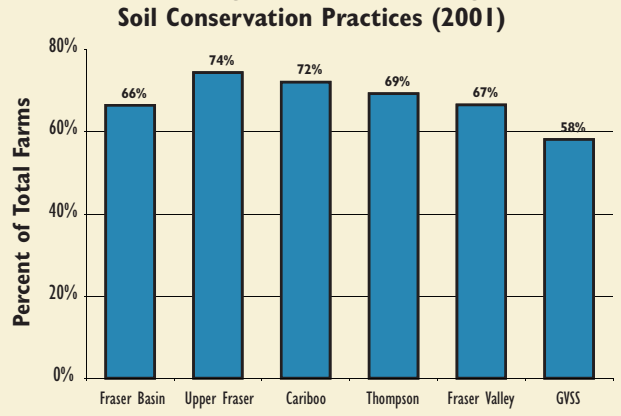
Net Change in Land in the Agricultural Land Reserve Since Designation (1974–2003)



Net Farm Income in the Fraser Basin (1986–2001)



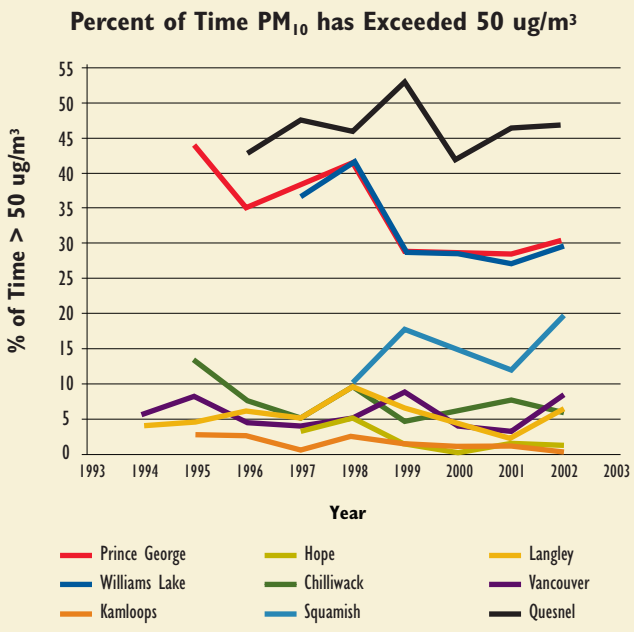
Percentage of Farms Reporting Soil Conservation Practices (2001)

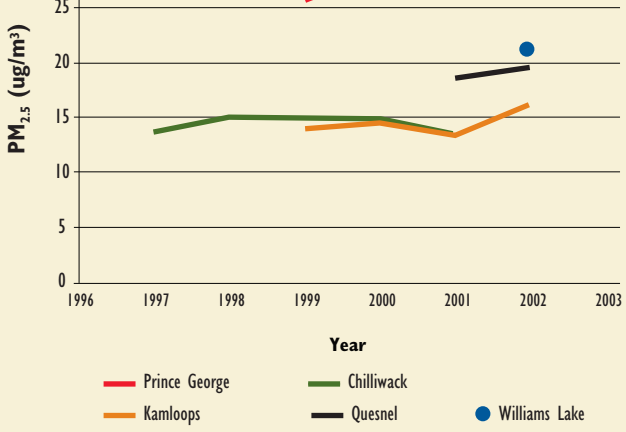


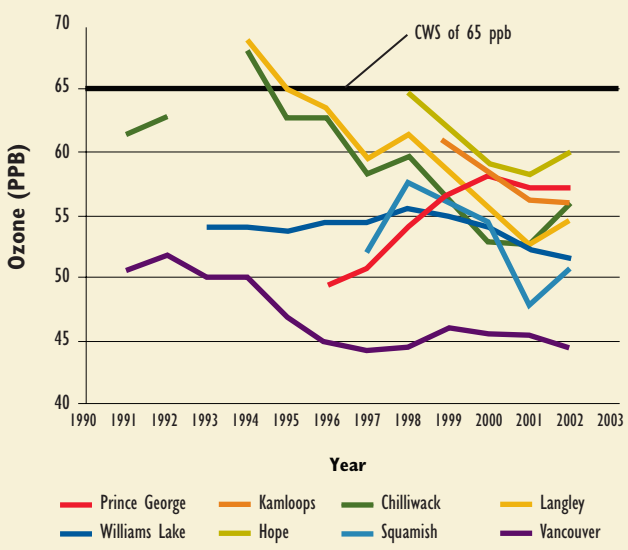
REFERENCES USED

- Agricultural Land Commission. Planning for Agriculture (2000). www.alc.gov.bc.ca/
- MAFF. Growing Together – Vol. 5 No. 1 (Fall 2004).
- MAFF Fast Stats, Agriculture and Food (2004).
- Statistics Canada. Census of Agriculture (1986–2001).

AIR QUALITY







REFERENCES USED

- BC Ministry of Water, Land and Air Protection (2003). http://wlapwww.gov.bc.ca/
- Canada-Wide Standards for PM and Ozone (2003). http://wlapwww.gov.bc.ca/air/airquality/pdfs/bccws_update_jan_03%20.pdf
- National Air Pollution Surveillance Network. Environment Canada (2002).
- Ontario Ministry of Environment. Air Quality in Ontario Report (2002). www.ene.gov.on.ca/envision/techdocs/4521e01.htm

The Sustainability Connection

We each breathe 11,000 litres of air a day. We need clean air to be healthy. Without it, we're at greater risk of respiratory diseases such as asthma, bronchitis, emphysema and lung cancer, as well as heart attacks and strokes. These diseases decrease our quality of life, and treating them increases health care costs. Fine particulate matter (PM) – microscopic particles that we can inhale deep into our lungs – has been identified as the most serious form of air pollution in BC and is hazardous to our health. Children, the elderly, asthmatics and those with cardio-respiratory diseases are at particular risk from PM. Energy consumption, transportation and industry are just three of the many activities that affect air quality. Concentrations of air pollutants can vary according to topography, forest fires, air circulation patterns, settlement patterns and the locations of industries.

Air Quality *Snapshot*

Fine particulate levels at which health risks are known to occur: . . . . . .PM_{10}>25 micrograms/m³
Fine particulate levels at which air quality is considered to be poor: . . . . . .PM_{10}>50 micrograms/m³
Respiratory diseases are the third leading cause of death in the Fraser Basin.

High levels of fine particulate matter, or PM, and Ground Level Ozone, or GLO, can have significant health and economic impacts. While PM and GLO – a component of smog – are generally getting better, many communities saw increased levels in 2002. Finer particulates with a diameter of less than 2.5 micrometres ($PM_{2.5}$) are more hazardous to human health than PM_{10}. On average, PM_{10} concentrations were greater in the interior and northern communities due to forest fires and slash burning. Transportation is the main source of pollutants in the GVSS and Fraser Valley regions. None of the regions exceeded the Canada Wide Standard (CWS) for GLO in 2002. By comparison, every major city in southern Ontario exceeded the CWS for ozone in 2002. Particulate levels should be of greatest concern to communities where beehive burners, woodstoves and fireplaces are commonly used, where forest fires are burning, and where there are high concentrations of vehicle use.

Industrial pollution contibutes to urban smog.

Sustainability Issues and Trends

Particulate Matter

Levels of particulate matter have risen slightly, with the frequency of high levels of PM_{10} increasing in seven of the nine locations monitored in 2002. This contrasts with a decrease in the frequency of high levels of PM_{10} between 1995 and 2000. In 2002, seven of nine communities in the Basin monitored had poor air quality (PM_{10}>50 micrograms/m³) on more than 18 days (or 5% of the time). For the last two years, four of these communities exceeded this level on more than 54 days (or 15% of the time).

The Upper Fraser and Cariboo-Chilcotin regions exceeded this level more than 30% of the time in 2002. Although levels of PM_{10} in the Upper Fraser have improved since 1995, recent data shows levels of $PM_{2.5}$ exceeded the CWS in 2002.

Ground Level Ozone

Other air pollutants of concern include Ground Level Ozone. Generally, levels of GLO have improved over the last five years, with the exception of the Upper Fraser region. None of the regions in the Basin exceeded the CWS for ozone (65 parts per billion) in 2002, but levels were worse in 2002 than in 2001 in four of eight monitored communities. Nitrogen oxides, sulphur dioxides, carbon monoxide and volatile organic compounds are all air pollutants. Nitrogen oxide and volatile organic compounds react with the atmosphere in the presence of sunlight to form GLO which can damage lung tissue and cause irritation to mucus membranes, as well as contribute to lower food crop yields. Therefore, the number of sunny days each year influences annual GLO concentrations.

Automobile exhaust is one of the leading causes of smog.

Making Sustainability Work

How are we doing?

- Particulate Matter (PM) and Ground Level Ozone (GLO) – Getting Better generally but worse in 2002.

What are we doing?

- Several communities in the Upper Fraser, Cariboo-Chilcotin, Fraser Valley and GVSS regions have developed Airshed Management Plans to improve air quality.
- Many cities have introduced initiatives into their Official Community Plans to reduce the air quality impacts of urban transportation.
- CHOKED (Community Health Opposition to Known Emissions Dangers) is a province-wide citizens' network working to raise awareness about air pollution's health risks and recommend actions to improve air quality. www.cleanairbc.tc.ca/smithers/smithers.html

What else can we do?

- Governments can maintain and expand air quality monitoring and reporting, e.g., National Pollutant Release Inventory. www.ec.gc.ca/pdb/npri/npri_home_e.cfm
- Continue to phase out beehive burners and schedule burning of slash when the weather will help disperse particulate matter.
- Provide facilities and programs to support ride-sharing and bicycle commuting by employees.
- Walk, cycle, carpool or take public transit instead of driving alone.
- Purchase low-emission vehicles, e.g., the Corporation of Delta is replacing its municipal vehicle fleet with clean burning hybrid vehicles.
- Households can use certified clean-burning wood stoves.
- Limit use of fossil-fuelled small engine tools such as lawn mowers, chainsaws and leaf blowers. Instead, use electric-powered or manual tools.
- Avoid using aerosol sprays and cleaners, oil-based paints and other chemical products that contribute to poor air quality indoors and outdoors. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

BUSINESS AND SUSTAINABILITY

The Sustainability Connection

Business contributes significantly to social and economic well-being by employing people and generating income for employees, investors and for other businesses through multiplier effects. Socially and environmentally sensitive business practices can strengthen a company's economic efficiency and the long-term viability of communities in which it operates. Enhancing the environmental and social performance of an enterprise can deliver significant and quantifiable benefits to the financial bottom line, improve its reputation, increase competitiveness, and build customer and employee loyalty.

Business and Sustainability *Snapshot*

of Fraser Basin businesses among the top 10 reporting businesses in Canada to receive "top scores" for their sustainability reports in 2001/02: 3
# of BC-based businesses that belong to Canadian Business for Social Responsibility: 91
Increase in R&D spending by BC business from 1996 to 2001: 50%
# of environment industry firms in BC in 2002: 1,305
Increase in such firms in BC from 1995 to 2002: . . . . . .more than doubled
BC has more LEED "green building" accredited professionals than any other province.

Business has traditionally focused on profits and the "bottom line". However, there is growing recognition about the need for business practices that support economic, social and environmental sustainability – often referred to as the "triple bottom line" or "corporate social responsibility" (CSR). BC ranks favourably in comparison with Canada as a whole when it comes to sustainability reporting, supporting business sustainability, growth in research and development spending, and growth in the environment industry.

Sustainability Issues and Trends

Sustainability Reporting

The number of companies reporting their social, environmental and economic practices and performance is one indicator of businesses' transition to sustainability. A Stratos Inc. study indicates that sustainability reporting is increasing among BC companies, but not as quickly as in Canada as a whole. In 2000, the country had 57 reporters, with 12 of them in BC. In 2001/02, the study identified 15 reporters in BC and 100 companies in Canada. However, three of the 10 reporters to receive "top scores" for the quality of their sustainability reports in 2001/02 were from the Fraser Basin.

Support for Business Sustainability

Businesses are getting support in moving towards sustainability from organizations, networks and alliances with mandates for sustainability and/or CSR. Examples include Canadian Business for Social Responsibility (CBSR) and Business Alliance for Local Living Economies (BALLE). Currently 91 BC-based businesses are members of CBSR and 100 are members of BALLE. The Ethics in Action™ Awards (www.ethicsinaction.com) is one example of an annual event that recognizes companies that exemplify good corporate citizenship by making corporate social and environmental responsibility a key aspect of their operations.

Corporate Donations

While reporting on and support for sustainability have been on the upswing, charitable corporate giving among larger companies between 1993 and 2003 declined, according to EthicScan Canada Ltd. In 2003, 19.9% of large companies were pledging to the Imagine Campaign, down from 25.5% in 1993/95. The number of companies found to be hosting matching gift programs has also decreased from 27.7% of companies surveyed in 1993-95 to only 19.9% in 2003.

Innovation through Research and Development

Investment in research and development (R&D) is an important indicator of innovation, which itself is an important component of the sustainability and resiliency of businesses and local economies. In 2001, BC's R&D-spending-to-GDP rate was 1.2%. This level is below the Canadian average (1.9%) but higher than Alberta (0.9%). However, this represents a 50% increase since 1996, a higher rate of growth over five years than Alberta, Ontario and Canada.

Environment Industry

Businesses also contribute to sustainability with particular types of environmental work in addition to internal business decisions, policies and programs. The environment industry provides a wide range of goods, services, expertise and technology to their clients that help address environmental dimensions of sustainability such as protecting the environment, preventing and/or cleaning up pollution, and managing waste. As of 2002, this industry represented 1,305 establishments in BC and employed 18,212 people. The industry is experiencing rapid growth in Canada and in BC. Between 1995 and 2002, the number of environmental establishments operating in Canada increased by 70%, and more than doubled in BC. Between 1995 and 2000, the number of employees in this industry had also grown by 6.2% nationally and 12.8% in BC.

Making Sustainability Work

How are we doing?

- Rates of sustainability reporting – Getting Better.
- Stable or increasing rates of corporate donations – Getting Worse.
- R&D-spending-to-GDP rate – Getting Better.

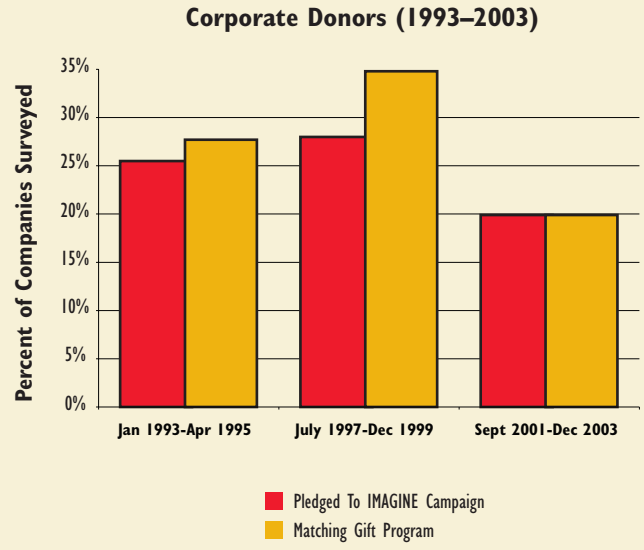
What are we doing?

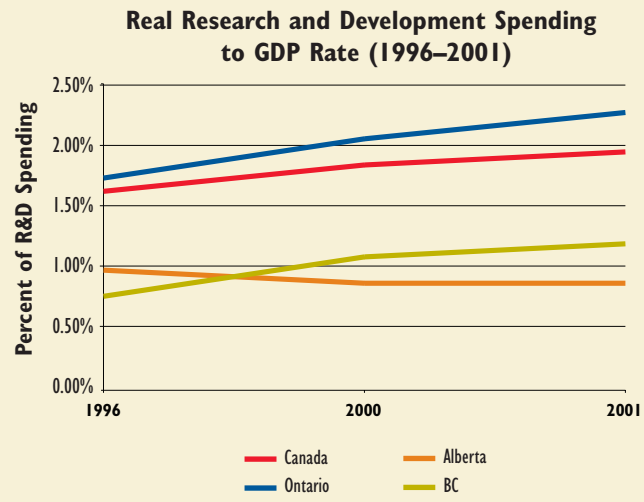
- Educating business professionals – a 2003 survey of 36 graduate and undergraduate business schools from universities across Canada revealed an extremely high level of innovation and leadership among business schools with respect to their CSR and sustainability activities. The University of British Columbia was ranked 10th overall for its MBA Program and 8th overall for its faculty.
- Building Construction – According to the Canada Green Building Council, BC has more LEED-accredited professionals than any other province, and the City of Vancouver is the first municipality in North America to adopt this leading edge energy and environmental performance system as its standard for all new city buildings.
- Energy Use – Many businesses participate in the BC Hydro PowerSmart program and/or purchase green energy certificates.

What else can we do?

- Encourage businesses to adopt policies and practices that are more sustainable.
- Businesses can join organizations such as CBSR (www.cbsr.ca) and BALLE (www.livingeconomies.org) to acquire advice, support and opportunities to apply sustainability and CSR.
- Conduct social and environmental assessments or audits to help increase efficiency and productivity while minimizing negative social and environmental impacts.
- Develop incentives to encourage social and environmental "goods" (employee training, efficiency, pollution prevention), while implementing disincentives or regulations to discourage social and environmental "bads" (waste generation). ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)



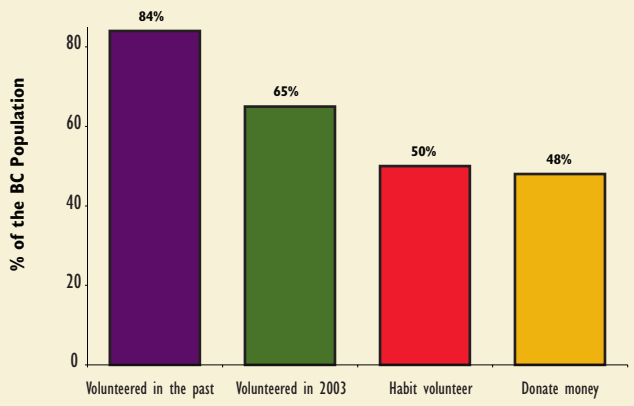


REFERENCES USED

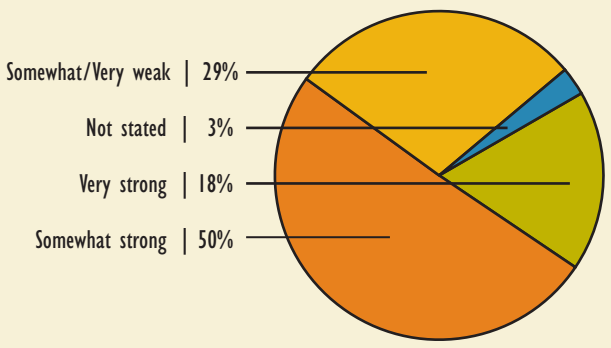
- BC Business. BC Check-Up Report (2004).
- Business Alliance for Local Living Economies. (2004).
- Canada Green Building Council. Leadership in Energy and Environmental Design Green Building Rating System. www.cagbc.org (2004)
- Canadian Business for Social Responsibility. (2004).
- Corporate Knights. The 2003 Knight School Survey. www.corporateknights.ca/knightschools/intro.asp (2004).
- EthicScan Canada Ltd, The Corporate Monitor (Sept.-Oct. 2003).
- Globe Foundation of Canada. An Assessment of British Columbia's Environmental Business Sector. www.globe.ca/attachments/BC_Enviro_Report.pdf (2003).
- Statistics Canada. Environment Industry Survey (1995-2000).
- Stratos Inc. Building Confidence: Corporate Sustainability Reporting in Canada. www.stratos-sts.com/ (2003).
- Stratos Inc. Stepping Forward Report. www.stratos-sts.com/ (2001).

COMMUNITY ENGAGEMENT

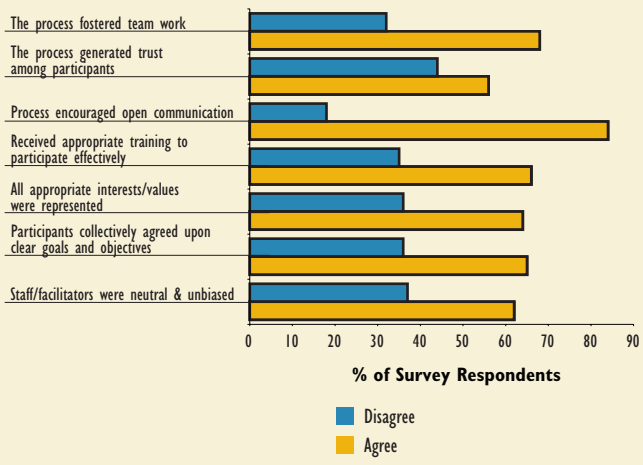
Volunteerism and Charitable Giving in BC (2004)



British Columbians' Sense of Belonging in Their Local Communities (2003)



Survey Results of the Land and Resource Management Planning Process (2002)



Community leaders worked together to revitalise the economy in McBride and Dunster as part the Fraser Basin Council's Strengthening Communities program.

REFERENCES USED

- Frame, Day and Gunton. School of Resource and Environmental Management, SFU. Strategic Land Use Planning for Sustainable Resource Management: An Evaluation of the Land and Resource Management Planning Process in BC. (2002).
- Ipsos Reid. Canada Volunteerism Initiative – British Columbia Network Research (2004).
- Statistics Canada. General Social Survey – Catalogue no. 89-598-XIE (2003).
- Statistics Canada. National Survey of Nonprofit and Voluntary Organizations (2004).

The Sustainability Connection

Community engagement is a central part of a well-functioning, democratic society. The more involved that individuals become in their communities, the more they are likely to connect with, and value, those communities. Not surprisingly, when people volunteer at their schools, join business groups, take time to vote, participate in community planning forums or help out at their local food bank, they have better schools, lower crime rates, more racial tolerance, closer involvement in decision-making and better economic opportunities. Without a strong community, many citizens will have difficulty understanding the importance of a sustainable environment – and the interrelationship between social, economic and environmental issues.

Community Engagement *Snapshot*

% of BC residents who have volunteered at some point: 84%
% who had volunteered in 2003: 65%
% who consider themselves to be habit volunteers: 50%
% who donate money instead of time: 48%
# of hours spent by the average volunteer: ....274 hours/year

A 2004 Ipsos Reid survey on volunteerism in BC produced strong evidence that British Columbians are engaged in their communities. However, with such a high level of volunteerism, it is both surprising and troubling that BC residents indicated a somewhat weak sense of belonging to their communities relative to other provinces. BC has among the lowest per capita number of non-profit and volunteer organizations (486 per 100,000 population as compared to the Canadian average of 508). However, BC had the third highest proportion of all of the nonprofit and voluntary organizations in Canada (12.6%), the fourth highest proportion of Canada's volunteers (7.8%) and the fifth highest proportion of total hours volunteered in Canada (4.9%).

Mayor Dave Hendrixson at the reopening of the Wells-Barkerville Elementary School.

Sustainability Issues and Trends

Social Engagement

The 2003 General Social Survey on Social Engagement reports that about half of BC respondents – as in Canada generally – indicated that they had a "strong sense of belonging to their local community." However, only 17.8% of survey respondents in BC indicated that they had a "very strong sense of belonging" to their local community, as compared to the Canadian average of 21.7%. Some 28.8% indicated that they had a "somewhat/very weak sense of belonging," as compared to 26.6% overall in Canada. Survey results also suggest that British Columbians have a lower than average confidence in public institutions such as the health care, education, police, welfare, parliament and justice systems.

Making Sustainability Work

How are we doing?

- Rate of volunteerism – Getting Better.
- Charitable giving – Getting Worse.
- In 2003, BC had the third highest proportion of nonprofit and voluntary organizations in Canada (12.6%), but among the lowest per 100,000 population.

Minister of Sustainable Resource Management George Abbott addresses the Mid-Fraser Economic Development Conference.

What are we doing?

- The Land and Resource Management Planning process is a unique model of community engagement that seeks to resolve resource conflicts and develop strategic land use plans by engaging stakeholders to ensure that resource decisions take into account the needs of communities, the economy and the environment. Currently, strategic land use plans are approved or being developed for more than 80% of British Columbia.
- The Citizens' Assembly on Electoral Reform is an example of community engagement in action on a province-wide scale in BC. The 161 members make up an independent, non-partisan assembly of randomly selected citizens from across the province who are developing recommendations on the way we elect provincial MLAs.
- The City of Vancouver has created *How to Participate in City Processes: A Guide for the Public*. The Guide contains 14 sections, which describe the workings of government, how decisions are made and the different processes by which citizens can become involved in the ongoing work of the City. www.city.vancouver.bc.ca/commsvcs/planning/pubinvolveguide/
- As part of its Strengthening Communities Program, the Fraser Basin Council facilitated five projects in 2003/04 to support local communities and regions to address local challenges with local solutions. Two examples include:
  - In the McBride-Dunster area (in the Upper Fraser Region), a community vision statement was developed and a Network Night was held, where 75 organizations exchanged information about upcoming events as a means of improving communication and relationships.
  - In the South Cariboo area, a Community Profile and Vision Statement were developed through a public consultation process, involving over 50 representatives of community organizations, the private sector, local governments and First Nations.

What else can we do?

- All levels of government, businesses and community organizations can provide ongoing opportunities and resources for individuals to become engaged in planning and decision-making processes that affect sustainability.
- Individuals, community groups and businesses can get informed about sustainability issues in their community and take action to advance sustainability. CivicInfo BC is an award-winning website and information sharing service created to encourage and facilitate the free exchange of local government information. www.civicinfo.bc.ca
- Contact Volunteer BC, your local volunteer centre or community organizations for opportunities to participate and advance sustainability in your community.
- Schools and others can adopt the BC Performance Standards for Social Responsibility, which have been developed for voluntary use in BC schools to provide a context within which teachers, students and families can examine aspects of social responsibility and citizenship in their schools. www.bced.gov.bc.ca/perf_stands/social_resp.htm. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

The Sustainability Connection

Strong communities are fundamental to a sustainable future in the Basin, not only because of the cumulative effects of sustainable or unsustainable conditions, but also because failure to address local community well-being can make it difficult for citizens to have concern for the larger picture. The challenges to individual communities vary considerably depending on the stresses faced and the capacity to resolve them. The nature of sustainability challenges at the community scale depends somewhat on whether they are rural or urban.

Community Sustainability *Snapshot*

Shift in Basin population from rural to urban regions: 4.9%
Average regional waste reduction per capita (1990-2002): 24%
% of people in the Basin who drove to work in 2001: 82%

Sustainability concepts have been helping communities focus on their capacity to meet a wide range of societal and individual needs and to withstand and be resilient to change. Many small rural communities may be facing population decline, job losses, economic vulnerability and a reduced capacity to provide community services. Urban centres are facing pressures associated with intensive growth in population including planning and density issues, transportation improvements, social services and upgrading infrastructure.

Sustainability Issues and Trends

Sustainability of Rural Communities

Changing demographics (as discussed in the section on Population) put stress on rural communities that are also facing economic and social challenges and restructuring. In response to downturns in mining, forestry and fisheries, a number of communities have been working hard to diversify their economies and maintain local services and infrastructure. Some communities lack key social services and infrastructure because of low or declining populations, or have lost them due to reduced government expenditures and other economic challenges. Adequate transportation, communications (including broadband Internet), health and educational services are examples of needed services that rural communities are attempting to maintain and enhance. These services are needed not only to sustain current residents, but also to attract the "new wave" of residents and visitors associated with tourism and the "knowledge economy."

Urban Sustainability and the Urban-Rural Interface

Different issues face the Basin's growing urban areas which include the GVSS and Fraser Valley regions, Kamloops and Prince George. Population growth increases stresses on land, water and other resources, as well as on the social and economic fabric of communities. High growth areas tend to experience air and water quality problems and traffic congestion, as well as over-stretched community services.

Some sustainability challenges arise from the interplay between urban and rural areas. Urbanizing communities seek more land for development, while others seek to protect the rural character of land in order to sustain food production capacity, and for environmental, social and cultural reasons. Agriculture, wetlands and other natural features that support ecological processes have been compromised, and in some locations lost to urban and industrial expansion.

Effective growth management is part of the answer in protecting the urban-rural interface and the quality of life in urban centres. This includes "smart growth" and collaborative planning practices to channel growth in ways that minimize social and environmental sustainability problems. Examples include developing compact and complete communities, utilizing increased density in new and existing neighbourhoods, and enabling a mixture of residential and commercial uses. The designation of urban containment boundaries has helped some local governments concentrate growth within already developed areas and preserve the rural, agricultural and resource lands outside of those boundaries.

Developing more public transit and other alternatives to the automobile is also part of the answer. Patterns of land use and urban development play a key role in influencing the transportation needs and choices of people. The availability of transportation-related infrastructure such as public transit, roads, highways and cycling routes is another important factor affecting transportation patterns in both urban and rural communities. As of 2001, approximately 82% of people in the Fraser Basin commuted to work in motor vehicles. In Greater Vancouver, fewer people (79%) drove to work, 11% took public transit, 6.5% walked and 2% traveled by bike. In the Cariboo and Fraser Valley regions, however, 91% and 92% of people commuted by car.

Managing Solid Waste

Community sustainability also means achieving efficient use of resources such as water, energy and transportation infrastructure, as well as managing waste (sewage, solid waste and air pollutants). The quantity of waste disposed in landfills remains high despite significant increases in recycling. Municipal solid waste patterns vary widely by regional district. Although six of eight regional districts have reduced rates of per capita waste disposal since 1990, five of eight have actually seen increases more recently (1999-2002). In addition, population growth is a factor. For example, in BC, per capita waste disposal was reduced by 28.6% between 1990-2002; however, BC only achieved a 10% reduction in tonnes of waste disposed due to population increases.

Making Sustainability Work

How are we doing?

- Stable or moderately changing population in all regions and in all age classes – Getting Worse.
- Development and implementation of growth strategies in areas where there are urban growth and development pressures – Getting Better.
- Reducing solid waste – Getting Better per capita.

What are we doing?

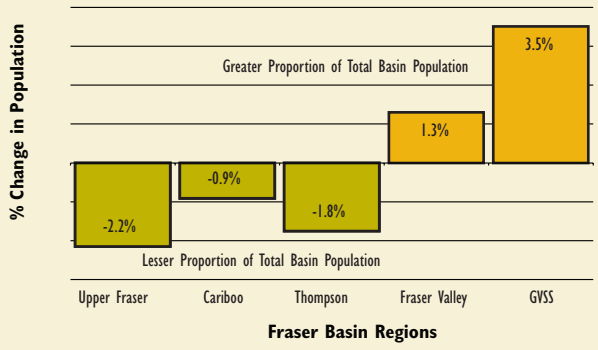
- Measuring and reporting on sustainability is vital to help understand community trends, facilitate public dialogue about community issues and develop appropriate actions to advance sustainability. Several communities including Quesnel and New Westminster have engaged in developing indicator-based processes similar to this *Sustainability Snapshot*.
- Regional districts and municipalities are using growth management strategies and "smart growth" to deal with sustainability issues in high growth areas. Recently, the Squamish-Lillooet Regional District initiated a Regional Growth Strategy process, joining five other regional districts in the Basin including the Greater Vancouver, Thompson-Nicola, Fraser Valley, Cariboo and Columbia-Shuswap Regional Districts.
- Community programs are applying the principles of "smart growth," a range of urban development strategies to reduce sprawl that are fiscally, environmentally and socially responsible.

What else can we do?

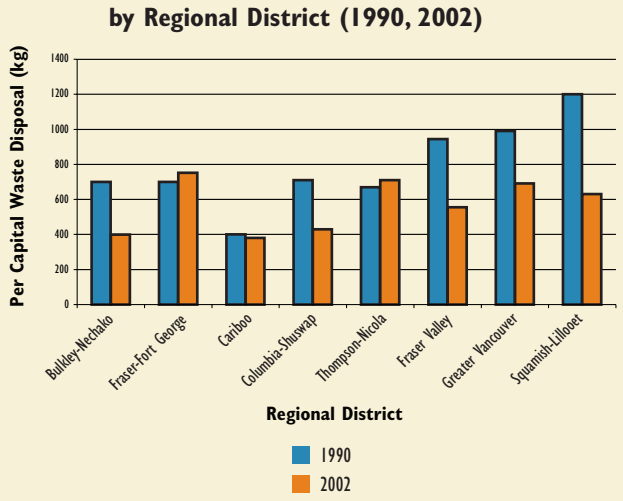
- Incorporate principles of sustainability and "smart growth" into land use decisions so that development and growth occur in a way that efficiently utilizes infrastructure, maintains community livability and protects agricultural land, habitat and biodiversity.
- Volunteer in your community and support volunteer opportunities.
- Get to know your neighbours, your neighbourhood and your region.
- Participate in and/or facilitate community planning and decision making.
- Support local businesses and a diverse economy.
- Support local farmers and protect farmland.
- Protect greenspaces and fish and wildlife habitat.
- Walk, bike, take public transit, and work and shop near your home.
- Save water, energy and money.
- Reduce, re-use and recycle. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

Percentage Change in Proportion of Population by Fraser Basin Region (1981–2001)



Per Capita Waste Disposal by Regional District (1990, 2002)



The Fraser Basin Council worked with Squamish residents to develop an imaginative new plan for the redevelopment of the city's waterfront.

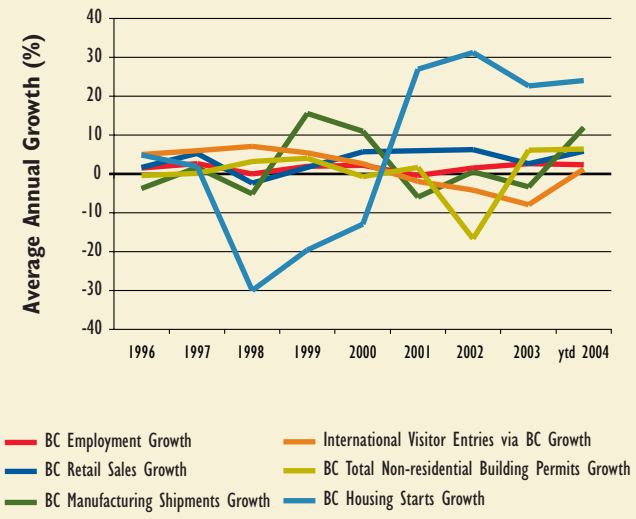
Small communities like Wells-Barkerville are trying to diversify their economy.

REFERENCES USED

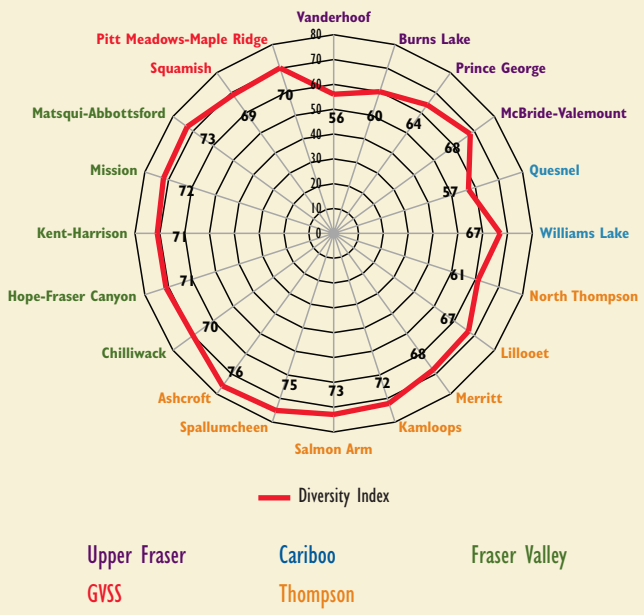
- Recycling Council of BC. 2001/2002 Municipal Solid Waste Tracking Report (2003).

ECONOMIC DIVERSIFICATION

Average Annual Growth in BC for Six Economic Indicators (1996–2004)



Diversity Index by Local Areas and Fraser Basin Regions (2001)



Fraser Basin Council Directors view devastation from the Mountain Pine Beetle epidemic.

Mountain Pine Beetle Epidemic

The Mountain Pine Beetle (MPB) is an additional factor when it comes to forest sector vulnerability for some regions. For example, BC's Chief Forester recently increased the annual allowable cut in the Quesnel Timber Supply Area by 63%, and in the Prince George TSA by 30% in 2002 and another 22% in 2004, to address the MPB epidemic. Although this may help to increase the use of beetle-killed trees, the Chief Forester acknowledged that these harvest levels cannot be sustained in the long term. Communities in these areas will face socio-economic adjustments in five to ten years. (Note: See Forest Vulnerability Index Chart, page 17.)

REFERENCES USED

- BC Business Council. BC Economic Indicators (1995-2004).
- BC Statistics. "British Columbia's Heartland at the Dawn of the 21st Century" (January 2004).
- Pedersen, L., BC Ministry of Forests. "Lakes Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination" (2004).
- Pedersen, L., BC Ministry of Forests. "Prince George Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination" (2004).
- Pedersen, L., BC Ministry of Forests. "Quesnel Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination" (2004).

The Sustainability Connection

A vibrant economy is part of the vision for a sustainable Basin. A sustainable economy is one that manages local, regional and global economic activities in a way that meets current needs without diminishing opportunities for future generations. Economic diversification is a measure of economic stability and resilience at the community and regional level. A diverse economy reduces the reliance on and vulnerability to changes in any one sector.

Economic Diversification *Snapshot*

Highest economic diversity rating of 20 smaller Basin communities: Ashcroft (76) and Spallumcheen (75)
Lowest economic diversity rating: Vanderhoof (56) and Quesnel (57)

In general, communities within the Thompson, Fraser Valley and GVSS regions have higher levels of economic diversity than communities within the Upper Fraser and Cariboo-Chilcotin regions. The upper regions are generally more dependent on the forest sector than the Thompson and lower Fraser regions. Between 1996 and 2004, five of six economic indicators experienced net growth; however, all six indicators experienced negative growth – or losses – in one or more years during this period. These ongoing swings between growth and decline across different sectors of the economy illustrate the importance of a diverse economy at local, regional, basin-wide and BC-wide levels. A highly diversified economy is less vulnerable to a decline in any one sector in a given period of time.

Sustainability Issues and Trends

Economic Diversity Index

BC Statistics developed an Economic Diversity Index that rates 20 smaller BC communities based on 2001 data. The higher the number (0 to 100), the more diverse a given community's economy is presumed to be.

In 2001, communities in the Upper Fraser and Cariboo-Chilcotin regions were relatively much less diverse than southern regions of the Basin. In particular, Vanderhoof (56) and Quesnel (57) had the lowest levels of economic diversity. In general, the Thompson, Fraser Valley and GVSS regions demonstrated the highest levels of economic diversity. With some exceptions, most communities in these three regions received Index values ranging from 70 to 73. Among the five Fraser Basin regions and 20 communities, the Thompson Region had the most variation, with Ashcroft (76) and Spallumcheen (75) being the most economically diverse, while the North Thompson area (61) and Lillooet (67) had relatively low levels of diversity. Between 1991 and 2001, Merritt and Vanderhoof had the largest declines in diversity, followed by Quesnel and the North Thompson area.

Forest Vulnerability Index

An index for forest vulnerability was developed by BC Statistics to calculate the level of income dependence on forestry of selected communities throughout the province. The higher the number (0 to 100), the more vulnerable a given community is presumed to be to downturns in the forest sector. (See chart page 17.)

In 2001, communities in the Upper Fraser and Cariboo-Chilcotin regions were relatively much more dependent on the forest sector than southern regions of the Basin. In particular, Vanderhoof (81) and Quesnel (78) had very high levels of income dependence on the forest sector. The GVSS and Fraser Valley regions demonstrated the lowest levels of income dependence on forestry. For example, Chilliwack (6) and Kent-Harrison (6) had the lowest forest sector vulnerability rating of 20 communities in the Fraser Basin for which the index was calculated. Communities within the Thompson Region are more varied in their vulnerability, with moderate to high dependence noted in the North Thompson and Merritt areas, but much lower levels of dependence and vulnerability in Salmon Arm, Kamloops and Spallumcheen. Between 1991 and 2001. Vanderhoof had the greatest increase by far in forest sector vulnerability (48 to 81), followed by Quesnel, Merritt, North Thompson and Williams Lake.

Other Economic Indicators

In addition to the BC Economic Diversity Index, diversity can also be examined in other ways, such as retail sales, manufacturing shipments, non-residential building permits and other indicators. Using this index, the BC Business Council tracks a variety of economic indicators to report on the health of, and growth in, different elements of the BC economy. These indicators help to illustrate the importance of a diverse economy. Between 1996 and 2004, five of six economic indicators experienced net growth. However, all six indicators experienced negative growth – or losses – in one or more years during this period. For example, retail sales grew in 1996 and 1997, declined in 1998 and then experienced growth from 1999 to 2004. On the other hand, international tourism – as measured by international visitor entries – experienced strong growth between 1996 and 2000, followed by losses from 2001 and 2003 and slight recovery in 2004. Non-residential building permits and manufacturing shipments have gone through several cycles of growth and decline within this eight-year period. Therefore, on a province-wide – or Fraser Basin – scale, it is important to have a widely diversified economy so when some economic components are declining, the overall economy can rely on other components for stability and resilience.

Making Sustainability Work

How are we doing?

- Economic diversity – The Thompson, Fraser Valley and GVSS regions have higher levels of economic diversity than the Upper Fraser and Cariboo-Chilcotin regions.
- Forest sector vulnerability – The Upper Fraser and Cariboo-Chilcotin regions are generally more vulnerable to the forest sector than the Thompson, Fraser Valley and GVSS regions.
- Other economic indicators – Five of six economic indicators have experienced growth over the past eight years.

What are we doing?

- Through the Canadian Rural Partnership, Rural Team BC is a network of federal, provincial and rural organizations committed to working with rural residents to address their priorities. Annual conferences bring together rural residents to share experiences and knowledge. www.rural.gc.ca/team/bc/bchome_e.phtml
- Two volumes of the *Sharing Information to Strengthen Rural Communities* report prepared by the Fraser Basin Council provide an inventory of BC projects and "lessons learned" on a range of topics, including economic development, social services and training. www.fraserbasin.bc.ca/publications/fbc_reports.html
- Rural Communities Summit – "A rural dialogue, with real results" is how organizers describe the first Rural Communities Summit which took place June 19-21, 2003 in Clearwater, BC. With common issues such as centralization of private and public services, problems with access to safe, reliable transportation, and difficulty in securing finances for existing or new businesses, rural communities had a lot to talk about. Many people from business, community services, First Nations communities, local government and rural organizations attended the summit, the first province-wide gathering to be planned by rural people for themselves. The second Rural Summit was held in Vancouver in November 2004. BC Chamber of Commerce website: www.bcchamber.org
- The BC Community Economic Development Network furthers support for best practices in, and communication among, Community Economic Development organizations in BC.
- The Sonoran Institute developed a workbook – "Measuring Change in Rural Communities" – to assist communities in Western Canada to deal with changing economic circumstances. www.sonoran.org/

What else can we do?

- Businesses can diversify the goods and services they provide to be less vulnerable to economic downturns.
- Governments, school districts and post-secondary institutions can help educate and train a highly qualified labour force.
- Communities can attract new business development by supporting livable, sustainable communities and providing high quality community services.
- Individuals can support locally owned businesses as consumers and investors. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

The Sustainability Connection

Education is a central factor in sustainability, helping people to meet their basic needs, achieve their social, economic and environmental goals, and respond to challenges in a changing economy and society. It also contributes significantly to a person's involvement in their community and their understanding of, and ability to contribute to, sustainability. The lack of a good education, on the other hand, can limit opportunities for employment, financial security and community involvement. While learning and personal development is a life-long process not limited to formal educational programs, development in early childhood is especially critical to long-term well-being.

Education *Snapshot*

% of Basin residents in 2001
with a university degree: 18%
% of Basin residents in 2001
who have graduated from college: 28%
% increase in BC workers aged 25-45
participating in job-related training
between 1997-2002: 6.2%
% increase in class size between 2000
and 2003 in 14 of 23 school districts: 5%
% drop in budgets for library materials
over the past 10 years: . . . . . .>50%

More Fraser Basin residents are attaining post-secondary education than ever before. More than 30% of BC workers have participated in adult and job-related education, and that percentage is increasing. However, class sizes and the number of students per educator have both increased in the K-12 school system.

Sustainability Issues and Trends

Highest Levels of Educational Attainment

The highest levels of educational attainment between 1996 and 2001 in the Basin were generally rising, with more people having post secondary training/education and fewer people with only high school and elementary education. In 2001, 18% of the population in the Basin held a university degree and 28% had graduated from a college. Between 25% and 30% of those 15 years and older in all regions had attained some form of non-university training or education. The GVSS and Fraser Valley regions had the highest proportions of people without a high school certificate or with less than a grade nine education.

Student-Educator Ratios in the K-12 System

The ratio of students to educators in the Basin has continued to increase, meaning that teachers and aides on the whole are working with larger class sizes and have less time per student. Between 2000 and 2003, class sizes grew by more than 5% in 14 of the Basin's 23 school districts (from 16.3 to 17.1 students). While smaller class sizes have traditionally been associated with better learning outcomes, they are not a direct indicator of quantity or quality of education. Funding for teacher-librarians in BC has also been reduced from 1:400 students, with paid clerical assistance, to 1:700 with no clerical assistance, and budgets for library materials have dropped by more than 50% in the last ten years.

Apprenticeship Training

Apprenticeship training is an important form of education that consists of on the job training, work experience and formal classroom technical instruction. Trends overall indicate that the numbers enrolled in apprenticeship programs are increasing. Between 2000 and 2001, the overall number enrolled in apprenticeships rose by 4%, with increases in all areas apart from building construction.

Adult Training and Education

More than one-third of BC workers aged 25 to 45 participated in some form of job-related training in 2002. This represents an increase from 1997's figure (26.8%). The mean number of hours that participants spent in training has also increased to 211 hours, 13% more than the number of hours spent in 1997 and 38% more than that spent in 1993.

Early Learning

Early childhood development is another important indicator that speaks more broadly to longer-term individual well-being and community social capacity. The Early Development Instrument (EDI) gathers data on children at the kindergarten level to identify patterns of children's vulnerability based on five subscales: communication skills and general knowledge; emotional maturity; language and cognitive development; physical health and well-being; and social competence. Data from the Human Early Learning Project relating to communities in the Fraser Basin will be issued as a Special Release in 2005 when it becomes available for publication.

Making Sustainability Work

How are we doing?

- Levels of Educational Attainment – Getting Better.
- Student:Educator Ratios – Getting Worse.
- Apprenticeships and Adult Training – Getting Better.

What are we doing?

- Learning for A Sustainable Future works with educators from across Canada to integrate the concepts and principles of sustainable development into the curricula at all grade levels. www.schoolnet.ca
- OPTIONS: Services to Communities Society brings together Lower Mainland parents and infants to participate in a Mother Goose Pre-literacy Program that stimulates a child's brain development and fosters language and listening skills, attention and concentration.

What else can we do?

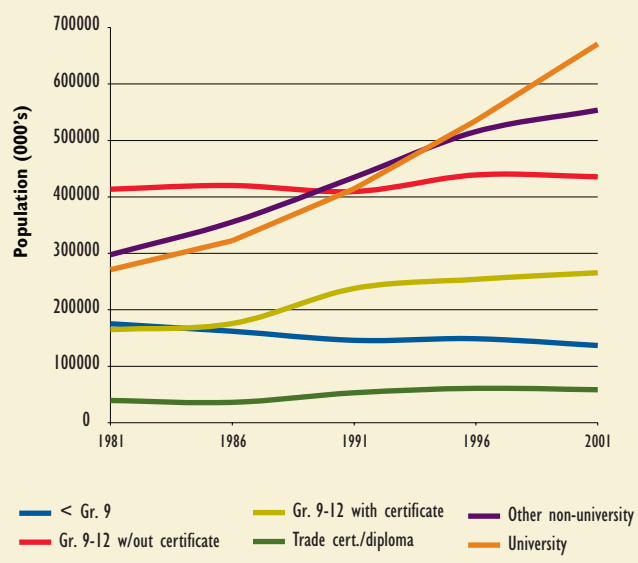
- Support and enhance schools, libraries and related resources.
- Participate in, and provide opportunities for, life-long learning.
- Support employee training and professional development opportunities, as well as opportunities for mentoring, internships and co-op education.
- Establish and support early learning programs to ensure that children and youth have the opportunities and resources they need to achieve their full potential for development.
- Families and other individuals can play a vital role in the education and development of children and youth through reading, tutoring and other activities.
- Educators can integrate sustainability into mainstream curriculum. For example, SENSE: www.sustain.ubc.ca/sense2/index.htm is a website created by students of UBC to aid other students to explore options related to sustainability at UBC by mapping undergraduate programs into three rings of sustainability: ecology, economy and society. ■

REFERENCES USED

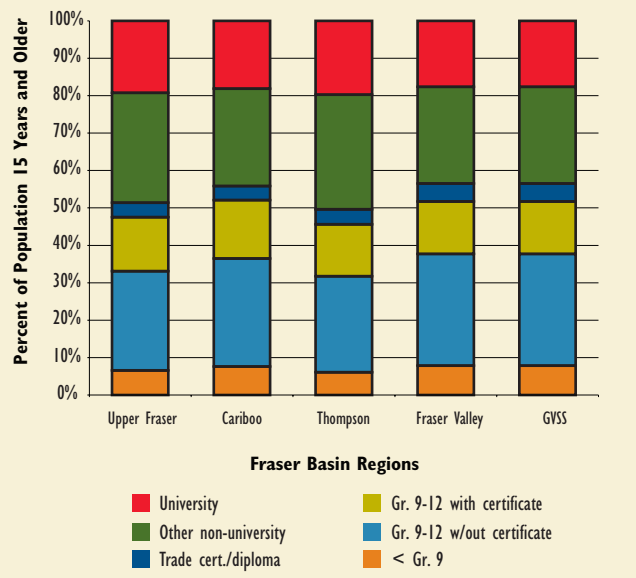
- BC Ministry of Education Data. www.bced.gov.bc.ca/ (2003)
- Haycock, Dr. Ken. The Crisis in Canada's School Libraries: The Case for Reform and Reinvestment, (2003). www.peopleforeducation.com/reports/library/library.html
- Statistics Canada. Population Census (1981-2001).

For more information on this topic go to:

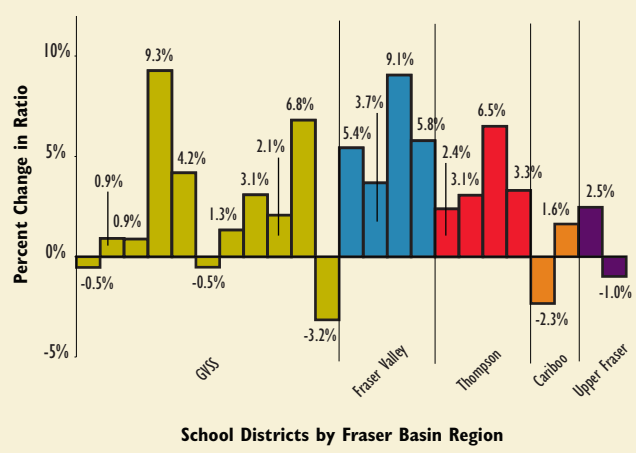
Basin Population by Highest Level of Educational Attainment (1981–2001)



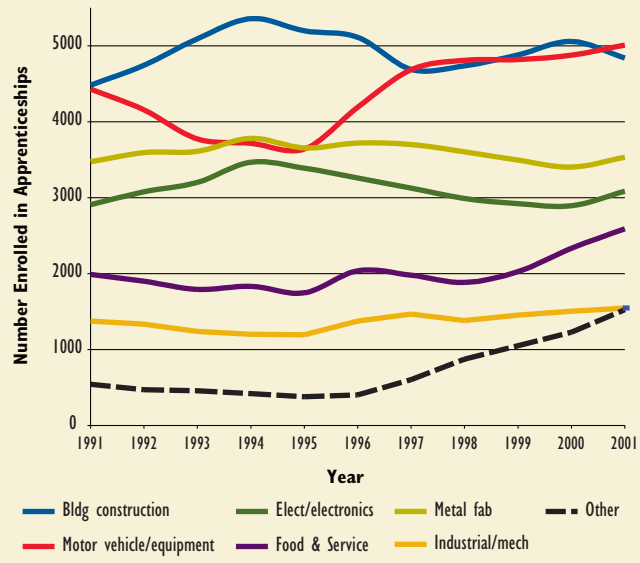
Highest Level of Educational Attainment by Region (2001)



Percentage Change in Student-Teacher Ratios, by School Districts (1997–2003)

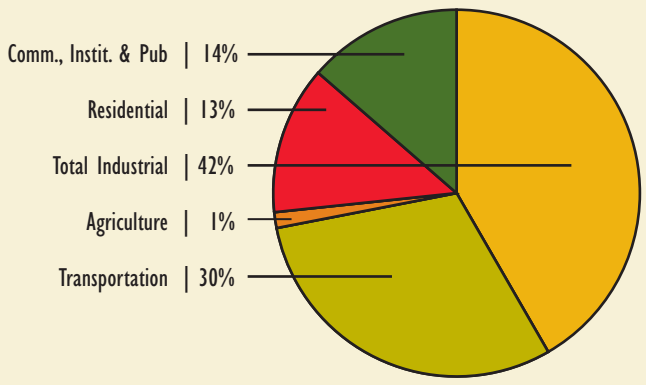


Number Enrolled in Apprenticeships in BC by Sector (1991–2001)

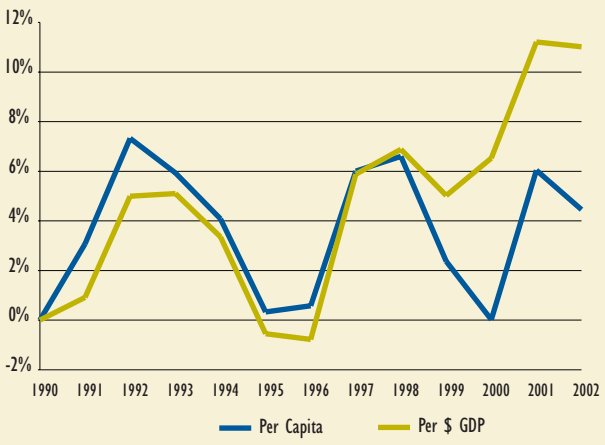


ENERGY AND CLIMATE CHANGE

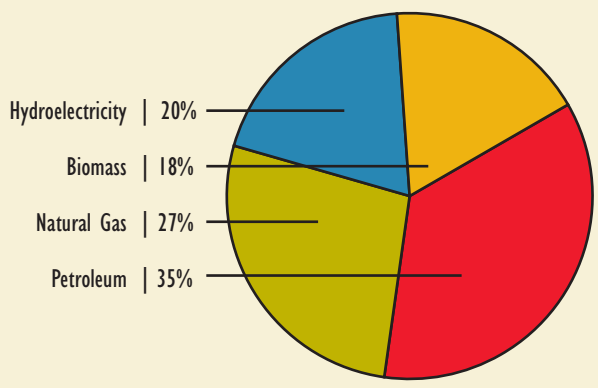
Energy Use in BC by Sector (2002)



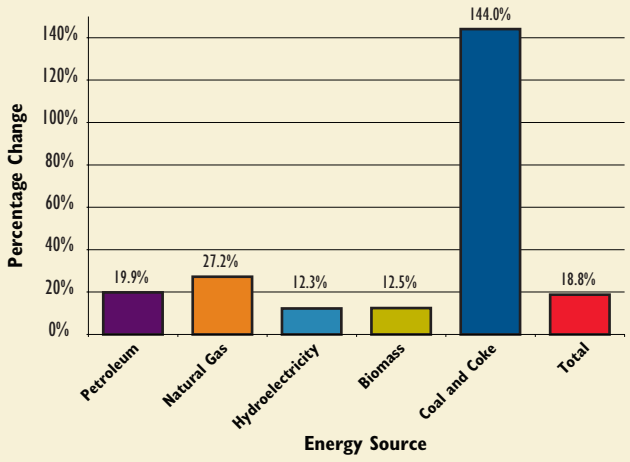
Energy Efficiency Improvements in BC Since 1990 (1990–2002)



BC Energy Consumption by Source (2001)



Percentage Change in Energy Use by Source (1990–2001)



The Sustainability Connection

Climate change is one of the world's leading sustainability challenges, and the energy sources we rely on play a determining role. A safe, reliable, affordable energy supply supports strong communities and vibrant economies. Renewable sources such as hydroelectricity, solar, wind and tidal power are more sustainable than fossil fuels that are a major source of pollution and greenhouse gas (GHG) emissions. Most scientists agree that pollutants and emissions are adversely changing the earth's climate, which is a key component in shaping the way we live on the planet. Increasing temperatures are changing wind and precipitation patterns and the types and frequency of severe weather events. These changes can have far-reaching and unpredictable environmental, social and economic consequences that affect our ability to have a sustainable future.

Energy and Climate Change *Snapshot*

Increase in total energy use in BC from 1990-2002: . .21%
Decrease in per capita energy use: 4.5%
Rise in BC's GHG emissions: 28%
Rise in GHG emissions from transportation: 31%
Per capita GHG emissions in the Basin: . . . . . .16.9 tonnes
Per capita GHG emissions in Canada: . . . . . .23.3 tonnes
World rank, if BC were a country,
in per capita GHG emissions: 4th
Average Basin temperature increase in
the past century: . . . . . .1°C
Increase in Fraser River summer water temperatures
over past 50 years: . . . . . .equivalent of 2.2°C per century

The Fraser Basin has many advantages in making our energy system more sustainable, including large hydroelectric power resources and a history of innovation in energy efficiency, green buildings, alternative fuels and vehicles, and new energy technologies. As a result, our GHG emissions of about 16.9 tonnes per person are well below Canada's average of 23.3 tonnes per person. We're also becoming more energy efficient – as our energy use in 2002 was lower by 4.5% per person and 11% per dollar of GDP compared to 1990 levels. Over the same period, GHGs rose slightly by 2.5% per person, while we produced 5% less emissions per dollar of GDP. However, per capita energy efficiency gains are being undermined by population growth, economic production, consumer choices (e.g., larger homes and vehicles), and increased use of fossil fuels. Overall energy use has risen by 19% and GHGs have risen by 28%.

Climate change is both a global issue and one that affects many aspects of our life in the Basin. In addition to lowering our output of GHGs, it is imperative that we prepare our communities to be more resilient to face impending variation and the potential natural disasters that may result.

Sustainability Issues and Trends

Energy Use in BC

The total energy used in BC increased by 21% between 1990 and 2002 (CIEEDAC 2004). While industry remains the largest energy user, the highest growth in energy use from 1990 to 2002 occurred in transportation (32% growth), commercial/institutional/public administration (30%) and agriculture (29%). On a per capita basis, we are becoming somewhat more energy efficient – as our energy use in 2002 was lower by 4.5% per person and 11% per dollar of GDP compared to 1990 levels.

Greenhouse Gas Emissions

Greenhouse gases (GHGs) include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and ozone (O_3). These gases – emitted by a wide range of human activities – serve to enhance the warming capability of the natural greenhouse effect to such a degree that scientists from around the world agree that GHG-emitting human activities are a contributing factor to the climate changes occurring around the globe.

- BC's GHG emissions rose by 28% from 1990 to 2002, due largely to changing energy consumption patterns. Transportation and stationary combustion sources (i.e., manufacturing, residential and commercial sources), as well as "fugitive" emissions from oil and gas exploration and coal mining have been the primary factors.
- GHG emissions from transportation rose by 31% from 1990 to 2002, and now represent approximately 38% of BC's total. Industry associated emissions make up 25% of total emissions, and grew by 10.2% over the same period.
- "Fugitive" sources comprise only 11% of BC's total GHG emissions, but grew by 110% from 1990 to 2002.
- Over the same period, GHG emissions rose slightly by 2.5% per person, while we produced 5% less emissions per dollar of GDP.

Climate Change

While there are uncertainties about what the future climate will look like, recent events make it clear that changes are occurring. We also know that communities are vulnerable to impacts from extreme events that occur under the present climate – including floods, drought, interface fires, pest outbreaks and invasive plants.

Average temperatures in the Basin have risen by approximately one degree Celsius in the past century, and average precipitation rose as well. Because higher temperatures drive other changes in climate systems, including the duration of ice on rivers and lakes, the proportion of snow to total precipitation and the temperature of freshwater ecosystems, they also affect various physical and biological systems.

Biophysical Impacts of Climate Change

- Summer water temperatures of the Fraser River have warmed over the past 50 years at a rate equivalent to 2.2°C per century.
- Fraser River water temperature is now in the upper threshold of what some fish species, such as salmon, can survive in. Sockeye salmon, in particular, are among the species that will be at risk if the warming trend continues. Temperatures above 18°C can impair their swimming ability, and temperatures between 22°C and 24°C can cause death (see section on Fish and Wildlife).
- The Fraser's volume and timing of flow has also changed. On average the river is reaching its cumulative annual flow earlier in the year. Data from the past 85 years suggest that the Fraser is reaching one third of its annual cumulative flow 11 days earlier on average per century and half of its annual cumulative flow nine days earlier on average per century. Other trends include earlier spring thaws and melting glaciers.
- Extremely high and low flows can affect water supplies for domestic and other uses, fisheries, power generation and flood risk.
- In BC, over the 20th century, sea levels rose by four centimetres in the Greater Vancouver area.

Solar Panels on the roof of the Best Western Inn Kelowna

Making Sustainability Work

How are we doing?

- Energy efficiency – Getting Better per capita and per GDP.
- Greenhouse gas emissions – Getting Worse.

What are we doing?

Reducing Energy Consumption and GHG Emissions

- Since BC Hydro began the Power Smart program in 1990, it has generated cumulative savings of more than 3621 gigawatt hours (GWh). One GWh is enough electricity to meet the needs of approximately 1,000 homes for a year.
- An estimated 6.8 megatonnes of GHGs have been avoided because about 36% of BC's energy is from renewable sources (CIEEDAC, 2004).
- "Green" electricity sources such as "low impact" hydro, wind, biogas/sewage gas, and solar make up about 0.9% of total capacity in BC.
- In 2003, BC Hydro and Canadian Forest Products Ltd. (Canfor) became partners in a biomass energy project that will provide all of the electricity needed at Canfor's two pulp and paper mills in Prince George at a significantly lower cost.
- 28 local governments in the Basin belong to the Federation of Canadian Municipalities (FCM) Partners in Climate Protection Program. Of Basin municipalities, 23 have developed an inventory of GHG emissions (Step 1), and others are developing plans.
- To date, more than 18,000 Basin households have participated in Natural Resources Canada's EnerGuide for Houses program and saved 106,608 GJ of energy, enough for the total energy needs of about 1,000 homes.
- Many local governments are engaged in recovering methane gas from landfills, a significant GHG with 21 times the impact of carbon dioxide.

Fraser Basin Council Directors at BC Hydro's new Stave Lake power plant that has been upgraded to be more efficient, increase power production and accommodate fish habitat.

Adapting to and Preparing for Climate Change

Communities that make themselves more resilient to the present climate-related vulnerabilities will also be better prepared to deal with future changes, including:

- Flooding – As of 2002, 90% of community respondents to a provincial survey had established an emergency flood plan.
- Drought – Land and Water BC Inc. has developed a province-wide drought strategy, including information materials for local government and water purveyors, and funding assistance for local drought strategies.
- Fires – All regional districts and municipalities are now required to develop local emergency plans. The most recent survey by the BC Office of the Auditor General in 2000 found that only about half the communities in high or moderate risk areas had mitigation strategies in place. Since 2003, when a number of damaging interface fire events occurred, many communities have begun work on emergency plans.

What else can we do?

- Take Environment Canada's One-Tonne Challenge to reduce your annual GHG emissions. www.climatechange.gc.ca/onetonne/english/

Energy Conservation – At Home

- Have your home assessed by the EnerGuide for Houses program to get good information for home renovations or furnace replacements – and be eligible for a homeowner's grant of up to $3,348.
- Install compact fluorescent light bulbs and LED lights; improve your home's insulation; turn off your computer at home and work; buy appliances and equipment with the Energy Star rating.
- Save water and energy by using low flow taps and showerheads.

Energy Conservation – Businesses

- Reduce energy use through fleet management, including compact and/or hybrid electric vehicles and Fleet Smart driver training for employees. Driving more efficiently can reduce fuel use by about 15%.
- Participate in the Natural Resources Canada Energy Innovators program or BC Hydro Power Smart program.
- Eco-industrial networking can identify how one's business waste can be another's resource. See the Eco-Industrial Development Council. www.eco-industry.org

Novex Courier's new Honda Civic hybrid car.

Energy Conservation – Transportation

- Walk, bicycle, carpool and take transit where available.
- Local governments can plan communities that put people close to their work and shopping, making it easier for people to get out of their cars.
- Telecommuting from home reduces travel.
- Increase the efficiency of our vehicles with proper maintenance, tire inflation and not idling. Operating a vehicle with just one tire under-inflated by 6 psi can reduce the life of the tire by 10,000 km and will increase the vehicle's fuel consumption by 3% – or at least $50 per year. Don't idle unless you have to. 10 minutes of idling a day can cost about $75 a year.

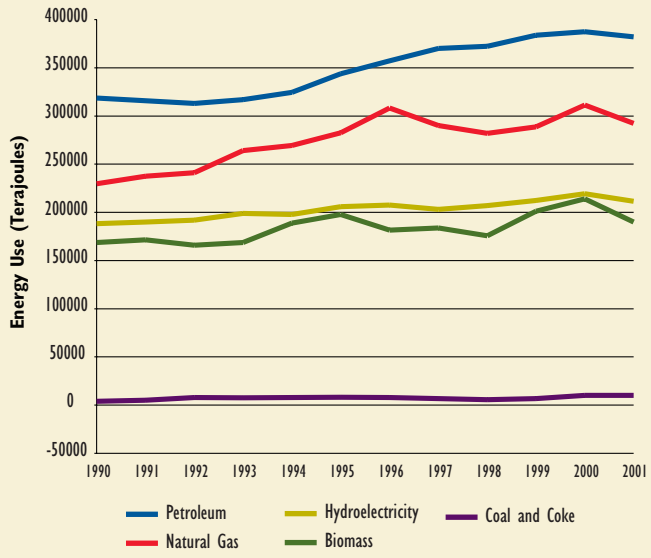
Energy Conservation – Community

- Local governments can join the FCM's Partners for Climate Protection Program and develop a local action plan. Funding from the Green Municipal Enabling Fund can help them make it happen.
- Use the new Greenhouse Gas Action Guide for ideas on how to save money and reduce GHGs. www.BCClimateExchange.ca ■

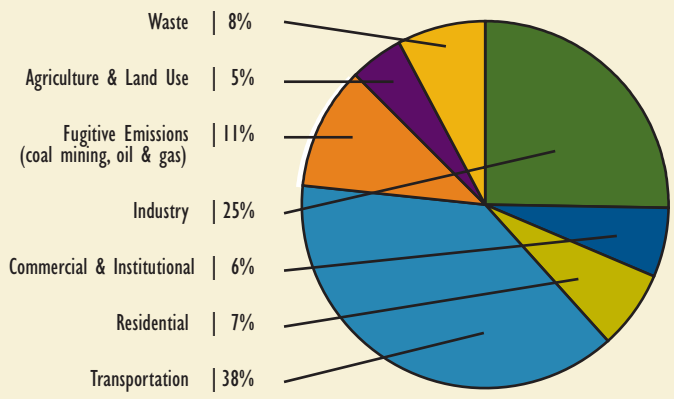
Transportation is a major energy consumer.

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

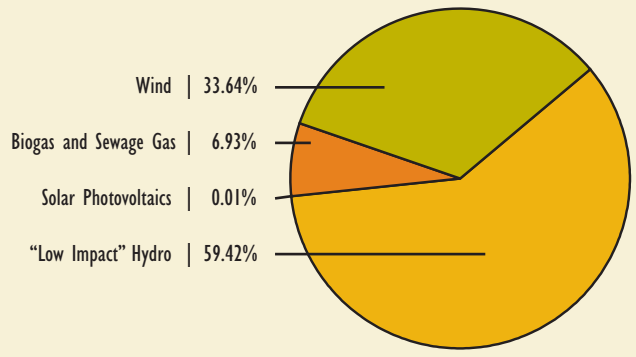
Growth in Energy Use by Source (1990–2001)



Sources of BC's Greenhouse Gas Emissions (2002)



Sources of Green Energy in BC (2002)

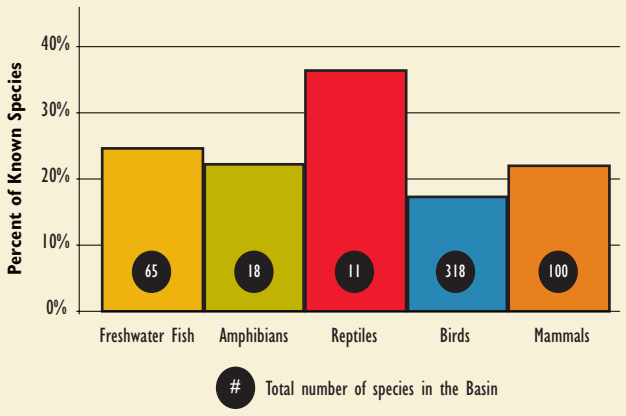


REFERENCES USED

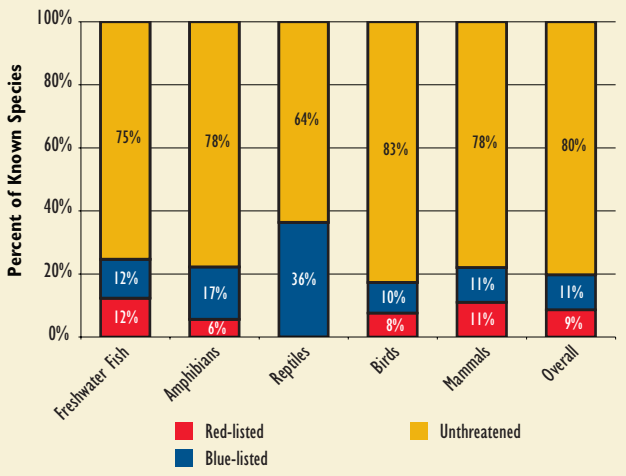
- BC Climate Exchange. www.BCClimateExchange.ca
- BC Hydro. Electricity consumption database (1992-2003).
- BC Hydro. 2004 BC Hydro Annual Report. Environmental Bottom Line (2003/04).
- BC Hydro/GRI Comparative Index (2004). www.bchydro.com/info/reports/reports11842.html
- BC Ministry of Water, Land and Air Protection. Indicators of Climate Change. wlapwww.gov.bc.ca/air/climate/indicat/pdf/indcc.pdf (2002)
- Deschênes, Suzanne M., personal communication. Data on participation in the EnerGuide for Houses Program from Natural Resources Canada (2004).
- Environment Canada. Water Survey of Canada.
- Federation of Canadian Municipalities. Partners for Climate Protection Program (Update 2004-07-06). www.fcm.ca
- Government of Canada. Climate Change (2004). www.climatechange.gc.ca (2004).
- Natural Resources Canada. Fuel Consumption Guide (2004). www.oee.nrcan.gc.ca/vehicles/
- Nyboer, John, Michelle Bennett and Katherine Muncaster. Energy Consumption and Supply in British Columbia: A Summary and Review Final Report. Canadian Industrial Energy End-use Data and Analysis Centre (CIEEDAC). Simon Fraser University, Burnaby, BC. Prepared for: the British Columbia Ministry of Energy and Mines (June 2004).
- The Hybrid Experience Report. www.hybridexperience.ca
- Turton, Hal and Clive Hamilton. Updating per capita emissions for industrialized countries. The Australia Institute (2002).

FISH AND WILDLIFE

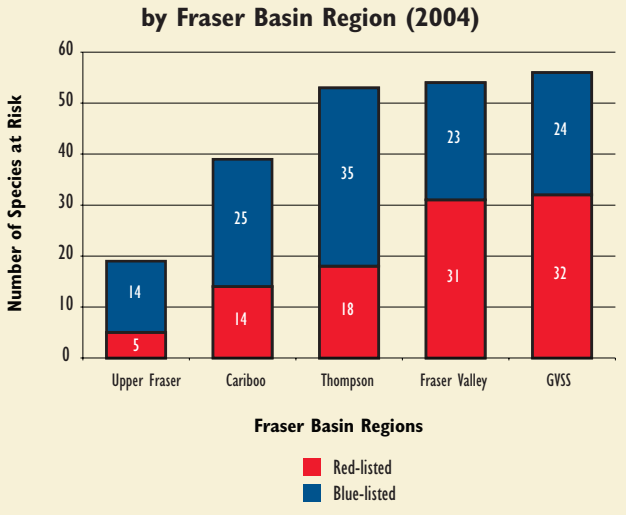
Red-listed and Blue-listed Species in the Fraser Basin as a Percent of Known Species (2004)



Red-listed, Blue-listed and Unthreatened Species in the Fraser Basin as a Percent of Known Species (2004)



Red-listed and Blue-listed Species by Fraser Basin Region (2004)



FOOTNOTES

(1) The provincial red list includes any indigenous species or subspecies that are extirpated, endangered or threatened. The blue list includes species that are considered to be of special concern or at-risk due to characteristics that make them particularly sensitive to human activities or natural events.

(2) Estimates of regional distribution of red- and blue-listed species were based on an approximation of the Fraser Basin regions using Forest Districts and Forest Regions.

(3) Eco-sections are areas with minor physiographic and macroclimatic or oceanographic variations.

(4) The DFO NuSEDS V1.0 database includes spawner estimates that were obtained using different counting methods over time. Therefore it is difficult to determine whether observed trends reflect real change in spawners or result from changing survey techniques. Caution is thus advised when interpreting these trends.

The Sustainability Connection

Fish and wildlife are key components of the ecosystems in which we live. The health of fish and wildlife species influences the health of ecosystems. For thousands of years, diverse, viable populations of fish and wildlife have contributed to social and economic well-being by supporting a variety of cultural and spiritual values and more recently, providing a basis for commercial, tourism and recreational industries. Some species like salmon are referred to as "keystone species" that play vital ecosystem roles. Salmon help in distributing nutrients from the oceans to the Basin, benefiting both aquatic and terrestrial ecosystems. Because our activities can have adverse effects on fish, wildlife and their habitats, we need to mitigate impacts to protect ecosystem health with proper management practices.

Fish and Wildlife *Snapshot*

% of lands in the Fraser Basin under Protected Area status in 2004: 13.3%

% of Basin vertebrate species listed as endangered, threatened or at risk in 2004: 20%

Salmonid species showing downward trends since 1990: . . . .Coho, Chinook, Sockeye, Steelhead

Estimated # of lower Fraser River White Sturgeon: 63,000

Nearly one in five vertebrates in the Fraser Basin were reported to be endangered, threatened or considered to be at risk in 2004. The largest percentage of these species occurs in the GVSS and Fraser Valley regions, which have intensive urban and agricultural land uses. Although protected areas can help protect wildlife and habitat, there was a slight decline in the total area of protected lands in the Basin in 2004 compared to 2002, with larger reductions occurring in the Fraser Valley (-1.1%) and GVSS (-2.2%) regions.

Trends in Fraser River salmon stocks are mixed and difficult to confirm due to data limitations and rapid natural fluctuations in salmon patterns. Fraser River salmon populations have been adversely affected by unpredicted changes to factors such as water temperature, water quantity, presence of parasites and other factors. Resources directed to fish and wildlife conservation, management and enforcement seem increasingly scarce. In particular, provincial and federal Auditors General have released reports calling on all orders of government for more concerted action to secure sustainable fish populations.

Sustainability Issues and Trends

Species at Risk

About 20% of known vertebrate species in the Basin are either red- or blue-listed(1). Vertebrate species include mammals, birds, freshwater fish, amphibians and reptiles. In 2004, 44 species were red-listed and 57 were blue-listed, suggesting a slight improvement (7% fewer species listed – 109 in 2002 versus 101 in 2004). However, changes in naming species (taxonomy) and observation methods are a more significant determinant of the numbers than actual changes in species abundance and diversity. The Upper Fraser region had only 5 species on the red list compared to 14 in Cariboo-Chilcotin, 18 in the Thompson, 31 in the Fraser Valley and 32 in the GVSS regions(2). Total red- and blue-listed species also follow this trend, with more listed species in regions with more intensive urban and agricultural land uses in the two lower Fraser regions. This may partly be the result of more species naturally inhabiting these regions.

Protected Areas

All five regions have more than 10% of their land in Protected Area status. In 2004, 13.3% of the land in the Basin was under Protected Area status – a slight decrease of 0.1% since 2002. The most significant regional changes occurred in the Lower Mainland. As a percentage of the total area in the region, protected areas in the GVSS region were reduced from 13.7% to 11.5% protected. In the Fraser Valley region, protected areas dropped from 17.5% to 16.4%. Within GVSS, this represents a loss of one-tenth of the previously protected land, and within the Fraser Valley, 2.8% of previously protected lands were lost. At a smaller scale, 18 out of 47 eco-sections(3) in the Fraser Basin have 4% or less land with Protected Areas designation and four of these have no level of protection. This is up from 14 eco-sections in 2002.

Photo: Lisa DeGoes

Salmon returning to the Adams River.

Salmon Spawning Returns – Escapement(4)

Salmon spawner estimates were grouped into three time periods and six regions. Because of this, the following analysis does not include changes in individual stocks or specific years.

Coho stocks are generally decreasing throughout the Basin with the exception of the mid-Fraser. In recent years, Thompson Coho have shown some improvement.

Chinook stocks have generally increased since before the 1980s but downward trends have been observed since the 1980s.

Sockeye – In recent decades sockeye stocks have appeared to be increasing; however, apparent Sockeye improvements are mostly driven by good escapements (adults returning to spawn) between 1980 and 1990. More recently, escapements have declined, in some cases dramatically. For example, for the late-run Sockeye, high pre-spawning mortality rates started occurring in 1996. Abnormally early-returning Sockeye were dying before spawning due, in part, to increased infection rates from a parasite [*Parvicapsula minibicornis*]; it is not yet known why this pattern occurred. This trend abated suddenly in 2002, leading to very high returns. However, a new problem emerged in 2004, with Fraser River water temperatures ranging from 19°C in mid-July up to 21°C in late August. Sockeye require water temperatures below 18°C for successful migration and spawning. In addition, a large mudslide blocked the Chilcotin River for 10 hours on August 29, indicating further mortality of Chilko Sockeye. Commercial Fraser Sockeye fisheries were closed since mid-August to conserve true late-run Sockeye.

Steelhead stocks have been decreasing substantially in the lower Fraser, Squamish and mid-Fraser. Returns from stocks in the Thompson and Chilcotin have remained similar to the 1980s, but still only half the runs are increasing.

Efforts are being made to restore Fraser River White Sturgeon populations.

Lower Fraser River White Sturgeon

The White Sturgeon is the largest (greater then 635kg and 6m) and longest living (over 150 years) fish in Canadian freshwater. Adults require 15 to 30 years to reach sexual maturity. The Fraser River is home to the last population of wild White Sturgeon in the world. The current lower Fraser population is greatly reduced from historic levels in the late 1800s. The sturgeon population in this area is now estimated at approximately 63,000 fish (40-220 cm in

length). Although this represents an increase in the short-term, it is likely that less than 10% of the population is sexually mature. Longer-term conservation will require protection of spawning habitat, conserving key food sources (such as eulachon, lamprey and salmon), reducing incidental mortality and injury from in-river net fisheries (targeting salmon), and controlling poaching.

Management of Fish and Fisheries

With respect to fisheries management, the Auditor General of Canada and the Commissioner of the Environment and Sustainable Development recently released a report with numerous criticisms of DFO, including delays in completing the Wild Salmon Policy; shortcomings in science and information on salmon stocks, habitat and the effects of aquaculture; and inadequate coordination between federal and provincial governments in habitat management and information-sharing. The Auditor General of BC has also expressed concerns, including an inability of federal and provincial governments to develop a common strategy for wild salmon, delays in implementing legislation beneficial to wild salmon protection, changing government business practices related to resource management, persistent gaps in information and knowledge, and lack of public accountability. Recently there appears to have been a decrease in the number of streams with valid escapement observations – at a time when stocks seem to be declining. Many former federal and provincial programs that focused on fish, watershed restoration and recovery have "sunsetted" or been cancelled recently, including the Habitat Restoration and Salmon Enhancement Program, Fisheries Renewal BC, Watershed Restoration Program, Habitat Conservation and Stewardship Program, and Urban Salmon Habitat Program. These programs once invested more than $20 million and countless volunteer hours in annual projects and programs.

Caribou populations have declined in recent years.

Making Sustainability Work

How are we doing?

- Species at risk – Stable (no detectable change).
- Protected areas – Getting Worse in Lower Mainland regions.
- Fish stocks – Getting Worse: Coho, Chinook, Sockeye and Steelhead.
- Government support for community-based stewardship – Getting Worse.

What are we doing?

- The Species at Risk Act was enacted by the federal government to support the protection and conservation of species at risk in Canada. www.speciesatrisk.gc.ca
- Recovery planning helps ensure the survival and recovery of species and ecosystems at risk. Recovery plans include a strategy and an action plan and represent the best available scientific, traditional and community knowledge. There are approximately 45 recovery teams in BC as well as several action groups and conservation initiatives. wlapwww.gov.bc.ca/wld/recoveryplans/rcvry1.htm
- A variety of government, quasi- and non-governmental organizations are working to advance sustainable fish and fisheries. Although there are too many to name, some key groups with a primary focus on salmonids or sturgeon include:
  - BC Conservation Foundation
  - Fraser River Sturgeon Conservation Society
  - Living Rivers Trust
  - Pacific Fisheries Resource Conservation Council
  - Pacific Salmon Commission
  - Pacific Salmon Endowment Fund Society
  - Pacific Salmon Foundation
  - Pacific Streamkeepers Federation
- Fraser River Sturgeon Conservation Society – A four-year, volunteer-driven study of white sturgeon, managed by the FRSCS, has provided credible and reliable estimates of the population of White Sturgeon in the lower Fraser River with support from provincial, federal and First Nation governments, plus non-government institutions, associations and foundations. Since 1999, over 100 volunteers (including sport fishing guides and fishermen) have applied over 18,000 tags to sturgeon from Yale to Steveston to better understand and manage Fraser River White Sturgeon.

Coldwater River Salmon Recovery Plan

In 2001 the Pacific Salmon Foundation, with funds from the Pacific Salmon Endowment Fund Society, initiated a watershed-based effort to recover salmon and steelhead in the Coldwater River. The Nicola Tribal Association and the Nicola Watershed Community Roundtable were key to the development of the plan, which involved federal and provincial personnel, landowners and ranchers, including communication with the public, project selection, monitoring and project partnerships. In order to improve habitat for these species an implementation plan focuses on the preservation and restoration of riparian areas; floodplain management and rehabilitation; treatment of chronic sediment sources; and the restoration of adequate in-stream summer flows. Although focused on fish, this initiative's success is driven by mutual respect among the people who live in the watershed and by embracing environmental, economic and social aspects of sustainability.

Species At Risk

The following illustrates the sustainability challenges and trade-offs faced by decision makers. In October 2004 the Government of Canada decided to not legally list Cultus Lake (and Sakinaw Lake) Sockeye under the Species At Risk Act, despite their listing by COSEWIC. The Minister of Fisheries cited the opportunity cost of not fishing other healthy stocks ($125 million in lost revenue by 2008 in the commercial, recreational and First Nation fisheries) as the reason for the decision. Recovery measures will still be undertaken to help the endangered stocks; however, this decision reflects a trade-off in pursuing social and economic benefits from the healthy stocks.

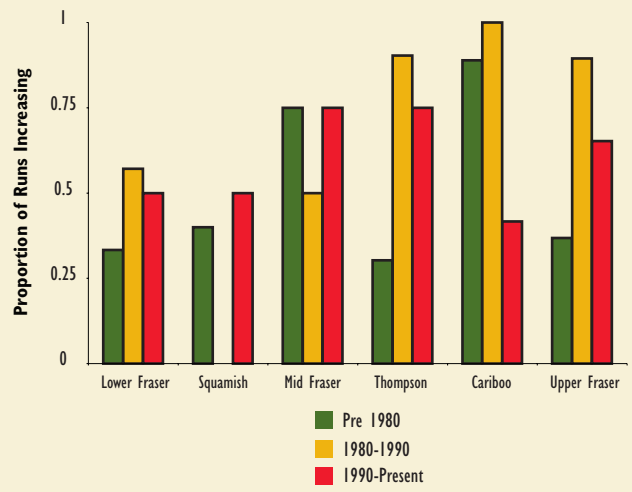
What else can we do?

- Governments and businesses can implement policies and best management practices to protect and conserve fish, wildlife and habitat, such as wetlands, streamside areas, and fish and wildlife corridors. These activities may also improve air and water quality and increase the aesthetic and economic value of adjacent lands. Streamside setbacks can also reduce flood damages. www.stewardshipcentre.bc.ca/
- Landowners can consult the Stewardship Options for Private Land Owners in BC to protect and maintain fish and wildlife habitat, using the four R's – Research, Retain, Restore and Reserve.
- Individuals and community groups can contact Pacific Streamkeepers Federation (www.pskf.ca) or the local DFO community advisor and get involved in local conservation and stewardship groups.
- Take the David Suzuki Foundation's Nature's Challenge (www.davidsuzuki.org) and find out 10 simple things one can do to live sustainably. ■

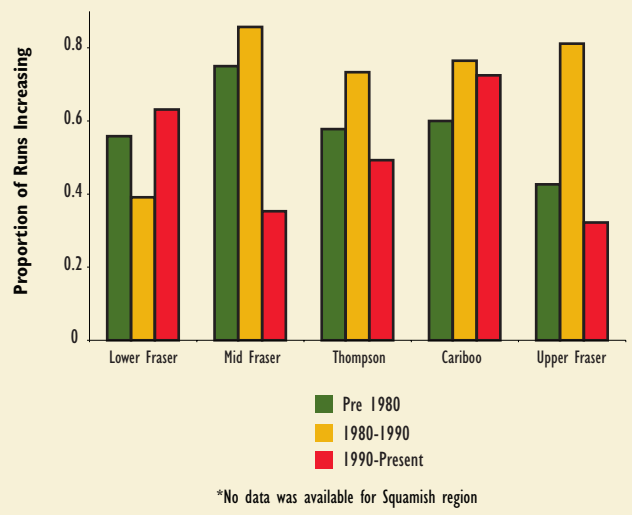
Hundreds of species call the Fraser Basin their home

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

Proportion of Chinook Runs Showing Increasing Escapement (Pre-1980 to Present)

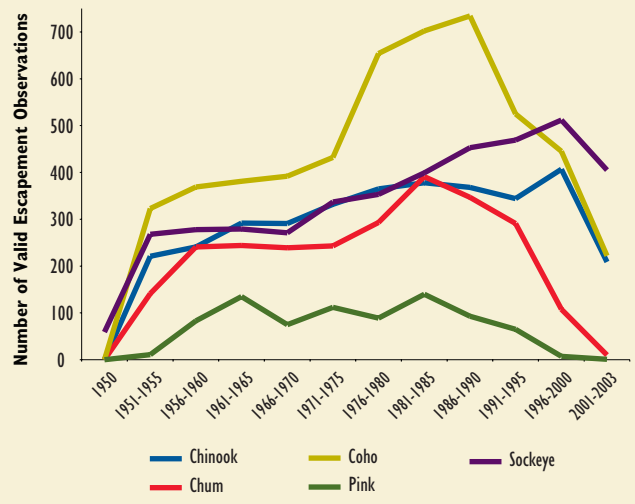


Proportion of Sockeye Runs Showing Increasing Escapement (Pre-1980 to Present)*



*No data was available for Squamish region

Valid Escapement Observations in the Fraser Basin (1950–2003)

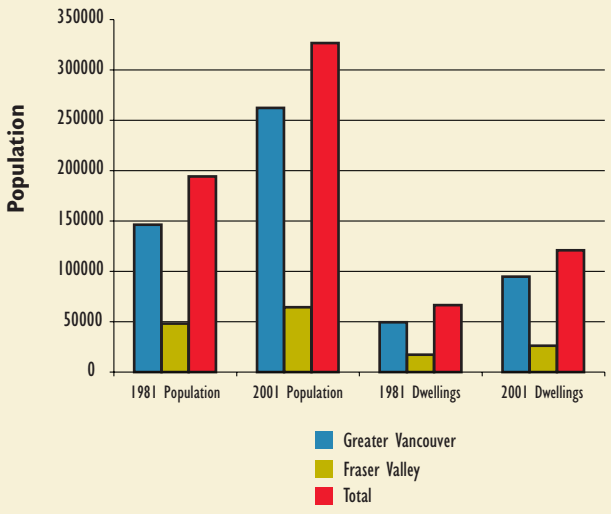


REFERENCES USED

- DFO. Salmon Escapement database (NuSEDS V1.0) (2004).
- Fraser River Sturgeon Conservation Society. Backgrounder (October 2004).
- MSRM. Business Solutions (2004).
- MSRM. Conservation Data Centre. BC Species Explorer (2004).
- Office of the Auditor General of British Columbia. Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon (2004 – 2005).
- Office of the Auditor General of Canada, Commissioner of the Environment and Sustainable Development. (2004).
- Pacific Salmon Commission. www.psc.org
- Pacific Salmon Foundation. Coldwater River watershed Recovery Plan (2001).

FLOOD HAZARD MANAGEMENT

Growth in Population and Housing in the Lower Fraser River Floodplain (1981–2001)



Flooding in Pemberton in October 2003.

October 2003 Flood Events

Several extreme storm events hit the south coast of BC in October 2003, resulting in significant localized flooding around Pemberton, Mount Currie, Squamish, Hatzic Prairie and the Chilliwack River Valley. For example, flooding damaged homes and destroyed several bridges in the Pemberton area, resulting in two deaths and the isolation of the communities of Pemberton and Mount Currie. For several days, helicopter access was the only means of transporting people and emergency supplies to these communities. The peak flow of the Lillooet River at Pemberton (1,523 m^3/s) was the largest flow recorded in 87 years, with an estimated return period of between 150 to 250 years. These recent events serve to illustrate the significance of flood hazards to many Basin communities.

FOOTNOTES

(1) These figures include all types of disasters, include all of Canada, and include federal and provincial Disaster Financial Assistance as well as private insurance claims (from a presentation by the Office of Critical Infrastructure Protection ad Emergency Preparedness).

(2) Floodproofing means the alteration of land or structures either physically or in use to reduce or eliminate flood damage. It includes the use of building setbacks from water bodies and raising the elevation of buildings above anticipated flood levels by building on fill, using structural means such as foundation walls, columns, etc., or a combination of fill and structural means.

REFERENCES USED

- Fraser Basin Council. Comprehensive Management for Flood Protection Works (October 2001).
- Fraser Basin Council. News Release (September 2004).
- MWLAP, River Forecast Centre. Frequency Analysis of the Recorded Peak Flows for the October 16-20, 2003 Coastal Flood Event (2004).
- Statistics Canada. Special tabulation based on the Population Census (1981, 2001).

The Sustainability Connection

Flood events are a natural part of the life cycle of rivers, streams and lakes. Flooding occurs annually in BC because of this province's many rivers, climatic conditions and mountainous landscape. Because many of the communities within the Fraser Basin are located wholly or in part within river valleys and along lakeshores, there are many social, economic and environmental impacts that may result when flood events occur. These include injury and loss of life, damage to public and private property, loss of agricultural crops and livestock, loss of critical infrastructure and utilities, and disruption in business, trade and community services.

Flood Hazard Management *Snapshot*

Sources of flood hazards in BC: rivers, streams, lakes, wetlands, reservoirs, tsunamis, alluvial fans, debris flow fans

Estimated length of flood protection works (diking systems) in BC: . . . . . .1,100 km

Average annual flood-related Disaster Financial Assistance expenditures in BC by provincial and federal governments (1990–1999): . . . . . .$13.1 million

Estimated cost of flood damages from the next Fraser River flood of record: . . . . . .$2 billion or more

Increase in the number of all types of disasters in Canada (1945-1999): . . . . . .567%(1)

Increase in disaster-related costs – federal, provincial and insured – in Canada (1945-1999): . . . . . .2,900%(1)

Managing flood hazards in the Fraser Basin has many challenges. All orders of government and the private sector have roles and responsibilities. An integrated approach and multiple lines of defense are needed to adequately address flood hazards, including land use planning, diking systems, and emergency preparedness and response. Both federal and provincial financial assistance programs for flood prevention and mitigation have "sunsetted", leaving local governments on their own for major capital costs such as repairs and rehabilitation of flood protection works. If communities continue to develop in flood hazard areas, and if flood protection infrastructure is not fully maintained and/or rehabilitated, future flood damages and recovery costs will continue to rise substantially.

Sustainability Issues and Trends

Flood Hazards in the Fraser Basin

There are many sources of flood hazards in the Fraser Basin, including rivers, streams, lakes, wetlands, reservoirs, tsunamis, alluvial fans and debris flow fans, to name a few. Localized flood events occur each and every year in the Basin or elsewhere in BC. However, someday the next great Fraser River flood will occur, wreaking havoc in the Basin and particularly for communities along the lower Fraser River. The impacts will also be felt by interior forest companies, Prairie grain farmers, seaports on the south coast and many other economic sectors that depend upon the Fraser Valley as a critical route for transportation and trade.

Community Vulnerability to Lower Fraser River Flooding

The floodplain of the lower Fraser River represents the most significant single flood hazard in the Fraser Basin and in BC. Record floods of the mighty Fraser occurred in 1894 and 1948. Although an extensive flood protection system has been constructed, with improvements following the 1948 Fraser River flood, community vulnerability remains a concern. Between 1981 and 2001, the population living within the lower Fraser River floodplain increased by about 132,000 (68%), and the number of dwellings increased by more than 66,000 (81%). With so many more people and homes on the floodplain today, the social and economic impacts of the next great flood will be significant. In 1994, the estimated cost of flood damages from the next Fraser River flood of record were about $2 billion in direct damages, plus additional billions of dollars in indirect economic costs.

1894 Fraser River Flood

Making Sustainability Work

How are we doing?

- Population living within the lower Fraser River floodplain – Getting Worse.
- Financial assistance available for flood management – Getting Worse.
- Availability of flood hazard management information – Getting Better

What are we doing?

Since 1998, the Fraser Basin Council with its partners have undertaken a number of projects to help prepare for flood hazards throughout the Basin and BC, including:

- Flood Hazard Maps have been prepared by the Ministry of Land, Water and Air Protection (MWLAP) and FBC for more than 180 municipalities, regional districts and provincial agencies in BC. They provide area-specific information about flood hazards to assist with floodplain development decisions.
- Flood Hazard Area Land Use Management Guidelines have been published by MWLAP to guide local decisions regarding land use and floodplain development.
- Dike Surveys and Maps were completed for more than 300 flood protection dikes throughout BC to support dike operations and maintenance, land use planning and emergency response.
- Fraser River Gravel Management – In September 2004, the Minister of Fisheries and Oceans and the BC Minister responsible for Land and Water BC Inc. signed a Letter of Agreement on a new, five-year Lower Fraser River Gravel Removal Plan. Significant amounts of gravel are deposited each year in the "gravel reach" of the lower Fraser River during the spring runoff. Gravel movement and build-up in some areas of the river reduces the ability of local communities to protect themselves from floods. To address this complex issue, the FBC brought together all interested parties to facilitate the development of a plan that would address flood and erosion protection, fish and aquatic habitat, navigation, First Nations' concerns and gravel resources. The resulting plan defined the location, timing and quantity for potential gravel removals in order to focus efforts on flood, erosion and navigation hazards, while avoiding impacts to habitat. www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/2004/nr054_e.htm

What else can we do?

- Local governments can develop floodplain bylaws to help avoid and reduce flood damages and develop emergency flood plans to ensure efficient and effective response during a flood event.
- Developers can reduce flood damages by applying floodproofing practices(2).
- The provincial government can continue to provide technical advice and flood hazard information to local decision-makers, now responsible for floodplain development.
- Homeowners and residents can prepare their homes and families for future flood events. www.pep.bc.ca/hazard_preparedness/flooding_preparedness.html
- Businesses can acquire flood insurance to protect their assets, including business disruption insurance.
- All orders of government can collaborate and establish a renewed funding program to support integrated flood hazard management, including flood protection works, land use planning, emergency preparedness and response, flood forecasting, and related flood hazard information. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

The Sustainability Connection

The Basin's forests provide many social, economic and environmental benefits, such as clean water, fish and wildlife habitat, recreation opportunities, and various spiritual and cultural values. Many communities and workers are highly dependent on the economic contributions of the forest sector. Forest sustainability includes the biodiversity of forest stands (e.g., forest species and age classes), the diversification of forest product development, public involvement in forest management and the long-term health of forests.

Forests and Forestry *Snapshot*

Area of forestland in the Fraser Basin: . . . . . .more than 17 million hectares
% of Fraser Basin forests with leading species older than 140 years: 37%
Area of forestland in BC impacted by fires, disease and pests in 2003: . . . . . .8 million hectares
Average # of forest fires per year in BC between 1993- 2002: 1,805
# of forest fires in BC in 2003: . . . . . .over 2,500

There are many sustainability challenges facing Fraser Basin forests and the forest sector. The Mountain Pine Beetle outbreak has impacted a huge proportion of the Basin's Lodgepole Pine trees and shows no signs of stopping. A large number of forest fires in 2003 and 2004 also impacted the social, economic and environmental sustainability of the Basin's forests. There has been a declining ratio of area reforested in BC since the early 1990s. Very high levels of income dependence on the forest sector exist in the northern regions of the Basin.

Sustainability Issues and Trends

Basin-wide and Regional Forest Cover

Over 17 million hectares of forest are in the Fraser Basin, covering 75% of the land area. Basin forests include a mix of age classes among leading tree species, with 51% between 21 and 140 years old, 37% older than 140 years, and 12% younger than 20 years in the year 2000. On average, there has been a declining ratio of area reforested in BC compared to the area disturbed by harvesting or losses due to fires and pests. In the early 1990s, the area reforested was 1.5 times that of the area disturbed, but by 2003, reforestation levels were down to less than 1.0 or below replacement levels. It is noted that fires, disease and pests impacted 8 million hectares of forestland in BC in 2003.

Sustainable Forest Management (SFM) Certification

Since 1999, virtually every BC forest company has pursued or achieved one of four SFM certification standards – a process of assessing forestry operations according to a set of sustainable management objectives, criteria and indicators such as protecting species at risk, biodiversity, local and Aboriginal employment, and non-timber forest values. There were significant certification efforts in the years 2001 and 2002, but more recently the trend has slowed. The CSA standard (CSA Z809) is the fastest growing standard within the Basin since 2002, with a 1,000% increase between 1999 (240,000 ha) and 2004 (2.5 million ha). The majority of certified Basin forest operations are located in the Upper Fraser, Cariboo-Chilcotin and Thompson regions.

Community Vulnerability to the Forest Economy

The economy of many regions and communities in the Fraser Basin is heavily dependent on the forest sector. This is particularly true in the Upper Fraser and Cariboo-Chilcotin regions. See the section on Economic Diversification for a more in-depth look at vulnerability to the forest sector.

Forest Pests

In 2003, the largest Mountain Pine Beetle epidemic ever recorded in BC continued to expand, with the area affected more than doubling to just over 4 million hectares. Forest pests play a natural role in forest ecosystems. However, the current outbreak has created significant socio-economic challenges by removing large numbers of trees from the future timber supply with related impacts on Crown and industry revenues, job losses and long-term community stability. There are also ecological impacts. Large areas of dead trees can increase the severity of forest fires and also change the water runoff patterns, which in turn impact soil and streambank erosion as well as fish habitat. The largest increase occurred in the Chilcotin Forest District, with 880,000 ha damaged vs. 34,500 ha in 2002. In the Quesnel Forest District alone, over one million hectares have been affected. Large infestations continued to expand in the Northern Interior Forest Region, with 1.4 million hectares impacted. Recent mild winters and an abundance of mature Lodgepole Pine have contributed to the current epidemic.

Forest Fires

The summer of 2003 was the worst ever for forest fires in BC. Abnormally hot, dry weather resulted in over 2,500 wildfire starts – almost a 40% increase over the previous 10-year average. Interface fires that occur in places where wildlands meet urban development destroyed over 334 homes and many businesses, and forced the evacuation of over 45,000 people. The total cost of the fires is estimated at $700 million(1). Although the most significant interface fire – Okanagan Mountain – occurred outside of the Fraser Basin, it serves to illustrate the significance of this natural hazard to many Basin communities.

Making Sustainability Work

How are we doing?

- Ratio of reforestation to deforestation – Getting Worse.
- Rate of Sustainable Forest Management certification – Stable.
- Forest pests – Mountain Pine Beetle epidemic is Getting Worse.

What are we doing?

- Forest Research Extension Network (FORREX) is a non-profit society founded in 1998. It is dedicated to promoting – through extension, research and partnerships – healthy and sustainable ecosystems throughout BC. www.forrex.org
- The Kamloops Timber Supply Area (TSA) Sustainable Forest Management Plan was developed to foster management practices based on science and local public and First Nations input that contribute to the long-term health and productivity of forest resources, a strong economy, and thriving communities throughout the region. www.for.gov.bc.ca/dka/TSASFmonreport2000.pdf
- The Local Level Indicators initiative of the Canadian Model Forest Network provides a "platform for national and local-level reporting on human activity and community well-being in forest ecosystems." www.modelforest.net/e/home_/locallee.html
- WoodTek Business Development Centre in Prince George is a business "incubator" for the value-added manufacturing industry. It is designed to act as a catalyst to help create a culture of diversified wood manufacturing and innovation, promote diversification in the wood industry and provide opportunities for budding entrepreneurs.

What else can be done?

- Governments, forest companies and community groups can commit to long-term planning, research and proactive Mountain Pine Beetle management.
- Fire-Smart – All regional districts and municipalities are now required to develop local emergency plans. In the year 2000, the BC Office of the Auditor General found that only about half the communities in high or moderate risk areas had mitigation strategies in place.
- Forest companies can continue to pursue Sustainable Forest Management certification.
- Forest companies can involve local advisory committees to take local interests into consideration in their operations.
- Consumers can support local and regional forest economies by buying local wood products ■

FOOTNOTES

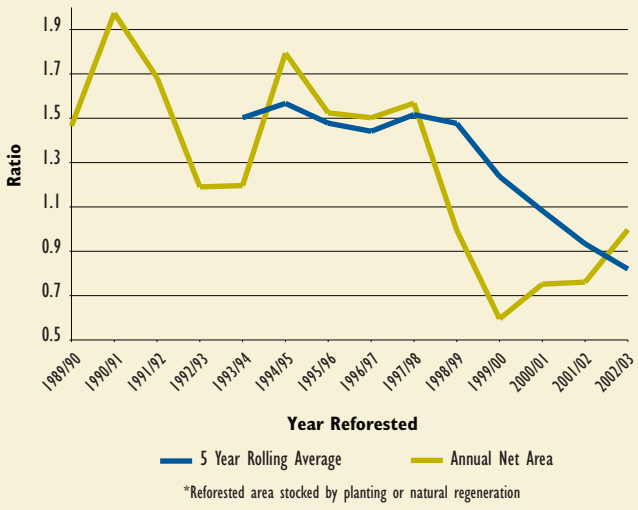
(1) Government of British Columbia. Firestorm 2003: Provincial Review.

REFERENCES USED

- BC Ministry of Forests. Forest Health Aerial Overview Survey (2003).
- BC Ministry of Forests, Forest Practices Branch. 2003 Summary of Forest Health Conditions in British Columbia (2003).
- BC Ministry of Sustainable Resource Management, Decision Support Services. Forest Inventory Database (2002).
- BC Statistics. British Columbia Local Area Economic Dependencies – 2001 (2003).
- Canadian Sustainable Forestry Certification Coalition. Certification Database (2003).
- David Suzuki Foundation, Forest Watch of BC, Canadian Parks and Wilderness Society (BC). Salvaging Solutions: Science-Based Management of BC's Pine Beetle Outbreak (2001).

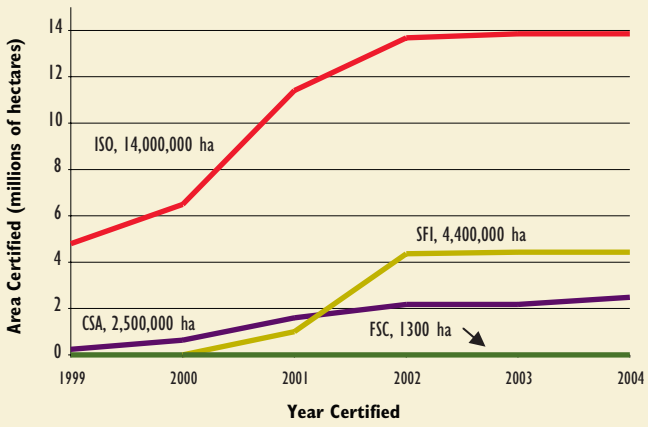
For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

Ratio of Area Reforested to Area Disturbed in BC (1993–2003)*

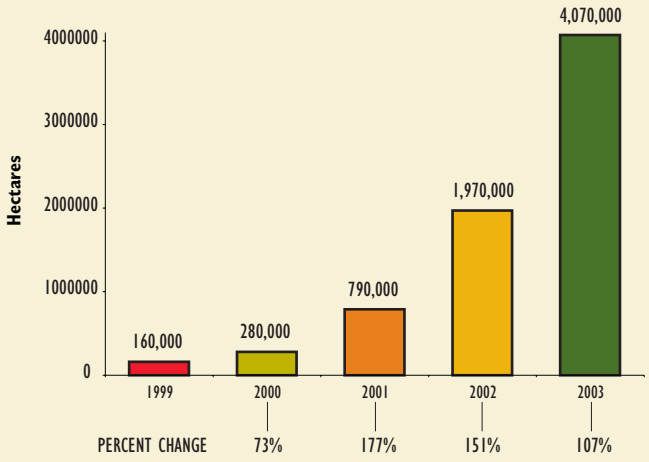


*Reforested area stocked by planting or natural regeneration

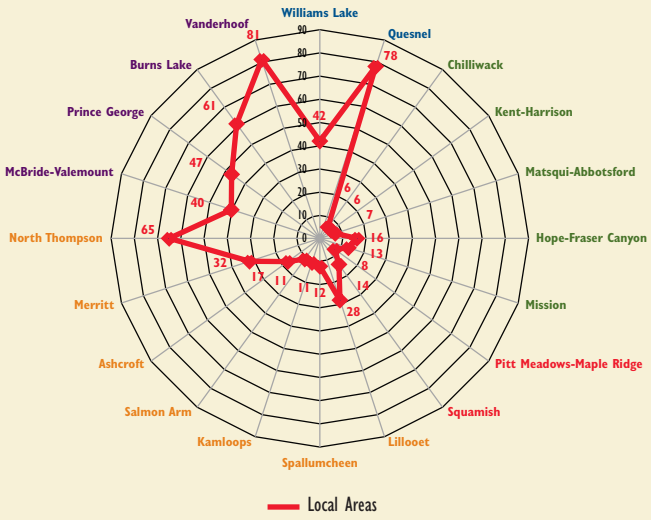
Cumulative Area Certified in the Fraser Basin by Standard (1999–2004)



Total Hectares of Land Affected by Mountain Pine Beetle Disturbance in BC (1999–2003)

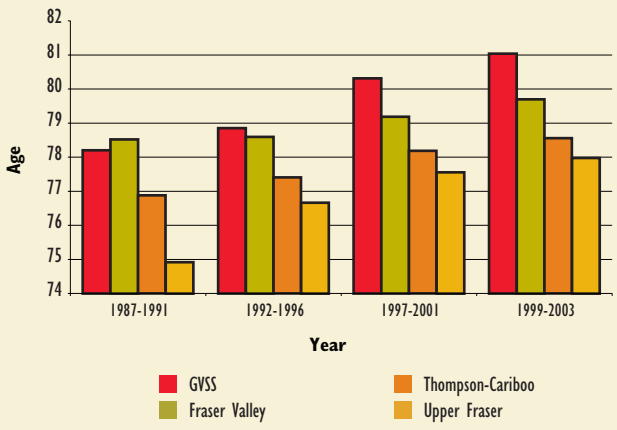


Forest Vulnerability Index by Local Areas in the Fraser Basin (2001)

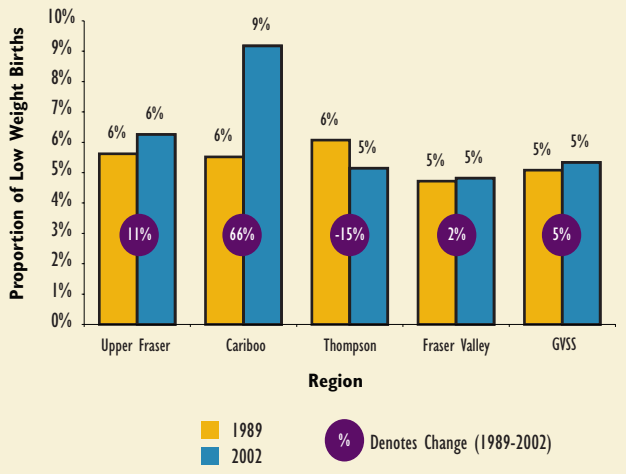


HEALTH

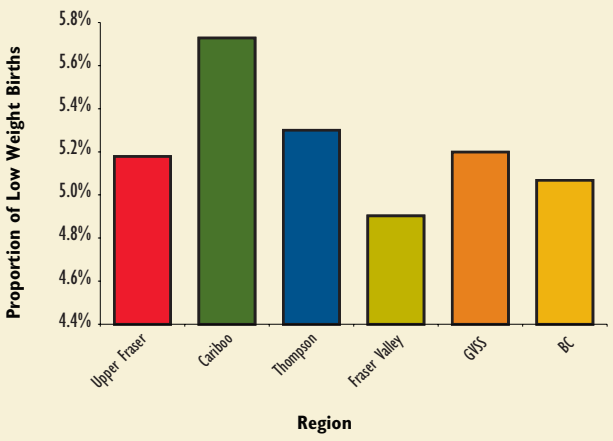
Life Expectancy at Birth by Region (1987–2003)



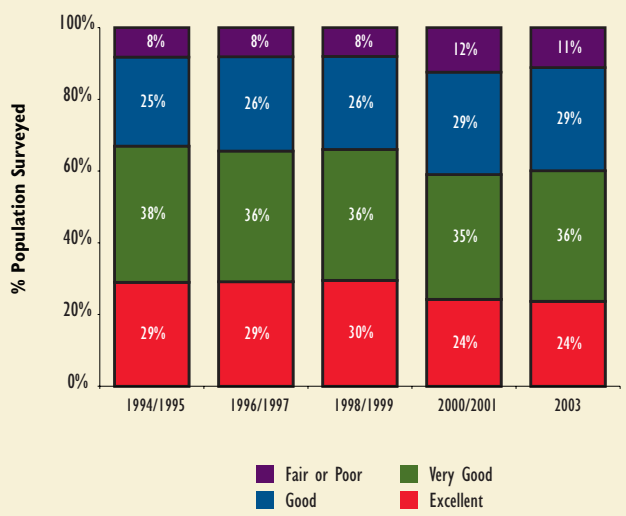
Change in the Proportion of Low Weight Births by Region (1989–2002)



Average Proportion of Low Weight Births by Region and in BC (1989–2002)



Self-Rated Health for BC (1994–2003)



The Sustainability Connection

Personal well-being and quality of life depend on health. Natural and built environments both affect public health, particularly through the quality of air and water, the management of liquid waste and pesticides, and opportunities for recreation. As a function of the social and economic environment, education, income and lifestyle choices, the health of individuals and populations is a barometer of sustainability. Health has economic implications – from lost productivity to increased demand on the health care system.

Health *Snapshot*

Average life expectancy: . . . . . .80.7 years
Rank in Canada: 1
Leading causes of death: . . . .cancer, cardiovascular diseases
Increase since 1985 in BC
population considered overweight: 100%
BC residents projected to have
diabetes by 2010: . . . . . .7% (87% increase from 2000)

At 80.7 years, Basin residents have the longest life expectancy in Canada and, next to Japan, the longest in the world. However, life expectancy varied within the Fraser Basin, from a high of 81.3 years in parts of Greater Vancouver to a low of 78 years in the Upper Fraser. In general, British Columbians live longer and rate their health as very good or excellent. However, rates of cancer and cardiovascular diseases continue to be high, especially in the upper regions of the Basin. Diabetes, largely a lifestyle related disease, remains a major and growing concern, as are adult and child obesity.

Sustainability Issues and Trends

Life Expectancy

Life expectancy is the best single indicator of human health as it integrates all of the factors that can shorten our lives such as infant mortality, accidents, disease and suicide. Between 1999 and 2003, the average life expectancy in the Basin ranged between 78 and 81.3 years of age in different regions, representing a 1.2% to 3.6% increase since the period from 1987 to 1991. Women generally live three to five years longer than men, but men have recently had greater increases in life expectancy. The Upper Fraser Region has seen the greatest increases in life expectancy.

Leading Causes of Death

The leading cause of death in the Basin since 1986 has been cancer, but the rate of cancer varies widely by region. The Age Standardized Mortality Rate (ASMR)(1) of cancer is highest in the Upper Fraser (19.25) and lowest in GVSS (13.17) regions. Cardiovascular disease, the second most common cause of death, is also highest in the Upper Fraser. The Cariboo-Chilcotin region has the highest ASMR for cerebrovascular diseases, i.e., strokes, and also has the highest rate of deaths due to unintentional injuries. The greatest change in ASMR is with respect to diabetes, which has doubled or tripled in some areas of the Fraser Valley and GVSS regions.

Low Birth Weight

Babies born with low birth weights are at greater risk of not surviving the first year of life, suffering birth defects, mental retardation, developmental delays, chronic respiratory ailments and learning difficulties. In 2002, low weight babies (babies born weighing less than 2,500 grams) represented approximately 5% of all babies born in the Fraser Basin. This is on par with the proportion of low weight births in BC generally. However, whereas the percentage of low weight births provincially only increased by 1% between 1989 and 2002, it increased by 5% in the Fraser Basin. The lowest proportion of low weight babies is in the Fraser Valley region. The most significant increases in low weight births since 1989 were in the Cariboo and Upper Fraser regions.

Self-Rated Health

Between 2001 and 2003, more people in BC rated their health as either "Very Good" or "Excellent". See the bottom graph for more details.

Physical Activity and Obesity

In 2003, more than 58% of the population was physically or moderately active, up from less than 50% in 1995. Children are at higher risk of being obese. Between 1981 and 1996, the percentage of children aged 7 to13 at risk of being obese by the age of 18 increased from 2% to 10% among boys and 9% for girls. Over the same time period, the risk of becoming overweight tripled for boys (from 11% to 33%) and more than doubled for girls (13% to 27%).

Making Sustainability Work

How are we doing?

- Life expectancy – Getting Better.
- Rates of low birth weight – Getting Worse.
- Levels of physical activity – Getting Better.

What are we doing?

- The Northern Family Health Society in Prince George provides a variety of information and support services including effective outreach services to at-risk pregnant women and families. www.nfhs-pg.org/home.html
- The BC Ministry of Health and the First Nations Chiefs' Health Committee formed a partnership to create a user-friendly health guide reference for First Nations Communities. www.bchealthguide.org/first_nations_healthguide.pdf
- Action Schools! BC is a physical activity program to help elementary school students create individual action plans for healthy living. www.actionschoolsbc.ca

What else can we do?

- Help to create healthy, supportive environments in our homes, schools and workplaces.
- Healthcare providers and pregnant parents may reduce the incidence of low birth weights with early and regular prenatal care, a balanced diet with sufficient calories and by gaining enough weight (between 25 and 35 pounds).
- Support public policies that restrict smoking in public spaces, reduce or eliminate use of pesticides, encourage use of public transit, and encourage pedestrian-friendly town centres and shopping areas.
- Establish and support early learning programs to ensure healthy child development.
- Protect clean air and water.
- Exercise and follow a healthy diet. ■

FOOTNOTES

(1) The Age Standardized Mortality Rate (ASMR) is the theoretical number of deaths that would occur per 10,000 population, if the specific population had the same age structure as the standard population.

REFERENCES USED

- BC Ministry of Health. Responding to Diabetes (2002).
- BC Statistics. www.bcstats.gov.bc.ca (2004)
- BC Vital Statistics Agency. www.vs.gov.bc.ca/stats/annual/index.html (2004)
- International Journal of Obesity, 26 (2002).
- Statistics Canada. National Population Health Survey cross-sectional sample, health file (1994/95, 1996/97 and 1998/99).

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

The Sustainability Connection

The availability of adequate, suitable and affordable housing influences the health, well-being, quality of life and economic stability of individuals and households. It is central to social sustainability. Housing is part of the broader issue of land use planning. Housing patterns may contribute to the livability of communities (i.e., efficient, compact, multi-use neighbourhoods that are transit- and pedestrian-friendly). Housing patterns may aggravate impacts associated with urban sprawl, resulting in a loss of green space or agricultural lands, increased traffic congestion and higher development costs associated with utility and transportation infrastructure. Housing may also affect environmental sustainability in terms of "green building" concepts such as energy efficient housing and site design, as well as environmentally friendly building and landscaping.

Housing *Snapshot*

% living in core housing need: 24%
% of owner-occupied households: 64%
% of rental households: 36%
% of homeless with at least one health condition: 66%

Almost one-quarter (24%) of the Basin population lives in inadequate housing (a slight increase over 1996) and the number is higher for renters. Renters are three times more likely to experience core housing need than owner-occupied households. Vacancy rates have been dropping considerably in rural centres, but these rates have either levelled off or increased in many urban centres throughout the Basin. The number and demographic diversity of the homeless are a growing concern. Studies show that homeless people face multiple challenges that often include at least one health condition, such as substance abuse or a mental health problem.

Sustainability Issues and Trends

Core Housing Need

In 2001, 24% of all private households in the Basin were in "core housing need," an increase from 20% since 1996. A household is in core housing need if its housing falls below at least one of the standards for adequacy, suitability or affordability, and it would have to spend 30% or more of its before-tax income to pay the median rent of local housing. Housing need was more pronounced among renting households (32%) than owner-occupied households (10%). This represents an improvement for renting households, as 36% were in need in 1996. The situation for renters improved in every region in the Basin except for the Cariboo-Chilcotin, where 37% of the population renting was in core housing need (up from 35% in 1996). For owner-occupied households, small improvements were noted in the Thompson and Fraser Valley regions. In every other region, however, there were small increases in the percentage of owner households in need since 1996.

Home Ownership vs. Rental Housing

Home ownership can represent a degree of financial sustainability whereby homeowners are investing in future assets. In 2001, 64% of households lived in owner-occupied housing compared to 36% who were living in rental housing. In the past 20 years, there has been a gradual trend of increasing rates of home ownership throughout the Basin, up from 62% in 1981. Home ownership is more prevalent in the rural regions. For example, only 61% of households owned their home in the GVSS region, while the percentages of owner-occupied homes ranged between 72% and 76% in the Upper Fraser, Cariboo-Chilcotin, Thompson and Fraser Valley regions.

Homelessness

Many Basin communities have more homeless people living on the street and in emergency shelters. There is a corresponding rise in the number of "hard to house" individuals or those considered to be at risk of homelessness. There is increasing diversity among the homeless in the Basin, including an increase in the number of women, youth, seniors, families with children, immigrants and refugees. Aboriginal people make up a disproportionate share of the homeless in most cities in the province. Studies are showing that many homeless people are diagnosed with multiple barriers to housing such as substance use, mental health problems or other behavioural barriers. A GVRD study reported 66% of homeless have at least one health condition: 39% reported addiction, 23% a mental illness, and 15% a physical disability.

Making Sustainability Work

How are we doing?

- Population in core housing need – Getting Worse (24% in 2001 vs. 20% in 1996 and 21% in Canada in 2001).

What are we doing?

- The Ministry of Community, Aboriginal and Women's Services (MCAWS) is working to provide housing options for British Columbians. Its *Planning for Housing* report provides examples of the innovative practices to encourage the development of housing options to address community needs. www.mcaws.gov.bc.ca/housing/index.htm
- The Greater Vancouver Steering Committee on Homelessness (GVRSCH) is a community advisory group that develops and manages the Regional Homelessness Plan for Greater Vancouver. www.gvrd.bc.ca/homelessness/

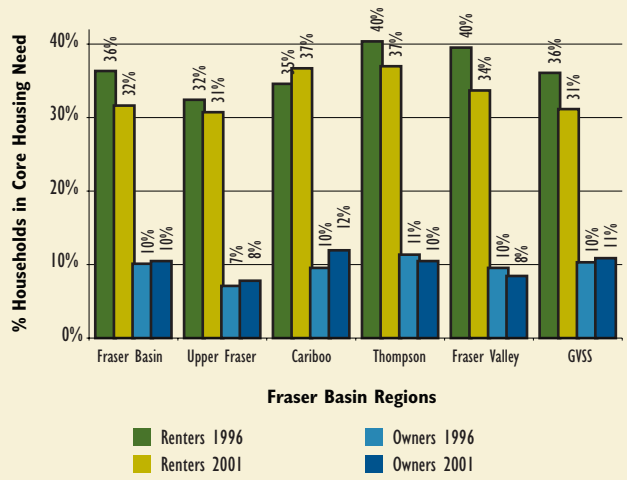
What else can we do?

- Stage and attend planning meetings, Official Community Plan (OCP) reviews, zoning and other bylaw development processes to support growth management and housing options. If planners and developers perceive there are both community interest in – and a market for – sustainability, development will respond to these interests.
- Collaborate to address homelessness through the BC Homelessness and Health Research Network, a multidisciplinary research program created to mobilize stakeholders around homelessness and health issues. Individuals and organizations have opportunities to become involved by becoming a community partner, hosting a research project, attending community forums, or becoming more informed by joining a network mailing list. www.bchhrn.ihpr.ubc.ca/
- Local governments, developers and residents can support a mix of housing types in a community through housing policies and strategies that enable a diversity of people to afford to live there. ■

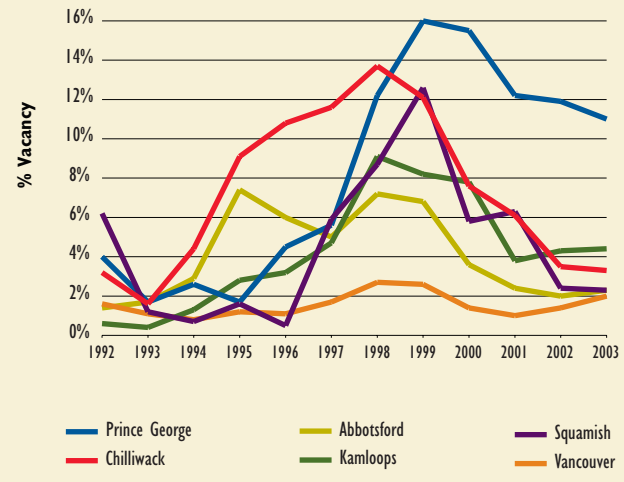
First Nations have shown leadership with the completion of the Seabird Island sustainable housing complex.

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

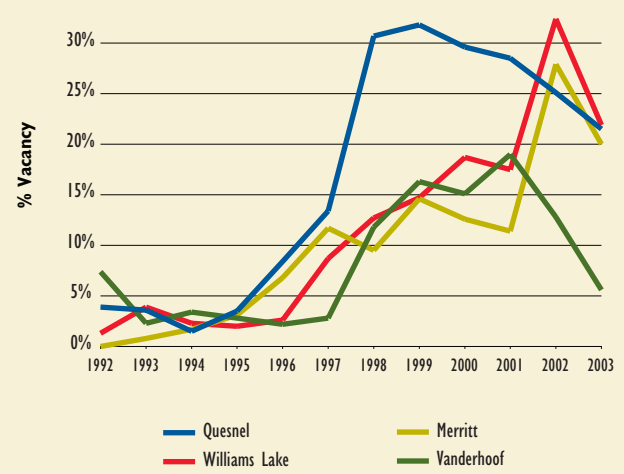
Households in Core Housing Need by Tenure and Region (1996, 2001)



Average Vacancy Rates for Apartments and Rowhouses, Urban Centres (1992–2003)



Average Vacancy Rates for Apartments and Rowhouses, Rural Centres (1992–2003)

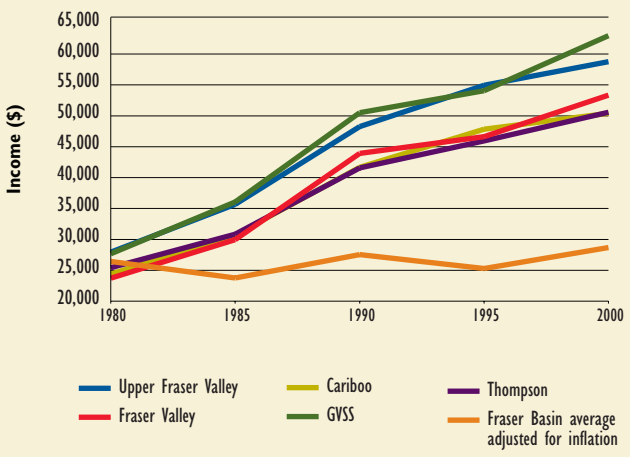


REFERENCES USED

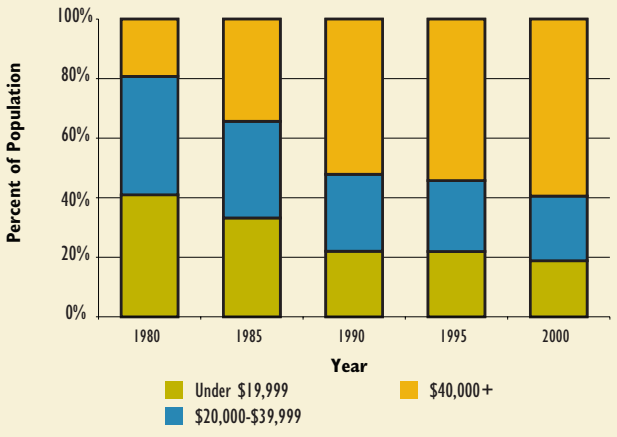
- Canada Mortgage and Housing Corporation. BC Rental Housing Reports (1992-2002).
- Canada Mortgage and Housing Corporation, Housing in Canada Database (2001).
- GVRD. Regional Homelessness Plan for Greater Vancouver (2003).
- Statistics Canada. Population Census (1981-2001).

INCOME AND EMPLOYMENT

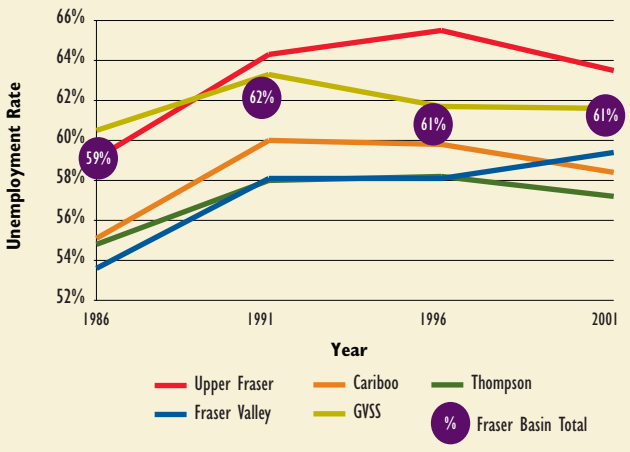
Average Household Income in Current Dollars (1980–2000)



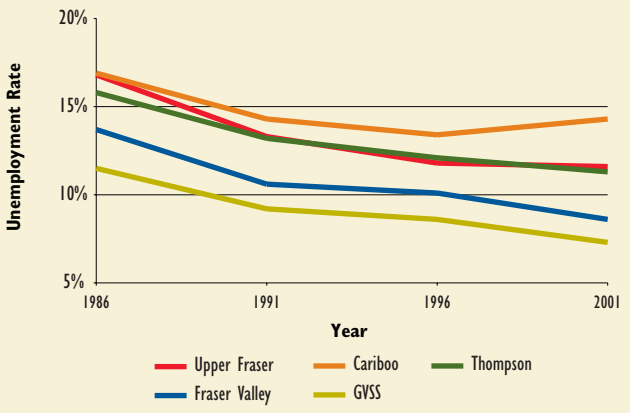
Percent of Population by Household Income (1980–2000)



Employment Rates by Region (1986–2001)



Unemployment Rates by Region (1986-2001)



FOOTNOTES

(1) Duxbury, L. and Higgins, C., Work Life Balance in the New Millennium: Where Are We? Where Do We Need to Go? Canadian Policy Research Networks (2004).

(2) Ministry of Community, Aboriginal, and Women's Services, International Qualifications Program: A Human Resource Strategy for Skilled Immigrants (2003).

REFERENCES USED

- BC Chamber of Commerce. Employer-Aboriginal/Immigrant/At-Risk Youth Partnerships Research Project (2003).
- Institute of Chartered Accountants of BC. BC Check-Up (2004).
- Ministry of Skills Development and Labour (2003).
- Statistics Canada. Population Census (1981, 1986, 1991, 1996, 2001).

The Sustainability Connection

Having adequate income to meet household needs is critical to the well-being of individuals, families and communities. Most people earn income from employment. Since a significant portion of the Basin's economy is resource-based, changes in income and employment levels are linked to the long-term sustainability of resources. High rates of employment usually reflect strong economic activity. Income and employment trends can be strongly related to other social indicators, including health and education. Many rural regions and their communities continue to face employment challenges linked to economic trends in various resource sectors, particularly downturns in mining, forestry and fisheries.

Income and Employment *Snapshot*

Increase in income levels
(adjusted for inflation) from 1981-2001: . . .no more than 9%
% Households in 2001 with low incomes
(less than $20,000 per year): 19%
Employment rate: 61%
Decrease in unemployment from 1996-2001: 1.5%

The number of people in the low-income bracket ($20,000 or less a year) declined by 3% between 1995 and 2000, but there are still about 500,000 people in that bracket. Total personal debt per capita grew from $14,584 in 1998 to $19,555 in 2003, a 34% increase. Unemployment has declined steadily over the past 20 years, but unemployment rates and households in poverty are still too high for a truly sustainable region. Labour scarcity and huge numbers of job vacancies are anticipated in the Basin and throughout Canada in the coming years, with more than 1 million job openings projected. The groups under-represented in the workforce are youth, Aboriginal people, and skilled immigrants who are expected to form most future growth in the labour force.

Sustainability Issues and Trends

Income

When adjusted to account for inflation, income levels increased by no more than 9% between 1981 and 2001, but appear to have more than doubled (130% increase) when not adjusted for inflation. Between 1996 and 2001, average income levels in current dollars increased by 19% compared to a 13% increase when adjusted for inflation. In 2001, 19% of private households throughout the Fraser Basin had incomes of less than $20,000 per year, 22% had $20,000 to $40,000, 34% had $40,000 to $79,999, and the remaining 25% had incomes of $80,000 or more per year. Some 495,000 residents are considered to be low-income, but in every region except for GVSS, this number has declined. Low income was highest in the GVSS at 21%, compared to 15% in the Cariboo-Chilcotin, Thompson and Fraser Valley regions. Low income was higher for women (21%) than men (19%), and much lower among seniors (12.5%) than children under 18 (24.1%).

Employment

With 1.3 million people employed in 2001, the Basin had a 61% employment rate. Between 1986 and 2001, the rate of employment in the Basin as a whole grew by 2%, and since 1996, by 1%. All regions have had increased employment rates since 1986, but more recently (1996-2001), each of the Basin's northern regions had small decreases in employment. The Fraser Valley Region saw a small increase, but there was little change in the GVSS Region. Changes in the labour force are projected to lead to a skill shortage in many different sectors and industries. Sectors identified as being under-represented in the workforce include Aboriginal, youth, and skilled immigrants. Some 49% of the 180,000 immigrants who landed in BC between 1998 and 2002 were considered "skilled workers"(1). The impending skills shortage and growing recognition among employers about competitive advantage to be gained by tapping into these labour markets has fuelled a movement to work to better integrate these groups(2).

Unemployment

The Basin unemployment rate decreased to 8% from 9.5% between 1996 and 2001. In general, unemployment rates have been steadily declining throughout the Basin since their peak rates in the 1980s. This trend was consistent throughout every region in the Basin except in the Cariboo-Chilcotin region. The lowest rate of unemployment was in the GVSS Region (7.3%) and the highest in the Cariboo-Chilcotin Region (14.3%). The proportion of youth who are unemployed (15%) is almost double that of adults, with even higher rates in the Cariboo-Chilcotin (24%), Thompson (19%) and Upper Fraser (18%) regions.

Workplace Demands

Work-life conflict in Canada rose in the 1990s, particularly with "role overload," in which people have too much to do, but too little time to do it.(1) This has been attributed in part to downsizing, declines in real earnings, and technologies allowing us to work anywhere and anytime. Role overload rose sharply to 59% from 47% between 1991 and 2001. There was also a 27% increase in job stress compared to 13% in the early 1990s as well as decreases in high satisfaction levels from 62% to 45% during that period.

Many communities throughout the Basin are still very dependent on forestry.

Making Sustainability Work

How are we doing?

- # of low-income families – Getting better slightly.
- Rates of employment – Getting better overall, but getting slightly worse in the Upper Fraser, Cariboo-Chilcotin and Thompson regions.

What are we doing?

- ASPECT, an association of community-based trainers, helps members strengthen their capacity to provide services to people with barriers to employment. www.aspect.bc.ca/
- Corporate Circles facilitates partnerships to develop training and employment programs for Aboriginal people. www.buildingfuturestoday.com/corporatecircle.php
- Employment Access to Skills Initiative (EASI) helps integrate skilled and professional immigrants into the workforce. www.mcaws.gov.bc.ca/amip/iqp/EASI_main.htm

What else can we do?

- Support programs with mentorship and on-site/field experience to enable younger people to learn from more experienced workers.
- Governments and community organizations can work to alleviate poverty and assist low-income families.
- Bring together industry, government, trainers and educators to link employment supply and demand. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

The Sustainability Connection

Population touches every aspect of sustainability. The better we understand population trends, including changing demographics and ethnic and cultural diversity, the more effectively we can develop strategies for managing resources and balancing economic, environmental and social priorities. Changing population patterns affect demand for housing, goods, energy, health care and other services, land, infrastructure and resources. High-growth communities must deal with traffic congestion, waste generation, over-stretched community services, and loss of agricultural land, fish and wildlife habitat, and biodiversity. Communities with low growth or decreasing population face diminished services and economic instability. An aging or shrinking labour force may also impact community planning, the tax base and service provision.

Population *Snapshot*

50% growth 1981-2001 (from 1.7 to 2.6 million)
4 million projected by 2030
86% live in Lower Mainland (GVSS and Fraser Valley)
5% in Thompson
3% in Cariboo-Chilcotin
5% in Upper Fraser

Change in Regional Proportions of Fraser Basin Population (1981- 2001)

Lower Mainland grew by 4.8%
Thompson declined by 1.8%
Cariboo-Chilcotin declined by 0.9%
Upper Fraser declined by 2.2%
Lower Mainland projected to grow by 49% over 30 years

Over the past 20 years, the Fraser Basin's population has grown by 50%, and it is projected to grow by about another 50% by 2030. Managing that growth is perhaps the greatest challenge facing communities and decision-makers in the Basin. Today, the Basin's population is more urban. More people, especially youth, are moving to the cities from rural areas. Huge numbers of "Baby Boomers" are about to retire. These massive changes will have a significant impact on sustainability throughout the Basin.

Sustainability Issues and Trends

Population Change

Increased economic and educational opportunities, mobility and lifestyle choices have resulted in more growth in urban regions. Today, 86% – or 2.2 million of the Basin's 2.6 million people – live in the GVSS and Fraser Valley regions, compared to 81% in 1981. At the same time, the proportion residing in the Upper Fraser, Cariboo-Chilcotin and Thompson regions dropped from 18% to 14%.

The greatest increase in population was in the 35 to 54 age group, the "Baby Boom" generation, which grew by 110% and became the single largest segment of the population. This aging trend will continue to affect the supply of labour, demand on health care services and changes in housing needs. In the Upper Fraser, Cariboo-Chilcotin and Thompson regions, there were decreases among age groups under 35 years and large increases among age groups over 35 years. Since 1981, the younger population seems to be relocating to find employment and education opportunities in more urban regions.

Urban and Rural Challenges

The population shift to urban from rural areas creates challenges in both. See the Community Sustainability section for a discussion of urban and rural challenges associated with demographic change and settlement patterns.

Aboriginal Population

The Aboriginal population grew by 41% from 1986 to 2001 to 115,000 and now comprises 4.4% of the Basin population. This is due in part to births, but may also reflect increases in self-reporting on the Census. 49% live in the GVSS region (56,600), 13% in the Fraser Valley (14,500), 15% in the Thompson (16,900), 8% in the Cariboo-Chilcotin (9,400) and 15% in Upper Fraser (17,600). More Aboriginal people are also moving to urban centres. Between 1986 and 2001, the proportion of the Fraser Basin Aboriginal population living in the GVSS region increased from 43% to 49%, while the proportion decreased in the Upper Fraser (from 21% to 15%) and the Cariboo-Chilcotin (from 10% to 8%) regions. Children under 14 comprise 30% of the Aboriginal population compared to only 18% of the overall Fraser Basin population.

Aboriginal youth train for fish stock assessment and management. Photo: Lillooet Fisheries Commission.

Mobility and Migration

Between 1996 and 2001, a total of 583,000 people moved within or migrated to the Fraser Basin (24% of the 2001 population), representing a 15% drop in the total number of movers and migrants to the Basin compared to the previous census period (1991–1996). Particularly notable was a 42% drop in interprovincial migrants. The Basin population included 23% that moved from somewhere else in the Fraser Basin or BC, 4% from another province in Canada and 7% from outside of Canada, mostly to the two lower Fraser regions.

Making Sustainability Work

How are we doing?

- Stable to moderately changing population in all regions and in all age classes: Getting Worse.
- Managing growth in areas with urban growth and development pressures: Getting Better.

What are we doing?

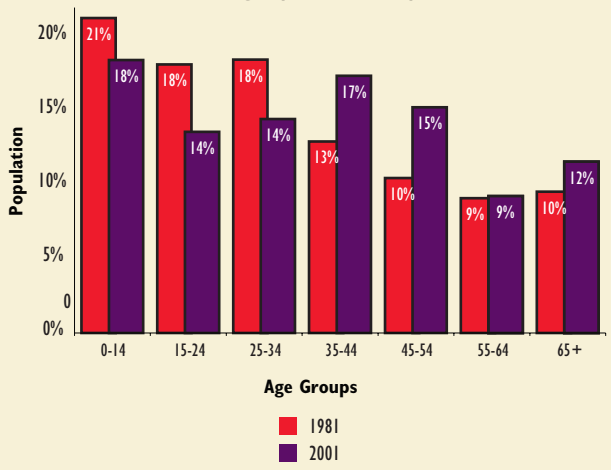
- Senior governments are reviewing immigration policies that could influence population trends in the Fraser Basin. Immigration is one way of addressing the challenges associated with an aging population and a shrinking labour force.
- Regional districts and municipalities are developing and implementing growth management strategies.

What else can we do?

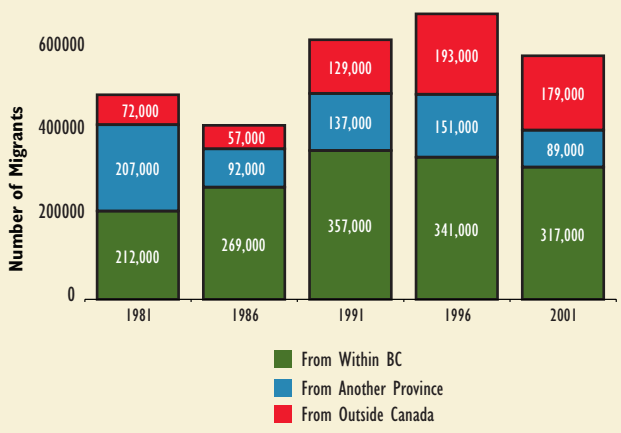
- Local governments can incorporate the principles of sustainability and "smart growth" into their land use planning decisions.
- Community goals and related services can be adapted to meet the sustainability needs of a changing population, with particular consideration to an aging population and the unique Aboriginal and ethic composition of each community. ■

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)

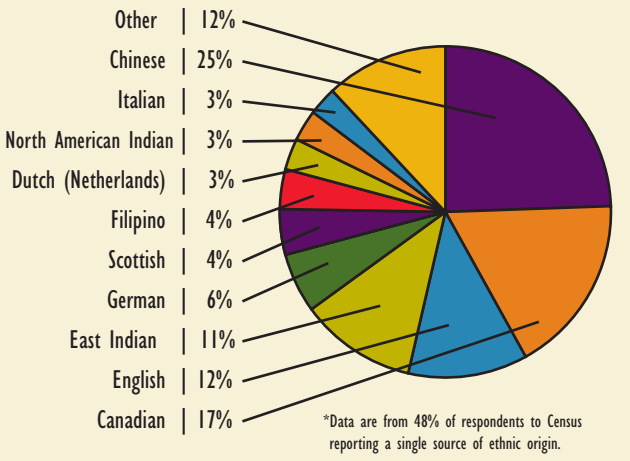
Distribution of the Fraser Basin Population by Age (1981, 2001)



Mobility within and Migrants to the Fraser Basin (1981–2001)



Population of Single Ethnic Origin in the Fraser Basin (2001)*



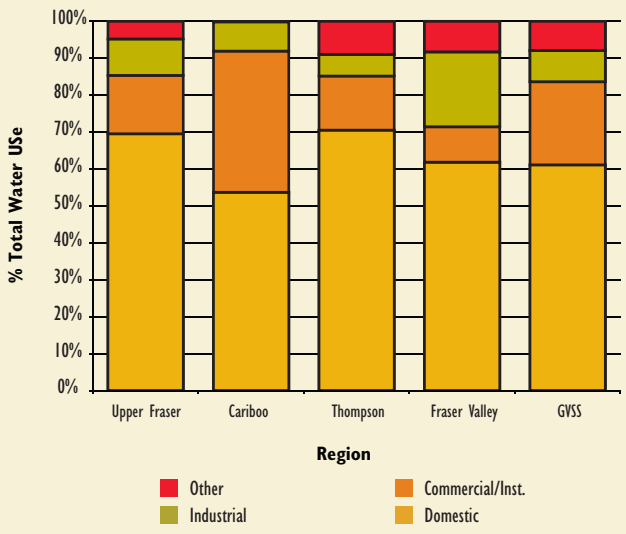
*Data are from 48% of respondents to Census reporting a single source of ethnic origin.

REFERENCES USED

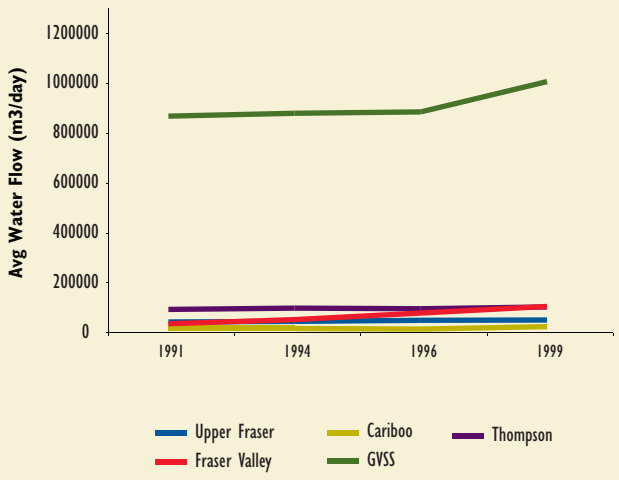
- Centre for Research and Information on Canada. A Changing People: Being Canadian in a New Century (2003).
- Statistics Canada. Population Census (1981-2001).

WATER QUALITY AND QUANTITY

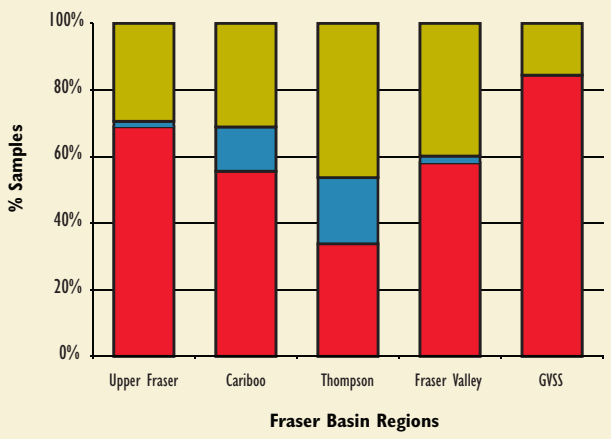
Water Use By Sector and Region (1999)



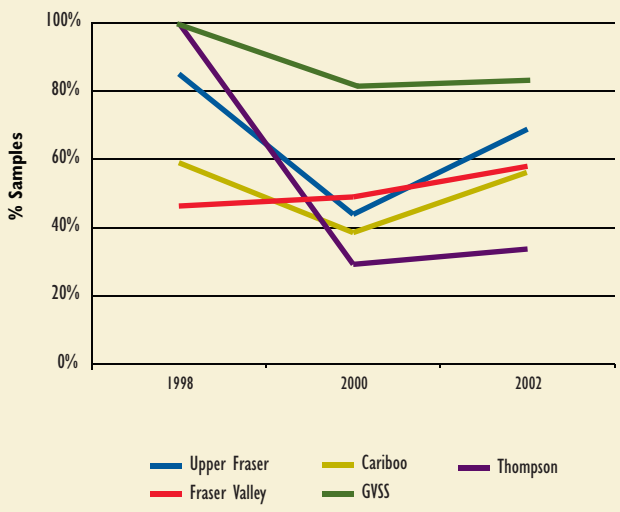
Average Daily Water Flow by Region (1991–1999)



Achievement of Water Quality Objectives by Region (2002)



Proportion of Samples that Met Water Quality Objectives by Region (1998, 2000, 2002)



The Sustainability Connection

A safe, secure water supply is essential to sustainable communities. We need safe drinking water to be healthy, and we need an adequate supply of water for households, agriculture, recreation, tourism, industry and commerce. Clean water is also essential for fish, wildlife and their habitat, as well as economic activities based on them. Only the combined efforts of individuals, communities and industry – with increased water monitoring to detect problems and to support needed improvements – can ensure the level of water quality and quantity required for sustainability.

Water Quality and Quantity *Snapshot*

Decrease in domestic water use per capita from 1991-1999: 4%
Increase in municipal water use from 1991-1999: 18%
Increase in number of boil water advisories since 1995: 100%
% of water samples that attained water quality objectives in 2002: 60%

Despite our already high use of water by global standards, most Basin regions are using more water. Population growth is the main driver for rising domestic or household use that accounts for about 62% of total municipal use. Water quality is a major concern for both human health and ecological protection. Water quality objectives were shown to be met about 60% of the time in 2002.

Sustainability Issues and Trends

Municipal Water Use

Every day in 1999, just over 1.5 million cubic metres of water flowed through municipal water systems in the Fraser Basin, an increase of 10% since 1996 and 18% since 1991. This amount does not include water from private wells or private water licenses. The GVSS region used the most water in all categories (domestic, commercial/institutional, industrial, and "other", which includes system leakages). Basin households used about 62% of the total, although percentages varied among the regions. Domestic use increased by 3% since 1996, with increases occurring in all regions except the Thompson. On a per capita basis, however, domestic usage declined by 4% since 1991 and by 1% since 1996.

Sewage Outflows

Sewage outflows stayed roughly constant in the 1990s, fluctuating around 1.2 million cubic metres per day, with most sewage originating in the GVSS region. The Fraser Valley region saw the greatest increase – almost three fold. The Thompson region increased sewage outflows by about a third and the Cariboo-Chilcotin and Upper Fraser regions by about one-tenth from 1991 to 1999. Population growth, commercial activity and meterological conditions are factors in the variation, along with the proportion of sewage producers attached to the municipal sewerage systems.

Water Quality Objectives

Provincial objectives define thresholds for substances that can compromise water quality and are based on the most sensitive uses at particular locations. In 2002, 60% of water monitoring samples achieved provincial objectives (down from 73.1% in 1998, but up from 50% in 2000). In 2002, 7.6% of samples did not meet the objectives (slightly more than the 6% level in 1998). Achievement of objectives was assessed at 18 sites in the Basin in at least one of the years 1998, 2000 and 2002. Most of the water pollution from the Fraser's source to mouth is generated from pulp and paper mills and municipal sewage treatment plants.

Groundwater

Groundwater, which provides the water supply for about 25% of British Columbians, is a concern throughout the Basin. Major groundwater issues are the sustainability of the level of aquifers to assure continued supply in the face of increasing human use, the protection of recharge areas and the protection of groundwater supplies from contamination. Aquifer levels have been dropping in some locations. Nine aquifers in the Lower Mainland were described in 2002 as heavily used; six of these were vulnerable to contamination.

Making Sustainability Work

How are we doing?

- Per capita water consumption – Getting Better slightly since 1991.
- Total water consumption – Getting Worse since 1991.
- Attainment of water quality objectives – Getting Better since 2000, but Getting Worse since 1998 in all regions except the Fraser Valley.

What are we doing?

- The provincial Groundwater Protection Act establishes standards for construction of wells, regular testing and reporting, and water management plans.
- Many communities are adopting programs to encourage the use of water saving devices and practices for the home, garden and commercial-industrial uses.
- Communities are also developing well and aquifer protection plans, including measures to protect the quantity of groundwater supplies, as well as best management practices to avoid their contamination.
- The Township of Langley and the Langley Environmental Partners Society are encouraging residents to get "wise" about groundwater and involving the community in their new "Water Wise" program. www.tol.bc.ca/Departments/Engineering/Environment/NewsRoom/47
- The Shoreline Action Challenge's Living by Water Project is helping individual shoreline residents, groups and agencies learn what they can do to help protect and restore the shoreline. The project is aiming to designate 200,000 Shoreline Ambassadors by 2005. www.livingbywater.ca/

new state-of-the-art River Street Water treatment Plant in Kamloops.

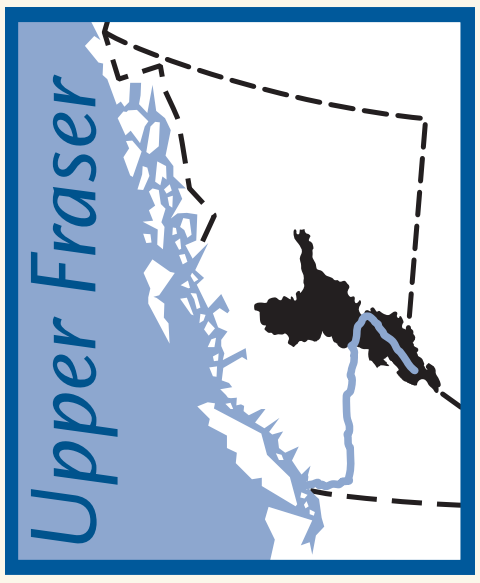
What else can we do?

- Business and industry can apply best management practices to prevent and reduce water pollution at the source.
- Develop government policy to encourage water conservation and pollution prevention and to discourage over-consumption and wastewater discharge.
- Communities can protect groundwater by developing and implementing a well protection plan. See the Well Protection Toolkit. wlapwww.gov.bc.ca/wat/gws/well_protection/acrobat.html
- Reduce water consumption by using water-efficient fixtures, appliances and industrial equipment and by using drought-tolerant plants in landscaping. See the Water Efficiency Clearinghouse website. www.awwa.org/waterwiser/ ■

REFERENCES USED

- BC Ministry of Water, Land and Air Protection. BC Environmental Trends, Groundwater Technical Paper. wlapwww.gov.bc.ca/soerpt/pdf/7groundwater/Groundwater_2002.pdf (2002).
- BC Ministry of Water, Land and Air Protection. Water Quality Objectives in British Columbia: Objectives Attainment Reports. wlapwww.gov.bc.ca/wat/wq/attain/ 02_attain_report.pdf (1998/99, 2001/02, 2002/03).
- Environment Canada. Municipal Use Database (1991-1999).

For more information on this topic go to: www.fraserbasin.bc.ca (click on Indicators)



Regional *Snapshot*

- Median household incomes are above the BC average. The incidence of low-income households is the lowest in the Upper Fraser compared with other Basin regions and BC.
- Both employment and unemployment are higher in the region.
- However, the dependency on the forest sector, combined with the Mountain Pine Beetle epidemic, poses a critical challenge to the region's economic stability over the long term. For example, Vanderhoof has been rated as one of the least economically diversified communities, as well as being the most dependent on the forest sector, of 20 Basin communities assessed.
- The Upper Fraser has the lowest life expectancy in the Fraser Basin – 78 years vs. 81.3 years in the GVSS region – but it also has seen the highest increases in life expectancy.
- The rate of cardiovascular disease is highest in the Upper Fraser.
- The region has the highest student to teacher ratio in the Basin.
- Water quality and sewage treatment have generally improved in recent years.
- The region has only five species on the Species at Risk red list, by far the lowest among all five Fraser Basin regions.

Sustainability Issues & Trends

Aboriginal and Non-Aboriginal Relations

Relationships between Aboriginal and non-Aboriginal communities appear to be improving in this region. There were five respondents from the Upper Fraser who participated in the FBC's recent survey. Three of the five believe that relationships are "getting better", with one responding "getting worse", and one "don't know". Three of the responding organizations have recently signed agreements covering a range of issues, including servicing, improving communication, exchanging information, and creating jobs and revenue. Survey respondents reported on 10 agreements between First Nations governments in the region and either one of the other three orders of government or corporations.

Economic Diversification

Diversification remains a challenge for much of the Upper Fraser Region. Using the BC Diversity Index(1), Vanderhoof is the least diversified (56) in the region and McBride-Valemount is the most (68) diversified, with Burns Lake (60) and Prince George (64) in between. The Forest Vulnerability Index(2) rates Vanderhoof as the community most dependent (81) on the forest sector in the entire Fraser Basin, followed by Burns Lake (61), which is the fourth most vulnerable in the Basin. Prince George (47) and McBride-Valemount (40) are considered less dependent on the forest sector, but still much more dependent on forestry than many other Basin communities.

Forests and Forestry

The Mountain Pine Beetle epidemic has been particularly severe in the Upper Fraser and Cariboo-Chilcotin Regions. In the Prince George Forest Region, the epidemic grew from 31,541 ha in 1999 to 685,598 ha in 2002 – an increase of over 2,000%. The areas most affected in the Upper Fraser are the Prince George, Vanderhoof and Lakes/Nadina Forest Districts. In the short term, the epidemic poses a severe challenge to managing forest ecosystems. In the long term, the epidemic poses a critical challenge to the region's communities that are highly dependent on forests for their economic well-being. As well, the risk of forest fires has become an increasing concern to the region's communities given the vast areas of dead and/or dying trees. As of 2004 in the Upper Fraser, there are 6,204,000 ha of managed forests certified under two systems of sustainable forest management (CSA, SFI) and/or one environmental management system (ISO), an increase of 70,000 ha since 2002. The largest single area (3.36 million ha) is certified under both ISO and SFI.

Income and Employment

The region's average household income of $58,762 is below the Basin average of $60,769 but above the BC average of $57,593, and the region's median household income of $52,054 is greater than both the Basin median of $48, 962 and the BC median of $46, 802. The incidence of low income among private households is the lowest (13.4%) in the Upper Fraser compared to other Basin regions, and is notably lower than the Basin rate (19.3%) and the BC rate (17.8%). Both the employment rate (63.5%) and the unemployment rate (11.6%) are higher in the Upper Fraser than the Basin averages (61.1% and 8.0%) and the BC averages (59.6% and 8.5%), respectively.

Water Quality

According to 1999 data, 93% of the region's population is served by a municipal sewage treatment system, with 85.4% of residents connected to a secondary treatment system. This level of service is a major improvement since 1983, when 80% were served only by primary treatment.

The province establishes and monitors water quality objectives at specific sites in BC. Data have been analyzed for two sites in the Upper Fraser for 1998, 2000 and 2002. For the Nechako River site, 74% of samples met the objectives in 1998, and 97% of the samples met the objectives in 2002. For the Fraser River site, 32 km downstream of Prince George, 74% of samples met the objectives in 1998. In 2002, 22% met the objectives and 77% of the samples had indefinite results.

University of Northern British Columbia (UNBC) in Prince George.

How are we doing in the Upper Fraser Region?

- Aboriginal and Non-Aboriginal Relations – Getting Better.
- Economic Diversification – Low Economic Diversity.
- Forests and Forestry – Vulnerable to the Forest Sector and Mountain Pine Beetle.
- Income and Employment – Good and Getting Better.
- Water Quality – Getting Better overall, but uncertain in the Fraser south of Prince George. ■

FOOTNOTES

(1) Diversity Index – 100 represents the most diverse and 0 the least diverse.
(2) Forest Vulnerability Index – 100 represents the most dependent on the forest sector and 0 the least dependent.

McBride and the Robson Valley.

The Upper Fraser Region is the largest of the Fraser Basin Council's five regions, encompassing 78,164 sq. km. It stretches from the Fraser River's headwaters in the Rocky Mountains near the Alberta border, then flows northwest along the Rocky Mountain Trench to Prince George, north through the Stuart-Takla watershed to Fort St. James and Takla Landing, and west through Vanderhoof and Burns Lake in the Nechako watershed to the Coast Mountains. The region features some of the most rugged and varied topography in the Fraser Basin, with abundant wildlife.

About 135,000 people – or 5% of the Basin's population – live in the region. Prince George is the regional centre and largest city, with 72,000 residents. Other communities include Burns Lake, Fort St. James, McBride, Valemount and Vanderhoof. Most communities range in size from 500 to 5,000 residents.

The economy is largely based on the forest industry which is important to all the communities in the region, although Prince George has a much more diversified economy. Agriculture and tourism also play an important role in the region's economy.

Making Sustainability Work

Preparing for Forest Fires

After seeing the extreme forest fires elsewhere in BC, residents of the Vanderhoof and Burns Lake area have taken action to address the fire hazard in their area. Initiated by the Nechako Valley Regional Cattlemen's Association, a committee was formed in January 2004, which included local and provincial government, industry and community organizations. Their goal was to address the increased fire hazard, especially in areas close to communities. Using maps, they could see where previous timber harvesting and agricultural fields created holes in the forest, and areas where the forest cover was continuous, potentially enabling a huge fire to roar into settled areas with nothing to stop it.

A strategy was developed, which integrated the timber harvesting that was to occur anyway with measures to decrease the fire hazard. By directing harvesting activities to five priority areas, breaks could be created in the forest cover. Another part of the strategy was an information open house, where residents could learn what actions they could take to reduce the fire hazard on their rural properties. By working together and pooling their resources, residents, industry and government are able to reduce the forest fire hazard, thus supporting community safety, employment and forest management.

Source: Mike Pritchard, Vanderhoof Forest District, Ministry of Forests; personal communication, November 3, 2004.

Kids play in water park in Prince George.

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CARIBOO-CHILCOTIN REGION

The Cariboo-Chilcotin Region is the second largest region in the Fraser Basin, occupying almost 70,000 sq km. It includes watersheds of the Middle Fraser, Quesnel, Blackwater and Chilcotin Rivers. The region stretches from just south of Prince George to 100 Mile House and from the Cariboo Mountains in the east to the Coast Mountains in the west. The region is divided roughly in half. The Cariboo, or eastern half of the region, refers to the Interior plateau spreading east of the Fraser River to the Cariboo Mountains. The area to the west of the Fraser is called the Chilcotin.

About 70,000 people – or 3% of the Basin's population – live in the region. Williams Lake, Quesnel and 100 Mile House are the three largest communities. Barkerville and Wells are known worldwide as gold rush heritage sites and offer an attractive tourist destination.

The economy is largely based on the forest industry which is important to all the communities in the region, although Williams Lake has a more diversified economy. Agriculture, mining and tourism also play important roles in the region.

Making Sustainability Work

Unique Landfill Partnership at Gibraltar Mine Site

The Cariboo Regional District (CRD) has a unique partnership approach to solid waste management for the Williams Lake area. Since 1991, the district had been looking for a new landfill site; however, all of the proposed locations had been opposed by the public. In 2001, Gibraltar Mines approached the CRD about locating the landfill at the mine site. Following much discussion and a feasibility study, it became apparent that the idea was the best solution and one supported by the public. In 2002, Gibraltar Mines and the CRD signed a Public-Private Partnership Agreement.

The mine's waste rock dump and the CRD's landfill are separated by a 1m thick layer of compacted glacial till and a sealed 60 mm geomembrane liner. A statutory right-of-way agreement was developed to provide legal ownership of the two layers, the first of its kind in BC. Construction began in May 2003 and operations began in October 2003. The landfill receives about 14,000 tonnes of waste per year from the 25,000 residents in the Williams Lake area.

There are a number of long-term sustainability benefits from this approach.

- No additional natural area was disturbed because the site was already industrial land with road access.
- Landfill development will complement mine reclamation measures.
- The mine already has an extensive monitoring system for surface and groundwater that can be easily extended to include the landfill.

Winter logging operations in the Cariboo.

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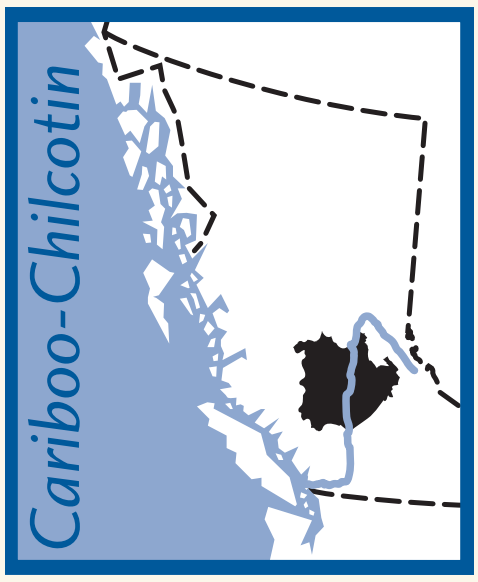

Regional *Snapshot*

- Air quality remains a concern in Quesnel and Williams Lake. Of nine Basin communities, particulate matter is of greatest concern in Quesnel and Williams Lake.
- The region has developed a unique approach to building relationships among Aboriginal and non-Aboriginal people through a series of regional visioning sessions.
- The region has the highest rates of death in the Basin from strokes as well as from unintentional injuries.
- More people in the Cariboo and Thompson regions reported their heath to be "Excellent" or "Good" than in any other part of the Basin.
- The region has 14 species on the Species at Risk red list, compared with 5 in the Upper Fraser, 18 in the Thompson, 31 in the Fraser Valley and 32 in the GVSS.

Sustainability Issues & Trends

Aboriginal and Non-Aboriginal Relations

Relationships between Aboriginal and non-Aboriginal people in this region can be reflected in two ways. First, respondents to a 2004 survey of the Fraser Basin Council reported on six formal agreements between various First Nations governments and either companies or local government. These agreements cover such things as services, communications and economic development. Anecdotally, there are indications of many more agreements, particularly with forest companies as well as local governments. Second, a unique approach has been developed to build relationships through a regional visioning process.

Air Quality

Air quality has been a major concern in both Quesnel and Williams Lake. In Quesnel, particulate matter, measured as PM_{10}, exceeded 50 micrograms/metre^3 (ug/m^3) – a level considered to be poor air quality – the most often among the nine Fraser Basin communities for which data were analyzed. The frequency of exceeding this level has varied from about 43% in 1996, to 53% in 1999 and to 46% in 2002. Levels of PM_{10} have slightly decreased in Williams Lake, and the frequency of PM_{10} levels exceeding 50 ug/m^3 has dropped from about 36% in 1997 to about 30% in 2002. However, Williams Lake is tied with Prince George for having exceeded this standard the second most often among the nine Basin communities. There are less data available for $PM_{2.5}$ for this region. In both Williams Lake and Quesnel, $PM_{2.5}$ was about 20 ug/m^3 between 2001-2002 – below the Canada Wide Standard (CWS) of 30 ug/m^3. Ozone levels in Williams Lake have slightly decreased from about 54 parts per billion (ppb) in 1993 to about 52 ppb in 2002. This is below the CWS of 65 ppb. Williams Lake has the third lowest ozone level among the eight Basin communities. There are no ozone data for Quesnel. The City of Quesnel has developed and is implementing an airshed management plan to help improve local air quality.

Economic Diversification

Economic diversification remains a challenge for much of the Cariboo-Chilcotin region, which is heavily dependent on the forest industry and must cope with the impacts of the Mountain Pine Beetle outbreak. A number of communities are one-industry towns. For example, Wells and Barkerville, which once had both mining and forestry as major employers, are now dependent almost exclusively on tourism. According to the BC Diversity and Forest Vulnerability Indices[1,2], Quesnel is rated as the second most dependent community on the forest sector (78), with the second least diverse economy (57), among Basin communities. Forty-three percent of income was earned in the forest sector. Williams Lake is less dependent on the forest sector (42), and has a more diverse economy (67). 30% of income in Williams Lake was earned in the forest sector.

Invasive Plants

Invasive plant species – often called "noxious weeds" – are taking over large tracts of land throughout the province. Without natural enemies to control their populations, these alien plant species threaten fragile ecosystems, reduce biodiversity and cost the economy untold millions of dollars each year. Invasive plants adversely affect crop yields, reduce range productivity (many weeds are non-palatable or injurious to domestic livestock), reduce wildlife forage and the land's recreational values, impact conifer regeneration efforts by the forest industry, and even impact personal health.

Following the Fraser Basin Council's field trip to the Cariboo-Chilcotin Region in June 2001, the Council worked with industry, government and community groups to develop a comprehensive *Invasive Plant Strategy for British Columbia* that was published in March 2004. As recommended in the strategy, the Invasive Plant Council of British Columbia has been established to coordinate invasive plant management province-wide, improve compliance with current and new legislation, establish research priorities and coordinate public awareness programs.

Chilcotin Mountains.

How are we doing in the Cariboo-Chilcotin Region?

- Air Quality – Particulate matter is poor relative to other Basin communities.
- Aboriginal and Non-Aboriginal Relations – Getting Better through regional visioning.
- Economic Diversification – Vulnerable to the forest economy and Mountain Pine Beetle. ■

FOOTNOTES

(1) Diversity Index – 100 represents the most diverse and 0 the least diverse.
(2) Forest Vulnerability Index – 100 represents the most dependent on the forest sector and 0 the least dependent.

Regional *Snapshot*

- Life expectancy in the region is 78.5 years, the second lowest in the Basin.
- The Thompson is the only Basin region where total domestic water consumption has decreased.
- The Thompson has the greatest proportion of residents served by tertiary sewage treatment systems in the Basin.
- Two-thirds of residents report their health as excellent or very good; however, access to health care services is a concern for rural residents.
- The North Thompson area has a less diversified economy and the third highest forest sector vulnerability rating among Basin communities.
- The Lillooet Land and Resource Management Plan was completed in 2004.

Sustainability Issues & Trends

Community Sustainability

The rural-urban interface is becoming an increasingly important issue for community sustainability in the region. For example, as residential and recreational property development has increased in rural areas, particularly around lakes, the loss of sensitive habitat in grasslands and lakeshore riparian areas has become a concern, as well as the loss of agricultural lands. In 2000, the Thompson Nicola Regional District (TNRD) was one of the first regional districts to adopt a Regional Growth Strategy (RGS). Described as a cooperative strategy for achieving a sustainable future, the RGS includes a vision, goals and policies for human settlement, transportation and energy, economic development, environmental protection, and other issues. However, elsewhere in the Thompson region (CSRD), 25% of the land designated under the Agricultural Land Reserve since 1973 has been removed.

Economic Diversification

Economic diversification is an important sustainability challenge for all parts of the region. Overall, the region is maintaining the provincial average for growth, but the Squamish-Lillooet Regional District portion of the region, the smaller towns in the Fraser Canyon and some First Nations communities have been in decline. Trade issues with the US have impacted both forestry and cattle, but in both cases, the industries are making their operations more efficient and/or developing new markets. A particular challenge for many small communities and rural areas is the lack of high speed Internet access.

Five of six communities in the region, rated according to the Diversity and Forest Vulnerability Indices[1][2], are shown as having diverse economies. Out of a possible 100, Ashcroft is rated the highest (76) in the region as well as in the Basin among the 20 communities listed. The other ratings are Spallumcheen (75), Salmon Arm (73), Kamloops (72), Merritt (68) and Lillooet (67). However, the North Thompson has a less diversified economy (61), the fourth lowest among all communities rated in the Basin. The North Thompson received the third highest forest vulnerability rating (65) among Basin communities, with 39% of incomes depending on the forest sector.

Health

Life expectancy in the region is 78.5 years, the second lowest in the Basin. Access to emergency health facilities is becoming more difficult, particularly for rural areas. For example, after-hours emergency services have been centralized in the region's larger centres. In some cases, an individual may be flown to Vancouver where specialists are located. After receiving treatment, rural residents then have to pay their costs to travel home.

Low weight births have been on average about 5% of total live births (1989-2002), about the same as the Basin and BC averages. In 2001, the low weight births reached close to 7%, the highest within the Basin for that year.

The Thompson Region had among the best results regarding self-rated health within the Basin. 26% rated their health as excellent, while 40% reported very good, 25% as good and only 9% as fair or poor.

Water Quality and Quantity

Water is a critical concern in the Thompson Region, especially in the southern drier parts of the region. The Thompson is the only Basin region where total domestic water consumption decreased between 1991 and 1999. The City of Kamloops has just built a state-of-the-art drinking water treatment plant, which is a LEED-certified "green building".

Efforts to protect water quality are partly reflected in the level of municipal sewage treatment. In 1983, 70% of the region's residents were served by a municipal treatment system, with 50% served by tertiary systems. By 1999, 77% of residents were served by municipal treatment systems, with 60% served by tertiary treatment – the highest proportion in the Basin. The 23% of residents not served by municipal systems were mostly in the rural areas in the southeastern part of the region. The water quality of Shuswap Lake is believed to be deteriorating because of the high number of individual septic systems, particularly affecting nearshore areas and groundwater. Lack of funding in rural areas has impeded development of better sewage treatment systems.

Fraser Basin Council Directors are dwarfed by one of the giant electric shovels at the Highland Valley Copper Mine near Kamloops.

The province establishes water quality objectives and monitors the water quality at specific sites. There are five sites on the Thompson River (including the North and South Thompson) for which there are data for 1998, 2000 and 2002. In 1998, the water quality objectives were met 100% of the time at all five sites. In 2000 and 2002, the objectives were met about one-third of the time, with a high portion of indefinite results. However, in 2002, the objectives for the Lower Thompson at Spences Bridge, downstream of the Nicola River, were not met 44% of the time.

How are we doing in the Thompson Region?

- Economic Diversification – generally Getting Better
- Health – Access is a concern.
- Rural-Urban Interface – Mixed Results – Regional Growth Strategy in TNRD, but significant loss of Agricultural Land Reserve in CSRD.
- Water Quality – Mixed Results – Getting Worse, but Kamloops drinking water is Getting Better. ■

FOOTNOTES

(1) Diversity Index – 100 represents the most diverse and 0 the least diverse.
(2) Forest Vulnerability Index – 100 represents the most dependent on the forest sector and 0 the least dependent.

The Thompson Region extends from Boston Bar in the Fraser Canyon north to the Cariboo, east through Kamloops and the Shuswap Lake area, south to Merritt and the Coquihalla toll booths, and west to include Lillooet. It occupies about 56,000 sq km – from deep forest with white water rivers to semi-arid, desert-like terrain and rolling grasslands.

The region has a population of approximately 135,000 people, or 5% of the total population of the Fraser Basin. Communities include Kamloops, Merritt, Ashcroft, Clearwater, Salmon Arm, Enderby, Lumby, Lytton and Lillooet.

Kamloops – the largest city in the region – has a diverse local economy based on forest industries, highway and rail services, mining, agriculture, regional trade, financial services, education and training, manufacturing, tourism and recreation. Historically, forestry, mining and ranching have been the primary industries in the region, but tourism, transportation, high technology and financial and professional services play an increasing role.

Making Sustainability Work

Mid-Fraser Economic Development Conference

Over the past decade, the mid-Fraser region – including the communities of Spences Bridge, Boston Bar, Lytton and Lillooet – have been hard hit by everything from reduced traffic and tourism on the Trans Canada Highway to the softwood lumber dispute, cutbacks in government services and the closing of BC Rail passenger service from North Vancouver to Lillooet.

As part of its Strengthening Communities program, the Fraser Basin Council brought together the business community, First Nations leaders, young entrepreneurs, elected officials and residents for an ambitious conference in Lillooet in March 2004 to share ideas on how to diversify the local economy and make their communities more sustainable.

The conference looked to the future rather than the past. It focused on practical tools to improve and diversify the local economy and make business dreams a reality. Sessions included: business planning and marketing; securing financing; regional 2010 Olympic opportunities; regional agriculture, tourism and mining initiatives; tips for youth and women entrepreneurs; and building effective First Nations partnerships and joint ventures.

Minister of Sustainable Resource Management George Abbott addresses the Mid-Fraser Economic Development Conference.

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FRASER VALLEY REGION

The Fraser Valley Region is located in the southern part of the Basin, from Boston Bar in the Fraser Canyon to the eastern boundary of the GVRD and north to Mount Currie. It covers almost 13,000 square kilometres and includes the Chilliwack and Lillooet-Harrison watersheds, as well as the main stem of the lower Fraser River. The broad, fertile floodplain contains some of the most productive farmland in Canada.

About 240,000 people, or 9% of the Basin's population, live in the region, and that number has risen significantly over the past two decades. Communities include Abbotsford, Chilliwack, Harrison Hot Springs, Hope, Kent/Agassiz and Mission.

The economy is based largely on agriculture and forestry, but tourism, fishing, transportation, manufacturing and service industries are also major employers. The region is also a major corridor for air, rail, road and river transportation, as well as communications, natural gas and electricity utilities.

Making Sustainability Work

Fish, Wasabi and Crayfish: Innovative Small Lot Agriculture in Kent

For Fraser Valley farmers, strengthening agriculture is synonymous with strengthening communities. One sector with the greatest potential for growth is small lot agriculture which constitutes 25% of BC's agriculture economy and complements production agriculture.

Just ask Bruce Swift who runs an innovative, land-based, environmentally friendly fish and wasabi farm in Agassiz. He is one of the key supporters working with Fraser Basin Council's Strengthening Communities project in the District of Kent. Bruce demonstrates sustainability through his research and development in home-based aquaculture, with assistance from Agriculture Canada and Fisheries and Oceans Canada.

Swift farms indigenous species like Coho. He then grows Japanese wasabi root in the nutrients produced from the fish. He is also doing research on raising freshwater crayfish that would feed on the wasabi leaves. Swift's academic background and practical "know-how" is another example of how British Columbia – with more than 280 commercial agricultural products – is a world leader in diversity of agriculture and high quality food production.

"Small lot agriculture has great potential in Kent. Good entrepreneurship, good soil, a warm climate and community spirit all contribute to our success," Swift says. "The Council has played a valuable role in bringing growers together and facilitating this process of strengthening small lot agriculture."

Bruce Swift with products from his small lot farm.

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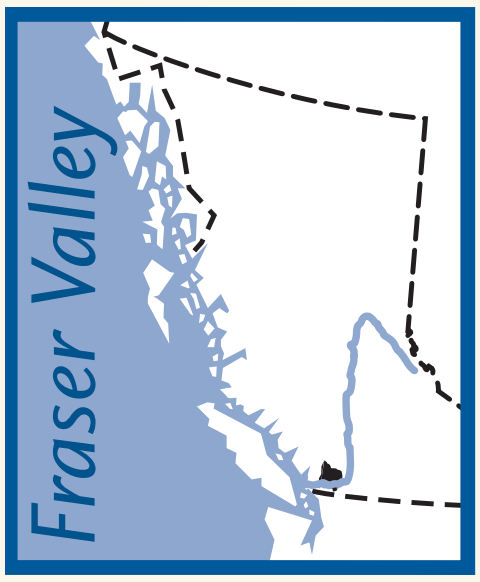


Regional *Snapshot*

- Increase in Fraser Valley population since 1981: 76%
- Decline in productive farmland (1986-2001): 5%
- Increase in net farm income (1986-2001): 116%
- Ground Level Ozone levels are among the highest in the Basin and Particulate Matter levels are among the lowest.
- Fraser Valley households consume the most electricity per household in the Basin, at 12,000 kWh/year.
- The region has the second highest number (31) of species on the Species At Risk red list in the Basin.

Sustainability Issues & Trends

Agriculture and Food Production

Agriculture is synonymous with the Fraser Valley region, which has some of the best growing conditions in Canada. The main types of agricultural products are dairy, poultry, berries, vegetables, nursery stock and niche products unique to BC. The region continues to struggle with protecting its valuable agricultural land while accommodating a growing population and urbanization pressures. From 1986 to 2001, there was a 5% loss of land in agricultural production. 3,600 ha of land were removed from the Agricultural Land Reserve (ALR), most for urban development. During the same period, however, the region's net farm income increased by 116%, the second largest increase in the Basin.

Air Quality

Air quality remains a major concern for Fraser Valley residents. Due to its location at the narrow end of a valley with westerly airflow, air pollution from Vancouver and Bellingham results in this region having the worst air quality in the Basin. Even though larger Particulate Matter (PM) has declined within the Fraser Valley due to less wood burning, data show that PM and other emissions from vehicles and ships are increasing from the GVRD. Also a US energy plant application (Sumas Energy 2/SE2) proposes to emit an additional three tons of pollution per day. This proposal has met with unanimous opposition in Canada, and the process is now with the Federal Appeals Court.

Ozone levels in the region have declined but are still among the highest in the Basin. For example, Hope had the highest ozone levels of all eight communities monitored in the Basin, and is near the Canada Wide Standard of 65 ppb. Hope experienced a decline from about 64.5 ppb in 1994 to 60 ppb in 2002. Chilliwack has also seen decreases in ozone levels, from around 68 ppb in 1994 to about 56 ppb in 2002. Chilliwack had the third highest ozone level in 2002 among the eight Basin communities.

Levels of PM_{10} pose less of a concern in the Fraser Valley, and are among some of the lowest in the Basin. Of the nine communities in the Basin for which data are reported, Hope has the second lowest frequency of poor air quality (PM_{10}>50 micrograms/m^3). In Hope, the frequency of PM_{10} levels exceeding this standard declined from around 3% in 1997 to 1% in 2002. Chilliwack has also experienced improvements in PM_{10}, levels exceeding 50 micrograms/m^3 13% of the time in 1995 but only 5% of the time in 2002.

Community Sustainability

The rural-urban interface is becoming an increasingly important issue of community sustainability in the region. For example, the Fraser Valley is experiencing significant population growth (76% increase in population since 1981) and related urban development pressures, leading to concerns about waste management, transportation, air quality and loss of agricultural land and habitat. The region has the second highest number (31) of species on the Species at Risk red list in the Basin. With rapid growth in the 1990s, the Fraser Valley Regional District adopted a resolution in January 1996 to develop a Regional Growth Strategy (RGS), involving research and public involvement regarding housing/infrastructure/services, transportation, land use, environment/parks/recreation, and economy/employment. The RGS will provide a useful tool for planning and decision-making to support local governments in making development decisions.

Dairyman Corne Klop (left) with Marion Robinson and Kent Councilor Mel Jorgensen at the "Focus On Farming" event in Agassiz .

Flood Hazard Management

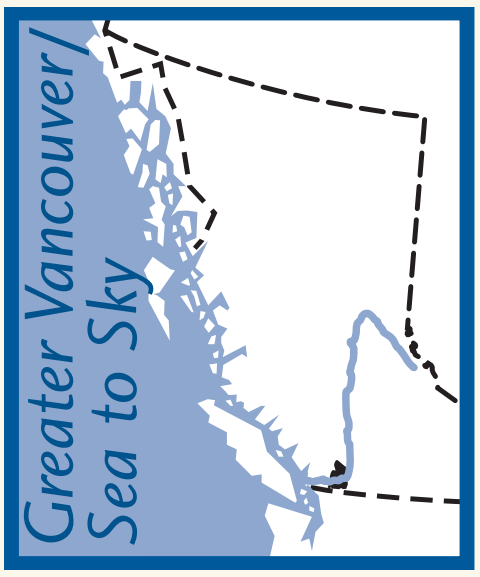
In this region, the vulnerability to flood hazards is a major concern. Record floods of the mighty Fraser occurred in 1894 and 1948. Between 1981 and 2001, the Fraser Valley population living within the Fraser River floodplain increased by about 16,000 (34%) and the number of dwellings increased by almost 9,000 (52%). If the Fraser Valley and GVSS regions were to experience the flood levels of 1894, estimates of damage range from over $1.8 billion in direct damages up to $10 billion in lost economic activities. Since the Fraser Basin Council's Flood Hazard Management Program was initiated in 1998, the Council and its partners have undertaken a number of projects to help prepare for the next great Fraser River flood. These include: establishment of the Joint Program Committee, flood hazard mapping, a GPS survey of flood protection works and production of detailed floodplain maps. Agreements have also been reached to address the contentious issue of Fraser River gravel management. Riverbed gravel has been accumulating in recent years, increasing the flood hazard for some communities including Chilliwack and Kent/Agassiz.

How are we doing in the Fraser Valley Region?

- Agriculture and Food Production – Mixed Results – Farm Income is Getting Better but land has been lost from the ALR.
- Air Quality – Getting Better slightly with new concerns from both Whatcom County and GVRD.
- Flood Hazard Management – Mixed Results – Progress is being made but, because so many more people live on the floodplain, vulnerability to flooding is Getting Worse.
- Rural-Urban Interface – Mixed Results – Regional Growth Strategy in FVRD, but loss of food producing land is occurring. ■

Harrison Lake sandcastle festival.

GREATER VANCOUVER/SEA TO SKY REGION



Regional *Snapshot*

- Residents in the GVSS region have the highest life expectancy in the Basin, in Canada and, next to Japan, in the world: 81.3 years.
- However, the GVSS and Fraser Valley regions have the highest proportion of people who are either physically inactive or only moderately active.
- Housing continues to be more expensive in the GVSS than all other regions for both owners and tenants, and 43% of tenant households spend more than 30% of their household income on shelter.
- GVSS residents use less electricity but more natural gas per capita than all other regions in the Basin. The region has the highest total consumption rates in all user categories for both electricity and natural gas.
- The region is meeting provincial water quality objectives more than 80% of the time. However, 39% of residents – or 765,000 people – are served by only primary sewage treatment.
- The region has the highest number – 32 – species on the red Species at Risk list compared with 5 in the Upper Fraser, 14 in the Cariboo, 18 in the Thompson and 31 in the Fraser Valley.

Sustainability Issues & Trends

Energy Consumption

With 77% of the Basin's population, households in this region consume 71% of the electricity. Of the five regions in the Basin, households in the GVSS region consume the least per household at 9,000 kWh/year. While the GVSS residential electricity consumption per household was the lowest, it has the highest total consumption rates in all user categories for both electricity and natural gas, compared to all other regions in the Basin. Commerce in this region uses far more electricity than commerce in all other regions. The region's commercial users have been steadily increasing their electricity consumption from about 6.5 billion kWh/yr in 1992/93, to 7.5 billion kWh/yr in 2002/03. In all the other regions, commerce uses less than 1 billion kWh/yr. For natural gas consumption, households in this region used an average 110 GJ per year (2003), higher than all other regions that averaged from 90 GJ to 105 GJ per year. Commercial use in this region, at an average 702 GJ per year, was also greater than all other regions, which averaged from 471 GJ to 631 GJ per year.

Housing

Housing for the region's two million residents is a challenge, particularly affordable housing. The GVSS has a slightly lower proportion of owned dwellings (61%) than the Basin average (64%), but notably less than some of the other regions such as Thompson and Upper Fraser with 73% ownership. Average monthly mortgage payments are $1,115 in GVSS, compared to the Basin average of $1,043 and an average $785 in the three interior regions. Affordability is also noted by the proportion of owner households spending more than 30% of household income on shelter. In GVSS about 22% of owner households fall into this category, while only 14.5% of owner households in the Thompson region pay more than 30% of their household income on shelter. The situation is even more dramatic for tenant households, where 43% of GVSS tenants pay more than 30% of their household income on rent. The average monthly rent payment in GVSS is $816, noticeably greater than the average $600 per month in the three interior regions.

Population

With just over two million residents, this region is home to 77% of the Basin's residents and 52% of BC's residents. The region's population increased by 58% between 1981 and 2001, second only to the growth rate of the Fraser Valley region (76%), but much larger than the growth rate experienced in the Thompson (18%), Cariboo-Chilcotin (10.4%) and Upper Fraser (6.4%) regions during the same period. The population in the GVSS region is predicted to grow by another 50% over the next 30 years. Managing this growth is perhaps the greatest sustainability challenge facing residents of the region and the Basin.

Improving public transit is a top sustainability priority.

Transportation

Over the past decade, in Greater Vancouver alone, the number of private vehicles has grown by as many as 30,000 vehicles per year with only small increases in road space, resulting in gridlock, air quality impacts and loss of productivity. As a major port city, goods movement is also increasing, with cargo shipped by truck expected to grow over 50% by 2021. At Vancouver International Airport, it is expected that passenger volumes will grow by 40%, between 2002 and 2010, and that cargo traffic will increase at a rate of 7.5% per year. Travel from communities along the Sea To Sky Highway to Vancouver for work, education and leisure is increasing, and this trend is expected to continue well into the future. Sound long-range transportation planning is essential in order to meet future demands for public transit, road networks and inter-modal infrastructure that takes full advantage of water- and rail-based opportunities.

Water Quality

Water quality is partly reflected in the level of sewage treatment provided to the region's residents. There have been major improvements in the region's sewage treatment systems in the past two decades. In 1983, 89% of the region's residents were served by a sewage treatment system. However, 88% were served only by primary treatment. By 1999, 92% of residents were served by a sewage treatment system, of which 52% was secondary treatment and 39% was primary treatment. While a vast improvement, the 39% represents more than 765,000 residents still with only primary sewage treatment. By comparison, a greater proportion of residents elsewhere in the Basin are served by secondary systems, such as the Upper Fraser at 85%, and tertiary systems such as the Thompson at 60%. The province sets objectives for water quality and tracks how often the objectives are achieved at the monitoring stations. In the GVSS, there are data available for seven monitoring sites on the lower Fraser River for 1998, 2000 and 2002; not all sites were tested in all three years. In 1998 at the sites tested, the water quality objectives were met 100% of the time and in 2002, 84% of the time.

How are we doing in the GVSS Region?

- Energy Consumption – Highest consumption levels in the Basin and growing.
- Housing – Core Housing Need (affordability) is Getting Worse for homeowners and Getting Better for renters.
- Sewage treatment – Getting Better with more people served by secondary Treatment. ■

REFERENCES USED

- Greater Vancouver Transportation Authority. 2005-2007 Three-Year Plan and Ten-Year Outlook (February 2004).

The Greater Vancouver / Sea To Sky (GVSS) Region encompasses the smallest area but includes by far the largest population of the Fraser Basin's five regions. As well as the Greater Vancouver area, the region also is comprised of the western portion of the Squamish-Lillooet Regional District (SLRD), including the communities of Squamish, Whistler and Pemberton. The region includes the lower main stem of the Fraser River and its estuary, as well as the Coquitlam, Pitt, Squamish and numerous smaller river watersheds.

From high rises, cruise ships and tapas bars in downtown Vancouver to farmers markets in Richmond, new subdivisions in the eastern and southern suburbs, high density housing complexes in Yaletown, sawmills and fishing boats along the Fraser, high-tech business parks in Burnaby and significant new development along the Sea To Sky Highway to Whistler – the GVSS Region is the most populous and urbanized region in the Fraser Basin. Over two million people live in this region – 78% of the Basin's total population – and the economy is highly diversified.

Making Sustainability Work

Reinventing Squamish

In recent years, Squamish – a community of 15,000 along the Sea to Sky Corridor – has undergone rapid change as traditional industries suffered economic downturns and companies such as Interfor and BC Rail reduced their presence in the community. At the same time, the successful bid for the 2010 Winter Olympics, increased tourism and the growth of knowledge-based industries have provided new opportunities to strengthen and diversify the local economy.

In Spring 2003, the Fraser Basin Council convened a Strengthening Communities dialogue session to identify key issues, existing strengths and emerging opportunities in Squamish. Revitalizing Squamish's downtown waterfront was seen to be the best way to capitalize on its strengths. Using sustainability and "smart growth" principles and a design "charette" process to stimulate creative ideas, the Council, in partnership with the District of Squamish and with the assistance of the UBC Sustainable Communities Program, worked with the community to develop an innovative and distinctive "working waterfront" concept plan for the downtown waterfront that was unveiled in April, 2004. The plan, which engaged a broad cross-section of interests in the community, includes marinas, ocean walkways, seaside residences, parks, a public market, restaurants, and a distinctive arts and cultural centre, in addition to traditional industrial uses and a deep sea port.

Greater Vancouver/Sea To Sky Regional Office


A new passenger ferry terminal is part of the new plan to revitalize Squamish's downtown waterfront.

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The Fraser Basin Council wishes to thank the companies, government agencies and organizations that sponsored our recent Conference at which we launched the *State of the Fraser Basin Report: Sustainability Snapshot 2*.

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2004 State of the Fraser Basin Report

SUSTAINABILITY Snapshot 2

Making Sustainability Work

Sustainability is a societal journey with shared roles and responsibilities. For many sustainability issues, much progress has been made by individuals, all orders of government, community organizations and businesses. However, for other sustainability issues, the challenges continue and we have much room for improvement.

The Fraser Basin Council believes that the concepts and principles of sustainability will always work to advance "social well-being supported by a vibrant economy and sustained by a healthy environment." However, in many cases, as a society we are not fully integrating and implementing sustainability goals and principles. Sustainability takes dedication, commitment, patience and persistence. It also requires new ways of thinking if we are going to successfully resolve long-standing challenges that threaten our existence in the long run. The Council is committed to continue to work in collaboration with many others to advance sustainability. It is also committed to further develop and refine its indicators program as a means to measure and report on progress towards sustainability.

Indicators can serve as a compass to help us find our path and move past the barriers and obstacles that we face along the way. However, indicators and sustainability reports are only a tool to help measure and convey information. What is more critical is that we are inspired by, and act upon, this information as individuals, families, consumers, employees, investors, government policy-makers and business managers. Let the insights of this report – and others like it – inform our day-to-day behaviours, choices and decisions with a goal in mind for long-term sustainability, not only for the Fraser River Basin, but also for the multitude of peoples and species who live on planet Earth, both now and in the future.

Acknowledgements

Development and production of the *2004 State of the Fraser Basin Report: Sustainability Snapshot 2* would not have been possible without the support of numerous contributors who provided data and information, technical expertise, research and writing, and financial assistance. The Council would like to express its sincerest thanks and gratitude to these supporters.

In addition to the Fraser Basin Council's Board of Directors, a special committee of the Board – the Sustainability Indicators Task Committee – provided oversight and decisions regarding this initiative that was undertaken between the spring of 2003 and the fall of 2004.

A significant number of advisors contributed their guidance, feedback and advice regarding information sources, as well as the analysis and interpretation of trends. Advisors included Fraser Basin Council Directors, staff and numerous individuals with expertise across a wide range of sustainability issues, including indicators and reporting. For a complete list of data and information sources, see the references and footnotes for each sustainability topic.

A diverse team of writers and editors collaborated on this report. Special thanks go to Noha Sedky, Clare Mochrie, Geoff Thornburn, Rich Chapple and Patrick Cotter, who worked with several Council staff – Joan Chess, Jim Vanderwal, Raymond McAllister and Steve Litke – as contributing writers.

The Council would also like to thank Environment Canada and Western Economic Diversification Canada for their financial support for the project.

We Want Your Feedback

This report was shaped, in part, by feedback and suggestions that were received following the release of the 2003 *Sustainability Snapshot* report and dialogue at the 2003 State of the Fraser Basin Conference. The Council values the insights and perspectives of all of its constituents, including individuals, all orders of government, the business community and civil society.

Once again, we would invite your feedback. Please let us know:

- Is the report useful in helping you better understand sustainability?
- Is the report useful in guiding your actions and decisions to advance sustainability?
- In what ways are you using the report and the Council's indicators?
- What suggestions do you have to improve our next *Sustainability Snapshot* two years from now?

A feedback form is available on the Fraser Basin Council's website or by request. See contact information below.

www.fraserbasin.bc.ca (click on Indicators)

MARK YOUR CALENDARS!

2006 State of the Fraser Basin Conference
November 17 & 18, 2006

INFORMATION

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