



# Sea-to-Sky LRMP

Land and Resource Management Plan

- I. Socio-Economic Assessment
  - II. Environmental Risk Assessment
- 



---

*April 2008*



Cover Photo by Brad Kasselmann  
[www.coastphoto.com](http://www.coastphoto.com)  
(used with permission)

## Executive Summary

### I. Socio-Economic Assessment.

The report assesses the expected socio-economic effects of the Sea-to-Sky LRMP over time compared to what is expected would occur in the absence of the Plan — that is, the Base Case. The general objectives of the LRMP are to reduce and resolve land-use conflicts, ensure sustainable resource management and provide for economic diversity and security.

The report uses a standardized but evolving methodology that is regularly employed for assessing the socio-economic impacts of government land-use plans and policy changes (further described in Chapter 1 of this report). The accounts specified for this analysis include economic development (forestry, tourism and recreation, minerals and mining, agriculture and energy) and social/community.

The anticipated impacts on these accounts and sectors are presented in Table ES1 and summarized as follows:

- The maximum timber available for harvest (timber supply) is forecast to be reduced by 12% in the first decade. The timber harvest, employment income and stumpage revenue in the same period are forecast to be reduced by 8%. While the LRMP reduces the land base available for timber harvesting (hence the timber supply), it is expected to lessen some impediments that have been contributing to the chronic under-harvest of timber.
- Tourism and recreation is the largest and fastest-growing sector in the LRMP area economy. Tourism in the Plan Area is concentrated in the front-country and the LRMP will provide minor benefits, primarily through visual quality management in that zone. Backcountry tourism and public recreation will likely benefit from the large areas to be included in Conservancies and Wildlands and the resulting preservation of wilderness experiences. However, the magnitude of increases in visitor numbers, satisfaction levels, expenditures, employment and GDP could not be quantified at this time.
- Minerals and the mining sector are considered from the perspective of the three sub-sectors. Aggregate and industrial minerals are primarily dependent on local markets for their products and these are expected to continue growing. The LRMP maintains access to most of the highest-value sites. However, local metal mineral investment must compete with opportunities elsewhere and the Plan Area is seen as a challenging place to work given the large number of interests on the land base. It would continue to be even without the LRMP. Under the LRMP, conservancies reduce the Plan Area open to metal mining by 4% and the Wildlands zone adds some constraints and possible uncertainties to a further 28%.
- Close to 50% of the Plan Area will not be available for hydroelectric development (compared to 22% in the Base Case), mostly because of their exclusion from Wildlands (28%) and, to a small extent, Conservancies (4%). However, since these high-elevation areas are largely unsuitable for run-of-the-river projects, only a much smaller percentage of the potential areas will be affected. One power generation water licence is affected by the Wildlands zone. Overall, a minor impact on hydroelectric potential is anticipated. Minimal impacts are expected on geothermal energy and none on windpower.
- Agriculture is not expected to be affected by the LRMP. The status of the Agricultural Land Reserve zone is unaffected by the Plan, as are range tenures. By and large, the industry does not have a strong link to Crown land.
- A small reduction in future forest job potential is likely to be offset by growth in other sectors. The LRMP will benefit First Nations communities.

**Table ES1 - Summary of LRMP Impacts**

<b>Account</b>	<b>Current Situation</b>	<b>Base Case</b>	<b>LRMP</b>
<b>Land Base (Crown Land)</b>			
Protected Areas incl. Conservancies	232,061 (22%)	232,061 (22%)	270,097 (26%)
Wildlands	-	-	300,102 (28%)
High Constraint <sup>1</sup>	149,118 (14%)	149,118 (14%)	129,855 (12%)
Medium Constraint <sup>1</sup>	125,123 (12%)	125,123 (12%)	129,920 (12%)
General Management <sup>1</sup>	556,032 (52%)	556,032 (52%)	232,359 (22%)
<b>Forestry</b>			
	<b>Current Situation (2007)</b>	<b>Base Case (Decade 1)</b>	<b>LRMP (Decade 1)</b>
Timber Supply	753,500 m3/yr	740,700 m3/yr	652,957 m3/yr (12% reduction)
Average harvest	575,000 m3	587,100 m3/yr	542,700 m3/yr (8% reduction)
Person-years of total local employment	456	465	430
Person-years of total employment	1,509	1,541	1,425
Stumpage (\$ millions)	\$6.6	\$5.2/yr.	\$4.8/yr.
<b>Tourism and Recreation</b>			
	<b>Current Situation</b>	<b>Base Case</b>	<b>LRMP</b>
Front-Country Tourism	12% of provincial tourism GDP. Room revenues of \$177 million in 2007. Total visitor spending of close to \$1 billion. 7,000 direct and indirect jobs, 11% of BC employment in the sector.	2010 Winter Olympics, major resort investments and ongoing expansion into four-season products should increase future infrastructure, marketability, visitor numbers, spending, employment and GDP contribution.	Minor benefits for front-country tourism concentrated in Sea-to-Sky corridor, primarily through visual landscape management.
Backcountry Tourism	300 businesses directly involved, and many more dependent on visitor spending. 22 commercial recreation licensees have tenure over one-half of the Plan Area land base. Visitor spending of between \$30 and \$60 million annually.	The business base is likely to diversify with more market-ready products targeted at the shoulder seasons. Continued expansion in backcountry tenures and operations can be expected. Gradual erosion of back-country wilderness experiences with increasing visitor numbers. Increasing conflict likely between motorized and non-motorized activities,	Overall, adventure tourism will see more constraints on a larger proportion of the total Plan Area than is currently the case, but existing tenures and user-days are not expected to be affected. New Conservancies are not expected to affect visitor activity significantly. Visitor experience in the backcountry should improve due to Wildlands areas. Visitor numbers, spending

<sup>1</sup> Constraint levels are specified from a forestry perspective.

		particularly in winter, will affect tourism operators.	and related measures are anticipated to increase, although scale is unknown.
Public Recreation	The most heavily-recreated area of the province, with a complete range of recreation activities. Approximately 2.5 million day-use visits in parks alone (2002). Approximately 350 kilometres of trails.	Continued growth expected in public participation levels in many outdoor recreation pursuits, though at lower than historical rates. The aging demographic will increase demand for softer adventures requiring low levels of physical activity. Increasing frequency and intensity of motorized and non-motorized user conflicts is likely.	Optimal recreation areas are expanded significantly. 12% of the Plan Area land base will be managed specifically for recreation emphasis. Anticipated increase in user-days and economic values, although size of increase is unknown.
<b>Minerals and Mining</b>			
Aggregate	30 active aggregate pits serving primarily local markets.	88% of primary aggregate potential available for future development.	Minimal impact. No active pits affected. 85% of aggregate potential open for development, a three-percentage point reduction. 7% of aggregate potential in Wildlands and 1.3% affected by cultural sites with some access constraints.
Industrial Minerals	Four granite quarries, one active pumice operation, focused on local markets. Steady growth expected in building and landscape stone.	93% of very high and high mineral potential areas open for exploration and development.	Limited impact. No existing quarries affected. 88% of mineral potential open for exploration and development, a 5% reduction. 39% of mineral potential in Wildlands and 0.3% affected by cultural sites and subject to some access constraints.
Metal Minerals	No active metal mines but strong history of mining. 140 occurrences of known mineralization. Plan Area has lagged recent provincial growth in exploration and development – competition with many interest groups and higher costs to achieve social licence.	98% of known occurrences and 78% of areas with high and very high potential open for exploration and development. Conflicts with other resource uses are likely to continue to grow.	Moderate impact. <b>Existing tenures</b> <ul style="list-style-type: none"> <li>• Two impacted by a Conservancy (around 1% of existing tenures).</li> <li>• 35% in Wildlands and 0.8% affected by cultural sites and subject to some access constraints.</li> </ul> <b>Occurrences</b> <ul style="list-style-type: none"> <li>• 93% open, a reduction of 5%.</li> <li>• 14% in Wildlands with some access constraints.</li> </ul> <b>Very high and high potential</b> <ul style="list-style-type: none"> <li>• 61% open.</li> <li>• 11% in Wildlands with</li> </ul>

			some access constraints.
<b>Energy</b>			
Run-of-river small-scale hydro	Five existing IPPs. Total generating capacity of 126 MW. Two IPPs selected by BC Hydro. Further 23 granted water licences. 77 water licence applications.	High potential for small-scale hydro. Considerable growth potential but constrained by local concerns concerning negative impacts on environmental, recreational, aesthetic and other values.	Existing rights-of-way and leases will be unaffected. <ul style="list-style-type: none"> <li>• 17% of current water licence applications are affected.</li> <li>• Overall, LRMP impacts likely to be minor.</li> </ul>
Geothermal	Considerable potential (e.g., Mount Meager area).	Considerable growth potential, but local stakeholder concerns likely re: aesthetics and wildlife as for hydro.	Minimal impacts.
Windpower	Exploratory stage.	Potential unclear. Local concerns likely as for hydro.	No impacts.
<b>Agriculture</b>			
Agriculture	86 farms in 2006, largely dependent on private and Band Reserve lands.	Industry will continue to evolve, but will not be impacted by Base Case.	Not impacted by LRMP.
Range Licence	4,000 ha supporting 136 AUMs.	No change.	No change.
<b>Social and Community</b>			
Population	Approximately 34,000 (2006).	Projected 52,000 (2030).	Negligible impacts expected.
Economy	Relatively well diversified; only tourism-dependent region of the province; loss of forest manufacturing base.	Continued growth and diversification as major investments are planned in tourism, construction, energy and services.	Growth and development are expected to mask any potentially negative changes associated with the LRMP. Backcountry tourism and recreation directions will provide benefits to offset possible negative effects on other resource sectors.
Socio-economic Indices	The Howe Sound area is in the top performing quartile among 77 health areas on socio-economic indices, covering health, education and incomes.	No indication that prevailing socio-economic conditions would change from the current situation.	Extended front-country visual management directions on forestry and backcountry recreation directions will provide some social benefits. First Nations are expected to benefit from the protection of lands and features of cultural significance to them as well as their increased involvement in the future management of these lands.

# Executive Summary

## II. Environmental Risk Assessment

The report presents coarse filter and fine filter environmental risk assessments of the Sea-to-Sky Land and Resource Management Plan (LRMP). The coarse filter considers indicators of ecosystem representation, protected or partially protected areas of productive forest, amount and trends in old forest abundance, and number and area of ecosystems at risk. The fine filter considers habitat for key wildlife species. Detailed assessments of risks to riparian ecosystems or fish were not conducted.

### Coarse Filter

- The LRMP is expected to provide a small benefit in the long term (200 years), compared to the Base Case, by reducing the proportion of forested ecosystems at high or high-moderate risk (66% to 60% by number; 39% to 31% by area).
- However, both the long-term Base Case and LRMP are expected to result in a rise in these risks from current levels (72% by number and 47% by area) to a maximum in year 50 and then a decline to the above long-term levels (year 200).
- Wildlands and Conservancies tend to be large and contiguous, thus reducing potential fragmentation of the landscape in future and contributing significantly to overall ecosystem functioning, assessed at a coarse level. However, they will not correct the existing under-representation of medium and higher productivity forested ecosystems within protected areas. Proposed Cultural Management Areas more evenly represent forested ecosystems and higher productivity ecosystems.
- Overall, the LRMP results in reduced risk compared with the Base Case, but continued under-representation of higher productivity ecosystems is expected to undermine long-term ecological integrity in the plan area.

### Fine Filter

- Species now at “high” or “very high” risk include grizzly bear, mountain goat, marbled murrelet and wolverine. Risks to all of these, except wolverines, as well as risks to a number of other species, will be reduced by habitat protection. This will be achieved through the zonations of Cultural Management Areas, Wildlands, Conservancies and Floodplain Management zones; land-use restrictions such as limits on motorized access; specific recognition of the need for wildlife species-specific management/recovery plans; and collaborative wildlife management planning with First Nations.
- The LRMP does not reduce risk to some species, such as wolverines and harlequin ducks.

### Key Uncertainties and Assumptions

- Risk reduction is dependent on commitments by First Nations, governments and stakeholders to implement the LRMP within reasonable time frames and on effective monitoring, compliance and enforcement to ensure management objectives are achieved. Reduced forest harvesting in Cultural Management Areas (compared with that modelled) may reduce risks to wildlife, but this remains uncertain.
- This quantitative analysis considers only forestry activity on the land base and does not reflect mining, independent power projects, tourism and recreation, and other potential sector impacts. Areas assumed to retain old forest to meet forestry policy may be undermined by hydroelectric projects and mining since these activities are not bound by forestry policies.

- In qualitative terms, however:
  - The cumulative impact of numerous planned run-of-the-river hydroelectric, geothermal and windpower projects could reduce other environmental benefits of the LRMP and present fine filter environmental risks that are not addressed by the LRMP; and
  - There remains a significant risk to fine filter environmental values from the cumulative impact of summer and winter recreation and tourism. Under the Base Case, the overall growth in the numbers of backcountry tourists and recreationists and, in particular, the increasing numbers of motorized visitors are expected to increase risks to wildlife.



# Sea-to-Sky LRMP

Land and Resource Management Plan

## I. Socio-Economic Assessment

---



---

*April 2008*



## **Acknowledgments.**

This socio-economic assessment report was prepared by Lionsgate Consulting (Steve Nicol, with assistance from Gary Robinson of Robinson Consulting and Associates and Randy Sunderman of Peak Solutions Consulting) for the Ministry of Agriculture and Lands and the Integrated Land Management Bureau (ILMB).

Direction and editorial input was provided by Jim Johnston and Alison Coyne of the Ministry of Agriculture and Lands, Crown Land Administration Division.

The report draws heavily on two sources of data: firstly GIS data, maps and assistance supplied by John Sunde, Gurdeep Singh, Joshua Chan, Allan Leong and Susan Mordy of the ILMB-GEOBC Spatial Analytical Services Branch; and secondly timber supply analyses conducted by Erik Wang of Timberline Forest Inventory Consultants Ltd. A number of sector representatives, listed under the references, were interviewed and greatly assisted our assessment.

Valuable comments on drafts were provided by Chris Ash, Frank DeGagne, Andre Germain, Nathan Hagan-Braun, Dave Hails, Tony Hamilton, Tim Hoskin, Bill Hrick, Ross Kreye, Kevin Kriese, Kevin Lee, Arlette Malcolm, Ian McLachlan, Hal MacLean, Al Niezen, Tony Pesklevits, Scott Shaw-MacLaren and Vera Vukelich. All remaining errors are the responsibility of Lionsgate Consulting and the Ministry of Agriculture and Lands.

Cover Photo by Brad Kasselmann  
[www.coastphoto.com](http://www.coastphoto.com)  
(used with permission)

# Socio-Economic Assessment Table of Contents

Executive Summary .....	i
1 Introduction .....	1
1.1 LRMP Role and Objectives .....	1
1.2 Report Purpose and Scope .....	1
1.3 SEA Methodology.....	2
1.4 Plan Area Socio-Economic Overview.....	6
2 Economic Development .....	7
2.1 Forestry .....	7
2.1.1 Forestry Overview.....	7
2.1.2 Forestry Base Case .....	7
2.1.3 Forest Sector Implications of LRMP .....	12
2.1.4 Socio-Economic Implications of the LRMP .....	15
2.2 Tourism and Recreation .....	16
2.2.1 Tourism and Recreation Definitions.....	17
2.2.2 Tourism Overview and Base Case .....	18
2.2.3 Recreation Overview and Base Case.....	21
2.2.4 LRMP.....	22
2.2.5 Tourism Implications of the LRMP.....	26
2.2.6 Public Recreation Implications of the LRMP.....	32
Aggregates, Industrial Minerals, and Metal Minerals.....	36
2.2.1 Mining Overview .....	37
2.2.2 Base Case .....	37
2.2.3 LRMP.....	38
2.2.4 LRMP Implications for the Mining Land Base within the S2S Plan Area .....	39
2.3 Energy .....	44
2.3.1 Overview and scope of the assessment.....	44
2.3.2 Base Case .....	44
2.3.3 Energy LRMP Implications .....	46
2.4 Agriculture and Range.....	48
2.4.4 Agriculture Background .....	48
2.4.5 Agriculture Implications of the LRMP .....	48
3 Social Implications .....	49
3.1 Overview .....	49
3.2 Base Case Community Implications.....	50
3.3 LRMP Community Implications .....	51
4 Summary and Conclusions .....	53
4.1 Summary of Implications .....	53
4.2 Conclusions.....	54
List of Tables .....	56
List of Charts .....	56
References .....	57
Contacts .....	58
Appendix 1 – Area Statistics .....	60
Appendix 2 – GIS Area and Indicator Rollup.....	62
Appendix 3 – Interactions Between Land-Use Zones and Resource Values .....	72

# 1 INTRODUCTION

---

## 1.1 LRMP Role and Objectives

Land and Resource Management Plans (LRMPs) are strategic planning tools used to assist the provincial government in fulfilling its responsibility to manage multiple uses of Crown land. The general, interrelated, objectives of an LRMP are:

- To reduce and resolve land-use conflicts (on Crown land);
- To ensure sustainable resource management; and
- To provide economic diversity and security.

The Sea-to-Sky LRMP states that the "process was undertaken to provide greater certainty for local economic development and the long-term sustainability of ecological values. The plan was developed with the aim of balancing the economic, environmental and social interests within the planning area in consideration of the wider regional and provincial setting"<sup>2</sup>.

LRMPs, including the Sea-to-Sky (S2S LRMP), utilize two main instruments to achieve these objectives:

- a collaborative planning process starting with a public planning forum representing a range of resource sectors, followed by government-to-government discussions between the Province and First Nations to identify interests and values pertaining to the land and options for managing it; and
- a combination of zoning and management direction, both general and zone-specific, to implement the results of these discussions by:
  - separating non-compatible activities on the land base;
  - managing potentially detrimental impacts of resource use on others;
  - creating opportunities for the complementary use of land;
  - reducing uncertainty concerning social licence and property rights; and
  - increasing certainty for residents and communities about access to Crown land and resources.

## 1.2 Report Purpose and Scope

This report assesses the expected socio-economic effects of the Sea-to-Sky LRMP over time compared to what is expected would occur in the absence of the Plan — the so-called Base Case. In so doing, it focuses principally on:

- the effects of management direction and zonation;
- the economic effects and the major social effects flowing from these; and
- the extent to which the plan provides net benefits by reducing and resolving land-use conflicts and increasing economic diversity and certainty.

The extent to which the S2S LRMP achieves ecological objectives is covered in the separate Environmental Risk Assessment report in Part B of this document.

---

<sup>2</sup> Integrated Land Management Bureau, "Sea-to-Sky Land and Resource Management Plan", March 2008.

This socio-economic assessment assumes that the management objectives and direction outlined in the LRMP can and will be applied and enforced in the LRMP area. No attempt has been made to assess the likelihood or feasibility of implementing management initiatives.

The scope of this report is limited in a number of respects in line with the scope of the S2S LRMP.

- LRMPs apply only to the management of Crown land by the provincial government in British Columbia. Public interests on private land are managed by local governments. As a consequence, the S2S LRMP and this report do not address any issues of coordination between Crown land and local government planning, such as those raised by urban development pressures in the Plan Area;
- While the LRMP was completed in several stages addressing parts of the Plan Area, the report focuses on assessing the impacts of the final S2S Plan in the whole Plan Area compared to the Base Case;
- The impacts of agreements reached with individual First Nations that form part of the overall Plan have not been assessed separately; and
- Several issues remain unresolved in the S2S Plan and the report deals with these as follows:
  - No plan has been finalized for the Ure Creek area of 3,851 hectares (0.4% of the Plan Area) on the northern boundary of Garibaldi Provincial Park. As a consequence, it is assumed that Base Case conditions apply in this area,
  - Earlier drafts of the LRMP included backcountry winter recreation zoning, but the final LRMP does not include this. However, discussions on this issue are ongoing with motorized and non-motorized recreationists. Consequently, while the general implications of zoning are discussed, the impacts of specific zoning possibilities are not assessed.

### 1.3 SEA Methodology

The report uses a standardized but evolving methodology that is regularly employed for assessing the socio-economic impacts of government land-use plans and policy changes<sup>3</sup>. This is summarized in Figure 1.1.

The effects of the LRMP on any sector or activity within it, including the objectives noted above, are assessed using the following steps:

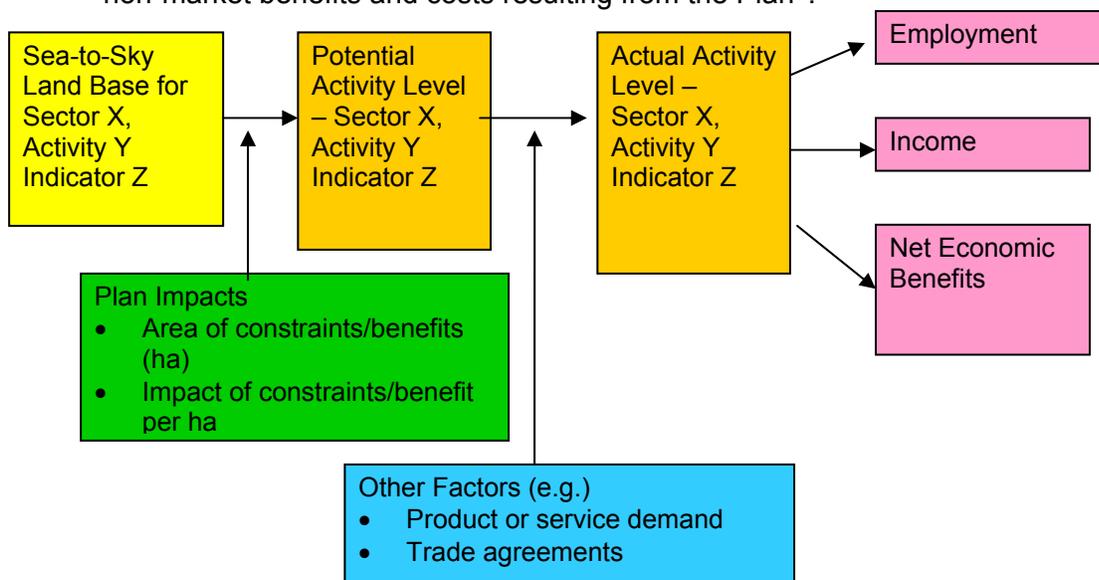
- A set of indicators for measuring the effects of the LRMP on that sector and activity is selected (e.g., hectares of timber harvesting land base, number of visitor user-days, number of mineral tenures);
- The following are examined:
  - The level of constraint imposed on the sector and activity by management direction within each zone compared to the Base Case;
  - The level of benefit conferred on the sector and activity by virtue of a constraint imposed on other sectors/activities that have negative effects in the zone on the sector/activity under examination, compared to the Base Case; and
  - The size of each zone measured in area and the units of each indicator, again compared to the Base Case (see Appendix 2 for the aggregate land-base data obtained from the

---

<sup>3</sup> Guidelines available at:  
[http://www.al.gov.bc.ca/clad/strategic\\_land/econ\\_analysis/projects\\_pubs/cabinet/SEEA\\_guidelines.pdf](http://www.al.gov.bc.ca/clad/strategic_land/econ_analysis/projects_pubs/cabinet/SEEA_guidelines.pdf)

Integrated Land Management Bureau (ILMB) and Figure 1.2 showing the change in areas at different constraint levels for forestry for the LRMP, (b), compared to the Base Case, (a)).

- The combined effect of size and constraint level between LRMP and Base Case on the likely fortunes of the sector and activity through time are analyzed.
  - In particular, care is taken to differentiate the likely effects of the Plan (e.g., more backcountry recreation user-days due to the cessation of logging in larger protected areas) from other factors likely to be changing in parallel and independently of the Plan (e.g., a reduced Cdn\$ lowering the cost of Canada as a travel destination and increasing Base Case visitor numbers).
  - Likely impacts on net economic benefits, income and employment are assessed. This is done quantitatively where the data allow it, but otherwise qualitative comments are provided. Net economic benefits include consideration of both additional market and non-market benefits and costs resulting from the Plan<sup>4</sup>.



**Figure 1.1 Overview of the SEA Methodology Used**

The area statistics and indicator data used extensively in this report were supplied by the ILMB using geographical information systems (GIS) methodologies. Most of the data are shown in Appendix 2. In addition, interest reports showing the ownership and details of various tenures were also obtained from ILMB. They are reported on at specific points in this report but have not been included in their entirety. Most of these data were obtained in September 2007. Since then, there have been some small changes in zone areas and some tenures. Their potential impact has been identified where appropriate and quantified where possible<sup>5</sup>

<sup>4</sup> Non-market benefits include such things as the value derived by public and commercial recreationists who are residents of BC, as a consequence of the LRMP, over and above what they pay in the market to participate in activities in the Plan Area. They also include the benefits of reduced impacts on the environment.

<sup>5</sup> In particular since our data were extracted, an additional Conservancy has been specified (100 Lakes Plateau) and boundary changes have been made to two Conservancies (Upper Soo and Callaghan) and some cultural sites. These have increased the aggregate area of Conservancies by 8.1% and reduced the area of Wildlands by 0.9%, 0.8% in the Recreation sub-class and 0.1% in the Cultural sub-class of Wildlands.

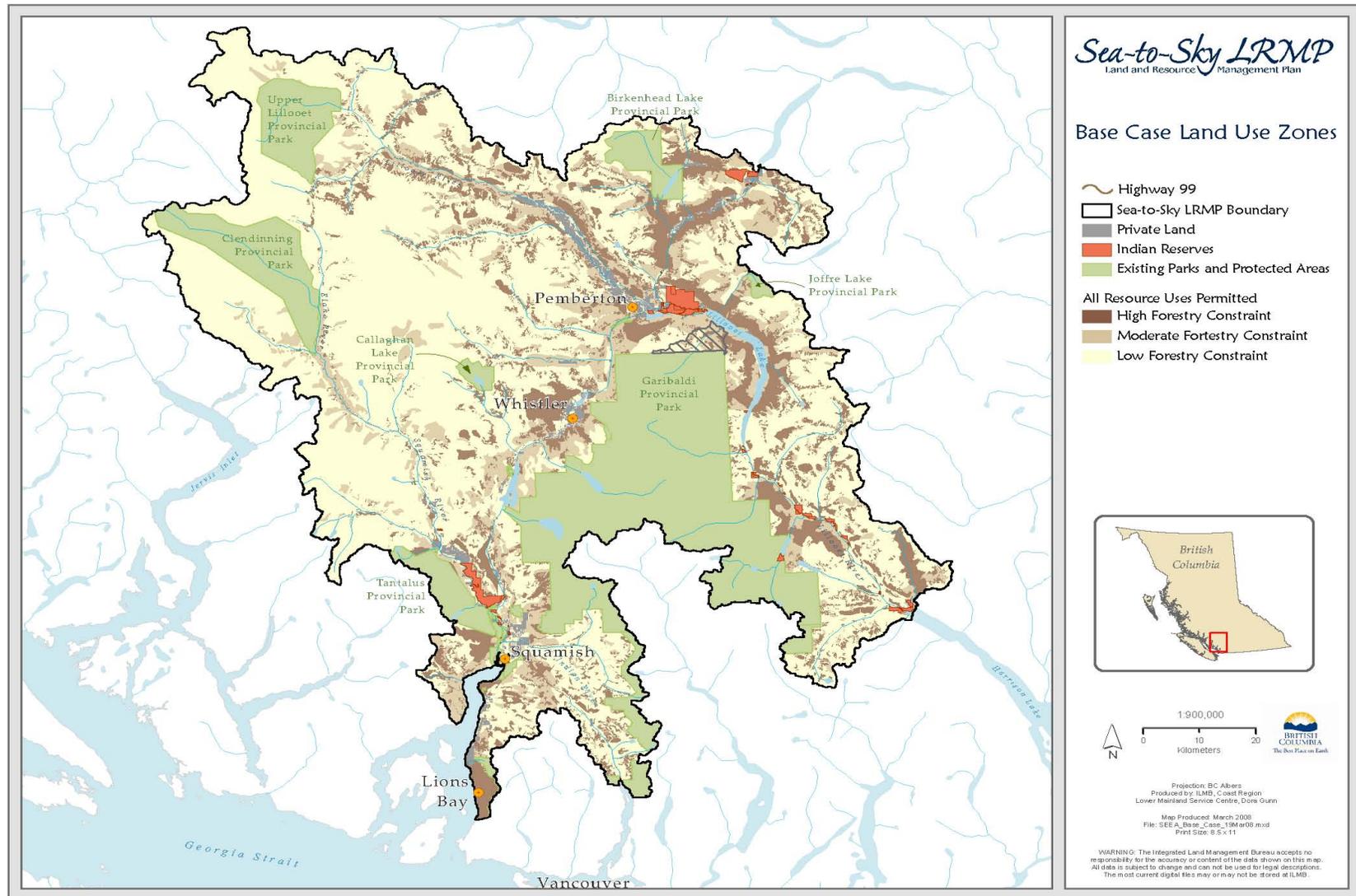


Figure 1.2 Main zones and example levels of constraint for forestry – Base Case

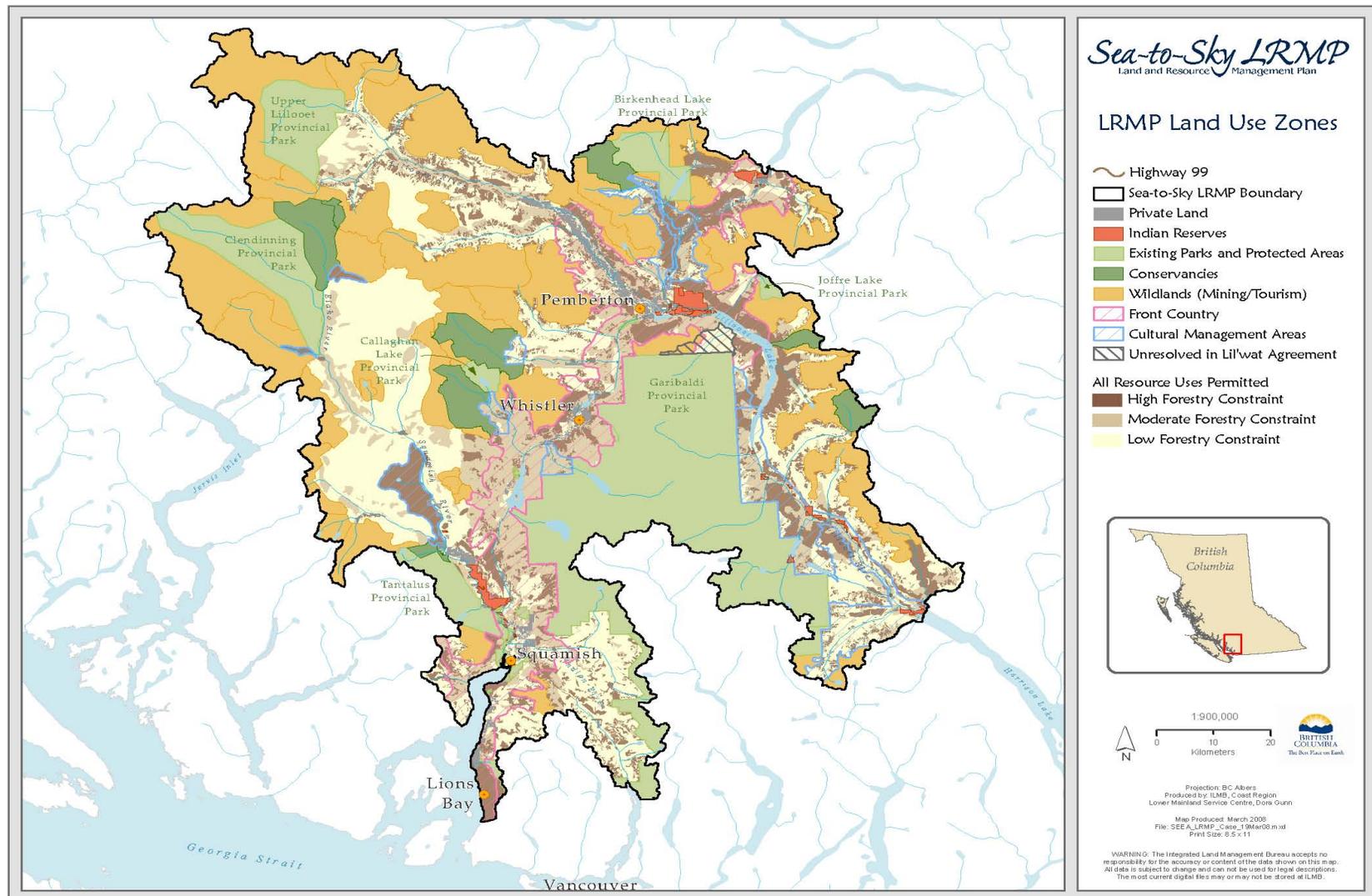


Figure 1.3 Main zones and example levels of constraint for forestry – LRMP

## 1.4 Plan Area Socio-Economic Overview

This section provides a brief socio-economic overview of the Sea-to-Sky Plan Area and is expanded upon in the notes on each sector that are impacted by the LRMP.

The Plan Area population of about 34,000 (2006) is concentrated in the communities of Whistler and Squamish. The population has more than doubled over the last 25 years and continued strong growth is expected.

The area economy has been experiencing a gradual and consistent shift in its job base away from goods producing sectors to service sectors since 1981. The once dominant forest industry has lost many primary and manufacturing jobs over the years, and the closure of its last two major mills since 2001 has virtually eliminated its processing capacity. Tourism has expanded rapidly since 1981 and will likely continue apace as the Olympics approach and the industry develops its four-season products. Construction, film and high-tech are not closely linked to the Crown land base, while mining, agriculture and non-timber forest products are not significant economic contributors at present.

In terms of total community income in the Plan Area, 29% is attributed to tourism, 11% to construction and 10% to forestry (all 2001)<sup>6</sup>. The public sector is also a major contributor to community income. Households in the region are fairly well off, with average family incomes 9% higher than the provincial average and lower levels of economic dependency (e.g., social assistance and employment insurance rates).

Growth within the Plan Area and in adjacent areas such as the Greater Vancouver Regional District (GVRD) is creating new pressures on local government to maintain service levels and preserve the quality of life that residents have come to expect. With significant investments in new developments on the books and record levels of tenures being issued for more and more uses of Crown land, the regional district, member communities and the provincial government will have an increasing challenge building a consistent and coherent relationship between regional growth strategies and Crown land use and management.

---

<sup>6</sup> BC Stats, January 2004.

## 2 ECONOMIC DEVELOPMENT

---

### 2.1 Forestry

**Table 2.1 Summary of Conclusions (Decade 1)**

	<b>Current Conditions</b>	<b>Base Case</b>	<b>LRMP</b>
Timber Supply Available (m <sup>3</sup> )	753,500	740,700	652,957
Timber Harvest Forecast (m <sup>3</sup> )	574,993	587,095	542,661
Related Employment (PY)			
- Direct	677	691	639
- Indirect & Induced	832	850	786
Related Stumpage (\$mil/year)	\$6.60	\$5.20	\$4.80

#### 2.1.1 Forestry Overview

In 2001, the forest industry accounted for 10% of the employment (1,608 jobs) and 12% of the income (\$73.7 million) in the LRMP area<sup>7</sup>. Its present contribution is smaller as several major mills have closed since then. The area is unique compared to other rural areas in the province in that the forest sector represents a smaller proportion of the local economy than tourism (43% of jobs). Forestry comprises a significant portion of the economy in Squamish and rural areas, but a low proportion in Pemberton, Whistler and Lions Bay.

The LRMP is expected to have both positive and negative effects on the forest sector. The negative effects will result from the introduction of no-harvest zones such as Conservancies and Wildlands. This will have consequential effects on timber supply, employment and income levels. Positive effects should result from reduced conflicts and increased certainty for licensees that they will be able to fully utilize their tenures.

Nevertheless, as illustrated in Figure 2.1, there are many factors influencing the overall performance of the forest industry that are external to the Plan. The section begins with a consideration of these non-Plan factors as part of defining a Base Case scenario. This then provides the appropriate context for estimating the LRMP's socio-economic implications.

#### 2.1.2 Forestry Base Case

There are two forest management units in the Plan Area, the Soo Timber Supply Area (TSA) 31 and the Squamish Tree Farm Licence (TFL) 38. The Chief Forester reviews and sets an allowable annual cut (AAC) for each management unit at approximately five-year intervals. The collective AAC of the two management units in the Plan Area is 753,500 m<sup>3</sup>; 503,000 m<sup>3</sup> for TSA 31, to be reviewed next in 2010, and 250,500 m<sup>3</sup> for TFL 38, next scheduled for review in 2012. The apportionment of these AACs between different types of tenures is summarized in Table 2.2. Multiple licence holders in the TSA hold volume-based licences, which are not formally tied to a land base, and any increase or decrease in AAC is apportioned among the licensees. By contrast, each TFL licensee holder operates on a defined land base and is fully affected by changes in AAC.

---

<sup>7</sup> BC Stats, January 2004.

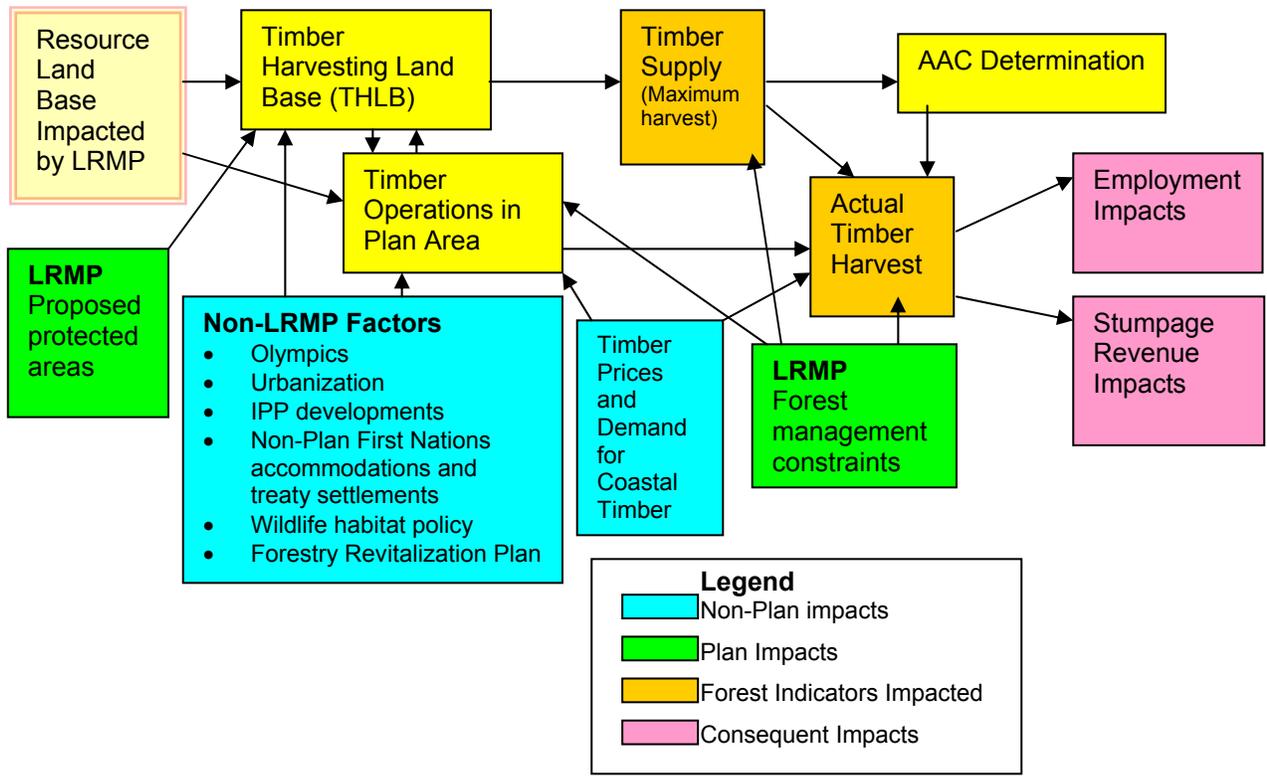


Figure 2.1 Interaction of LRMP and Other Factors on the Forest Sector

Table 2.2 Apportionment of AAC

	TSA 31	TFL 38
AAC for Management Unit	503,000	250,500
Replaceable Forest Licences	241,579	109,453
Non-Replaceable Forest Licences	93,771	98,823
BCTS Timber Sale Licence	105,197	42,224
Timber Sale Licences (< 1000 m3)	19,076	
Community Forestry Agreement	30,000	
Woodlot Licence	12,862	
Forest Service Reserve	515	

Source: Ministry of Forests and Range Apportionment System.

The licence holders and the corresponding volume for most licence categories are summarized in Table 2.3. The largest single holder of Crown tenures in the Plan Area is Northwest Squamish Forestry Ltd. (the Squamish First Nation), which holds a total of 235,241 m<sup>3</sup> in the TSA and TFL, or 31% of the total AAC. The remaining Crown quota is held in mostly small volume licences (i.e., 15,000 to 60,000 m<sup>3</sup>) by a number of companies. Licence holdings have changed markedly in recent years with implementation of the Forestry Revitalization Plan (FRP) and commitments to Forest and Range Agreements with First Nations. The largest quota holder prior to the FRP, International Forest Products Ltd., has exited the Plan Area entirely, as has Canadian Forest Products and Western Forest Products. Their quota was purchased or reallocated to BC Timber Sales, community forests, woodlots and First Nations through the Forest and Range Agreements. First Nations now hold licences to 49% of the total AAC. The resulting fragmentation of forest licences in the Soo TSA is causing significant management challenges

for Ministry of Forests and Range (MoFR) and cost pressures for licensees. It is also producing strong pressures for licence rationalization and consolidation.

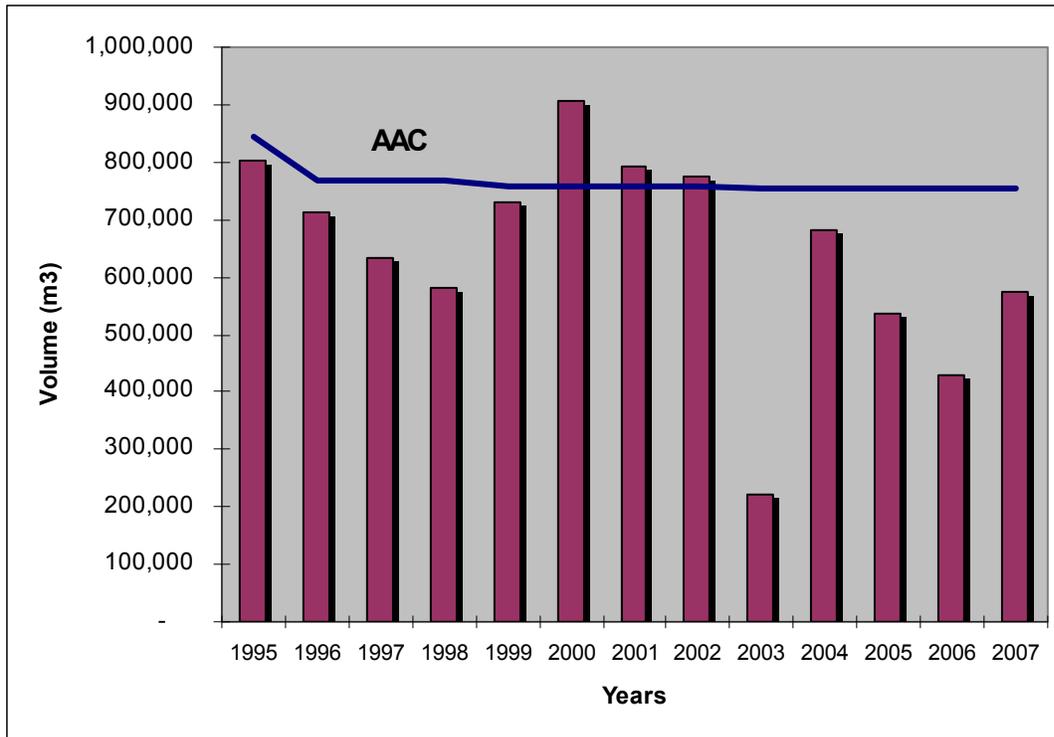
As a consequence of the overall rationalization of the coastal forest sector in recent years and the Plan Area impacts of the FRP, two major mills have permanently closed recently – Interfor's Squamish sawmill (2004) and Doman-Western's Woodfibre pulp mill (2006). According to MoFR, in 2005 there was one small sawmill operating in Brackendale, a log home mill at Whistler and a small pole operation in Pemberton. Almost all the Plan Area timber harvest is processed outside the area (MoFR, 2006).

**Table 2.3 Commitments of Crown Timber**

<b>Tenure Type and Licensee</b>	<b>Soo TSA 31</b>	<b>Squamish TFL 38</b>
BC Timber Sales	105,197	42,224
Other	50,433	
<b><i>Replaceable Tenures</i></b>		
Northwest Squamish Forestry Ltd.		109,453
Northwest Squamish Forestry Ltd. and In-SHUCK-ch Development Corporation <sup>1</sup>	88,297	
Squamish Mills Ltd.; Western Forest Products	37,620	
Terminal Forest Products Ltd.	59,780	
Halray Logging; Western Forest Products	18,004	
C.R.B. Logging	19,626	
Richmond Plywood Corporation Ltd.	18,252	
<b><i>Non-Replaceable Tenures</i></b> <sup>3</sup>		
Northwest Squamish Forestry Ltd.		98,823
Richmond Plywood Corporation Ltd. <sup>2</sup>	13,500	
In-SHUCK-ch Forestry Ltd. Partner	19,248	
Creekside Resources Inc.	54,500	
Black Mount Logging Inc.	1,295	
Halray Logging Ltd.	8,048	
LeBlanc	5,600	
Other	3,600	
<b>Total Commitments</b>	<b>503,000</b>	<b>250,500</b>

**Source:** Ministry of Forests and Range Apportionment System and Andre Germain, *pers. comm*, March 2008.

**Notes:** **1.** These First Nations have entered into a partnership with the Lil'wat First Nation and have applied for this licence to be split into three licences: NW Squamish with a cut of 26,965 m<sup>3</sup>, In-SHUCK-ch with a cut of 45,548 m<sup>3</sup> and Lil'wat with a cut of 15,784 m<sup>3</sup>. **2.** Licence and volume to be eliminated in 2008. **3.** Agreements for the issue of non-replaceable forest licences have been signed with the N'Quatqua (8,361 m<sup>3</sup>) and T'sleil Waututh (11,639 m<sup>3</sup>), but licences have not yet been issued.



**Figure 2.2 Squamish District Harvest Volumes and AAC, 1995-2007**

As shown above in Figure 2.2, timber harvests in the Plan Area have averaged 644,500 m<sup>3</sup> over the last decade (1995-2007), about 85% of the AAC. Contributing factors to this undercutting during the period have included low timber and pulp prices, high production costs, changes in forestry legislation and policy, company-specific issues and land-base issues. The latter included strong opposition by environmental groups and First Nations to logging in areas such as the Elaho. The aggregate harvest in 2003 was very depressed and has rebounded from that low point. The average harvest in the most recent three years was 513,372 m<sup>3</sup>, or 68% of the available volume. The harvest volume in 2007 was some 575,000 m<sup>3</sup>. The average Vancouver log market price over the period was \$100 per cubic metre.<sup>8</sup>

In order to identify the implications of the LRMP to the forest sector, a benchmark is needed for measuring change. For the forest sector, the benchmark is the forecasted future timber harvest volume in the absence of the LRMP. From this harvest forecast, economic indicators such as employment level, income and stumpage revenue can be derived as outlined in Figure 2.1. The forecast provides an indication of the direction and magnitude of production over the next two decades, based on past performance and discussions with industry and government officials.

The approach used here for deriving the harvest forecast is to first determine the potential timber volume available (similar to an AAC), and then make adjustments for other factors that may impact the harvest decision. The steps are summarized in the following paragraphs.

<sup>8</sup> See Appendix 1 for table of the harvest volumes and prices for the period 1995-2007.

The flow of timber volume available from the Plan Area’s forests depends on physical characteristics, such as the extent of the land base, the state of the forest industry, net growth rates and the like. The forecast is also dependent on the following policy rules that MoFR applies when conducting timber supply analyses for the Chief Forester:

- maintain the short-term harvest as long as possible;
- limit step-downs to 10 percent per decade;
- do not fall below the long-term level; and
- ensure that growing stock stabilizes in the long-term.

The technical timber supply analysis was undertaken by Timberline Forest Inventory Consultants in March 2007 (Timberline, 2008) using the most up-to-date data sets available on forest inventory, land net down and timber harvesting constraints.

Table 2.4 corresponds to the present timber harvesting land base and forest management prescriptions. Conceptually, it is equivalent to the AAC. Note that the forecast is not the current AAC volume, because TFL 38’s timber supply is expected to step down in the near term from its current 250,500 m<sup>3</sup>/yr to 217,200 in decade 2. The timber supply volume for the TSA can be maintained at its current AAC volume through decade 6 before stepping down.

**Table 2.4 Derivation of the Base Case Timber Harvest Forecast (‘000 m<sup>3</sup>)**

<b>Forecast</b>	<b>Decade 1</b>	<b>Decade 2</b>	<b>Decade 7 to 25</b>
Base Case Timber Supply	741	720	630
Deduction for expected land-base removals	50	50	50
“Adjusted Base Case” timber supply	691	670	580
Deduction for market and other factors	104	101	87
Forecast of average timber harvest	587	570	493

**Source:** Timber supply is from Timberline (January 2008). Subsequent adjustments were made by consultants working with Ministry of Agriculture and Lands/ILMB, MoFR and industry representatives.

An expressed concern by the forest industry and MoFR managers in the Plan Area is that there are a number of development proposals and wildlife policy issues that are anticipated with a high degree of certainty. These will reduce the timber harvesting land base (THLB) and/or timber supply, but their occurrence will not be affected by the LRMP. Thus it is unrealistic to assume that the current THLB will remain available for harvesting over the forecast period in the absence of the LRMP. Examples of developments that will reduce the THLB include new facility and infrastructure associated with the 2010 Olympic and Paralympic Winter Games, a number of large resort and residential developments, and new small hydroelectric projects that are moving toward completion. In addition, increasing constraints on timber harvesting may be anticipated to meet wildlife objectives and in response to increased urbanization (e.g., higher visual quality objectives). These issues are summarized in Figure 2.1. Most of these pressures and the THLB impacts apply to the Soo TSA only. There was consensus among forest industry and district MoFR persons about the downward pressure on the land base, but opinions varied as to the timing and scale of the impact. A loss of some 12,500 hectares of THLB was taken to be a reasonable short-run estimate by those interviewed (about a 7% reduction in the THLB). This is shown as land-base removal in Table 2.3 and we have conservatively assumed this level of reduction will remain at 50,000 m<sup>3</sup> per annum in the long term. In time, as the impacts of these changes become clear, it can be expected that the AAC will be reduced, and we have thus indicated an “adjusted Base Case” timber supply.

A treaty settlement with the In-SHUCK-ch First Nation is anticipated during the forecast period. The impact on timber harvest volume at the Plan Area level is not certain, as it will become a matter for the In-SHUCK-ch to decide the rate and manner in which they harvest timber from their lands. For the purposes of this forecast, it is assumed that the In-SHUCK-ch would continue to manage their forest lands similar to MoFR.

While there is substantial variation in the observed total harvest volume year to year, the question is whether there is evidence to suggest that the relationship between timber supply (potential harvest) and average harvest volume over the next two decades will be different than that observed over the past decade.

As noted above, over the past 12 years, the actual harvest volume has averaged about 85% of the allowable volume. Forest sector representatives suggested that much of this under-cut can be explained by market factors, including the loss of Asian market for hemlock-balsam, periods of low lumber and pulp prices, increasing costs, fragmentation of licences, loss of local mills and the softwood lumber trade dispute with the US. While logic and empirical evidence clearly indicate that a higher percentage of AAC will be logged at higher log prices, given the current uncertainty in markets and variability in forecasts, we see no reason to adopt a forecast of future coastal log prices any different from that of the past decade.

A number of non-market factors were also cited by industry representatives as depressing harvest levels including a “loss of social licence” making some areas inaccessible; spreading urbanization and resulting increases in demands for protection of viewsapes; and, finally, conflicts on the land base with First Nations and environmental interests. Most of these comments apply to the Soo TSA. Ownership of TFL 38 by the Squamish First Nation is likely to reduce conflicts on the land base in that tenure area and could increase THLB utilization. On balance, we anticipate that urbanization will be the major Base Case factor, that the resulting land-based withdrawals will be reflected in AAC determinations (albeit with some lag) and that the ratio of non-land base to land-base factors will probably stay relatively constant. Consequently, we have assumed that actual harvests will continue to average about 85% of the maximum available after adjusting the maximum for the land-base withdrawals. In the first decade then, the harvest is expected to average about 590,000 cubic metres, declining moderately to 570,000 cubic metres in the second decade due to reduction in timber supply. It is noted that these values are within the variation actually experienced by the sector in recent years. There is a downside risk for the sector that there will be a significant loss of scale economies in individual cut-blocks and valleys and possibly over the whole of the Soo TSA. There is also an upside chance of better market and cost conditions through factors such as greater demand for coastal timbers, more specialised niche markets, technological change in harvesting and milling aided by innovations in tenure allocation and other forest policy changes.

While the land base and market factors are mostly independent of the LRMP, they are to a degree additive to the LRMP. That is, the industry — with the LRMP — will be subject to the cumulative changes, not just the effect attributable to the LRMP compared to “current conditions”. This is important in considering the social and economic implications. Another reason for recognizing cumulative effects is to address whether a threshold might be crossed that could give rise to socio-economic impacts that would otherwise not be recognized.

### **2.1.3 Forest Sector Implications of LRMP**

The LRMP is expected to have both positive and negative effects on the forest industry.

Positive implications include some greater certainty and social licence on the land base available to the industry, support for product certification initiatives, and improved communication with community stakeholder groups and First Nations. These positive aspects are mostly related to improvements in process and relationships, which are not easily quantified. Their value is assessed by judgmentally reducing the constraining influence of the “Market and Other Factors” used to project the future timber harvest.

The detrimental effects of the LRMP on the forest sector will be felt in terms of a reduced land base and the consequential effect on timber supply. There might also be some minor impacts on costs.

Table 2.5 shows the size of the different LRMP zones both in terms of their gross area and the THLB they contain. On the land base available for commercial timber harvesting, varying levels of management constraints may be applied to maintain certain non-timber values. The zones are characterized as high constraint, moderate constraint and integrated forest management.

**Table 2.5 Sea-to-Sky LRMP Zones and Their Impact on Forestry**

	% of Plan Area (1,062,333 ha.)		% of THLB (141,825 ha.1)	
	Base Case	LRMP	Base Case	LRMP
<b>S2S LRMP</b>				
<b>Harvest Exclusions:</b>				
Existing Protected Areas	21.8%	21.8%	n.a.	n.a.
Conservancies (proposed protected areas)		3.9%		4.6%
Wildlands (no timber harvest)		28.3%		1.9%
Sub-total	21.8%	54.0%	0.0%	6.5%
<b>All Resource Uses Permitted – Area specific management</b>				
High constraint	14.0%	12.1%	9.4%	11.1%
Moderate constraint	11.8%	12.1%	22.6%	30.1%
Low constraint	52.3%	21.7%	67.9%	52.4%

**Source:** GIS data supplied by ILMB at Sept. 17, 2007. (See Appendix 2).

The THLB is defined by MoFR as “forested land that is available, and commercially viable to harvest given current technology and contemporary market conditions”<sup>9</sup>. In the Base Case, 13% of the Plan Area meets this criteria. While the LRMP more than doubles the land base in “no harvest” management zones, most of this is in high elevation Wildlands with little or no THLB. The THLB is reduced to 12% of the Plan Area or 94% of the Base Case THLB. On the open land base, the LRMP generally increases the quantum of THLB in the higher constraint categories.

<sup>9</sup> MoFR, July 2007. In any planning area there is always some uncertainty surrounding both the size and the location of the THLB, generally of the order of +/-10%. THLB is generally defined for favourable market conditions and the operable area will tend to be lower than the THLB in lower price and higher cost years. In relation to location in the S2S Plan Area Timberline has estimated that between 30% to 50% of recent and planned logging has been in the so-called non-contributing forest — generally of lower quality but in readily accessible areas (E. Wang, unpublished report to the S2S Technical Advisory Committee (March 2006)). More recently MOFR has estimated that since 1999 in the Soo TSA, only 11% has been in the non-contributing, 14% has been in designated heli-logging THLB and the balance in the conventional THLB (Hal MacLean, *pers..comm.*, April, 2008). So the THLB may be somewhat higher than the above figures indicate or it may just be in different locations.

The Plan's proposed THLB and timber management rules were modeled by Timberline using the corresponding rules and assumptions adopted for the Base Case timber supply forecast discussed earlier. The results are summarized in Table 2.6 as the "LRMP Timber Supply". Relative to the Base Case value, the LRMP reduces the potential timber supply available by about 12%. The timber supply of TSA 31 is reduced by about 7%, and that of TFL 38 by about 24%.

**Table 2.6 Derivation of the LRMP Timber Harvest Forecast ('000 m<sup>3</sup>)**

<b>Forecast</b>	<b>Decade 1</b>	<b>Decade 2</b>	<b>Decade 7 to 25</b>
LRMP Timber Supply	653	604	563
Deduction for expected land-base removals	50	50	50
"Adjusted LRMP" timber supply	603	554	513
Deduction for market and other factors	60	55	52
Forecast of average timber harvest	543	499	461

**Note:** Timber supply is from Timberline (January 2008). Subsequent adjustments were made by consultants working with MAL/ILMB, MoFR and industry representatives.

Timberline's LRMP timber supply was then adjusted by the same non-Plan factors as discussed under the Base Case to take account of the land-base reductions that are anticipated but not reflected in the timber supply analysis. Most of the land likely to be removed from the THLB is in the front-country zone and its area is not expected to be affected by the LRMP. Hence the same volume reduction of 50,000 m<sup>3</sup>/yr has been applied as for the Base Case forecast.

The final step is to account for the market and other factors that historically have constrained the average harvest volume to less than the maximum available. In the Base Case, this included a diverse number of causes, such as a loss of markets, low product prices, government policy, loss of social licence, conflicts with other stakeholders, etc. The average under-cut of 15% recorded over the past 12 years was attributed collectively to these other factors, and reduced the timber supply after adjusting for the reduced land base. In the case of the LRMP, all of the external factors will continue to affect the industry, but the LRMP is expected to ameliorate some of these. In particular, the matters giving rise to the land-use conflicts have been addressed by the Plan<sup>10</sup>. This is expected to give greater certainty on the land base, facilitate forest planning, improve the social licence to operate, support forest certification initiatives and the like. Intuitively, the resolution of these matters removes detrimental influences and should result in a reduction of the average under-cut as compared to the Base Case. How substantial the reduction might be is open to interpretation. Based on discussions with industry and MoFR personnel, a continuing under-cut of 10% given the LRMP is probably a reasonable magnitude. This factor was applied to the timber supply after adjusting for the reduced land base to derive the LRMP timber harvest forecast presented in

It is not anticipated that the Plan will have a significant effect on forestry operational costs. Most Conservancies and Wildlands have been located to minimize cost as well as volume implications to forestry operations. Cultural management areas and sites will have some impact but overall, industry representatives did not expect this to be significant. There is a downside

<sup>10</sup> As pointed out earlier, some conflicts with First Nations, particularly in TFL 38, have been addressed to some extent by the sale of the TFL to the Squamish First Nation and the issuing of non-replaceable forest licences to the Squamish and other First Nations in the Soo TSA 31. These are effects outside the LRMP. However, conflicts with environmental groups and many First Nations groups regarding the protection of areas of wildlife, cultural and recreational interest that have impacted logging in the past have been directly addressed by the LRMP and are expected to be reduced by the Plan.

risk expressed by some MOFR representatives that the LRMP will exacerbate an overall loss of scale economies that is seen as the likely result of other Base Case factors.

## 2.1.4 Socio-Economic Implications of the LRMP

The socio-economic implications of the LRMP relate to employment, incomes and direct government revenue. The coefficients for employment are from a recent mill survey with adjustments for subsequent mill closures. Fixed employment and income coefficients are used and hence the change in socio-economic indicators is proportional to the change in timber harvest forecast discussed earlier.

**Table 2.7 Provincial Implications**

	2007 Conditions	Decade 1		Decade 2	
		Base Case	LRMP	Base Case	LRMP
Timber Supply Available (m <sup>3</sup> )	753,500	740,700	652,957	720,200	604,357
“Adjusted Timber Supply” (m <sup>3</sup> )		690,700	602,957	670,200	554,357
Timber Harvest Forecast (m <sup>3</sup> )	574,993	587,095	542,661	569,670	498,921
Related Employment (PY’s)					
Direct Harvesting	329	336	311	326	286
Wood Processing	246	251	232	244	214
Pulp and Paper	101	103	96	100	88
Total Direct	677	691	639	671	587
Indirect & Induced	832	850	786	825	722
Employment Total	1,509	1,541	1,424	1,495	1,310
Before-Tax Employment Income (\$mil. / year)	\$ 62.24	\$ 63.55	\$ 58.74	\$ 61.66	\$ 54.00
Related Stumpage (\$mil/year)	\$ 6.6	\$ 5.2	\$ 4.8	\$ 5.0	\$ 4.4
Stumpage Rate (\$/m <sup>3</sup> )	\$ 11.46	\$ 8.80	\$ 8.80	\$ 8.80	\$ 8.80

**Notes:** 2005 figures show “current conditions”. Direct employment estimates are based on Sea-to-Sky survey by Pierce Lefebvre Consulting (2006). Indirect/induced employment is based on multipliers from BC Stats (2005). Employment income is before-tax.

The table above shows BC-wide employment levels that would be associated with the forecast timber harvest levels. About 80% of the current harvesting employment is in the Sea-to-Sky area, including Squamish (40%), Pemberton (8%) and other Sea-to-Sky communities (29%). Harvesting jobs are also on north Vancouver Island (5%), Campbell River (8%) and the Lower Mainland (10%). Almost all the wood processing and pulp/paper employment is *outside* the Sea-to-Sky area, mostly on the south coast. The employment implications of the LRMP are assumed to be distributed among communities in the same proportions.

Relative to the Base Case, the LRMP would reduce forest sector employment in the first decade by an average of 120 person-years. Most of this impact would occur outside of the Plan Area.

The average stumpage rate in 2007 was \$11.46. For the purposes of forecasting future stumpage rate, the actual weighted average value over the past five years was adopted, or \$8.80/m<sup>3</sup>. Relative to the Base Case, the estimated provincial stumpage revenues would be reduced by \$0.4 million/year under the LRMP.

With or without the LRMP, there will continue to be significant sector adjustment and the end result will depend on economic factors and industry and government responses.

## 2.2 Tourism and Recreation

**Table 2.8 Summary of Conclusions**

	<b>Base Case (Current Conditions)</b>	<b>LRMP</b>
Front-Country Tourism	<ul style="list-style-type: none"> <li>• 12% of provincial tourism GDP.</li> <li>• Total visitor spending of close to \$1 billion.</li> <li>• Room revenues of \$177 million in 2007.</li> <li>• Employment income \$179.2 million.</li> <li>• 7,000 direct and indirect jobs, 11% of BC employment in the sector.</li> <li>• 2010 Olympics will increase infrastructure, marketability, employment and income.</li> </ul>	<ul style="list-style-type: none"> <li>• Minor incremental benefits for front-country tourism concentrated in Sea-to-Sky corridor, primarily through visual landscape management and the establishment of new front-country zones.</li> </ul>
Backcountry Tourism	<ul style="list-style-type: none"> <li>• 22 licensed commercial operators (not including downhill skiing, communities and educational institutions).</li> <li>• 300 businesses directly involved and many more dependent on visitor spending.</li> <li>• Tenures cover roughly half the Plan Area land base.</li> <li>• Visitor spending of between \$30 and \$60 million annually.</li> <li>• Increasing frequency and intensity of motorized and non-motorized user conflicts.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall, adventure tourism will see more constraints on a larger proportion of the total Plan Area than is currently the case, but existing tenures and user-days are not expected to be affected.</li> <li>• New Conservancies are not expected to affect visitor activity significantly.</li> <li>• Visitor experience in the backcountry should improve due to Wildlands areas.</li> <li>• Visitor numbers, spending and related measures are anticipated to increase, although scale is unknown.</li> </ul>
Public Recreation	<ul style="list-style-type: none"> <li>• The most heavily-recreated area of the province, with a complete range of recreation activities.</li> <li>• Approximately 2.5 million day-use visits in parks alone (2002).</li> <li>• Approximately 350 kilometres of trails.</li> <li>• Increasing frequency and intensity of motorized and non-motorized user conflicts.</li> <li>• Continued growth expected though at lower than historical rates.</li> <li>• The aging demographic will increase demand for softer adventures requiring low levels of physical activity.</li> </ul>	<ul style="list-style-type: none"> <li>• 12% of the Plan Area land base will be managed specifically for recreation emphasis. When this is considered in conjunction with other Wildlands areas, new Conservancies, existing parks and visual quality management, public recreation will be a significant beneficiary of the Plan.</li> <li>• An increase is anticipated in user-days and economic values, although size of increase is unknown.</li> </ul>

## 2.2.1 Tourism and Recreation Definitions

A tourist is defined by Statistics Canada, and understood internationally, as a person who travels to, or stays at, a place outside his/her usual environment for a period of no more than a year.<sup>11</sup> It includes both “same-day” tourists and “overnight” (i.e., multi-day) tourists. The balance of people participating in recreational activities are residents of the Plan Area.<sup>12</sup> While these are the definitions on which much of the public statistical data are based, they refer to the types of users and their place of residence. By contrast, the concepts of commercial and public (or non-commercial) recreation refer to the types and organization of activities being undertaken and are more relevant for discussing the impacts of the LRMP. The relationship between these definitions is set out schematically in Table 2.9

**Table 2.9 Relationship of Tourists and Residents to Commercial and Non-Commercial Recreation and their Importance in the Sea-to-Sky**

	Commercial Recreation (CR)		Public (Non-commercial) Recreation	
	Front-country	Backcountry	Front-country	Backcountry
<b>Tourists</b>	*****	**	****	*****
<b>Residents</b>	**	m	**	***

**Notes.** The number of stars indicate a guess at the order of magnitude of the user-days of recreation activity in each category in the Plan Area. m = minor.

Commercial recreation is defined in this document as any outdoor recreational activity provided on a fee-for-service basis, with a focus on experiences associated with the natural environment. While it is principally a provincial government term applied to tenuring of Crown land, by this definition it could also include downhill skiing or golf. Commercial recreation has two components: guided recreation, also known as adventure tourism, and unguided recreation such as lodges, resorts and ski-lift operations. Tourism and commercial recreation are not synonymous because there are many residents of the GVRD and other provincial locations who Statistics Canada classifies as tourists but who engage in public recreation. In this report, when we refer to tourism, it relates to commercial recreation (including that undertaken by both tourists and residents).

In discussing recreation we will focus on the public or non-commercial part of it; that is recreation activities that are undertaken by individuals or groups, in a voluntary, non-profit capacity. For the most part, non-commercial recreation is unorganized, unguided and most participants are not associated with any organization.<sup>13</sup> We will include in this discussion tourists who are self-guided and equipped. Most GVRD tourists are likely to be in this category, at least in utilizing Crown land.

<sup>11</sup> BC Stats, January 2008.

<sup>12</sup> The World Tourism Organization uses a travel distance from home of 40 kilometres to distinguish tourists from residents. Residents comprise full time, seasonal and temporary residents, including Lower Mainland residents with second homes in the Plan Area.

<sup>13</sup> A number of types of clubs and educational bodies hold commercial outdoor recreation tenures or community and institutional tenures issued under the *Land Act* or partnership agreements to manage established recreational sites and trails under the *Forest and Range Practices Act*. These tenures provide access to exclusive use of Crown lands (e.g., for the purposes of a cabin or for research or instructional purposes), but these activities are not undertaken for profit.

The table also contains a qualitative, guesstimated indication of the relative size of user-days of people in each of the categories — these are the stars for each category<sup>14</sup>. For the purposes of assessing net economic benefits and economic impacts on the province as a whole and on the Plan Area, we are interested in being able to distinguish between tourists and Plan Area residents and also between international, inter-provincial and BC resident tourists. It is important to point out that our understanding of the volume and behavioural characteristics of any of these groups is quite limited. As a consequence, we are required to refer to proxy indicators and measures (e.g., room revenues, park visitation). While these provide valuable trend information, they do not allow us to accurately value overall tourism or recreation activity. While the data are inadequate to arrive at a comprehensive overview of user-day numbers of all types, the following tourism and recreation overview sections provide an assessment of some numbers.

We expect the LRMP to have its greatest impacts on tourism and recreation through backcountry activities, at least on a per-visitor basis. The LRMP will have impacts in the front-country through management of visual quality, and this will be valuable by dint of the magnitude of the numbers of tourists visiting the front-country.

### **2.2.2 Tourism Overview and Base Case**

Tourism in the Plan Area is not only a major contributor to the Plan Area's economy but also to that of the province. In 2003, the Plan Area was responsible for about 12% of provincial tourism GDP, or \$680 million,<sup>15</sup> and supported 12,500 jobs, around 11% of all BC tourism employment. However, many of these jobs are seasonal and held by residents from outside the Sea-to-Sky LRMP area.

Inside the Plan Area, tourism and recreation is the largest single sector in the local economy. In 2001, tourism and recreation accounted for 43% of the local employment and 28% of the before-tax individual income. This represented a total of 6,931 local jobs and included before-tax income to local residents of \$179.2 million.

The Sea-to-Sky tourism sector is driven by a combination of natural recreational amenities (e.g., terrain, climate, water bodies, forests, etc.) and man-made ones (ski hills, restaurants, hotels, golf courses, etc.). The man-made amenities exist in large part to complement the natural attributes of the area.

The Plan Area is the only LRMP area in the province where tourism directly or indirectly employs more local residents (6,931) and generates more income for its residents (\$179.2 million, pre-tax) than any other sector, as of 2001. An estimated 53% of the Plan Area's tourism workers live in Whistler, 34% reside in Squamish and 8% are in Pemberton. According to BC Stats' economic dependency database, tourism jobs in the LRMP area pay on average \$25,855 per annum, higher than tourism wages in most other areas of the province. At the same time, the tourism sector has been growing rapidly at the local level. In 1996, tourism income was \$105.4 million (23% of the total), but by 2001 this had risen to \$179.2 million (29% of the total), a 70% increase.

---

<sup>14</sup> The data are inadequate to arrive at a comprehensive overview of user-days of all types.

<sup>15</sup> Unpublished analysis by Garry Horne for the Ministry of Economic Development, June 2005. Note that Gross Domestic Product (GDP) statistics are not kept at the regional level, so this must be considered to be a rough estimate.

In 2006, the Squamish-Lillooet Regional District (SLRD) generated total room revenues of \$177 million, 9.7% of total provincial room revenues of \$1.8 billion. Whistler accounted for \$169 million or 95% of the SLRD total. Inferred total visitor spending was roughly \$1 billion in 2006.<sup>16</sup> After two decades of sustained growth, the number of properties, rooms and total room revenues in the SLRD has levelled off since their peak in 2002.

The tourism industry in the area is made up of diverse business types, from international resort operations to numerous independent, small business operators, including accommodation facilities, commercial outdoor recreation operators, and businesses in the retail, service and transportation sectors. The last comprehensive inventory of existing use in the region showed approximately 286 businesses engaged in tourism operations, evenly split between accommodation facilities and commercial recreation operators.<sup>17</sup> The study identified 102 tourism operators offering outdoor experiences.

**Table 2.10 Licensed Commercial Recreation Operators in the LRMP Area**

Tenure Sub-purpose	Number of Licences	Number of Licensees	Tenure Area		
			Total (ha)	In Plan Area (ha)	Percent of Total in Plan Area
Cat Skiing	2	2	7,365	3,111	42%
Guided Freshwater Recreation	4	2	3,968	2,991	75%
Guided Mountaineering/Rock Climbing	1	1	57,175	39,329	69%
Guided Nature Viewing	3	3	1,983	289	15%
Heli-hiking	3	3	27,164	17,638	65%
Heli-skiing	8	4	579,313	373,945	65%
Multiple Use	6	6	494,176	52,598	11%
Nordic Skiing	2	2	6,352	6,352	100%
Snowmobiling/ATV	6	6	29,149	29,149	100%
Community Outdoor Recreation	4	3	59	58	99%
Miscellaneous	4	3	9	9	100%
Total	43	30 <sup>1</sup>	1,206,713	525,469 <sup>2</sup>	
Total (less community and institutional licensees)	33	22			

**Notes:**

1. Licensees may hold more than one licence and for more than one activity so therefore the total is less than sum.
2. Tenure areas of different sub-purposes may overlap so total tenure area shown is greater than the gross land base covered (e.g., Guided mountaineering/rock climbing tenures will overlap with heli-skiing tenures).

**Source:** GIS data supplied by ILMB at Sept 17, 2007. (See Appendix 2).

As seen in Table 2.10, less than one-third of the outdoor operators hold commercial recreation licences to provide guided services on Crown land. As of August 2007, 30 such operators representing 11 guided summer and winter activities were operating in the Plan Area. Major activities and popular locations are heli-skiing<sup>18</sup> (Whistler, Pemberton, Squamish), river rafting and jet boating (on the Elaho, Squamish, Lower Cheakamus, Green, Birkenhead and Lillooet rivers), snowmobiling (around the Hurley and Daisy Lake forest service roads, Pemberton Icefield, Meager, Rutherford, Soo and Callaghan valleys and Metal Dome mountain), horse trail riding (Pemberton Valley, Miller Creek and Tenquille-Owl Lake), and 4X4 tours (Britannia Creek,

<sup>16</sup> Tourism British Columbia (1998), *ibid*.

<sup>17</sup> Clover Point Cartographics, March 31, 2000.

<sup>18</sup> Indicated are the business office locations in the Plan Area, but tenure areas are quite large. One heli-skiing tenure is held by a Vernon-based company.

Meager Creek and Callaghan Valley). ATV tours, hiking, mountain bike tours, ski touring, guided mountaineering, cat skiing, showshoeing, paintball, ziplining and dog sledding are also undertaken. When community and education institution tenures are excluded, 22 operators are engaged in providing guided commercial recreation services in the Plan Area.

Commercial recreation operators have different land requirements depending on the activities offered. Heli-skiing and some multiple-use activities such as snowmobiling and ATV'ing require access to large trail networks, while non-motorized activities like nature viewing and Nordic skiing require much less infrastructure and area. The 30 licensees have a total tenure area of 1.2 million hectares. Commercial recreation "extensive use" tenures such as heli-skiing and snowmobiling do not confer exclusive land use to the licensee and therefore often overlap with one another<sup>19</sup>. The land base in the Plan Area covered by commercial recreation interests is almost 368,000 hectares, roughly one-third of the gross land base.

A review of information filed by 15 of the 30 licensees in 2006 showed user-days to be 64,316. Actual client days are higher than this as the information contained no records from operators providing water-based activities or records for a number of heli-ski, ATV, cat skiing and snowmobile guide outfits (Shaw-Maclaren, *pers. comm.*). Supplementary information sources, including company websites, were used to develop the expenditure estimates in Table 2.11. As shown, total user-days are estimated at about 83,500.

**Table 2.11 Estimated Value of Licensed Commercial Recreation Activity in the LRMP Area, 2006**

Activity	Client Days <sup>1</sup>	Daily Gov't Fees <sup>2</sup> (per client)	Total Gov't User Fees	Estimated Range of Visitor Expenditures <sup>3</sup>	
				Low	High
Cat Skiing	1,600	\$4/day	\$6,400	\$640,000	\$800,000
Guided Freshwater Recreation	10,000	\$1/day	10,000	1,500,000	5,000,000
Guided Mountaineering/Rock Climbing	500	\$1/day	500	100,000	250,000
Heli-hiking	700	\$1/day	700	420,000	490,000
Heli-skiing	8,600	\$4/day	34,400	7,740,000	10,320,000
Multiple Use	23,100	\$1/day	23,100	4,620,000	8,085,000
Nordic Skiing	1,400	\$1/day	1,400	350,000	560,000
Snowmobiling/ATV	37,600	\$6/day	225,600	13,160,000	33,840,000
<b>Total</b>	<b>83,500</b>		<b>\$302,100</b>	<b>\$28,530,000</b>	<b>\$59,345,000</b>

**Notes:**

1. Client days for 2006 are based on a review of statutory declarations and assumptions about activity levels for missing or incomplete declarations. A client day is assumed to be eight hours of activity.
2. Daily Fees refer to Annual Rent for Licence of Occupation (extensive) payable to the government by the licensee. It does not include application, annual or other fees as applicable.
3. Visitor expenditures are based on a review of prices for the 2007/08 season and may differ somewhat from 2006 prices. Prices do not factor in discounts that the operator may provide to intermediaries.

**Source:** Ministry of Tourism, Sport and the Arts (MTSA), 2007 and 2008 for client days and user fees. Operator websites for expenditures.

Undocumented tourism activity is also prevalent in the Sea-to-Sky region. It falls into two broad categories:

- Unlicensed commercial recreation activity; and
- Tourists who are either completely self-guided or who guide themselves on activities

<sup>19</sup> In contrast, intensive use tenures, such as leases for snowmobile training areas, do confer exclusive use.

secondary to their principal, guided activity<sup>20</sup>.

There is no reliable estimate of the extent of unlicensed use. A 2003 study suggested that the number of unlicensed operators could exceed licensees (then numbering 25) by as much as four times. (Ministry of Sustainable Resource Management, May 2003). Licences issued since that time in combination with new compliance and enforcement measures have very likely brought the large majority of guided activities under the tenure system. The second source is believed to be significant, especially in Whistler, where destination visitors will participate in many activities in addition to their primary trip purpose (e.g., downhill skiing, golfing).

The territories of guide-outfitters (hunting guides) within the Plan Area itself have low harvests and are rarely worked because the financial return does not justify the cost of operation. (Evans pers. comm.). Almost all effort is focused on black bear, with very minor harvests in mule deer, goats, cougars and wildfowl.

Future tourism growth in the Plan Area is expected but may be limited by Whistler's bed-unit cap, growth management strategies and infrastructure limitations.

### **2.2.3 Recreation Overview and Base Case**

As noted in section 2.2.1, the LRMP will have important implications for non-commercial recreation on Crown land; that is recreation activities that are undertaken by tourists and residents who do not utilize the services of tenured commercial recreation operators.

The Plan Area is a major outdoor playground for the approximately 2.5 million residents of the Lower Mainland.<sup>21</sup> Popular activities include cross-country skiing, ski touring, ski mountaineering, snowshoeing, hiking, mountain biking, mountaineering, rock climbing, white water kayaking, river rafting, angling, nature appreciation and wildlife viewing, wind surfing, sailing, swimming, paragliding, snowmobiling, motor-biking, four-wheel driving and all terrain vehicle riding. The numerous local and provincial recreation clubs represented on the Planning Forum are indicative of the interest in and value placed upon recreation use in the Sea-to-Sky Plan Area.

The Plan Area is one of the most heavily used recreation areas in BC, with roughly 2.5 million user-days annually in parks alone, covering a full range of water and land-based activities (MSRM, May 2003). Apart from BC Parks attendance, there is no reliable estimate of public recreation use in the Plan Area, although judging from park use and anecdotal evidence the volume is significant and growing. The use of recreation sites, features, trails and staging areas is not tracked on a consistent or reliable basis and is only incidentally described in the literature and correspondence of member clubs of the Outdoor Recreation Council. Even the logs of facilities that keep such information (e.g., Overseer and Tantalus huts) are known to under-represent the actual number of users. (MSRM, May 2003).

Participation in many outdoor recreation pursuits by area residents and visitors is expected to continue growing in the future, though at lower than recent historical rates. The level and manner of this growth is expected to be consistent with the changing demographics of the North American markets. (Martin, May 2007). With the aging of the Canadian and American populations, activities that are physically demanding, such as outdoor adventure (summer and winter) or alpine skiing are expected to grow at lower rates than the population of travellers as a

---

<sup>20</sup> As noted earlier, visitors who are self-guided are still classified as tourists.

<sup>21</sup> Includes Greater Vancouver and Fraser Valley regional districts.

whole. (Research Resolutions, August 2004). Activities that require low levels of physical activity, such as wine/culinary and cultural activities, are expected to increase at higher rates than the population of travellers.

### 2.2.4 LRMP

It is anticipated that the LRMP will provide benefits to, and/or impose costs on, the tourism and recreation sectors through the mechanisms and logic identified in Figure 2.3.

While the tourism and recreation sector would obviously like to see the LRMP result in increases in all the outcomes shown, this will not necessarily be the case. In some cases measures taken to protect the environment or another sector could negatively affect the tourism or recreation sector. In other cases there will be a positive benefit but it may be less than what might at first appear to be the case or than it could have been. Finally, there may be some unintended negative impacts of the LRMP. The following sections will review the likelihood of these outcomes occurring.

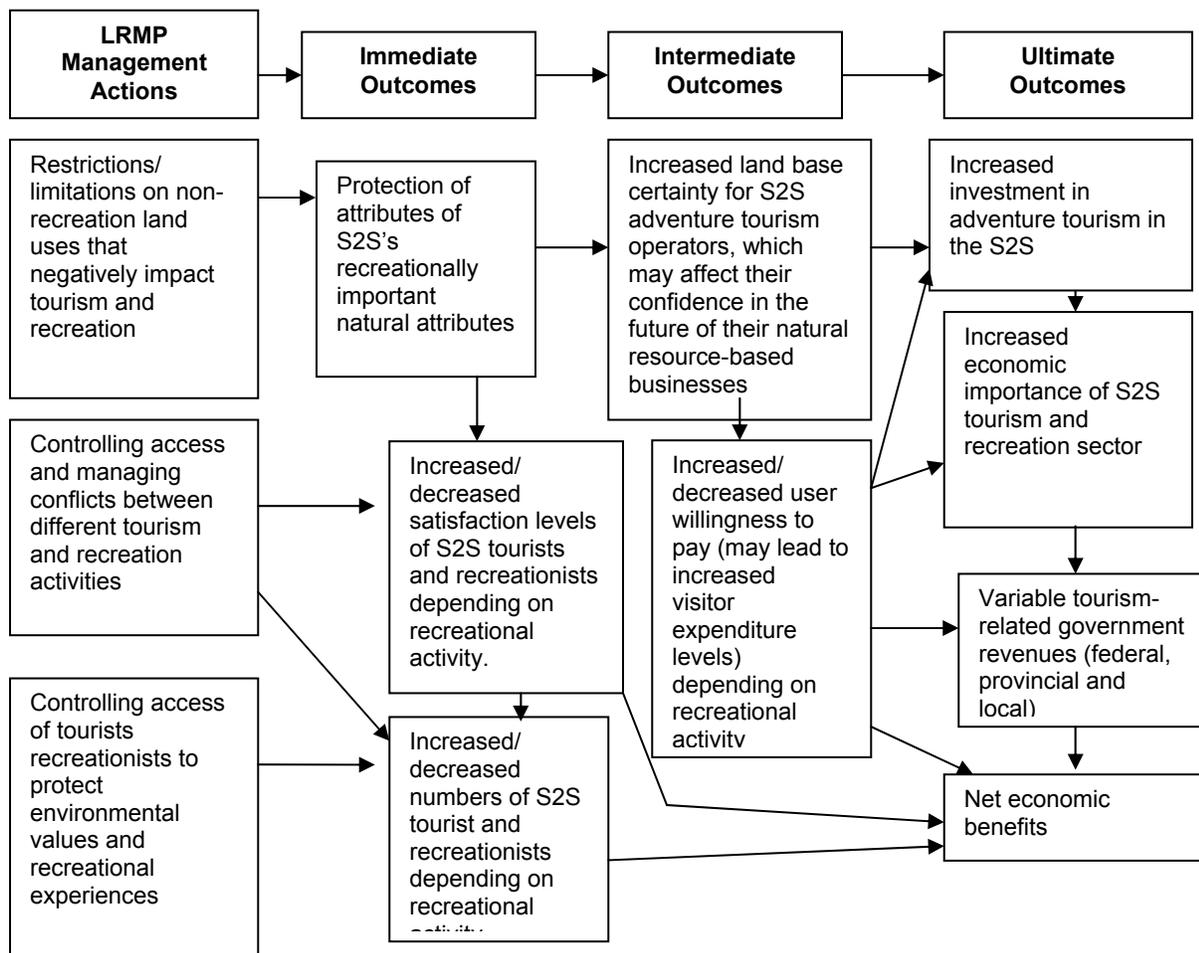


Figure 2.3 Potential Implications of the LRMP for the Tourism and Recreation Sectors<sup>22</sup>

<sup>22</sup> Note that “willingness to pay” refers to the maximum dollar amount that an individual is willing to pay to participate in an activity. It is an economic measure used to estimate the full benefits that tourists or

In regard to the devices listed on the left in

Figure 2.3, the LRMP contains provisions that recognize tourism and recreation values. All of the zones and sub-zones below are shown on the map in Figure 1.3 on page 6. The Conservancies and Wildlands sub-zones are shown in Figure 2.4.

- **Wildlands Zone**<sup>23</sup> – Backcountry recreation activities (commercial and non-commercial) are permitted throughout Wildlands zones, while timber harvesting and run-of-river hydro projects are prohibited. Roads and other industrial development are limited. Wildlands are further classed into four sub-zones (tourism, recreation, wildlife, cultural), each with a different set of management directions as they apply to commercial and public recreation. Accommodation and other tourism infrastructure is limited in all sub-zones except tourism, while no new commercial and public recreation infrastructure is allowed in the wildlife Wildlands. Cultural Wildlands only allow non-motorized commercial and public recreation that is compatible with First Nations interests and values.
- **Conservancies** – Conservancies are areas where industrial resource development activities are prohibited in order to protect First Nations values and interests. Commercial logging, mining, hydroelectric development, new roads and commercial development are not permitted within Conservancies. Some development activities may be considered as acceptable uses where all parties involved in collaborative management are in agreement. Current levels of low-intensity backcountry recreational and tourism use are to be maintained.
- **All Resource Uses Permitted Zone** – The All Resource Uses Permitted Zone includes the vast majority of the productive forest land and is also intensively used for public recreation and tourism. The LRMP proposes that the public and commercial recreation stakeholders work together to create an inventory of key recreational features that require cooperative management with other users of Crown land, specifically with regard to visual quality and access.
- **Front-Country Sub-Zone** – The Front-Country Zone is the gateway through which all visitors to the region pass, where the majority of residents make their home and where almost all the tourism infrastructure is placed. Public and commercial recreational activities, including outdoor recreation visits, occur mostly in this zone as well. Although all resource activities, including timber harvesting, are allowed, the primary focus for management is on visual quality and recreation values.
- **Summer Recreation** – The LRMP provides general management directions for summer recreation that emphasizes consultation among stakeholder groups for dealing with resource-use conflicts. New permits and tenures (or changes to existing tenures) are now to be assessed for their cumulative impacts on public recreation use. A general principle specified by the LRMP for use in decision-making on recreation access is that summer motorized uses should be in areas of low diversity values and with good access. Other issues such as aerial management and trail management are to be dealt with through stakeholder agreements. Zoning is to be utilized on an “as required” basis in those areas

---

recreationists derive from participation in an activity and is best used for public decision-making. It does not imply that these participants should be charged this amount. Indeed, even where the activities are provided commercially, willingness to pay will invariably exceed what can be captured by operators (this is the case in any economic market).

<sup>23</sup> The original intent of the Planning Forum and Working Group in identifying Mining/Tourism areas was in part to protect the potential for backcountry tourism development. In the LRMP, these areas are referred to as Wildlands.

where values are high and where other options have proven unsuccessful.

- **Winter Recreation** – Recommendations made by the Winter Backcountry Recreation Forum placed emphasis on physically separating motorized and non-motorized uses in order to preserve the backcountry experience in the Plan Area. These recommendations were included in earlier Plan drafts. Winter recreation zoning *could* be incorporated in the Plan once current discussions with different interest groups are completed, but the timing and scope is unknown at this time. Consequently, while the general implications of zoning are discussed in this report, the impacts of specific zoning possibilities are not assessed.

The LRMP also stipulates that no new, or expansions of existing, motorized public or commercial recreation activities or tenures will be allowed within mountain goat winter range. We are advised that this management direction would have been applied in the absence of the LRMP — the Base Case, in other words — so no effects of this have been attributed to the LRMP.

The implications of the LRMP for tourism and recreation are now discussed in turn. However, many of the implications of the above LRMP management directions apply to both and will be introduced in the tourism section.

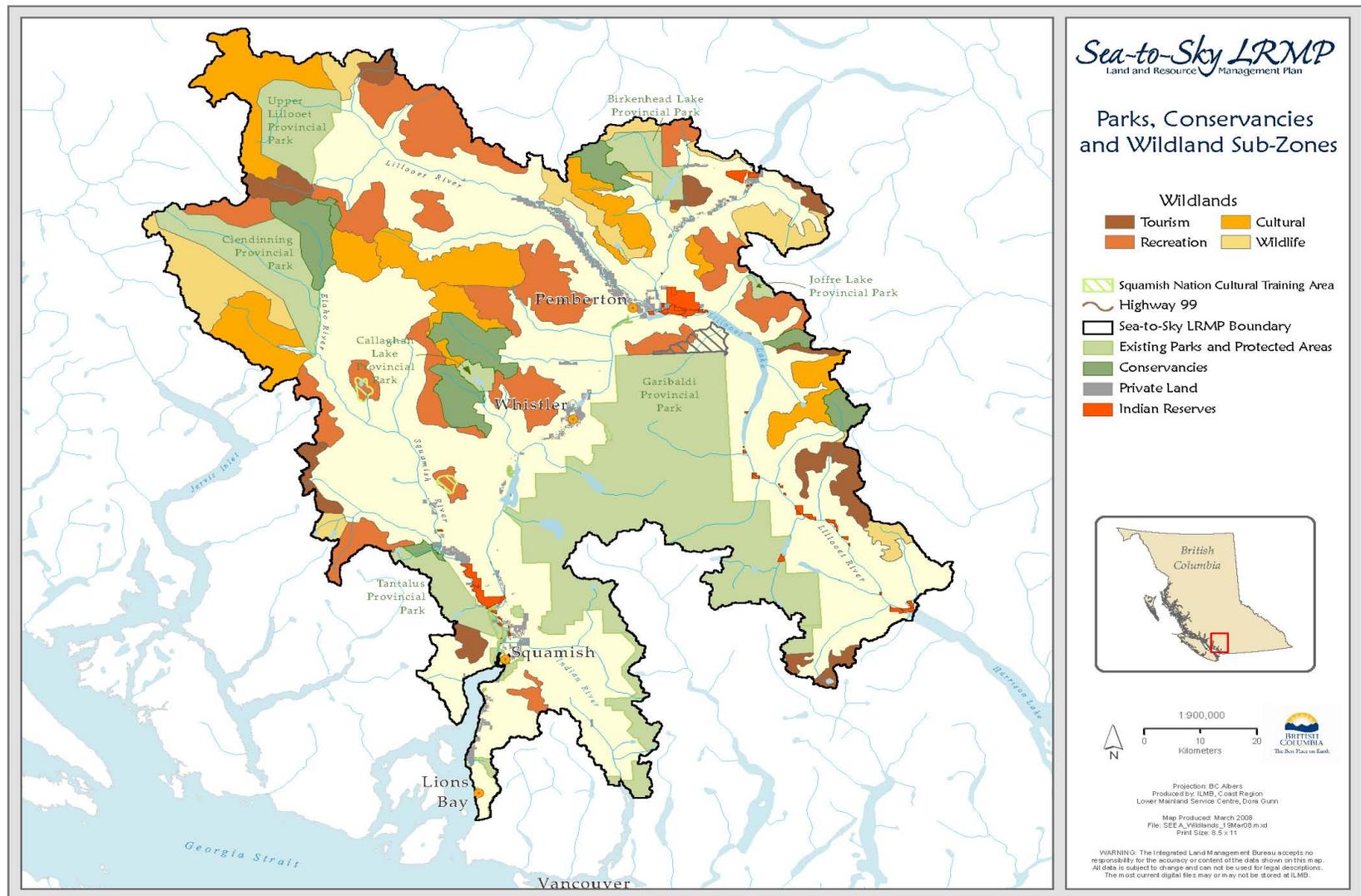


Figure 2.4 Parks, Conservancies and Wildlands Sub-zones

## 2.2.5 Tourism Implications of the LRMP

At its highest level, increased land-use certainty attained by the LRMP should encourage the tourism industry (and communities) to take advantage of development potential by investing in new products, infrastructure and amenities that are at least somewhat dependent on Crown land-use designations that have broad agreement among key interests.

As summarized in Figure 2.3 the LRMP will affect tourism and commercial recreation mainly through its provisions related to:

- Restrictions or limitations on incompatible or competing land uses;
- Restrictions or limitations on where tourism can occur on the land base, including constraints on physical development and tenuring; and
- Controlling access and managing conflicts between tourism and recreation users.

### **Front-Country**

In the front-country zone, improved visual quality standards should be a benefit, although the significance of this effect is unclear. Most tourism activity occurs in front-country zones along the Sea-to-Sky corridor, with a high concentration in Whistler. It is recognized that tourists have different sensitivities toward alteration of existing visual conditions and that visual quality can be of significant value to at least some tourists and the tourism businesses providing services to them<sup>24</sup>. It is also evident that the expansion of the tourism industry in the Plan Area over the last 20 years has been accompanied by an increasingly modified forest land base.

### **Backcountry**

Most of the benefits to tourism are likely to be felt through commercial recreation in the backcountry. The LRMP should create a better environment for such tourism use through zoning that prohibits timber harvesting and other industrial activities. The assessed degree of impact of these restrictions is dependent on three things:

- The percentage of the Plan Area land base and important characteristics/indicators for tourism and recreation that are located in the zones in question;
- The industrial activities restricted in each zone and the extent to which they are likely to detract from the backcountry experience of tourists and recreationists; and
- For each zone and industrial activity, the likely level of protection afforded per hectare of area relative to the Base Case.

#### **(a) Area and Indicators.**

Existing protected areas occupy 22% of the Plan Area, while Conservancies will occupy 4% and Wildlands 28% (Table 2.1). Thus the overall area in protected areas, Conservancies and Wildlands will be lifted from 22% to 54%, a 145% increase. For the most part, these are optimum zones from a tourism and recreation perspective.

It is important to consider how the attributes of Crown land that are likely to be valued by commercial and public tourists and recreationists are distributed across the landscape and what percentage of these are in the three optimum zones. Table 2.12 shows this for three indicators. The numbers of recreation features and kilometres of recreation trails are self-explanatory. The recreation opportunity spectrum (ROS) is a system of classifying landscapes according to their

---

<sup>24</sup> For example, see BC Ministry of Forests, 1996 and 2003.

current degree of wilderness and extent of roads. This is used as an indicator of the nature of the recreation experience to be expected in those areas<sup>25</sup>. The LRMP will tend to protect, and potentially increase, the three so-called primitive ROS classes in these three optimum zones (as well as features and trails)<sup>26</sup>.

In Table 2.12 the hectares of the Plan Area in the first three ROS primitive classes have been summed for each of the protective zones and then expressed as a percentage of the total ROS primitive hectares in the whole Plan Area. The table shows that the percentage increase in each of the indicators from the Base Case percentage protected to the LRMP percentage is each in the range of 100% to 160% and similar to the overall increase in the percentage of the land base in the three protected zones.

**Table 2.12 Percent of Total Land Base in Optimal\* Recreation Zones**

	Base Case	LRMP				
		All Protective Zones	PA	Conservancies	Wildlands	Non-Protective Zones
Total Plan Area	22%	54%	22%	4%	28%	78%
ROS Total Primitive Classes <sup>1</sup>	33%	80%	33%	6%	42%	20%
Tourism Features	15%	39%	16%	3%	21%	61%
Recreation Trails	26%	52%	28%	3%	21%	48%

**Notes:**

1. Primitive, Semi-primitive Non-motorized, Semi-primitive Motorized.
2. Totals may not add to 100% due to rounding.

In examining the impact of Wildlands sub-zones we draw on a more extensive and slightly different set of indicators. These are set out in Table 2.13 and illustrate a number of points:

- The areas of commercial recreation (CR) tenures, both current and applications, in the Wildlands just exceed that in the rest of the Plan Area but on only 28% of the Plan Area. This underscores the importance of these areas to adventure tourism on Crown land. CR operators are in position to immediately capture the benefits of whatever additional protection of tourism attributes will be afforded by these areas;
- The representation of these CR tenures, both current and applications, in non-tourism sub-category Wildlands is much greater relative to land area than in the tourism sub-category. The tourism sub-category contains 3% of the current CR tenures and applications for these, the same as the land area of this sub-category. By contrast, the other sub-categories contain just under 50% of these tenures but only 25% of the land area; and
- The remoteness of these areas is underscored by the fact that there are no current tourism facilities in any of the Wildlands (lodges, resorts, etc.) and tourism benefits are only currently obtained through guided commercial recreation.

<sup>25</sup> See MTSA (2000), <http://www.tsa.gov.bc.ca/sites/trails/manual/chap06/chap06.htm#s6.3>.

<sup>26</sup> Those hectares of land located in the three optimum zones and currently classified under ROS in a certain way will either remain in that class or, where the management direction specifies it, become more wilderness in character through time as existing tenures expire and some roads are closed or decommissioned.

**Table 2.13 Distribution of Key Indicators by Wildlands Sub-Zones**

Wildlands	Base Case	LRMP					
		All Wildlands	Cultural	Wildlife	Recreation	Tourism	Other <sup>1</sup>
<b>Total Plan Area</b>							
Wildlands		28%	1%	6%	12%	3%	6%
All other zones	100%	76%					
<b>Guide-Outfitter<sup>2</sup> Territories</b>							
Wildlands		19%	3%	5%	4%	6%	1%
All other zones	100%	81%					
<b>Tourism Features</b>							
Wildlands		21%	1%	5%	12%	1%	2%
All other zones	100%	79%					
<b>Tourism Facilities</b>							
Wildlands		0%	0%	0%	0%	0%	0%
All other zones	100%	100%					
<b>CR Tenure Applications</b>							
Wildlands		52%	8%	15%	14%	3%	12%
All other zones	100%	48%					
<b>Comm Rec Tenures</b>							
Wildlands		51%	3%	14%	29%	3%	3%
All other zones	100%	49%					

**Notes:**

1. At the time of the Sept. 7, 2007 GIS, some Wildlands were unclassified pending finalization of negotiations with First Nations. Since then, these areas have been classified as either recreation or wildlife Wildlands. Although the exact proportional effect on the above indicators is unknown, the percentage values in the “Other” column are assumed to be distributed to either “Wildlife” or “Recreation”.
2. Also known as hunting guides.

**Source:** GIS data supplied by ILMB at Sept. 17, 2007.

**(b) The Industrial Activities Restricted in each Zone.**

These activity restrictions were listed above. In Conservancies, by and large, no industrial activities are permitted (commercial logging, mining, hydroelectric development, new roads and commercial development). In Wildlands, prohibitions are restricted to commercial logging and small scale, run-of-the-river hydroelectric development by IPPs. The impacts of each activity are likely to differ substantially between people and through time and there are no research studies available of such factors for the Plan Area. No assessment has therefore been made of the likely relative impact of restricting these activities on commercial operators. However, given the nature of the restrictions, we can make a reasonable qualitative assessment of the impact of the Plan on the tourism sector.

**(c) The Likely Level of Protection Afforded in Each Zone Relative to the Base Case.**

The increases afforded by the LRMP in the area of the Conservancies and Wildlands, and important characteristics/indicators for tourism and recreation that they contain, suggests the LRMP may provide significant benefits to these sectors. We turn now to examine whether the degree of protection afforded per hectare relative to the Base Case would bear this out. Conservancies and Wildlands are examined in turn.

**Conservancies**

The Conservancies will protect backcountry wilderness experiences for tourists and public recreationists through elimination of all industrial activities that could negatively affect tourist

experiences. The indicators in the forestry, mining and energy sections of this report show that under the Base Case logging would occur over most of the area in Conservancies, and there would be a reasonably high risk of mining and run-of-the-river IPPs as well as some risk of geothermal projects.

As a consequence, the impact of the LRMP per unit of Plan Area protected in Conservancies (4%) is high.

### **Wildlands**

The Wildlands will only partially protect backcountry wilderness experiences for tourists and public recreationists. This will result partly from elimination of two industrial activities that could negatively affect tourist experiences — commercial logging and run-of-the-river IPPs. They will also minimize transmission line impacts and reduce road and some other motorized impacts, depending on the sub-category. Additionally, they will place some minimal restrictions on the way that mining and geothermal exploration are conducted. The indicators in the forestry, mining and energy sections of the report show that under the Base Case very little forestry or run-of-the-river IPPs are likely to be undertaken anyway (7% of the Wildlands areas are THLB and virtually all the Wildlands are above the elevations suitable for run-of-the-river IPPs). So despite their significant area (28% of the Plan Area), the benefits that Wildlands will deliver to the tourism and recreation sectors, relative to the Base Case, are likely to be small. There may be individual commercial recreation operators contemplating investments in backcountry tenures and infrastructure who may derive benefits in the form of increased certainty and reduced risks to their investments when they know that an IPP and its attendant roads and transmission lines or logging of an area cannot go ahead. In this respect, at least, the tourism sector may gain more per unit area of Wildlands than the public recreation sector.

There is a second reason why these zones may not provide as much benefit to tourism as the area numbers would suggest. All of the Wildlands sub-zones, other than the tourism sub-zone, place restrictions on the construction of new tourism infrastructure such as lodges, resorts and staging areas for motorized and helicopter operations. These restrictions will potentially impact commercial recreation operators.

As can be seen from Table 2.13, tourism sub-zones in Wildlands account for 3% of each of the Plan Area, the area of current commercial recreation tenures and the area of applications for such tenures. Therefore, in addition to the restrictions or prohibitions on tourism infrastructure in protected areas and Conservancies, new tourism infrastructure will be limited or prohibited in a further 25% of Plan Area and approximately 50% of the area of both current commercial recreation tenures and applications for these. However, these limitations may not be as significant as they seem for several related reasons.

- Most of the commercial operators have their bases in the front-country where their clients stay.
- The tourism sub-zone Wildlands are all adjacent to existing parks, Conservancies and/or recreation sub-zone Wildlands which could be accessed by commercial operators from staging areas, huts and lodges that might be built in these tourism sub-zones. Furthermore, the Wildlands are distributed fairly evenly around the perimeter of the Plan Area and will allow user access to varying degrees — in the west and east by helicopter or 4X4, and in the north and south, closer to the front-country, possibly by two-wheel drive vehicles.
- The majority of high-value tenure areas are already taken and developed, and while expansion opportunities exist, the potential incremental gain in user-days and the aggregate

value of tourist experiences may be limited by the potential for decreasing qualities of client experiences as the total numbers of tourists and recreationists increases (so-called land-base “carrying-capacity” issues). In this case, negative effects from the Wildlands infrastructure restrictions that might befall new tenure applicants could well be offset by benefits to existing licensees and their clients.

Lastly, the LRMP table was cognizant of these limitations but was equally aware of the need to preserve the visitor experience in these areas. The restrictions were felt necessary to keep physical development to a level in keeping with the perception of the Plan Area as a “wilderness area” while still allowing that to be exploited from more accessible, less sensitive existing staging and front-country areas. (Vamos, Zeidler, *pers. comm.*).

Table 2.14 summarizes our assessment of each of these factors, firstly for Conservancies and then for Wildlands. The Wildlands assessment is also broken down by sub-group since the management direction for each sub-group is quite different.

**Table 2.14 Relative Impacts of Differing Restrictions in Conservancies and Wildlands on Tourism and Public Recreation**

<b>Conservancies</b>			
<b>Zone and Indicators</b>			<b>Impacts of LRMP</b>
<b>Indicators</b>	<b>Base</b>	<b>LRMP</b>	
• Plan Area	0%	4%	Protection of backcountry wilderness experiences for tourists and public recreationists through elimination of all industrial activities that could negatively affect tourist experiences. For example: <ul style="list-style-type: none"> <li>• logging which would otherwise have occurred over most of the area at some point in time</li> <li>• mining activity risk — reasonably high Base Case risk</li> <li>• run-of river hydro IPPs — high Base Case risk,</li> <li>• geothermal-some Base Case risk.</li> </ul> The LRMP impact per unit of Plan Area protected in Conservancies is high.
• Tourism features	0%	3%	
• Rec trails	0%	3%	
• ROS Primitive categories	0%	6%	
<ul style="list-style-type: none"> <li>• Inclusion of features, trails and wilderness at levels equivalent to, or greater than, the increase in Plan Area protected.</li> <li>• Full protection of the wilderness and the effectiveness of tourist features and trails measured by these indicators.</li> </ul>			
<b>Wildlands – All Sub-Categories</b>			
<b>Zone and Indicators</b>			<b>Impacts of LRMP</b>
<b>Indicators</b>	<b>Base</b>	<b>LRMP</b>	
• Plan Area	0%	28%	Backcountry, high elevation areas. Small reduction in area or likelihood of industrial activities that could negatively affect tourist and recreationist experiences. For example: <ul style="list-style-type: none"> <li>• elimination of logging affecting only 7% of area</li> <li>• elimination of run-of-river hydro risk, although this is likely minimal in these high elevation areas</li> <li>• minimization of transmission line impacts</li> <li>• minimal-to-small constraint on mining in areas where there is a moderate-to-high potential for industrial and metallic mineral discovery.</li> </ul> The LRMP impact on tourism and recreation per unit of Plan Area protected in Wildlands is low relative to the Base Case. The increased certainty afforded is likely to be valuable to individual tourism operators in reducing the perceived risks of their tenure and infrastructure investments.
• Tourism features	0%	21%	
• Rec trails	0%	21%	
• ROS Primitive categories	0%	42%	
<ul style="list-style-type: none"> <li>• Inclusion of features, trails and wilderness at levels equivalent to, or greater than, the increase in Plan Area protected.</li> <li>• Less effective protection of the wilderness, tourist features and trails measured by these indicators.</li> <li>• Likely limited future difference between the LRMP and the Base Case.</li> </ul>			

<b>Wildlands Sub-categories</b>						
<b>Tourism</b>						
<b>Zone and Indicators</b>			<b>Impact of LRMP on Tourism</b>	<b>Impact of LRMP on Public Recreation</b>		
<b>Indicators</b>	<b>Base</b>	<b>LRMP</b>	<ul style="list-style-type: none"> <li>• Base comments as for all sub-categories above.</li> <li>• Allows tourism infrastructure such as lodges and resorts in contrast to other sub-categories.</li> <li>• Seem well located relative to other Wildlands zones, parks and Conservancies in which lodge/resort clients could recreate.</li> </ul>	<ul style="list-style-type: none"> <li>• Base comments as for all sub-categories above.</li> <li>• Favourable to backcountry public recreation.</li> </ul>		
• Plan Area	0%	3%				
• Existing CR tenures	0%	3%				
• CR tenure applications	0%	3%				
• Tourism features	0%	1%				
<ul style="list-style-type: none"> <li>• Relatively small area.</li> <li>• Low representation of tourism features.</li> </ul>						
<b>Recreation<sup>1</sup></b>						
<b>Zone and Indicators</b>			<b>Impact of LRMP on Tourism</b>	<b>Impact of LRMP on Public Recreation</b>		
<b>Indicators</b>	<b>Base</b>	<b>LRMP</b>	<ul style="list-style-type: none"> <li>• Base comments as for all sub-categories above.</li> <li>• Accommodation and other tourism infrastructure is limited. This may limit backcountry tourism development, particularly by new tenure holders.</li> </ul>	<ul style="list-style-type: none"> <li>• Base comments as for all sub-categories above.</li> <li>• Restrictions favourable to preserving wilderness experiences for backcountry public recreation.</li> </ul>		
• Plan Area	0%	15%				
• Existing CR tenures	0%	30%				
• CR tenure applications	0%	20%				
• Tourism features	0%	13%				
<ul style="list-style-type: none"> <li>• High representation of existing CR tenures and applications.</li> </ul>						
<b>Wildlife, Cultural<sup>1</sup></b>						
<b>Zone and Indicators</b>			<b>Impact of LRMP on Tourism</b>	<b>Impact of LRMP on Public Recreation</b>		
<b>Indicators</b>	<b>Base</b>	<b>LRMP</b>	<ul style="list-style-type: none"> <li>• Wildlife Wildlands don't allow new commercial and public recreation infrastructure..</li> <li>• Cultural Wildlands only allow non-motorized commercial and public recreation that is compatible with First Nations' interests and values.</li> <li>• These restrictions are likely to limit backcountry tourism development in these areas, particularly by new tenure holders.</li> </ul>	<ul style="list-style-type: none"> <li>• Base comments as for all sub-categories above.</li> <li>• Restrictions favourable to preserving wilderness experiences for backcountry public recreation.</li> </ul>		
• Plan Area		10%				
• Existing CR tenures	0%	19%				
• CR tenure applications	0%	29%				
• Tourism features	0%	7%				
<ul style="list-style-type: none"> <li>• High representation of existing CR tenures and applications.</li> </ul>						

**Notes.**

1. At the time of the Sept. 7, 2007 GIS, some Wildlands were unclassified pending finalization of negotiations with First Nations. Since then, these areas have been classified as either recreation or wildlife Wildlands. Although the exact proportional effect on the above indicators is unknown, the percentage values in the "Other" column in Table 2.3 are assumed to be split evenly between "Wildlife" and "Recreation".

Overall, we anticipate the LRMP to benefit commercial tourism and recreation as follows:

- Satisfaction levels of adventure tourists are expected to be protected or increased by the provisions of the LRMP, although the scale of the impacts are difficult to measure and may not be large;
- We would expect increased confidence levels of S2S commercial recreation operators;

- As a consequence of the improved preservation of adventure tourism experiences, we expect user numbers to potentially increase as a consequence of the LRMP, in part due to the absence of competing resource uses. Again, the size of the impacts may not be large;
- These three factors should lead to increased visitor numbers and associated measures like investment, profits and employment in the Plan Area and elsewhere in the province, particularly in Greater Vancouver; and
- Base-level information on participant numbers and research on participant satisfaction levels, expenditure levels and operator costs and profits are insufficient at this time to predict the size of these effects.

### **2.2.6 Public Recreation Implications of the LRMP**

Public recreation participants will probably be more significant beneficiaries of the LRMP compared to the Base Case than the tourism sector.

As summarized in Figure 2.3, the LRMP will affect public recreation mainly through its provisions related to:

- Restrictions or limitations on incompatible or competing land uses; and
- Controlling access and managing conflicts between tourism and recreation users.

We apply the same analytical logic as under the tourism section but in an abbreviated fashion since many of the issues will be similar.

#### ***Front-Country***

In the front-country zone, improved visual quality standards should be a benefit, although perhaps less so than for tourism. While public recreationists, predominantly from the GVRD and residents, may place importance on such visual quality, its absence may not change their recreation destination choices as much as for tourists from further afield.

#### ***Backcountry***

As with tourism, most of the benefits of the LRMP to public recreation are likely to be felt in the backcountry. The LRMP should create a better environment for such use through zoning that prohibits timber harvesting and other industrial activities. The same three factors discussed above will affect the assessed degree of impact of these restrictions:

- The percentage of the Plan Area land base and important characteristics/indicators for tourism and recreation that are located in the zones in question;
- The industrial activities restricted in each zone and the extent to which they are likely to detract from the backcountry experience of tourists and recreationists; and
- For each zone and industrial activity, the likely level of protection afforded per hectare of area relative to the Base Case.

#### **(a) Area and Indicators.**

The area impacts are the same as for tourism, but we only focus on the recreation trails, tourism features and recreation opportunity spectrum (ROS) wilderness indicators as ones of concern to public recreation. Under the Base Case, 22% of the land base is in protected areas, which are considered prime recreation areas for many users. Base Case protected areas also capture 15% of all tourism features and 26% of all trails. Under the LRMP, as seen earlier in Table 2.12, 39% of tourism features and 52% of trails will be in optimal recreation zones (protected areas,

Conservancies and all Wildlands sub-zones).<sup>27</sup> Within these optimal recreation zones, the LRMP will also protect primitive and semi-primitive designations in the ROS, increasing their representation in the optimal recreation zones from 33% to 80%.

**(b) The Industrial Activities Restricted in each Zone.**

The relevant restrictions were noted above. In addition to the restrictions on industrial activities, restrictions on infrastructure in most of the Wildlands sub-categories designed to preserve the wilderness aspects of these areas will particularly benefit public recreation relative to tourism.

**(c) The Likely Level of Protection Afforded in Each Zone Relative to the Base Case.**

The likely effects of the extra protection afforded by the LRMP in terms of increased recreation use and its associated economic impacts are unknown, although they are assumed to be positive<sup>28</sup>. The same qualifications apply here as raised in the tourism section, regarding whether these recreation values would have deteriorated in what are now Wildlands in the absence of the LRMP given the low levels of THLB and run-of-river IPP potential in these Wildlands.

In addition, there is little research on the cause-effect relationship between recreation zoning established in previous LRMPs and subsequent recreation use. The lack of baseline data is problematic in undertaking such research. The rapid growth in recreation use in the Plan Area over the last 20 years has occurred during a period when the land base outside of parks was managed for integrated forestry. The lack of recreation-specific zoning does not appear to have impeded growth in recreation use, some intensive use areas may be approaching their carrying capacity and resource user conflicts are increasing in both frequency and intensity. Given our understanding of regional population growth, increasing participation rates and the growth of competing tourism uses, these situations could well be exacerbated in the future without changes to the way the land and resource base is managed. From this perspective, the major benefits of the LRMP are expected to be in the preservation or improvement in the quality of the recreation experience as well as the opportunity to engage in that experience for all user groups.

Recreation access management and recreation use conflicts are high profile topics in the Plan Area. The summer and winter Backcountry Recreation Forums have spent many years documenting their values, interests and preferred activity areas in response to growing use and increasing conflicts between motorized and non-motorized uses. Earlier drafts of the LRMP acknowledged these conflicts and, for winter recreation, proposed several zoning categories<sup>29</sup>. This aspect of the LRMP has not been finalized and further discussions are underway to resolve the issues. Quite apart from such zoning driven by recreation objectives, the LRMP imposes a number of constraints on motorized activities and access to meet wildlife preservation, First Nations cultural and other objectives, and these may have ancillary benefits for non-motorized

---

<sup>27</sup> Wildlands sub-zones with management emphases other than recreation will create favourable conditions for many public recreation activities and will still allow access to the public to engage in those activities.

<sup>28</sup> A number of studies have shown significant expenditure and tax impacts on local communities and government from increased numbers of recreationists (e.g., WTMBTA (2007), The Sea-to-Sky Mountain Biking Economic Impact Study. [http://www.imba.com/resources/science/sea2sky\\_e\\_i\\_study.pdf](http://www.imba.com/resources/science/sea2sky_e_i_study.pdf)).

<sup>29</sup>ILMB, "Sea-to-Sky Land and Resource Management Plan", December 2007.

recreation<sup>30</sup>. However, it is understood that at least the wildlife driven restrictions would have been introduced irrespective of whether the LRMP had been approved and we have not attempted to evaluate this ancillary benefit<sup>31</sup>.

In general, non-motorized zoning will provide economic benefits to the province in the form of:

- increased numbers and satisfaction levels/willingness-to-pay (WTP) of non-motorized recreation participants;
- increased net revenues to the providers of non-motorized commercial services to such participants; and
- external environmental benefits such as wildlife habitat protection.

Such zoning will also provide desirable market and tax impacts (indirect and induced jobs, income and tax revenues) resulting from the expenditures of non-motorized participants both in the Plan Area and elsewhere in the province.

These benefits need to be weighed against negative economic impacts of such zoning, such as:

- reduced numbers and satisfaction levels/WTP of motorized recreation participants; and
- reduced net revenues to the providers of motorized commercial services.

Likewise the desirable market and tax impacts from increased user-days of non-motorized activities will need to be weighed against the lower market and tax impacts of reduced motorized user-days.

The size of both the benefits to non-motorized recreationists and the costs to motorized recreationists from zoning will be affected by their capacity to find similar experiences elsewhere. The closer the quality of the experience from substitute areas and the lower the cost difference in getting to them, the lower will be the benefits and costs from S2S recreational zoning.

Since data and analyses are currently lacking on the numbers of existing motorized and non-motorized users, the quantification of the above benefits and costs and the impact that zoning would have on each group of users, then it is impossible to assess the net benefits (or costs) of non-motorised zoning at this time. Some work is currently underway (e.g. by the School of Resource and Environmental Management, Simon Fraser University) and we would recommend further work in this area before conclusions can be drawn.

The LRMP does not propose to use zoning to spatially separate non-compatible **summer** recreation user groups. The LRMP states that stakeholder forums, consultations and referrals are the preferred non-zoning tools for resolving conflicts or potential conflicts. In light of the growing use of multi-stakeholder agreements in the Plan Area and other areas of the province, we have assumed that such tools would logically be part of Base Case conditions (i.e., in the absence of the LRMP), and would not, therefore, anticipate any significant differences or benefits as a result of the LRMP.

Overall, we anticipate the LRMP to benefit public recreation as follows:

---

<sup>30</sup> A number of wildlife management zones for mountain goats, moose and deer will prohibit motorized activities. Furthermore, a coordinated access management plan is to be developed for grizzly bears.

<sup>31</sup> It might be argued that the research, consultations and policy development required to establish these zones would not have taken place were it not for the development of the LRMP — or, at least, they were accelerated by the development of the LRMP.

- Satisfaction levels of public recreationists are likely to be increased by the provisions of the LRMP, and we expect the size of the impacts to be significant but not large;
- As a consequence of the improved preservation of recreation experiences, we expect use numbers would increase (in line with demand) as a consequence of the LRMP, but again, the size of the impacts may not be large;
- These two factors should lead to increased economic value in terms of expenditure levels and willingness-to-pay both in the Plan Area and elsewhere in the province, particularly in Greater Vancouver; and
- Base-level information on participant numbers and research on participant satisfaction levels and expenditure levels are insufficient at this time to predict the size of these effects.

## Aggregates, Industrial Minerals, and Metal Minerals

**Table 2.15 Summary of Conclusions**

	<b>Base Case (Current Conditions)</b>	<b>LRMP</b>
Aggregates	<ul style="list-style-type: none"> <li>• 30 active aggregate pits.</li> <li>• 88% of aggregate potential is open for development.</li> <li>• Stable growth is expected driven by Plan Area road building and construction plus exports, providing access to tidewater is maintained.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Minimal impacts.</b></li> <li>• No active pits affected.</li> <li>• 85% of aggregate potential open for development, a three-percentage point reduction.</li> <li>• 7% of aggregate potential in Wildlands and 1.3% affected by cultural sites, with some access constraints.</li> </ul>
Industrial Minerals	<ul style="list-style-type: none"> <li>• Four dimension stone quarries.</li> <li>• One pumice operation, another in development.</li> <li>• Steady growth expected in building and landscaping stone driven by construction.</li> <li>• Good potential for industrial minerals.</li> <li>• 93% of very high and high mineral potential areas open for exploration and development.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Limited impact.</b></li> <li>• No existing quarries affected.</li> <li>• 88% of high and very high mineral potential open for exploration and development, a 5% reduction from the Base Case.</li> <li>• 39% of the high and very high mineral potential in Wildlands and 0.3% in cultural sites are subject to some access constraints.</li> </ul>
Metal Minerals	<ul style="list-style-type: none"> <li>• No active metal mines but a strong history of mining in the Plan Area.</li> <li>• 140 occurrences of known mineralization.</li> <li>• Plan Area has lagged recent growth in exploration and development elsewhere in the province due to perceived higher costs of obtaining required social licence from First Nations and communities.</li> <li>• 98% of known occurrences and 76% of areas of very high and high potential are open for exploration and development.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Moderate impact.</b></li> <li>• <b><i>Existing Mineral and Placer Tenures</i></b></li> <li>• Two existing mineral tenures will be impacted by a Conservancy (around 1% of existing mineral and placer tenure areas).</li> <li>• 35% of the area of existing mineral and placer tenures are in Wildlands and 0.8% in cultural sites, and will be subject to some access constraints.</li> <li>• <b><i>Occurrences</i></b></li> <li>• 93% open for exploration and development, a reduction of 5%.</li> <li>• 14% are in Wildlands (15% of open areas) and subject to some access constraints.</li> <li>• <b><i>Very High and High Potential Area</i></b></li> <li>• 61% open for exploration and development, a reduction of 15 percentage points or 20%.</li> <li>• 11% is in Wildlands with some access constraints (18% of the open areas).</li> </ul>

### 2.2.1 Mining Overview

In 2001, the mining sector accounted for 97 direct and 69 indirect (supply and service) jobs, about 1% of the employment in the Plan Area. Pre-tax employment income was \$5.8 million.

### 2.2.2 Base Case

The mining sector has three important sub components: aggregate and quarrying, industrial minerals and metal mining. In recent years, the aggregate, quarrying and industrial mineral sectors have benefited from the growing municipalities and regional development. Conversely, metal mineral exploration has seen marginal expenditures and has often been in conflict with other area stakeholders using the land base in the region. (Northcote, *pers. comm.*).

**Aggregates** – There are large sand and gravel reserves near Squamish and between Squamish and Whistler. Presently there are approximately 30 active sand and gravel pits in the area. Both active and inactive aggregate pits are concentrated near the communities of Squamish, Whistler and Pemberton, servicing the local road building and development projects of those communities. In addition, there are a number of pits on tidewater in the Howe Sound portion of the Plan Area. All aggregate production is currently concentrated on meeting local demands.

However, transportation costs to coastal markets from pits on tidewater are significantly lower than land transport from inland pits. This creates additional market opportunities for tidewater pits to sell their product into the coastal markets of Vancouver and further south into the United States, as has occurred from other coastal locations in the province in recent years.

Overall, in the absence of the LRMP, we anticipate stable growth in this sub-sector in the Plan Area given the expected population growth and construction demands in the Plan Area. We also expect there will be increasing opportunities for growth in shipments outside the region. As aggregate supplies are depleted in major centres along the west coast of the United States and in Vancouver, and as aggregate prices increase, opportunities will exist for new pits to come on line or existing ones to expand their production to serve external markets. However, it is unclear if the Plan Area will be utilized to service these external markets.

**Industrial Minerals** – There are at least six locations where Garibaldi volcanics and granite are quarried along the Whistler corridor for landscaping and masonry purposes. Columns and slabs of Garibaldi basalt, andesite and dacite are used in decorating many buildings and gardens in the province, but are also finding markets further abroad. Quarries include Huckleberry Stone Supply Ltd. and Corridor Masonry Corp. (Regional Geologist Report, 2008). There have been four recent Notices of Work from Alpine Mining Ltd. for dimension and landscaping stone. The proximity of the Sea-to-Sky Plan Area to Vancouver and the building boom underway for the Olympics provide good opportunities to further develop BC's fledgling natural stone product industry.

In mid-2007, production at Great Pacific Pumice Ltd.'s pumice quarry near Pemberton was suspended, but the site still has a very significant reserve of material and is anticipated to start quarrying again in the future. Garibaldi Aggregates Ltd. also quarries pumice in the area and is currently preparing an application for a mine lease. As for industrial mineral quarrying, under the Base Case, we anticipate there would be steady growth in the building stone side of this sub-sector given the expected population growth and construction demands in the Plan Area and Lower Mainland. Moving forward, as the local industrial mineral sector builds market profile for its product it is likely the sector will continue to expand in the Plan Area. Other industrial

minerals may also participate in the sub-sector in the future, but their prospects are difficult to assess at this time.

**Metal Minerals** – There are no active metal mines in the Plan Area. Past mineral developments — principally the Britannia, Northair and Brandywine mines — have had substantial economic impacts in the area. In 2007, Auramex Resource Corp. undertook a new mineral exploration program at the Brandywine property. In addition, there have been a few smaller exploration projects in the Plan Area in recent years including: Paget Resource, which has been doing work on its Salai Molybdenum property (Northcote, *pers. comm.*, Feb. 29, 2008). This property straddles the Plan Area boundary and is located north of Pemberton.

There are 140 metallic and industrial mineral “occurrences” (i.e., known areas of mineralization) recorded in the Plan Area, excluding private land and existing protected areas and including six past producers<sup>32</sup>. Most past discoveries have been in accessible areas, while much less exploration has occurred in more remote areas.

Following the “two-zone” policy, mineral exploration and potential development<sup>33</sup> in British Columbia is allowed in all areas unless explicitly prohibited, such as in Conservancies. Notwithstanding this policy, mining companies are required to effectively consult and accommodate First Nations or risk prevention of development if they do not. In general, metal mineral exploration has increased in recent years, but the Plan Area has generally lagged the province in metal mineral exploration. This is due to prospector and mining company perceptions of the multiple stakeholders already active on the Plan Area land base and partly due to their perceived higher costs of obtaining the necessary social licence for exploration and mine development from First Nations and communities in the Plan Area compared with other regions (Northcote, *pers. comm.*, Feb. 29, 2008). In the absence of the LRMP we would anticipate that the difficulties and costs in obtaining social licence for exploration and mine development would have continued relative to other locations.

### 2.2.3 LRMP

The LRMP contains provisions that recognize mining values, such as in Wildlands. In general, the LRMP follows and refines the two-zone policy for the Plan Area:

**Wildlands Zones** – These are part of the Mineral Zone as defined by the provincial two-zone policy and legislation and are open to exploration, tenure application and potential mine development, including suitable access required to undertake these activities. However, in order to meet their primary objective<sup>34</sup>, the Wildlands zones place added encumbrances on mining that include the following:

- Existing roads are to be decommissioned after the completion of the resource development and access is no longer required or, if required, are to be rehabilitated to minimize environmental impacts. Any other development sites are to be remediated and reclaimed;

---

<sup>32</sup> See Table 2.18 below for further details and sources.

<sup>33</sup> Pursuant to meeting the requirements of the Mine Development Review and Environmental Assessment (EA) processes. An EA is required when planned subsurface resource production exceeds a prescribed threshold as outlined in the Health Safety and Reclamation Code for Mines in British Columbia.

<sup>34</sup> That is, “To maintain the important wildlife, ecological, conservation, natural backcountry wilderness values and recreation and tourism opportunities within Wildland zones” (LRMP (2008), p. 86.).

- Exploration must use low-impact methods such as foot and aerial access during early stages. New roads and trails will generally not be acceptable except during the late exploration stage;
- Where roads are necessary for mining purposes, access controls will be applied to restrict public motorized access; and
- In most of the cultural sub-category of Wildlands, LRMP management directions prohibit new road construction for early exploration. They do the same for access for sub-surface mineral development unless there is no feasible alternative. In this case, new road construction *may* be considered, subject to consultation with the First Nation(s) involved and, if appropriate, accommodation.

**Conservancies and Existing Protected Areas** – Conservancies and existing protected areas are areas where industrial resource development activities are prohibited. Conservancies protect important values of Plan Area First Nations and decrease the area accessible to mining exploration and development.

**All Resource Uses Permitted Zone** – The remaining Crown lands in the LRMP are considered to be in this zone and are accessible for mining purposes. However, within this there are nine cultural management areas in which resource and economic developments, including subsurface resource development, are allowed, but require full consideration be given to First Nation cultural and heritage resources. There are also many cultural sites involving small areas on which tenure holders will be expected to use low-impact exploration methods and road access restrictions may apply. Conditional reserves will be placed on these sites under the province’s on-line mineral tenure registration system so that those seeking to register a tenure containing such a site will be aware of these restrictions and their duty to consult with the First Nation involved.

As a consequence of the above provisions, the LRMP will have two types of impacts on the mining sector:

- Conservancies will result in the expropriation of a number of existing mineral properties; and,
- Conservancies, Wildlands, cultural management areas and cultural sites may have both positive and negative impacts on access to potential exploration areas or the perceived potential for development of areas as discussed below.

Three categories of indicators are used in assessing these impacts:

- Valid mineral exploration claim areas indicating the mineral industry’s current interest in particular lands;
- The location and extent of past mineral exploration activity, including identified prospects (an indicator of future industry interest); and
- Mineral potential assessment, as prepared by the Ministry of Energy, Mines and Petroleum Resources, which ranks tracts of land in terms of their relative probability of containing a commercial deposit.

#### **2.2.4 LRMP Implications for the Mining Land Base within the S2S Plan Area**

This section summarizes, for each zone or group of zones with similar constraints on mining, the magnitude of the specific mining indicators on Crown lands now open for exploration and mineral development (the Base Case) and compares them to the LRMP. The majority of the existing tenured areas are unaffected by the proposed Conservancies. However, the Wildlands

areas place some added constraints on exploration and mining development, the likely effects of which have not been fully determined. Indicators for the three mining sub-sectors are explored below. Potential for each sub-sector on private, Indian Reserve and federal lands is reported separately in each section for context.

**Aggregate and Quarrying** – Table 2.16 provides an overview of the percentages of aggregate pits and associated primary and secondary aggregate potential on Crown land that are in zones that are either open, open-constrained or closed for aggregate development under either the Base Case or the LRMP. Under the LRMP, protected areas, Conservancies and category A cultural sites are not open to aggregate development. However, there are no active pits in these zones under either the Base Case or the LRMP (and hence no difference in the “Total Open” number of aggregate pits between the two scenarios). In addition, there is virtually no difference in aggregate potential between the Base Case and the LRMP. Turning to the Wildlands zones, again there is no impact on the numbers of pits and only a small impact on the hectares of primary and secondary aggregate potential. In addition to the Crown land impacted by the LRMP, 25% of the active or inactive pits and 8% of the aggregate potential in the Plan Area is on private, Indian Reserves or federal lands and these are also not impacted.

**Table 2.16 Aggregate Pits and Potential**

	Base Case			LRMP				
	Not Open <sup>1</sup>	Open <sup>2</sup>	Total	Not Open <sup>3</sup>	Open Constrained <sup>4</sup>	Open Other <sup>5</sup>	Total Open	Total
<b>Number of pits</b>								
Active Pits	0%	100%	100%	0%	0%	100%	100%	100%
<b>Aggregate potential (hectares)</b>								
Primary & secondary	12%	88%	100%	15%	7%	78%	85%	100%

**Notes:** 1. Protected areas; 2. All other areas; 3. Conservancies, protected areas and category A cultural sites; 4. Wildlands; 5. All remaining open areas.

**Source:** GIS data supplied by ILMB at Sept. 17, 2007; cultural site data, Oct. 10, 2007.

**Industrial Minerals** – As illustrated in Table 2.17, the addition of Conservancies means the area of high and very high mineral potential open for exploration and mining development will drop by five percentage points from 93% to 88% of the Crown land base. A large area of industrial mineral potential — 39% with high and very high potential — falls within the Wildlands zone and this area will face some additional constraints for future exploration and development. However, it will remain open to the mining sector. It can be argued that to a large extent these constraints would exist in the absence of the LRMP because of the legal obligations of mining companies to consult and accommodate First Nations. Private, Indian Reserves or federal lands represent only 3% of the high and very high industrial mineral potential in the Plan Area.

**Table 2.17 Industrial Mineral Potential (percentage of hectares)**

	Base Case			LRMP				
	Not Open <sup>1</sup>	Open <sup>2</sup>	Total	Not Open <sup>3</sup>	Open Constrained <sup>4</sup>	Open Other <sup>5</sup>	Total Open	Total
Very High Plus High	7%	93%	100%	12%	39%	49%	88%	100%

**Notes:** 1. Protected areas; 2. All other areas; 3. Conservancies, protected areas and Category A cultural sites; 4. Wildlands; 5. All remaining open areas.

**Source:** GIS data supplied by ILMB at Sept. 17, 2007; cultural site data, Oct. 10, 2007.

**Metal Minerals** – Table 2.18 shows the proportion of the area of current mineral and placer tenures in different Base Case and LRMP zones and therefore the impact of the LRMP compared with the Base Case on these current tenures. It suggests that around 1,600 hectares, or 1% of the total current mineral and placer tenured area in the Plan Area, will be impacted by Conservancies. However, through some small boundary changes and grandparenting of existing tenures, only two mineral tenures will be affected by a Conservancy.

In addition, around 52,000 hectares, or 35% of the total mineral tenured area, lies in the Wildlands zone and is therefore open for mining, but subject to additional access constraints. All of the affected tenures are mining rather than placer tenures.

**Table 2.18 Metallic Mineral Tenures (percentage of hectares)**

	Base Case			LRMP				
	Not Open <sup>1</sup>	Open <sup>2</sup>	Total	Not Open <sup>3</sup>	Open Constrained <sup>4</sup>	Open Other <sup>5</sup>	Total Open	Total
Mineral & Placer	0%	100%	100%	1%	35%	64%	99%	100%

**Notes:** Protected areas; 2. All other areas; 3. Conservancies, protected areas and Category A cultural sites; 4. Wildlands; 5. All remaining open areas.

**Source:** GIS data supplied by ILMB at Sept 17, 2007; cultural site data, Oct. 10, 2007.

Table 2.19 shows the impact of the LRMP on the area of very high and high metal mineral potential under the Base Case and different levels of constraint under the LRMP. Again, the percentages of the hectares of different levels of mineral potential are also divided by the different Base Case and LRMP zones. Overall, the area of very high and high mineral potential open to mineral exploration and development has decreased by 15 percentage points, from 76% to 61% of the total mineral potential area, by the addition of the Conservancy areas in the LRMP when compared to the Base Case. Via the Wildlands, the LRMP places access constraints on a further 11 percentage points of the high and very high mineral potential areas.

**Table 2.19 Metallic Mineral Potential (percentages of hectares)**

	Base Case			LRMP				
	Not Open <sup>1</sup>	Open <sup>2</sup>	Total	Not Open <sup>3</sup>	Open Constrained <sup>4</sup>	Open Other <sup>5</sup>	Total Open	Total
Very High plus High	24%	76%	100%	39%	11%	50%	61%	100%

**Notes:** 1. Protected areas; 2. All other areas; 3. Conservancies, protected areas and Category A cultural sites; 4. Wildlands; 5. All remaining open areas.

**Source:** GIS data supplied by ILMB at Sept. 17, 2007; cultural site data, Oct. 10, 2007.

**Industrial and Metallic Mineral Occurrences Impacts** – There are 143 metallic and industrial mineral “occurrences” (i.e., known areas of mineralization) on Crown land in the Plan Area. Four of these are current producers and 129 are prospects and showings. Table 2.20 shows the percentage distribution of each of these categories by the different zones. There are an additional 13 occurrences on private land, which are unaffected by the LRMP.

Under the LRMP, no current producers are impacted and 93% of existing occurrences will remain available for further exploration and mining development. The Wildlands zones contain 14% of occurrences in the open Crown land base so that under the LRMP, 79% will be under no additional access constraints as a consequence of the LRMP<sup>35</sup>. Most discoveries in the past have been in accessible areas, while much less exploration has occurred in more remote areas.

**Table 2.20 Mineral Potential (percentage of the number of occurrences)**

	Base Case			LRMP				
	Not Open <sup>1</sup>	Open <sup>2</sup>	Total	Not Open <sup>3</sup>	Open Constrained <sup>4</sup>	Open Other <sup>5</sup>	Total Open	Total
Producer	0%	100%	100%	0%	0%	100%	100%	100%
Mineral Occurrences	2%	98%	100%	6%	14%	79%	93%	100%

**Notes:** 1. Protected areas; 2. All other areas; 3. Conservancies, protected areas and Category A cultural sites; 4. Wildlands; 5. All remaining open areas.

**Source:** GIS data supplied by ILMB at Sept. 17, 2007; cultural site data, Oct. 10, 2007.

In summary, for most of the indicators, a high proportion of the land base remains open for exploration and mining.

Wildlands and cultural sites impose some access constraints. Mining activity that takes place in Wildlands will find constraints vary somewhat by sub-category within Wildlands. Overall, those areas not open for mining range from 12% of very high and high industrial mineral potential, to 15% of the primary and secondary aggregate potential, to 39% of high and very high of metal mineral potential. Cultural sites will impact 0.8% of existing mineral tenures and 1.3% of high and very high metallic mineral potential, 0.3% of the high and very high industrial mineral potential and 1.3%<sup>[1]</sup> of the primary and secondary aggregate potential<sup>[2]</sup>. It has also been

<sup>35</sup> There are existing legislated requirements regarding access that apply to miners wherever they may be operating in the province.

<sup>[1]</sup> All of these impacts of cultural sites are measured in the same way and relative to the same base as the above tables.

suggested that some Conservancies could possibly interfere with potential access routes and their construction or conditions imposed on lands adjacent to Conservancies could render potential development uneconomic. However since the proposed Conservancies are all located in the top ends of valleys, these access impacts are likely to be small.

It is anticipated that the Plan, in combination with conditional acquisition reserves, may have some positive impacts. The LRMP should clarify First Nations issues and concerns such as cultural sites and their appropriate treatment and provide more certainty for mining companies. In the absence of the LRMP (i.e., the Base Case), mining companies exploring and developing projects in the Plan Area would continue to need to deal with these factors.

---

<sup>[2]</sup> However, many of these requirements are probably well accepted as best practices by the mining sector for the maintenance of environmental stewardship and social licence

## 2.3 Energy

**Table 2.21 Summary of Conclusions**

	<b>Base Case (Current Conditions)</b>	<b>LRMP</b>
<b>Run-of-river small-scale hydro</b>	<ul style="list-style-type: none"> <li>• Six existing IPPs. Total generating capacity of 140 MW.</li> <li>• Two IPPs selected by BC Hydro.</li> <li>• Further 23 granted water licences.</li> <li>• 77 water licence applications.</li> <li>• High potential for small-scale hydro.</li> <li>• Considerable growth potential but constrained by local concerns concerning negative impacts on environmental, recreational, aesthetic and other values.</li> </ul>	<ul style="list-style-type: none"> <li>• Existing rights-of-way and leases will be unaffected.</li> <li>• 17% of current water licence applications are affected.</li> <li>• Overall, LRMP impacts likely to be minor.</li> </ul>
<b>Geothermal</b>	<ul style="list-style-type: none"> <li>• Considerable potential (e.g., Mount Meager area).</li> <li>• However, local stakeholder concerns likely re: aesthetics and wildlife as for hydro.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impacts.</li> </ul>
<b>Windpower</b>	<ul style="list-style-type: none"> <li>• Exploratory stage and potential unclear. Local concerns likely as for hydro.</li> </ul>	<ul style="list-style-type: none"> <li>• No impacts.</li> </ul>

### 2.3.1 Overview and scope of the assessment

The Sea-to-Sky energy sector has several existing operators engaged in hydroelectric power production in the Plan Area. There are also a number of planned and potential projects for electric power production based on water flow or geothermal deposits. With respect to oil and gas resources, there are no discovered reserves and the potential is considered low so consequently the resource was not considered in this assessment.

### 2.3.2 Base Case

The Plan Area's steep topography and ample precipitation, along with its relatively close proximity to customers, makes it highly suitable for hydroelectric developments. There are seven presently operating hydropower generating facilities. The largest is BC Hydro's Cheakamus generating station on the Squamish River which uses water diverted from Daisy Lake. The remaining facilities are of more recent vintage, relatively small in size, privately owned, and sell power to the provincial transmission grid. These are termed Independent Power Producers (IPPs). Increased electricity prices and government policy have encouraged this type of power development in recent years.

BC Hydro buys power from 16 "green power projects"<sup>36</sup> in BC. Six of these are IPPs in the Plan Area and listed above. The projects collectively generate about 552 GWh per year, or equivalent to the annual power requirements of approximately 55,000 households.<sup>37</sup> Individual project descriptions indicate that construction and operations of the IPPs has typically involved consultation and, in some cases, participation with First Nations and recreation associations.

<sup>36</sup> BC Hydro evaluates potentially green project proposals against detailed low environmental impact and social responsibility criteria. Criteria available at: [http://www.bchydro.com/rx\\_files/info/info4793.pdf](http://www.bchydro.com/rx_files/info/info4793.pdf).

<sup>37</sup> 166 MWX.5 (load factor)X(8760 hrs/yr) = 552 GWh/yr.

**Table 2.22 Operating and Advanced Hydroprojects in Sea-to-Sky Plan Area**

Location	Company	Size/Type of Generation (MW)
Squamish River	BC Hydro and Power Authority	158
<b>Independent Power Producers</b>		
Rutherford Creek	Rutherford Creek Power	50
Miller Creek	EpCor Power Development Corp.	33
Upper Mamquam	Canadian Hydro Developers	25
Soo River	Executive House Power Corporation	14
Furry Creek	579220 BC Ltd.	10.5
Brandywine Creek	Rockford Energy Corporation	7.6
<b>Total Existing IPP Generation</b>		<b>140</b>
<b>IPP Projects selected under BC Hydro Green Power Generation Call</b>		
Ashlu Creek	Ledcor Power	42
Mkw'alts Creek	Mkw'alts Energy	45
<b>Total Proposed IPP Generation</b>		<b>87</b>

Source: BC Hydro webpage.

There are also two advanced projects in the Plan Area selected by BC Hydro under the Green Power Generation Call. It is estimated the capital cost to develop the two projects listed in the above table would be in the order of \$115 million. Gross sales from operations would be in the order of \$24 million per year and total permanent employment of 12 persons.<sup>38</sup> Presently, the proponents for each project are addressing issues raised by local government or First Nations.

In addition to the operating facilities, there are a number of projects at various planning stages. Water power projects that are intended to produce energy for commercial purposes are subject to public review and are required to obtain a water licence and an appropriate Crown land tenure if occupying Crown land (for plant, access road and transmission line right-of-way). For commercial feasibility, the project must also arrange a sales agreement with BC Hydro. A water licence application establishes priority in the granting of a licence by government, but *Land Act* applications are considered a more reliable indicator of active interest in developing a site. (A. Drysdale, pers. comm.)

With respect to geothermal projects, the Mount Meager area is the most promising geothermal site in BC. Western GeoPower is currently conducting a feasibility study to confirm the commercial viability of the South Meager project with an initial generation capacity of 100 megawatts. The project is subject to an environmental assessment and is presently listed as having pre-application status by the Environmental Assessment Office. The plant is expected to commence commercial generation in 2011 or 2012 (Western GeoPower Corp., 2007). There has also been interest in the feasibility of a geothermal power development at Pebble Creek and the Mount Caley field.

<sup>38</sup> Based on the coefficients for a 27 MW plant reported on pages 14 and 15, *Small Hydro Building Block Profile*. That is, capital costs of \$35.8 million, sales revenue of \$7.1/yr and 3.7 positions for a 27 MW facility, scaled up proportionately.

The Plan Area has considerable potential for small-scale hydropower and geothermal development. However, some proposals will be controversial. Local governments, residents, recreationists and other stakeholders have raised concerns over individual and cumulative impacts of numerous IPP projects. The concerns are project specific but may relate to the location of the transmission line, aesthetics or other values. It is noted that public input is sought in the project approvals process where these matters can be addressed. In the review of each project, the LRMP will be principally referred to by the proponent, public and review agencies as to whether the project proposal is an acceptable land use, and the priorities in managing for other values relevant to that location.

### **2.3.3 Energy LRMP Implications**

The LRMP does not allow hydro developments in designated Conservancies or Wildlands, while geothermal development is allowed in the latter. Provincial government review of future energy project applications will be guided by direction given by the LRMP on the affected lands.

In general, much of the Wildlands zones are at higher elevation, above the areas where energy projects are developed. In addition, care has been taken to avoid including advanced IPP projects where it has been practical to do so.

Table 2.2.23 summarizes the LRMP's impact on energy resources and potential. With respect to the geothermal resource, the resource potential covers a relatively large area and 95% remains available for further investigation and development. All of the hotspots are in land management zones compatible with geothermal development.

The current locations of interest for hydropower development are indicated by the various tenures or pending applications for water licences under the *Water Act* and tenures under the *Land Act*. It is common for a project to hold several tenures, such as several water licences covering different purposes as well as land tenures for rights-of-way, leases and permits, and the like. It is for these reasons that the number of tenures affected as shown in Table 2.2.23 is more than the number of projects. However, the number of projects is largely (but not always) indicated by the number of water licences (power general storage). Where an LRMP zone overlaps with some of the proposed parts of an IPP, it is generally unclear how critical that overlap will be for the feasibility of the project or the other values in the LRMP zone that it is designed to protect. Each application is considered individually.

There are a total of 30 water licences located on 20 streams. The one impacted licence holder is on Miller Creek and is affected by a category A cultural site (Lil'wat Spirited Ground). With respect to the water licence applications, the 77 applications are located on 49 streams. The affected licences are located on four streams (ZZ Creek, Fries Creek, Meager Creek and High Falls) that are within three separate Wildlands, and one stream located in a Conservancy (Twin Two Creek). The *Land Act* tenures are held by operating projects or advanced projects. The area analysis identified a small degree of overlap with the existing facility at Miller Creek (four tenures) and the project on Ashlu Creek (one tenure).

**Table 2.2.23 Summary of Energy Indicators Open for Development**

<b>Indicator</b>	<b>Unit</b>	<b>Base Case</b>	<b>% Available in LRMP</b>
Geothermal Potential	High & Moderate	694,259 ha	95%
Geothermal Hotspots	# of Springs	11	100%
Water Licences (Power General, Storage)	Count	30	97%
Water Licence Applications (General, Storage)	Count	77	83%
<i>Land Act Tenures</i>			
Water Power Rights-of-Way	Count	13	85%
Water Power Rights-of-Way	Area (ha)	42	99.6%
Water Power Leases	Count	5	100%
Water Power Leases	Area (ha)	6	100%
Water Power Licences	Count	18	78%
Investigative Permits (wind power)	Count	1	100%
Water Power Applications	Count	50	84%

**Source:** ILMB, March 2008.

## 2.4 Agriculture and Range

**Table 2.24 Summary of Agriculture Implications**

	<b>Base Case (Current Conditions)</b>	<b>LRMP</b>
<b>Existing Agriculture Activity</b>	<ul style="list-style-type: none"> <li>• Very small component of economy, appears to be growing in value.</li> <li>• Direct labour force of 175.</li> <li>• On ALR and 98% non-Crown land.</li> <li>• Mainly Pemberton Valley. Three small range tenures.</li> <li>• Potential loss of ALR to residential and other uses.</li> </ul>	<ul style="list-style-type: none"> <li>• General Management constraints apply.</li> <li>• No impact.</li> </ul>

### 2.4.4 Agriculture Background

The Plan Area has a very small agriculture economy. Between 2001 and 2006, the Census of Agriculture shows:

- Weeks of paid labour increased from 1,470 to 1,542;
- The number of farms increased from 77 to 86;
- Gross farm receipts increased from \$5.1 million to \$6.5 million;
- The area of farms shrank from 3,380 hectares to 2,583 hectares; and
- The average size of holdings has therefore shrunk considerably from 44 to 30 hectares.

The labour force of 175 in 2001 (2001 Census) has probably grown slightly, in line with the weeks of paid labour.

The Pemberton Valley has a cluster of small farms and a valuable seed potato sector. In 2006, there were 17 farms growing potatoes on 284 hectares in the study area. Agriculture occurs almost exclusively in the Agriculture Land Reserve (ALR), 98% of which is in settlement areas located in the region's valley bottoms. Just less than 75% or 8,944 hectares of the ALR is either private or Indian Reserve, while another 25% is on Crown Lands outside of protected areas. A small amount of ALR (184 hectares) is in existing protected areas.

In 2001, the productive agriculture land base was estimated to be 5,084 hectares, about 42% of the ALR land base. This implies the availability of land that could accommodate further agriculture. The Plan Area has three range tenures in the upper meadows of Miller Creek, covering roughly 4,000 hectares and supporting approximately 136 animal-unit months.

### 2.4.5 Agriculture Implications of the LRMP

No agriculture or range impacts are expected as a result of the LRMP. ALR land in the Plan Area is mostly private, while Crown land designated ALR is not impacted by proposed zoning changes. No ALR falls within Conservancies or Wildlands. General management directions in the LRMP do not make specific provision for agriculture.

### 3 SOCIAL IMPLICATIONS

**Table 3.1 Summary of Community Implications**

	<b>Base Case (Current Conditions)</b>	<b>LRMP</b>
<b>Population</b>	<ul style="list-style-type: none"> <li>Approximately 34,000 residents in Plan Area.</li> <li>Populations in communities and rural areas continued to grow despite lower harvests and mill closures (Squamish Lumber, Western Pulp).</li> <li>Most of the timber harvest is processed outside the area.</li> </ul>	<ul style="list-style-type: none"> <li>Minor forest job loss unlikely to have an impact.</li> <li>Reduced future timber supply may mean forgone potential jobs and population growth (particularly in Squamish).</li> </ul>
<b>Community Stability</b>	<ul style="list-style-type: none"> <li>Plan Area ranks in the top quartile among all BC health areas on key socio-economic measures.</li> </ul>	<ul style="list-style-type: none"> <li>Loss of potential future forest jobs may create hardship for some families, but Plan Area diversity and growth will offset this and provide alternatives.</li> </ul>

#### 3.1 Overview

The Plan Area consists of four municipalities, Squamish, Whistler, Pemberton and Lions Bay, several First Nations' communities and a small but rapidly growing rural population base scattered along Highway 99.

The population of the Plan Area grew 8.3% between 2001 and 2006, compared to overall provincial growth of 5.3%. With the exception of Lions Bay, all communities increased their populations, with robust growth in Pemberton, rural areas, and Mount Currie and Squamish First Nation reserves. At the same time, population growth in Whistler and Squamish was in line with growth experienced at the provincial level. BC Stats' current population projections for the Howe Sound Local Health Area show 52,000 people in 2030, a 54% increase over the 2006 population, equivalent to 2% per annum. This is almost double the increase projected for the province over the same time period.

**Table 3.2 LRMP Area and Population By Community, 2006**

<b>Jurisdiction</b>	<b>2001 Population (number)</b>	<b>2006 Population (number)</b>	<b>% Change</b>
District Municipality of Whistler	9,285	9,715	4.6%
District Municipality of Squamish	14,870	15,705	5.6%
Village of Lions Bay	1,440	1,400	-2.8%
Village of Pemberton	1,710	2,275	33.0%
Squamish-Lillooet RD Electoral Area C	1,500	1,885	25.7%
Squamish-Lillooet RD Electoral Area D	750	840	12.0%
Mount Currie	1,145	1,295	13.1%
Squamish Reserves in Study Area	235	390	65.9%
N'Quatqua (Nequatque No. 1, 2, & 3A)	175	175	0.0%
<b>Total LRMP Area</b>	<b>31,110</b>	<b>33,680</b>	<b>8.3%</b>

**Source:** Statistics Canada, 2006 Census.

**Notes: Squamish Reserves** in Study Area include: Cheakamus 11, Kowtain 17, Seaichem 16, Stawamus 24, Waiwakum 14, Yekwaupsum 18, Yekwaupsum 19 and Yookwitz 12.

**Mount Currie Reserves** in Study Area include: Mount Currie 1, 2, 6, 8 and 10, and Nesuch 3.

Socio-economic conditions in the Plan Area rate highly in the provincial context. Of the 77 local health areas in BC, the Sea-to-Sky region scored 14<sup>th</sup> best on the composite socio-economic index. Communities in the region perform well when measured against standards of economic hardship (fourth best in province), health, education and children/youth at risk. The only poor showing is in crime statistics (ranking 47 out of 77). The socio-economic indices are an overall measure of community health and stability.

Labour force data for the 2006 census had not yet been released at time of writing<sup>39</sup>, but the dynamics and structure of the 2001 workforce are not believed to have changed substantially since that time. The overall shift to a service-based economy that was evident during the 1981 to 2001 period has continued, with increases in the tourism, trade, public and service sectors expected to have offset job losses in forest manufacturing. The construction and energy production workforces have also likely gained in numbers and percentage of the total labour force since 2001.

The 2006 statistics on the economic base of the Plan Area, as measured by BC Stats local area dependency estimates, will not be available for at least a year. We would not expect the current economic base to deviate markedly from 2001 dependency data which showed tourism, the public sector, construction and forestry as leading economic sectors. Given two major mill closures since 2001, the forest industry is likely to have fallen below its 11% share of total community income, while tourism (29% in 2001) and construction (11% in 2001) have probably increased. At the individual community level, the characteristics of the economy can differ from the Plan Area profile. This is especially the case with Squamish, which has a much higher reliance on forestry activity than the tourism-oriented economies of Whistler or Pemberton.

### **3.2 Base Case Community Implications**

The slate of major projects in the Plan Area provides a good indication of future economic direction, as well as some insights into the growth management and land-use issues that might arise in the future. The 31 in-progress or planned projects (see Appendix 1) fall into four categories: energy, housing, tourism and commercial. Continued growth in those sectors that currently lead the local economy — namely tourism, construction and services — is anticipated, as is the emergence of an energy sector based on run-of-river, wind and geothermal power projects.

The large number of housing projects has been stimulated by new investments in transportation infrastructure and growth pressures in the rest of the Lower Mainland. This will continue to have implications for communities in the SLRD, particularly around growth management. The regional district's Regional Growth Strategy (RGS) is in final draft form and is expected to be approved shortly. The strategy acknowledges the higher growth rates and escalating housing costs faced by the southern communities of the Sea-to-Sky Corridor. This has created challenges for regional planning, as the needs and goals of these sub-regions vary significantly.

The SLRD foresees management issues around accommodating its high estimates of population growth while maintaining quality of life and the exceptional natural surroundings that residents and visitors value so highly. For these reasons, the RGS stresses the need to plan for compact, sustainable communities in existing urban centres, while preserving land-use patterns in support of traditional rural lifestyles and economic transitions. Urban residential and

---

<sup>39</sup> Release date for Statistics Canada is March 4, 2008.

commercial sprawl into the rural land base is seen as an undesired outcome of current growth patterns and its prevention a high priority. (SLRD, January 2008).

### 3.3 LRMP Community Implications

The LRMP's implications for community and social factors are associated with anticipated direct changes in the employment and economic base, especially those that might be considered destabilizing on the downside, and secondly with the more indirect effects on overall community well-being.

Timber harvest levels in the Plan Area have been below the AAC in recent years, while two major wood processing facilities (Squamish Lumber and Western Pulp Partnership) have closed. Population loss associated with forest sector difficulties has been more than offset by continued population gain from other sources.

Forecast timber harvest levels under the LRMP are slightly lower than levels forecast under the Base Case. Future forest employment would be slightly lower under the LRMP, representing foregone jobs beyond those forecast if market and operational conditions were to improve. Job losses would be expected in the timber harvesting sector, rather than wood processing. The loss of wood processing employment would be felt outside the Plan Area, primarily in Greater Vancouver, where the mills are located. In short, the forestry employment and population effects of the LRMP, while real, are not expected to destabilize or otherwise impair socio-economic conditions in the Plan Area.

The decline in forestry over the last 20 years, not only in the Plan Area but for the entire coastal region, is not necessarily an irreversible trend. That is, the current situation may not be a good representation of future conditions. The resource is renewable and will continue to exist. A case could be made that the industry as a whole will eventually reverse its decline and begin to attract the capital and innovation needed to regain a competitive footing. This may be in the form of new manufacturing opportunities, value-added processing, certified forest products and other sustainable uses for the timber resource. In such a future case, the loss of access to timber harvesting areas by a renewed forest industry may have costs greater than they seem today. The manifestation of these costs would most likely be in the area of foregone economic diversity.

The LRMP will prove a benefit for the tourism sector. Backcountry tourism activities could increase, but probably not enough to offset the potential loss of forestry jobs. The primary source of tourism growth over the last 20 years has been front-country development in the Sea-to-Sky corridor associated with downhill skiing, golfing and other outdoor activities near Whistler, Squamish and Pemberton. Even though the large majority of front-country visitors never visit backcountry areas, the benefits of the LRMP, including visual quality management and wildlife/habitat protection, will be widespread insofar as they preserve conditions deemed distinctive from a destination perspective. (Zeidler, *pers. comm.*).

Future tourism employment (and population) resulting from the effects of the 2010 Olympics will likely offset forestry job losses, but as these events are associated with the Base Case, they do not represent a benefit flowing from the LRMP.

The Regional Growth Strategy now being finalized by the SLRD characterizes the sprawl or urban-like residential and commercial developments into rural areas as a major concern. Of particular interest are proposed developments in Brohm Ridge and the Soo Valley that call for

the establishment of entirely new communities in rural areas outside of existing municipal boundaries. Residential developments that are conceived and presented as resort developments are seen as potentially problematic and counter-productive to the aims of the RGS. (Olmstead, Zeidler, *pers. comm.*, Feb. 28, 2008). The LRMP does not address issues concerning the use and disposition of Crown lands for purposes other than forestry, mining, energy production, tourism and recreation. Therefore, while we recognize the potentially negative effects of resort and residential development in rural areas in the Plan Area, the situation would be no different than under Base Case conditions, and therefore such effects should not be attributable to the LRMP.

For the above-noted reasons, the LRMP impact on community resilience is likely to be minor, despite the loss of some forestry employment. The current high health and stability of the region referred to in section 3.1, a growing population and anticipated economic, ecological and community stability benefits arising from the Plan are expected to offset the effects of the potential forestry job losses.

## 4 SUMMARY AND CONCLUSIONS

---

### 4.1 Summary of Implications

A summary of implications of the LRMP is presented in Table 4.1.

Forestry is a major land use, but very little of the harvest is now processed in the Plan Area. The maximum timber available for harvest (timber supply) is forecast to be reduced by 12% from Base Case volume in the first decade. The timber harvest, employment income and stumpage revenue in the same period are forecast to be reduced by 8%. While the LRMP reduces the land base available for timber harvesting (hence the timber supply), it is expected to lessen some impediments that have been contributing to the chronic under-harvest of timber.

Tourism is the largest and fastest-growing sector in the LRMP area economy, and while benefits are anticipated from the LRMP, they will be incremental. The majority of visitation, spending and economic activity is concentrated in front-country areas around Whistler where the plan impacts around visual quality protection will be positive but modest. Over half of the total Plan Area is already tenured for commercial recreation so significant increases in licensing activity are not anticipated because of the Plan. The quality of the visitor experience, however, may improve in backcountry areas where timber harvesting is now restricted.

Recreation will be a beneficiary of the LRMP due to protection in the Wildlands. The conflicts between motorized user groups like snowmobiling and non-motorized groups is a major issue in the Plan Area and are expected to worsen in the future in the absence of resolution of issues.

Minerals and the mining sector are considered from the perspective of the three sub-sectors: aggregate operations, industrial minerals and metal minerals. Aggregate and industrial minerals are primarily dependent on local markets that drive demand for their products. As local demand requires aggregate and industrial minerals, local operators will have a comparative advantage in supplying the area. The LRMP maintains access to most of the highest value sites and with local demand remaining stable or growing, it is likely that exploration and development will continue. However, local metal mineral investment must compete with external opportunities for investment interest. For metal mining activities, the area is now seen as a challenging place to work given the large number of interests on the land base. Under LRMP, the Wildlands zone adds additional constraints to the area open to mining and is likely to create future uncertainties for mineral exploration investment in the Plan Area.

The energy sector has three existing or potential components in the Plan Area: run-of-the-river, small-scale hydroelectricity generation by so-called independent power producers (IPPs), geothermal and windpower. Due to the exclusion of small-scale hydro from Conservancies and Wildlands, the LRMP will have a minor impact on existing, proposed and potential IPP projects. It will have a minimal impact on the exploitation of geothermal energy and no impact on the exploitation of windpower potential.

The agriculture sector is small in the study area but does provide an important opportunity for economic diversification. The sector will continue to mature and likely capitalize on specific market niches as they present themselves. Overall, the sector is not highly dependent on the LRMP planning and the plan will likely be neutral concerning future agriculture activities.

Few community and social impacts are anticipated because of the LRMP. Major new investments in infrastructure, housing, energy, tourism and services will stimulate economic activity and population growth that is expected to be in excess of the provincial average over the next 20 years. Most of this new activity is not linked to or dependent on the Crown land base and is unlikely to be affected by the Plan. The positive economic outlook will also mask any negative implications that might arise for forestry and mining.

## **4.2 Conclusions**

The LRMP should create a better environment for Crown land and resource use in the Plan Area through facilitation of ecological integrity, greater recognition and management of multiple-use values and the participation of First Nations in Plan content and implementation. When compared to the current situation, there will be greater certainty for user groups concerning issues around access and use and more explicit direction and remedies for resolving conflicts. This should allow communities to better plan for and accommodate their aspirations for social and economic development.

Our assessment of LRMP impacts is qualified by the following two factors:

- The GIS data cited in the tables throughout this document are derived from a Sept. 17, 2007 analysis. In the case of IPPs, interest reports from February 2008 were obtained. Although most indicators would not be expected to have changed in the six months that have elapsed since this analysis was done, we do recognize the sensitivity of some indicators, particularly concerning applications for and issuance of Crown land tenures and water licences. The potential sensitivity of some results to changes in data since September has been flagged at a number of points
- The cause-effect relationship between land use plans and key economic and social indicators is not that well understood and in many cases bears a high level of uncertainty. While the predictive results of AAC cuts in forestry carry with them a reasonable amount of certainty, the outcomes for other sectors are much less clear.

**Table 4.1 Summary of LRMP Effects**

Account	Characterisation of Effects	Direction	Magnitude	Confidence Level	Likelihood																
Forestry	Reduces timber harvesting land base by 12%, which reduces sustainable harvest level. But LRMP addresses land-base conflicts that were constraining timber harvest so harvest impacts less.	N	Average timber harvest reduced by 8%; 85 person-years lost per year; \$0.4 million lost in stumpage revenue.	High – THLB reduction High – direction Low - magnitude	High																
Tourism	Benefits anticipated from visual quality and increase in protected habitat but, as most of the area is already tenured, increases in visitor numbers and impacts will be incremental.	P	Low	Moderate	High																
Recreation	Access and quality of experience will improve in Wildlands zones.	P	Moderate	Moderate	Medium																
Minerals	Most high-value areas remain open to mining; however, limitations in Wildlands may deter investment and activity.	N	Low	Moderate	Medium																
Agriculture	None anticipated.	Nu	-	High	High																
Energy	Run-of-river small-scale hydroprojects will be precluded in Conservancies and Wildlands, but most Wildlands are in high elevations with little impact. No impact on windpower and minimal impact on geothermal.	N	Low	Moderate	High																
Social/Community	Small job losses in forestry will be offset by continued population growth and economic development in other sectors.	Nu	Low	High	High																
<p><b>KEY</b></p> <table border="0"> <tr> <td>Direction:</td> <td>Magnitude:</td> <td>Prediction confidence based on scientific information, statistical analysis and professional judgment:</td> <td>Likelihood based on professional judgment:</td> </tr> <tr> <td>P Positive</td> <td>L Low: No discernible change in key measures</td> <td>L Low level of confidence</td> <td>L Low probability of occurrence</td> </tr> <tr> <td>N Negative</td> <td>M Moderate: Change is evident but within historical parameters</td> <td>M Moderate level of confidence</td> <td>M Medium probability of occurrence</td> </tr> <tr> <td>Nu Neutral</td> <td>H High: Change in one or more measures is beyond historical parameters</td> <td>H High level of confidence</td> <td>H High probability of occurrence</td> </tr> </table>						Direction:	Magnitude:	Prediction confidence based on scientific information, statistical analysis and professional judgment:	Likelihood based on professional judgment:	P Positive	L Low: No discernible change in key measures	L Low level of confidence	L Low probability of occurrence	N Negative	M Moderate: Change is evident but within historical parameters	M Moderate level of confidence	M Medium probability of occurrence	Nu Neutral	H High: Change in one or more measures is beyond historical parameters	H High level of confidence	H High probability of occurrence
Direction:	Magnitude:	Prediction confidence based on scientific information, statistical analysis and professional judgment:	Likelihood based on professional judgment:																		
P Positive	L Low: No discernible change in key measures	L Low level of confidence	L Low probability of occurrence																		
N Negative	M Moderate: Change is evident but within historical parameters	M Moderate level of confidence	M Medium probability of occurrence																		
Nu Neutral	H High: Change in one or more measures is beyond historical parameters	H High level of confidence	H High probability of occurrence																		

## List of Tables

Table 2.1 Summary of Conclusions (Decade 1) .....	7
Table 2.2 Apportionment of AAC .....	8
Table 2.3 Commitments of Crown Timber .....	9
Table 2.4 Derivation of the Base Case Timber Harvest Forecast ('000 m <sup>3</sup> ) .....	11
Table 2.5 Sea-to-Sky LRMP Zones and Their Impact on Forestry .....	13
Table 2.6 Derivation of the LRMP Timber Harvest Forecast ('000 m <sup>3</sup> ) .....	14
Table 2.7 Provincial Implications .....	15
Table 2.8 Summary of Conclusions .....	16
Table 2.9 Relationship of Tourists and Residents to Commercial and Non-Commercial Recreation and their Importance in the Sea-to-Sky .....	17
Table 2.10 Licensed Commercial Recreation Operators in the LRMP Area .....	19
Table 2.11 Estimated Value of Licensed Commercial Recreation Activity in the LRMP Area, 2006 .....	20
Table 2.12 Percent of Total Land Base in Optimal* Recreation Zones .....	27
Table 2.13 Distribution of Key Indicators by Wildlands Sub-Zones .....	28
Table 2.14 Relative Impacts of Differing Restrictions in Conservancies and Wildlands on Tourism and Public Recreation .....	30
Table 2.15 Summary of Conclusions .....	36
Table 2.16 Aggregate Pits and Potential .....	40
Table 2.17 Industrial Mineral Potential (percentage of hectares) .....	41
Table 2.18 Metallic Mineral Tenures (percentage of hectares) .....	41
Table 2.19 Metallic Mineral Potential (percentages of hectares) .....	42
Table 2.20 Mineral Potential (percentage of the number of occurrences) .....	42
Table 2.21 Summary of Conclusions .....	44
Table 2.22 Operating and Advanced Hydroprojects in Sea-to-Sky Plan Area .....	45
Table 2.23 Summary of Energy Indicators Open for Development .....	47
Table 2.24 Summary of Agriculture Implications .....	48
Table 3.1 Summary of Community Implications .....	49
Table 3.2 LRMP Area and Population By Community, 2006 .....	49
Table 4.1 Summary of LRMP Effects .....	55
Table 4.2 Major Projects Inventory for the Sea-to-Sky Region .....	60
Table 4.3 Harvest in TSA 31 and TFL 38 combined .....	61
Table 4.4 Sea-to-Sky GIS Area Statistics – LRMP .....	62
Table 4.5 Sea-to-Sky GIS Area Statistics – Base Case .....	67
Table 4.6 Interactions Between Land-Use Zones and Resource Values .....	72

## List of Charts

Figure 1.1 Overview of the SEA Methodology Used .....	3
Figure 1.2 Main zones and example levels of constraint for forestry – Base Case .....	4
Figure 1.3 Main zones and example levels of constraint for forestry – LRMP .....	5
Figure 2.1 Interaction of LRMP and Other Factors on the Forest Sector .....	8
Figure 2.2 Squamish District Harvest Volumes and AAC, 1995-2007 .....	10
Figure 2.3 Potential Implications of the LRMP for the Tourism and Recreation Sectors .....	22
Figure 2.4 Parks, Conservancies and Wildlands Sub-zones .....	25

## References

- BC Stats. January 2008. Business Indicators – January 2008 Trends in BC’s Tourism Sector. Available at: <http://www.bcstats.gov.bc.ca/pubs/bcbi/bcbi0801.pdf>
- BC Stats. January 2004. 2001 Economic Dependency Tables for MSRM/LRMP Areas.
- BC Stats. 2006. Local Health Area 48 - Howe Sound Statistical Profile. Available at: [http://www.bcstats.gov.bc.ca/data/sep/lha/lha\\_main.asp](http://www.bcstats.gov.bc.ca/data/sep/lha/lha_main.asp).
- BC Stats. 2006. Local Health Area 48 - Howe Sound Socio-Economic Indices: 2006. Available at: [http://www.bcstats.gov.bc.ca/data/sep/choose\\_i.asp](http://www.bcstats.gov.bc.ca/data/sep/choose_i.asp).
- BC Ministry of Economic Development. Aug. 8, 2005. Economic Trends in the Sea-to-Sky LRMP Area and Significance of the Plan Area to the BC Economy.
- BC Ministry of Economic Development. September 2007. Major Projects Inventory. Available at: [http://www.gov.bc.ca/ecdev/attachments/mpj0704\\_feb292008\\_feature.pdf](http://www.gov.bc.ca/ecdev/attachments/mpj0704_feb292008_feature.pdf).
- BC Ministry of Forests. November 1996. Clearcutting and Visual Quality: A Public Perception Study. FRDA II.
- BC Ministry of Forests. February 2003. Economic Benefits of Managing Forestry and Tourism at Nimmo Bay: A Public Perception Study and Economic Analysis. Forest Practices Branch and Economics and Trade Branch. Victoria, BC.
- BC Ministry of Forests and Range. July 2007. Glossary of Forestry Terms in British Columbia. Available at: [http://www.for.gov.bc.ca/hfd/library/documents/glossary/Glossary\\_July2007.pdf](http://www.for.gov.bc.ca/hfd/library/documents/glossary/Glossary_July2007.pdf).
- BC Ministry of Forests and Range. 2005. Major Primary Timber Processing Facilities in British Columbia. 2005 edition. Accessed at <http://www.for.gov.bc.ca/het/>
- BC Ministry of Energy, Mines and Petroleum Resources. 2008. Exploration and Mining in British Columbia 2007 – Southwest Region.
- Geoscape Environmental Planners, Black Coffee Consulting and Lions Gate Consulting. March 2006. Tourism Potential under the Sea to Sky Land and Resource Management Plan. Ministry of Agriculture and Lands Strategic Land Policy Branch.
- Harshaw, H.W., R.A. Kozak and S.R.J. Sheppard. 2006. How well are outdoor recreationists represented in forest land-use planning? Perceptions of recreationists in the Sea-to-Sky Corridor of British Columbia. Science Direct Landscape and Urban Planning 78 (2006) 33–49.
- Hickin, A.S.; Brooks, E.D.; Dixon-Warren, A. B.; and, Bobrowsky, P.T. nd. Sea-to-Sky Aggregate Resource Potential Mapping Project. BCGS Open File 2001-12. From website located at: <http://www.em.gov.bc.ca/Mining/Geolsurv/Surficial/aggregate/sskypot.htm>
- Integrated Land Management Bureau, March 2008. Sea-to-Sky Land and Resource Management Plan.

Research Resolutions & Consulting Ltd. August 2004. Opportunities for British Columbia: Activity-Based Tourists in Canada. A special analysis of the Travel Activities and Motivation Survey (TAMS) conducted from September 1999 and April 2000 for Tourism British Columbia.

Squamish Lillooet Regional District. January 2008. Regional Growth Strategy Revised Draft for Discussion.

Statistics Canada, 2006 Census of Agriculture.

Stohtert Engineering Limited, 2003. Small Hydro Building Block Profile. Prepared for Economic Development Branch, Ministry of Sustainable Resource Management.

Timberline Forest Inventory Consultants. 2008. Timber Supply and Environmental Report, Sea to Sky LRMP. Prepared for BC Ministry of Agriculture and Lands, ILMB, January 2008.

Weber, Sarah. May 2003. Recreation Use in the Squamish Forest District: A Summary of Available Recreation User Day Information. BC Ministry of Sustainable Resource Management.

Western Canada Mountain Bike Tourism Association (2007). The Sea-to-Sky Mountain Biking Economic Impact Study. Vancouver, BC.

[http://www.imba.com/resources/science/sea2sky\\_e\\_i\\_study.pdf](http://www.imba.com/resources/science/sea2sky_e_i_study.pdf)

Western GeoPower Corp. December 2007. South Meager Geothermal Project, Project Summary. Accessed at <http://www.geopower.ca/meagerdescription.htm>

## **Contacts**

Blomfield, Mike, BC Snowmobile Federation. March 3, 2008.

Denbak, Suzanne. Formerly Tourism Whistler Manager. March 3, 2008. Telephone: (604) 938-3348.

Drysdale, Alec, Manager of Crown Land Adjudication. BC Ministry of Agriculture and Lands. Feb. 29, 2008.

Feller, Michael, Federation of Mountain Clubs of BC. Feb. 29, 2008.

Ferbey, Travis, Aggregate Geologist, BC Ministry of Energy, Mines and Petroleum Resources. Feb. 27, 2008.

Fisher, Jeff. CRB Logging, December 5, 2006.

Germain, Andre. Operations Manager, Squamish Forest District, BC Ministry of Forests and Range, December 8, 2006 and April 14, 2008.

Hails, Dave. District Manager, Squamish Forest District, BC Ministry of Forests and Range, December 8, 2006 and April 14, 2008.

Hanson, Brian, Run of River Power, March 14, 2008.

Heyes, Glenn, Range Officer, BC Ministry of Forests and Range. Feb. 29, 2008.

Olmstead, Steve, Director of Planning and Development, Squamish Lillooet Regional District.  
Feb. 28, 2008.

Northcote, Bruce, Regional Geologist, BC Ministry of Energy, Mines and Petroleum Resources.  
Feb. 29, 2008.

Shaw-Maclaren, Scott, Regional Manager, Adventure Tourism Branch, BC Ministry of  
Agriculture and Lands. Feb. 27, 2008.

Vamos, Geza, EcoMountain Tours and Wilderness Tourism Association. March 12, 2008.

Wallace, Mike. Soo Coalition for Sustainable Forests Society, December 8, 2006.

Zeidler, Eckhard, Councillor, Resort Municipality of Whistler, Feb. 28, 2008.

## Appendix 1 - Area Statistics

**Table 4.2 Major Projects Inventory for the Sea-to-Sky Region**

Name	Location	Description	Status	Estimated Cost (\$millions)
Britannia Mine Remediation Project	Britannia Beach	Multi-facility mine site remediation	Started	99
Furry Creek Recreation/Residential Project	Furry Creek	Housing, golf, marina development	Started	Unknown
Porteau Cove Residential Development	Furry Creek	1,400 residential units	Proposed	200
Mkw'alts (Ure) Creek Water Power Project	Pemberton	45 MV run-of-river power plant	Proposed	80
South Meager Creek Geothermal Project	Pemberton	100-250 MV geothermal electric power plant	Proposed	400
Evolution Condominiums	Squamish	70-unit condominium	Started	20
Skye at Coastal Village	Squamish	226 apartment/townhouse units	Started	40
Eaglewind Master Planned Community	Squamish	435 multi-residential units	Started	80
Thunderbird Creek in the Highlands	Squamish	300 single-family townhouse units	Started	50
Ashlu Creek Hydroelectric Project	Squamish	230 GWh run-of-river power project	Started	45
Quest University Canada	Squamish	International university, 960 market-housing units	Started	100
Garibaldi Springs Golf & Country Club	Squamish	Hotel, 106 townhouse units, commercial space	Started	73
Garibaldi at Squamish Ski Resort	Squamish	2,600 acre resort	On Hold	238
Squamish Wind Farm Project	Squamish	Wind turbine project	Proposed	150
Waterfront Landing Residential Development	Squamish	1,350 multi-residential units	Proposed	800
Factory Outlet Mall	Squamish	100,000 sq ft shopping centre complex	Proposed	20
Squamish Oceanfront Development	Squamish	Multi-purpose downtown and waterfront redevelopment	Proposed	Unknown
Squamish, Lil'wat Cultural Centre	Whistler	Native cultural centre	Started	30
Whistler/Blackcomb Mountain Gondola	Whistler	Peak-to-peak gondola	Started	40
Whistler Natural Gas Pipeline	Whistler	Squamish to Whistler pipeline	Started	37
Nita Lake Lodge	Whistler	80-room hotel	Started	56
Whistler Creekside Resort Modifications	Whistler	Mountain modifications	Started	26
Whistler Nordic Competition Venue	Whistler	Olympic Nordic competition site	Started	120

Whistler Sliding Centre	Whistler	Olympic sliding venue	Started	105
Whistler/ Callaghan Valley Olympic Village	Whistler	Athletes village	Started	130
Creekside Residential Development	Whistler	Residential redevelopment	Started	200
Raffuse Creek Hydroelectric Project	Whistler	9.9 MW run-of-river hydroelectric project	Proposed	21
Fitzsimmons Walk Townhouses	Whistler	77 townhouse units	Proposed	60
Whistler Wind Farm Project	Whistler	Wind tower power project	Proposed	80
The Lakelands at Green Lake	Whistler	Multi-family housing, international college, golf course	Proposed	50
Whistler Wastewater Treatment Plant Upgrade	Whistler	Plant upgrade	Proposed	22

**Source:** Ministry of Economic Development, September 2007.

**Table 4.3 Harvest in TSA 31 and TFL 38 combined**

Year	Harvest <sup>1</sup>	log price <sup>2</sup>	Harvest/AAC
1995	804,057	\$122.14	95%
1996	714,301	\$111.10	93%
1997	631,559	\$116.70	82%
1998	580,021	\$97.27	75%
1999	729,203	\$95.95	96%
2000	906,321	\$104.57	120%
2001	793,378	\$98.47	105%
2002	776,369	\$108.31	103%
2003	220,488	\$93.56	29%
2004	683,056	\$88.79	91%
2005	537,069	\$77.26	71%
2006	428,053	\$85.88	57%
2007	574,993	\$102.98	76%
<b>Average</b>	<b>644,528</b>	<b>\$100.23</b>	<b>84%</b>

**Source:** Economics and Trade Branch, Ministry of Forests and Range.

Notes: 1. Harvest is TSA 31 and TFL 38 combined.

2. Vancouver log price (softwoods only).

## Appendix 2 - GIS Area and Indicator Rollup

Table 4.4 Sea-to-Sky GIS Area Statistics — LRMP

Last Updated:	17-Sep-07		Total Plan Area							IFM	Total
			Private, Fed, IR	Protected Areas	Conservancies	Wildlands	Highly Constrained	Mod Constrained			
Sea-to-Sky Plan Area	Total - Plan Area		28,123	232,061	38,036	300,102	129,855	129,920	232,359	1,090,456	
	THLB		657	0	6,527	2,637	15,785	42,776	74,415	142,796	
<b>SOCIOECONOMIC INDICATORS</b>											
Community Watersheds	Total - Community Watersheds	Area (ha)	436	2,727	0	8,400	5,150	8,646	0	25,359	
Culture & Heritage Areas (AFNSITES_SQ)	Total - C & H areas	Area (ha)	80	1,815	264	574	2,932	0	0	5,666	
Culture & Heritage Areas (AREQ945)	Total - C & H areas	Area (ha)	22	9	0	0	22	32	8	93	
Cultural and Heritage Areas (LILWAT_CMS)	Max	Area (ha)	25	0	18	592	863	11	12	1,522	
	Mod	Area (ha)	150	0	0	39	1,490	2,111	0	3,790	
	Total - C and H areas	Area (ha)	175	0	18	631	2,354	2,122	12	5,312	
Productivity (based on SITE_IDX)	G	Area (ha)	5,313	1,766	100	130	7,484	10,913	12,589	38,295	
	M	Area (ha)	9,230	13,812	1,411	3,331	53,279	42,300	48,203	171,566	
	P	Area (ha)	2,328	55,317	9,700	37,425	50,356	34,969	45,684	235,778	
	Total - Productivity	Area (ha)	16,871	70,895	11,211	40,885	111,119	88,182	106,475	445,639	
Woodlots	Total - Woodlots	Area (ha)	0	0	0	0	638	854	647	2,139	
Heli	Total - Heli	Area (ha)	879	564	420	1,557	11,507	10,592	9,387	34,905	

Last Updated:	17-Sep-07		Total Plan Area							
			Private, Fed, IR	Protected Areas	Conservancies	Wildlands	Highly Constrained	Mod Constrained	IFM	Total
Mushroom Management Area	Total - Mushroom Mgt Area	Area (ha)	2	0	0	0	196	639	0	836
Industrial Mineral Potential	Very High	Area (ha)	2,096	520	0	10,111	6,048	3,805	4,319	26,899
	High	Area (ha)	6,713	18,305	10,634	102,191	45,860	25,467	50,413	259,583
	Moderate	Area (ha)	17,474	138,682	18,572	143,347	64,668	72,084	140,449	595,275
	Low	Area (ha)	1,834	48,416	8,831	14,757	10,202	25,605	25,163	134,808
	Very Low	Area (ha)	7	26,137	0	29,696	2,992	3,066	11,992	73,891
	Total - Industrial Mineral Potential	Area (ha)	28,123	232,061	38,036	300,102	129,769	130,028	232,336	1,090,456
Metallic Mineral Potential	Very High	Area (ha)	14,039	54,579	9,910	44,223	43,835	55,141	74,846	296,573
	High	Area (ha)	10,731	122,252	17,492	128,477	44,055	52,141	102,305	477,453
	Moderate	Area (ha)	3,347	16,681	10,634	101,792	38,101	20,048	36,778	227,380
	Low	Area (ha)	0	20,396	0	0	2,482	937	12,865	36,680
	Very Low	Area (ha)	5	18,154	0	25,610	1,296	1,762	5,542	52,369
	Total - Metallic Mineral Potential	Area (ha)	28,123	232,061	38,036	300,102	129,769	130,028	232,336	1,090,456
										0
Mineral Tenures	Mineral	Area (ha)	1,530	372	1,589	52,414	25,229	21,681	46,100	148,916
	Placer	Area (ha)	427	3	0	0	369	1,418	669	2,886
	Mineral & Placer	Area (ha)	104	0	0	0	425	670	734	1,932
	Total - Mineral Tenures	Area (ha)	2,061	375	1,589	52,414	26,022	23,769	47,503	153,734
										0
Crown Grants	Total - Crown Grants	Area (ha)	14,717	266	1	840	2,677	3,379	5,151	27,030
										0
Aggregate Potential	Primary	Area (ha)	11,316	1,010	0	18	2,662	4,050	2,258	21,315

Last Updated:	17-Sep-07		Total Plan Area							
			Private, Fed, IR	Protected Areas	Conservancies	Wildlands	Highly Constrained	Mod Constrained	IFM	Total
	Secondary	Area (ha)	5,603	4,695	229	4,344	6,775	11,622	9,047	42,316
	Tertiary	Area (ha)	7,811	30,937	2,991	34,598	54,794	59,605	58,541	249,276
	Water	Area (ha)	675	1,570	0	143	242	1,014	124	3,769
	Ice	Area (ha)	0	1,668	0	2,040	367	80	1,099	5,254
	Total - Aggregate Potential	Area (ha)	25,405	39,881	3,219	41,144	64,839	76,371	71,070	321,929
										0
Mineral Occurrences	Developed Prospect	Count	0	0	0	0	0	2	2	4
	Past Producer	Count	1	0	0	0	1	4	1	7
	Producer	Count	0	0	0	0	1	2	1	4
	Prospect	Count	7	1	0	7	4	16	9	44
	Showing	Count	5	2	0	16	20	23	31	97
	Total - Mineral Occurrences	Count	13	3	0	23	26	47	44	156
										0
ARIS	Number of Sites	Count	6	5	3	61	73	146	133	427
	Expenditures	\$	26,973	180,971	5,652	1,089,425	1,002,602	3,168,680	4,168,855	9,643,158
										0
Geothermal Potential	High	Area (ha)	8,384	95,209	25,806	134,943	57,772	72,150	157,780	552,044
	Moderate	Area (ha)	13,991	114,622	12,226	88,669	54,767	45,974	48,022	378,272
	Total - Geothermal Potential	Area (ha)	22,375	209,832	38,031	223,612	112,539	118,124	205,802	930,316
										0
Geothermal Hotspots	Number of Springs	Count	0	1	0	0	1	8	2	12
										0
Aggregate Pits	Active	Count	7	0	0	0	6	10	7	30
	Closed	Count	1	0	0	0	0	0	1	2
	Inactive	Count	10	1	0	0	7	18	3	39
	Not Active	Count	0	0	0	0	0	1	0	1
	Blank	Count	24	4	0	0	11	10	5	54

Last Updated:	17-Sep-07		Total Plan Area							Total
			Private, Fed, IR	Protected Areas	Conservancies	Wildlands	Highly Constrained	Mod Constrained	IFM	
	Total - Aggregate Pits	Count	42	5	0	0	24	39	16	126
										0
Recreation Opportunity Spectrum	Primitive	Area (ha)	0	113,849	3,153	64,188	0	0	123	181,312
	Semi-Primitive, Non-Motorized	Area (ha)	234	96,563	26,039	179,156	24,659	17,839	60,307	404,797
	Semi-Primitive, Motorized	Area (ha)	0	1,069	5,750	27,792	875	4,157	21,299	60,942
	Natural Roded	Area (ha)	809	6,393	1,626	4,637	7,180	6,003	7,891	34,539
	Modified Roded	Area (ha)	13,209	12,437	1,383	21,794	95,619	100,070	141,821	386,333
	Rural	Area (ha)	6,935	156	41	0	928	758	616	9,434
	Urban	Area (ha)	6,934	3	0	0	470	1,029	82	8,517
	Total - ROS	Area (ha)	28,121	230,469	37,993	297,567	129,729	129,856	232,138	1,085,873
			84	10	0	0	48	78	32	252
Guide-Outfitter Territories	Total - Guide-Outfitter Territories	Area (ha)	7,508	94,536	6,157	61,966	56,403	43,286	58,697	328,552
										0
Registered Traplines	Total - Registered Traplines	Area (ha)	27,338	87,208	38,001	298,690	123,925	120,321	224,958	920,441
										0
Tourism Features	Total - Tourism Features	Area (ha)	4,205	8,258	1,401	11,014	7,286	11,781	12,681	56,625
										0
Tourism Facilities	Total - Tourism Facilities	Area (ha)	169	2	0	0	5	24	2	203
										0
Trails	Total - Rec Trails	Length (m)	20,501	95,782	9,763	73,604	68,448	55,948	40,872	364,917
										0
Land Act Tenure Applications	Total - Land Act Tenure - Apps	Area (ha)	410	2,846	99	103,368	6,970	6,811	12,972	133,477
										0
Land Act Tenure Applications (Comm Rec)	Total - CR Tenure Applications	Area (ha)	306	382	10,229	38,131	4,747	4,790	14,989	73,574
										0

Last Updated:	17-Sep-07		Total Plan Area							
			Private, Fed, IR	Protected Areas	Conservancies	Wildlands	Highly Constrained	Mod Constrained	IFM	Total
Land Act Tenures	Total - Land Act Tenures	Area (ha)	4,253	18,497	15,545	32,195	19,056	28,846	20,180	138,572
										0
Land Act Tenures (Comm Rec)	Total - Comm Rec Tenures	Area (ha)	554	619	20,491	188,541	33,964	32,637	91,109	367,915
										0
Agricultural Land Reserve	Total - ALR	Area (ha)	8,944	183	0	0	928	1,139	772	11,966
										0
Water Power Projects - Rights of Way	Total - WPP RoW	Area (ha)	0	0	0	0	3	11	27	42
										0
Water Power Projects - Leases	Total - WPP Leases	Area (ha)	0	0	0	0	2	3	1	6
										0
Water Licences	Total - Water Licences	Count	6	2	3	8	32	21	38	110
										0
Water Licences (Applications and Licences Only)	Applications	Count	0	2	1	7	20	11	23	64
	Licences	Count	6	0	2	1	12	10	15	46
	Total - Water Licences (A & L)	Count	6	2	3	8	32	21	38	110
										0
Water Licences - Power Generation	Total - WL (Power Generation)	Count	2	0	1	1	2	4	4	14
										0
Water Licences - Power Generation (Applications and Licences Only)	Applications	Count	0	0	0	0	1	0	0	1
	Licences	Count	2	0	1	1	1	4	4	13
	Total - WL (Power Gen, A & L)	Count	2	0	1	1	2	4	4	14

**Table 4.5 Sea-to-Sky GIS Area Statistics – Base Case**

Last Updated:	17-Sep-07		Total Plan Area					Totals
			Private, Fed, IR	Protected Areas	Highly Constrained	Mod Constrained	IFM	
Sea-to-Sky Plan Area	Total - Plan Area		28,123	232,061	149,118	125,123	556,032	1,090,456
	THLB		657	0	13,417	32,151	96,572	142,796
<b>SOCIOECONOMIC INDICATORS</b>								
Community Watersheds	Total - Community Watersheds	Area (ha)	436	2,727	8,371	13,825	0	25,359
Cultural and Heritage Areas (AFNSITES_SQ)	Total - C and H areas	Area (ha)	80	1,815	866	489	2,416	5,665
Cultural and Heritage Areas (AREQ945)	Total - C and H areas	Area (ha)	22	9	19	16	28	93
Cultural and Heritage Areas (LILWAT_CMS)	Max	Area (ha)	25	0	353	245	899	1,522
	Mod	Area (ha)	150	0	1,492	1,284	864	3,790
	Total - C and H areas	Area (ha)	175	0	1,844	1,529	1,763	5,312
Productivity	G	Area (ha)	5,313	1,766	7,267	8,282	15,667	38,295
(based on SITE_IDX)	M	Area (ha)	9,230	13,812	54,704	33,718	60,101	171,566
	P	Area (ha)	2,328	55,317	68,939	27,918	81,276	235,778
	Total - Productivity	Area (ha)	16,871	70,895	130,910	69,918	157,044	445,639
Woodlots	Total - Woodlots	Area (ha)	0	0	555	863	721	2,139
Heli	Total - Heli	Area (ha)	879	564	11,890	9,518	12,054	34,905
Mushroom Management Area	Total - Mushroom Mgt Area	Area (ha)	2	0	196	639	0	836

Last Updated:	17-Sep-07		Total Plan Area					Totals
			Private, Fed, IR	Protected Areas	Highly Constrained	Mod Constrained	IFM	
Industrial Mineral Potential	Very High	Area (ha)	2,096	520	8,041	5,874	10,368	26,899
	High	Area (ha)	6,713	18,305	59,381	36,057	139,128	259,583
	Moderate	Area (ha)	17,474	138,682	63,907	66,551	308,661	595,275
	Low	Area (ha)	1,834	48,416	15,414	13,384	55,760	134,808
	Very Low	Area (ha)	7	26,137	2,375	3,256	42,115	73,891
	Total - Industrial Mineral Potential	Area (ha)	28,123	232,061	149,117	125,123	556,032	1,090,456
Metallic Mineral Potential	Very High	Area (ha)	14,039	54,579	48,152	38,954	140,849	296,574
	High	Area (ha)	10,731	122,252	48,418	52,952	243,101	477,453
	Moderate	Area (ha)	3,347	16,681	49,909	29,973	127,470	227,380
	Low	Area (ha)	0	20,396	2,405	714	13,166	36,680
	Very Low	Area (ha)	5	18,154	235	2,530	31,445	52,369
	Total - Metallic Mineral Potential	Area (ha)	28,123	232,061	149,117	125,123	556,032	1,090,456
Mineral Tenures	Mineral	Area (ha)	1,530	372	31,894	19,908	95,211	148,916
	Placer	Area (ha)	427	3	353	907	1,196	2,886
	Mineral & Placer	Area (ha)	104	0	422	52	1,354	1,932
	Total - Mineral Tenures	Area (ha)	2,061	375	32,669	20,868	97,761	153,734
Crown Grants	Total - Crown Grants	Area (ha)	14,717	266	2,684	1,711	7,652	27,030
Aggregate Potential	Primary	Area (ha)	11,316	1,010	2,524	3,692	2,772	21,315
	Secondary	Area (ha)	5,603	4,695	7,851	9,031	15,135	42,316

Last Updated:	17-Sep-07		Total Plan Area					Totals
			Private, Fed, IR	Protected Areas	Highly Constrained	Mod Constrained	IFM	
	Tertiary	Area (ha)	7,811	30,937	59,733	53,428	97,367	249,276
	Water	Area (ha)	675	1,570	310	421	793	3,769
	Ice	Area (ha)	0	1,668	0	332	3,253	5,254
	Total - Aggregate Potential	Area (ha)	25,405	39,881	70,418	66,904	119,321	321,929
Mineral Occurrences	Developed Prospect	Count	0	0	0	0	4	4
	Past Producer	Count	1	0	1	1	4	7
	Producer	Count	0	0	1	1	2	4
	Prospect	Count	7	1	4	17	15	44
	Showing	Count	5	2	20	15	55	97
	Total - Mineral Occurrences	Count	13	3	26	34	80	156
ARIS	Number of Sites	Count	6	0	0	0	0	6
	Expenditures (1986)	\$	26,973	180,971	1,042,600	1,318,135	7,074,479	9,643,158
Geothermal Potential	High	Area (ha)	8,384	95,209	60,196	52,676	335,579	552,044
	Moderate	Area (ha)	13,991	114,622	67,524	54,573	127,562	378,272
	Total - Geothermal Potential	Area (ha)	22,375	209,832	127,720	107,249	463,140	930,315
Geothermal Hotspots	Number of Springs	Count	0	1	1	4	6	12
Aggregate Pits	Active	Count	7	0	4	10	9	30
	Closed	Count	1	0	0	0	1	2
	Inactive	Count	10	1	6	17	5	39
	Not Active	Count	0	0	0	1	0	1
	blank	Count	24	4	11	7	8	54
	Total - Aggregate Pits	Count	42	5	21	35	23	126
Recreation Opportunity Spectrum	Primitive	Area	0	113,849	1,401	1,464	64,599	181,312

Last Updated:	17-Sep-07		Total Plan Area					Totals
			Private, Fed, IR	Protected Areas	Highly Constrained	Mod Constrained	IFM	
		(ha)						
	Semi-Primitive, Non-Motorized	Area (ha)	234	96,563	40,743	34,343	232,914	404,797
	Semi-Primitive, Motorized	Area (ha)	0	1,069	1,618	2,831	55,423	60,942
	Natural Roded	Area (ha)	809	6,393	9,752	3,185	14,400	34,539
	Modified Roded	Area (ha)	13,209	12,437	94,243	81,643	184,800	386,333
	Rural	Area (ha)	6,935	156	885	795	663	9,434
	Urban	Area (ha)	6,934	3	431	638	512	8,517
	Total - ROS	Area (ha)	28,121	230,469	149,073	124,899	553,311	1,085,873
Guide-Outfitter Territories	Total - Guide-Outfitter Territories	Area (ha)	7,508	94,536	62,449	45,804	118,255	328,552
Registered Traplines	Total - Registered Traplines	Area (ha)	27,338	87,208	143,393	120,941	541,561	920,441
Tourism Features	Total - Tourism Features	Area (ha)	4,205	8,258	8,474	8,044	27,645	56,625
Tourism Facilities	Total - Tourism Facilities	Area (ha)	169	2	5	13	13	203
Trails	Rec Trails	Length (m)	20,501	95,782	95,995	34,192	118,447	364,917
Land Act Tenure Applications	Total - Land Act Tenure Applications	Area (ha)	410	2,846	10,955	9,581	109,684	133,477
Land Act Tenure Applications (Comm Rec)	Total - CR Tenure Applications	Area (ha)	306	382	8,008	7,807	57,070	73,574
Land Act Tenures	Total - Land Act Tenures	Area (ha)	4,253	18,497	20,900	24,365	70,557	138,572
Land Act Tenures (Comm Rec)	Total - Comm Rec Tenures	Area	554	619	42,194	39,305	285,244	367,915

Last Updated:	17-Sep-07		Total Plan Area					Totals
			Private, Fed, IR	Protected Areas	Highly Constrained	Mod Constrained	IFM	
		(ha)						
Agricultural Land Reserve	Total - ALR	Area (ha)	8,944	183	719	1,100	1,020	11,966
Water Power Projects - Rights of Way	Total - WPP RoW	Area (ha)	0	0	3	8	30	42
Water Power Projects - Leases	Total - WPP Leases	Area (ha)	0	0	1	4	1	6
Water Licences	Total - Water Licences	Count	6	2	33	16	53	110
Water Licences	Application	Count	0	2	19	9	34	64
(Applications & Licences Only)	Licence	Count	6	0	14	7	19	46
	Total - Water Licences (A&L)	Count	6	2	33	16	53	110
Water Licences - Power Generation	Total - WL (Power Generation)	Count	2	0	4	4	4	14
Water Licences - Power Generation	Application	Count	0	0	1	0	0	1
(Applications & Licences Only)	Licence	Count	2	0	3	4	4	13
	Total - Power Generation (A & L)	Count	2	0	4	4	4	14

### Appendix 3 – Interactions Between Land-Use Zones and Resource Values

**Table 4.6 Interactions Between Land-Use Zones and Resource Values**

	<b>Timber Harvesting</b>	<b>Mineral Exploration</b>	<b>Commercial Recreation</b>	<b>Public Recreation</b>	<b>Agriculture &amp; Range</b>	<b>Trapping</b>	<b>Energy</b>
Protected areas	Not allowed	Not allowed	Some restrictions, particularly motorized uses	Subject to park management plan	General Management	General Management	Not allowed
Conservancies	Not allowed	Not allowed	Constrained No new facilities permitted No new motorized tenures	Constrained No new facilities No new motorized uses	General Management	General Management	Not allowed
Wildlands							
Cultural	Not allowed	General Managm't – with low impact exploration, access controls and no new roads	Constrained Lodges/facilities not permitted Restrictions to motorized use	Constrained Cabins/facilities not permitted Restrictions to motorized use	General Management	General Management	Geothermal allowed, hydro and wind not allowed
Recreation	Not allowed	General Managm't – with low impact exploration, access controls	Constrained Only small cabins/huts allowed	General Management	General Management	General Management	Geothermal allowed, hydro and wind not allowed
Tourism	Not allowed	General Managm't – with low impact exploration, access controls	General Management	General Management	General Management	General Management	Geothermal allowed, hydro and wind not allowed
Wildlife	Not allowed	General Managm't – with low impact exploration, access controls	Constrained No commercial recreation infrastructure of any sort	Constrained No public recreation infrastructure of any sort	General Management	General Management	Geothermal allowed, hydro and wind not allowed
Lil'wat Spirited Ground A, and Cultural Sites	Not allowed except for existing planned blocks	Constrained No roads unless necessary, preservation of First Nation values	Constrained No new land act tenures unless provincially significant	General Management	General Management	General Management	Constrained No new Land Act tenures unless provincially significant
OGMA	Not allowed	General Management	General Management	General Management	General Management	General Management	General Management

	<b>Timber Harvesting</b>	<b>Mineral Exploration</b>	<b>Commercial Recreation</b>	<b>Public Recreation</b>	<b>Agriculture &amp; Range</b>	<b>Trapping</b>	<b>Energy</b>
Sea-to-Sky Front-country	Constrained VQOs	General Management	General Management	General Management	General Management	General Management	General Management
Cultural Management Areas All activities conducted so as to "protect First Nations cultural values and the ecological integrity"	General Management	General Management	Constrained	Constrained	Constrained	Constrained	Constrained
Lil'wat Spirited Ground B Must consult First Nation and preserve values	General Management	General Management	Constrained	General Management	Constrained	Constrained	Constrained
Community Watersheds	General Management	General Management	Constrained Discourage or restrict motorized uses	General Management	General Management	General Management	General Management
Goat Winter Range	General Management	General Management	Constrained No new or expanded motorized tenures	Constrained No new or expanded motorized uses	General Management	General Management	General Management

Other wildlife and environmental values – most commercial and recreation activities are allowed under general management subject to recovery plans, management plans and site-specific management directions.



# Sea-to-Sky LRMP

Land and Resource Management Plan

## II. Environmental Risk Assessment

---



---

*April 2008*



## **Acknowledgments.**

The environmental risk assessment report was authored by Rachel Holt of Veridian Ecological Consulting Ltd. (coarse filter analysis) and Tony Hamilton of the Ministry of the Environment (fine filter analysis) for the Ministry of Agriculture and Lands and the Integrated Land Management Bureau (ILMB).

Direction and editorial input was provided by Ross Kreye of the Integrated Land Management Bureau, Jim Johnston of the Ministry of Agriculture and Lands, Crown Land Administration Division and Andy Mackinnon of the Ministry of Forests and Range.

The report draws heavily on two sources of data: firstly timber supply analyses conducted by Erik Wang of Timberline Forest Inventory Consultants Ltd; and secondly GIS data, maps and assistance supplied by John Sunde, Gurdeep Singh, Joshua Chan, Allan Leong and Susan Mordy of the ILMB-GEOBC Spatial Analytical Services Branch.

Valuable comments on drafts were provided by Frank DeGagne, Bill Hrick, Ross Kreye, Kevin Kriese, Arlette Malcolm, Hal MacLean, Al Niezen and Tony Pesklevitz.

All remaining errors are the responsibility of the authors and the Ministry of Agriculture and Lands.

Cover Photo by Brad Kasselmann  
[www.coastphoto.com](http://www.coastphoto.com)  
(used with permission)

# Environmental Risk Assessment Table of Contents

EXECUTIVE SUMMARY *(included with SEA Exec Summary)*

1	Introduction .....	1
1.1	LRMP Role and Objectives .....	1
1.2	Report Purpose and Scope .....	1
1.3	ERA Methodology .....	2
2	Coarse Filter Analysis .....	4
2.1	Methodology and Indicator Overview .....	4
2.2	Forest Areas with No Logging or Substantially Restricted Logging .....	5
2.2.1	Base Case/Current Management .....	5
2.2.2	LRMP .....	5
2.3	Old Forest Protection and Risk Levels .....	6
2.3.3	Base Case/Current Management .....	7
2.3.4	LRMP .....	7
3	Fine Filter Analysis .....	8
3.1	Methodology and Indicator Overview .....	8
3.2	LRMP Implications Relative to Base Case .....	9
4	Uncertainties and Assumptions — Coarse and Fine Filter .....	11
	References .....	13

# 1 INTRODUCTION

---

## 1.1 LRMP Role and Objectives

Land and Resource Management Plans (LRMPs) are strategic planning tools used to assist the provincial government in fulfilling its responsibility to manage multiple uses of Crown land. The general, interrelated, objectives of an LRMP are:

- To reduce and resolve land-use conflicts (on Crown land);
- To ensure sustainable resource management; and
- To provide economic diversity and security.

The Sea-to-Sky LRMP (S2S LRMP) states that “the Sea-to-Sky Land and Resource Management Plan process was undertaken to provide greater certainty for local economic development and the long-term sustainability of ecological values. The plan was developed with the aim of balancing the economic, environmental and social interests within the planning area in consideration of the wider regional and provincial setting”<sup>1</sup>.

Further comments are provided under the Social-Economic Assessment (SEA) on page 1.

## 1.2 Report Purpose and Scope

This report assesses the effects of the LRMP on environmental values and risks over time compared to what is expected would occur in the absence of the Plan — the so-called Base Case.

The extent to which the S2S LRMP achieves socio-economic objectives is covered in the separate SEA report in Part I of this document.

This environmental assessment assumes that the management objectives and direction outlined in the LRMP can and will be applied and enforced in the LRMP area. No attempt has been made to assess the likelihood or feasibility of implementing management initiatives. Section 4 on critical assumptions and uncertainties expands on this issue.

The scope of this report is also limited in a number of respects in line with the scope of the S2S LRMP.

- Management directions in LRMPs apply only to Crown land under the jurisdiction of the province of British Columbia. Public interests on private and municipal land are managed by local governments.
- While the LRMP was completed in several stages which addressed different parts of the Plan Area, the report focuses on assessing the impacts of the final LRMP in the whole Plan Area compared to the Base Case.
- The impacts of agreements reached with individual First Nations that form part of the overall Plan have not been assessed separately.
- The land-use status of the Ure Creek area of 3,851 hectares (0.4% of the Plan Area) on the northern boundary of Garibaldi Provincial Park remains unresolved. As a consequence, it is assumed that Base Case conditions apply in this area. The original Environmental Risk

---

<sup>1</sup> ILMB, “Sea-to-Sky Land and Resource Management Plan”, March 2008.

Assessment (ERA) analysis assumed, however, that no timber harvesting would be allowed in this area. Where possible, adjustments have been made, but otherwise a footnote comment has been added identifying the issue and estimating the likely magnitude of any errors involved.

### 1.3 ERA Methodology

Environmental Risk Assessment considers and interprets the interactions between land use and resource management scenarios and environmental values. Indicators of ecological integrity are selected and then, for each of these, current conditions are compared against the historic “natural” range of variation and predicted future ranges under differing management scenarios (i.e., options). An overview of ERA methodology is provided in:

[Environmental Risk Assessment: An Introduction, With Examples From QCI/Haida Gwaii, Rachel Holt \(2006\)](http://www.al.gov.bc.ca/clad/strategic_land/econ_analysis/projects_pubs/cabinet/ERA_intro.pdf)  (146kb) (See [http://www.al.gov.bc.ca/clad/strategic\\_land/econ\\_analysis/projects\\_pubs/cabinet/ERA\\_intro.pdf](http://www.al.gov.bc.ca/clad/strategic_land/econ_analysis/projects_pubs/cabinet/ERA_intro.pdf)).

The ERA procedure involves several steps, including:

- Identifying appropriate environmental indicators;
- Characterizing trends in those indicators through time;
- Establishing benchmarks against which to understand the significance of the trends through time and, where possible, identifying low and high risk thresholds to categorize the significance of changes;
- Assessing whether the Base Case and the land-use plan scenarios are adequate to maintain ecological integrity over the long term. This is usually done by comparing them with a benchmark approximating “natural conditions”; and
- Presenting results and identifying key assumptions and uncertainties so that decisions can be made with full knowledge of the potential environmental implications, and so that adaptive management processes can test the hypotheses being generated.

To facilitate the description and assessment of impacts, indicators of ecological integrity are required. A well-accepted method is to use a “coarse filter” and “fine filter” approach.

- **Coarse Filter Indicators:** The coarse filter focuses on ecosystem elements that provide for the vast majority of species. This can include:
  - representative ecosystems across the landscape;
  - using umbrella or wide-ranging species which have habitat that potentially also provides habitat for a wide array of other species;
  - using keystone species (those that have a disproportionately higher ecological role than is suggested by their biomass); and
  - using indicator species which are sensitive and require a broad set of ecosystem elements.
- **Fine Filter Indicators:** The fine filter approach identifies special elements that are not likely to be maintained by the coarse filter, including key ecosystem processes and rare species or habitats in the Plan Area, such as red- and blue-listed plants, plant communities and

animals<sup>2</sup>. Those species that are targeted by provincial or federal legislation would also be included<sup>3</sup>.

---

<sup>2</sup> See BC Species and Ecosystems Explorer at: <http://srmapps.gov.bc.ca/apps/eswp>

<sup>3</sup> These would include: species listed on *Species at Risk Act (Sch. 1)*; species listed under the *Wildlife Act*, [www.qp.gov.bc.ca/statreg/reg/W/Wildlife/168\\_90.htm](http://www.qp.gov.bc.ca/statreg/reg/W/Wildlife/168_90.htm); species at risk under the *Forest and Range Practices Act (FRPA)* [www.env.gov.bc.ca/wld/frpa](http://www.env.gov.bc.ca/wld/frpa)

## 2 COARSE FILTER ANALYSIS

---

### 2.1 Methodology and Indicator Overview

The coarse filter analysis focused on old growth forest. Output from timber supply analysis was used to determine current and predicted levels of old forest on the landscape (Timberline (January 2008) and E. Wang, *pers. comm.*), based on a series of modelling rules intended to reflect the most current land-use proposals for the S2S LRMP area.

- Current and predicted old forest levels under each of the options, Base Case and LRMP, were then compared to a 'mean natural' level of old forest estimated to be present on the landscape under a natural disturbance regime.
- The levels of risk to biodiversity were then determined for each of the options under the assumption that the closer to natural levels, the lower the risk (Province of BC, 1995). High risk is defined as greater than 70% deviation from the natural level of old forest. Low risk is defined as less than 30% deviation from the natural level of old forest. The mid-range (30%-70% deviation) is separated into Moderate-High (50%-70% deviation) and Moderate-Low (30%-50% deviation).

Forest cover data used in the timber supply analysis were incomplete for 76% of protected areas. However, the vast majority of this area is deemed to be non-forested areas (primarily rock, ice and alpine forest (B. Calder and E. Wang, *pers. comm.*), and, consequently, this analysis should not significantly overestimate risk due to missing data.

In describing the current and predicted old forest, four indicators have been used:

- The percentage of the moderate and high productivity forest which is protected. Such forest is typically associated with higher biodiversity values and the greater the percentage of such forest, the lower the risk to the maintenance of biodiversity;
- The percentage of representative old growth forest which is in protected areas. Protection of such old forest contributes to lowering the risk to ecological integrity by maintaining, into the future, species and ecosystems with their associated functions;
- The area of old growth forest likely to result from the LRMP and the Base Case through time, with the impact of the LRMP measured as the difference between the two; and
- The percentage of this additional old growth forest area which is of moderate and high productivity (calculated from the above three indicators).

The level of risk to biodiversity has then been described in terms of the number of ecosystems which are at high and moderate risk and the percentage this forms of all ecosystems — again, measured through time. The analysis uses analysis units (leading species and productivity codes) within biogeoclimatic units as a surrogate for “real” ecosystems.

Areas that are fully protected areas from commercial logging include existing parks plus Conservancies and Wildlands. Logging is substantially constrained in Cultural Management Areas (CMAs).

## 2.2 Forest Areas with No Logging or Substantially Restricted Logging

Table 2.1 lists, both as a percentage of the total area and in the Base Case versus the LRMP, the productive forest and high and moderate productivity forest which are either fully protected in Conservancies and Wildlands or partially protected in Cultural Management Areas.

**Table 2.1 Percentage of Productive Forest in Which Logging is Prohibited or Substantially Restricted**

Indicators	Total Area (Ha & % of Plan Area) <sup>1</sup>	Base Case		LRMP	
		Productive Forest	High/Mod Productivity	Productive Forest	High/Mod Productivity
Existing Protected Areas	232,263 ha (22.0%)	6.0%	0%	6.0%	0.9%
Conservancies	40,862 ha (4.0%)			1.4%	0.3%
Wildlands	300,775 ha (28.0%)			2.3%	0.2%
Cultural Management Areas	76,800 ha (7.0%)			4.8%	1.9%
<b>Totals</b>	<b>650,700 ha (60%)</b>			<b>14.3%</b>	<b>3.3%</b>

**Notes.** 1. Areas are based on Integrated Land Management Bureau (ILMB) GIS data from September 2007. Conservancy areas have been increased since then.

### 2.2.1 Base Case/Current Management

- Existing protected areas under-represent forested ecosystems (27%) and, particularly, high-moderate productivity ecosystems (4%).

### 2.2.2 LRMP

- The Wildlands and Conservancies are off-limits to harvesting as a result of the LRMP and thus add extensive areas to the existing protected areas (61% increase). The large size and contiguous nature of these areas will result in decreased risk due to a reduction in fragmentation and to the impact of prohibitions on activities in some areas (e.g., hydro development).
- The specific future contribution of CMAs to coarse filter biodiversity will differ with respect to, and depend upon, the specific management regimes implemented. If they are implemented as planned and modelled in the timber supply analysis<sup>4</sup>, they will increase by 82% the percentage of productive forest that is totally or partially protected, an even larger contribution than the Wildlands and Conservancies, bringing the total increase to 147%.
- The LRMP more than quadruples the area of high and moderately productive forested ecosystems under full or partial protection (a 268% increase). CMAs account for most of this increase (111%), based on the assumption that CMA management regimes are implemented as modelled.

<sup>4</sup> See Timberline (2008, p.32).

- Despite these absolute increases, only 14% of the additional full and partially protected areas are productive forest and only 3% are high and moderate productivity forested ecosystems<sup>5</sup>.
- In combination, the protected areas, Wildlands and Conservancies significantly under-represent high and moderate productivity forested ecosystems. This under-representation will likely leave those ecosystems, typically associated with higher biodiversity values, at higher risk into the future.
- The CMAs more evenly represent all ecosystems, and therefore have the potential to result in lower risk in future to those ecosystems currently at high risk. However, as highlighted above, specific outcomes will depend on the specific management regimes occurring within these areas.
- This pattern does not undermine the local gains to biodiversity values added by individual areas. For example, the Upper Elaho adds a significant area of relatively low productivity but older hemlock-dominated forest which, due to its size and location, will result in reduced risk to biodiversity values in that locale.

### 2.3 Old Forest Protection and Risk Levels

Old forest is maintained on the land base by the combination of all the constrained and partially constrained areas plus other assumed inoperable areas. This combination of constraints is reflected in the data below in Table 2.2, which shows the differences in old growth maintained on the land base under the Base Case and LRMP options. The number and area of ecosystems at risk (high and high-moderate risk) are then summarized. Note that the trends are different at different time periods.

**Table 2.2 Old Forest Protection and Risk Levels Over Time**

	Current	20 years	50 years	100 years	200 years
<b>Additional Old Growth as a Result of LRMP</b>					
(i) Area (ha)	0	2,627	6,677	8,541	28,071
(ii) Per cent of which is high/mod productive ecosystems <sup>6</sup>	0	42%	35%	29%	22%
<b>Forest Ecosystems at Risk<sup>7</sup></b>					
(i) Number (of 67) (Base Case/LRMP)	48/48	51/50	52/52	52/49	44/40
(ii) Per cent of forested area (Base Case/LRMP)	47%/47%	54%/48%	55%/50%	55%/48%	39%/31%

Protection of representative old forest contributes to lowering the risk to ecological integrity by maintaining species and ecosystems, with their associated functions, into the future. The LRMP results in a different trajectory for the amount of old growth in each ecosystem and, therefore,

<sup>5</sup> Note that this gain will be further reduced slightly since Ure Creek, which was modelled as a no-harvesting zone, is currently being considered as “Base Case – All Resource Uses Permitted” until resolved. Ure Creek has a relatively high proportion of higher productivity ecosystems compared to many other protection areas in the plan area.

<sup>6</sup> *Op. cit.*

<sup>7</sup> High and high-moderate risk – defined as forest ecosystems with “less than 30%” and “less than 50%” of the natural levels of old forest, respectively.

the numbers and trends of ecosystems at risk compared to Base Case. Table 2.2 also summarizes the number and area of high risk and high-moderate risk ecosystem through time.

### **2.3.3 Base Case/Current Management**

- 48 of 67 ecosystems are at risk today, increasing to 52 out of 67, 100 years into the future, and then decreasing to 44 out of 67 in 200 years. This represents a significant area of ecosystems at risk – 167,000 hectares, or 47% of the forested area today and 55% of the area in the future.

### **2.3.4 LRMP**

- The LRMP results in protection of more old growth through time – 2,627 hectares after 20 years, 6,677 hectares after 50 years and rising to 28,071 hectares after 200 years. This old growth is distributed across ecosystems, resulting in a slightly lower number of ecosystems at risk over time – 40 out of 67 remain at risk after 200 years, representing 31% (109,000 hectares) of the total area. The difference in ecosystems at risk only becomes apparent at 100 years-plus.
- The LRMP will result in a slightly lower number and percentage area of ecosystems at risk over time.
- Both the long term Base Case and the LRMP are expected to result in forested ecosystems at risk rising from current levels to peak around year 50 and then declining to the above long-term levels (year 200).
- The number and area of ecosystems at risk under both scenarios, at around 50% in 100 years, remain sufficiently high that they will likely undermine the effectiveness of the coarse filter biodiversity strategy intended to maintain ecological integrity.
- Overall, the LRMP results in continued under-representation of higher productivity ecosystems, undermining the coarse filter protection strategy, and therefore this will likely undermine long-term ecological integrity in the Plan Area.

### 3 FINE FILTER ANALYSIS

---

#### 3.1 Methodology and Indicator Overview

Fine filter species are typically those for which survival requires management objectives and strategies in addition to the maintenance of forest biodiversity and ecosystem representation at the landscape spatial scale. Forest biodiversity is still critical; the higher the risk to forest biodiversity at the landscape scale, the higher the risk to the individual forest-dependent species. Fine filter species are typically not "caught" by the coarse filter or riparian area conservation provisions. In addition, where the coarse filter fails (section 2.3.2), a greater number of species may require fine filter conservation provisions. The fine filter list may grow as a result, and the complexity of species-based conservation provisions along with it. In the Sea-to-Sky, the fine filter list of species represents a choice of a broad spectrum of habitat requirements and is based on knowledge about requisites, population status and distribution/range as well as the coarse filter assessment.

Risks to fine filter environmental values in the Plan Area were evaluated using a combination of model outputs, Geographical Information System (GIS) area statistics and expert opinion. For example, maps of marbled murrelet habitat suitability, ungulate winter ranges, existing and proposed grizzly bear wildlife habitat areas and other fine filter indicators were evaluated in relation to plan outcomes. The assessment considered questions like the following:

- Will formerly at-risk wildlife habitats now be protected in Conservancies?
- What are the overlaps between critical grizzly bear habitat and Floodplain Management Areas?
- Will the motorized access management provisions of the Coordinated Access Management Plan, if implemented, reduce mortality and displacement risk to wildlife?
- What environmental risks are not addressed by the LRMP and will be residual?

Risk to some fine filter values are more complex than others. For example:

- risks to population persistence were not evaluated for the majority of indicators; and
- for those species where mortality risk was examined, the assessment was more subjective than quantitative (e.g., in interpreting the likely implications of modelled changes in road density).

The major focus here was on risks to critical species habitats (e.g., mountain goat winter range). No attempts were made to link habitats to animal density, and risk categories were deliberately qualitative: very high, high, moderate, low, very low or nil. Emphasis was put on assigning the correct *relative* change from Base Case to LRMP implementation because modelling the absolute amount of change is inherently difficult. In the case of northern goshawks, risks were categorized as unknown simply because of the paucity of information about this listed sub-species in the Plan Area.

Base Case values were set from a variety of sources, ranging from inventory reports (e.g., Apps and Bateman, 2005), suitability maps (e.g., Smart, 2006) and personal knowledge and experience in the area (Rochetta, *pers. comm.*, 2008). A variety of maps utilized at the Sea-to-Sky LRMP Table were carried forward to this risk analysis.

Table 3.1 identifies the chosen fine filter species and summarizes the risk analysis for the Plan Area.

**Table 3.1 Fine Filter Indicators**

<b>Indicator Species</b>	<b>Base Case – Whole Plan Area (Current Conditions)</b>	<b>LRMP Relative to Base Case<sup>8</sup></b>
Grizzly Bear	Very High Risk	Moderate Risk because of recovery planning, Conservancies, Wildlands, grizzly bear management allowance (up to 5% of productive forest land base)
Mountain Goat	Moderate to High Risk	Reduction to Moderate Risk because of species plan, collaborative management on Squamish Nation Focus areas and some incremental habitat protection
Deer	Moderate to Low Risk	Low Risk: benefit from management planning and collaborative management in Focus areas
Roosevelt Elk	Moderate to Low Risk	Low Risk: benefit from management planning and collaborative management in Focus areas
Moose	Moderate to Low Risk	Low Risk: benefit from management planning and collaborative management in Focus areas
Bald Eagle	Moderate to Low Risk	Low Risk: benefit from management planning and Floodplain Management areas, and pending Regionally Important Wildlife status
Marbled Murrelet	Moderate to High Risk	Moderate Risk: benefit of Conservancies, Floodplain Management areas and species management plan
Wolverine	Very High Risk	High Risk: despite benefit of species management plan and furbearer plan with Squamish First Nation
Northern Goshawk	Unknown Risk	Unknown Risk, but improvement if species management plan genetic evaluation/inventory proves occupancy by listed sub-species
Harlequin Ducks	Moderate Risk	Moderate to Low Risk: improvement due to species management plan and pending Regionally Important Wildlife Status
Spotted Owl	Neutral	Plan has been deliberately made neutral with respect to Spotted Owl conservation as directed by the Species-at-Risk Coordination Office.

### **3.2 LRMP Implications Relative to Base Case**

- Conservancies will secure more wilderness of benefit in reducing risks to fine filter species. In particular, conservancies in the Upper Elaho, West Squamish, Soo, Birkenhead and Upper Rogers Creek catchments will help protect local critical Grizzly Bear and other significant wildlife habitats. The proposed Conservancy in the Callaghan will also enhance grizzly bear security, provided summer activity is minimized.

<sup>8</sup> Many influences on wildlife conservation are not specifically addressed by the LRMP. Threats include: high-end (e.g., helicopter) backcountry tourism and recreation; further settlement and development of transportation corridors; cumulative effects of energy developments by independent power producers (IPPs); and forest harvesting outside the defined timber harvesting land base (See section 4).

- Wildlands areas will also secure additional wilderness, provided motorized access is restricted. However their high elevation, rugged terrain and lack of representative forest (section 2.3.2) will limit their benefits to wildlife habitat. New road construction for forest harvesting (and subsequent public and commercial motorized use) remain as risks to fine filter environmental values, particularly in the Soo and Rogers watersheds (see section 4).
- Specific management plans recommended for the large, productive floodplains in the Plan Area will protect biodiversity, wildlife and fisheries values. Specifically, the establishment of the Birkenhead, Upper Lillooet and Squamish River Floodplain Management zones will result in enhanced protection of a wide variety of fine filter values.
- Implementation of grizzly bear recovery planning in the four grizzly bear population units that overlap the S2S Plan Area will significantly reduce risk to grizzly bears in southwestern British Columbia.
- The LRMP recommends specific management strategies/plans for mountain goats, moose, deer, bald eagles, marbled murrelets, wolverines, northern goshawks and harlequin ducks. The LRMP is neutral with regard to spotted owls.
- Benefits will likely result from management direction in the LRMP for Wildlife Focus Areas.
- By clearly identifying acceptable boundaries and activities by area, the LRMP enables better environmental planning and conservation.
- Risks to wildlife from concentrated commercial tourism, particularly a variety of helicopter-based activities, remain for part of the Plan Area. Motorized recreation and tourism, both summer and winter, can displace wildlife from critical habitat (see section 4).

#### 4 UNCERTAINTIES AND ASSUMPTIONS — COARSE AND FINE FILTER

---

The above analysis is built on the following assumptions and significant uncertainties which may influence the environmental risks.

- The extent to which actual management reflects assumptions used in the timber supply analysis will influence how well this analysis mirrors future land use in this region.
- This analysis considers only forestry activity on the land base and does not reflect mining, independent power projects, tourism and recreation, and other potential sector impacts. Areas assumed to retain old forest to meet forestry policy may be undermined by hydroelectric and mining projects since these activities are not bound by forestry policies. The Conservancies have management regulations similar to protected areas (no forestry, mining, hydroelectric and recreation as per the management plan for the Conservancy in question). Wildlands prevent forestry and hydroelectric, but not mining or tourism development. As a result, there may be some additional disturbance in Wildlands not included in this modelling. The following bullets expand on these points.
- The cumulative impact of numerous planned run-of-the-river (ROTR) hydroelectric, geothermal and windpower projects could reduce other environmental benefits of the LRMP and present fine filter environmental risks that are not addressed by the LRMP. These include:
  - the loss of old growth and consequent habitat for old growth dependant species due to timber harvesting under power lines;
  - incremental motorized access and associated ancillary impacts;
  - habitat loss and/or alienation of critical habitat for species at risk; and
  - both site-specific and cumulative impacts on a wide variety of wildlife, fisheries and ecosystems.

While the LRMP does prohibit ROTR hydroelectric projects in Wildlands, this is unlikely to have a significant beneficial impact on wildlife habitat since:

- it is unlikely to reduce ROTR project numbers in aggregate (Wildlands are high in elevation and typically have inadequate water flows for ROTR development); and
- the greatest impacts per ROTR projects will likely be at lower elevations.
- There remains a significant risk to fine filter environmental values from the cumulative impact of summer and winter recreation and tourism. Under the Base Case, the overall growth in the numbers of backcountry tourists and recreationists and, in particular, the increasing numbers of motorized visitors are expected to increase risks to wildlife.
- Motorized winter recreation (e.g., snowmobiling) can have significant environmental impacts on over-wintering ungulates, particularly mountain goats. Frozen snowmobile trails can facilitate access of wolves and so increase predation rates. Animals may also be displaced from critical winter and spring habitat by snowmobiles and helicopters (particularly grizzly bears, mountain goats and wolverines). Zonation for non-motorized recreation and tourism use reduces fine filter environmental risk by providing relatively disturbance-free refugia.
- The LRMP, in its present form, could add to this risk from increased numbers of motorized visitors by the creation of Conservancies and Wildlands, the protection of viewscapes and the consequent improvement of visitor experiences<sup>9</sup>. If the LRMP is modified to include non-motorized zones, then this will mitigate the fine filter risks to wildlife compared to the Base

---

<sup>9</sup> These relationships are discussed in the SEA (see p. 28 to 37).

Case. The amount of mitigation will depend on the size and location of the zones. The LRMP also calls for the development of a Coordinated Access Management Plan which has the potential to reduce risks to wildlife<sup>10</sup>.

- Increasing numbers of backcountry hikers and mountain bikers also present a risk to grizzly bear recovery, albeit a lesser one than motorized uses. The LRMP will increase these risks through its encouragement of greater backcountry visitor numbers.
- The modelling uses ‘analysis units’ — leading species and productivity — as a surrogate for ecosystems. Although these are the best available for modelling, the link between analysis units and ecosystems defined by site series remains an area of uncertainty.
- Areas that are classified as inoperable today are assumed in the timber supply model to remain inoperable into the future. Two recent analyses have shown this is probably not a reasonable assumption since it is estimated that between 10% and 50% of the recent and planned logging in the Plan Area has been outside the defined timber harvesting land base (THLB)<sup>11</sup>. The influence of this assumption will be somewhat reduced in this LRMP due to extensive identification of Conservancies and Wildlands in the currently non-contributing land base. However, it remains a potentially significant uncertainty for ecosystems currently in that zone. That is, the non-contributing forest, which wildlife managers have hitherto regarded as secure habitat, is no longer secure in the Base Case, and the LRMP does not address this issue.
- The consequences of climate change, including impacts on future forest trajectories and disturbance levels, as well as many other assumptions in the analysis are quite unknown.
- Reduced forest harvesting in Cultural Management Areas (compared with that modelled) may reduce risks to wildlife, but this remains uncertain.

---

<sup>10</sup> A spatially-explicit assessment of future road construction for forest harvesting in the All Resource Uses zone by the Ministry of Environment, utilizing modelling results from Timberline, demonstrated that even with management, motorized access will remain a risk to wildlife throughout the Plan Area.

<sup>11</sup> In an unpublished report by Timberline in 2006, it was estimated that between 30% to 50% of recent and planned logging in the Plan Area has been in the so-called non-contributing forest, generally of lower quality but in readily accessible areas (E. Wang. unpublished report to the S2S Technical Advisory Committee (March 2006)). More recently MOFR has estimated that since 1999 in the Soo TSA, only 11% has been in the non-contributing, 14% has been in designated heli-logging THLB and the balance in the conventional THLB (Hal MacLean, *pers..comm.*, April, 2008).

## References

- Apps, C. and B. Bateman. 2005. "Grizzly bear population density and distribution in the Southern Coast Ranges". *Aspen Wildlife Research*, Calgary, Alberta. 24 pp.
- Coast Information Team. 2004. "Ecosystem Based Management Handbook". Available at [www.citbc.org](http://www.citbc.org)
- Holt, R.F. 2005. "Environmental Conditions Report for the Haida Gwaii / Queen Charlotte Islands Land Use Plan". Prepared for the Ministry of Sustainable Resource Management. Available at: [www.veridianecological.ca](http://www.veridianecological.ca)
- Holt, R.F. 2006. "Environmental Risk Assessment: An Introduction, With Examples From QCI/Haida Gwaii". Available at [http://www.al.gov.bc.ca/clad/strategic\\_land/econ\\_analysis/projects\\_pubs/cabinet/ERA\\_intro.pdf](http://www.al.gov.bc.ca/clad/strategic_land/econ_analysis/projects_pubs/cabinet/ERA_intro.pdf).
- Holt, R.F. and A. MacKinnon. 2007. "Central Coast LUP Environmental Risk Assessment: Ecosystem Protection, Condition and Trends". Prepared for the Integrated Land Management Bureau. *Unpublished Report*.
- Price, K., R.F. Holt and L. Kremsater. 2007. How much is really enough? Informing old growth targets with threshold science. Manuscript in Preparation.
- Province of BC. 1995. "*Biodiversity Guidebook*". Queens Printer.
- Smart, Brian. 2006. "Marbled murrelet habitat suitability mapping for the Squamish Forest District".
- Timberline Forest Inventory Consultants. 2008. Timber Supply and Environmental Report, Sea to Sky LRMP. Prepared for BC Ministry of Agriculture and Lands, ILMB, January 2008.