

**SOO TSA
SOCIO-ECONOMIC ANALYSIS**

**Prepared for:
Economics and Trade Branch
Ministry of Forests
Victoria, B.C.**

Crane Management Consultants Ltd.

November, 1994

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EXECUTIVE SUMMARY

INTRODUCTION

- The BC Forest Service is presently conducting a provincial timber supply review to assist the Chief Forester in setting allowable annual cut (AAC) levels. The review examines the amount of timber available for harvesting in timber supply areas (TSAs)¹. Four documents are being prepared for each of the province's 36 TSAs: two technical documents (Timber Supply Analysis and Socio-Economic Analysis) offer information on timber supply alternatives and their social, environmental, and economic implications; a Discussion Paper summarizes the technical information and provides a focus for public debate; and a fourth report describes the rationale behind the Chief Forester's AAC decision.

SOCIO-ECONOMIC PROFILE

- The Soo Timber Supply Area (TSA) covers 880 000 hectares and is one of eight TSAs in the Vancouver Forest Region. The Ministry of Forests' District Office in Squamish administers the TSA. The Soo TSA lies north of Vancouver in the Southern Pacific Ranges of the Coast Mountains.

Communities and Economic Activity

- The TSA includes the District Municipality of Squamish, the Resort Municipality of Whistler, the Village of Lions Bay, the Village of Pemberton, and Electoral Areas C and D of the Squamish - Lillooet Regional District.
- The TSA population and labour force grew substantially in the 1980s. The population and labour force were 18 093 and 6 435, respectively, in 1991. Within this labour force, the most recent region-wide unemployment rate was 7.7 percent, two percentage points below the B.C. rate of 9.7 percent. Employment and employment growth is greatest in the service sector.
- The strong growth in regional population over the last decade is projected to continue, reaching 36 000 by 2018.
- Because of Whistler, the TSA's permanent population swells with temporary residents throughout the winter, especially on a winter week-end of good skiing weather. An excellent skiing week-end can bring Whistler's population up by an estimated 10 000 to 35 000 [Ministry of Forests, 1994]. In most respects less is known about the visitors than the residents but it is important from this study's perspective that outdoor recreation is their primary reason for spending time in the area.

¹ Current management practices are assumed in the review. These cover many but not all practises of the new Forest Code.

- Based on harvesting and primary employment data, the communities of Squamish and Pemberton are the most closely tied to the forest industry in the Soo TSA. Squamish has significant employment in forest products manufacturing and harvesting and Pemberton has a sizeable logging work force. Tourism holds an important position in all the communities, especially Whistler.

First Nations

- Six Indian bands have reserve lands in the Soo TSA, while seven bands have claimed traditional territory in the TSA.

The Forest Industry

- The Soo TSA has an Allowable Annual Cut (AAC) of 580 000 m³. The names and AACs of the established licensees appear in Appendix 5. The Small Business Forest Enterprise Program has the largest allocation with 20.9 percent of the total available AAC. International Forest Products (16.2%), Terminal Forest Products (11.8%), and Pacific Forest Products (11.5%) also have significant harvests. The remaining 39.6 percent of the AAC is allotted among another 13 licensees.
- Within the Soo TSA, direct forest industry employment, attributable to the Soo TSA's timber harvest, is estimated to be 367 PYs. Province-wide total direct forestry industry employment, attributable to the TSA's timber harvest, is 689 PYs. Most of the timber from the Soo TSA is processed outside the TSA.

Environmental Setting

- The Soo TSA encompasses the drainages of the lower Squamish River, the Cheakamus River and the Lillooet River. It is adjacent to the north, west and east side of Garibaldi Provincial Park and lies to the east of Howe Sound. The physiography consists mainly of the Coast Mountains throughout the TSA, with floodplains, such as the Pemberton Valley and the Squamish estuary, in valley bottoms.
- The TSA has five biogeoclimatic zones. Almost all of the valley floors and lower mountain sides of the TSA lie within the Coastal Western Hemlock (CWH) zone.
- Important big game species are Black-tailed Deer, Moose, Black and Grizzly Bear, Cougar, Mountain Goat and Gray Wolf.
- The fisheries potential of the drainage system into Howe Sound, mainly the Squamish and Cheakamus Rivers, is somewhat limited due to high gradients, extreme flow variation, low temperatures and nutrients and habitat loss due to industry and urbanization. Steelhead fry are the most abundant salmonid in the mainstream of the Cheakamus below Daisy Lake. The lower portion of the Squamish River, within the TSA, has significant populations of Steelhead, Coho, Chum and Chinook Salmon with

smaller numbers of Sockeye Salmon, Cutthroat and Rainbow Trout and Dolly Varden Char. All systems tributary to the main river above Lillooet Lake, with the exception of Meager Creek which is rated Class A, are very steep and their watersheds are too small to sustain significant fish populations.

Agro-Forestry

- The Soo TSA is one of several areas in British Columbia where Pine mushrooms are commercially harvested. The Ministry of Forests has designated the Blackwater Creek drainage, near Birkenhead as a wild mushroom harvesting reserve. Most residents of the D'Arcy and Birkenhead areas pick them in a good crop year.

Outdoor Recreation

- Participation rates for outdoor recreation activities are high for TSA residents. There is also a large number of visitors who use its public forests for active leisure activities, such as hiking and skiing, and passive ones, such as enjoying ocean and mountain landscapes. The forests provide a fundamental backdrop to these activities which in turn support a wide variety of businesses and their employees. Whistler is the centre of this activity.
- Statistics on Provincial Park and Forest Service recreation site visitation, highway traffic volumes and visitation to tourism amenities and attractions indicate growth trends, well in excess of population increases.

TIMBER SUPPLY SITUATION

- Three harvest forecasts based on the timber supply analysis are examined in this socio-economic analysis to identify the range of social, environmental, and economic implications associated with different harvest levels. The forecasts are for discussion purposes and do not imply that a particular harvest level is preferred.
- The Ministry of Forests estimates the TSA's long-run harvest level at 442 000 m³, 138 000 m³ below the current AAC of 580 000 m³. All three harvest forecasts move down to this level through different schedules, as shown in Figure ES-1 and Table ES-1.

IMPACTS AT THE TSA LEVEL

The impacts at the TSA level of all three harvest forecasts are summarized in Table ES-2.

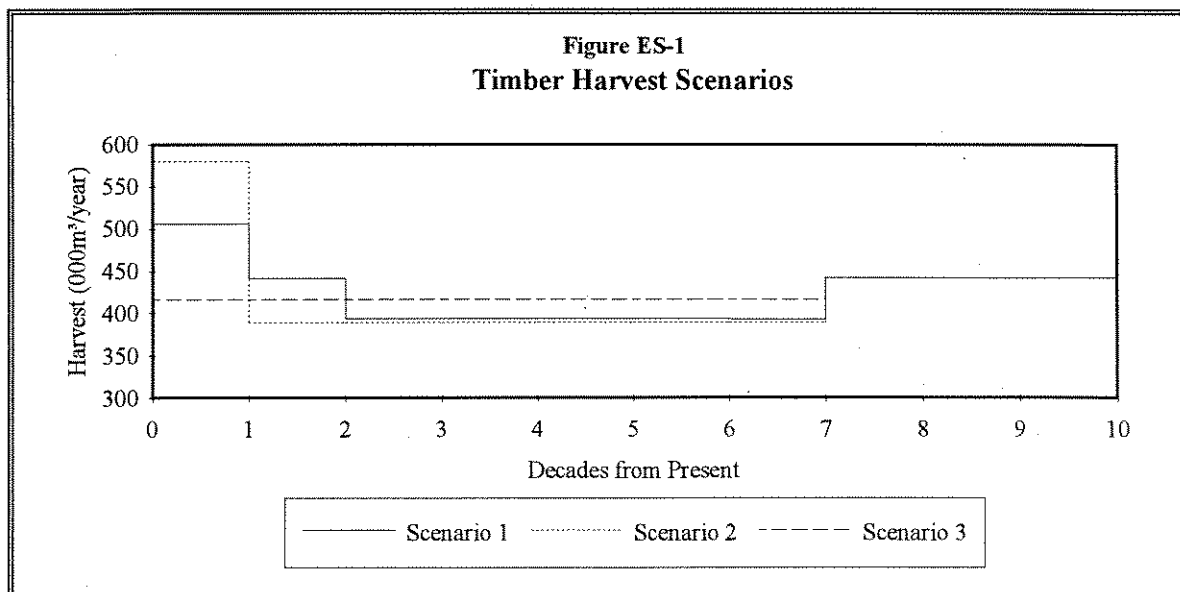


Table ES-1: Harvest Flow Forecasts (^{'000 m³})									
Harvest Period	Scenario 1			Scenario 2			Scenario 3		
	Harvest '000 m ³	Change		Harvest '000 m ³	Change		Harvest '000 m ³	Change	
		'000 m ³	%		'000 m ³	%		'000 m ³	%
Current	580			580			580		
0	506	-74	-13	580	0	0	416	-164	-28
10	441	-65	-13	389	-191	-33	416	0	0
20	394	-47	-11	389	0	0	416	0	0
30	394	0	0	389	0	0	416	0	0
40	394	0	0	389	0	0	416	0	0
50	394	0	0	389	0	0	416	0	0
60	393	1	-.3	389	0	0	416	0	0
70	442	49	12	442	53	14	442	26	6

Economic Development

- In Scenario 1, direct forest sector employment in the TSA would fall off immediately by 13 percent, or 47 person years (PY), below present employment levels. There would be a further 23 PYs of associated indirect jobs lost, leading to a total decline of 70 PYs. The corresponding direct and indirect employment income losses would be \$1.53 million and \$2.05 million per year, respectively. This would be followed by two successive decades of significant declines. Total job losses would be 62 and 44 PYs in years 10 and 20, respectively. Total cumulative job losses by year 20 would be 176 PYs. The corresponding total annual employment income loss would be \$1.80 million and \$1.31 million, in years 10 and 20, respectively. Total cumulative employment income losses by year 20 would be \$5.16 million per year.
- With Scenario 2 harvest there would be no changes in employment or income for the first decade. In year 10, direct forest sector employment in the TSA would drop by 33 percent, or 121 PYs, below present employment levels. There would be a further 60 PYs of associated indirect jobs lost, leading to a total decline of 181 jobs. The corresponding loss in direct income and indirect employment income of \$3.96 million and \$1.34 million per year, respectively.
- With Scenario 3, direct forest sector employment in the TSA would drop immediately by 28 percent, or 104 PYs, below present employment levels. There would be a further loss of 51 PYs of associated indirect jobs, leading to a total decline of 155 jobs. The corresponding direct income and indirect employment income losses would be \$3.40 million and \$1.15 million per year, respectively.
- The three harvest forecasts are likely to have similar tourism and outdoor recreation economic impacts over the long 80 year timber planning horizon.
- The harvest forecasts are likely to have the same impacts on mushroom harvesting and other agro-forestry uses because the same harvesting guidelines apply to each scenario and over time, each has a similar total timber harvest.

Community Impacts

- A reduction in the harvest level would probably not lead to a loss of population. In the long term, the potential of the tourism industry and the possibility of off-setting mitigation measures through intensive silviculture and possibly, additional value-added wood businesses should more than off-set any population losses arising from AAC reduction associated job losses.
- A reduction in the harvest level in the Soo TSA, in itself, will not likely lead to the closure of a major mill. Higher timber costs and lower harvests throughout the province are more menacing factors for mills relying on market logs. Soo TSA supply reductions will be a small factor in these trends.

Table ES-2: Summary of TSA Accounts

[illegible]

- Laid-off forest workers would have difficulty securing alternate local employment with wages and benefits equivalent to those in the forest industry. Pemberton, especially, does not have a base of adequate services to minimize transition problems.

Aboriginal Impacts

- The In-SHUCK-ch do not perceive lower harvest levels as having a negative impact on their members or their traditional communities. Lower harvest levels are seen as having some benefit to the In-SHUCK-ch in that they will forestall consumption of the forest resource in advance of land claims negotiations and settlements. They understand that lower harvest levels will heighten competition for the resource but they haven't formed an opinion as to the implications for the In-SHUCK-ch of this situation.
- The Anderson Lake Band (N'Quatqua First Nation) sees the TSA AAC reduction as imposing another burden on the difficult task of building a sustainable economy in their territory. If access to timber tenures by aboriginal organizations must continue under present rules, the N'Quatqua perceive the proposed AAC reductions as a threat to their vision of a self-governing, economically sustainable community.

IMPACTS AT THE PROVINCIAL LEVEL

The provincial impacts of the three harvest forecasts are summarized in Table ES-3.

- In Scenario 1, direct forest sector employment in the province would drop immediately by 13 percent, or 88 PYs, below present employment levels. There would be a further 132 PYs of associated indirect jobs lost, leading to a total decline of 220 jobs. The corresponding direct income and indirect employment income losses would be \$2.89 million and \$3.06 million per year, respectively. There would be two more successive decades of significant declines. Total job losses would be 193 and 140 PYs in years 10 and 20, respectively. Total cumulative job losses by year 20 would be 553. The corresponding total employment income loss would be \$5.21 million and \$3.77 million per year, in years 10 and 20, respectively. Total cumulative employment income losses by year 20 would be \$14.92 million per year.
- In Scenario 2 there would be no changes in employment or income for the first decade. In year 10, direct forest sector employment in the province would fall by 33 percent, or 227 PYs, below present employment levels. There would be a further loss of 341 PYs of associated indirect jobs, leading to a total decline of 568 jobs. The corresponding direct income and indirect employment income losses would be \$7.44 million and \$7.89 million per year, respectively.

Table ES-3: Summary of Provincial Accounts

[illegible]

- In Scenario 3 direct forest sector employment in the province would fall immediately by 28 percent, or 195 PYs, below present employment levels. There would be a further 293 PYs of associated indirect jobs lost, leading to a total decline of 487 jobs. The corresponding direct income and indirect employment income losses would be \$6.39 million and \$6.78 million per year, respectively.

Environmental Impacts

- Under any of the forecasts, timber harvesting would occur only on 14.8 percent of the TSA's land base. All the projected harvest flows would have fewer and less widespread environmental impacts over the long-term than attempting to maintain the current harvest level indefinitely.
- There would be a shift in the age-class distribution of forests within the TSA as most of the mature old growth forests in the timber harvesting land base would be converted to younger managed forests. The most productive forests within the TSA, for biological diversity and species richness, are at lower elevations. Timber harvesting, would decrease the area of mature forest stands and reduce overall natural diversity.
- Habitat generalists, those species that can adapt to a wide range of habitat types and species which occupy early successional forest types, would likely increase in numbers (most of these species are not of specific management concern). Populations of species which are dependent on old forests or old growth attributes, or reach their maximum abundance in late successional forests, would decline. The greatest declines would occur among habitat specialists (most of these species are of significant management concern) and recovery options for species at risk, such as the Northern Spotted Owl, would be impaired.
- Direct damage to fisheries habitat can include bank destabilization, the removal of stream side vegetation and debris jams. Other, more indirect, logging related disturbances include the alteration of hydrological processes, increased sedimentation and reduction in large organic debris. With important populations of steelhead and other salmonid species already faced with reduced habitat, environmental damage could have impacts extending beyond the Soo TSA.

Government Revenue Impacts

- Current annual provincial government revenues are approximately \$12.60 million. In the Scenario 1, the immediate harvest reduction results in an annual loss of \$1.61 million in revenue. There are further reductions of \$1.41 million and \$1.02 million in years 10 and 20, respectively. Annually, \$3.00 million is lost by the time the long-term harvest level is reached in year 70.

- In Scenario 2, there would be no reduction until year 10 when the harvest reduction results in a loss of \$4.15 million per year in provincial revenue. There are no further changes for the next 6 decades.
- In Scenario 3, the immediate harvest reduction results in an annual loss of \$3.57 million in provincial revenue. There are no changes for the next 7 decades.
- Policy changes, announced in April, 1994 as part of the Forest Renewal Plan, will result in significantly higher stumpage revenues if the increase in lumber prices which occurred in 1993 represents a structural shift in the market. Initial estimates indicate that stumpage revenues may be 60 percent to 80 percent higher than in the past².

² The estimates herein do not incorporate these potentially higher stumpage levels.

1. INTRODUCTION

1.1 Background

The BC Forest Service is presently conducting a provincial timber supply review to assist the Chief Forester in setting allowable annual cut (AAC) levels. The review examines the amount of timber available for harvesting in timber supply areas (TSAs)³. Four documents are being prepared for each of the province's 36 TSAs: two technical documents (Timber Supply Analysis and Socio-Economic Assessment) offer information on timber supply alternatives and their social, environmental, and economic implications; a Discussion Paper summarizes the technical information and provides a focus for public debate; and a fourth report describes the rationale behind the Chief Forester's AAC decision.

1.2 Objectives and Methodology

The Soo TSA Timber Supply Analysis report was released in July, 1994⁴. Three harvest forecasts based on the timber supply analysis are examined in this socio-economic assessment. These forecasts represent possible harvest flow patterns given current land base and forest management practices in the Soo TSA. The forecasts were chosen to illustrate a range of social, environmental and economic implications associated with different harvest levels. **The forecasts are neither meant to suggest a preferred AAC level nor do they represent the only options that could be considered in the final AAC determination.**

The impacts of the three harvest forecasts are assessed within a "multiple accounts" framework. A multiple accounts analysis focuses attention on a range of values derived from the forest resource and recognizes that a number of factors may need to be considered when examining alternatives for forest management.

The implications of the harvest forecasts are evaluated in terms of six accounts. Three accounts consider economic development, community, and First Nations concerns at the TSA level. Economic development, environment, and government revenue impacts are then viewed on a province-wide basis.

³ Current management practices are assumed in the review. These cover many but not all practises of the new Forest Code. Future changes in practises will be included in the next reassessment of the timber supply, expected in approximately five years.

⁴ Ministry of Forests, Resource Planning Branch. (1994). *Soo TSA Timber Supply Analysis*.

Table 1-1: Multiple Accounts	
Account	Impacts
TSA Level	
Economic Development	Direct and indirect income and employment impacts.
Community	Impacts on population, provision of local services, local government revenues and the provision of local government services and infrastructure. The impacts on community goals such as stability and quality of life.
First Nations	Impacts on aboriginal community resources, cultural values, traditional activities and economic development goals.
Provincial Level	
Economic Development	Province-wide direct and indirect income employment.
Environment	Impacts on the environment assessed from an ecological perspective.
Provincial Government	Impacts on gross government resource-related taxes and other revenues.

The impact estimation methodologies are discussed in Appendix 8.

1.3 Data Sources

The study utilized information and data from a variety of sources. The regional profile was prepared with data from Statistics Canada, BC Central Statistics Branch, the Squamish-Lillooet Regional District, various B.C. Government ministries and individual municipalities.

The economic impact assessment draws upon information from Soo TSA licensees, Ministry of Forests and Ministry of Finance and Corporate Relations in Victoria. The data and assumptions from these sources were updated, verified, and in some cases supplemented by further discussions with the appropriate agencies and companies.

The environmental account is based on reports from BC Environment, Environment Canada, Ministry of Forests, Fisheries and Oceans Canada and local environmental organizations.

The community account was based on a series of telephone interviews conducted with forest company representatives, forest workers, union representatives, community leaders and other stakeholders. Where possible, impact statements were supplemented by available industry studies and discussions with other industry officials.

Meetings and telephone discussions with First Nations representatives were used to define and gauge impacts on the aboriginal community.

A bibliography and list of study contacts are provided in Appendices 3 and 4, respectively.

1.4 Report Structure

The next chapter of this report provides a socio-economic profile of the Soo TSA communities. Chapter Three explains the timber harvest projections which drive the analysis. Chapters Four and Five examine the impacts of Scenarios 1, 2 and 3 respectively. The final chapter presents a summary of impacts.

2.0 SOCIO-ECONOMIC PROFILE

2.1 Introduction

The Soo Timber Supply Area (TSA) encompasses 880 000 hectares and is one of eight TSAs in the Vancouver Forest Region. The Ministry of Forests administers the TSA from their District Office, located in Squamish.

The Soo TSA lies north of Vancouver in the Southern Pacific Ranges of the Coast Mountains and encompasses the lower Squamish, Cheakamus and Lillooet River drainages and area the east of Howe Sound. It includes Squamish, a regional centre of about 12 000, and a number of smaller communities: Lions Bay, Whistler, Pemberton, D'Arcy, Birkenhead, Mount Currie, and Skookumchuck. A map of the TSA is shown in Figure 2-1.

The forest and tourism industries anchor the local economy. There is an extensive history of logging and timber processing and they provide a substantial source of revenue and employment. With the recent growth of Whistler, tourism and recreation have become increasingly important employment sources and have affected the local lifestyle. The major population centres of the Lower Mainland have easy highway access to forested recreation areas and for this reason, visual quality management of the main transportation corridor, the Sea to Sky Highway has become a high priority.

The area's primary biogeoclimatic zones are Coastal Western Hemlock, Mountain Hemlock and Alpine Tundra. The most prevalent species in the forested area is hemlock/balsam followed by Douglas-fir and cedar. Wildlife species in the study area are typical of Pacific northwest coastal forests, with some of special management concern.

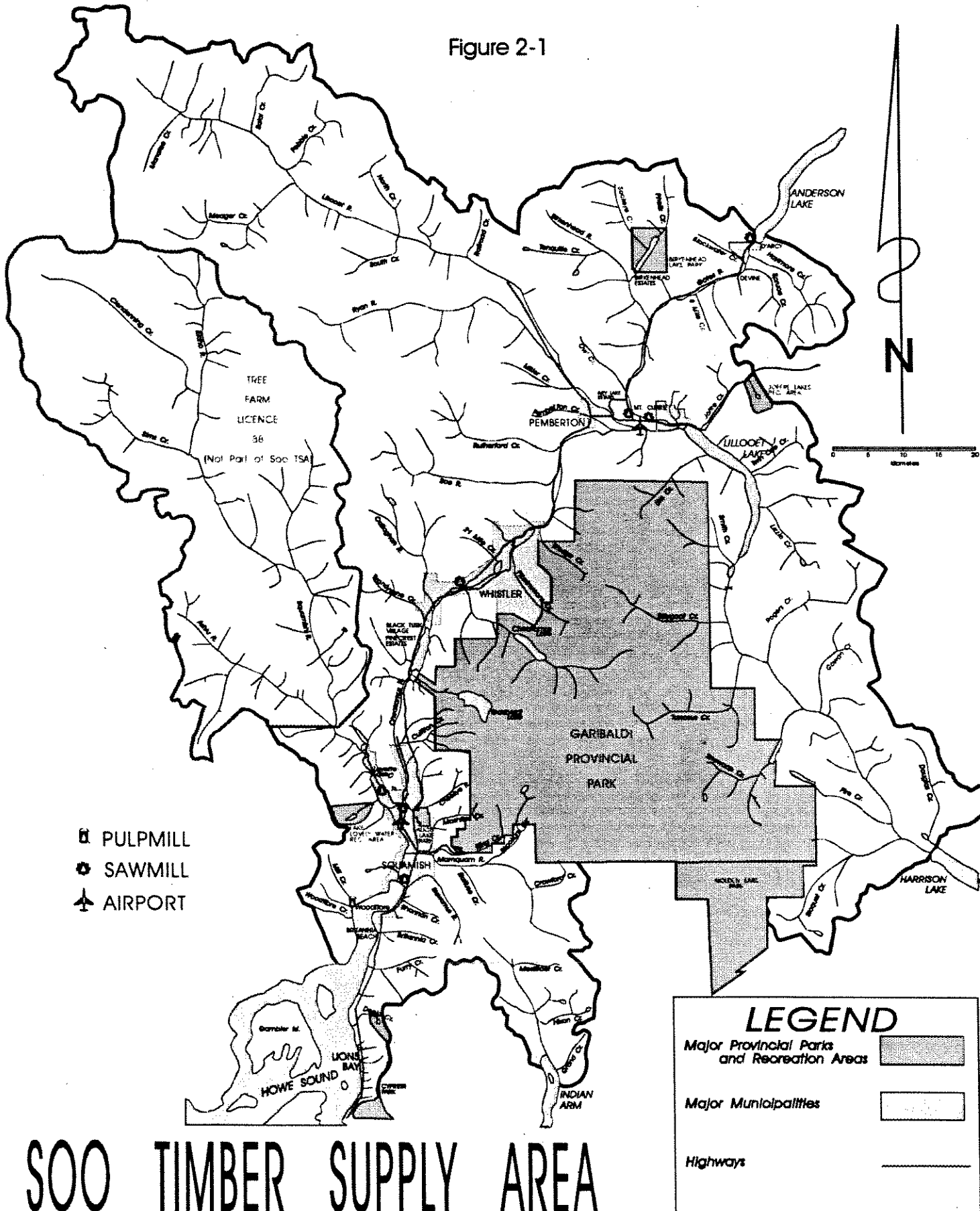
2.2 Overview

The information in this section encompasses the District Municipality of Squamish, the District Municipality of Whistler, the Village of Pemberton, and Census Subdivision B⁵ of the Squamish - Lillooet Regional District⁶.

⁵ This unit is not the same as the regional district electoral area. It includes almost all of Electoral Areas D and C of the Squamish-Lillooet Regional District.

⁶ The community of Lions Bay also falls within the Soo TSA but is within the Greater Vancouver Regional District. A small portion of Subdivision B lies outside of the TSA and a small part of the Fraser-Cheam Regional District lies inside the TSA; however, the populations in these affected areas are very small and should not affect the overall assessment.

Figure 2-1



Population

Basic statistics describing the demographic and labour force characteristics of the region appear in Table 2-1. The total 1991 population of 18 093 represented a 29.9 percent increase over the 1986 population of 13 928. This population growth of the province during this period was 13.8 percent. The area's labour force also grew substantially in the 1980s. In 1991, the combined labour force was 6 435. The most recent region-wide unemployment rate was 7.7 percent, two of percentage points below the B.C. rate of 9.7 percent. Average incomes were lower in the Squamish - Lillooet R.D. (\$23 955) than in B.C. (\$25 893).

Table 2-1: Key Regional Economic Statistics

	Study Area	Squamish-Lillooet R.D.	B.C.
Population (1991)	18 093	23 421	3 282 061
Annual Growth (1986-91)	5.4%	5.5%	2.6%
Per cent Change (1986-91)	29.9%	30.9%	13.8%
Land Area (square kms)	8 936	16 534	892 677
Labour Force	6 435	13 570	1 748 920
Unemployment Rate (1993)	7.7% ⁷		9.7%
Average Income (1990)	n/a	\$23 955	\$25 893
Source: 1991 Census Data, Statistics Canada Monthly Labour Force Survey, Statistics Canada BC Central Statistics			

There are a few significant demographic trends which have implications for the study area. The average age of the regional population has steadily advanced over the last two decades as the baby boom generation moves into its middle age years. Table 2-2 compares the regional population age profile for the census years 1981, 1986 and 1991.

Table 2-2: Squamish - Lillooet R.D. Age Profile for 1991, 1986 and 1981

Age Group	1981	1986	1991
0-14	27.0%	26.0%	24.2%
15-24	19.3	15.4	13.8
25-34	21.1	20.5	21.1
35-44	12.1	15.1	17.9
45-54	9.2	8.9	9.8
55-64	6.6	8.0	6.9
65+	4.7	6.1	6.3
Total	100.0%	100.0%	100.0%
Source: 1981, 1986, 1991 Census Data, Statistics Canada			

⁷ Includes North Vancouver, Sechelt and Squamish.

Between 1981 and 1991, the 0-25 age group lost 8.3 percent from its share of the total population. This was picked up predominantly by the 35-44 age group, which gained 5.8 percent in its share, and by smaller gains in the above 65 age group.

The robust growth in regional population over the last decade is projected to continue in future years, as shown in Table 2-3.

Table 2-3: Soo TSA Population Projections for 1993 - 2018⁸		
Year	Total Population	Per cent Change
1993	20 024	-
1998	23 160	15.7
2003	26 050	12.5
2008	29 079	11.6
2013	32 402	11.4
2018	36 009	11.1
Source: BC Stats		

The population ageing trend is also expected to continue well into the next century. The percentage share of the 45+ age groups and the 25-34 age group will increase significantly while the other age groups will decline. The cumulative effect of these ageing trends will see the median age of the population in the Squamish - Lillooet R.D. increase from 31.6 in 1993 to 37.8 in 2018.

Visitor Population

An important feature of the population statistics is that they do not reflect the significant week-end and seasonal upsurges in population because of the Whistler resort area. The sources are Greater Vancouver residents who have second homes in Whistler, transient ski hill workers and tourists who come to experience Whistler's four season resort.

The TSA's relatively modest permanent population swells throughout the winter and can explode on a winter week-end of good skiing weather. Only gross estimates are available for the region's augmented population. An excellent skiing week-end could bring Whistler's population up by 10 000 to 35 000, representing an increase of 224 to 785 percent on Whistler's population and a 55 to 193 percent increase over the study area's population. Based on skier visits alone during winter months, not accounting for non-skiing visitors, there is an average of over 7 000 skiers on any one day on the slopes.

⁸ The Central Statistics Branch projects populations for regional districts only. We have assumed that municipalities comprising the Soo TSA will grow at the same rate as the regional district itself. The figures are presented for illustrative purposes only and are not meant as reliable forecasts.

In most respects less is known about the visitors than the residents but from this report's perspective it is important that outdoor recreation is the visitor's primary reason for spending time in the area.

Labour Force and Income

Labour force statistics are the best source of official information about the economic structure of a community or region. The percentage share by industry of the regional labour force for the 1981 and 1991 census years appears in Table 2-4. In general, declines in the primary and manufacturing sectors were offset by significant increases in service sector activity especially in the hospitality industry where the proportion of workers almost doubled. The forest workforce is accounted for in two categories: the primary forest sector (mainly logging) and the manufacturing sector (mainly wood processing). In 1991, approximately 65 percent of the regional manufacturing labour force was related to forestry; therefore, the forestry labour force in the Squamish - Lillooet R.D. was approximately 11 percent of the total labour force.

Table 2-4: Experienced Labour Force in the Squamish - Lillooet R.D. Percentage Share 1991 and 1981		
Industry	1991	1981
Forestry ⁹	5.5	10.0
Other Primary	2.5	4.3
Manufacturing	3.2 ¹⁰	15.3 ¹¹
Forestry Processing	5.9	n/a
Construction	9.2	12.2
TCU	10.8	16.2
Trade	11.2	9.9
FIRE	3.0	2.8
Government	7.1	4.3
Accommodation, Food & Beverage	16.8	8.5
Other Services	24.8	16.5
Total	100.0%	100.0%
Key: TCU-Transportation, Communications, Utilities; FIRE-Financial, Insurance, Real Estate; Other Services-includes Education and Health Services Source: 1991 and 1981 Census Data, Statistics Canada.		

The Ministry of Finance [1993] researched the economic dependencies of 55 small areas, including the Squamish area. The area included Squamish, Pemberton, Whistler, Mount Currie, Britannia Beach and Birken. In 1990, 32 percent of the Squamish area's total basic sector income was derived from the forest industry. The tourism industry contributes

⁹ Includes logging activity, but does not include processing.

¹⁰ Does not include forest processing activity.

¹¹ Includes forest processing activity.

16 percent and the non-employment sources, such as pensions and UI benefits, made up fully 37 percent. In comparison to communities where non-employment income sources predominate, such as in the Okanagan, the Squamish area has a much lower proportion of non-employment income. For example, Kelowna's percentage is 72 percent. Squamish's forest industry share is in the middle for the B.C. communities studied. In comparison to the other communities, Squamish's tourism share is also high (and probably higher in 1994) reflecting Whistler's contribution. Using the Ministry of Finance's data, the Squamish forest and tourism portions of total (basic and non-basic) employment income were estimated at about 45 and 23 percent, respectively. These figures indicate the area's employment dependence on these two industries.

2.3 Community Setting

History

The corridor through which Highway 99 and B.C. Rail now runs was originally a route that aboriginal peoples travelled from the ocean to the Interior valleys. Many settled in the area where they hunted, gathered food and fished. In 1792, Captain Vancouver and his crew were the first Europeans to meet local aboriginal residents. Trading with the aboriginal community near Brackendale resulted from this encounter.

The next major event to affect the region was the Gold Rush of the 1850s. Miners came to find gold and an alternative route to the interior of the province. Following this, a cattle trail was built from Lillooet to Lynn Valley in Vancouver to provide access to markets. However, the trail was abandoned after only one year of use as it was too dangerous.

Settlers began to arrive throughout the late 1800s and early 1900s to farm, trade and trap. One of the first logging operations occurred on Diamond Head Road, near modern day Squamish, and used oxen to skid logs into the Squamish River, which provided the only transportation corridor out of the area. In 1912, construction of The Great Eastern Railway (now B.C. Rail) started and this brought more logging and mining activity. A number of small sawmills, producing timber and railway ties began their operations on Alta, Green and Lost Lakes, and the earliest signs of tourism in the region also began around this time with the establishment of several fishing lodges around these Whistler area lakes.

By 1956, the railway extended from Vancouver through the Squamish - Whistler corridor to Prince George. This led to the opening of Squamish Terminals in 1972.

Although relatively close as the crow flies to the populous Lower Mainland, the study area was remote for most travellers until 1958, when Highway 99 was opened between Vancouver and Squamish. Shortly, thereafter the road was continued up through Whistler and Pemberton. In 1991 the final stretch of Highway 99 was paved, between Mt. Currie and Lillooet, completing the paved road link from Vancouver through Squamish and into the Interior.

Community Background

The survey of forest licensees conducted for this study indicates that in 1993 less than 5 percent of the wood processed by primary manufacturers in the Soo TSA came from the TSA. The majority comes from TFL 38, private sources and other TSAs. This indicates that overall wood manufacturing within the TSA is not greatly impacted by changes in the Soo TSA wood supply. However, reductions in the timber supply can lead to discernible impacts in those communities which tend to rely more heavily on harvesting. They are more likely to experience the social hardships resulting from job and income losses related to reductions in the timber supply.

To help identify communities closely associated with local harvesting activities, Soo TSA licensees were asked to provide place of residence information for their employees and contractors. The results are presented in Table 2-5. The majority of local loggers reside in the Pemberton area. Given this community's small size, timber harvesting employment is quite important to its economic well-being.

Table 2-5: Place of Residence of Soo TSA Licensee Harvesting Employees and Contractors in 1993	
Municipality	Percent of Total
Squamish	32%
Whistler	1
Pemberton Area	54
Other	13
Total	100%

Selected demographic data for Soo TSA communities appears in Table 2-6.

Squamish - Squamish is the largest municipality in the Squamish - Lillooet Regional District. Between 1986 and 1991 the population grew 15.3 percent, from 10 157 to 11 709. By 2001, the regional district population is projected to grow a further 34 percent, which would give Squamish a population of about 15 726.

In 1991, manufacturing and transportation employed 13.4 percent and 10.4 percent of the workforce respectively. Squamish Terminals and B.C. Rail are among the largest employers in the municipal district and heavily dependent on forest products traffic. Much of the manufacturing is accounted for by forestry. The forest industry workforce was 13.7 percent of the total labour force in Squamish or 881 people. Business counts in 1993 indicate that there were 85 logging and forest manufacturing firms in the regional district, most of these in Squamish. Two forest manufacturers, Weldwood's lumber mill and Western Pulp's Woodfibre operation, are among the four largest employers in the municipality. The mid-summer "Squamish Days Logger Sports" event characterizes the

town's heritage and is the largest of its kind in B.C. This event, held for four days over the B.C. Day long weekend, attracts between 5 000 and 10 000 people annually.

Table 2-6: Key Statistics for Selected Soo TSA Communities

	Squamish	Whistler	Pemberton	Subd. B
Land Area (square kms.)	101	120	4	8 711
Population (1991)	11 709	4 459	502	1 423
Annual Growth (1986-91)	3.1%	24.5%	8.9%	6.2%
Per cent Change (1986-91)	15.3%	122.7%	44.7%	31.0%
Projected Population (2001) ¹²	15 726	5 988	675	1 911
UIC Claimant Rate ¹³ (1992)	11.4%	13.7%	8.7%	n/a
Average Income (1990)	\$25 872	\$25 981	\$23 158	n/a
Source: BC Central Statistics				

More than 55 percent of the workforce was employed in the service and trade sectors. Service sector employment was weighted in favour of the food, beverage and accommodation sector with 14.7 percent of the total work force. Tourism in Squamish is growing and has been pinpointed as a major economic development priority. The highway between Vancouver and Squamish has spectacular views and mountain peaks ring the community. Shannon Falls, B.C.'s third highest waterfall, graces the entrance to Squamish and attracts approximately 100 000 visitors every year. There have been recent developments regarding the expansion of rockclimbing, windsurfing and mountain-biking facilities. There is a substantial trade generated from travellers on their way to and from Whistler, Garibaldi Provincial Park and numerous other recreation sites. Squamish is the northern terminus of the seasonal tourist attraction, the Royal Hudson steam train. Other outdoor tourism draws are listed in Table 2-7.

As with the retail sector, Squamish's social infrastructure is the most extensive of the communities in the TSA and has taken on the role of regional centre. The infrastructure includes the Squamish General Hospital, a mental health centre, elementary and secondary schools, a library, a branch of Capilano College, a Canada Employment and Immigration Centre (CEIC) and a B.C. Ministry of Social Services office. Adult education and skills upgrading are available at Capilano College.

¹² The Central Statistics Branch projects populations for regional districts only. We have assumed that municipalities comprising the regional districts will grow at the same rate as the regional district itself. The figures are presented for illustrative purposes only and are not meant as reliable forecasts.

¹³ The UIC claimant rate is not the same as the unemployment rate. Not all unemployed persons are entitled to UIC payments so these rates may understate actual unemployment. The claimant rate is used here because, unlike EIC's unemployment rate, it is made available at the municipal level.

Table 2-7: Selected Outdoor Recreation Activities Around Squamish

Attraction	Activities
The Stawamus Chief	Rockclimbing, Hiking
The Stawamus Squaw	Rockclimbing, Hiking
The Smoke Bluffs	Rockclimbing, Hiking
Railway Museum	Heritage Sightseeing
Vancouver Helicopters	Sightseeing
The Squamish Spit	Windsurfing
Squamish Golf and Country Club	18 Hole Golf
Furry Creek Golf and Country Club	18 Hole Golf
Squamish Estuary - Brackendale	Bald Eagle Viewing
Sea to Sky Trail	Mountain Biking
Miscellaneous	Trail Riding, Boating, Camping, Swimming

Whistler - In June 1991 Whistler's resident population was 4 459. It had the fastest growth rate in the province between 1986 and 1991, averaging a phenomenal 24.5 percent annually. When weekend and temporary residents are considered the population increases by between 10 000 and 35 000. Based on regional growth rates, Whistler is projected to grow to approximately 6 000 by 2001. Considering that Whistler has substantially exceeded regional growth rates, it is possible that these forecasts are under-estimated. Whistler's average income in 1990 of \$25 981 was slightly above the B.C. average wage of \$25 893 and higher than the other communities within the Soo TSA. Unemployment (13.7%) is the highest in the TSA and stems from the seasonal nature of employment for a large portion of its workforce.

The service and trade sectors accounted for 74.1 percent of Whistler's workforce or 2 590 people in 1991. Of this, 28.4 percent was in the accommodation, food and beverage sector. Tourism is clearly a mainstay of Whistler's economy. Whistler's status as a world-class destination ski resort continues to fuel the construction sector, which accounted for 11.9 percent of the work force in 1991.

In 1994, Whistler Resort was rated the Number One Ski Resort in North America for the second year in a row by Snow Country Magazine. At the base of Whistler and Blackcomb Mountains, the resort provides access to over 200 marked ski runs, a combined vertical rise of over 10 000 feet and a long-ski season. Special events, such as the World Cup Ski Classic and the World Cup Freestyle Competition attract large numbers of visitors as well as international media attention. Other outdoor winter activities include heli-skiing and sightseeing, ice skating, snowshoeing, snowmobiling, cross-country skiing and sleighrides.

Although somewhat overshadowed by its winter resort reputation, Whistler's summer attractions have become a substantial draw for recreationists. The Resort's two world class golf courses, Whistler Golf Club and the Chateau Whistler Golf Club, provide 36 holes of challenging and scenic golf and, as with skiing, depend on forested landscape for

a scenic backdrop. These golf courses are operating close to capacity at approximately 30 000 rounds each per year. A third golf course, to be completed next season, is the Green Lakes course and, due to pent up demand, is expected to provide 30 000 rounds within the year, without drawing from the existing courses (Paul Clark, pers. comm.). This reflects the rapidly growing golf market in B.C. Many other summer activities using the natural surroundings include hiking, rockclimbing, swimming, mountain-biking, heli-sightseeing, picnicking and simply enjoying the ambience and beauty of the region.

Forestry does not have as high a profile in Whistler as it does in other municipalities in the region. The forestry workforce accounted for 1.5 percent of the total workforce in 1991. Most of the jobs were in the forest services industry.

Social infrastructure at Whistler includes a Diagnostic and Treatment Centre, an elementary school and a library. Adult education and skills upgrading is available through the local elementary school. The Whistler Centre for Business and Arts provides education programs for business, professionals, artists and the general public, marketing outside of the community in a similar vein to the Banff educational enterprises.

Pemberton - Between 1986 and 1991, Pemberton's population grew 44.7 percent to 502. The population by 2001 is projected to be 675. The unemployment rate of 8.7 percent has been declining steadily for at least the last five years and is the lowest in the TSA. The average income of the community is \$23 158, 89 percent of the provincial average.

In 1991 the Village of Pemberton's economy was dominated by the trade and service sectors as is Whistler. These two sectors accounted for 57.4 percent of the labour force of 305. Construction, driven by activity at Whistler, accounted for 14.2 percent of the labour force. While only 6.5 percent of labour force of the Village of Pemberton were loggers, logging remains important to the local economy. The industry survey indicates that most loggers in the Pemberton area reside in the rural areas outside the Village of Pemberton, but still support the community's economic base. A recent study found that approximately 75 percent of business in Pemberton is done between May and September [Sea to Sky Economic Development Commission, 1990] which is the height of the logging and tourist seasons.

Pemberton is the gateway to the newly paved Duffey Lake Road which provides an alternative route to the B.C. interior. The community is surrounded by mountains, valleys and lakes, is within two miles of Nairn Falls Provincial Park and offers abundant summer recreation. There is one 18 hole golf course, the Pemberton Golf and Country Club, and another 18 hole course nearing completion, the Big Sky Golf and Country Club which expects 20 000 rounds within the first year [Halsam, May 1994].

Social infrastructure in Pemberton includes a Diagnostic and Treatment Centre, an elementary and secondary school and a library. Adult education is encouraged through the Organization for Adult Education. Pemberton residents travel to Squamish for shopping, business supplies and services not available locally.

Subdivision B - The population of outlying areas surrounding the above communities grew by 31.0 percent between 1986 and 1991, to 1 423. A population of 1 911 is projected for 2001. The majority of the population in this subdivision reside north of Whistler.

Social Profile

Table 2-8 shows key health indicators for the Squamish - Lillooet R.D. Generally, the health indicators (mortality rates and teen birth rates) suggest no dramatic differences between the Squamish - Lillooet R.D. and provincial averages, with the exception of Squamish - Lillooet R.D.'s high level of teen births. However, this rate is not very different from other rural regional districts and is not considered unreasonable by the Ministry of Social Services.

Table 2-8: Health Indicators		
	Squamish - Lillooet R.D.	B.C.
Mortality Rates ¹⁴ - per 1 000 pop'n:		
All Causes - Both Sexes	59.6	52.1
Motor Vehicle Accidents - Males	4.2	2.4
Infant Mortality Rate ¹⁵ - per 1 000 pop'n	10.5	7.9
Teen (15-19) Birth Rate ¹⁶	51.9	24.0
General Practitioners - per 10 000 pop'n	9.8	9.4
Source: BC Stats		

Table 2-9 shows low birth weight rates and potential years of life lost (PYLL) by the Local Health Area (LHA) of the respective communities. The Ministry of Health considers both of these statistics to be valid indicators of the health of a community as it relates to long-term ability to develop human resources. Low birth weight rates are caused by maternal malnutrition, smoking, drug use or premature birth and are often associated with teenage pregnancies or mothers with low socio-economic status. PYLL is indicative of premature mortality and the resulting loss of potential social and economic productivity.

¹⁴ 3 year average to 1990. LHA age standardized rates by sex, weighted by the 1989 male and female populations in the LHA.

¹⁵ 3 year average to 1990.

¹⁶ 3 year average to 1990.

Table 2-9: Low Birth Weight Rate and Potential Years of Life Lost Index, 1987-1991 and 1992

	Low Birth Weight Rate ¹⁷		Potential Years of Life Lost Index ¹⁸	
	1987-1991	1992	1987-1991	1992
Howe Sound	55.3	36.2	1.36	1.66
B.C.	50.1	47.5	1.00	1.00

Source: Ministry of Health, Division of Vital Statistics, 1992.

The Howe Sound Local Health Area (closely corresponds to the Soo TSA boundaries) exhibited a slightly higher rate of low birth weights than the province between 1987 and 1991, but improved significantly in 1992. In terms of PYLL, the Howe Sound area is significantly above the provincial average but is on par with similar communities.

Table 2-10 shows Squamish - Lillooet R.D. crime rates. In 1992, Whistler had the highest crime rate in the province. However, as the crime rate is based upon resident population, the large number of visitors is likely to inflate this figure by not being included in the residential base and by bringing in both criminals and victims from outside the region. According to the local police detachment, ski and mountain bike thefts account for approximately 500 crimes per year, which represents approximately 25 percent of all crimes. This crime rate has dropped significantly over the last 10 years as a result of increased policing. The number of officers has grown from 3 in 1981 to 14 in 1994.

Table 2-10: Crime Rates of Squamish - Lillooet R.D. and Communities, 1987 and 1992

	1987	1992	% Change
Squamish	139	151	8.6%
Whistler	545	405	-25.7
Pemberton	119	129	8.4
Squamish - Lillooet R.D.	177	190	7.3
B.C.	138	155	12.3

Source: BC Central Statistics Branch, B.C. Ministry of Attorney General

The high crime rate due to visitors is also likely to inflate the rate for the regional district. Since all other crime rates in the region are below the B.C. average, crime rates as a measure of the social fabric, indicate relative stability in the region.

Data in Table 2-11 indicates long-term social assistance caseloads and children on social assistance are below provincial averages. This provides more evidence of social stability.

¹⁷ Birth weight less than 2,500 grams per 1000 live births in the Local Health Area in which listed communities are found.

¹⁸ PYLL Index = Observed PYLL/Expected PYLL

Table 2-11: Social Profile Indicators

	Squamish - Lillooet R.D.	B.C.
Long-term (>1 yr) Social Assistance Caseload - Sept. 1993 (as % of total)	34.8%	48.8%
% of Children (<19) on Social Assistance - Sept. 1993	9.9%	13.4%
Source: BC Central Statistics Branch		

The income and education indicators in Table 2-12 help to describe a community's ability to satisfy basic needs and cope with economic and social change. Generally, the communities in the Soo TSA exhibit favourable results. The incidence of low income families is lower and education levels are higher than provincial averages, especially in Whistler's case.

Table 2-12: Incidence of Low Income Families and Population With a Minimum Grade 9 Education

	Incidence of Low Income Families¹⁹	Population With a Minimum Grade 9 Education
Squamish	8.4%	92.3%
Whistler	0.7	99.9
Pemberton	2.8	95.7
Subdivision B	8.2	92.8
B.C.	12.1	91.3
Source: Statistics Canada		

The preceding statistics primarily refer to permanent residents. The visitors are largely much more affluent than B.C. averages and they comprise a significant portion of the area's population on any week-end. Whistler's visitors have a median annual income of between \$35 000 and \$50 000 for the winter visitors and between \$25 000 and \$35 000 for summer visitors [Whistler Resort Association, 1994]. Combining the area's resident and visitor populations would produce a different, more positive health and social welfare picture.

¹⁹ The proportion of economic families or unattached individuals in a given classification below the low income cutoff. The cutoff will differ according to the number of individuals in the family and the size of the community. For example, the cutoff for a family of three in a community whose population is between 30 000 and 99 999 is \$22 103.

2.4 First Nations

Six First Nations have reserve lands and traditional territory in the Soo TSA. Another group has claimed traditional territory only. A map of traditional territory claims appears in Figure 2-2.

- The Squamish Nation (Skwxwumish7ulh) has the largest traditional territory. It is a member band of the Lower Mainland based Alliance Tribal Council (ATC)²⁰. The ATC has 10 member bands, but the Squamish Nation is the only one with reserves in the Soo TSA.
- The ATC affiliated Burrard Band (Tsleil-Waututh) has claimed traditional territory in the area but does not have a reserve there.
- The Coast Mountain Development Council represents four bands, Anderson Lake (N'Quatqua), and Douglas, Samahquam and Skookumchuck (collectively referred to as In-SHUCK-ch), all of whom have reserve lands and traditional territory in the TSA. The Anderson Lake Band is situated in the northwest corner of the TSA and the In-SHUCK-ch reside in the Lillooet River valley between Lillooet and Harrison Lakes.
- The Mt. Currie Band (Stl'atl'imx) is based at Mt. Currie and is unaffiliated with a tribal council.

Membership and population data for these First Nations is shown in Table 2-13.

The small communities of D'Arcy on Anderson Lake and Mount Currie, adjacent to Pemberton, are largely populated by aboriginal residents. The Squamish Nation is based in North Vancouver but a small portion of its membership resides around Squamish. The In-SHUCK-ch have three small communities in the river valley between Harrison and Lillooet Lakes but most members live in the Fraser Valley or the Pemberton area.

Land Claims

The British Columbia Treaty Commission facilitates the treaty process in B.C. The Commission was appointed under an agreement signed by the First Nations Summit and the governments of Canada and British Columbia in September, 1992. On December 15, 1993, the Treaty Commission began accepting statements of intent to negotiate treaties from aboriginal groups. The filing is the first step in a six-stage process designed to settle long-standing land and resource related issues in British Columbia where few treaties have been signed with First Nations. There is no timetable for concluding the negotiations process.

²⁰ Tribal councils are administrative vehicles with varying degrees of authority. The bands are the First Nations vested with political and cultural responsibilities and duties.

Table 2-13: Regional Tribal Councils, Member Bands²¹ and Independent Indian Bands with Traditional Territory in the Soo TSA

Organization	Total No. of Bands	Total Population	On-Reserve Population	Head Office
Alliance Tribal Council	10	6 418	3 901	Delta
Squamish		2 554	1 627	N. Vancouver
Burrard		285	176	N. Vancouver
Coast Mountain Dev. Corp.	4	894	235	Squamish
Anderson Lake		212	148	D'Arcy
In-SHUCK-ch Service Society ²²	3	682	87	Mission
Douglas		164	49	Harrison
				Hotsprings
Samahquam		221	12	Mission
Skookumchuck		297	26	Pemberton
Mt. Currie	1	1 466	1 024	Pemberton
Source: Indian and Northern Affairs Canada				

To date, 39 statements of intent to negotiate have been filed in B.C. At the time of this report's writing, two groups, Squamish Nation and the In-SHUCK-ch, have filed intents covering a major portion of the Soo TSA boundaries. Others may follow. Settlement of these claims will have a major impact on First Nations, their relations with other Canadians and the forest industry. The impact of the timber supply review process on land claims is a matter of some concern to First Nations.

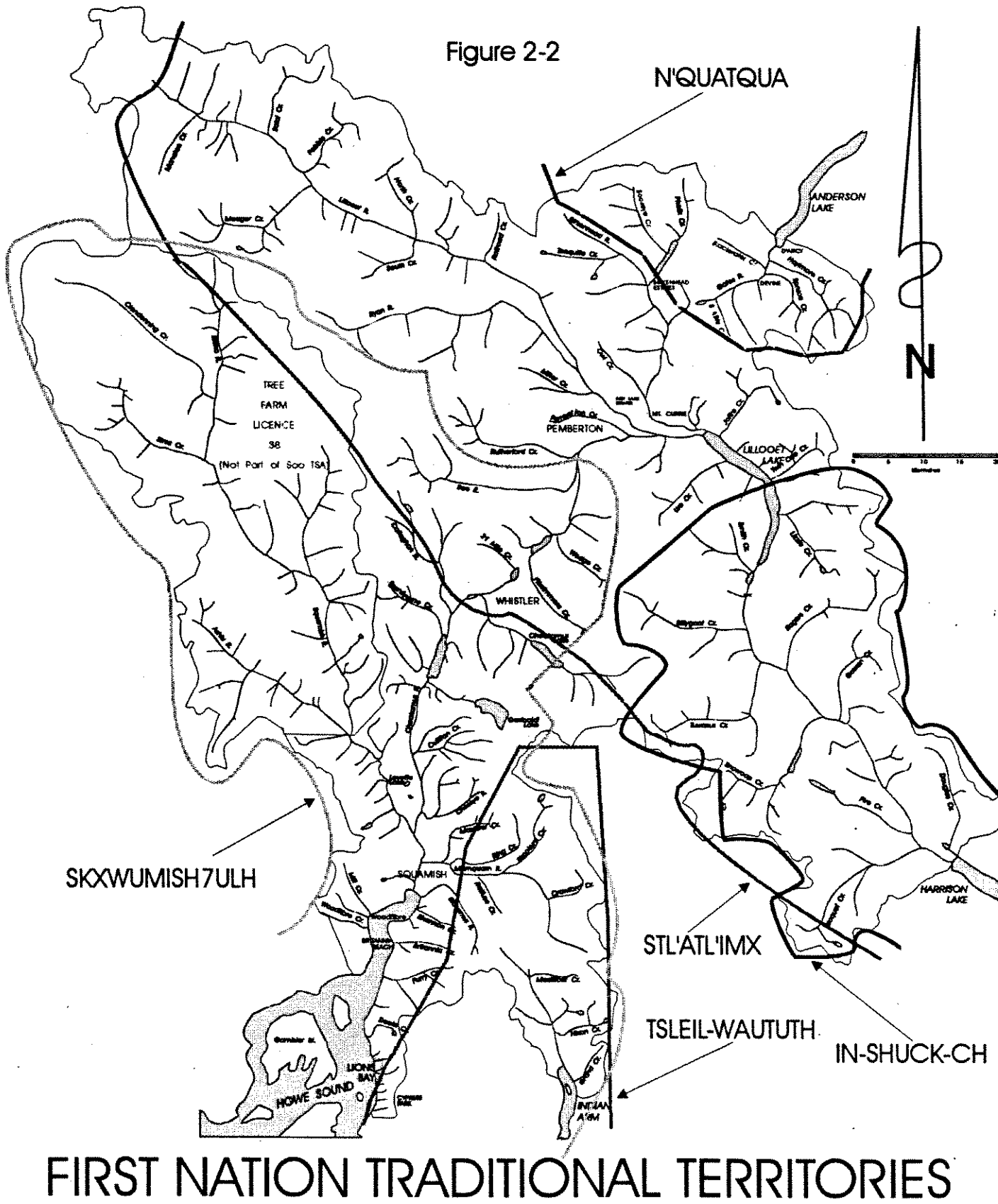
Employment

In 1991, the unemployment rate for aboriginal people in B.C. was 28.2 percent, while the rate in Metro Vancouver (which includes Squamish) was believed to be slightly lower [Employment and Immigration Canada, December 1991]. However, Human Resources Development Canada (formerly Employment and Immigration Canada) has estimated that the participation rate of aboriginal people is lower than for the population as a whole, and that the actual unemployment situation is in fact worse than the official rate.

Unemployment among aboriginal people is consistently higher than it is for the population as a whole. In 1991, 9.9 percent of the provincial population was unemployed.

²¹ Only those member bands within the Soo TSA are listed.

²² In-SHUCK-Ch Service Society delivers social, educational and cultural programs for the Douglas, Samahquam and Skookumchuck bands. Many economic development and infrastructure initiatives for these bands plus the Anderson Lake Band are delivered by Coast Mountain Development Corp.



Lower education levels, which may confine aboriginal people to low-paying, low-skill jobs, are partly to blame for this situation. Many other reasons also play a part: a lack of on-reserve economic development; a preference among some aboriginal people for working on-reserve; a lack of equity investment capital; and the general issue of the exclusion of aboriginal peoples from the mainstream economy.

Employment among aboriginal people in BC is clustered in the public administration and resource sectors. While fishing dominates the latter, forestry also plays a significant role. In fact, aboriginal people in BC are more dependent on forestry and wood manufacturing than is the overall population [Employment and Immigration Canada, December 1991].

Economic Development

The industrial job distribution pattern described above for aboriginal people has some serious implications. Both the public administration and resource sectors are either static or in decline in terms of employment. At the same time, aboriginal people are less involved in those sectors which are experiencing the greatest growth (e.g. finance and services). A continuing erosion of the forest job base can be expected to adversely affect the employment levels and job prospects of aboriginal people in the region. However, there are several economic development initiatives taking place among the various councils and bands.

Aboriginal Forestry Activity

Obtaining forest tenures is viewed as critically important by First Nations. In the Soo TSA, only the Anderson Lake Band has acquired a Ministry tenure.

Both the Intertribal Forestry Association of British Columbia and the First Nations Forestry Council are addressing this issue at a provincial level by exploring new forms of native tenure and means to access a wood supply through existing tenure systems via joint ventures. Other areas of concern are the impact of logging on water and fishery resources, heritage resources and spiritual ceremonial sites in the traditional territory of First Nations. Co-operative planning processes, heritage resource inventories, involvement in the review of 5 year development plans and encouraging economic development opportunities are ways that the Squamish District Office is attempting to deal with these issues.

Aboriginal Organization Profiles

In-SHUCK-ch

Members of the Douglas, Samahquam and Skookumchuck Bands comprise the In-SHUCK-ch people. They are the southern part of the Stl'atl'imx or Lillooet tribe which includes bands to the north such as Anderson Lake, Fountain and Bridge River. The

In-SHUCK-ch traditional territory in the Soo TSA is shown on the map in Figure 2-2. It takes in the drainage of the Lillooet River between Lillooet and Harrison Lakes. The Samahquam Band is based at the bottom of Lillooet Lake, Skookumchuck (Skatine) further south along the river and Douglas (Xa'xtsa) at the head of Harrison Lake. Their communities in the Lillooet River valley have neither BC Hydro electrical nor BC Tel phone service. Petroleum fuelled generators and radio telephones are the substitutes. A Forest Service road connects them to Highway 99 in the north and Highway 7 to the south. This relative remoteness in close proximity to the populous Lower Mainland has resulted in a small proportion of band members, approximately 13 percent, residing in the traditional communities.

Established in 1989, the Coast Mountain Development Council (CMDC) performs a tribal council function for the In-SHUCK-ch bands and the Anderson Lake Band. It acts at the behest of the four member bands. For example, the Anderson Lake Band has a well developed community, 40 kilometres north of Pemberton on the Portage Road, so it delivers its own social programs. A CMDC subsidiary, In-SHUCK-ch Services Society provides social programs to the In-SHUCK-ch communities.

At this time, the In-SHUCK-ch have a relatively tenuous connection to the wage economy of the forest industry. An estimated six band members work regularly in logging. Anecdotal evidence suggest that many more In-SHUCK-ch members were involved with the logging sector up till the early sixties when company operations shifted away from the territory. A Douglas Band member operates a small silviculture contracting company. They do not have forest tenures. In the past few years the In-SHUCK-ch have made important efforts to reverse this situation. Arising from Interfor's purchase of Fletcher Challenge harvesting rights, they have a general agreement with Interfor that the In-SHUCK-ch will be directly involved in resource management. Negotiations are underway on how this might best be effected and includes how Interfor can assist in the In-SHUCK-ch's economic development initiatives. As well, they are in preliminary negotiation stages with another industry major, Canfor, about a similar type of formal agreement. The In-SHUCK-ch are joint venture participants in the SBFEP Category 2 licence bids in the Fraser and Soo TSAs. Both initiatives involve training and employment. The latter competition is just starting and the former should soon be decided. The In-SHUCK-ch and the Squamish District Office are poised to enter into a process of more regular consultation about forestry matters in In-SHUCK-ch territory. This process may result in a formal understanding such as an MOU or an Interim Measures Agreement.

With the establishment of CMDC, the In-SHUCK-ch have been improving their infrastructure. Most band members live off-reserve because their traditional communities have lacked the amenities that are available elsewhere in southwest B.C. to support economic and social development. The Samahquam Band recently inaugurated a new housing subdivision at Billy Goat Creek. Satellite phone service is being introduced. Discussions are being held with BC Hydro about supplying power and with the Ministry of Forests about road maintenance. The intent of the In-SHUCK-ch is to build a social and

economic base in their traditional territory which can support the members who wish to live there.

Douglas Band members harvest mushrooms for their own use. Members of Lillooet Bands to the north pick mushrooms in In-SHUCK-ch territory too. The In-SHUCK-ch would like to eventually manage the mushroom harvest in their territory.

The In-SHUCK-ch view tourism as having some economic development potential. Whistler Jet Boating pays a licence fee to the In-SHUCK-ch for the right to operate on the Lillooet system. There are discussions between the two parties around involving the In-SHUCK-ch more directly in this venture, perhaps through development of an interpretative centre and/or providing some operating services.

The In-SHUCK-ch will be engaging a consultant to begin an archaeological overview of the lower Lillooet River Valley in the near future.

Anderson Lake Band

The Anderson Lake Band (the N'Quatqua people) belong to the Stl'atl'imx or Lillooet tribe. They are associated with the In-SHUCK-ch people through the Coast Mountain Development Council tribal organization. The N'Quatqua's five reserves are located at and around the base of Anderson Lake. The boundary between the Soo and Lillooet TSAs bisects Anderson Lake and the N'Quatqua's traditional territory, as shown in Figure 2-2. The band has an attractive community location at D'Arcy on the Portage Road at the base of the lake. It is on the BC Hydro grid and the BC Tel network. BC Rail runs past the village. Owing to the possibility for employment in the immediate area, approximately 70 percent of band members live in the traditional territory.

Band members have had a long association with the forest industry. Since 1972 a band owned company, N'Quatqua Logging Co., has held a forest licence in the Lillooet TSA. The AAC is presently 7 278 m³. The company employs five band members when logging. On the 700 hectares IR#5, this band owned company annually harvests between 1 000 and 3 000 m³. Penta Developments Ltd., a private company owned by four band members is a registered Category 2 SBFEP bidder and was a licensee in the Soo TSA. In addition D'Arcy Investment Corp. (DICOR), a band owned company, was a registered Category 2 licence bidder. A band member has won several Category 1 SBEFP licences to harvest small volumes. To help protect the integrity of the area's visual landscape, the band does not clearcut log, instead opts for alternatives such as shelterwood and strip logging²³.

Up until 1963 Gibson Bros. operated saw and planer mills at nearby Devine and provided employment for many Native area residents. As the major operations moved out of the area, jobs went with them. Commuters from Pemberton and Squamish then filled what harvesting work was available in the area.

²³ The band does clearcut in beetle kill situations.

Penta has a small sawmill at D'Arcy which operated in 1993. It employed six band members and at full production produced 8 500 board feet per day. The mill produced cants which were sold to a Vancouver company with Japanese markets. Penta would like to revive the mill with some equipment improvements. N'Quatqua Logging Co. has bid for a 15 year non-replaceable Forest Licence in the Lillooet TSA. The AAC would be 15 000 m³. The band's intention is to produce cants at the Penta mill, trade them for better quality logs and use these for manufacturing moldings and frames at a proposed band-owned millwork shop. The band views the added volume of the new Forest Licence as critical to sustaining value-added activity in D'Arcy.

Penta also undertakes silviculture contracts and a contract with BC Hydro to maintain its power line right-of-way in the area. There are 21 band members who commute to Pemberton to work for a Ministry of Forests Heatseekers Unit Crew. They receive advanced Fire Fighting training and work experience in trail building and silviculture work (brushing and thinning). Employment is of four months duration each year and started in 1990. The Ministry of Forests has programs that include silviculture training through the Forest Worker Development Program. A series of training initiatives was delivered to local bands in the 93/94 fiscal year. Level 1 (introductory silviculture) and level 3 (silviculture contracting) courses were conducted for the In-SHUCK-ch, Anderson Lake and Mt. Currie bands. A level 3 course was also held for the Squamish Nation. More courses are planned for this year.

Five band members are employed full-time at two aquaculture operations. DICOR maintains a Sockeye salmon spawning channel under contract to Fisheries and Oceans Canada and has a joint venture agreement with D'Arcy Springs Hatchery to raise Chinook salmon smolts for its Tofino salmon farm.

Anderson Lake Band members harvest mushrooms in the Blackwater Creek area. It is an important but unpredictable income source. Many persons from outside the band, including members of Lillooet Bands to the north pick mushrooms in N'Quatqua territory as well. The N'Quatqua want to have a larger role in the marketing and management of this resource.

The N'Quatqua have a territory of considerable physical majesty. A band member operates a seasonal boat launch, 56 unit campsite and fast food outlet at Anderson Lake. The band has considered some tourism ventures and hopes to establish one or more in the near future.

The N'Quatqua are attempting to secure resources for a heritage inventory.

The other bands with traditional territory claims covering the TSA either could not allocate the time, or chose not to contribute information at this stage of the Timber Supply Review process. They may do so at the public consultation stage.

2.5 The Forest Industry

In the Soo TSA, timber harvesting, pulp production and sawmilling are important economic engines. The area's logging operations help supply the wood manufacturing plants in Squamish and the Lower Mainland. The Port of Squamish's business consists mostly of forestry products and Squamish Terminals is North America's largest volume pulp and lumber terminal [Sea to Sky Economic Development Commission, 1992]. With its main repair shop located in Squamish, forest products account for an estimated 50 percent of B.C. Rail's freight tonnage and an estimated 62 percent of its total revenue [District of Squamish, 1991]. B.C. Rail and Squamish Terminals rely primarily on forest products from outside of the Soo TSA and on very small amounts of Soo TSA products [Barry Wall, B.C. Rail, pers. comm.; Ray Wilburn, Squamish Terminals, pers. comm.].

Soo TSA Activity

The Soo TSA has an Allowable Annual Cut (AAC) of 580 000 m³. The names and AACs of the established licensees appear in Appendix 5. The Small Business Forest Enterprise Program holds the is the largest allocation with 20.9 percent of the total available AAC. International Forest Products (16.2%), Terminal Forest Products (11.8%), and Pacific Forest Products (11.5%) also have significant harvests. The remaining 39.6 percent of the AAC is allotted among another 13 licensees.

In January 1992 the Chief Forester reduced the AAC by 17.7 percent from 705 000 m³ to 580 000 m³. Because of the historically high prices for lumber and cut control flexibility, the actual harvest has remained high: 687 394 in 1993; 629 197 in 1992; and approximately 703 000 in 1991.²⁴ Because of the high harvest the 17.7 percent reduction has had little employment impact at this point.

Licensees

International Forest Products Limited (Interfor) - Interfor is a major Soo TSA operator in terms of harvesting. The Interfor name arose in 1988 as a replacement for Whonnock Industries, which had been active in the TSA since the 1950s. The company has seven manufacturing facilities in the Lower Mainland but none within the Soo TSA.

Harvesting employment in the Soo TSA is 37 with planned expansion to 77 sometime in 1994. Head office employment in Vancouver accounts for a further 70 personnel. Harvesting operations are spread throughout the TSA with concentrations in Twin One, Ure and S&M Creeks near Lillooet Lake; Rogers Creek off the lower portion of the Lillooet River and Mill & Woodfibre Creeks near Woodfibre. A contractor's camp, Lineham Logging, is located at the head of Harrison Lake. Ninety percent of harvesting

²⁴ Under the Ministry's Cut Control Policy, a licensee can annually harvest up to 50 percent more than its AAC and up to 10 percent more over the five year cut control plan. Over and under harvesting can be made up in a subsequent five year plan.

employees live in Pemberton and the remaining 10 percent in Squamish. Interfor currently employs four aboriginal people from Mt. Currie in harvesting and five from Mt. Currie and five from Skookumchuck in silviculture. Lineham Logging, Interfor's contractor, employs 6 aboriginal people from the Samahquam, Skookumchuck and Douglas Bands.

The company processes 84 percent of its Soo TSA harvest in its Lower Mainland mills. Another 5 percent is sold to the Fletcher Challenge pulp mill at Elk Falls and 11 percent is sold to the Canfor pulp mill at Port Mellon. A very small fraction of the logs go to a log home manufacturer in Whistler.

Pacific Forest Products Limited - Pacific Forest Products is the successor to Canadian Pacific Forest Products and began operations in the TSA in 1960. Harvesting in the TSA employs 31 people, of which 60 percent reside in Squamish and 33 percent in Pemberton. Two aboriginal people are employed including one from the Squamish Nation and one from Mt. Currie.

The majority of its harvest leaves the Soo TSA; 48 percent for processing into lumber, 5 percent for plywood plants and another 30 percent for pulp and paper. Seventeen percent of its harvest stays in the TSA; 12 percent is directed to lumber processing and 5 percent to log home and post manufacturers.

Pacific is currently harvesting near Meager, Gravell, Rutherford, Callaghan, and Brandywine Creeks and Daisy Lake.

Terminal Forest Products Limited - Terminal has have been operating in the region since 1956 and has had a Forest Licence in the Soo TSA since 1982. It employs 25 harvesting personnel, predominantly from Pemberton and Squamish.

It is currently harvesting in the drainages of Ryan River, Upper Lillooet River, and South, Furry, Chance, Roe, 19 Mile and Wedge Creeks.

Weldwood of Canada - In 1964, Weldwood of Canada Limited was created to consolidate the Canada-wide holdings of the United States Plywood Corporation. A major component of Weldwood was the Western Plywood Company Limited, which it had purchased in 1961. Western was founded in Vancouver in 1945 and by 1960 the company had four plywood plants, three sawmills and its own wholesale distribution warehouses in major cities across Canada. In 1964, Weldwood purchased Canadian Collieries Resources Limited, whose timber rights and mills gave its buyer a timber supply for its coastal manufacturing facilities. This purchase included the Squamish Lumber mill. In 1967, U.S. Plywood merged with Champion Papers to become Champion International Corporation, currently one of the United States' foremost forest product companies, and the major shareholder in Weldwood of Canada. In 1969, Weldwood joined with Daishowa-Marubeni International Ltd. to build Cariboo Pulp and Paper Company in Quesnel. Since then, Weldwood has purchased additional mills in the Cariboo and established two joint venture mills in the Bulkley-Nechako, one a successful partnership

with the Burns Lake Native Development Corporation. Weldwood is based in Vancouver and directly employs 3 800. Weldwood recently put its coastal operations up for sale. Interfor has offered to purchase their operations along with the timber supply.

The sawmill in Squamish employs 175 and is therefore one of the larger employers in the TSA. Two full shifts at capacity would employ 200. Two aboriginal persons work at the mill. In 1991, the mill was upgraded, with a capital investment of \$6.5 million, so that it could manufacture products for the Japanese market. Since then, an older wood line was shut down due to wood shortages. This did not result in direct job losses as attrition and early retirement over a period of six months enabled the company to avoid layoffs.

Approximately 6 percent of the mill's wood input is from the Soo TSA, 80 percent of which is from Weldwood's Forest Licence and purchases and trades within the Soo TSA. Another 22 percent of the mill's inputs are from Weldwood's TFL # 38 and the remainder is obtained outside the TSA. About 40 percent of Weldwood's harvest remains within the region for processing at Squamish Lumber, with the remaining 60 percent leaving the region for processing as lumber, pulp and paper, plywood and shake and shingles.

Weldwood's harvesting is currently in the Mamquam River drainage, the Gates Lake Area and the Pemberton/D'Arcy Corridor. Its TSA harvest employs 25 people. Thirty percent of these employees reside in Pemberton and 60 percent reside in Squamish. The remaining 10 percent reside outside of the TSA.

Canadian Forest Products Limited - Canadian Forest Products (CFP) is a long standing operator, with operations beginning in 1944. CFP's harvesting operations are concentrated in the drainages of Sloquet, Glacier and Chief Paul Creeks, employing 23. Forty-nine percent of harvesting employees reside in Chilliwack, 9 percent in Mission, 7 percent in Aggasiz, and the remaining 35 percent in other areas. As with Interfor, Lineham Logging, contracts for CFP and operates a camp at the head of Harrison Lake. CFP employs a local aboriginal silviculture contractor.

Squamish Mills Ltd. - Squamish Mills began operation in the Soo TSA in 1992 but its affiliates have had a longer term presence through harvesting under a Timber Licence. Harvesting no longer occurs under this licence and instead, Squamish Mills performs contract logging in Timber Sale Licences (TSL) for local mills and a Forest Licence (FL) jointly held with MacMillan Bloedel. Ninety percent of the wood harvested leaves the TSA for processing elsewhere, predominantly for lumber and shake and shingles. The remaining 10 percent goes to local lumber (5%) and log home (5%) production.

The company's harvesting activities near the Ashlu River employ 32. Seventy percent of harvesting employees live in Pemberton and 30 percent live in Squamish. Usually 2 aboriginal people from the Mt. Currie Band are employed by the company during the silviculture season.

C.R.B. Logging Ltd. - C.R.B. Logging has been operating in the region since 1956. They are currently harvesting in the Meager Creek and Joffre Creek areas and employ 57. Two aboriginal people from the Mt. Currie Band are employed by this company. Eighty-one percent of their harvesting employees reside in Pemberton and 19 percent reside in Squamish. Twenty percent of its logs are processed as lumber in the region and another 10 percent goes to log homes and poles. The wood leaving the TSA is predominantly used for lumber and pulp and paper production.

Halray Logging - Halray Logging operates in the Pemberton Valley and employs 24, including three aboriginal people from the Mount Currie Band. The company holds a TSL and jointly holds a FL with MacMillan Bloedel.

Richmond Plywood - Richmond Plywood has been harvesting in the Soo TSA since 1975 and is currently operating near the Soo River and Britannia Creek. It employs 7 people for harvesting in the Soo TSA. All of its harvest from the Soo TSA is used in its Richmond plywood mill which employs 428.

Other Licensees - Another six licensees hold either Forest Licences or Timber Sale Licences with combined AACs of 17 540 m³.

Small Business Forest Enterprise Program (SBFEP) - The BC Forest Service sells timber to registered small business operators through the SBFEP. Introduced in 1978, the program's objectives are to generate new opportunities, diversification and jobs, and increase competition and profits. In the Soo TSA, the SBFEP has grown gradually over the years with a current harvest level of 121 425 m³ per year. This is the largest apportionment in the TSA at 20.9 percent of the AAC. There are 53 small business operators registered with the Ministry of Forests' District Office in Squamish. Approximately half have been active purchasing SBFEP Timber Sale Licences (TSLs) in recent years. At this time, eleven SBFEP operators have active TSLs. Many small business operators also serve as contractors for established licensees. An estimated 60 people are directly employed in harvesting timber from this program. The program has resulted in the establishment of at least three small manufacturing operations through value-added sales [District of Squamish, 1991].

Other Harvests - There are other harvests from other tenures in the Squamish Forest District, such as Tree Farm Licences (TFL), Timber Licences (TL) and Woodlot Licences, which contribute to the local industry but are not accounted for in this study²⁵. Weldwood of Canada has an approved cut of 263 000 m³ for TFL #38, one of province's larger TFLs. Combining the TFL and FL AACs gives Weldwood a regional AAC of approximately 310 000 m³. The Soo TSA currently forms approximately 60 percent of the total harvest in the Squamish Forest District. Other 1993 harvests within the district include; harvests from Timber Licences at 165 747 m³, Woodlot Licences at 13 709 m³ and the private land at 69 817 m³.

²⁵ The AACs of TFLs are being reviewed through another process.

Major Manufacturers

Ultimate Log Homes Ltd. - Ultimate Log Homes, located in Whistler, began operations in 1981. The company manufactures hand-crafted log home shells, primarily for export to the U.S. and Japan. Ultimate purchases wood on the open market, primarily from a single major company, and approximately 10 percent comes from the Soo TSA. The other 90 percent is predominantly heli-logged in other coastal timber areas.

The company employed an average of 11 full time employees in 1993 but is currently running at double 1993 production levels with orders reaching into 1995. The sole local owner believes, subject to availability of wood, he can reach his current capacity of 35 employees within the year. Occasionally, workers are laid-off for short periods due to shortages of wood.

Ultimate Log Homes is discussing, with its current log supplier and a local Band, a joint venture application for a SBFEP Licence. The company employs two members from the Mt. Currie Band.

Continental Pole Ltd. - Continental Pole began operations in 1982 and is located in Pemberton. The company manufactures poles, posts, log homes and accessories and custom cut logs. It obtains 90 percent of its wood from SBFEP market loggers operating in the Soo TSA. The other 10 percent is from market loggers on the Sunshine Coast.

In 1993 the company employed an average of 8 employees, well below capacity of 35 to 40 employees. The company employs some Mt. Currie Band members when operating close to capacity.

A.J. Forest Products - A.J. started operating within the Soo TSA in 1974 and is located in Squamish. The company operates a circular sawmill and employs 6 people, including one member of the Lillooet Band. The company has not had layoffs in its twenty years of operation but is facing problems now due to wood shortages.

Western Pulp Limited Partnership - Western Pulp is a subsidiary of Duncan based Doman Industries. The company operates the Woodfibre Pulp Mill, which began production in 1912 under previous owners, and the Port Alice pulp mill on Vancouver Island. The company has neither Soo TSA licences nor uses Soo TSA wood. It holds a Soo Timber Licence that has not been logged since 1980 but the company anticipates logging it before the 2011 expiry. Inputs for the pulp mill predominantly come from Doman's whole log chippers and its sawmill residues from Vancouver Island.

The pulp mill employs over 300 people, including at least two of aboriginal descent.

Creekside Mill - This locally owned mill in Pemberton is not currently operating and is unlikely to do so in the near future.[Allan Hayrup, pers. comm.]

Daken Forest Products Ltd. - No information available.

Weldwood of Canada - Described earlier under *Licensees*.

Supporting Business

The long local history and pervasiveness of the forest industry throughout the region has made it a major purchaser of supplies and services from local businesses. Over the years, many local operations which anchor their businesses on forest industry purchases, have developed. They include companies which perform construction, road-building, road transport, helicopter transport, forestry consulting, machining, vehicle repair, legal and accounting services. There are also the suppliers of tires, vehicle parts, construction materials, work clothes and other items. The impacts on local businesses of forest industry strikes, or the industry down-sizing since the early 80s, are conclusive evidence of the forest industry - supplier linkages. Even local consumer oriented businesses are tied to the forest industry through purchases by forest industry employees. The following examples highlight the forest industry's impact on local suppliers.

Squamish Freightways - Squamish Freightways is a general transport company based in Burnaby but all its business is to and from the Soo TSA. The company employs 60 people. Approximately 25 percent of their business consists of forest industry goods. A downturn in the forest industry would certainly affect the transport of forest industry goods and would also have a ripple effect on the transportation of consumer goods as lower incomes reduce consumer purchases.

Auto-Marine Electric - Auto-Marine is a corporate-owned branch located in Squamish that employs 7 people. The company is primarily a retailer of automotive parts. The forest industry presently accounts for approximately 30 percent of revenues, but its proportion has been as high as half. The company has redirected its business throughout B.C. due to forest industry down-sizing.

Howe Sound Equipment - Howe Sound Equipment retails machinery and equipment to both consumers and the forestry industry. The company employs three people and relies on the forestry industry for about 60 percent of its business. A downturn in the forest industry would severely impact this company. The owner, in an affiliated business, builds logging roads for MacMillan Bloedel. His revenues went from \$350 000 in 1992 with two employees earning \$50 000 each to no business at all in 1993 as a result of cut-backs in the forest industry purchases.

2.6 Environmental Setting

The Soo TSA closely corresponds to the drainages of the lower Squamish River, the Cheakamus River and the Lillooet River. It is adjacent to the north, west and east side of Garibaldi Provincial Park and to the east of Howe Sound. Its physiography consists of Coast Mountains throughout, with floodplains in valley bottoms such as in the Pemberton Valley, and the Squamish River Estuary.

Forests

Almost all of the valley floors and lower mountain sides of the Soo TSA lie within the Coastal Western Hemlock (CWH) zone - one of the main zones of the five biogeoclimatic systems in the TSA. This zone occupying elevations from sea level to approximately 900 metres, is the wettest in B.C. and is characterized by cool summers and mild winters. Dominant tree species are western hemlock and amabilis fir, with less common occurrences of western red cedar and Douglas-fir. The CWH zone has the highest diversity of vertebrates of any zone [Ministry of Environment 1993].

The Mountain Hemlock (MH) zone lies between 900 and 2 250 metres and is characterized by short, cool summers and long, cool, wet winters, with heavy snow cover for several months. Mountain hemlock, yellow cedar and amabilis fir are the dominant tree species, with other, less common occurrences of western hemlock, western red cedar, Douglas-fir and western white pine. Due to the harsh conditions in this zone, wildlife diversity within it is not nearly as high as in the CWH zone. There are probably no reptiles and only a few amphibians present [Ministry of Forests, 1993].

A small eastern portion of the TSA is within the Englemann Spruce - Subalpine Fir zone, found at elevations between 1 200 and 2 125 metres. Wet cool summers, long snowy winters and steep topography characterize this area. It is the interior counterpart to the MH zone and is an important wildlife habitat for ungulates and furbearers [Ministry of Forests 1991].

Another small area in the TSA's eastern reaches is in the Interior Douglas-fir biogeoclimatic zone that is found at elevations between 325 metres to 1 375 metres. Warm, dry summers with a fairly long growing season and cool winters are characteristic. Topographic variety and diversity of vegetation provides a wide range of important wildlife habitat niches.

In areas above 2 250 metres lies the Alpine Tundra zone. This harsh alpine climate is cold, windy, and snowy, and its growing season is short. The alpine zone is, by definition, treeless, but trees are common at lower elevations in stunted form. Wildlife diversity and density are low.

Wildlife

The mature virgin forests of this TSA contain many wildlife species that are highly dependent on the unique qualities of an old growth forest. The Soo TSA Options Report [1990] stated that, in the coastal forests, approximately 130 wildlife species use old growth: 4 species of amphibians; 5 species of reptiles; 93 species of birds; and 28 species of mammals (excluding big game species)²⁶. Big game species in the area include Grizzly and Black Bears, Moose, Mule and Black-tailed Deer, Mountain Goat, Cougar and Gray Wolf.

Some of the bird species in the conifer forested areas include Northern Spotted Owl, Northern Flicker, Hairy Woodpecker, Steller's Jay, Common Raven, Chestnut-backed Chickadee, Red-breasted Nuthatch, Townsend's Warbler, Winter Wren and Varied Thrush. Clearcut areas provide habitat for Blue Grouse, Hairy Woodpecker, Swainson's Thrush, Cedar Waxwing and Purple Finch. The nutrient rich, protected waters of the Squamish estuary provide shelter for various ducks, Trumpeter Swan, various Scoters, Canada Goose and Glaucous-winged Gull. The fish bearing waters of the many drainages support a wide range of predators including Common Merganser, Barrow's Goldeneye, and Bald Eagle. At Brackendale, on the Squamish River, a wildlife viewing attraction has developed because as many as 2 500 Bald Eagles feed on the river's salmon during the winter months. In the alpine tundra, species such as White-tailed Ptarmigan and Golden Eagle can be found.

The damp litter on the floor of mature forests supports amphibians such as salamanders, Western Toad, Pacific Treefrog and various garter snakes are widespread. River Otter, and Mink consume fresh water fish as part of their diets. Hoary Marmot and Wolverine can be found in the alpine areas.

Important big game species are also found in the Soo TSA. Table 2-14 lists some of these species and their population estimates. Black-tailed deer are populous in the upper

Table 2-14: Big Game Wildlife Populations in the Soo TSA	
Black Bear	950
Blacktail Deer	7 700
Cougar	300
Grizzly Bear	20-40
Moose	50-100
Mountain Goat	400
Wolf	10
Source: Ministry of Forests, 1993	

²⁶ The actual number of species is likely higher [pers. comm. J. Morgan].

Lillooet region and smaller populations of Moose and Grizzly Bear can also be found there. These Moose belong to the most southerly coastal population in North America. The aforementioned big game species have been cited by the Ministry of Forests [1993] as requiring special forest management to protect their populations. Environmentally sensitive winter range habitats have been identified and mapped, to ensure sufficient habitat is available to maintain desired populations. There are unconfirmed reports of an elk population on the northwest shore of Howe Sound [Turner 1991]. Government management agencies have not had the resources to develop population estimates for non-game species except the Northern Spotted Owl.

Species of management concern are listed in Table 2-15. The Northern Spotted Owl has had the highest profile and is on the Federal endangered species list. It nests in cavities or platforms of trees and feeds on a variety of forest mammals, birds and insects. They are long-lived territorial birds which often spend their adult lives in the same territory. In good habitat, owl pairs are spaced 1.5 to 3 kilometers apart [Forest Ecosystem Management Assessment Team 1993]. The owl's habitat is mainly comprised of large contiguous tracts of old growth forest. The Ministry of Environment has recorded 69 adult owls at 39 different sites in southwestern B.C. The U.S. Department of Interior has inventoried pairs at 3 602 sites and single owls at approximately 1 000 sites, a total of approximately 8 200 owls. The actual population is larger in both cases because surveys of the bird's known range are not complete. B.C. experts on the species view the small B.C. population as important to the survival of the species [Canadian Spotted Owl Recovery Team 1994]. In the U.S., a long-standing, high profile debate on management of this species culminated in a 1993 Presidential Summit in Portland, where the debate was shifted from the owl's conservation to the overall importance of late-successional (old growth) forests as a unique ecosystem. Timber harvesting is considered to be threat to the species' sustainability. In British Columbia, the Ministries of Environment and Forests have implemented an Interim Conservation Strategy to insure that known spotted owl habitat is protected. Various groups are researching biological, economic and regulatory issues to develop a long term management strategy for the owl.

Table 2-15: Species of Management Concern in the Soo TSA

S1²⁷ and S2²⁸ Rank	S3²⁹ Rank	
American Peregrine Falcon	American Bittern	Hutton's Vereo
Keen's Long-eared Myotis	Bald Eagle	Marbled Murrelet
Pacific Water Shrew	Fisher	Rubber Boa
Northern Spotted Owl	Great Blue Heron	Tailed Frog
	Green-Backed Heron	Western Screech Owl
	Grizzly Bear	Wolverine
Source: British Columbia Conservation Data Centre, Ministry of the Environment, January 6, 1994.		

²⁷ Critically imperiled on a provincial scale because of extreme rarity.

²⁸ Imperiled because of rarity.

²⁹ Rare or uncommon; may be susceptible to large scale disturbances.

Fisheries

The fisheries potential of the drainage system into Howe Sound, mainly the Squamish and Cheakamus Rivers, is somewhat limited due to high gradients, extreme flow variation, low temperatures and nutrients and habitat loss due to industry and urbanization. Smaller creeks in these drainages support runs of Cutthroat Trout, Chum and Coho Salmon, Sculpin, and Stickleback while the larger streams support Chinook and Pink Salmon, Dolly Varden Char, Rainbow Trout, Steelhead, Lamprey, Sculpin and Stickleback. Area lakes of the area were largely barren but stocking programs have spread Rainbow and Cutthroat Trout throughout many.

The Cheakamus River has been rated as a Class A watercourse as it reaches the Valley floor near Whistler. The lower portion of Callaghan River is rated Class A, however, virtually all of the other creeks and rivers are B or C Class. Steelhead fry were found to be the most abundant salmonid in the mainstream of the Cheakamus below Daisy Lake followed by lesser amounts of Coho, Chinook and Dolly Varden. The Steelhead population is low compared to historic levels, however, it is considered a very important angling resource (catch and release only)[Peter Caverhill, pers. comm.]. Logging, flood control and road building have had a detrimental impact on the Steelhead population. The Ministry of Environment is attempting to facilitate natural regeneration as opposed to hatchery techniques. Aboriginal fishing captures a number of Steelhead through winter net catches although exact amounts are unknown.

One of the main detriments to spawning success and egg survival of the salmon in this drainage is probably the hydroelectric facility that uses diverted water from Daisy Lake. The flow modifications are thought to have a major impact on Chinook reproduction [Levings and Riddell, 1992]. Chum, Coho and Chinook populations are augmented in large numbers by the Tenderfoot hatchery on the Cheakamus.

The lower portion of the Squamish River within the Soo TSA is rated Class A. With the exception of the Mamquam and Stawamus Rivers, all other tributaries are rated Class B or C. This system has significant populations of Steelhead, Coho, Chum and Chinook Salmon with Sockeye Salmon, Cutthroat and Rainbow Trout and Dolly Varden Char found in smaller numbers. Logging, dyke construction and some sewage pollution have modified the spawning habitats of these species. Port construction, landfilling and log storage have modified rearing habitats in the Squamish Estuary and major portions of wetlands have been permanently lost. These habitat factors and overfishing are major reasons that present day salmonid catches in Howe Sound are significantly lower than historical levels. This is especially true for Chinook Salmon, as their present escapements are believed to be less than 10 percent of pre-1970 levels [Levings and Riddell, 1992].

The Lillooet River system is very extensive. Most tributary systems to the main river above Lillooet Lake, with the exception of Meager Creek which is rated Class A, are very steep and their watersheds are too small to sustain significant fish populations. The few exceptions include Sampson Creek and Green River [Pers. Comm. J. Morgan]. The

Lillooet River itself and Lillooet Lake, however, supports migratory and resident fish populations and are rated Class A. Below Lillooet Lake there are many Class A tributaries.

Birkenhead River and Gates River represent another smaller Class A system in the Soo TSA. The Birkenhead River provides an important Sockeye spawning ground with annual returns between 50 000 to 200 000 [pers. comm., Bert Ionson, Department of Fisheries and Oceans]. Birkenhead Lake's Phelix Creek has a significant run of land-locked Kokanee Salmon.

Agro-Forestry

The Ministry of Forests has designated the Blackwater Creek drainage, near Birkenhead as a wild mushroom harvesting reserve. Pine Mushroom harvesting is unregulated and in recent years has attracted the attention of the mainstream media because of the No.1 grade's high prices, upwards of \$200 per pound. In the U.S., several land use conflicts have been associated with the industry but the B.C. industry has been spared these confrontations. High prices and media attention have attracted more pickers into the industry.

Pine or Matsutake mushrooms are a wild product so crops are subject to the vagaries of climatic conditions and vary widely from year to year. They are not farmed and research is only starting on growth management issues [de Geus 1992]. The last major harvest in the Blackwater area was in 1991. In the past few seasons there has only been some picking for local use. Other recent good years were 1990 and 1987. In 1993 the Nass Valley and Terrace areas had good crops and in 1992, Powell River was reputed to be the top producer.

The 1993 and 1992 harvests in B.C. are estimated at 300 and 200 tons, respectively. The largest harvest was 375 tons in 1988. Payments to pickers in 1993 totalled \$7.5 million for a \$12.50 per pound average. In 1993, pickers were paid \$200 to \$250 per pound for the top grade [Crane Management Consultants 1994]. The approximate average prices and proportion of the total crop for the other grades appears in Table 2-16.

Table 2-16: 1993 Pine Mushroom Average Prices

Grade	Price per Tonne	Percent of Total
no. 1	\$200	5%
no. 2	\$150	5%
no. 3	\$100	10%
no. 4	\$50	-
no. 5	\$25	80%
no. 6	\$0.25	-

The industry is organized into pickers, buyers and brokers and processors. The buyers strike alliances with processors and set up buying stations in the picking areas. The processors have off-shore alliances with Japanese distributors who make possible the industry's cash purchase characteristic. The mushrooms are air freighted fresh to Japan. There is one local buyer who is affiliated with a Britannia Beach based buyer. The latter is affiliated with an American processor. In 1991 there were approximately a dozen buyers in the Blackwater area. The local buyer purchased about 8 tons [pers. comm. S. Pietila]. Most residents of the D'Arcy and Birkenhead areas pick Pines in a good crop year. They are supplemented by a number of pickers from outside the local area who camp in the forest.

The B.C. Ministry of Forests is leading a research process into the regulatory needs of pine mushroom harvesting as well as other "agroforestry" products such as medicinal plants, floral and greenery products; nursery/landscaping products; craft products' herb and vegetable products and fruit and berry products [de Geus 1993].

*Outdoor Recreation*³⁰

The Soo TSA has an unusually large number of residents and visitors who use its public forests for active leisure pursuits, such as hiking and skiing; and passive activities, such as enjoying ocean and mountain landscapes. The forests provide a fundamental backdrop to these activities which in turn support a wide variety of businesses and their employment.

Table 2-17 shows Greater Vancouver Regional District (GVRD) and Squamish - Lillooet R.D. participation rates for outdoor recreation activities of prime interest to this study. Overall, the figures indicate steady levels of participation over time in outdoor recreation. This rate stability translates into increased levels of participants through population increase. With the ageing of the population, growth rates will decline, but only slightly. Projected population increases will place pressure on the existing supply of outdoor recreation opportunities. Also of interest in these figures is that Squamish - Lillooet R.D. residents have much higher participation rates compared to the residents of the Greater Vancouver R.D., probably due to their proximity to outdoor recreation opportunities.

Several demographic factors influence recreation suppliers to meet the expectations and needs of significant population sub-groups. One of the most interesting is the ageing of the population. Table 2-18 shows participation rates by age in the Lower Mainland. An ageing population will limit the increase in recreation activity from area residents that an expanding population would indicate. It will also alter demand between activities.

³⁰ Recreation refers to a range of outdoor activities undertaken either by a resident of the area, or a non-resident. Non-resident visitors are commonly referred to as tourists.

Table 2-17: Outdoor Recreation Participation Rates in Parks

Activity	Squamish - Lillooet R.D.	Greater Vancouver R.D.			
	(1993)	(1993)	(1991)	(1989)	(1983)
Day hiking	64.3%	40.7%	57.0%	49.0%	44.0%
Overnight backpacking	29.1	13.7	19.0	18.0	19.0
Camping Trip	49.8	44.9	48.0	42.0	-
Fishing	23.9-37.6	23.6-29.8	37.0	36.0	37.0
Hunting	7.4	6.6	5.0	6.0	-
Canoeing	43.5	24.1	16.0	17.0	-
Cross-country skiing	38.3	16.1	14.0	14.0	14.0
Downhill skiing	6.2	32.4	21.0	29.0	22.0
Snowmobiling	20.1	2.9	6.0	4.0	-
Going to the beach	89.2	83.4	82.0	83.0	-
Outdoor swimming	79.3	59.4	60.0	63.0	-
Driving for pleasure	80.1	75.2	-	-	69.0
Walking for pleasure	92.5	91.6	-	-	-

Sources: GVRD, BC Parks

Similar changes in participation in older age cohorts were noted in a 1991 BC Parks survey. The more strenuous activities exhibited the sharpest declines in participation among older age groups. However, trends in participation rates are only one measure affecting outdoor recreation. There are a number of other supply and demand issues which have to be taken into account in the planning process. For example, frequency of participation has not been evaluated in the above tables. It could be that, even though the participation rate for a selected age group may be low, the frequency of use could be high, resulting in a much higher level of demand than would otherwise be evident.

Table 2-18: Lower Mainland Recreation Percentage Rates of Participation by Age

Activity	18-30	31-40	41-50	51-60	60+
Driving for pleasure	75.4	80.7	76.1	75.8	74.9
Going to the beach	94.8	91.7	80.8	74.6	62.9
Day hiking	49.1	47.9	45.4	37.2	22.2
Backpacking	19.3	18.8	7.8	15.4	2.2
Fishing	26.7	37.7	27.0	37.1	26.6
Swimming	70.2	69.8	67.5	50.3	37.5
Downhill skiing	50.3	42.7	28.6	19.7	6.9
Cross-country skiing	17.6	17.5	16.1	16.5	10.3
Snowmobiling	7.5	3.4	1.0	2.8	2.3
Golfing	39.5	39.0	31.2	33.0	29.8

Source: GVRD 1993.

Park Visitorship Trends

There are some major provincial parks, such as Garibaldi and Shannon Falls, which lie completely or partially in the TSA. The visitation levels in Table 2-19 provide an indicator of demand within the region for the types of recreation experiences found in these parks. Their total 1992 visitation was approximately 520 000 visitor days³¹, up 24.7 percent from 1991. In comparison, visits to all B.C. provincial parks increased by a much lower amount, 11 percent. Between 1987 and 1992, total visits to the parks in and around the Soo TSA grew by 35.6 percent, whereas, for the province as whole growth was only 21.6 percent. The Garibaldi-Sunshine District, within which the Soo TSA falls, had the largest increase in total visits in the province over the same period [BC Parks, 1993].

As in the province, day use in the region has been growing at a faster rate than campground use. Campground visitors in the Soo TSA parks grew only 27.8 percent, while day use visitors grew by 36.4 percent between 1987 and 1992.

Table 2-19: Visitation at Provincial Parks in the Soo TSA (thousands of visitor days)						
	1992	1991	1990	1989	1988	1987
Alice Lake (campground)	11.0	9.6	9.4	9.7	7.7	9.2
Alice Lake (day use)	78.5	62.9	72.8	70.1	63.5	65.6
Birkenhead Lake (campground)	4.5	2.6	2.9	3.5	2.8	2.7
Birkenhead Lake (day use)	3.1	1.2	0.5	1.0	-	-
Blackcomb Glacier (day use)	53.0	35.0	-	-	-	-
Brandywine Falls (campground)	1.5	1.1	0.9	1.0	0.9	.5
Brandywine Falls (day use)	43.4	31.6	31.7	27.2	26.0	28.0
Chieftain Viewpoint (day use)	45.5	33.5	44.0	-	-	-
Garibaldi (campground)	3.5	3.2	2.6	3.6	2.7	4.2
Garibaldi (day use)	25.1	22.1	19.6	20.3	17.9	25.5
Joffre Lakes R.A. (day use)	4.5	2.4	1.1	2.0	-	-
Murrin (day use)	38.5	29.1	32.5	32.4	30.6	29.1
Nairn Falls (campground)	5.8	4.2	3.7	4.3	4.0	3.2
Nairn Falls (day use)	21.7	17.5	18.4	18.9	2.2	1.4
Porteau Cove (campground)	8.2	7.5	7.5	7.0	5.4	7.2
Porteau Cove (day use)	69.2	62.9	70.9	73.1	63.7	58.1
Shannon Falls (day use)	102.1	89.7	83.0	81.2	69.8	69.8
Source: BC Parks.						

Forest Recreation Site Visitation Trends

Table 2-20 shows usage trends at the 15 Ministry of Forests recreation sites in the Soo TSA. There has been some difficulty in obtaining accurate data but overall the trends indicated are reliable. Visitation at these sites has grown approximately 10 percent per year between 1989 and 1992. 1993 visitation is estimated to have increased by 12 percent

³¹ All growth calculations regarding Provincial Parks in and around the Soo TSA made use of information only from those parks with a full six years of data.

with the exception of Meager Creek where visitation was believed to be approximately 20,000 [John Tisdale, pers. comm., 1994].

Table 2-20: High Season Visitation at Ministry of Forests Road Accessible Recreation Sites (user days)		
Recreation Site	1989³²	1992³³
Callaghan Creek	4 070	6 751
Alexander Falls	290	360
Callaghan Lake	1 882	1 432
Mosquito Lake	214	354
Owl Creek	383	1 426
Spetch Creek	35	798
Blackwater Lake	383	599
Strawberry Point	138	357
Twin One Creek	1 025	1 457
Lizzie Bay	658	985
Driftwood Bay	643	973
Lizzie Lake	275	1 027
Cat Lake	2 118	3 456
Brohm Lake	2 429	3 525
Meager Creek	11 407	10 751
TOTAL	25 950	34 251
Source: B.C. Ministry of Forests, 1993		

The Ministry maintains 8 hiking trails and recreational use also occurs at a number of unofficial sites. Table 2-21 provides the visitation data for these trails and sites. In addition to the intense use of the forest on trails and at sites, it is important to note that there are an estimated 6 million plus user days³⁴ of viewing the forest. This demonstrates the importance of visual quality in high traffic areas within the Soo TSA.

There are three interpretative forests in the Soo TSA - Brohm Lake (400 ha.) near Squamish, Cheakamus (2 886 ha.) near Whistler and Shadow Lake (125 ha.) near Pemberton. This blending of tourism and forestry, within a working forest, is intended to provide an outdoor recreation experience together with education about forestry and wildlife management practices, and includes interpretative sites and trails, and forestry demonstrations. These interpretative forest sites have been in operation for less than two years and no visitation data is yet available.

³² May 15 to October 15.

³³ May 1 to October 31.

³⁴ Viewing Use = (Population residing, travelling or working within view of forest) x (Days in a year that forest is visible) x (Proportion of population with a lifestyle for viewing forests).

Table 2-21: Estimates of Visitation on Crown Forest Land, 1992 (user days)

Type of Use	User Days
Official Trail Use	
Rainbow Lake	3 000
Ancient Cedars	2 000
Brohm Lake	200
Callaghan Creek/Brandywine	1 000
Tenquille Lake	200
Branch 12 (Tenquille Lake)	1 000
Whistler Interpretative Trails	1 000
Rutherford Snowmobile Trail	600
Use at Non-project Locations ³⁵	25 000
Recreation Site Use ³⁶	37 000
TOTAL	71 000
Source: B.C. Ministry of Forests, 1993	

Hunting and Fishing Trends

As hunting and fishing are closely tied to fish and wildlife habitat, forest harvesting can have a direct impact on these activities. Table 2-22 provides hunter effort data for major game species in the Soo TSA from 1987 to 1992. These totals have remained fairly stable at levels of 8 000 to 10 000 hunter days per year.

Table 2-22: Hunter Days for Major Game Species in the Soo TSA

Game	1987	1988	1989	1990	1991	1992
Mule Deer	7 548	7 057	8 209	6 720	7 932	8 118
Mountain Goat	50	37	49	8	36	12
Black Bear	1 352	2 047	2 066	1 418	1 636	2 082
Cougar	23	41	56	8	18	9
TOTAL	8 973	9 182	10 380	8 154	9 622	10 221
Source: B.C. Ministry of Environment						

Table 2-23 provides the number of hunters of small game species in the Soo TSA from 1987 to 1992. Hunter effort is not available for these species. It is difficult to suggest any sort of trend with this data due to the high variance from year to year with the number of hunters ranging from 1 701 to 4 164. These totals should also be used with caution as there is a potential for double counting of hunters pursuing more than one species.

³⁵ Includes 29 trails, 22 recreation routes and 15 undeveloped sites.

³⁶ High season use was multiplied by an MoF estimate of 1.09 to obtain annual use as shown.

Table 2-23: Number of Hunters for Small Game Species in the Soo TSA

Game	1987	1988	1989	1990	1991	1992
Blue Grouse	264	206	413	213	265	587
Spruce Grouse	186	207	359	82	184	689
Ruffed Grouse	391	391	819	367	277	593
Goose	636	497	631	307	466	664
Duck	1 013	695	1 065	650	569	805
Pheasant	136	146	198	70	105	385
Ptarmigan	6	36	35	12	12	441
TOTAL	2 632	2 178	3 520	1 701	1 878	4 164

Source: B.C. Ministry of Environment

Traffic Volume Trends

The drive between Vancouver and Whistler on Highway 99 is one of the most attractive in North America and attracts a large volume of day-trippers during the spring and fall. This highway also provides the only direct road access into the Soo TSA from the Lower Mainland and, as the main road through the TSA, has also seen significant growth in traffic volumes over the years. This can be indicative, not only of population growth, but also of the number of people driving through the area to experience outdoor recreation. Table 2-24 provides average annual daily traffic (AADT) for count stations on this highway. Annual traffic counts at Whistler, Squamish and Horseshoe Bay, based on available data, have increased over past years at 9.5, 7.3 and 3.6 percent respectively. The 1993 total traffic count at Whistler amounted to 4.4 million vehicles.

Based on projected average annual traffic growth of 6 percent, a Ministry of Transportation and Highways consultant recommended the widening of Highway 99 and the construction of a complementary route between Vancouver and Squamish east of Indian Arm by 2014 [Hamilton Associates 1990]. There has also been a presentation to the public by the Ministry regarding a \$700 million upgrading in the form of an expressway between Lions Bay and Squamish, however, no plans have been made.

Growth in traffic, which significantly exceeds population growth, can indicate that driving in the area has increased from factors other than population. Between 1986 and 1991, the Greater-Vancouver R.D.'s population grew 15.4 percent and the Squamish - Lillooet R.D. grew 30.9 percent while traffic counts at Whistler grew 71.9 percent. It can reasonably be assumed that the traffic growth was in large measure due to an increase in the demand for outdoor recreation in the region.

Table 2-24: Average Annual Daily Traffic (AADT) on Highway 99, 1978 - 1993

Year	Horseshoe Bay ³⁷		Squamish ³⁸		Whistler ³⁹	
	AADT	% Change	AADT	% Change	AADT	% Change
1978	n/a	n/a	1 957	n/a	n/a	n/a
1979	n/a	n/a	2 207	12.8%	n/a	n/a
1980	n/a	n/a	2 531	14.7	n/a	n/a
1981	n/a	n/a	2 544	0.5	n/a	n/a
1982	n/a	n/a	2 440	-4.1	4 447	n/a
1983	n/a	n/a	2 616	7.2	4 442	-0.1%
1984	n/a	n/a	2 712	3.7	4 928	10.9
1985	n/a	n/a	3 130	15.4	5 147	4.4
1986	n/a	n/a	3 214	2.7	5 949	15.6
1987	n/a	n/a	3 740	16.4	7 248	21.8
1988	n/a	n/a	4 433	18.5	8 913	23.0
1989	9 802	n/a	4 404	-0.7	9 573	7.4
1990	9 367	-4.4%	4 346	-1.3	9 964	4.1
1991	9 671	3.2	4 926	13.3	10 427	4.6
1992	10 527	8.9	5 377	9.2	11 124	6.7
1993	11 304	7.4	5 662	5.3	12 101	8.8
Average Annual Growth ⁴⁰		3.6%		7.3%		9.5%

Source: B.C. Ministry of Transportation and Highways

Whistler Resort Outdoor Recreation Trends

Whistler Resort Association maintains visitation data for Whistler Resort, the base for both Whistler and Blackcomb Mountains. Table 2-25 shows inventory and occupancy for accommodation at Whistler. For the past 9 years, both summer and winter occupancy has risen at an average annual rate of 17 percent. For the 1991-92 and 1992-93 seasons, growth in summer occupancy has been significantly higher than winter reflecting Whistler's growing reputation as an all season destination. The overall large annual increases reflect the expansion of the resort and its growing international reputation as a world class destination.

A fundamental reason for visiting the TSA is that Whistler has an international reputation and has become a type of brand product. Advertising and promotion will drive up visitation beyond that suggested by local demographics. It competes with other international destinations in a growing market which is powered by forces such as trade

³⁷ Permanent Count Station P-15-5, 1.0 km north of Route 1/99 at Horseshoe Bay. This station is just south of the entrance into the Soo TSA.

³⁸ Permanent Count Station P-15-3, at Cheekye River Bridge, 11.5 km north of Squamish.

³⁹ Permanent Count Station P-15-4, 0.2 km north of the Gondola parking lot at Whistler.

⁴⁰ Based on all yearly data available.

globalization and the accumulation of wealth among older age groups with significant amounts of leisure time.

Table 2-25: Inventory and Occupancy of Commercial Accommodation at Whistler, 1984/85 - 1992/93					
Year	No. of Rooms	Room Nights			
		Winter ⁴¹	% Growth	Summer ⁴²	% Growth
1984-85	969	72 304	n/a	56 007	14%
1985-86	1 084	112 446	56%	88 872	59
1986-87	1 230	138 338	23	101 710	14
1987-88	1 615	188 455	36	133 229	31
1988-89	1 814	212 266	13	137 136	3
1989-90	2 561	261 239	23	165 396	21
1990-91	2 756	289 305	11	178 125	8
1991-92	2 756	293 961	2	219 208	22
1992-93	2 756	300 934	2	233 140	7
Average Annual Growth		17%		17%	
Source: Whistler Resort Association, 1994					

Squamish Destination Tourism Trends

Surrounded by natural beauty and bare granite cliffs, Squamish offers over 600 established rock climbs. A climbing season generates approximately 20 000 climber days with climber expenditures totalling an estimated \$590 000 [Sea to Sky Economic Development Commission, March 1993]. Windsurfing off Squamish Spit in Howe Sound is considered high quality, and attracts approximately 15 000 windsurfer days annually. Spending associated with windsurfing is approximately \$375,000 [Sea to Sky Economic Development Commission, March 1993].

Squamish also attracts a large number of tourists in conjunction with the historic Royal Hudson Steam Train which travels during the summer tourist between Squamish and North Vancouver along scenic Howe Sound. Over 90 000 passengers rode the train in 1992. Table 2-26 provides passenger data over the last several years and, with the exception of 1993 when BC Rail had a major strike, demonstrates average annual growth of 13 percent.

⁴¹ Winter season extends from November 1 to April 30 in the years given.

⁴² Summer season extends from May 1 to October 31 in the second year given.

**Table 2-26: Royal Hudson Passengers
1990 - 1993⁴³**

Year	# of Passengers
1990	70 000
1991	75 000
1992	90 000
1993	37 000
Source: Crown Corporation Secretariat, 1994	

Protected Area Strategy

Under its Protected Area Strategy (PAS), the B.C. Government is committed to doubling the system of protected areas from six to 12 percent of the province's land base by the year 2000 [B.C. Government 1993]. Protected areas are defined as inalienable areas where no industrial extraction or development is permitted. Within the Soo TSA, 159 200 hectares have protected status, 18 percent of its total land base. At the time of writing this report the government had not made decisions on adding to this amount through the PAS process although various parties have proposed several areas within the TSA.

Presently, the government is identifying, mapping and analyzing sites for possible protected designation. The Spotted Owl Conservation Areas (SOCAs) are included on the PAS Areas of Interest list. Although the SOCA and PAS processes are separate, SOCA preservations, because they would be classified as protected areas, would influence the PAS process. SOCAs have been recommended as a possible means of managing the Spotted Owl in the Soo and Fraser TSAs.

⁴³ The operator, BC Rail, had a lengthy strike in 1993.

3.0 TIMBER SUPPLY SITUATION

3.1 Introduction

The Soo TSA Timber Supply Analysis report was released in July, 1994. Three scenarios from this report are examined in this socio-economic analysis. These scenarios represent possible harvest flow patterns given current land base and forest management practices⁴⁴ in the Soo TSA. The forecasts were chosen to identify the a range of social, environmental, and economic implications associated with different harvest levels. **The forecasts are neither meant to suggest a preferred AAC level nor do they represent the only options that could be considered in the final AAC determination.**

3.2 Current Forest Management Guidelines

The majority of the Soo TSA land base is managed under Integrated Resource Management (IRM) principles. A three pass harvesting system is used with a 13 year green-up period (three metre tall regenerated trees) between passes. An additional goal of current management is to have no more than 33 percent of the forest less than three metres tall at any time. The remaining 67 percent is managed for visual quality, wildlife, community watersheds and mushroom habitat.

The selection of a forest management system sets constraints on the amount, location and timing of the annual timber harvest. If a significant portion of the timber harvesting land base is subject to current IRM practices and if there is to be no severe future falldown in timber supply then present harvest levels cannot be maintained indefinitely. The two most important factors contributing to the projected decline in timber supply are:

- The available timber harvesting land base has been reduced significantly since the last timber supply analysis, due largely to a redefinition of what constitutes the timber harvesting land base, and to a lesser extent, more accurate mapping and deletions of forested land for other purposes;
- Approximately 11 percent of the area that is available for timber harvesting is managed for scenic values, which significantly limits the rate of harvest.

3.3 Current AAC

The current AAC for the Soo TSA is 580 000 m³, set by the Chief Forester in January 1992. The previous AAC level of 705 000 m³ was established in 1980. The harvest apportionment is shown in Table 3-1.

⁴⁴ Current management practices are assumed in the review. These cover many but not all practises of the new Forest Code. Estimates based on new forest management rules will be developed in the next cycle of TSA AAC reviews, approximately five years hence.

The 580 000 m³ does not include Woodlot Licences. There are seven Woodlot Licences in the TSA, having a combined AAC of 7 391 m³.

Table 3-1: Current AAC Apportionment, Soo TSA, 1993

	m ³	% of AAC
Forest Licences, Replaceable	432 987	74.6%
Timber Sale Licences (Major) < 10 000	21 431	3.7
SBFEP Conventional (log market sales)	85 159	14.7
SBFEP Bid Proposal (value added sales)	25 391	4.4
Forest Service Reserve	10 875	1.9
Forest Licence, Non-Replaceable	4 157	.7
Total Approved Allowable Annual Cut	580 000	100.0%

The total area for the entire Soo TSA is 880 000 hectares, including parks. After accounting for non-Crown land, non-forest land, and various reductions to the productive forest area, the long-term timber harvesting land base is only 106 371 hectares (12 percent of total land base). A larger portion, about 18 percent, is in parks. See Appendix 6 for a complete breakdown of the TSA's land base.

3.4 Current TSA Forest Industry Operations

Information furnished by major licensees and small business operators (Table 3-2) indicates that about 13 percent of current harvest levels is processed within the TSA⁴⁵. The majority, about 56 percent, of the TSA's timber is manufactured into lumber - 10 percent inside the TSA and 46 percent outside the TSA. About 26 percent of the timber, consisting of low quality logs, is consumed by the pulp and paper industry located outside the TSA. Seventeen percent of the harvest is processed into other solid wood products. Of this, about 3 percent is processed in the Soo TSA, predominantly manufactured into log homes. The remaining 14 percent is processed outside of the TSA, manufactured into other solid wood products such as plywood, shakes and shingles and log homes.

The wood flow information is based on licensee information, but not all of the licensees are integrated companies owning processing facilities. C.R.B. Logging and Squamish Timber and the majority of the small business operators, are market loggers who distribute their wood through a variety of channels. The movement of logs to their final processing point can be quite complex with private trades, sales agreements and distribution through the Vancouver log market all playing a part in log exchange. As a result, licensees do not always know precisely where their TSA wood is eventually processed.

⁴⁵ Twelve established licensees and two small business operators were surveyed. Collectively, the survey respondents accounted for 80 percent of the total Soo TSA AAC in 1993 and 99 percent of non-SBFEP licensees.

Table 3-2: Soo TSA Wood Flows, 1993

Timber Use	Within TSA	Outside TSA	Total
Lumber	10%	46%	56%
Other Processing	3	14	16
Pulp and Paper	0.0	26	26
Export	-	1	1
Total	12.9%	87.1%	100.0%

Employment Attributable to Soo TSA Wood

Census labour force information for the region was reviewed in Section 2.2. The census data shows employment supported by Soo TSA timber and from other sources, including those outside the TSA. Direct harvesting employment and processing employment for major licensees in the Soo TSA was discussed in section 2.5. In terms of the AAC for the Soo TSA, direct employment in harvesting and silviculture is approximately 303 PYs⁴⁶. This does not include additional employment related to the cut outside of the AAC, including Tree Farm Licence (TFL), Timber Licence (TL) and private wood. Soo TSA wood is the basis for another 64 jobs at numerous processing facilities (primarily sawmills) in the TSA. Based on the available wood flow information, most of these jobs are at mills in Squamish. Forest sector employment within the TSA attributable to the harvest from the Soo TSA is about 367 PYs. Outside of the TSA, the harvest from the Soo TSA supports another 322 processing jobs, primarily in the Lower Mainland and coastal pulp mills. Therefore, total provincial employment attributable to the Soo TSA harvest is about 689.

These estimates do not include employment related to the harvest from outside of the TSA, including TFL #38, Timber Licence (TL) and other harvesting activity (e.g. private wood harvest) that is processed by mills with the Soo TSA. Approximately 95 percent of the timber processed within the TSA boundaries is harvested outside the TSA.

3.5 Description of Harvest Forecasts

The Scenario 1 timber harvest flow is shown in Table 3-3 and Figure 3-1. The harvest levels apply to the beginning of each decade and are assumed to be the same for each year of the decade. The Timber Supply Analysis indicates that the current AAC cannot be maintained over the long term, given current management practices. Two other possible paths for moving towards the long-term harvest level are also shown in Table 3-3.

⁴⁶ This employment data is based on a survey of Soo TSA licensees. The methodology is explained in Appendix 8.

Scenario 1

Scenario 1 is fully described in the Timber Supply Analysis report [1994]. It begins with a maximum allowable harvest of 506 000 m³ for the first decade, a 13 percent decrease from today's AAC of 580 000 m³. The harvest declines by approximately 13 and 11 percent in the second and third decades, respectively. Thereafter, the harvest is steady at 394 000 m³ for four decades. This level is 11 percent below the long term harvest level (LTHL). In decade seven, there is a small decrease of .3 percent before the LTHL of 442 000 m³ is achieved in the eighth decade. The long run harvest level is a 24 percent reduction below the current AAC and 37 percent below the pre-1992 level of 705 000 m³.

Scenario 2

Scenario 2 considers the implication of retaining the current AAC for a decade. Therefore, it begins with the current AAC of 580 000 m³ for the first decade. The harvest then declines by approximately 33 percent in the second decade to 389 000 m³ and remains at this level for six decades. This level is 12 percent below LTHL. In decade eight, there is an increase of 14 percent and the LTHL of 442 000 m³ is achieved. As with Scenario 1, the long run harvest level is a 24 percent reduction below the current AAC and 37 percent below the pre-1992 level.

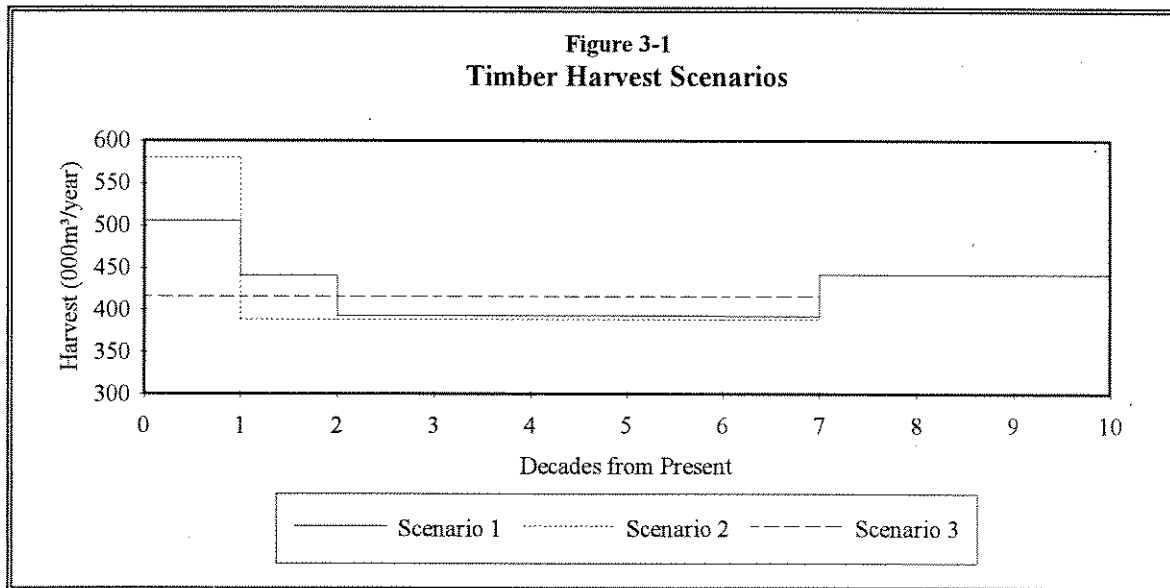
Scenario 3

Scenario 3 examines moving quickly to the long term harvest level. It begins with a maximum allowable harvest of 416 000 m³ for the first decade, a 28 percent decrease from today's AAC volume. This level is maintained for a total of seven decades. It is 6 percent below the long term harvest level. In decade eight, there is a corresponding increase of 6 percent when the LTHL of 442 000 m³ is achieved. As with Scenario 1, the long run harvest level is a 24 percent reduction below the current AAC and 37 percent below the pre-1992 level.

Table 3-3: Harvest Flow Forecasts
('000 m³)

Harvest Period	Scenario 1			Scenario 2			Scenario 3		
	Harvest '000 m ³	Change		Harvest '000 m ³	Change		Harvest '000 m ³	Change	
		'000 m ³	%		'000 m ³	%		'000 m ³	%
Current	580			580			580		
0	506	-74	-13	580	0	0	416	-164	-28
10	441	-65	-13	389	-191	-33	416	0	0
20	394	-47	-11	389	0	0	416	0	0
30	394	0	0	389	0	0	416	0	0
40	394	0	0	389	0	0	416	0	0
50	394	0	0	389	0	0	416	0	0
60	393	1	-.3	389	0	0	416	0	0
70	442	49	12	442	53	14	442	26	6

Figure 3-1
Timber Harvest Scenarios



4.0 SCENARIO 1 IMPACT ANALYSIS

This section describes the economic, environmental, community and First Nations impacts in the TSA and the province resulting from the timber harvest schedule identified in Scenario 1⁴⁷.

4.1 TSA Impacts

Economic Development

Forestry employment and employment income impacts of the Scenario 1 harvest levels are shown in Table 4-1. In Scenario 1, direct forest sector employment in the TSA would fall immediately by 13 percent, or 47 person years (PYs), below present employment levels⁴⁸. There would be a further 23 PYs of associated indirect jobs lost⁴⁹, leading to a total decline of 70 jobs. The corresponding direct and indirect employment income losses

Table 4-1: Scenario 1 - TSA Economic Impacts							
	Harvest	Employment (PY/Year)			Employment Income (1993 Millions/Year)		
Year	'000 m ³	Direct ⁵⁰	Indirect ⁵¹	Total	Direct ⁵²	Indirect ⁵³	Total
Current	580	367	182	549	\$12.02	\$4.07	\$16.09
0	506	320	159	479	10.49	3.55	14.04
10	441	279	138	417	9.14	3.10	12.24
20	394	249	124	373	8.17	2.77	10.93
30	394	249	124	373	8.17	2.77	10.93
40	394	249	124	373	8.17	2.77	10.93
50	394	249	124	373	8.17	2.77	10.93
60	392	249	123	372	8.14	2.76	10.90
70	442	280	139	418	9.16	3.10	12.26

⁴⁷ This study focuses on the Soo TSA's harvest and not on all aspects of the area's forest industry. TFL, TL and private timber from the TSA are not factored into the analysis because they are not included in the Soo TSA timber supply. Similarly, employment derived from wood sourced outside the Soo TSA and processed by the area's forest industry is not considered.

⁴⁸ The job loss is projected to occur in the first year of the decade. Thereafter, the employment level is projected at the same level as in the first year of the decade.

⁴⁹ Indirect jobs include employment in forest industry suppliers, such as road building, machine shop, engineering companies, and in businesses which provide consumer goods and services to employees of the forest industry and their suppliers. Indirect employment includes induced employment.

⁵⁰ The estimated cumulative co-efficient for the TSA is .63 PY per 1 000 m³. This includes harvesting, silviculture, and processing employment. See Appendix 7.

⁵¹ Indirect employment for the TSA is based on a regional multiplier of 1.5. See Appendix 8.

⁵² The average 1993 annual after-tax income for a regional forest industry employee is \$32 764. See Appendix 7.

⁵³ Indirect employment income for the TSA is derived using an average annual after-tax income of \$23 350 for B.C. See Appendix 7.

would be \$1.53 million and \$0.52 million, respectively. There would then be two more successive decades of significant declines. Total job losses would be 62 and 44 in years 10 and 20, respectively. Total cumulative job losses by year 20 would be 176. The corresponding total employment income loss would be \$1.80 million and \$1.31 million per year, starting in years 10 and 20, respectively. Total cumulative employment income losses by year 20 would be \$5.16 million per year. No further changes would occur for 40 years. In year 60, the harvest decreases slightly and in year 70 the harvest level increases to the long-run harvest level of 442 000 m³, resulting in the addition of 46 total jobs and \$1.36 million per year in employment income.

Employment coefficients collected as jobs per thousand cubic meter of timber from a survey of licensees, are the basis of the impact estimates. The full methodology is presented in Appendix 7. The employment coefficients presume a linear relationship between harvest level and jobs, so employment changes parallel harvest level changes. While the linear relationship provides a reasonable estimate, employment changes would probably occur irregularly and depend on factors such as:

- Government budgeting, which could affect silviculture activity and Squamish Forest District office employment;
- Increased mechanization, which could lead to further job loss;
- Increased steep slope logging, which could lead to increased woods employment if long distance yarding methods are used; and
- Use of alternative silviculture systems (e.g. commercial thinning)⁵⁴.

The qualifications to the analysis of employment impacts are discussed in Appendix 1.

Any changes in the TSA's AAC are assumed to be distributed proportionately to all volume licensees. One company and its employees would not be expected to bear the entire burden. A change to the AAC might require a revision of licensee chart areas so the impact could include both a harvest reduction and a move of operations.

B.C. Ministry of Forests' employment levels would probably remain at or around the same level through the decades. The Ministry's Squamish District Office employment attributable to the TSA's AAC is estimated as 33.6 PYs for fiscal 1992-93. Total staffing for the Squamish Office was 56 PYs. This employment is additional to the estimated industry employment shown in Table 4-1. Although the TSA's timber harvest will affect Ministry activity to some extent, the majority of Ministry of Forests' employment is viewed as being related to forest management, not harvest management.

Current integrated resource management practice is a fundamental premise underlying the harvest scenarios. As a result, the scenarios are likely to have similar impacts on mushroom harvesting and other agro-forestry uses. The harvest flows also have similar implications for tourism and outdoor recreation activities. This does not mean that the

⁵⁴ Appendix 10 contains a general explanation of the effects of varying silviculture practises.

harvest scenarios will not have an impact on these activities, only that they are projected to have similar impacts over the planning horizon. The intent of this assessment is to analyze the impact of the changing harvest flows but not to project growth for each sector of the economy. Employment projections based on local resident and tourist driven outdoor recreation activity are not included in this report. Appendix 7 provides a more detailed discussion of the issue of tourism and changes in the Soo TSA timber harvest.

Community Impacts

The three largest communities, Squamish, Whistler and Pemberton, differ in their economic characteristics. Squamish has the largest population, the closest proximity to Vancouver, a the largest social infrastructure, and a more diversified economic base but one still reliant on the forest industry. Whistler has little direct exposure to changes in the forest sector activity. Pemberton is small with a 1991 population of 502; has the least amount of social infrastructure and is heavily reliant on the forest industry. A study of the economic impact of the Duffey Lake Road closure in July, 1990 illustrates Pemberton's difficulties in adjusting to a major economic dislocation [Sea to Sky Economic Development Commission, October, 1990]. The study concluded that the road closure led to the lay-off of 33 percent of the workforce and 49 percent decline in revenue or \$3.28 million in July and August. The negative financial impacts of the event are still being felt today [pers. comm., Robert Fine].

Population

Each community has experienced population growth, primarily driven by in-migration and the boom in the local tourism industries. There have been a few recent negative employment situations in the region, such as the short-term Duffey Lake Road closure and the permanent loss of 82 jobs from the closure of the CanOxy chemical plant [Sea to Sky Economic Development Commission, March 1994], but they do not appear to have hampered overall growth. Based on this experience job losses associated with AAC reductions would have a relatively small effect on population numbers in the short-term. The Scenario 1 projects 47 direct PYs and 23 indirect PYs at risk. In the long term, the tourism industry's potential, the possibility of off-setting mitigation measures through intensive silviculture and, perhaps, additional value-added wood businesses should off-set population losses arising from associated job losses. Even in forest industry dependent communities like Squamish and Pemberton, an initial reduction in harvest would probably not lead to a significant loss of population.

Local Government

Property tax revenues are a principal indicator of the impact of timber harvests on local government. A harvest reduction can result in less tax revenues flowing to local government, mainly from lower property values. Ultimately it could affect a community's ability to support infrastructure and service needs.

It is difficult to say whether or not the harvest level projected in Scenario 1 would result in the closure of a mill, within the TSA, in the short-term. The larger mills located in the TSA source timber extensively from outside the TSA. This fact does not completely protect them because, the timber supply in B.C. is becoming tighter. The size and technology of the Weldwood sawmill should allow it to continue operations in the face of a declining long-term supply and higher timber input prices. Smaller mills, with greater dependence on local and open market wood, are the ones at risk because of lower local harvests.

Mills without a timber supply licence, such as A.J. Forest Products and Continental Pole, which obtain as much as 90 percent of their wood from the Soo TSA, are in a weaker position because the price of open-market logs is expected to rise in the short and long term. The owner of A.J. Forest Products felt that a 10 percent reduction in Soo TSA wood would probably amount to a larger reduction to him and could conceivably result in closure of the mill [pers. comm. Ross Mader]. The owner of Continental Pole felt a 10 percent reduction would translate into approximately a 20 percent reduction to him. Higher log prices could eventually lead to increased international competition in log homes in the longer term and that may have implications for the survival of his company [pers. comm. Drew Oberson].

Although some small forest companies endure for many years, a portion of smaller operators come and go with the overall fortunes of the B.C. industry. A 13 percent reduction, in itself, will not likely result in the closure of a local mill. Higher prices for wood input, a general North American trend, are perhaps a more menacing factor. Another round of AAC reductions in the second decade would place greater pressure on small companies.

From the perspective of property tax revenues, the problem of a closure would be one of the timing of the replacement of the lost tax revenue. There would be a gap between the time a mill closed and when increased revenues associated with population growth trends might replace the lost mill tax revenue. Due to the population growth in the area, residential property values are unlikely to be negatively affected by the forest industry workforce reductions.

Social Fabric

Communities and individuals suffer in a major lay-off. Pemberton, where the reliance on logging is highest, and to a lesser degree, Squamish would bear the greatest strain of an

AAC reduction. However, certainly in the first decade of Scenario 1, the strain of lay-offs will be most visible in unemployed individuals and their families rather than the larger community.

There have been several sociological studies of resource industry lay-offs. A clear issue in this research is that the emotional impacts of job loss are of great significance [CORE 1994; R.E. Lee 1991]. Job loss dramatically and permanently alters the lives of long-time workers. Displaced forest industry workers differ from typical social service clients in that they have a stable work history in an industry with relatively good wage levels. They suffer emotionally and in some instances they do not qualify for social assistance programs because of their accumulated property [CORE, 1994].

Dr. Katherine Carlson [CORE, 1994], in a study of U.S. Pacific Northwest forest workers, found that all family members experienced strong emotional impacts. When questioned about the stress of dislocation, 38 percent stated that relations with those nearest them became somewhat more difficult and unhappy and seven percent reported that these relationships became very difficult and unhappy. According to a recent U.S. Government report, children can be especially affected [CORE, 1994]. The report found that there can be serious and lasting effects on children in forestry dependent communities where they are physically harmed through poverty and parental abuse or neglect and psychologically harmed through family and community disintegration. The overall stresses on family life can result in physical and substance abuse, divorce and juvenile delinquency.

The social and health indicators discussed in section 2.2 showed that the Squamish - Lillooet R.D., in general, has a relatively stable social fabric. However, unemployment levels are high in the region suggesting that these communities are not well-positioned to respond to further forest industry layoffs. In fact, a recent study described the Howe Sound Labour Market Area's unemployment as "extremely high", the highest on a five tier scale [Human Resources Canada, December 1993]. Whistler's unemployment level is also high, but is largely due to a transient workforce and, as its forestry employment is low, Whistler is unlikely to be affected significantly by further forest industry down-sizing. The proximity of Squamish - Lillooet R.D. communities to Greater Vancouver offsets much of their infrastructure deficiencies. However, residents affected by a large forest industry lay-off are still open to considerable upheaval in their lives as they struggle to adjust to new circumstances.

The Squamish RCMP detachment [pers. comm. Sgt. R. Deroun] suggests, based on observing community changes during local labour upheavals, that increased family violence, shoplifting, breaking and entering and alcohol-related crimes could result from increased unemployment. Neither the Whistler nor Pemberton detachments could correlate crime rates with unemployment and forest industry worker displacement.

Physical and Social Infrastructure

On April 13, 1994 Premier Mike Harcourt announced the Forest Renewal Plan [BC Government 1994]. All of its five goals relate to sustaining jobs and communities, and two directly address these concerns.

- To ensure the continued availability of good forest jobs
- To ensure the long term stability of communities that rely on the forests

The plan's centrepiece is an increase in stumpage rates, which is projected to bring an additional \$2.25 billion into the B.C. Treasury over the next five years. An estimated \$400 million will be annually spent within the plan plus \$50 million will be used to finance new forest management initiatives. The plan is comprehensive and touches upon the wide range of forest-related matters which are at issue.

- Almost half of the funds will be directed to silviculture.
- The government will invest in companies producing value-added wood products.
- A new Forest Sector Skills Council will guide an expansion of programs to improve the skills of forest industry workers.
- Communities will receive assistance for planning and accomplishing the diversification of their economies.
- Each Forest Renewal program will include specific initiatives for First Nations.

The government has created a new Crown agency, Forest Renewal BC, to manage and direct this spending which will help alleviate the economic impact from timber supply related job losses. Specific announcements about spending priorities and locations are forthcoming.

There are other initiatives of a general mitigative nature that individuals and communities can access to soften the negative economic impacts of timber harvest reductions. A laid-off forest worker may apply for benefits of the various general employment development programs which are largely delivered or funded by the federal government. These include the Fee Payer and Full Sponsorship Programs under Section 26 of the Unemployment Insurance Act, which permit a qualified unemployment insurance (UI) claimant to attend education classes.

The Howe Sound Community Futures Society, based in Squamish oversees the operation of a local Enterprise Centre delivering a self-employment assistance program, which provides loans and counselling to qualified applicants who want to start a business. Community Futures is also involved in bringing diverse groups together in a forum to develop and implement socio-economic strategies. The Society began operations in 1984, and together with the Enterprise Centre, employs 5 people.

Squamish has a Canada Employment and Immigration Centre (CEIC) which can place unemployed persons into short career planning and job search courses to facilitate the

transition to another job. They also sponsors job finding clubs. Specifically targeted towards forestry workers, The Squamish CEIC developed a program called "Options" to prepare them for possible future displacement. This course upgrades math, English, computer and job search skills. However, the response has been disappointing.

CORE's land use plan for Vancouver Island [1994] analyzed the recent experience of laid-off forest industry workers to estimate the short-term costs they place on social services. The findings are summarized in Table 4-2. The study also made predictions on the longer term effects of lay-offs. An estimated 16 percent of displaced workers would eventually be employed in other forest industry jobs, 36 percent would find employment in other industries, 22 percent would either become self-employed or rely on spousal or other income, 10 percent would retire, 12 percent would rely on occasional jobs and UI and 4 percent would rely on income assistance. An earlier study that tracked laid-off B.C. forest workers between 1978 and 1985 [CORE, 1994] found that workers who gained employment in other industries saw income reduced by 33 percent.

Table 4-2: Projected Impact of Forestry Worker Lay Offs on Social Services over First Two Years

Expected Program Utilized	Expected Per Cent Utilization	Estimated Case-Months per 100 Laid Off Workers	Program Costs per 100 Laid Off Workers
None	17.7%	0	\$0
Unemployment Insurance (UI)	69.4	303	575 700
Income Assistance (IA)	5.4	52	49 400
Both UI and IA	7.5	59 (UI) 74 (AI)	112 100 70 300
Total	100.0%		\$807 500
Source: CORE, 1994			

The Carlson study [CORE, 1994] found that older workers and those with less education were likely to experience the longest periods of unemployment. Re-employment was typically in lower paying and less stable jobs. Carlson also concluded that displaced workers from rural areas tended to find lower paying jobs than those from urban areas. Few workers, in general, left to look for work elsewhere and few became involved in retraining.

A local example of the difficulty of upgrading skills over a large workforce is at the Weldwood operation. Approximately fifty percent of Weldwood's workforce is comprised of older workers who have low computer and English language literacy skills. Re-employment in a lay-off situation, or career advancement, as mill technology upgrades, for these workers may be hindered by their skill deficiencies. Weldwood initiated a program through the Open Learning Institute to provide language and computer training to

employees but has found, similar to the CEIC's experiences, volunteer attendance was disappointing.

Based on the above tracking studies, older forest workers in Squamish and Pemberton with lower education levels, would have the greatest difficulty in obtaining alternative employment and, especially in Pemberton's case, in securing adjustment services. Although the region has good growth prospects, it will be difficult for laid-off forest industry workers to move into service industry jobs. Skill mismatches, lower service sector incomes and lack of personal interest in service jobs will present barriers.

First Nations Impacts

In-SHUCK-ch

The In-SHUCK-ch have registered their intention to negotiate a land claim through the new Treaty Commission process. They are disturbed about the expectation of the B.C. government that they participate in the TSA and other review processes without providing resources to them to adequately do so. The remoteness of their communities has hindered their development and they have been trying to become better established in their traditional territory in advance of treaty negotiations. They do not want decisions within these review processes to compromise their claims.

The In-SHUCK-ch are mindful of the economic consequences to communities in the TSA of the impacts of reduced harvest levels. Because of their present low involvement in the forest industry they do not perceive lower harvest levels as having a negative impact on their members or their traditional communities. Lower harvest levels are seen as having some benefit to the In-SHUCK-ch in that they will forestall consumption of the forest resource in advance of land claims negotiations and settlements.

The In-SHUCK-ch are attempting to gain forest tenures as an initial step into the industry in advance of claims negotiations. They understand that lower harvest levels will heighten competition for the resource but they haven't formed an opinion as to the implications for the In-SHUCK-ch of this situation.

Anderson Lake Band

The N'Quatqua have not registered an intent to negotiate a land claim through the new Treaty Commission process. They see their community developing in stages. The community at D'Arcy has been built with a fairly good infrastructure and some employment. They have applied for a 15 000 m³ non-replaceable licence in the Lillooet TSA and view it as fundamental to the next stage in their community's development. It would provide the needed base for some processing and value added employment. The N'Quatqua have a strategic vision of their development including a Tree Farm Licence in the traditional territory as an interim step towards a comprehensive land claim. The TFL

is desired because its range of responsibilities are viewed as an excellent training ground for self-government.

The N'Quatqua have a long active history in the forest industry so they have a solid understanding of the economic consequences to communities in the TSA of the impacts of reduced harvesting levels. The Anderson Lake Band believes selection logging methods could be more widely practised, especially in view of higher log prices, to help sustain local economies and minimize damage to forest values.

A reduced AAC would directly affect the N'Quatqua SBFEP Category 2 bidders, Penta and DICOR, along with other bidders. Given that aboriginal peoples must compete against well established forest companies, the Anderson Lake Band sees a reduction in AAC as imposing another burden on the difficult task of building a sustainable economy in their territory. If access to timber tenures by aboriginal organizations must continue under present rules, the N'Quatqua perceive possible AAC reductions as a threat to their vision of a self-governing, economically sustainable community.

4.2 Provincial Impacts

Economic Impacts

Estimates of province-wide job and employment income impacts from implementing the Scenario 1 timber harvest appear in Table 4-3. The current BC-wide direct employment supported by Soo TSA wood consists of the following:

- Direct employment of 367 in the Soo TSA from silviculture, harvesting and processing activities.
- Direct employment of 180 from processing Soo TSA sawlogs outside the TSA.
- Direct employment of 142 from processing Soo TSA pulplogs into pulp and paper outside of the TSA. Sixty-nine of these jobs result from the chipping and pulping of logs. The other 73 jobs come from the manufacture of pulp and paper using chips and sawdust residue generated by processing Soo sawlogs, peelers, and other wood in mills within and outside of the region.

Total current direct provincial employment attributable to harvesting Soo TSA timber is estimated as 689 PYs.

With Scenario 1, direct forest sector employment in the province associated with the Soo harvest would fall immediately by 13 percent, or 88 person years (PYs), below present employment levels. There would be a further 132 PYs of associated indirect jobs lost, leading to a total decline of 220 jobs. The corresponding income and indirect employment income losses would be \$2.89 million and \$3.06 million per year, respectively. There would be two more successive decades of significant declines. Total job losses would be 193 and 140 PYs in years 10 and 20, respectively. Total cumulative job losses by year 20 would be 553. The corresponding total employment income loss would be \$5.21 million and \$3.77 million per year, in years 10 and 20, respectively. Total cumulative employment

income losses by year 20 would be \$14.92 million per year. No further changes would occur for 40 years. In year 60, the harvest decreases slightly and in year 70 the harvest level increases to the long-run harvest level of 442 000 m³, resulting in the addition of 146 total jobs and \$3.94 million per year in employment income.

Table 4-3: Scenario 1 - Provincial Economic Impacts

Year	Harvest '000 m ³	Employment (PY/Year)			Employment Income (1993 Millions/Year)		
		Direct	Indirect ⁵⁵	Total	Direct ⁵⁶	Indirect ⁵⁷	Total
Current	580	689	1 034	1 723	\$22.59	\$23.96	\$46.54
0	506	601	902	1 503	19.70	20.90	40.60
10	441	524	786	1 310	17.18	18.22	35.39
20	394	468	702	1 170	15.34	16.27	31.62
30	394	468	702	1 170	15.34	16.27	31.62
40	394	468	702	1 170	15.34	16.27	31.62
50	394	468	702	1 170	15.34	16.27	31.62
60	392	467	700	1 167	15.30	16.23	31.53
70	442	525	788	1 313	17.21	18.26	35.47

Environmental Implications

The environmental impacts discussed here are based on activities on the timber harvesting land base in the Soo TSA, which constitutes only 14.8 percent of the TSA's total land base or 30 percent of the forested land base. Eighty-five percent of the TSA land base cannot be harvested for one reason or another as shown in Appendix 6. Further, there are two major provincial parks, Garibaldi and Golden Ears, that adjoin the TSA and which provide additional habitat protection.

All the scenarios would result in fewer and less widespread environmental impacts over the long-term than attempting to maintain the current harvest level indefinitely. However, there would still be changes or impacts to the current state of the Soo TSA's environment.

Under all scenarios, there would be a shift in the age-class distribution of forests within the TSA as the mature old growth forests in the timber harvesting land base is converted to younger, managed forests, although large areas of the timber harvesting land base would still be maintained for winter deer range (5 300 hectares), and visual quality

⁵⁵ Indirect employment for the province was based on the Ministry of Forests' multiplier of 2.5 See Appendix 7.

⁵⁶ The average 1993 annual after-tax income for a provincial forest industry employee processing Soo TSA wood is \$32 800. The income is higher than the regional forest worker income owing to the presence of higher-income pulp and paper jobs. See Appendix 7.

⁵⁷ Indirect employment income for the province was also based on the \$23 350 average income used to assess regional indirect employment income. See Appendix 7.

(11 700 hectares). The most productive forests within the TSA, for biological diversity, species richness and timber production occur in the lower elevations of the timber harvesting land base. Timber harvesting in these areas will narrow the range of natural diversity on the timber harvesting land.

In general, the conversion of mature forests to immature forests will cause changes in the distributions (both spatial and temporal) and population levels of many wildlife species. Habitat generalists (those species that adapt to a wide range of habitat types) and species which occupy early successional forest types, would likely increase in numbers. Most of these species are not of specific management concern. Populations of species which are dependent on old forests or old growth attributes, or reach their maximum abundance in late successional forests, are likely to decline. The greatest declines would occur among habitat specialists. Most of these species are of significant management concern. Recovery options for species at risk, such as the Spotted Owl, would be impaired. Some wildlife, such as cavity nesting birds and bats, may be accommodated by techniques that maintain old growth characteristics.

There are ongoing initiatives, outside the scope of the Timber Supply Area Review, which are addressing long-term habitat requirements for certain wildlife and fish species, and improving harvesting practices. These include but are not limited to: Spotted Owl Recovery Team project, Forest Practices Code, and Coastal Biodiversity Guidelines. The full implementation of these initiatives has yet to occur.

Wildlife Habitat Impacts

Deer and Moose Habitat - The BC government has mapped deer and moose winter ranges that will be maintained over the long term. Both species however, are dependent on an appropriate mosaic of seral stages. Early seral stages (i.e. < 20 years old) provide important spring and summer forage. Under Scenario 1 there will be a reduction in the area of early seral stages from the 4th to the 9th decades and, as a result, it will be difficult to situate early seral stage "spring range" adjacent to winter ranges. Much of the old-growth harvesting in the next decade would be concentrated in the higher elevation sites. The availability of high elevation, early seral stage, summer range for deer may be maximized under Scenario 1 in decades 1 through 3 however, it would be minimized through decades 4 to 9.

Mountain Goat Habitat - Critical Mountain Goat winter habitat is protected from harvesting. Mountain Goats however, are highly sensitive to disturbance. Concentrating timber harvesting on high elevation sites within the earlier decades in Scenario 1, may intensify pressure on goat populations. Opportunities to improve habitat information and to practice adaptive management would be restricted under Scenario 1. In the long term all harvest scenarios have the potential to negatively impact habitat unless road access planning and harvest timing fully considers Mountain Goats populations.

Riparian and Wetland Habitats - Riparian and wetland habitats are extremely valuable to many wildlife species. The timbered uplands adjacent to riparian habitats often provide vital habitat components (i.e. nesting trees) to many riparian dwelling species. Although riparian habitats are usually protected, in many instances the adjacent timbered areas are not. Harvesting in these areas could affect this habitat.

Wildlife Implications

Assessing the impacts of forest management on wildlife populations is often difficult. Our understanding of habitat requirements for individual species allows us to make predictions about the effects of a habitat disturbance. Although these predictions are not usually quantitative, adverse impacts on habitat be expected to reduce the size of the population in question. This section presents a brief summary of possible impacts, based on available information and on a current understanding of wildlife habitat requirements.

Forest Bird Species - Many forest bird species require large diameter snags found within late successional habitats to provide them with nesting cavities. Many of these same species, such as Hairy Woodpeckers, also rely on snags as foraging sites. Other birds, particularly raptors, require the tops of old snags as nest platforms. The reduction in the availability of the older age class forest stands will reduce the availability of these critical habitat components. As a result the population of many species can be expected to diminish unless measures are taken to maintain wildlife trees or harvesting systems designed to mimic old growth characteristics.

Bats - At least seven species of bats (California, Keen's, Western Long-eared, Little Brown, Big Brown, Yuma, and Silver-haired bat) that roost in tree cavities and/or beneath the bark of large decadent trees are known to occur in the Soo TSA. The conversion of old-growth forests to second-growth stands would reduce the availability of roosting snags. Bat numbers therefore, can be expected to decrease.

Deer and Moose - Deer and moose thrive when their habitats provide a balance of late and early seral stages. In the next nine decades, the habitat mosaic within the Soo TSA forests will change dramatically. The current proportions of clear cuts and old-growth forests will shift in favour of more second-growth stands. Even if winter range availability is not compromised, Scenario 1 will reduce the availability of early seral stage spring and summer ranges through the 4th to 9th decades. Deer populations can be expected to decline in this period as a result.

Mountain Goats - Scenario 1 will the concentrate the time of harvesting activities close to goat winter ranges. This could result in increased alienation of goat habitat due to adjacent disturbance from logging operations and as a result, population declines could be expected.

Cougars and Wolves - In the Soo TSA, these predators depend primarily on deer and moose for food and as a consequence, their abundance will track ungulate availability. If

Scenario 1 reduces ungulate availability in the 4th through 9th decades, cougar and wolf populations would also decline in this period.

Black and Grizzly Bears - Black Bear, like deer, benefit from a mosaic of seral stages. In the 4th through 9th decades, the amount of early seral stage forage sites will be reduced. The area of young second growth stands with limited forage capability will increase. Disturbance of high elevation sites in the next two decades will also occur. This will negatively impact the Grizzly population which does not interact well with humans. Increased access will spur more poaching and increase bear/human encounters which can result in the destruction of bears when human safety is threatened. Specialized Grizzly Bear foraging sites, such as herbaceous slides and salmon streams, often require buffering. In the short term, higher AACs would make buffering requirements more contentious.

Northern Spotted Owls and Marbled Murrelets - Spotted Owls and Marbled Murrelets are old-growth dependent species, listed as endangered species. A recovery plan for the Spotted Owl is under development. The management of both species will be an adaptive process, which may require a conservative approach to the removal of old-growth forests. As old-growth is harvested, options for the recovery and/or maintenance of these species could be impaired.

Wildlife Associated Recreation

Hunting - Over 90 percent of hunter effort within the Soo TSA is directed toward Black-tailed Deer. Black Bear, Cougars, and grouse are also hunted, but they receive much less effort. The hunting of Grizzly Bears and Moose is closed. Mountain Goats are hunted only in the Meager Mountain area, where authorizations are issued annually under the province's limited entry hunting (LEH) draw system. As discussed previously, deer, bear and cougar numbers can be expected to experience the greatest decline under Scenario 1 in the 4th to 9th decades. Hunting opportunities would also undergo a decline in this period. All the Scenarios can be expected to lead to more road network development within the next two decades. Thereafter, much of this road network may be decommissioned reducing hunter access.

Wildlife Viewing - Wildlife viewing opportunities, like hunting opportunities, are influenced by habitat conditions and access. Wildlife viewing and hunting opportunities are optimized by a balanced forest age class distribution, combined with a stable road access system that is sensitive to the wildlife species that are adversely impacted by human disturbance. As wildlife is expected to decline during the 4th to 9th decades in Scenario 1, viewing opportunities would also likely decline.

Fisheries Resource

Timber harvesting can impact fish habitat in many ways. Most disturbances interact with others and, as a result, the determination of the causal mechanisms for habitat degradation is often difficult to determine. Direct damage can include bank destabilization, the removal of stream side vegetation and debris jams. Measures to protect streamside and

lakeshore habitats from these impacts are outlined in the Coastal Fish/Forestry Guidelines and in the Forest Practices Code.

Other, more indirect logging related disturbances, include the alteration of hydrological processes and changes to water quality. Hydrological processes are complex, however it is generally agreed that forest cover moderates flow regimes. Maximum and minimum flows are exacerbated when too much forest cover within a given drainage is removed. Erosion associated with high flows increases sedimentation and degrades fish habitat. Conversely, low flows prevent fish from using what could otherwise be good habitat and contributes to elevated water temperatures. Under the Forest Practices Code a Watershed Assessment Procedure (WAP) is used to calculate the acceptable rate of harvest for individual watersheds. Harvest rates will depend on past and proposed development, a terrain analysis, and the water and fisheries values of the system.

Changes in water quality are often a function of altered flow regimes, however they are also caused by forest practices that expose erodible materials. This ranges from the surface erosion of forest roads to mass wasting events caused by logging or road building in unstable terrain. Although there are techniques for minimizing the severity and risk of such incidents, forest practices inevitably elevate the transport of sediment and other materials into water bodies. The long-term impacts on the water quality associated with forest harvesting is not well understood, although some practices such as clearcutting are known to reduce long-term large organic debris (LOD)⁵⁸ recruitment. Impacts from reduced LOD availability would be realized much later than hydrology and sedimentary impacts since existing LOD would continue to function for some time after harvesting.

The protection of fish habitat is vital to the maintenance of fish stocks within the Soo TSA so fisheries managers continue to stress the importance of adequate habitat protection. They rank maintaining wild, indigenous fish populations or stocks, regardless of whether they contribute to a sport or commercial fishery, as highest in importance,

Government Revenue Impacts

Total provincial government revenue impacts appear in Table 4.4. All assumptions are discussed in Appendix 7. The present AAC generates an estimated \$12.60 million in annual provincial government revenues. The immediate harvest reduction in Scenario 1 results in a first decade annual loss of \$1.61 million in revenue. There are further annual reductions of \$1.41 million and \$1.02 starting in years 10 and 20, respectively. A total of \$3.0 million per year is lost by the time the long-term harvest level is reached in year 70.

Policy changes announced in April, 1994 as part of the Forest Renewal Plan will result in significantly higher stumpage revenues if the increase in lumber prices which occurred in 1993 represents a structural shift in the market. The revenue estimates herein are based

⁵⁸ L.O.D. provides habitat complexity, maintains channel stability, provides escape cover and resting areas, and is an indirect source of fish food organisms.

on past stumpage rates and historical, inflation adjusted prices. With an average lumber selling price of \$US350 per thousand board feet, initial estimates indicate that stumpage revenues may be 60 percent to 80 percent higher than in the past. The high lumber prices are relatively new and the policy changes are only a few months old so it is too early to predict, with a high level of confidence, government revenues into the future. The relative differences between the three harvest scenarios would be the same with a projection based on recent history or the new stumpage and lumber prices.

Federal government revenue impacts also appear in Table 4.4. Current annual federal government revenues are approximately \$10.74 million. The immediate harvest reduction results in a loss of \$1.37 million per year in revenue. There are further annual reductions of \$1.20 million and \$0.87 million in years 10 and 20, respectively. Annually a total of \$2.55 million is lost by the time the long-term harvest level is reached in year 70.

Table 4-4: Scenario 1 - Government Revenue Impacts
(1993 millions/Year)

Year	Provincial				Total Federal Taxes ⁶²
	Resource Revenues ⁵⁹	Personal Income Tax ⁶⁰	Other Taxes ⁶¹	Total	
Current	\$4.82	\$4.96	\$2.81	\$12.60	\$10.74
0	4.21	4.33	2.45	10.99	9.37
10	3.67	3.77	2.14	9.58	8.17
20	3.28	3.37	1.91	8.56	7.30
30	3.28	3.37	1.91	8.56	7.30
40	3.28	3.37	1.91	8.56	7.30
50	3.28	3.37	1.91	8.56	7.30
60	3.27	3.36	1.91	8.54	7.28
70	3.68	3.78	9.60	9.60	8.19

⁵⁹ Includes stumpage and other rents and revenues.

⁶⁰ Includes provincial share of taxes on direct, indirect, and induced employment income.

⁶¹ Includes logging, corporate income, corporate capital, sales, property and electricity taxes.

⁶² Includes corporate income tax, personal income tax, excise tax and withholding tax.

5.0 ALTERNATIVE SCENARIOS

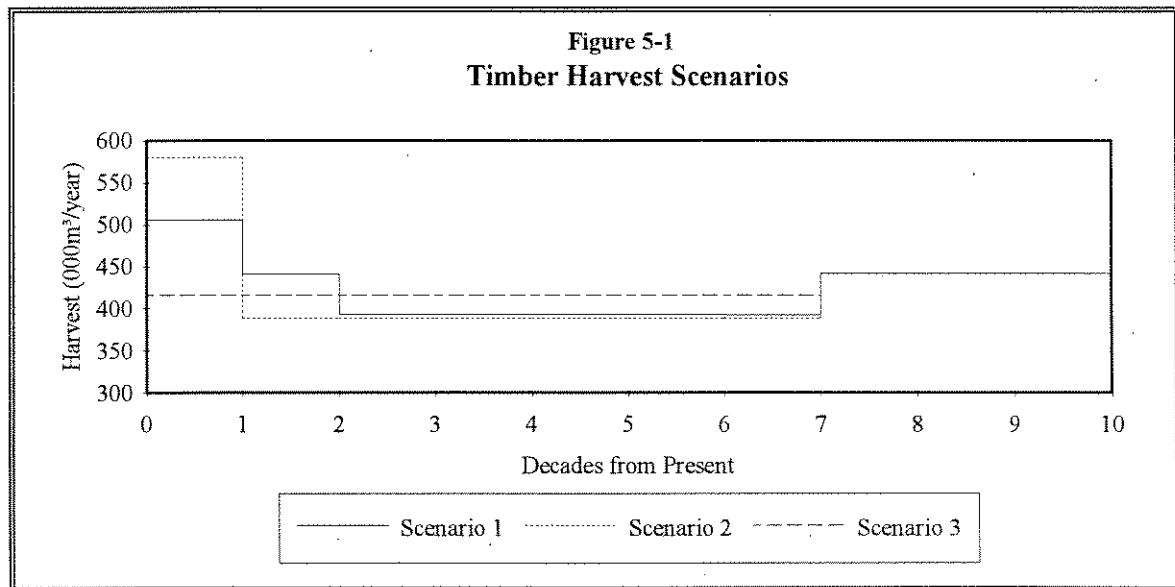
5.1 Timber Supply

Scenario 1 showed a harvest decrease of 32 percent from the present AAC over the initial 30 years. Two additional scenarios were selected to indicate the implication of alternative paths for reaching the LRHL. The two additional scenarios are sufficiently different from Scenario 1 to have identifiably different impacts over the planning horizon of the Timber Supply Analysis.

The distinguishing feature of Scenario 2 is that the harvest level is held at the current level of 580 000 m³ for the first decade. The harvest level then drops precipitously, 33 percent, in the next decade and stays at 389 000 m³, below the LRHL, until increasing to the LRHL in decade 8.

Scenario 3 drops the harvest level close to LRHL immediately. The harvest level drops 28 percent from the current level, to 416 000 m³, and held there until the LRHL is arrived at in decade 8.

The harvest scenarios are presented in Figure 5.1.



5.2 TSA Alternative Scenario Impacts

Economic Development

Scenario 2 - With Scenario 2 timber harvest there would be no changes in employment or income for the first decade. In year 10, direct forest sector employment in the TSA would fall by 33 percent, or 121 person years (PY), below present employment levels. There would be a further 60 PYs of associated indirect jobs lost, leading to a total decline of 181 jobs. The corresponding direct and indirect annual employment income losses would be \$3.96 million and \$1.34 million per year, respectively. No further changes would occur for 60 years. In year 70, the harvest level could increase to the long-run harvest level of 442 000 m³, resulting in the addition of 50 total jobs and \$1.47 million per year in employment income.

The impact of Scenario 2 differs quite sharply from Scenario 1. Instead of a 13 percent decline in the first decade, there would be no job loss in the first decade. At the start of its second decade, though, there would be a major employment impact.

Quantitative estimates of the employment and employment income impacts associated with the alternative scenarios are shown in Appendix 8.

Scenario 3 - In Scenario 3 direct forest sector employment in the TSA would fall immediately by 28 percent, or 104 person years (PY), below present employment levels. There would be a further 51 PYs of associated indirect jobs lost, leading to a total decline of 155 jobs. The corresponding direct and indirect annual employment income losses would be \$3.40 million and \$1.15 million, respectively. No further changes would occur for 70 years. In year 70, the harvest level could increase to the long-run harvest level of 442 000 m³, resulting in the addition of 24 total jobs and \$0.72 million in annual employment income.

Scenario 3 takes an immediate drop in employment that is much larger, at 28 percent, than the 13 percent drop in the first decade of Scenario 1. Thereafter Scenario 3 remains steady with no further employment losses whereas both Scenario 1 and Scenario 2 experience harvest and employment decreases in the second decade.

The three scenarios are likely to have similar tourism and outdoor recreation economic impacts over the long 80 year timber planning horizon. Approximately the same amount of wood will be harvested in total for each case over the planning term. Each is subject to the same set of visual quality objectives, habitat management guidelines, and area planning conventions, such as the Whistler Local Resource Use Plan (LRUP). It should be noted that a significant part of outdoor recreation experience in the TSA can be attributed to the proximity of Garibaldi provincial park. Appendix 7 provides a more detailed discussion of the issue of tourism and changes in the Soo TSA timber harvest.

Similarly, the scenarios are likely to have the same implications for mushroom harvesting and other agro-forestry uses because the same harvesting guidelines apply and over time a

similar amount of timber is harvested. Different harvesting guidelines and/or different removals from the non-operable area between the harvest flows would lead to differences in agro-forestry productivity.

Community Impacts

The long-term impacts of the alternatives would be similar to Scenario 1. In the short and medium-terms, Scenario 1 spreads the harvest declines, and therefore social impacts, over a number of decades. Scenario 2 will delay any impacts for ten years followed by a sharp drop in employment and a corresponding, larger strain on the communities and individuals. Scenario 3 has a large, immediate harvest decrease which will severely strain communities but, as its harvest levels remain much higher in the medium term than with Scenario 2 or Scenario 1, the future impacts will be smaller.

Aboriginal Impacts

Over the long-term there will be little difference in the impacts between the scenarios. Scenario 2 best provides for the short term employment opportunities as the harvest is maintained for ten years. Scenario 3 best preserves old growth timber in the short to medium term as land claims are settled.

5.3 Provincial Alternative Scenario Impacts

Economic Impacts

Provincial employment and employment income impacts of the alternative scenarios analyses are shown in Appendix 8.

Scenario 2 - In Scenario 2 there would be no changes in employment or income for the first decade. In year 10, province-wide, direct forest sector employment would fall by 33 percent, or 227 person years (PYs), below present employment levels. There would be a further 341 PYs of associated indirect jobs lost, leading to a total decline of 568 jobs. The corresponding direct and indirect annual employment income losses would be \$7.44 million and \$7.89 million, respectively. No further changes would occur for 60 years. In year 70, the harvest increases to the long-run level of 442 000 m³, resulting in the addition of 158 total jobs and \$4.25 million in annual employment income.

Scenario 2's impact differs quite sharply from the Scenario 1; instead of a 13 percent decline, there is no job loss in the first decade from an AAC decision. At the start of its second decade, there would be a major drop in employment.

Scenario 3 - Province-wide, direct forest sector employment would fall immediately by 28 percent, or 195 person years (PYs), below present employment levels. There would be a further 293 PYs of associated indirect jobs lost, leading to a total decline of 487 jobs. The corresponding direct and indirect annual employment income losses would be \$6.39 million and \$6.78 million, respectively. No further changes would occur for 70 years. In

year 70, the harvest increases to the long-run level of 442 000 m³, resulting in a total of 77 additional jobs and \$2.09 million in annual employment income.

Scenario 3 takes an immediate drop in employment that is much larger, at 28 percent, than the 13 percent drop in the first decade of Scenario 1. Thereafter, Scenario 3 remains steady with no further employment losses whereas Scenario 1 and Scenario 2 experience harvest and employment decreases in the second decade.

Environmental Impacts

For all three harvest scenarios, impacts on many wildlife habitats should be very similar over the very long term since current integrated resource management practices are common to all scenarios. The differences in rate of cut, within the next seven decades though, can have differential impacts on wildlife habitats. Scenario 1 and Scenario 2 will have similar impacts. Both reduce old growth stands at a quicker rate than Scenario 3, over the first two decades and maximize the amount of immature second growth stands (20 -80 years) within decades four to nine. It follows that the amount of early seral stage habitats (<20 years) within the latter decades will be minimized. Scenario 3 allocates the old growth harvest more evenly through time. As a result, a more balanced forest age distribution over the next nine decades is possible, providing more habitat for early seral stage species, such as deer and moose.

Species that depend on older age class forests, such as the Northern Spotted Owl, would be affected most severely by the higher rates of harvest that more rapidly deplete the remaining old growth forests. By concentrating the harvest of old growth in the early decades, Scenario 1 and Scenario 2 provide these wildlife species with smaller areas of suitable alternative habitats. By reducing the rate of cut below LRHL immediately, Scenario 3 gives existing second growth stands more time to mature and provide alternative, late seral habitats before much of the old growth is harvested. This could moderate a population decline of many late seral species within the Soo TSA.

Government Revenues

Scenario 2 - Current annual provincial government revenues are approximately \$12.60 million. This would remain unchanged for the first ten years of Scenario 2. In year 10, the harvest reduction results in an annual loss of \$4.15 million in revenue. There are no changes for the next 6 decades. In year 70, a rise in the harvest level would result in an increase of \$1.15 million. A total of \$3.00 million per year is lost by the time the long-term harvest level is reached in year 70.

Current annual federal government revenues are approximately \$10.74 million. This would remain unchanged for the first ten years. In year 10, the harvest reduction would result in an annual loss of \$3.53 million in revenue. There are no changes for the next 6 decades. In year 70, a rise in the harvest would result in a \$0.98 million increase annually. A total of \$2.55 million per year would be lost by the time the long-term harvest level is reached in year 70.

Scenario 2's impact differs quite sharply from Scenario 1. Instead of a 13 percent decline, there would be no revenue loss from an AAC decision in the first decade. At the start of the second decade, there would be a large drop in forestry activity and a corresponding drop in government revenues.

Scenario 3 - The immediate harvest reduction results in an estimated annual loss of \$3.57 million to the B.C. treasury. There are no changes for the next 7 decades. In year 70, an increase in the harvest level results in an annual increase of \$0.57 million. A total of \$3.00 million per year would be lost by the time the long-term harvest level is reached in year 70.

The immediate harvest reduction results in an annual loss of \$3.03 million to the Federal treasury. There are no changes for the next 7 decades. In year 70, a harvest increase results in additional revenues of \$0.48 million per year. Federal Government revenues are \$2.55 million per year lower by the time the long-term harvest level is reached in year 70.

Scenario 3 takes a larger immediate drop in revenues, at 28 percent, than the 13 percent drop in the first decade of the Scenario 1. Thereafter, Scenario 3 remains constant with no further revenue losses whereas the Scenario 1 and Scenario 2 experience harvest and revenue decreases in the second decade.

6.0 SUMMARY

6.1 TSA Impacts

The TSA-level impacts of the three scenarios are summarized in Table 6-1.

- Scenario 1 spreads harvest reductions over the first three decades, whereas Scenario 2 maintains the harvest in the first decade followed by the largest single reduction in the second decade. Scenario 3 has a sizeable immediate reduction followed by a long period of stable harvest levels. All three scenarios reach the long run harvest level of 442 000 m³ by year 70.
- Employment and employment income distributions follow the same pattern as the harvest reductions. In Scenario 1, direct and indirect employment is estimated to fall immediately by 13 percent, or 70 person years (PY), below present employment levels. The corresponding direct and indirect employment income losses would total \$2.05 million per year. There would then be two more successive decades of significant declines. With Scenario 2 there would be no changes in employment or income for the first decade. In year 10, direct plus indirect employment would fall by 33 percent, or 181 PYs, below present employment levels. The corresponding direct and indirect employment income losses would be \$5.30 million per year. In Scenario 3 direct and indirect employment would fall off immediately by 28 percent, or 155 PYs, below present employment levels. The corresponding direct and indirect employment income losses would be \$4.55 million per year.
- Outdoor recreation tourism plays a very large role in the economy of the Soo TSA. A large portion of outdoor recreation expenditures within the TSA, though are probably related to the adjacent parks. IRM practises, such as Visual Quality Objectives, do take into account many tourism and recreation values of forest resources. The three harvest flows are likely to have similar tourism and outdoor recreation economic impacts over the long 80 year timber planning horizon.
- Community impacts would be immediate under Scenario 1 and Scenario 3, but would be deferred until year 10 under Scenario 2. Employment losses in the local forest industry would likely hit hardest in Pemberton as its economy is less diversified and the community has fewer support services.

Table 6-1: Summary of TSA Accounts

	Scenario 1							Scenario 2							Scenario 3						
	Years from Present							Years from Present							Years from Present						
	0	10	20	30	40	50	60	0	10	20	30	40	50	60	0	10	20	30	40	50	60
Harvest in '000 m ³	Current	506	441	394	394	393	393	580	389	389	389	389	389	389	416	416	416	416	416	416	416
Economic Account	Employment (PY/Year)	320	279	249	249	249	249	367	246	246	246	246	246	246	263	263	263	263	263	263	263
	Indirect	182	138	124	124	124	124	182	122	122	122	122	122	122	131	131	131	131	131	131	131
	Total	549	417	373	373	373	373	549	368	368	368	368	368	368	394	394	394	394	394	394	394
Employment	Direct	12.02	10.49	9.14	8.17	8.17	8.17	12.02	8.06	8.06	8.06	8.06	8.06	8.06	8.62	8.62	8.62	8.62	8.62	8.62	8.62
Income (\$1992	Indirect	4.07	3.55	3.10	2.77	2.77	2.77	4.07	2.73	2.73	2.73	2.73	2.73	2.73	2.92	2.92	2.92	2.92	2.92	2.92	2.92
Millions/Year)	Total	16.09	14.04	12.24	10.93	10.93	10.93	16.09	10.79	10.79	10.79	10.79	10.79	10.79	11.54	11.54	11.54	11.54	11.54	11.54	11.54
Community Account	Population																				
	Local Government																				
	Social Fabric																				
Aboriginal Account	Economic																				
	Cultural/Historical																				

6.2 Provincial Impacts

The provincial impacts of the three harvest flows are summarized in Table 6-2.

- Provincial employment, income, and government revenues would decline in the same manner as the TSA impacts.
- In Scenario 1, direct and indirect employment would fall off immediately by 13 percent, or 220 PYs, below present employment levels. The corresponding direct income and indirect employment income losses would be \$5.94 million per year. There would then be two more successive decades of significant declines. In Scenario 2 there would be no changes in employment or income for the first decade. In year 10, direct indirect employment would fall by 33 percent, or 568 PYs, below present employment levels. The corresponding direct and indirect employment income losses would be \$15.32 million per year. In Scenario 3, direct and indirect employment would fall immediately by 28 percent, or 487 PYs, below present employment levels. The corresponding direct and indirect employment income losses would be \$13.16 million per year.
- Long-term environment impacts under all three scenarios are similar. The environmental impacts refer only to the timber harvesting land base which is 15 percent of the TSA's total land base. In general, on the timber harvesting land base there would be a loss of old growth and other valuable habitats supporting several wildlife species of key management concern in the region. Scenario 3, because of its larger immediate harvest reduction, provides the greatest short-term planning flexibility.

Table 6-2: Summary of Provincial Accounts

[illegible]

6.3 TSA Issues

This report identifies several issues which are critical to Soo TSA stakeholders. The recently announced Forest Renewal Plan will address, on a province-wide basis, some of these, but it is not possible at this time to describe to what extent that will occur. The Forest Renewal Plan does provide a basis for resolving some of the more critical concerns.

- Further identification and development of opportunities for greater aboriginal involvement in management and use of forest resources in the face of a shrinking resource base.
- Developing an improved understanding of the economic trade-offs between long and short rotation cycles for second growth stands.
- Further identification of agro-forest product opportunities and improved management of the forest resource for agro-forestry products.
- Development of a long-term Northern Spotted Owl recovery plan which will remove the species from the endangered list and minimize economic hardship on forest resource users.
- Accommodation of the PAS's objective of 12 percent protected area in the face of other pressures on the forest resource base such as long run sustained yield issues, environmental issues such as sustaining the Northern Spotted Owl, and desires of the First Nations communities to have a greater involvement in the management and use of the forests.
- Adjustment to higher prices for open market wood because of the expected lower TSA harvest levels throughout the province and mitigation of their impact on marginal mill operations throughout the Fraser TSA.
- Developing mitigation measures prior to any reductions in harvests.
- Development of a better understanding of the total timber supply impact that various forest initiatives (the Timber Supply Review, PAS, Spotted Owl, Forest Practices Code, Coastal Biodiversity Guidelines) could have.
- Planning for more forest recreation areas, in response to strong population growth.

APPENDIX 1

QUALIFICATIONS TO ANALYSIS

The primary objective of this analysis is to project the impacts which can be directly attributed to timber harvest scenarios. The quality of an analysis is a function of the skills of the analysts and the time and resources provided to undertake it. These socio-economic assessments of timber harvest scenarios are intended to provide a broad understanding of the fundamental economic, environmental, social and Aboriginal community issues associated with them and to stimulate reflection and discussion. Numerous stakeholders and audiences, including the province's Chief Forester, forest companies, environmental organizations, local government officials, and Aboriginal governments, use the assessments, which are neither funded nor prepared as definitive documents on the subject. The following qualifications should be kept in mind as readers interpret the analyses, but they should not be seen as invalidating the analysis. Every projection, no matter how comprehensive or well-funded it may be, must account for uncertainty. This analysis is based on recent historical experience and is undertaken by experienced analysts using widely accepted methods.

Recent Historical Data

Appendix 3 lists the study's data sources. It is standard practice to use recent historical data to extrapolate the future.

Methodologies

Multipliers are used to estimate the indirect and induced employment and income impacts. The multipliers used here are estimates only, but they are often based on sophisticated research. They provide the "best" available estimates of demand and inter-sectoral relationships.

The economic development account contains quantitative impact estimates. The other accounts contain only qualitative judgements. The differing approach is required because of the lack of sufficient historical data and widely accepted methodologies for attributing social, environmental, and aboriginal impacts to timber harvest activity. The qualitative estimation methodologies used for these other accounts depend on professional opinion and insight and do not produce quantitative information. Readers should interpret the assessments as initial and broad-based; definitive conclusions would be dependent on further field study and research.

Influential Factors

The most closely scrutinized parts of these studies are the economic impact projections. The foundation for the projections is the employment per thousand cubic meter of harvested and processed timber. This historical relationship is assumed in the projections not to vary over the long time horizon of this study. This assumption produces a linear relationship. The many factors which influence this relationship, however, including technology, input costs, and timber prices, will be different tomorrow. No attempt is made herein to forecast or predict changes in these variables or to include related sensitivity analyses. This analysis is not meant to assess all impacts over the 80 year planning horizon - instead, it is meant to assist short-term planning until the next analysis is conducted, probably in five or six years. It is therefore reasonable to keep key variables constant in order to ensure the validity of the analysis. Any subsequent dramatic changes in one or more of the variables may, however, give cause to revisit the analysis.

The timber harvest projections are based on the Ministry's computer modelling of the forest base. Readers are directed to the Soo Timber Supply Analysis [1994] for information on its methodology. The timber harvest projections are dependent on key variables, including timber prices and technology, which closely influence the operable land base. Thus, as with the socio-economic analysis, the projections are subject to changing conditions and should also be viewed as short-term models.

Industry Activities

The analysis provides an estimate of harvesting, processing, silviculture, and government regulation employment and income attributable to the forest industry. It shows neither the impacts from the forest industry's capital investment, nor transportation of product to export shipment points nor wholesaling activities. They are not estimated because of the additional time and resources required to do so. Nevertheless, they are important corollaries of the forest economy. A 1991 study of the impact of a supply reduction throughout BC considered all industry activity and some results are shown in the following table:

Forest Industry's Share of BC's 1989 GDP	
Component	% of 1989 GDP
Production for Final Demand	17
Forest Sector Investment	1
Transportation/Wholesale Activity	5
Intermediate Demand Production	2
Total	25
Source: BC Ministry of Finance 1991	

APPENDIX 2

GLOSSARY

Allowable Annual Cut (AAC)	The volume of timber which may be cut each year from a forest management unit (e.g., a TSA), set by the Chief Forester in accordance with Section 7.0 of the Forest Act.
AAC Apportionment	The allocation by the Minister of the AAC for a TSA among timber tenures in accordance with Section 8.0 of the Forest Act.
Biodiversity	Biological Diversity. The diversity of plants, animals and other living organisms and their habitats measured by factors such as genetic variability, number of species, and variation in species composition.
Biogeoclimatic Zones	Areas which are defined by similar biological, physical and atmospheric characteristics.
Cut Block Adjacency	Integrated management guidelines restrict harvesting in areas adjacent to a cut block until that cut block has satisfied certain regeneration requirements (i.e., green-up requirements).
Constant (or Real) Dollar	The general inflationary effects are removed from the current value of a dollar.
Direct Activity	In an input-output model, income and employment impacts in the industry under study, in this case the forestry industry (i.e., harvesting, transportation, silviculture, and processing).
Economic Base Theory	In economic base theory, the basic or direct sector(s) is seen as the driving force in the local economy. The basic or direct sector is an industry or group of industries in a community or region which sells its output or services to buyers who live outside of them. It could be a forest industry which sells 2x4s, a hotel which caters to outside visitors or pension payments from Ottawa to local residents. The non-basic or indirect sector supplies goods and services to the direct sector and caters to the personal demands of employees of the direct and indirect sectors.
Ecosystem	Any complex of living organisms together with all the other biotic and abiotic (non-living) factors which affect them.
Environmentally Sensitive Area	Notable non-timber values, fragile or unstable soils, or areas that have problems in establishing a new stand or where timber harvesting may result in landslides.
Ecoprovince	An area of the earth's surface characterized by very broad ecological interactions between the four major environmental components of the ecosystem: air, water, land and biota.

Green-up Period	The time needed for a stand of trees to reach a desired condition (i.e., height) to ensure maintenance of water quality, wildlife habitat, soil stability or aesthetics. Green-up requirements refer to the desired conditions.
Indirect Activity	In an input-output model, spin-off income and employment effects from businesses which provide intermediate goods or services to the direct sector.
Induced Activity	In an input-output model, the economic activity created through the incomes of workers in the direct and indirect businesses, who spend their earnings on a broad range of consumption and investment goods and services.
Integrated Resource Guidelines	Guidelines requiring that forest management activities (such as harvesting, road building and silviculture treatments) be conducted in a special way to protect or enhance timber and non-timber forest resource values.
Long-run Harvest	Refers to timber harvesting levels whereby the volume of timber harvested in any given period can be replaced by a similar volume of regenerated stands within the same period.
Multiple Accounts Analysis	A method of socio-economic evaluation that accounts for both measurable and non-measurable benefits and costs, and compares the impacts of different objectives on several socio-economic features or accounts.
Multipliers	Coefficients which indicate the historical relationship between economic sectors and impact categories in an economic impact model. For example, a total employment multiplier of 2.5 for the forest industry indicates that there are 1.5 indirect/induced jobs attributable to 1 forest industry job.
Person-year (PY)	A standard measure of employment that takes into account part-time, seasonal, and over-time work. For example, if an employee works full-time six months, he or she will account for 0.5 PYs of employment. Using person-years allows different types of employment to be compared on a similar basis. In this report, 1 800 hours per year represents a person-year.
Protected Area	An area designated under the BC Protected Areas Strategy for protection in its current state, based on special physical and environmental qualities it may possess.
Riparian Zone	The stream bank and flood plain adjacent to streams or water bodies, with particular reference to the vegetation.
Timber Supply Area (TSA)	An integrated resource management unit established in accordance with Section 6.0 of the Forest Act.
Watershed	An area drained by a particular stream or river. A large watershed may contain several smaller watersheds.

APPENDIX 3

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APPENDIX 4

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 Paul F. Haley, Ministry of Environment
 Chuck Harvey, Squamish Lumber, Squamish
 Brad Harris, Ministry of Forests, Silviculture Branch
 Allan Hayrup, Ministry of Forests, Squamish Forest District
 Viggo Holm, Ministry of Forests, Economics and Trade Branch
 Dave Ingram, Western Pulp Partnership
 Bert Ionson, Fisheries and Oceans Canada
 Karen Kirby, BC Stats
 Joachim Knauff, Economic Services, Human Resources Development Canada
 Norm LeBlanc, LeBlanc Bros.
 Delores Lewis, Canada Employment and Immigration Centre, Squamish
 Randall Lewis, Squamish Nation
 John Lowe, Squamish Timber Co. Ltd.
 Jay MacArthur, Federation of B.C. Mountain Clubs
 Skip McCarthy, Howe Sound Community Futures, Squamish
 Brent McIvor, Ultimate Log Homes
 Ross Mader, A. & J. Forest Products
 E. Shawna Nickerson, Whistler Resort Association
 Jeff Morgan, Forest Ecosystem Specialist, Ministry of Environment
 Drew Oberson, Continental Log Homes
 Randel Paul, Research Coordinator, In-Shuck-ch
 Stephane Perron, AWARE

Gerard Peters, President, Coast Mountain Development Council
Ken Pickering, C.R.B. Logging and Soo Coalition for Sustainable Forests
Shirley Pietila, Blackwater Mushroom Representative
Mark Pimlott, B.C. Ministry of Environment, Fish and Wildlife Branch
Dean Raven, Scott Paper Limited
William Rosenberg, International Forest Products Limited
Rod Smelser, Economic Services, Human Resources Development Canada
John Steward, Mayor, Village of Pemberton
Weldon Talbot, Talbot Logging
Art Thevarge, Chief, N'Quatqua First Nation
Oliver Thomae, R.O. Planning, Squamish District Office, Ministry of Forests
Mathew Thomas, Burrard Band
Geoff Tindale, Weldwood Canada
John Tisdale, Squamish Forest District, Squamish
Dave Tones, IWA-Canada
Vicky Troup, Howe Sound Round Table
Mike Vance, Planner, Resort Municipality of Whistler
Sergeant B.L. Waite, Pemberton RCMP
Barry Wall, B.C. Rail, Vancouver
Bill Warren, Alliance Tribal Council
Duff Warnock, Terminal Forest Products
Dave Whitely, Pacific Forest Products
Ray Wilburn, Squamish Terminals, Vancouver
Jim Wisnia, Squamish Estuary Conservation Society

APPENDIX 5

SOO TSA LICENSEE APPORTIONMENT

AAC Apportionment by Licensee, Soo TSA, 1993		
	m ³	% of AAC
Small Business Forest Enterprise Program	121 425	20.9
International Forest Products Limited	93 768	16.2
Terminal Forest Products Ltd.	68 369	11.8
Pacific Forest Products Limited	66 866	11.5
Weldwood of Canada	47 239	8.2
Canadian Forest Products Ltd.	46 460	8.1
Squamish Mills Limited	45 290	7.8
C.R.B. Logging Ltd.	22 446	3.9
Halray Logging Ltd. & MacMillan Bloedel Limited	21 675	3.7
Richmond Plywood Corporation Limited	20 874	3.6
Halray Logging	8 048	1.4
LeBlanc Bros.	6 468	1.1
Scott Paper Limited (nonreplaceable)	4 157	0.7
Talbot Logging	3 505	0.6
P.A.M. Log Homes	1 373	0.2
Black Mount Logging	1 295	0.2
Phillip Perkins	742	0.1
Total Approved Allowable Annual Cut	580 000	100.0%

APPENDIX 6

TIMBER HARVESTING LAND BASE IN THE SOO TSA, 1993

Classification	Area (ha)	Area (ha)	% of Total Area
Total Land Base		719 503 ¹	100.0%
Non-Crown Land		49 566	6.9
Non-forest land		369 221	51.3
Total Productive Crown Forest		300 716	41.8
Reductions to Productive Crown Forest:			
Non-commercial Cover (NC)	711		-
Inoperable	141 908		19.7
Environmentally Sensitive	15 108		2.1
Low Timber Growing Potential	20 970		2.9
Deciduous (except cottonwood)	3 443		0.5
Specific Geographic Areas	3 036		0.4
Streamside Buffers	3 466		0.5
Roads, Skid Trails, Landings	3 306		0.5
Total Reduction	191 950		26.7
Timber Harvesting Land Base (Less Additions)		108 765	15.1
Additions:			
Alder Rehabilitation	1 000		0.1
Total Additions	1 000	1 000	-
Future Reductions for Roads, Trails, Landings	3 394		0.5
Total Reductions	3 394	3 394	-
Future Timber Harvesting Land Base		106 371	14.8

¹ The total area is about 880 000 hectares. The amount in the table is less because of Inventory Branch procedures which exclude some parks, Indian reserves and other areas for which the Ministry of Forests is not responsible for inventories.

APPENDIX 7

METHODOLOGIES AND ISSUES

I. Economic Impact Methodology

The economy is a system of inter-related sectors. Any change in the final demand of a business or industry will induce a sequence of changes in production and employment in other sectors of the economy. There are three impact categories: direct, indirect, and induced. The direct impacts are changes in income and employment in those industries where final demand has changed. In this analysis, the focus is on the forest industry. Spending by producers of final goods and services generates demand for other firms further up the production chain, so any change in final forest industry demand will bring about further changes in output and employment among suppliers of intermediate goods. Successive rounds of changes will occur; taken in aggregate, these constitute the indirect impacts. Finally, additional economic activity will occur as the result of changes in spending by persons receiving income from industries subject to direct and indirect impacts. The successive changes in output and employment occurring through this channel constitute the induced impacts. For clarity of presentation, indirect and induced activity are combined under indirect for this report.

This study examines economic impacts of TSA timber at the TSA and province-wide levels². The following table shows the key employment and income values which were used to estimate the forest industry impacts from altering the timber harvest.

Summary Table of Key Economic Impact Values in the Soo TSA		
	TSA	Provincial
Harvesting Employment Coefficient (PYs/1 000 m ³)	.52	.52
Processing Employment Coefficient (PYs/1 000 m ³)	.11	.66
Total Employment Coefficient (PYs/1 000 m ³)	.63	1.19
After-Tax Forest Wage	\$32 764	\$32 800
After-Tax Indirect Wage	\$23 350	\$23 350
Multiplier	1.24	2.5

A detailed explanation of the economic impact estimation methodology follows.

² The focus of this study is on TSA timber. Soo TSA processing operations also obtain wood input from elsewhere in B.C. A critical examination of their future would require a wider view of the timber availability and price situations than is undertaken in this report.

TSA Impacts

Direct Employment

Employment estimates were based on licensee employee information. All information is expressed as a per 1 000 m³ coefficient, which allows for a ready estimate of forest sector employment and income impacts based on timber harvest level changes.

Harvesting and Silviculture - Soo TSA Licensees were surveyed for three year average logging, silviculture and administration employment information relating to their licence quotas. The following companies provided employment information: Canadian Forest Products Ltd., Pacific Forest Products Limited, Terminal Forest Products Ltd., Weldwood, International Forest Products Limited, Squamish Timber, C.R.B. Logging Co. Ltd., Scott Paper, LeBlanc Bros., Halray Logging, Talbot Logging and Richmond Plywood. Small business operators, Greg Richmond and Alex Ryan (GBA Logging), provided SBFEP employment estimates. Licensee respondents accounted for 80 percent of the Soo AAC in 1993 and 99 percent of non-SBFEP licensees.

Established licensees contract out significant amounts of quota harvest to small business operators. Many of these same operators also harvest their own quotas under the SBFEP. Consequently, we have not attempted to distinguish separate harvesting coefficients for SBFEP and non-SBFEP wood in the Soo TSA.

The TSA harvesting (including logging, silviculture and administration) coefficient is estimated to be 0.52 PY per 1 000 m³. All harvesting employment is assumed to accrue to the TSA.

Processing - The licensee survey provided processing employment information for the last three years. A sample of 6 mills (excluding the Woodfibre pulp mill) throughout the region was obtained, representing approximately 420 000 m³ of average annual consumption. According to wood flow information obtained from licensees, 12.9 percent of all wood from the TSA is processed in the TSA none of which is used in pulp production. Using actual mill employment in the TSA with estimates on the percentage of wood sourced from within the TSA, a processing coefficient for the TSA of 0.11 PY per 1 000 m³ was estimated.

The TSA coefficient for all processing and harvesting activities is estimated to be 0.63 PY per 1 000 m³.

Except for employment estimates directly furnished by licensees, we have not included any further wood-related remanufacturing employment in the coefficient. Classifying remanufacturing employment and identifying the type, amount and source of raw material inputs used by remanufacturers are equally difficult tasks. Without these, estimating employment directly attributable to Soo TSA wood would also be speculative. Wood remanufacturers have alternative sources of supply (including imports) and can use

substitute materials, so we have assumed that their employment levels would not be a function of the Soo TSA's AAC.

Direct Employment Income

Forest sector employment income was estimated using Statistics Canada 1991 Census data [Statistics Canada, Employment Income by Occupation, 1993] adjusted to 1993 dollars by the BC Consumer Price Index. Harvesting employment income is estimated to be \$46 094 in 1993. Silviculture employment income is estimated to be \$39 891. Pulp and paper income and wood processing income are estimated to be \$48 927 and \$42 636, respectively in 1993. The weighted average income for study area forestry employment is \$45 242.

Employment income is reported as after-tax in this report as an estimate of disposable income. Income tax deductions are included in government tax revenues. Based on the above harvesting, silviculture and processing incomes, a weighted average tax rate of 27.6 percent was derived from Ministry of Finance tax tables [Central Statistics Branch 1992]. The weighted average after-tax income for study area forestry workers is \$32 764.

Indirect/Induced Employment

The BC Ministry of Finance and Corporate Relations has prepared economic base multipliers for all parts of BC except for the Lower Mainland [Horne and Robson 1993]. Economic base multipliers are calculated in a different fashion than input-output multipliers. The direct and indirect portions of the I/O approach are roughly equivalent to the basic portion. The induced portion of the I/O approach is roughly equivalent to the non-basic portion of the economic base multiplier. The economic base multiplier for the Squamish area is 1.24, based on 1990 data. The procedure for applying this multiplier is contained in a forthcoming BC Ministry of Finance paper (Horne, 1994).

Indirect/Induced Employment Income

Indirect employment income is obtained by multiplying the estimated indirect employment by an average annual after-tax income of \$23 350 for BC in 1993. This wage was derived by applying an effective tax rate of 20.5 percent to Statistics Canada's average annual aggregate gross income for BC in 1993 of \$29 385.

Provincial Impacts

Direct Employment

Eighty-seven percent of Soo TSA wood leaves the TSA for processing. According to licensee survey information, 26.4 percent is in the form of pulp logs headed to coastal pulp mills. Based on average employment information obtained from Howe Sound Pulp and Paper, Western Pulp Partnership, and Fletcher Challenge Canada, the pulp and paper processing coefficient for this wood is estimated to be 0.45 PY per 1 000 m³.

A considerable volume of chip and sawdust residue is generated when non-pulp Soo TSA wood is processed, primarily as lumber. Based on licensee information, it is estimated that 43 percent of all TSA wood processed both inside and outside the region (excluding pulp wood, chips and log exports) ends up as chip and sawdust residue and is subsequently processed as pulp and paper. We have applied the above pulp and paper coefficient (less chipping) of 0.40 PY per 1 000 m³ to these volumes.

Approximately 59.9 percent of Soo TSA wood leaves the region for non-pulp processing. A Crane Management survey of solid wood producers in south west B.C. carried out for the Fraser TSA socio-economic analysis produced a processing coefficient of 0.52 PY per 1 000 m³. We have applied this coefficient of to these volumes.

The provincial coefficient for harvesting and processing Soo TSA wood (inside and outside the TSA) is estimated to be 1.19 PY per 1 000 m³.

According to our survey responses, a small volume of TSA logs are exported from BC annually, but not enough to alter the coefficients.

Direct Income

Forest sector employment income was estimated using Statistics Canada 1991 Census data [Statistics Canada, Employment Income by Occupation, 1993] adjusted to 1993 dollars by the BC Consumer Price Index. Harvesting employment income was estimated to be \$46 094 in 1993. Silviculture employment income was estimated to be \$39 891. Pulp and paper income and wood processing income were estimated to be \$48 927 and \$42 636, respectively in 1993. The weighted average income for provincial forestry employment is \$45 399.

Employment income is reported as after-tax in this report. After tax income is a measure of disposable income. Income tax deductions are included in government revenue. Based on the above harvesting, silviculture and processing incomes, a weighted average tax-rate of 27.8 percent was derived from Ministry of Finance tax tables [Central Statistics Branch 1992]. The weighted average after-tax income for study area forest workers is \$32 800.

Indirect/Induced Employment

Multiplying direct employment by the Ministry of Forests' forest sector multiplier of 2.5 provides an estimate of total employment³. Indirect and induced employment is the difference between the total and direct figures. For clarity of presentation in this report indirect and induced employment and income are combined under the indirect category.

³ The Ministry of Forests has selected the multiplier of 2.5 for the timber harvest impact assessments after reviewing the literature and considering the multipliers that various organizations have developed.

Indirect/Induced Income

Indirect employment income is obtained by multiplying the estimated indirect and induced employment by an average annual after-tax income of \$23 350 for BC in 1993. This wage was derived by applying an effective tax rate of 20.5 percent to Statistics Canada's average annual aggregate gross income for BC in 1993 of \$29 385.

II. Tourism Impact Issues

A change in timber harvest levels can have important implications for the businesses and employees who depend on tourism and outdoor recreation. So TSA forests provide significant opportunities for people to enjoy the outdoors. There is no clearly defined relationship between tourism/recreation employment and timber harvest. There is a relationship between outdoor related visits and recreation/tourism employment. If harvest level changes affect visitorship, outdoor recreation and tourism related employment will change.

Tourism and recreation have somewhat unique product characteristics and production processes. The entire trip is the product, rather than just recreation sites and facilities. It involves the total experience, anticipation, travel and memories. Consumers combine the opportunities made available by nature, government and the private sector with their own knowledge, equipment, travel and technology to produce the trips. Tourists and recreationists will assess any preceived impacts from timber harvesting and decide whether or not to go forward with a trip.

In a general sense, each scenario would similarly affect outdoor recreation and tourism activity because they are subject to the same forest management practices, including Ministry of Forests Integrated Resources Management (IRM) guidelines. Specific protection for biodiversity, landscape views and habitat will prevail in the same fashion and in the same quantity for each scenario.

Timber harvesting can improve recreation access to backwoods areas through creation of logging roads and cuts for heli-skiing runs. Over the longer term, there would be no difference between scenarios regarding access.

One possible difference in recreation and tourism potential between the scenarios comes from the lower near-term harvest for Scenario 3 compared to Scenario 1 and Scenario 2. The immediate 28 percent drop in harvest could make it easier to manage visual impacts from timber harvesting. Reduced harvests would not enhance tourism features, but may help avoid potential problems, such as reduced visits, associated with rapid changes to visual features caused by timber harvesting.

Tourism and outdoor recreation fall into the category of services whereas forest products are categorized as goods. There is an increasingly important debate about the importance of services as an engine of economic growth. Conventional growth models focus on

exports and investment. The most commonly mentioned form of service-led growth takes place when a reduction in the prices of intermediate services leads to a reduction in the price of exports, which, in turn, leads to classic export-led growth. Tourism services in this context can be considered as the export of forest based experiences though the individual must enter the province to accept delivery of the experience.

Tourism services sold to non-residents can increase economic activity but recreation undertaken by residents does not do so, unless it replaces activity which would otherwise be consumed outside of the economy. Outdoor recreation by residents improves personal health and provides intellectual and emotional benefits but it does not raise the GDP.

There is another viewpoint which holds that it is not maximization of GDP, or output which is important but maximization of utility. This viewpoint holds that the "marketplace" decides, via individuals exercising personal discretion in their spending patterns. If residents want to purchase recreation and its benefits then they should be able to do so. As incomes change people will alter their pattern of purchases. If GDP is stagnant, residents will supposedly save more and reduce spending on non-essential final consumption items, such as recreation. From an analytical standpoint, the main difference between the two is what to measure: utility, or an indicator, such as jobs, GDP or income.

These two basic perspectives have important consequences for interpreting the economic impacts of the scenarios. This study does not attempt to compare utility impacts of the scenarios. It compares jobs and income impacts. Changes in the forest industry will add or subtract from overall economic well-being, measured through jobs and income, because it is a goods producing export sector. The situation is not as cut and dried for the outdoor recreation possibilities of the TSA's forests. As a service industry, outdoor recreation must be separated into its export and resident components each with different implications for the province's economy.

The spending of non-resident tourists for recreational activities in the TSA's forests could be included in an impact analysis but only the portion which comes because of the opportunities offered in the TSA's forests. If tourists would otherwise visit BC and spend similar amounts of money without using its forests, then the recreational activity would not be counted as a contributor to overall economic change.

Resident recreational activity occurs at some level regardless of changes in forest conditions. A timber harvesting induced change in forest conditions may cause some residents to pursue another activity elsewhere, but likely in the province. For example, instead of hiking in the forests, time and financial resources might go towards tennis. Since there is no change in spending, i.e. the money is either spent on hiking or tennis in BC, there is no change at the level of the overall economy. If residents visit Washington state to hike, then there is import substitution, i.e., the recreation experience is received outside of Canada and imported back into Canada, and a resulting decrease in the overall Canadian economy.

There is another important interpretation issue when outdoor recreation and tourism are a significant economic sector. The services of environmental resources used in the production of a visit or experience have either no price or a price which does not reflect a market value. Although the recreationist or tourist does not pay for them, they can often place a dollar value on what they would be willing to pay. There are a large number of academic studies on this issue. An example is the fishing experience, where an angler can accurately estimate what he or she would pay for a day of fishing, above the spending on bait, fuel, food, etc. Even though the angler does not pay for the environmental resources which combine to yield the fishing experience, it still has economic value. There are many other examples of services or goods which do not have market prices yet provide economic value. An economic impact study does not record something if there is no spending. This situation leads to an understatement of the importance of recreation and tourism within the TSA or province.

III. First Nations Impact Methodology

Representatives of all First Nations with traditional territory in the Soo TSA were asked to provide their perceptions of impacts arising from a reduction in the timber harvest. The N'Quatqua First Nation and the In-SHUCK-ch chose to provide information while the others did not do so. The consultants collected information through a series of meetings and faxes and drafted the First Nations sections of the report. Representatives of the In-SHUCK-ch and the N'Quatqua reviewed and revised the drafts. The approved drafts are presented intact herein. The material in these sections applies to the N'Quatqua and In-SHUCK-ch peoples and not to the other First Nations, Squamish, Burrard and Mount Currie, with traditional territory in the Soo TSA.

IV. Government Revenues Impact Methodology

The same general approach is taken with this account as was done for the economic development account; historical government revenues per cubic meter of harvested timber are estimated. The recent historical averages are multiplied by the AAC volumes to indicate expected government revenues by decade. Provincial government revenues are grouped into three categories:

Resource Revenues - These include stumpage and rents. The weighted 1990-1993 average for Soo TSA is \$8.36 per m³. Other rents included in this figure are assumed to be \$.25 per m³ on non-SBFEP wood.

Policy changes announced in April, 1994 as part of the Forest Renewal Plan will result in significantly higher stumpage revenues if the increase in lumber prices which occurred in 1993 represents a structural shift in the market. The revenue estimates above are based on historical inflation adjusted prices. Based on an average lumber selling price of \$350 U.S. per thousand board feet, initial estimates indicate that stumpage revenues may be 60 percent to 80 percent higher than in the past. Stumpage revenues will vary with

changes in lumber prices and it is not possible to precisely project the impact of these new policy changes at the TSA level until the new policy has been implemented for a period of time.

Personal Income Taxes - Effective employment income tax rates are assumed to be 27.6 percent for regional forestry income, 27.8 percent for provincial forestry income, and 20.5 percent for other income, both regional and provincial; the provincial share of these is assumed to be one third.⁴

Other Taxes - A composite tax rate of \$4.85 per m³ is used to cover corporate, logging, property, sales, and electricity taxes [Price Waterhouse, 1993, 1994]. This was based on a 1988-1993 industry average.

Federal government revenues have all been grouped into one category. A corporate tax rate of \$1.163 per m³, an excise tax rate of \$0.163 per m³ and a withholding tax rate of \$0.10 per m³ based on a 1988-1993 industry average [Price Waterhouse 1993 & 1994] is used to calculate a portion of the Federal revenue amount. The remainder is personal income tax which is assumed to be twice the provincial income tax amount as described above.

⁴ The amount of personal income tax is difficult to project. Job losers will have lower incomes, at least for a short time. The majority will secure other work, but perhaps not in the forest industry. Assuming no income for job losers would be incorrect and bias scenarios with larger reductions in harvest. Further, there is the difficulty of making assumptions about B.C. government expenditures on behalf of forest industry workers to arrive at a net figure.

APPENDIX 8

IMPACT ANALYSIS - SCENARIOS 2 & 3

Scenario 2 - TSA Economic Impacts							
	Harvest	Employment (PY/Year)			Employment Income (\$1993 Millions/Year)		
Year	'000 m ³	Direct	Indirect	Total	Direct	Indirect	Total
Current	580	367	182	549	\$12.02	\$4.07	\$16.09
0	580	367	182	549	12.02	4.07	16.09
10-60	389	246	122	368	8.06	2.73	10.79
70	442	280	139	418	9.16	3.10	12.26

Scenario 2 - Provincial Economic Impacts							
	Harvest	Employment (PY/Year)			Employment Income (\$1993 Millions/Year)		
Year	'000 m ³	Direct	Indirect ⁵	Total	Direct	Indirect ⁶	Total
Current	580	689	1 034	1 723	\$22.59	\$23.96	\$46.54
0	580	689	1 034	1 723	22.59	23.96	46.54
10-60	389	462	693	1 155	15.15	16.07	31.22
70	442	525	788	1 313	17.21	18.26	35.47

Scenario 2 - Government Revenue Impacts (\$1993 millions/Year)					
Year	Provincial				Total Federal Taxes ¹⁰
	Resource Revenues ⁷	Personal Income Tax ⁸	Other Taxes ⁹	Total	
Current	\$4.82	\$4.96	\$2.81	\$12.60	\$10.74
0	4.82	4.96	2.81	12.60	10.74
10-60	3.24	3.33	1.89	8.45	7.21
70	3.68	3.78	2.14	9.60	8.19

⁵ Indirect employment for the province was based on the Ministry of Forests' multiplier of 2.5 See Appendix 7.

⁶ Indirect employment income for the province was also based on the \$23 350 average income used to assess regional indirect employment income. See Appendix 7.

⁷ Includes stumpage and other rents and revenues.

⁸ Includes provincial share of taxes on direct, indirect, and induced employment income.

⁹ Includes logging, corporate income, corporate capital, sales, property and electricity taxes.

¹⁰ Includes corporate income tax, personal income tax, excise tax and withholding tax.

Scenario 3 - TSA Economic Impacts							
	Harvest	Employment (PY/Year)			Employment Income (\$1993 Millions/Year)		
Year	'000 m ³	Direct	Indirect	Total	Direct	Indirect	Total
Current	580	367	182	549	\$12.02	\$4.07	\$16.09
0-60	416	263	131	394	8.62	2.92	11.54
70	442	280	139	418	9.16	3.10	12.26

Scenario 3 - Provincial Economic Impacts							
	Harvest	Employment (PY/Year)			Employment Income (\$1993 Millions/Year)		
Year	'000 m ³	Direct	Indirect	Total	Direct	Indirect	Total
Current	580	689	1 034	1 723	\$22.59	\$23.96	\$46.54
0-60	416	494	741	1 236	16.20	17.18	33.38
70	442	525	788	1 313	17.21	18.26	35.47

Scenario 3 - Government Revenue Impacts (\$1993 millions/Year)					
Year	Provincial				Total Federal Taxes ¹⁴
	Resource Revenues ¹¹	Personal Income Tax ¹²	Other Taxes ¹³	Total	
Current	\$4.82	\$4.96	\$2.81	\$12.60	\$10.74
0-60	3.46	3.56	2.02	9.03	7.71
70	3.68	3.78	2.14	9.60	8.19

¹¹ Includes stumpage and other rents and revenues.

¹² Includes provincial share of taxes on direct, indirect, and induced employment income.

¹³ Includes logging, corporate income, corporate capital, sales, property and electricity taxes.

¹⁴ Includes corporate income tax, personal income tax, excise tax and withholding tax.

APPENDIX 9

INCREMENTAL IMPACT CHANGES

SCENARIO 1										
	TSA Impacts				Provincial Impacts				Revenues	
	Employment (PYs/Year)		After-Tax Income (\$1993 Mill/Year)		Employment (PYs/Year)		After-Tax Income (\$1993 Mill/Year)		Prov.	Fed.
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	(\$Mill/Year)	
0	-46.81	-70.03	-1.53	-2.05	-87.91	-219.78	-2.88	-5.94	-1.61	-1.37
10	-41.11	-61.52	-1.35	-1.80	-77.22	-193.05	-2.53	-5.21	-1.41	-1.20
20	-29.73	-44.48	-0.97	-1.30	-55.84	-139.59	-1.83	-3.77	-1.02	-0.87
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	-0.69	-1.03	-0.02	-0.03	-1.29	-3.24	-0.04	-0.09	-0.02	-0.02
70	31.05	46.46	1.02	1.36	58.32	145.80	1.91	3.94	1.07	0.91

SCENARIO 2										
	TSA Impacts				Provincial Impacts				Revenues	
	Employment (PYs/Year)		After-Tax Income (\$1993 Mill/Year)		Employment (PYs/Year)		After-Tax Income (\$1993 Mill/Year)		Prov.	Fed.
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	(\$Mill/Year)	
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	-120.81	-180.76	-3.96	-5.30	-226.91	-567.27	-7.44	-15.33	-4.15	-3.54
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	33.52	50.16	1.10	1.47	62.96	157.41	2.06	4.25	1.15	0.98

SCENARIO 3										
	TSA Impacts				Provincial Impacts				Revenues	
	Employment (PYs/Year)		After-Tax Income (\$1993 Mill/Year)		Employment (PYs/Year)		After-Tax Income (\$1993 Mill/Year)		Prov.	Fed.
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	(\$Mill/Year)	
0	-103.74	-155.21	-3.40	-4.55	-194.83	-487.08	-6.39	-13.16	-3.56	-3.04
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	16.45	24.61	0.54	0.72	30.89	77.22	1.01	2.09	0.56	0.48

APPENDIX 10

INTENSIVE SILVICULTURE IMPACTS

The Soo TSA's long history of logging has important implications for the amount, quality and timing of the harvest of second growth timber volumes [Ministry of Forests, Squamish District Office 1993]. Natural regeneration or basic silviculture can result in smaller volumes, poorer wood and later maturity; "The natural development of our coastal second growth stands is unlikely to fit the desired product profile we require or should expect from our growing sites" [Ministry of Forests, 1993]. Lower timber quality and log grades could result in not having suitable timber to take advantage of value added opportunities.

In a modelling project in the Vancouver Forest Region, second growth log value under basic silviculture were estimated as 12 percent lower than for 1990-92 old growth log values. Intensive silviculture can raise volumes, improve wood quality and provide earlier maturation [Reid Collins, 1994].

If left to develop naturally, second growth stands produce less volume in a given period than treated stands [H.A. Simons, 1992]. When a juvenile spacing treatment is applied, the second growth stand will have a similar volume as the naturally regenerated stand but achieve it a decade sooner [Ministry of Forests, undated]. Pruning can significantly increase log quality and therefore value [Reid Collins, 1994].

The question of how much to invest in intensive silviculture is a benefit/cost issue; the cost of the treatments versus the dollar value of the incremental yield that they achieve. Other questions include who will pay how much and when, and what are the employment implications. Intensive silviculture requires more labour, and government and industry are likely to designate laid-off forest industry workers as having priority hiring status for newly created silviculture jobs. The Forest Renewal Plan announcement of spending of over \$2 billion over five years indicates intensive silviculture will receive the largest portion of funding under the plan.

The Soo Timber Supply Analysis report was based on current management and harvesting regimes. It did not project yields and their timing under a different set of silviculture assumptions. From a wood value perspective, incorporating more intensive silviculture would modestly affect volumes and significantly affect wood quality and tree maturities. This socio-economic report does not compare wood value between scenarios but it does estimate employment. Intensive silviculture is more costly and labour intensive than basic silviculture or of course natural regeneration. The Ministry of Forests Annual Report for 1992/1993 provides employment coefficients for the various activities in basic and intensive silviculture. These figures, shown in the table below, give some indication of the increase in employment in silviculture that could occur if more intensive methods are used. However, as the silviculture coefficient used in this study of .025 is approximately 2 percent of the total employment coefficient for this report of 1.19, an intensive silviculture coefficient would raise the total employment coefficient by a very modest

amount. It is difficult to say with authority the size of an intensive silviculture coefficient because we do not know at this time the dimensions of future intensive silviculture programs for the Soo TSA.

Average Cost and Employment of Silviculture Treatments on Crown Land in 1992/1993		
Activities	Vancouver Forest Region	BC
	\$ per Hectare	Worker Days per Hectare
Basic Silviculture		
Surveying	\$14	0.01
Preparing Sites	569	0.03
Planting	621	1.8
Brushing - manual	548	1.0
Brushing - chemical	358	1.0
Spacing	n/a	3.5
Incremental Silviculture¹⁵		
Surveying	18	.01
Spacing	998	3.5
Fertilizing	137	0.1
Pruning	1 240	6.0
Source: Ministry of Forests, 1994		

¹⁵ Including any of the incremental activities in silviculture generally implies "intensive silviculture".