FRASER TSA
SOCIO-ECONOMIC ANALYSIS

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June, 1994

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EXECUTIVE SUMMARY

INTRODUCTION

- The British Columbia Ministry of Forests (MoF) is conducting a province-wide timber supply review which is assessing the short and long-term effects of forest management practices in British Columbia. The Timber Supply Review process will generate four reports for each Timber Supply Area (TSA): a timber supply analysis; a socio-economic assessment of timber supply scenarios; a discussion paper based on the first two studies; and, a report by the Chief Forester on the Allowable Annual Cut (AAC) rationale. As part of the review process, the MoF has recently examined the availability of timber in the Fraser Timber Supply Area [Integrated Resources Branch, MoF, 1993]. The completion of the Timber Supply Analysis has led to the preparation of this socio-economic assessment of the effects of timber supply scenarios on communities within the TSA and on the province as a whole. It is the objective of this study to evaluate, using a multiple accounts methodology, the social, economic and environmental impacts of the alternative harvest rate scenarios.

SOCIO-ECONOMIC PROFILE

- The Fraser Timber Supply Area covers 1 173 616 hectares of which only 275 083 hectares are in the timber harvesting land base. It is one of eight TSAs comprising the Vancouver Forest Region and is located in the southwest corner of the province. The Chilliwack Forest District Office in Rosedale, near Chilliwack, administers the TSA.

Communities and Economic Activity

- The area covered by the Fraser TSA includes Greater Vancouver, the Fraser Valley, the Fraser Canyon up to Boston Bar and the Hope area. This region includes four regional districts: Greater Vancouver; Dewdney-Alouette; Central Fraser Valley; and, Fraser-Cheam.

- Population and labour force both grew substantially in the 1980s. The total regional population and labour force were 1 790 000 and 972 000, respectively, in 1991. Within this labour force, the most recent region-wide unemployment rate was 8.5 percent, below the British Columbia rate of 9.3 percent. Employment and employment growth is greatest in the service sector.

- The robust growth in regional population over the last decade is projected to continue in future years, reaching almost 3 million by 2020.

- Based on harvesting and primary processing employment data, the communities of Maple Ridge, Mission, Chilliwack, Kent, Hope, Yale, Boston Bar and North Bend are

the most closely tied to the forest industry in the Fraser TSA. Maple Ridge and Mission both have significant forest industry workforces, mainly in manufacturing employment. The other communities also have significant forest industry workforces, but with more reliance on logging activities.

Aboriginal Community

- The Fraser TSA has the largest number of First Nations communities in British Columbia. Thirty-four bands have reserve lands in the area, primarily along the Fraser River. Membership and population data for these organizations is shown in Appendix 6.

- In 1991, the unemployment rate for aboriginal people in British Columbia was 27.8 percent, while the rate in the lower Mainland and Fraser Valley was slightly higher at 29 percent, in spite of better job opportunities in the region [Employment and Immigration Canada, December 1991]. Employment among aboriginal people in British Columbia is clustered in the public administration and resource sectors. While fishing dominates the latter, forestry also plays a significant role.

- In general, aboriginal organizations have focused on fishing, together with land development, mining, agriculture and public administration for employment development. Many communities are exploring forestry opportunities in harvesting, sawmilling, silviculture, remanufacturing and log homes.

- The forests hold an important economic and social position for aboriginal peoples in the Fraser TSA. Traditional uses of forestry resources, including fishing, hunting, berry picking, the use of cedar for ceremonial purposes, and spiritual sites, continue to be important. Agro-forestry is assuming a higher profile in the TSA and aboriginal people are actively involved in activities such as mushroom harvesting.

Forest Industry in the TSA

- The Fraser TSA has a currently approved Allowable Annual Cut (AAC) of 1 765 000 m^3. The established licensees in the Fraser TSA appear in Appendix 5. J.S. Jones Holdings Ltd. is the largest licensee with 27.2 percent of the total available AAC. The Small Business Forest Enterprise Program (SBFEP) has the second largest allocation at 20 percent. International Forest Products, Pretty's Timber, and Cattermole Timber also have significant harvests. Another 14 licensees hold either Forest Licences or Timber Sale Licences whose combined AAC is approximately 100 000 m^3. Harvesting operations for these operators are spread throughout the Fraser Valley, with concentrations in the Chilliwack, Sardis, Mission and Hope areas.

- Direct forest industry employment within the Fraser TSA attributed to the Fraser TSA's timber harvest is estimated to be 1579. Total direct forest industry employment in the province attributable to the Fraser TSA's timber harvest is 2061 PYs.

Environment

- The Fraser TSA closely corresponds to the watershed boundaries of the Lower Fraser River Basin. There are three physiographic units that shape this area: the Coast Mountains that border the region on the north and east which contain various tributaries and lakes that drain into the Fraser River; the Fraser Lowland, a broad plain of riverine and glacial deposits that extends east from Vancouver to the community of Hope; and, the Fraser Estuary that covers the delta and tidal waters surrounding the outlet of the Fraser River.

- The TSA has five biogeoclimatic zones. The Fraser Lowland and Estuary almost all lie within the Coastal Western Hemlock (CWH) zone, the largest and most diverse in the TSA. On the Coast Mountains, between 3000 and 7400 feet, lies the Mountain Hemlock zone. In areas above 7400 feet lies the Alpine Tundra (AT) zone. The Interior Douglas-fir zone (IDF) is evident on the lee side of the Coast Mountains and the Engelmann Spruce-Subalpine Fir zone (ESSF) is also represented in the eastern portion of the Fraser TSA. With five biogeoclimatic zones and 13 commercial tree species, the Fraser TSA is one of the most biologically diverse regions in the province.

- Despite the extent of urban and rural development and resource-use activities, the Fraser TSA still contains one of the richest and most diverse arrays of wildlife in Canada. More than 300 species of migratory and resident birds, 45 species of mammals, 11 species of amphibians and 5 species of reptiles range throughout the TSA [Environment Canada, 1992].

- Native mammals include species such as the mule and black-tailed deer, moose, elk, black and grizzly bear, wolf, coyote, bobcat, muskrat, marmots, river otter, beaver, marten other fur bearing species, mountain goats and cougar. Several species are of special management concern.

- At least 87 species of resident, semi-resident and migratory finfish and shellfish inhabit the rivers, streams and lakes of the Lower Fraser Valley Basin. The lower Fraser River is a corridor for the salmonid species of chum, pink, sockeye, chinook and coho. The lower Fraser River provides escapements for more than 50 percent of the total of all salmon in the entire Fraser River watershed. Degraded water quality or habitat in the Basin negatively affects a major proportion of the salmon fishery.

- There are at least 16 species of finfish other than salmonids that inhabit either the freshwater or marine aquatic environment.

Agro-Forestry

- The Fraser TSA is one of several British Columbia regions where the Pine mushroom is commercially harvested. This harvest benefits the economy of the Boston Bar-North Bend-Lillooet area. Many aboriginal residents of the area participate in harvesting and the cash from mushrooms has become an important part of their income.

Recreation

- The TSA is unique in the respect that there are an unusually large number of residents and visitors who use its forests for active leisure pursuits, such as hiking, and passive pursuits such as enjoying the ocean and mountain landscapes. The forests provide a fundamental backdrop to these activities which are the underpinning for a wide variety of businesses and their employment.

- Participation rates in outdoor recreation in the lower Mainland have held steady over time. This rate stability translates into increased levels of participants through population increase. The projected population increases will place pressure on the existing supply of outdoor recreation opportunities.

TIMBER HARVEST SCENARIOS

- Three harvest forecasts from the Fraser TSA Timber Supply Analysis report were chosen to demonstrate a range of possible socio-economic impacts. These forecasts are meant for discussion purposes only and do not imply that a particular harvest level is preferred.

- The long-run harvest level for the TSA is 1 182 500 m^3. All three harvest scenarios move down to this level through different reduction schedules, as shown in Figure ES-1 and Table ES-1.

Figure ES-1: Timber Harvest Scenarios

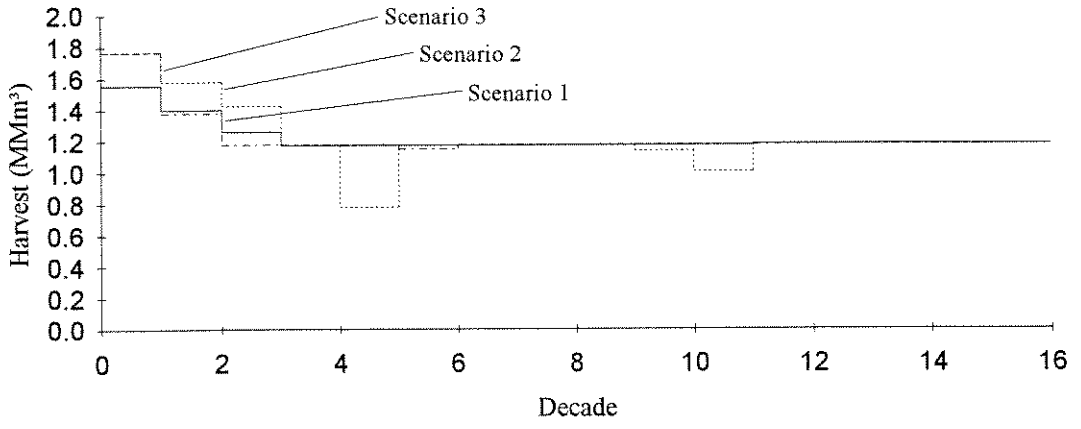

Table ES-1: Harvest Scenarios
('000 m^3)

	Scenario 1			Scenario 2			Scenario 3		
Harvest Period	Harvest m^3	Change m^3	Change %	Harvest m^3	Change m^3	Change %	Harvest m^3	Change m^3	Change %
Current	1 765 000			1 765 000			1 765 000		
0	1 553 200	-211 800	-12	1 765 000	0	0	1 765 000	0	0
10	1 397 880	-155 320	-10	1 579 000	-185 500	-11	1 376 700	-388 300	-22
20	1 258 092	-139 788	-10	1 421 500	-158 000	-10	1 177 500	-199 200	-14
30	1 172 500	-85 592	-7	1 172 500	-249 000	-18	1 177 500	0	0
40	1 172 500	0	0	780 500	-392 000	-33	1 177 500	0	0
50	1 172 500	0	0	1 172 500	392 000	50	1 151 000	-26 608	-2
60	1 172 500	0	0	1 172 500	0	0	1 177 500	26 608	2
70	1 172 500	0	0	1 172 500	0	0	1 177 500	0	0
80	1 172 500	0	0	1 172 500	0	0	1 177 500	0	0
90	1 172 500	0	0	1 135 167	-37 333	-3	1 177 500	0	0
100	1 172 500	0	0	1 006 869	-128 298	-11	1 177 500	0	0
110	1 172 500	0	0	1 182 500	175 631	17	1 177 500	0	0
120	1 182 500	10 000	1	1 182 500	0	0	1 112 941	-64 559	-5
130	1 182 500	0	0	1 182 500	0	0	1 177 500	64 559	6
140	1 182 500	0	0	1 182 500	0	0	1 182 500	5 000	0

IMPACTS AT THE TSA LEVEL

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

Table ES-2: Summary of TSA Accounts

			Scenario 1					Scenario 2					Scenario 3				
			Years from Present					Years from Present					Years from Present				
		Current	0	10	20	30	60	0	10	20	30	60	0	10	20	30	60
Harvest in '000 m^3		1 765	1 553	1 398	1 258	1 173	1 173	1 765	1 580	1 422	1 173	1 173	1 765	1 377	1 178	1 178	1 178
Economic Account																	
Employment	Direct	1 579	1 390	1 251	1 125	1 049	1 049	1 579	1 413	1 272	1 049	1 049	1 579	1 232	1 053	1 053	1 053
(PY/Year)	Indirect	1 895	1 667	1 501	1 351	1 259	1 259	1 895	1 696	1 526	1 259	1 259	1 895	1 478	1 264	1 264	1 264
	Total	3 474	3 057	2 751	2 476	2 308	2 308	3 474	3 109	2 798	2 308	2 308	3 474	2 710	2 317	2 317	2 317
Employment	Direct	$51.4	$45.2	$40.7	$36.6	$34.1	$34.1	$51.4	$46.0	$41.4	$34.1	$34.1	$51.4	$40.1	$34.3	$34.3	$34.3
Income ($1993	Indirect	44.2	38.9	35.0	31.5	29.4	29.4	44.2	39.6	35.6	29.4	29.4	44.2	34.5	29.5	29.5	29.5
Millions/Year)	Total	$95.6	$84.1	$75.7	$68.1	$63.5	$63.5	$95.6	$85.6	$77.0	$63.5	$63.5	$95.6	$74.6	$63.8	$63.8	$63.8
Community Account																	
Population			▪ small long-term effect in Fraser Canyon					▪ small long-term effect in Fraser Canyon					▪ small long-term effect in Fraser Canyon				
Local Government			▪ reduced tax base in short-term if mill closes					▪ neutral in short-term; higher risk of mill closure medium-term					▪ neutral in short-term; higher risk of mill closure medium-term				
Social Fabric			▪ moderate strain in short to medium term - most vunerable areas are Fraser Canyon, Hope and Chilliwack					▪ neutral in short-term; more severe impact in medium term - most vunerable areas are Fraser Canyon, Hope and Chilliwack					▪ neutral in short-term; more severe impact in medium term - most vunerable areas are Fraser Canyon, Hope and Chilliwack				
Aboriginal Account																	
Economic			▪ decreased employment opportunities in the forest industry in Fraser Canyon, Hope, Kent and Chilliwack areas					▪ neutral impact in short-term; larger drop in employment opportunities in the forest industry in the medium-term					▪ neutral impact in short-term; larger drop in employment opportunities in the forest industry in the medium-term				
Cultural/Heritage			▪ potential impact on cultural/heritage sites					▪ potential impact on cultural/heritage sites					▪ potential impact on cultural/heritage sites				
Land Claims			▪ indeterminate					▪ indeterminate					▪ indeterminate				

Economic Development

- In Scenario 1, direct forest sector employment in the TSA would fall off immediately by 12 percent, or 189 person years (PY), below present employment levels. There would be a further 228 PYs of associated indirect jobs lost, leading to a total decline of 417 jobs. The corresponding direct and indirect employment income losses would be $6.2 million and $5.3 million, respectively.

- Under Scenario 2, in the first 10 years, current direct and indirect employment would remain unchanged at 3474 and employment income at $95.61 million. Total direct and indirect job losses would be 365, 311 and 490 in years 10, 20, and 30, respectively.

- Under Scenario 3, in the first 10 years, current direct and indirect employment would remain unchanged at 3474 and employment income at $95.6 million. Total direct and indirect job losses would be 764 and 392 in years 10 and 20, respectively.

- The three scenarios have similar implications for tourism and outdoor recreation activities.

Community Impacts

- There would be no population impact in larger communities in the TSA as a result of harvest reductions. However, there could be long-term effects in the Fraser Canyon communities of Yale, Boston Bar and North Bend.

- In the first 10 years, mill closures would be unlikely under any of the scenarios; therefore, there would be no change in the industrial tax base in the communities. However, in the medium and long-terms some mill closures are inevitable due to the anticipated harvest reductions in this and other TSAs.

- Chilliwack and, especially, Hope and the Fraser Canyon communities, where the reliance on harvesting activity is highest, would likely bear the greatest strain of a reduction in harvest. Unemployment and social assistance levels are high suggesting that these communities are not well-positioned to respond to further forest industry lay-offs.

- Based on tracking studies, forest workers in the communities furthest from the Greater Vancouver urban core, Boston Bar, Yale, Hope, Kent and Chilliwack, would have the greatest difficulty not only in obtaining alternative employment but also in securing adequate adjustment services.

Aboriginal Impacts

- Any loss of employment in the Fraser TSA due to reduced allowable annual cuts will negatively affect the aboriginal community. The effects would be the greatest in the communities with the highest concentrations of aboriginal forest workers such as Boston Bar, North Bend, Kent, Hope and Chilliwack. Although the employment loss may be proportionate among aboriginal and non-aboriginal forest workers, the impact may be more dramatic among the aboriginal communities because their unemployment levels are already high.

- The other major aboriginal impacts of the harvest scenarios involve heritage and cultural resources. Due to a lack of information, a detailed analysis is not possible; however, it is believed that in the long-term, there would be some adverse impacts on these resources which would be the same amongst all scenarios.

IMPACTS AT THE PROVINCIAL LEVEL

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

Economic Impacts

- In Scenario 1, at the outset, direct forest sector employment would drop 247 PYs below present employment levels. There would be a further loss of 371 PYs of associated indirect jobs, amounting to a total decline of 618 jobs. The corresponding direct income and indirect employment income losses would be $8.1 million and $8.7 million, respectively. Current annual provincial government revenues are approximately $51.01 million. The immediate harvest reduction in Scenario 1 results in an annual loss of $6.12 million in gross revenue.

- Under Scenario 2, maintaining the harvest at current levels would maintain employment and employment income in the first 10 years. Thereafter, total direct and indirect job losses would be 542, 461 and 727 in years 10, 20, and 30, respectively. Annual government revenue losses would be $5.36 million, $4.57 million, and $7.19 million in years 10, 20, and 30, respectively.

Table ES-3: Summary of Provincial Accounts

			Scenario 1					Scenario 2					Scenario 3				
			Years from Present					Years from Present					Years from Present				
		Current	0	10	20	30	60	0	10	20	30	60	0	10	20	30	60
Harvest in '000 m^3		1 765	1 553	1 398	1 258	1 173	1 173	1 765	1 580	1 422	1 173	1 173	1 765	1 377	1 178	1 178	1 178
Economic Account																	
Employment	Direct	2 061	1 814	1 633	1 469	1 369	1 369	2 061	1 845	1 660	1 369	1 369	2 061	1 608	1 375	1 375	1 375
(PY/Year)	Indirect	3 092	2 721	2 448	2 204	2 054	2 054	3 092	2 767	2 490	2 054	2 054	3 092	2 412	2 063	2 063	2 063
	Total	5 153	4 535	4 081	3 673	3 423	3 423	5 153	4 612	4 151	3 423	3 423	5 153	4 020	3 438	3 438	3 438
Employment	Direct	$67.8	$59.6	$53.7	$48.3	$45.0	$45.0	$67.8	$60.7	$54.6	$45.0	$45.0	$67.8	$52.9	$45.2	$45.2	$45.2
Income ($1993	Indirect	72.2	63.5	57.2	51.5	48.0	48.0	72.2	64.6	58.2	48.0	48.0	72.2	56.3	48.2	48.2	48.2
Millions/Year)	Total	$140.0	$123.1	$110.9	$99.8	$93.0	$93.0	$140.0	$125.3	$112.8	$93.0	$93.0	$140.0	$109.2	$93.4	$93.4	$93.4
Provincial Revenue Account ($1993 Millions/Year)																	
Stumpage and Rents		$26.6	$23.4	$21.1	$19.0	$17.7	$17.7	$26.6	$23.8	$21.4	$17.7	$17.7	$26.6	$20.8	$17.8	$17.8	$17.8
Personal Income Taxes		14.6	12.9	11.6	10.4	9.7	9.7	14.6	13.1	11.8	9.7	9.7	14.6	11.4	9.8	9.8	9.8
Other Taxes		9.8	8.6	7.7	7.0	6.5	6.5	9.8	8.7	7.9	6.5	6.5	9.8	7.6	6.5	6.5	6.5
Total		$51.0	$44.9	$40.4	$36.4	$33.9	$33.9	$51.0	$45.6	$41.1	$33.9	$33.9	$51.0	$39.8	$34.1	$34.1	$34.1
Environmental Account			▪ same long-term impacts as scenarios 2 and 3; however, affords the greatest short-term (first 20 years) flexibility for managing the forest for biological diversity					▪ conversion of old growth forests to younger forests, especially at lower elevations ▪ short-term enhancement of some ungulates; long-term declines in population of key big game and old growth dependent species					▪ conversion of old growth forests to younger forests, especially at lower elevations ▪ short-term enhancement of some ungulates; long-term declines in populations of key big game and old growth dependent species				

- Under Scenario 3, total direct and indirect job losses would be 1134 and 582 in years 10 and 20, respectively. The corresponding total employment income losses would be $30.8 and $15.8 million. Government revenues would not change in the first 10 years. Losses would then be $11.22 million and $5.76 million annually, beginning in years 10 and 20, respectively.

Environmental Impacts

- Each AAC Scenario presented would have fewer and less widespread environmental impacts over the long-term than the current timber harvesting situation. Scenario 1 presents the smoothest and most manageable transition to long-run harvest levels. Scenarios 2 and 3 delay the harvest reductions, thereby placing greater strain on the environment in the short-term. They also exhibit sometimes widely fluctuating cut levels that would make management more difficult. IRM guidelines will apply equally to all the Scenarios and help to mitigate general environmental impacts.

- Under all three scenarios, there would be a shift in the age-class distribution of forests within the TSA. Most of the mature old growth forests in the timber harvesting land base would be converted to managed forests. 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 which are dependent on old forests or old growth attributes, or reach their maximum abundance in late successional forests, would decline.

- Fisheries in the Fraser TSA are especially important as over 50 percent of migrating Fraser River salmon spawn in the lower Fraser and its tributaries, and all use the lower Fraser as a corridor. Environmental damage to this habitat could have far-reaching impacts extending beyond the Fraser TSA.

1. INTRODUCTION

1.1 Background

The B.C. 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) if current management practices continue. 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 and the social, environmental, and economic implications of changing timber harvest levels. A Discussion Paper summarizes the technical information and provides a focus for public discussion of issues surrounding timber harvest levels. A fourth report describes the rationale behind the Chief Forester's AAC decision.

1.2 Objectives and Methodology

The Fraser TSA Timber Supply Analysis report was released in October, 1993[1]. 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 Fraser TSA. The forecasts were chosen to illustrate a range of social, environmental and economic implications associated with different harvest levels. **The forecasts are not 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 account" framework. A multiple account 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 options for forest land management. The objective of multiple account analysis is to present the implications of alternatives in terms of these factors.

The multiple accounts framework used in this study, as outlined in Table 1.1, has been adapted from interim guidelines developed for land and resource management planning.[2] The implications of the harvest forecasts are evaluated in terms of six accounts. Three accounts are used to consider economic development, community, and aboriginal concerns from a TSA perspective. Provincial accounts include economic development, environmental implications, and government revenues.

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1 Ministry of Forests, Integrated Resource Branch. (1993). *Fraser TSA Timber Supply Analysis.* The Integrated Resource Branch is now called Resource Planning Branch.

2 Integrated Resource Planning Committee. (1993). *Social and Economic Impact Assessment for Land and Resource Management Planning in British Columbia: Interim Guidelines.*

Table 1-1: Multiple Accounts	
Account	**Impacts**
TSA or Regional 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. Impacts on community goals such as stability and quality of life.
Aboriginal	Impacts on native community resources, cultural values, traditional activities and economic development goals.
Provincial Level	
Economic Development	Direct and indirect employment and income impacts in British Columbia communities outside the TSA.
Environment	Impacts on the environment assessed from an ecological perspective.
Provincial Government	Gross government resource-related taxes and other revenues.

The methodologies used for estimating viewpoints within the various accounts 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 using available data from Statistics Canada, Central Statistics Branch, Ministry of Government Services, Greater Vancouver Regional District, Dewdney-Alouette Regional District, Fraser-Cheam Regional District and individual municipalities.

The economic impact assessment drew upon information furnished by Fraser TSA licensees, Ministry of Forests' Integrated Resources Branch, Chilliwack Forest District, and Ministry of Finance and Corporate Affairs. The data and assumptions in these reports were updated, verified, and in some cases supplemented by further discussions with the appropriate agencies.

The environmental account is based on reports from British Columbia Environment, Environment Canada, Ministry of Forests, and Fisheries and Oceans Canada.

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.

Telephone interviews with band, tribal council and British Columbia Government representatives were used to gauge the impacts on the aboriginal community.

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

1.4 Report Structure

The next chapter of this report provides a socio-economic profile of the Greater Vancouver Regional District and Fraser Valley communities covered by the Fraser TSA. Chapter Three explains the scenarios to be used in the analysis. Chapters Four, Five, and Six 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

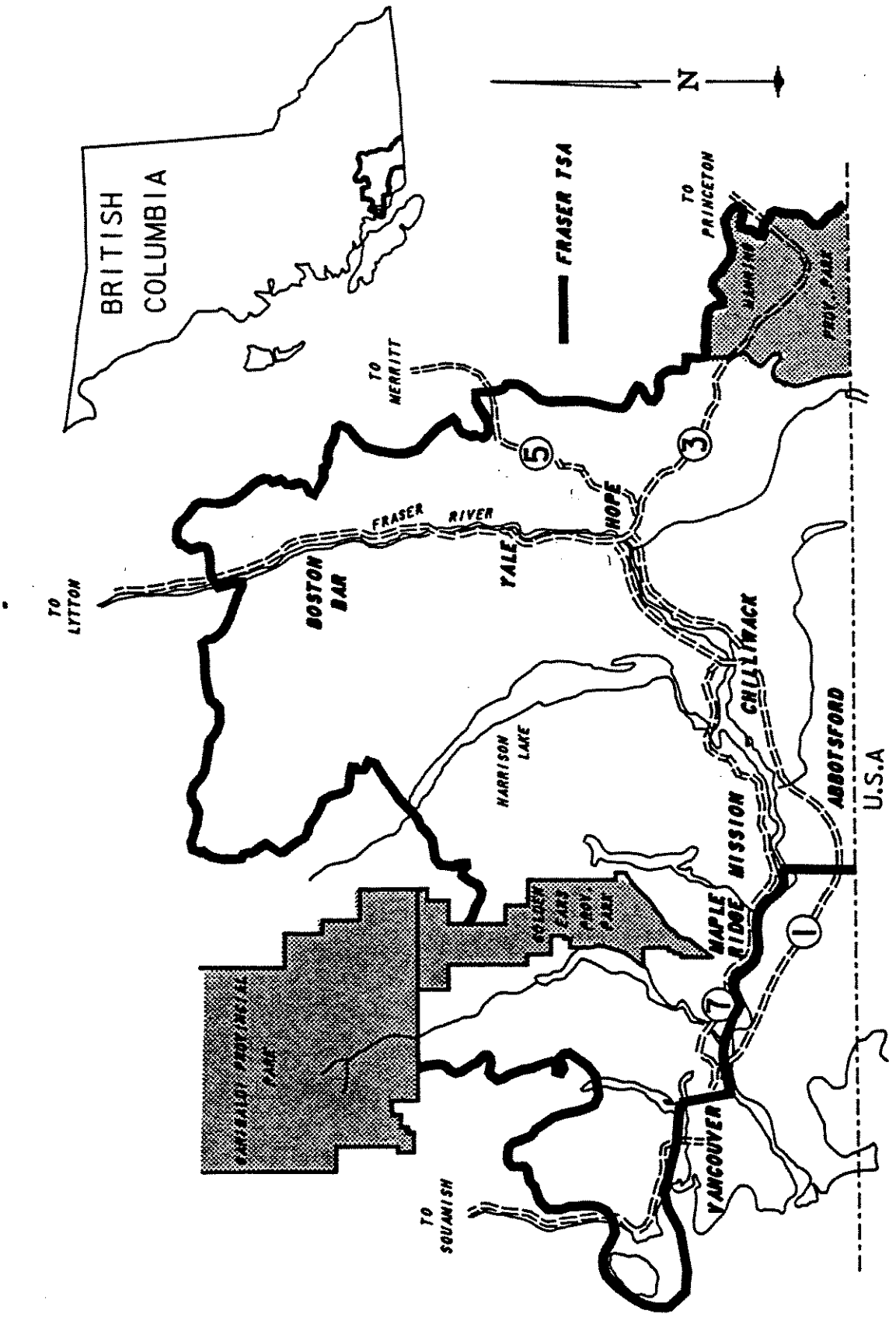
The Fraser Timber Supply Area covers 1 173 616 hectares and is one of eight TSAs comprising the Vancouver Forest Region. The Chilliwack Forest District Office located in Rosedale, near Chilliwack, administers the TSA.

The Fraser TSA (Figure 2-1) is located in the southwest corner of the province, and lies in the Southern Pacific Ranges of the Coast Mountains. The Coastal Western Hemlock, Mountain Hemlock and Alpine Tundra biogeoclimatic zones dominate the region. The forested area is primarily hemlock/balsam and Douglas-fir, with minor representation by cedar, spruce, pine, larch and deciduous stands.

The region has an extensive history of logging and forest products manufacturing. Today the forest industry provides a substantial source of revenue and employment in the Fraser TSA. There are approximately 110 major timber processing facilities within the TSA [British Columbia Ministry of Forests, Economics and Trade Branch 1992]. Although the majority of wood processed within the Fraser TSA is harvested from outside the TSA, timber harvesting is an important part of the regional economy, especially in smaller rural communities.

Forests are an important attraction and source of recreation enjoyment for the most densely populated part of the province and its hundreds of thousands of annual visitors. For this reason, visual quality management of the forest landscape and sustaining the wildlife and fishery resources are prime considerations in developing integrated resource management plans.

Wildlife species in the area are typical of Pacific Northwest coastal forests. The Fraser River, which flows through the TSA, and its tributaries are the greatest source of salmonids in the world [Environment Canada 1992].


BRITISH COLUMBIA
N
FRASER TSA
TO PRINCETON
TO MERRITT
TO LYTTON
FRASER RIVER
BOSTON BAR
YALE
HOPE
HARRISON LAKE
CHILLIWACK
ABBOTSFORD
MISSION
MAPLE RIDGE
U.S.A
VANCOUVER
TO SQUAMISH
5
3
1
7

2.2 Overview

The area covered by the Fraser TSA includes Greater Vancouver, the Fraser Valley, the Fraser Canyon up to Boston Bar and the Hope area. The TSA boundary closely corresponds to the four regional districts of Greater Vancouver; Dewdney-Alouette; Central Fraser Valley; and, Fraser-Cheam.

The lower mainland (Greater Vancouver and Central Fraser Valley) is the leading centre for many of the economic activities in the province, including manufacturing, services, trade, agriculture and fishing. The urban centre of Greater Vancouver is the hub for most financial, educational, tourist, transportation and industrial activity in the region, while the resource industries play a significant role in the less densely populated areas. The forest industry is particularly significant in the Fraser-Cheam and Dewdney-Allouette Regional Districts which encompass the Hope-Fraser Canyon, Kent-Harrison and Mission areas. In the Chilliwack area agriculture is the dominant resource activity.

Population

Basic statistics describing the demographic and labour force characteristics of the TSA appear in Table 2-1. A total population of 1.79 million in 1991 represented a 16.9 percent increase over the 1986 population of 1.5 million. Population growth rates were high in all four regional districts. The comparable rate in British Columbia was 13.8 percent. The labour force also grew substantially in the late 1980s. In 1991, the combined labour force of the region was 972 220. Within this labour force, the most recent unemployment rate within the TSA was 8.5 percent, below the British Columbia rate of 9.3 percent. Average incomes were highest in the Greater Vancouver at $27 998 and lowest in the Fraser-Cheam at $21 909. The average British Columbia wage in 1990 was $25 893.

Table 2-1: Lower Mainland and Fraser Valley Key Statistics

	Greater Vancouver	Fraser-Cheam	Dewdney-Alouette	Central Fraser Valley
Population (1991)	1 542 750	68 681	89 968	87 360
Annual Growth (1986-91)	2.9%	3.5%	5.3%	5.6%
Percent Change (1986-91)	15.4%	18.5%	29.5%	31.5%
Land Area (square kilometres)	2 473	10 798	3 156	385
Labour Force	851 905	32 330	45 475	42 510
Unemployment Rate (Last quarter 1993)	8.5%			
Average Income (1990)	$27 998	$21 909	$24 389	$25 014

Source: 1991 Census Data, Statistics Canada
Monthly Labour Force Survey, Statistics Canada
British Columbia Central Statistics Branch

Some demographic trends will have implications for the study area. The average age of the 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. Between 1981 and 1991, the 0-25 age group lost a 4.4 percent share of the total population, which was picked up by all of the above 25 age groups, except for the 55-64 age group, which showed a small decline.

Table 2-2: TSA Population[3] Age Profile for 1991, 1986 and 1981

Age Group	1991	1986	1981
0-14	19.1%	18.9%	19.5%
15-24	13.6%	15.4%	17.6%
25-34	18.4%	18.4%	18.1%
35-44	16.8%	15.2%	12.9%
45-54	11.1%	10.4%	10.7%
55-64	8.6%	9.5%	9.7%
65+	12.4%	12.2%	11.5%
Total	100%	100%	100%

Source: 1981, 1986, 1991 Census Data, Statistics Canada

The robust growth in population over the last decade is projected to continue in future years. As shown in Table 2-3, total population is projected to increase by more than 1 million from 1.89 million in 1993 to 2.93 million in 2018.

The population's ageing trend is also expected to continue well into the next century. The percentage share of the 45+ age groups will increase significantly while the under 45 age groups will decline. The cumulative effect of these ageing trends will see the median age of the population increase from 34.8 in 1993 to 41.1 in 2018.

Table 2-3: TSA Population Projections for 1993 - 2018

Year	Total Population	Percent Change
1993	1 892 535	-
1998	2 128 553	12.5%
2003	2 344 371	10.1%
2008	2 553 842	8.9%
2013	2 745 119	7.5%
2018	2 926 591	6.6%

Source: British Columbia Stats

3 Includes Greater Vancouver, Dewdney-Alouette, Central Fraser Valley and Fraser-Cheam Regional Districts.

Labour Force

The percentage share by industry of the labour force for the 1981 and 1991 census years appears in Table 2-4. The industry trends tend to reflect broader provincial and national trends. In general, declines in the primary and manufacturing sectors were offset by notable increases in service sector activity. The forest workforce in the region is accounted for in two categories: the primary forest sector (which includes logging) and the manufacturing sector (which includes timber processing). There are approximately 110 major timber processing facilities in the region, employing some 9000 persons.

Table 2-4: Experienced Labour Force for 1991 and 1981 Percentage Share

	Greater Vancouver		Fraser-Cheam		Dewdney-Alouette		Central Fraser Valley	
Industry	**1991**	**1981**	**1991**	**1981**	**1991**	**1981**	**1991**	**1981**
Forestry[4]	0.6	0.9	1.2	1.7	3.4	4.7	0.5	0.6
Other Primary[5]	9.3	9.5	4.6	5.3	7.3	7.7	1.9	1.7
Manufacturing[6]	12.7	14.5	14.1	18.4	8.2	11.2	11.1	14.6
Construction	11.5	11.7	9.7	9.6	8.9	9.4	7.2	6.5
TCU	7.3	8.2	9.2	7.9	6.3	5.4	9.0	10.8
Trade	17.5	19.4	18.7	16.4	16.7	16.2	18.7	19.3
FIRE	4.6	4.8	4.7	5.0	3.6	3.9	7.6	7.4
Government	5.7	6.1	6.2	6.9	12.6	13.9	5.1	5.7
Service	30.8	24.8	31.7	28.8	33.0	27.6	38.9	33.4
Total	100%	100%	100%	100%	100%	100%	100%	100%

Key: TCU-Transportation, Communications, Utilities; FIRE-Financial, Insurance, Real Estate.
Source: 1991 and 1981 Census Data, Statistics Canada.

4 Includes forestry and logging activity, but does not include processing and manufacturing.
5 Includes agriculture, mining, fishing and trapping.
6 Includes timber processing and other manufacturing activity.

2.3 Community Setting

In many TSAs in the province, community impacts resulting from timber harvest reductions are readily identified and described. However, in the Fraser TSA, the region's large population and relative economic diversity make forestry impacts less evident. Moreover, the majority of timber processed is sourced from outside the TSA. In 1993, approximately 10 percent of the wood processed by primary manufacturers in the Fraser TSA came from the TSA. For these reasons, incremental reductions in the harvest from the Fraser TSA will not have a significant impact on a region-wide basis[7]. Population growth and overall economic growth are other key forces driving the regional economy and insulating it against long-term declines in the resource sector job base.

However, even in the lower Mainland and Fraser Valley, reductions in the timber supply can lead to discernible impacts in those smaller communities which tend to rely more heavily on the forest industry. They would be 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, Fraser TSA licensees were asked to provide place of residence information for their employees and contractors.[8] The results are presented in Table 2-5.

Table 2-5: Place of Residence of Fraser TSA Licensee Harvesting Employees and Contractors in 1993

Municipality	Percent of Total
Chilliwack	28.5
Hope	24.7
Mission	7.1
Maple Ridge	1.6
Boston Bar	9.5
Kent	10.8
Other	17.8
Total	100.0

7 The exception is J.S Jones' sawmill in Boston Bar. The sawmill, which significantly supports the Boston Bar and North Bend economies, is heavily dependent on timber from the Fraser TSA.

8 This study focuses on the timber harvest of Fraser TSA Forest Licensees. The overall BC forest industry has a large measure of importance throughout the Lower Mainland but it is not the subject of this study. The community impact section of this study is narrower, looking at the towns in the Fraser TSA where its wood flows take on considerable economic importance.

The table refers to harvesting employment only and not processing employment. When Statistics Canada processing employment data is analyzed, Maple Ridge and Mission assume more prominence as communities with significant forest economies.

Based on harvesting and processing employment data, the communities identified in Table 2-5 have been selected for assessment of the community impacts of reductions in the Fraser TSA timber harvest. Selected demographic data for the communities appears in Table 2-6.

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

	Dewdney Alouette		Fraser-Cheam			
	Maple Ridge	Mission	Chilliwack	Kent	Hope	Fraser Canyon
Land Area (square kilometres)	260	225	261	160	5	5 384
Population (1991)	48 422	26 202	49 531	4 322	3 147	4 150
Annual Growth (1986-91)	6.1%	3.6%	3.7%	2.9%	0.7%	1.9%
Percent Change (1986-91)	34.4%	19.2%	19.8%	15.5%	3.3%	10.1%
UIC Claimant Rate[9] (1992)	5.9%	8.3%	6.2%	5.9%	8.6%	n/a
Average Income (1990)	$25 345	$22 521	$22 420	$18 731	$21 132	n/a

Source: British Columbia Central Statistics Branch

Maple Ridge - Maple Ridge is the largest municipality in the Dewdney-Alouette Regional District. Between 1986 and 1991 the population grew 34.4 percent, from 36 023 to 48 422. Of the communities shown in the tables, Maple Ridge has the highest average income and lowest unemployment rate.

In 1991, more than 50 percent of the workforce was employed in the service and trade sectors, while manufacturing was also important, with 13.3 percent. Service sector employment was distributed evenly among education, health, business service, personal service and food, beverage and accommodation employers. Tourism in Maple Ridge is growing but it is largely based on touring (i.e. rubber-tire trade) and sports markets. Camping and day trips to Alouette Lake in Golden Ears Provincial Park has become increasingly popular.

9 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 CEIC's unemployment rate, it is made available at the municipal level.

In 1991, the forest-based workforce was 4.9 percent of the total labour force in Maple Ridge. Although this proportion has declined since 1986, it remains prominent in the economy. Business counts in 1993 indicate that there were 106 logging and forest manufacturing firms in the regional district, many of these in Maple Ridge. Two forest manufacturers are among the five largest employers in the municipality and they are the only private sector firms among the top ten employers.[10]

A 1991 economic development strategy indicated that one of the community's strengths was the recent establishment of several value-added forest manufacturers [District of Maple Ridge 1991]. In 1993 there were an estimated seven wood remanufacturers in Maple Ridge [Canada-British Columbia Partnership Agreement on Forest Resource Development]. District Council in Maple Ridge is actively pursuing a community-type tree farm licence in the vicinity of Blue Mountain just north of town as a way of ensuring a continued timber supply for local industry.

Mission - Mission, with a 1991 population of 26 202, is also a member of the Dewdney-Alouette Regional District. Mission's average income in 1990 of $22 521 was 87 percent of the British Columbia average wage of $25 893. Unemployment in Mission is among the highest in the region.

The service sector accounted for 33 percent of Mission's workforce in 1991. Tourism is a growing force in Mission, but it remains under-developed, as tourism infrastructure, amenities and destination products are largely missing. Current tourism strategies are focusing on enhancing community products and services. The importance of the local natural attributes is understood but featuring them is a lower priority at this time [District of Mission 1993].

In 1991, 16.6 percent of the Mission workforce was in the manufacturing sector. This compares to the provincial average manufacturing sector proportion of 11.2 percent. The vast majority of this manufacturing was forest products based. Eleven of the 14 largest industrial firms in Mission are forest-related companies (i.e. either manufacturers or suppliers). There are nine major wood processors in the area, eight cedar shake and shingle manufacturers and one remanufacturer. Ruskin (immediately west of Mission bordering the Maple Ridge municipal boundary) is home to another seven shake and shingle operations. Altogether, the Mission/Maple Ridge area is home to 54 percent of shake and shingle mills in British Columbia, and 69 percent of total provincial shake and shingle output capacity. The shakes and shingles are largely exported to California where the product has been the subject of several government regulation and legal battles.

10 Interfor Products Ltd. (Hammond) and Fraser Cedar Products Ltd.

Almost 10 percent of the total workforce in Mission is involved in timber processing. When added to the 1.8 percent in the timber harvesting sector, the two forest-related groupings accounted for 11.4 percent of the labour force in Mission. Like most other areas of the province, Mission has experienced a slight decline in the proportion of its workforce employed in the forest industry, but the community nevertheless retains strong ties to the forest industry.

Like Maple Ridge, Mission has targeted growth of the value-added industries as a community economic development priority [District of Mission 1993]. Log home, treated lumber, door, pallet and specialty product manufacturers are now established in Mission.

Chilliwack - In 1991, Chilliwack's population was 49 531, a significant 38 percent increase over 1986. Unemployment in 1992 (6.2 percent) was lower than the British Columbia average. The average income in 1990 was $22 420.

Chilliwack's central location in the upper Fraser Valley has given it a preferred trading position. Thus, the wholesale and retail trade sector, along with the service sector, are important sources of jobs in the community. Also significant to the local economy is the public sector job base. Several provincial ministries, prison facilities and a Canadian Forces Base give Chilliwack a high profile public sector job base.

In 1991, 2.2 percent of Chilliwack's labour force was employed in the primary forest sector. A further 2.5 percent was employed in timber processing. In contrast to Mission and Maple Ridge, where forest employment is dominated by the manufacturing sector, Chilliwack is stronger in the primary sector. Although its growing population tends to reduce the proportion of forestry employment, in absolute terms, Chilliwack has the highest number of timber harvesting workers in the Fraser TSA. In 1991, 530 of the region's 1355 primary forest workers resided in Chilliwack.

Kent - In 1991, Kent's population was 4322. This represented a 15.5 percent growth over the 1986 population of 3741. The community's unemployment rate in 1992 was 5.9 percent, well below the provincial rate of 10.4 percent. Kent's average income ($18 731 in 1990) was only 72 percent of the provincial average income, owing primarily to the prevalence of farming jobs in the community.

Kent's workforce is relatively diversified among the service, government, trade, construction, manufacturing, and primary sectors. However, the area's rural economy has given it a high proportion (18.4 percent) of primary sector employment compared to the province (6.4 percent) and other communities in the region. Farming is responsible for most of this employment, but an important five percent is attributable to forestry. Including another 4.1 percent in timber processing, a total of 9.1 percent of the Kent workforce is involved in forestry.

Kent has very little tourism activity. Most tourism employment is generated by the adjoining Village of Harrison Hot Springs.

Hope - Between 1986 and 1991, Hope's population grew 3.3 percent to 3147. The unemployment rate of 8.6 percent in 1992 was at its highest level in four years. The average income of the community is $21 132, 82 percent of the provincial average.

In 1991 Hope's economy was dominated by the service sector, and particularly by the tourism sector. With its location at the convergence of three major highways, Hope experiences high volumes of highway traffic at all times of the year. Jobs are based on food and accommodations service and depend almost entirely on this transient rubber-tire trade. There are no high profile tourism destination facilities in Hope.

Forestry, especially logging, is a key sector in the local economy. In contrast to the Mission/Maple Ridge area where manufacturing dominates, Hope is reliant on harvesting activity in the Fraser TSA. Logging contributed 8.5 percent of total jobs in the community in 1991. Another 2.5 percent were involved in manufacturing. In all, the forest workforce accounted for 11.0 percent of Hope's total workforce.

Fraser Canyon - The population of the Boston Bar, North Bend and Yale areas (including Census Subdivision A in the Fraser Cheam Regional District) grew by 10.1 percent between 1986 and 1991, from 3768 to 4150.

In 1991, the economy was highly dependent on the service sector, of which tourism was the major contributor. The profile of the tourism industry in the area is almost identical to that of Hope. Almost all business is based on transient highway traffic, although there are some short-stay destination attractions. The primary (e.g. logging, agriculture, mining, and fishing and trapping), construction, transportation, and trade sectors are also important to the local economy.

Of all communities in the region, those in the Fraser Canyon are the most reliant on primary forest jobs, most of which derive from timber harvests in the Fraser TSA. In 1991, 9.4 percent of the workforce was involved in harvesting activities. Another 3.3 percent was in timber processing. In total, 12.7 percent of its workforce is in the forest sector. This is the highest proportion amongst all communities in the region. J.S. Jones' sawmill at Boston Bar is the major processing facility in the area. Unlike sawmills in the lower mainland, this sawmill is highly dependent on timber from the Fraser TSA.

Social Profile

Table 2-7 shows key health indicators for Dewdney-Alouette and Fraser-Cheam Regional Districts. The two regional districts contain all six of the communities identified in Table 2-5 for assessment of community impacts of reductions in Fraser TSA harvests. Generally, the health indicators (mortality rates and teen birth rates) suggest no dramatic differences between these districts and provincial averages, with the exception of Fraser-Cheam's high level of teen births. These districts also have a slightly lower number of physicians per capita than the British Columbia average.

Table 2-7: Health Indicators

	Dewdney-Alouette	Fraser-Cheam	British Columbia
Mortality Rates[11] - per 1 000 pop'n:			
All Causes - Both Sexes	60.0	54.6	55.2
Accidental Causes - Males	5.1	5.8	5.5
Infant Mortality Rate[12]- per 1 000 pop'n	7.7	6.3	8.0
Teen (15-19) Birth Rate[13]	23.5	30.1	22.6
General Practitioners - per 10 000 pop'n	7.3	7.7	8.9

Source: BC Stats

Table 2-8 shows low birth weight rates and potential years of life lost (PYLL) by the Local Health Area (LHA) of the respective communities. Both of these statistics are indicators of the health of a community as it relates to long-term ability to develop human resources [British Columbia Ministry of Health 1992]. Low birth weights 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. A PYLL greater than 1 is indicative of premature mortality and the resulting loss of potential social and economic productivity.

Table 2-9 shows crime and social assistance data for Dewdney-Alouette and Fraser-Cheam. Crime indicators show the two regional districts to be at or below provincial averages. However, in Dewdney-Alouette crimes against property are growing at a high rate. On the other hand, crime rates in Fraser-Cheam are either growing very slowly or declining.

11 5 year average to 1989. LHA age standardized rates by sex, weighted by the 1989 male and female populations in the LHA.

12 4 year average to 1989.

13 4 year average to 1989.

Table 2-8: Low Birth Weight Rate and Potential Years of Life Lost Index, 1987-1991 and 1992

	Low Birth Weight Rate[14]		Potential Years of Life Lost Index[15]	
	1987-1991	1992	1987-1991	1992
Maple Ridge	43.0	32.3	0.88	0.77
Mission	49.5	35.3	1.27	1.23
Kent	38.7	35.3	1.65	0.93
Chilliwack	43.6	40.1	0.96	1.06
Hope, Boston Bar	63.5	36.4	1.85	2.72
British Columbia	50.1	47.5	1.00	1.00

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

Table 2-9: Social Profile Indicators

	Dewdney Alouette	Fraser-Cheam	British Columbia
Criminal Offences per 1,000 pop'n - 1991:			
Against Persons (5 year change)	14 (2.4%)	15 (0.4%)	15 (14.2%)
Against Property (5 year change)	86 (9.8%)	82 (-12.7%)	103 (8.6%)
Long-term (>1 yr) Social Assistance Caseload - June 1991 (as % of total)	46.0%	47.7%	29.7%
% of Households on Social Assistance - June 1991	10.2%	12.6%	10.7%
% of Children (<19) on Social Assistance - June 1991	9.7%	12.5%	10.3%

Source: BC Stats

Short-term social assistance measures show the two regional districts to be close to provincial averages, although Fraser-Cheam does have moderately higher levels of dependency. Long-term measures tell a different story, however, as both regional districts have twice the provincial rate of social assistance caseloads. The chronic reliance on social assistance can have a negative impact on the social well-being of a community in the long-run.

14 Number of babies with a birth weight less than 2,500 grams, per 1000 live births in the Local Health Area in which listed communities are found.

15 PYLL Index = Observed PYLL/Expected PYLL

The indicators in Table 2-10 help to describe a community's ability to satisfy basic needs and cope with economic and social change. Generally, as one moves east up the Fraser Valley, social indicators tend to worsen. Education levels are lower and the percentage of low income families (with the exception of Hope) is higher.

Table 2-10: Incidence of Low Income Families and Population With a Minimum Grade 9 Education

	Incidence of Low Income Families[16]	Population With a Minimum Grade 9 Education
Maple Ridge	8.1%	93.0%
Mission	12.4%	91.2%
Kent	10.3%	87.7%
Chilliwack	12.5%	88.9%
Hope	8.6%	87.9%
Fraser Canyon (Area A)	13.4%	87.4%
British Columbia	12.1%	91.3%

Source: Statistics Canada

2.4 Aboriginal Community

Aboriginal Organizations

The Fraser TSA has the largest number of First Nations communities of any TSA in British Columbia. Thirty-four bands have reserve lands in the area, primarily along the Fraser River. However, the entire Fraser TSA is part of the traditional territory of 35 First Nations. The largest part of the area is the traditional territory of the Sto:lo Nation. The Sto:lo Nation consists of 24 bands and two tribal organizations, Sto:lo Nation Canada and Sto:lo Tribal Council. The Nlaka'pamux Nation Tribal Council centred in Lytton has traditional territory extending down the Fraser Canyon to the international border. The In-SHUCK-ch have traditional territory at the north end of Harrison Lake. The Squamish Nation, Musqueam, Tsawwassen, Semiahmoo, Burrard, Katzie and Coquitlam Bands all have traditional territory in Greater Vancouver. Membership and population data for these organizations are shown in Appendix 6.

Employment

In 1991, the unemployment rate for aboriginal people in British Columbia was 27.8 percent. The unemployment rate in the lower mainland and Fraser Valley was

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

slightly higher at 29 percent, in spite of better job opportunities [Employment and Immigration Canada, December 1991]. Discussions with tribal council representatives indicated unemployment levels as high as 80 percent on some reserves.

Unemployment among aboriginal people is consistently higher than for the population as a whole. In 1991, 9.9 percent of the provincial population was unemployed. Lower education levels, which may confine aboriginal people to low-paying, low-skilled 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 mainstream Canadian society.

Employment among aboriginal people in British Columbia 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 British Columbia are more dependent on forestry and wood manufacturing than is the overall population [Employment and Immigration Canada, December 1991]. This dependency is most evident in the Fraser Valley. In 1986, 20 percent of the aboriginal labour force in the Fraser Valley and 14 percent in the lower mainland had jobs in the primary and manufacturing sectors, in which forest activities dominated. Our discussions with Employment and Immigration Canada indicated that the as yet unreleased Aboriginal Peoples Survey labour force figures for 1991 will show that these proportions have not changed.

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, particularly in the Fraser Valley. However, there are some general economic development initiatives taking place among the various councils and bands.

In general, the focus of employment development has been primarily on fishing together with land development, mining, agriculture, aggregates and public administration. The Alliance Tribal Council's recent major economic development initiative has involved establishing the Coast Salish Aboriginal Capital Corporation. The Sto:lo Tribal Council is developing a comprehensive economic development strategy for its band membership. Tourism is seen as one of the hopeful prospects for the future and several bands have projects at the planning stages. Many communities are exploring forestry opportunities in harvesting, sawmilling, silviculture, remanufacturing and log homes as means for economic development and employment.

Aboriginal Forestry Activity

The forests hold an important economic and social position for aboriginal peoples in the Fraser TSA. Traditional uses of forest resources, including fishing, hunting, berry picking and the use of cedar for ceremonial purposes, continue to be important. The forests also contain spiritual sites important to aboriginal culture. Aboriginal peoples are also involved or becoming involved in a variety of economic activities including harvesting, milling, silviculture and clean-up of forest operations under a variety of commercial arrangements. The following is not a complete list but illustrates some examples of the current initiatives related to this:

- A new forest licence for the Fraser TSA will be awarded this year with seven of the eight proposals including aboriginal involvement to some degree. Examples include J.S. Jones' Forest Licence joint venture proposal with the Nlaka'pamux Nation and Interfor's proposal with the Ohamil Band. This is illustrative of the growing interest of the established forest industry to consider joint ventures with First Nations.

- There is increasing interest in the Woodlot Program but no licences have been awarded to date.

- Many bands are involved with on-reserve harvesting and silviculture. The Ministry of Forests has programs that include silviculture training through the Forest Worker Development Program.

- The Katzie, Boothroyd, Chehalis, Spuzzum Bands and the In-SHUCK-ch are engaged in silviculture contracting. For example, the Boothroyd band's economic development corporation has undertaken silviculture contracts since 1990 which has provided steady work from the spring through the fall for up to 20 people.

- Interfor employs a creek cleaning crew from the Ohamil Band.

- The Sto:lo Nation has submitted an application for a Native Unit Crew for fire fighting which would involve 20 fire fighters.

- Many First Nations people are employed by local contract companies and mills. For example: the J.S. Jones operation in Boston Bar has 16 aboriginal people (most from the Boston Bar band) on its mill payroll and 25 band members are also employed in harvesting; a number of Chehalis members are employed by forestry companies in harvest operations in the Harrison area; and, the Skwah Band engages in contract logging for Scott Paper.

Agro-forestry is assuming a higher profile although it is much less important as an economic sector than timber harvesting. The most widely known agro-forestry activity is mushroom harvesting. The Nahatlatch drainage, west of Boston Bar, is the main picking

area in the Fraser TSA. Many teenage and adult members of the Nlaka'pamux Nation harvest the Pine mushrooms.

General Concerns

Access to a secure timber supply is a key issue to many First Nations as a means of economic and employment development. Several bands in the Fraser TSA have applied for Forest Licences and Woodlot Licences and have a growing interest in the SBFEP. Both the Intertribal Forestry Association of British Columbia and the First Nations Forestry Council are addressing this issue by exploring new forms of native tenure and means to access a wood supply through existing tenure systems via joint ventures.

Another area of concern is the impact of logging on water and fishery resources, heritage resources and spiritual and ceremonial sites in First Nation traditional territory. Specific concerns have focused on these impacts and the lack of aboriginal involvement in planning and employment opportunities. For example, an Integrated Resource Management Plan (IRMP) was initiated as a result of concerns raised by the Boothroyd Band related to the impacts of harvesting activities on Pine mushrooms and heritage/archaeological sites in the Nahatlatch Valley. Similarly, there is growing concern about the impacts of harvesting activity on fisheries values and cultural/heritage resources in the Chilliwack Valley by the Sto:lo Nation. These issues will be addressed in an Integrated Resources Management Planning (IRMP) process for the Chilliwack Valley.

To address impacts on heritage resources, the District Office has undertaken two heritage resource overviews to inventory and document traditional resource values in conjunction with the Nahatlatch IRMP and the Protected Area Strategy study of Pinecone Lake - Burke Mountain. Further inventories are required for other parts of the TSA.

Cooperative planning processes, inventory of heritage resource, involvement in the review of 5 year development plans and encouraging economic development opportunities are ways that the District Office is dealing with these issues. Increased participation in all aspects of forestry is an essential part of building resource management skills in First Nation communities.

Land Claims

Aboriginal land claims in British Columbia are handled by the British Columbia Treaty Commission. 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 notices of intent to negotiate land claims from aboriginal groups. The filing is the first step in a six-stage process designed to settle long-standing land claims and related issues in British Columbia where few treaties have been signed with First Nations. There is no timetable for concluding the negotiations process.

To date, 37 notices of intent to negotiate have been filed. At least four, and possibly five, of these claims overlap the Fraser TSA boundaries[17]. Only a few claimants have prepared maps of their traditional territories. Other claims are forthcoming, including several from aboriginal groups in the Fraser Valley[18]. Eventually, most, if not all, of the Fraser TSA is expected to be claimed as traditional territory. Settlement of these claims could have a major impact on forestry but is a necessary step to establish stability for aboriginal and non-aboriginal participation in the industry.

2.5 The Forest Industry

The forest industry has been a dominant force in the British Columbia economy since European settlement began in the nineteenth century. Forest based economic activity is not as visible in the lower mainland as it is in Fraser Valley/Canyon communities with a high level of dependency on forestry, but the contributions to the regional economic base are important. While many forest jobs are in the visible logging and manufacturing sectors, less evident are the significant number of jobs generated in the administrative, marketing, log-handling and forest service sectors, most of which accrue to the Vancouver economy. In addition, forest sector spending supports sizable portion of the maintenance, supply, engineering, technology, communication, utility, transportation and construction sectors in the region.[19]

Fraser TSA Activity

The currently approved Allowable Annual Cut (AAC) in the Fraser TSA is 1.765 million m^3. The established licensees in the Fraser TSA appear in Appendix 5. J.S. Jones Holdings Ltd. is the largest licensee with 27.2 percent of the total available AAC, while the Small Business Forest Enterprise Program (SBFEP) has the second largest allocation at 20 percent. International Forest Products, Pretty's Timber, and Cattermole Timber also have significant harvests. There are approximately 45 registrants in the SBFEP with the Ministry of Forests District Office in Chilliwack.

Licensees

J.S. Jones Holdings Ltd. - J.S. Jones is based in Surrey. Its operations date back to 1946 when it established a shingle manufacturing facility near Vancouver. In 1978, two companies, Stag Timber and MJS Lumber Limited, both specialty manufacturing facilities, were created in Surrey. In early 1993, the company purchased Fletcher Challenge's

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17 Musqueam Nation (Vancouver), Squamish Nation (North Vancouver), Tsawwassen First Nation (Delta), In-Shuck-Ch (Harrison Hot Springs), and Xaxli'P Nation (Lillooet).

18 Sto:Lo Nation (Chilliwack), Nlaka'pamux Nation (Lytton), Burrard Band (North Vancouver), and Katzie Band (Coquitlam).

19 Except for employment estimates directly furnished by licensees, we have not included value-added remanufacturing employment in this study. Most value-added producers source wood supply from primary producers whose log supplies are from areas outside the Fraser TSA and can use substitute materials (including imports). Therefore we have assumed that their employment levels would not be a direct function of the Fraser TSA AAC.

Boston Bar sawmill along with Forest Licence A 19201 in the Fraser TSA and A 18699 in the Lillooet TSA.

Today, J.S. Jones operates three mills in the region:

- J.S. Jones Timber Ltd. - sawmill in Boston Bar specializing in lumber for Asian, Pacific Rim and European markets
- Teal Cedar Products (1972) Ltd. - shingle mill in Surrey
- Stag Timber Ltd. - sawmill in Surrey

Total employment with the company is 424, including 194 harvesting personnel in the Fraser TSA. Harvesting operations are located in the Pitt River drainage (where the company's only logging camp in the TSA is located) and the Fraser Canyon area (including the Nahatlatch River, Ainslie Creek, Scuzzy Creek, East Anderson River and Mowhokam Creek drainages).

In 1993, approximately 75 percent of J.S. Jones' Fraser TSA harvest stayed within the region for processing, primarily at the company's own facilities. The remaining 25 percent is mostly pulp logs destined for coastal pulp mills.

The economic base of the Fraser Canyon is tied very closely to the operations of J.S. Jones. Almost half of all of the company's harvesting personnel live in the area, in addition to the majority of the 181 Boston Bar sawmill employees. In light of the tourism decline precipitated by the opening of the Coquihalla Highway, forestry is the critical sector in the economy and J.S. Jones the major employer.

J.S. Jones has a significant aboriginal workforce in the Fraser Canyon area - up to 25 in harvesting and another 16 in the sawmill. There are four aboriginal contractors providing bush crews to the company at any one time. Jones also actively solicits bids from aboriginal silviculture contractors. Additionally, the firm has submitted a Forest Licence application to the Ministry of Forests that is a joint venture with bands of the Nlaka 'pamux Nation.

International Forest Products Limited - Interfor is a major industry operator in the Fraser TSA, in terms of harvesting and processing. Interfor was formed in 1988 to replace Whonnock Industries Ltd., which had been active in the TSA since the 1950s. The company has seven manufacturing facilities in the region, most of which were either built or purchased from other companies in the 1970s and 1980s. These include:

- Mackenzie Seizai - sawmill in Surrey specializing in Japanese dimension lumber
- MacDonald Cedar - sawmill in Langley
- Hammond Cedar - sawmill in Maple Ridge
- Bay Forest - sawmill in Pitt Meadows
- Western Whitewood - sawmill in New Westminster
- Fraser Mills - sawmill in Coquitlam

- Westminster Wood - remanufacturing plant in Surrey

Employment at these facilities is 1251. Harvesting employment in the Fraser TSA is a further 88. Head office employment in Vancouver accounts for a further 70 personnel (head office employment is attributable to all coastal operations and not just the Fraser TSA). Harvesting operations are spread throughout the TSA with concentrations in Big Silver Creek (Harrison Lake) and Spuzzum/Emory Creek (north of Hope). There are smaller operations in the Silver Skagit drainage and Sumas Mountain west of Chilliwack. Eighty percent of harvesting employees live in Hope and the remaining 20 percent in Chilliwack. Interfor currently employs five aboriginal people in Hope: two loggers, two in the booming crew at the dry land sort in Hope, and one part-time engineering student. Like J.S. Jones, Interfor has submitted, in cooperation with the Ohamil Band, a joint venture Forest Licence application to the Ministry of Forests.

Interfor processes 74 percent of its Fraser TSA harvest in its lower mainland mills. Another 15 percent is sold to other processing facilities in the region. The remaining 11 percent goes to Fletcher Challenge pulp mills at Crofton and Elk Falls.

Communities in the Greater Vancouver and Dewdney-Allouette Regional Districts benefit significantly from manufacturing employment generated by Interfor mills. In 1992, the impacts of a shrinking log supply were felt in the Dewdney-Alouette, as Interfor closed its Pioneer Lumber sawmill in Whonnock, laying off 99 employees. This shutdown alone represented a five percent reduction in the forest manufacturing workforce in this regional district. Interfor's harvesting activity tends to benefit communities further up the Fraser Valley, particularly Hope and Chilliwack where the majority of employment and harvest related company expenditures are made.

Pretty's Timber Company Limited - Pretty's Timber has one of the longest histories of any licensee in the TSA today. The Pretty family has lived and been involved in the forest industry in the Fraser Valley since the turn of the century. It became active in the Harrison Lake area in the 1940s and 1950s, when Ivan Pretty established Pretty's Timber at 20 Mile/Bear Creek.

Pretty's is classified as a market logger - it does not own any major processing facilities but instead sells its harvest through a variety of channels to other companies. The company is active in the Harrison Lake and Coquihalla areas (Ladner and Sowaqua Creek drainages) of the Fraser TSA. The approximately 120 employees reside primarily in Chilliwack, Kent and Hope. The company does not operate any logging camps in the TSA. It employs 15 aboriginal people, many from the Chehalis band, in its Harrison Lake operations.

Pretty's operates three small scale salvage mills at Bear Creek employing five. There are plans to establish a similar facility in Hope in the near future. The mills process low grade timber into a variety of products for value-added production.

Because of its position as a market logger, the company does not always know the ultimate destination of its wood. Based on recent years' sales activity, however, approximately 75 percent of the timber harvested is processed in the region, primarily as lumber, and secondarily as pulp chips and plywood. In 1993, the major buyer of this wood was Interfor. The remaining 25 percent of Pretty's total TSA harvest was processed outside the region at coastal pulp mills.

Cattermole Timber - Cattermole Timber has an extensive history in the Fraser TSA dating back to the 1940s. Cattermole became very active in the 1950s forming various partnerships, purchasing quota in the Chilliwack River area and logging in the Stokke Creek area of Harrison Lake. By 1980, the company was a fully integrated forest company with three major sawmill/pulp mill facilities in northern British Columbia and logging operations on the Chilliwack and Anderson Rivers. In the mid 1980s, Cattermole Timber had sold its manufacturing assets and concentrated on harvesting.

Like Pretty's, Cattermole is a market logger. Today, its harvesting operations are located in the Nahatlatch and Anderson River drainages. The company employs approximately 146 in harvesting operations and another 11 in administration. It operates a 75 person logging camp approximately 52 kilometres from North Bend up the Nahatlatch River. Another logging camp is located in the Anderson River drainage. The majority of workers live in Chilliwack and Hope, with the remainder dispersed among other lower mainland communities. Cattermole employs eight aboriginal workers.

Approximately 23 percent of Cattermole's timber volume is estimated to remain in the region for processing, mostly as lumber and plywood. The remaining 77 percent is processed as either lumber or pulp and paper elsewhere in the province.

Canadian Forest Products Limited - Canadian Forest Products (CFP) is a long standing operator in the Fraser TSA. Operations date to 1943 when the company purchased the Chehalis operation from Vedder Logging. Today, CFP is an integrated forest company with three manufacturing facilities in the region, including:

- Eburne - sawmill in Vancouver
- Westcoast Cellufiber Industries (WCI) - sawmill and chipper in Vancouver
- Panel and Fibre - panel plant in New Westminster

Employment at these facilities, including administrative personnel, is 547. Harvesting employment in the Fraser TSA is 83. Harvesting operations are concentrated in the Chehalis/Norrish area of the TSA. Forty percent of harvesting employees reside in the Agassiz area, 23 percent in Chilliwack, 18 percent in Mission, 13 percent in Abbotsford, and the remaining five percent in other areas of the Fraser Valley. CFP employs 17 aboriginal people, most of whom are from the nearby Chehalis band.

The company processes most of its timber harvest in the region as lumber. The rest goes to its Howe Sound pulp mill for processing.

Pacific Forest Products Limited - Pacific Forest Products is the successor of Canadian Pacific Forest Products. The company is an integrated forest manufacturer, but does not have processing facilities in the TSA. It employs 15 harvesting personnel, most living in Chilliwack and Hope.

Approximately 75 percent of the company's timber leaves the region for processing as lumber and pulp and paper. The remaining volume stays in the region for processing as lumber and plywood.

Other Licensees - Another 14 licensees hold either Forest Licences or Timber Sale Licences whose combined AAC is approximately 100 000 m^3. There is also a non-replaceable Forest Licence for the harvesting of deciduous species for 65 000 m^3. Harvesting operations for these operators are spread throughout the Fraser Valley, with concentrations in the Chilliwack, Sardis, Mission and Hope areas.

Small Business Forest Enterprise Program (SBFEP) - The British Columbia 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 in the forest industry. In the Fraser TSA, the AAC of the SBFEP has grown gradually over the years to its current level of 353 835 m^3. The program has the second largest allocation in the TSA. Approximately 46 registered small business operators bid for the Timber Sale Licences sold by the program. Many of these operators also serve as contractors to larger licensees. Approximately 180 people are directly employed annually harvesting timber through the program.

Of the 353 835 m^3 apportioned to the SBFEP annually, approximately 80 000 m^3 to 100 000 m^3 is sold as bid proposals. These sales are awarded to the bidder who proposes the most value added to each cubic meter of timber. In the Fraser TSA, these sales are producing products such as log homes, spindles, stair railings, mouldings and window and door stock.

Other Harvests - There are area based tenure harvests in or adjacent to the TSA which also contribute to local industry and the economy but which are not the focus of in this study. The District of Mission and Scott Paper hold Tree Farm Licenses. In 1993, the Tree Farm Licence harvest was 60 153 m^3. Other 1993 harvests included: the Greater Vancouver Water District harvest was 47 197 m^3; the Timber Licence harvest was 81 970 m^3; and the private wood harvest was 296 994 m^3. The combined area-based tenure harvest was 486 314 m^3.

2.6 Environmental Setting

Physiographic Description

The Fraser TSA closely corresponds to the watershed of the Lower Fraser River Basin. There are three physiographic units that shape this area: the Coast Mountains that border the region on the north and east with various tributaries and lakes that drain into the

Fraser River; the Fraser Lowland, a broad plain of riverine and glacial deposits that extends east from Vancouver to the community of Hope; and, the Fraser Estuary that covers the delta and tidal waters surrounding the outlet of the Fraser River.

Biogeoclimatic Zones

The Fraser Lowland and Estuary almost all lie within the Coastal Western Hemlock (CWH) zone - by far the largest of the three major biogeoclimatic systems in the Basin. This zone occupies elevations from sea level to approximately 3000 feet, is the wettest in British Columbia 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 greatest diversity of vertebrates of any of the zones and the greatest diversity of birds, amphibians, and reptiles in British Columbia is found within the Fraser Lowland portion [Ministry of Forests, 1991].

At elevations between 3000 and 7400 feet, lies the Mountain Hemlock zone. This zone is characterized by short, cool summers and long, cool, wet winters, experiencing 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 is not nearly as extensive as in the CWH zone. There are probably no reptiles and only a few species of amphibians present [Ministry of Forests, 1993].

In areas above 7400 feet lies the Alpine Tundra (AT) zone. This harsh alpine climate is cold, windy, snowy, and the growing season is short. The alpine zone is, by definition, treeless, but some species common at lower elevations are found in stunted form. Wildlife diversity and density are low, although this zone can provide summer range.

In addition to the three major biogeoclimatic zones, there are two others with minor occurrences in the Fraser TSA. The Interior Douglas-fir zone (IDF) is evident on the lee side of the Coast Mountains below the CWH zone. In the Fraser TSA the IDF begins just west of Manning Park. The Engelmann Spruce-Subalpine Fir zone (ESSF) is also represented in the eastern portion of the TSA, just below the AT zone. With five biogeoclimatic zones and 13 commercial tree species, the TSA is one of the most biologically diverse regions in the province.

Wildlife

Despite the extent of urban and rural development and resource-use activities, the TSA contains one of the richest and most diverse arrays of wildlife in Canada. More than 300 species of migratory and resident birds, 45 species of mammals, 11 species of amphibians and 5 species of reptiles range throughout the area [Environment Canada, 1992].

The population of birds includes loons, grebes, cormorants, geese, dabblers, divers, mergansers, raptors, herons, coots, shorebirds, gulls and passerines. The estuary portion of the TSA supports the highest density of wintering waterfowl, shorebirds and raptors in

Canada. During peak migration periods, populations of both migratory and resident birds can reach 1.4 million [Environment Canada, 1992]. In mountain areas, Ruffed and Blue Grouse and raptors, including eagles and hawks and owls can be found. Population information on these species is not readily available.

Native mammals in the TSA include species such as the mule and black-tailed deer, moose, elk, mountain goats, black and grizzly bear, wolf, coyote, bobcat, cougar, muskrat, marmots, river otter, beaver, marten, and other fur bearing species. Population estimates are incomplete.

Population estimates for many of the non-game species and all species of reptiles and amphibians inhabiting the TSA are non-existent; however, those considered threatened are included in Table 2-11 together with other species. This table shows an annotated list of vertebrate species in the study area that are of management concern.

Table 2-11: Species of Management Concern in the Fraser TSA

S1[20] and S2[21] Rank	S3[22] Rank	
Cultus Lake Sculpin	American Peregrine Falcon	Townsend's Big-Eared Bat
Keen's Long-Eared Myotis	Bald Eagle	Trowbridge's Shrew
Mountain Beaver	Brassy Minnow	Turkey Vulture
Pacific Giant Salamander	Grizzly Bear	Western Screech-Owl
Pacific Water Shrew	Marbled Murrelet	White Sturgeon
Pygmy Longfin Smelt	Rubber Boa	Williamson's Sapsucker
Southern Red Bat	Sandhill Crane	
Spotted Owl	Tailed Frog	

Source: British Columbia Conservation Data Centre, Ministry of the Environment, January 6, 1994.

The Northern Spotted Owl has the highest profile of the species of management concern and is recognized as nationally endangered by the Committee on the Status of Endangered Wildlife in Canada. 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. The owl's habitat is mainly comprised of large contiguous tracts of old growth forest and is distributed from British Columbia's southwest mainland to California.

The British Columbia population may be considered peripheral but remains important to the survival of the species [Canadian SORT 1994]. The Ministry of Environment has recorded 69 adult owls at 39 sites in southwestern British Columbia. The U.S. Department of the interior has inventoried pairs at 3602 sites and single owls at

20 Critically imperilled on a provincial scale because of extreme rarity.
21 Imperilled because of rarity.
22 Rare or uncommon; may be susceptible to large scale disturbances.

approximately 1000 sites, a total of about 7200 owls. The actual population is larger in both cases because population surveys of the bird's known range are not complete.

In the U.S., where a long-standing, high profile debate culminated in a 1993 Presidential Summit in Portland, the debate 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 a threat to the species' sustainability, so in British Columbia the Ministries of Environment and Forests have implemented an Interim Conservation Strategy to ensure known spotted owl habitat is protected. Various parties are researching biological, economic and regulatory issues to develop a long term management strategy for sustaining the species in B.C.

Fisheries

At least 87 species of resident, semi-resident and migratory finfish and shellfish inhabit the rivers, streams and lakes of the Lower Fraser Valley Basin. The lower Fraser River is a corridor for the commercially valuable salmonid species of chum, pink and sockeye. Chinook and coho are often not targeted for commercial catch because of low numbers. In an average year 800 million juvenile salmonids migrate seaward through the lower Fraser River and annual salmon returns average 24 million fish [Environment Canada 1992]. The lower Fraser River provides escapements for more than 50 percent of the total of all salmon in the entire Fraser River watershed. Virtually 100 percent of the Fraser River chum spawn downstream of Hope. Approximately 75 percent of the Fraser River Coho stocks spawn below Hope [Environment Canada, 1992]. The Fraser is also important for the rearing of chinook. Degraded water quality or habitat in the Basin negatively affects a major proportion of the salmon fishery.

There are at least 16 species of finfish other than salmonids that inhabit either the freshwater or marine aquatic environment. These include northern squawfish, longfin smelts, longnose dace, three-spined stickleback, peamouth chub, suckers, redside shiners, lampreys, brassy minnow, sculpins, dogfish, eulachons, herring, Pacific cod, and sturgeon. Fish of recreational value include coho, pink, chinook, sockeye, steelhead and rainbow trout, resident cutthroat, sea run cutthroat, Dolly Varden, eastern brook trout, lake trout, kokanee, black crappie, brown bullhead, carp, whitefish, crayfish, white sturgeon and Atlantic salmon.

Qualitative assessments of fish habitats have been made for 96 streams in the six areas of the Lower Fraser River Basin. Forest harvesting in three of the areas, Chilliwack River, Harrison River and Hope to Mission, was cited as having moderate to severe impacts on the productivity of the streams [Environment Canada, 1992]. Log storage has also been noted to have an effect on fish habitat and water quality where 970 hectares of surface has been used for log booms in the lower Fraser [Environment Canada, 1992].

Initiatives are taking place to respond to fisheries concerns. In order to safeguard fisheries habitat, consideration was given in the Fraser TSA Timber Supply Review to the

importance of riparian habitat and streamside buffers alongside fish bearing streams. The Ministry of Forests is party to the Fraser River Estuary Management Program and the Coastal Fish/Forestry Guidelines, both of which are ongoing processes aimed at preserving and safeguarding fisheries habitat.

Agro-Forestry

The Fraser TSA is one of several British Columbia regions where the Pine mushroom is commercially harvested. Mushroom harvesting is unregulated and recently attracted the attention of the mainstream media because of the high prices for the No.1 grade product. In the U.S., several land use conflicts have been associated with the industry [McRae, 1993] but the British Columbia industry has been spared these confrontations. The high prices and media attention has attracted more pickers into the industry.

The past two seasons have been poor for mushrooms in the TSA. Industry representatives say that the area was the best British Columbia producing region in 1991. In 1991, 30 to 40 tons are estimated to have been harvested in the TSA. Other good local harvest years included 1990 and 1987.

The 1993 and 1992 harvests in British Columbia 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 2-12.

Table 2-12: 1993 Pine Mushroom Average Prices

Grade	Price per Pound	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 mushroom harvest benefits the economy of the Boston Bar-North Bend-Lillooet area and is important for two reasons. The season stretches over a three to four month period but intense harvesting occurs within a three to four week window. The timing of this peak depends on the weather, but it usually occurs between September and October. There is no official tally of pickers and their numbers balloon during the peak period. In a productive harvest year, an estimated 1000 pickers will comb the rugged terrain of the TSA during the peak season. Half of the pickers will be local residents. The other half are pickers who follow the mushroom harvest southward. Buyers make cash payments so local residents have a seasonal opportunity to supplement their regular incomes. Local merchants also gain a seasonal opportunity because the non-resident pickers purchase food, and other supplies in the local area. The small size of its service sector limits the impact on Boston Bar. Almost all of the non-resident pickers camp near harvest areas. Non-resident buyers use local hotel and motel accommodation. This economic opportunity fluctuates from year to year with the harvest.

Many aboriginal residents of the area participate in harvesting. Because of the few local employment opportunities, the cash from mushrooms has become an important part of their income.

The Ministry of Forests is leading a research process into the regulatory needs of pine mushroom harvesting as well as other botanical forest 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]. The Ministry separates these into two broad categories; special forest products, regulated under the Forest Act and unregulated products. Except for Pine mushrooms the Fraser TSA is not prominent for the commercial harvesting of these products.

Outdoor Recreation[23]

The Fraser TSA is unique to British Columbia in that there are an unusually large number of residents and visitors who use its public forests for both active leisure pursuits, such as hiking, and passive leisure pursuits, such as enjoying the 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 2-13 shows Greater Vancouver Regional District participation rates for outdoor recreation activities of prime interest to this study.

[23] 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.

2-13: Outdoor Recreation Percentage Rates of Participation

	(1993)	(1991)	(1989)	(1983)
Day hiking	40.7%	57.0%	49.0%	44.0%
Overnight backpacking	13.7	19.0	18.0	19.0
Camping Trip	44.9	48.0	42.0	-
Fishing	29.8-23.6	37.0	36.0	37.0
Hunting	6.6	5.0	6.0	-
Canoeing	24.1	16.0	17.0	-
Cross-country skiing	16.1	14.0	14.0	14.0
Downhill skiing	32.4	21.0	29.0	22.0
Snowmobiling	2.9	6.0	4.0	-
Going to the beach	83.4	82.0	83.0	-
Outdoor swimming	59.4	60.0	63.0	-
Driving for pleasure	75.2	-	-	69.0
Walking for pleasure	91.6	-	-	-

Sources: Greater Vancouver Regional District and British Columbia Parks

Overall, the figures indicate steady levels of participation in outdoor recreation. This participation rate stability translates into increased levels of use as population increases. The key demographic changes occurring in the lower mainland over the past decade were described in Section 2.2. These changes are not expected to abate until at least the early years of the next century. The projected population increases will place pressure on the existing supply of outdoor recreation opportunities. Other factors, including demographic changes, need to be considered as well.

Demographic factors influence recreation suppliers to market their products to significant population sub-groups. One of the most interesting demographic factors is the aging of the population. Table 2-14 shows participation rates by age in the Greater Vancouver Regional District. The implication for regional outdoor recreation is an overall lower demand for many outdoor activities as the population ages and participation rates decline.

Table 2-14: Greater Vancouver Regional District 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: Greater Vancouver Regional District 1993.

Similar declines in participation were noted in the 1991 British Columbia 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. For example, frequency of participation is not available for the tables above. 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 if only participation rates are analyzed.

Park Visitorship Trends

There are major parks in the lower mainland (including Cypress, Mount Seymour and Golden Ears Provincial Parks) which offer outdoor experiences and are primarily visited by resident recreationists. The visitation trends and levels appearing in Table 2-15 provide an indicator of demand within the region.

The biggest increases in activity have taken place at Golden Ears. As the population centre of the lower mainland gradually shifts eastward, similar increases in use can be expected for park facilities farther up the Fraser Valley. Overall, the growth in attendance of 16 percent was in the same range as the population increase for the lower mainland.

Table 2-16 shows usage trends at the 55 Ministry of Forests recreation sites in the Fraser TSA. The Ministry also maintains 12 hiking trails. Overall, there was a six percent annual growth in usage during the 1985-1992 period. The table shows groups of recreation sites by geographic area. The most westerly site is popular Widgeon Creek where recreationists rent canoes at Grant Narrows, paddle across the Pitt River to the site where they can hike up a Ministry maintained trail to Widgeon Falls and Lake. The other sites are in the upper Fraser Valley and Canyon areas. The Harrison and Chilliwack Valley

Table 2-15: Visitation at Lower Mainland Provincial Parks (millions of visitor days)

	1992	1991	1990	1989	1988	1987
Chilliwack Lake (day use)	.014	.012	.016	.016	.013	.013
Chilliwack Lake (campground)	.005	.004	.004	.004	.004	.005
Cultus (day use)	.306	.285	.300	.299	.311	.298
Cultus (campground)	.052	.046	.046	.046	.045	.048
Cypress (day use)	1.146	1.004	1.101	1.173	1.347	0.964
Garibaldi (day use)	.025	.022	.020	.020	.018	.025
Garibaldi (campground)	.003	.003	.003	.004	.003	.004
Golden Ears (day use)	.441	.350	.403	.342	.351	.339
Golden Ears (campground)	.112	.094	.094	.091	.081	.090
Manning (day use)	.435	.421	.447	.426	.355	.369
Manning (campground)	.043	.040	.039	.041	.041	.040
Mount Seymour (day use)	.651	.562	.576	.520	.568	.548
Sasquatch (day use)	.070	.067	.060	.063	.082	.041
Sasquatch (campground)	.018	.016	.016	.016	.016	.016

Source: British Columbia Parks.

Table 2-16: Visitation at Ministry of Forests Recreation Sites (visitor days)

Year	TSA Total	Chehalis	Chilli-wack Valley	Harrison	Nahat-latch	Silver Skagit	Lost Creek/ Widgeon
1992	156 365	37 194	43 791	38 200	15 844	420	20 916
1991	136 129	29 530	45 854	35 280	10 021	401	15 043
1990	144 418	29 915	49 558	40 034	11 900	1 526	11 485
1989	136 923	31 496	52 991	32 266	8529	917	10 724
1988	149 917	38 464	56 352	36 195	5 815	655	12 436
1987	135 429	27 908	49 779	39 058	4 627	775	13 282
1986	109 553	25 939	38 791	29 115	11 366	777	3 565
1985	96 663	16 934	49 008	19 764	3 988	1 077	5 892

Source: British Columbia Ministry of Forests

sites, which are closer to the population centres, reached a visitor saturation point in the late 80s and sites further east in the Nahatlatch are experiencing greater visitation now as recreationists seek less crowded sites.

The Greater Vancouver Regional District is another supplier of frontcountry recreation experiences. Kanaka Creek, Minnekhada and Lynn Headwaters have easy frontcountry hiking experiences. Although the Greater Vancouver Regional District trend data in Table 2-17 covers only a few years, these two northeast sector parks registered sharp visitation gains in recent years.

Table 2-17: Number of Visitors for Selected Greater Vancouver Regional District Parks				
Park	**Percentage Change**	**1991**	**1990**	**1989**
Kanaka Creek	135	57 007	45 733	24 258
Lynn Headwaters	12	108 218	89 707	96 815
Minnekhada	93	128 869	109 603	66 745

Hunting and Fishing

As hunting and fishing are closely tied to fish and wildlife habitat, forest harvesting can have a direct impact on these activities. Harvesting can remove wildlife security cover or impede travel corridors, and logging roads increase access to previously unroaded areas. Cut over areas often provide forage for wildlife but also increase visibility to hunters. Harvesting and road construction can degrade fish habitat productivity through siltation and change in hydrology.

In the Lower Mainland Region[24] there was an annual average of 36 627 days of hunter effort between 1948 and 1987 in the harvest of game wildlife species [British Columbia Ministry of Environment, Fish and Wildlife Branch]. As for fishing, total angler effort in the lower mainland amounted to 777 439 days in 1990 of which 95 percent was from residents in the region [British Columbia Fisheries, Planning and Economics Section, 1992]. Also worthy of mention is the fact that the Chilliwack/Vedder River is the most heavily sport-fished river in the province.

Protected Area Strategy

Under its Protected Area Strategy (PAS), the British Columbia Government is committed to doubling its system of protected areas from six to 12 percent of the province's land base by 2000 [Government of British Columbia, 1993]. Protected areas are defined as inalienable areas where no industrial extraction or development is permitted.

At this point areas are being identified, mapped and analyzed for possible protected designation. The PAS is a flexible process and the British Columbia Government can designate areas throughout the evaluation period. For example, a large area which includes Chilko Lake in the Cariboo region was recently preserved as a Provincial Park. It is important to note that the Spotted Owl Conservation Areas (SOCA) are included on the PAS's lists of Areas of Interest and Study Areas. Although the SOCA and PAS processes are separate, SOCA preservations, because they may be classified as protected areas, could influence the PAS process.

24 Includes areas beyond the boundaries of the Fraser TSA.

Withdrawals of operable timber harvesting areas under the PAS will have important implications at some juncture for the TSA timber harvest. The Chief Forester is required to re-visit the AAC determination every five years.

3.0 TIMBER SUPPLY SITUATION

3.1 Introduction

The Fraser TSA Timber Supply Analysis report was released in October, 1993. 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 Fraser TSA. The forecasts were chosen to illustrate a range of social, environmental, and economic implications associated with different harvest levels. **The forecasts are not 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 Fraser TSA is managed under Integrated Resource Management (IRM) principles. A four pass harvesting system is used with a 10 to 15 year green-up period (three metre tall regenerated trees) between passes. An additional goal is to have no more than 25 percent of the forest less than three metres tall at any time. Visual quality, recreation and wildlife values are incorporated into current management practices.

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 by about 25 percent since the last timber supply analysis of the TSA, due largely to redefinement of the timber harvesting land base, and to a lesser extent, more accurate mapping and deletions of forested land for other purposes;

- Approximately 25 percent of the area that is available for timber harvesting is being managed for scenic values, which significantly limits the rate of harvest.

3.3 Current AAC

The current AAC for the Fraser TSA is 1 765 000 m^3, set by the Chief Forester in 1985. The harvest apportionment is shown in Table 3-1.

Table 3-1: Current AAC Apportionment, Fraser TSA, 1993		
	m^3	% of AAC
Forest Licences, Replaceable	1 300 206	73.7%
Timber Sale Licences (Major) > 10 000 m^3	18 562	1.1
SBFEP	353 835	20.0
Forest Service Reserve	7 397	.4
Woodlot Licences	10 000	.6
Temporary Licences	75 000	4.2
Total Approved Allowable Annual Cut	1 765 000	100.0%

The land base for the entire Fraser TSA is 1 173 616 hectares (Appendix 7). After accounting for non-Crown land, non-forest land, and reductions to the productive forest area, the long-term timber harvesting land base is 275 083 hectares, 23.4 percent of the total land base. The timber harvesting land base is almost 90 000 hectares smaller than was assumed in the last timber supply analysis completed for the Fraser TSA in 1984.

The proximity of the harvestable land area to the communities of interest in this study are shown in Table 3-2. Fraser Canyon communities and Hope are central to the TSA's largest supply blocks. Chilliwack, Kent and Mission are also close to major blocks. The information corresponds to residency data furnished by licensees, which showed that, in terms of harvesting employment, these communities were home to the majority of forest workers in the Fraser TSA.

Table 3-2: Communities in Timber Supply Blocks and Timber Harvesting Land Base		
Timber Supply Block	**Major Communities in Vicinity**	**Percent of Total Harvesting Land Base**
Chilliwack	Chilliwack	12.5%
Harrison	Kent, Hope	19.1
Yale	Yale, Hope	21.7
Nahatlatch	North Bend, Boston Bar	20.1
Stave	Mission	17.8
Upper Pitt	Maple Ridge	7.1
Maple Ridge	Maple Ridge	1.7
Total		100.0%
Source: Ministry of Forests		

Table 3-3 suggests that future harvesting activity will probably occur near the communities affected by current harvesting activity.

Table 3-3: Timber Harvesting Land Base and Volume by Supply Block

Timber Supply Block	Harvesting Land Base		Volume	
	Immature[25]	Mature[26]	Immature	Mature
Chilliwack	75%	25%	46%	54%
Harrison	69	31	34	66
Yale	65	35	22	78
Nahatlatch	37	63	11	89
Stave	74	26	36	64
Upper Pitt	56	44	23	77
Maple Ridge	78	22	64	36

Source: Ministry of Forests

Generally, the more accessible supply blocks like Maple Ridge and Chilliwack have more extensive harvesting histories and thus less mature timber volumes. The reverse holds true for the more distant supply blocks of Upper Pitt, Yale and Nahatlatch. These will presumably be more active in the future, suggesting that communities in the Fraser Canyon, Hope, and Chilliwack will continue to have significant harvesting sectors.

3.4 Current TSA Forestry Operations

Information furnished by major licensees and small business operators (Table 3-4) indicates that approximately 70 percent of the current TSA harvest is processed within the TSA[27]. The manufacture of lumber is the predominant use of the wood with 54 percent of the harvest being processed into lumber inside the TSA. Other processing (e.g. plywood, shakes and shingles and poles and posts) account for a further 10 percent of the harvest. Chips are also an important use of timber with over 5 percent going to chippers which produce chips for use outside of the TSA. The remaining one percent is processed into paper at the Scott Paper Mill in New Westminster. The remaining 30 percent is processed outside the TSA.

The wood flow information is based on licensee information but two of the larger licensees, Cattermole Timber and Pretty's Timber, and the majority of the small business operators, are market loggers who distribute their logs 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 the timber they harvest is eventually processed.

25 Age class one to four (1-80 years).

26 Age class five and greater (greater than 80 years).

27 Nine established licensees and three small business operators were surveyed. Collectively, the survey respondents accounted for 80 per cent of the total Fraser TSA AAC in 1993.

Table 3-4: Fraser TSA Wood Flows, 1993

Timber Use	Used Within TSA	Used Outside TSA	Total
Chips	5%	2%	7%
Lumber	54	11	65
Other Processing	10	1	11
Pulp and Paper	1	16	17
Export	-	-	-
Total	70%	30%	100%

Employment Attributable to Fraser TSA Wood

Census labour force information for the area was reviewed in section 2.3, while direct harvesting employment and processing employment for major licensees in the Fraser TSA was discussed in section 2.4.[28] In terms of the Fraser TSA's timber harvest, direct employment in harvesting and silviculture is approximately 920. Timber from the Fraser TSA, employs another 659 people at numerous processing facilities (primarily sawmills) in the area. Therefore, total TSA forest sector employment attributable to the Fraser TSA's harvest is 1579. Based on the available wood flow information, most of the processing jobs are at mills in New Westminster, Surrey, Maple Ridge and Mission. Outside of the TSA, Fraser TSA wood supports another 482 processing jobs, primarily at coastal pulp mills. Therefore, total provincial employment in the forest industry attributable to the Fraser TSA harvest is 2061.

These estimates do not include employment related to the harvest from outside of the TSA, including Tree Farm Licence (TFL), Greater Vancouver Water District, Timber Licence (TL) and other harvesting activity (e.g. private wood harvest) that is processed by mills with the Fraser TSA. Approximately 90 percent of the timber processed within the TSA boundaries is harvested outside the TSA.

3.5 Description of Harvest Scenarios

The harvest levels for 3 scenarios are shown by decade in Figure 3-1 and Table 3-5. The harvest level at the decade's start applies in the subsequent years of the decade.

[28] Comparisons in employment between sections 2.3, 2.4 and this section should not be made. Section 2.3 shows 1991 Statistics Canada estimates and were based on 1980 SIC classifications. Section 2.4 estimates were based on licensee information for 1993 with **no attempt to distinguish between employment attributable to Fraser TSA wood and wood obtained elsewhere in the province**. The estimates in this section were derived using the methodology in Appendix 9. They were based on licensee information and refer **only to employment attributable to Fraser TSA wood**.

There are two major factors influencing these harvest forecasts. First, there is the reduced timber harvesting land base when compared to the last timber supply analysis conducted in 1984. Improved mapping of the operable land base, more accurate mapping and deletion of forested land for other purposes have led to a land base with 90 000 fewer hectares than previously assumed. Second, the forest cover requirements needed for the management of visual quality of the landscape and, wildlife and recreation values, are being applied to a large proportion of the timber harvesting land base, and this has a limiting effect on the rate of timber harvest from the forest as a whole.

Scenario 1

Scenario 1 begins with an annual harvest of 1 553 200 m^3 for the first decade, a 12 percent decrease from the present AAC. The harvest then declines by approximately 10 percent per decade for the next two decades, and a further seven percent in the fourth decade. Thereafter, harvest is maintained at 1 172 500 m^3 for another nine decades before increasing marginally to the long run harvest level of 1 182 500 m^3. The long run harvest level is a 33 percent reduction below present levels.

Scenario 2

Under Scenario 2, the current harvest level is maintained for 10 years, then experiences four successive decades of progressive declines of 11 percent, 10 percent, 18 percent and 33 percent, respectively. In the fifth decade, the harvest increases by 50 percent, then is maintained until year 90 when 2 decades of reductions are followed by a single decade of increase. The long run harvest level is reached in year 110. The scenario is used to illustrate what will likely occur if the present AAC is maintained for a decade and declines in the following two decades are held to an approximate 10 percent level.

Scenario 3

Under Scenario 3 the present harvest level of 1 765 000 m^3 is maintained this for one decade, but in the second and third decades, there are declines of 22 percent and 14 percent respectively. Thereafter, there are minor adjustments in years 50, 60, 120 and 130, before the long run harvest level of 1 182 500 m^3 is reached in year 140. This scenarios is used to illustrate the harvest reductions required to reach the long term levels without a significant drop below the LRSY if the present AAC is retained for a decade. Compared to Scenario 1, where harvest levels decline immediately, Scenario 3 defers reductions for 10 years, but then experiences sharp declines in harvest during the subsequent 20 years. The long-term harvest level is reached in year 140 compared to year 120 in Scenario 1.

Figure 3-1: Timber Harvest Scenarios

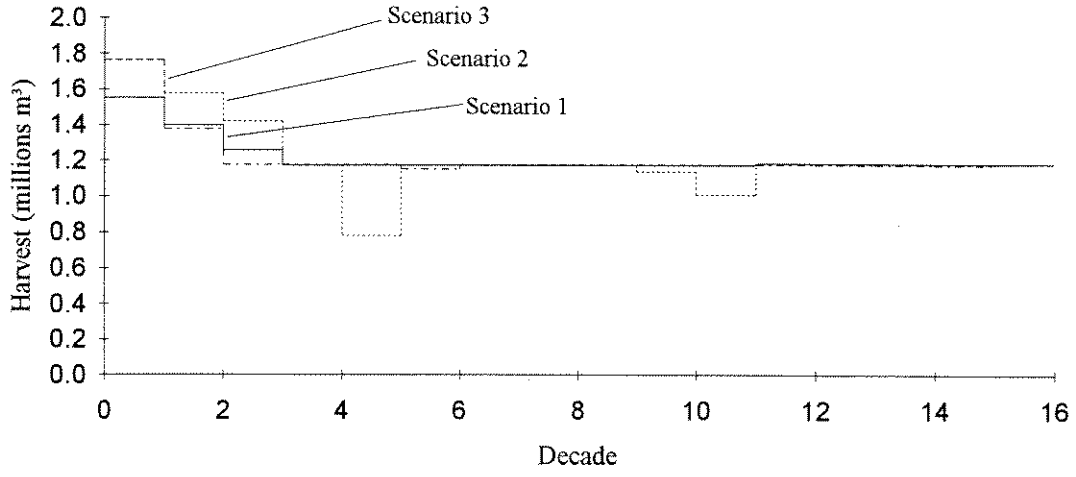

Table 3-5: Harvest Scenarios
('000 m³)

	Scenario 1			Scenario 2			Scenario 3		
Harvest	Harvest	Change		Harvest	Change		Harvest	Change	
Period	m³	m³	%	m³	m³	%	m³	m³	%
Current	1 765 000			1 765 000			1 765 000		
0	1 553 200	-211 800	-12	1 765 000	0	0	1 765 000	0	0
10	1 397 880	-155 320	-10	1 579 000	-185 500	-11	1 376 700	-388 300	-22
20	1 258 092	-139 788	-10	1 421 500	-158 000	-10	1 177 500	-199 200	-14
30	1 172 500	-85 592	-7	1 172 500	-249 000	-18	1 177 500	0	0
40	1 172 500	0	0	780 500	-392 000	-33	1 177 500	0	0
50	1 172 500	0	0	1 172 500	392 000	50	1 151 000	-26 608	-2
60	1 172 500	0	0	1 172 500	0	0	1 177 500	26 608	2
70	1 172 500	0	0	1 172 500	0	0	1 177 500	0	0
80	1 172 500	0	0	1 172 500	0	0	1 177 500	0	0
90	1 172 500	0	0	1 135 167	-37 333	-3	1 177 500	0	0
100	1 172 500	0	0	1 006 869	-128 298	-11	1 177 500	0	0
110	1 172 500	0	0	1 182 500	175 631	17	1 177 500	0	0
120	1 182 500	10 000	1	1 182 500	0	0	1 112 941	-64 559	-5
130	1 182 500	0	0	1 182 500	0	0	1 177 500	64 559	6
140	1 182 500	0	0	1 182 500	0	0	1 182 500	5 000	0

4.0 SCENARIO 1 IMPACT ASSESSMENT

This section describes the economic, environmental, community and aboriginal impacts in the TSA and the province resulting from the timber harvest identified in Scenario 1[29].

4.1 TSA Impacts

Economic Development

Forestry employment and employment income impacts of Scenario 1 harvest levels are shown in Table 4-1[30].

The employment coefficients used to estimate the impacts presume a linear relationship between harvest level and jobs, so employment changes parallel harvest level changes. While the linear relationship provides a reasonable estimate, in reality, employment changes would probably occur irregularly and depend on other factors such as:

- Government budgeting, which could affect silviculture activity and Chilliwack 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).

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.

Workers who lose jobs may find alternative employment locally or elsewhere. There may be a possibility of employment in the value-added manufacturing part of the forest industry. The estimated job impacts should be interpreted as a short-term potential impact; in the longer term, many unemployed are likely to find work elsewhere. The qualifications to the analysis are more fully discussed in Appendix 1.

In Scenario 1, direct forest sector employment in the TSA is expected to drop by 12 percent, or 189 person years (PY), below present employment levels. There would be

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29 This study focuses on the Fraser TSA's harvest and not all aspects of the Lower Mainland forest industry. TFL, TL and private timber from the TSA are not factored into the analysis because they had no direct impact on the timber supply analysis for the Fraser TSA. Similarly, wood sourced from outside the Fraser TSA and processed by the Lower Mainland forest industry is not considered because it is not impacted by the timber supply analysis of the Fraser TSA.

30 Employment coefficients and income multipliers are discussed in Appendix 8.

a further 228 PYs of associated indirect jobs lost, leading to a total decline of 417 jobs[31]. The corresponding direct income and indirect employment income losses would be $6.2 million and $5.3 million, respectively. There would then be three more successive

Table 4-1: Scenario 1 - Regional Economic Impacts

	Harvest	Employment (PY/Year)			Employment Income (1993 Millions/Year)		
Year	'000 m^3	Direct[32]	Indirect[33]	Total	Direct[34]	Indirect[35]	Total
Current	1 765	1 579	1 895	3 474	$51.37	$44.24	$95.61
0	1 553	1 390	1 667	3 057	45.20	38.93	84.14
10	1 398	1 251	1 501	2 751	40.68	35.04	75.72
20	1 258	1 125	1 351	2 476	36.62	31.54	68.15
30	1 173	1 049	1 259	2 308	34.12	29.39	63.52
40	1 173	1 049	1 259	2 308	34.12	29.39	63.52
50	1 173	1 049	1 259	2 308	34.12	29.39	63.52
60	1 173	1 049	1 259	2 308	34.12	29.39	63.52
70	1 173	1 049	1 259	2 308	34.12	29.39	63.52
80	1 173	1 049	1 259	2 308	34.12	29.39	63.52
90	1 173	1 049	1 259	2 308	34.12	29.39	63.52
100	1 173	1 049	1 259	2 308	34.12	29.39	63.52
110	1 173	1 049	1 259	2 308	34.12	29.39	63.52
120	1 183	1 058	1 269	2 327	34.42	29.64	64.06
130	1 183	1 058	1 269	2 327	34.42	29.64	64.06
140	1 183	1 058	1 269	2 327	34.42	29.64	64.06

decades of significant declines. Total job losses would be 306, 275, and 168 in years 10, 20, and 30, respectively. Total cumulative job losses by year 30 would be 1166. The corresponding total employment income loss would be $8.4 million, $7.6 million, and $4.6 million, in years 10, 20, and 30, respectively. Total cumulative annual employment income losses by year 30 would be $32.1 million. No further changes would occur for 80 years. In year 120, the harvest increases slightly to the long-run harvest level of 1 182 500 m^3, resulting in the addition of 20 jobs and $0.5 million in employment income.

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31 The terms, job and PY, are used interchangeably in this study. Appendix 2 provides a definition of PY.

32 The estimated cumulative coefficient for the study area is .89 PY per 1 000 m^3. This includes harvesting, silviculture, and processing employment. See Appendix 9.

33 Indirect employment for the region is based on a regional multiplier of 2.2. See Appendix 9.

34 The average 1993 annual after-tax income for a regional forest industry employee is $32 532. See Appendix 9.

35 Indirect employment income for the region is derived using an average annual after-tax income of $23 350 for B.C. See Appendix 9.

Employment in the district and regional offices of the Ministry of Forests attributable to the TSA is estimated as 84 for fiscal 1993-94. This employment would be in addition to the estimated industry employment shown in Table 4-1. Ministry of Forests employment is not be assumed to be a direct function of the AAC in any of the three scenarios. Although the TSA's timber harvest will affect activity to some extent, the majority of Ministry of Forests' employment is viewed as forest management related, not harvest management activity.

Integrated resource management is a fundamental precept underlying the three scenarios. As a result, the three scenarios are likely to have similar impacts on mushroom harvesting and other agro-forestry uses. Similarly, the three scenarios have similar implications for tourism and outdoor recreation activities. This does not mean that they will not have an impact in these areas, only that they are projected to have similar impacts over the planning horizon. The intent of this assessment is to compare the impact of the Fraser TSA timber harvest scenarios and not to project overall sectoral growth. Projections for employment derived from local resident and tourist-driven outdoor recreation activity are not included in this report. Appendix 8 provides a more detailed discussion of the issue of outdoor recreation and tourism activity and changes in the Fraser TSA timber harvest.

Community Impacts

Under Scenario 1 direct forest industry job losses are projected to be 189 in the first decade. Some of the implications for employees and communities are discussed below.

Social Fabric

There have been several sociological studies of lay-offs in resource industries. One finding which is consistent throughout the studies is that the emotional impacts of job loss are of great significance [The ARA Consulting Group 1993; R.G. Lee 1991]. The lives of many displaced workers have been dramatically and permanently altered as a result of job loss. 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 assets [ARA Consulting Group 1993].

Dr. Katherine Carlson [1991], in a study of forest workers in the U.S. Pacific Northwest, found that families as a whole faced 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. The report found that there can be serious and lasting effects on children in forestry dependent communities where they are being physically harmed through poverty, abused by distressed parents and psychologically harmed through family and community disintegration. Stresses on families can result in physical abuse, substance abuse, divorce and juvenile delinquency.

Chilliwack and, especially, Hope and the Fraser Canyon communities, where the reliance on harvesting activity is highest, would likely bear the greatest strain of a reduction in harvest. The social and health indicators discussed in section 2.3 showed that the Fraser-Cheam Regional District in general, and Yale, Boston Bar, North Bend and Hope in particular, have relatively fragile social fabrics. Unemployment and social assistance levels are high suggesting that these communities are not well-positioned to respond to further forest industry lay-offs. The Fraser Canyon communities lack the social infrastructure of larger communities such as Chilliwack. While Maple Ridge and Mission appear better able to respond to lay-offs, the impacts at the family level of job loss would be just as significant.

Our conversations with regional RCMP detachments could not correlate crime rates with unemployment and worker displacement in the region.

Population

Scenario 1 would have a relatively minor effect on population in the Fraser TSA in the short-term. Populations in the region have all been growing as part of an overall British Columbia trend of increased in-migration. Even in more sensitive areas like the Fraser Canyon and Hope, an initial reduction in harvest would probably not lead to a loss of population. In the longer term, as harvest levels continued to decline, there would likely be only a slowing effect on population growth in Yale, Boston Bar, North Bend, Hope and Chilliwack.

Local Government

A change in harvest levels could result in changes to the tax revenues flowing to local government from industry and residents and affect a community's ability to support infrastructure and service needs. It is difficult to say whether or not Scenario 1 would result in an immediate mill closure with subsequent implications for local government. Due to the number of facilities in the region, Fraser TSA wood tends to be distributed among numerous mills. Consequently, rather than having one or two mills with a very high level of dependency on timber from the TSA, there are many mills with low to moderate levels of dependency (with the exception of the Boston Bar sawmill). This may make individual mills in the lower mainland somewhat less sensitive to declines in the Fraser TSA harvest providing they can obtain wood from alternative sources (which itself is not certain). The TSA Review process is occurring in all TSAs and it appears that a number may have their AACs reduced, thus affecting lower mainland mills. These reductions could raise prices for open market timber supplies and may force some mills to close if they cannot reduce their costs in other areas to compensate for higher wood costs.

An additional concern in the short-term is the fact that some independent companies with little or no tenure in the region appear to be more dependent on Fraser TSA wood than major licensees. Companies such as Primex Forest Products and Richmond Plywood are major buyers of SBFEP (current AAC of 383 835 m^3) wood. Even a 12 percent reduction in harvest could be expected to hit independent companies hard.

Physical and Social Infrastructure

On April 13 Premier Mike Harcourt announced the B.C. Government's Forest Renewal Plan [Government of British Columbia, 1994]. Its five goals focus on sustaining jobs and communities, but two of the goals 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, targeted to obtain $2.25 billion in additional revenues over the next five years. An estimated $400 million per year will be spent within the Forest Renewal Plan and $50 million will be used to finance new forest management initiatives. The plan is comprehensive and touches upon the wide range of forests-related matters which are at issue.

- Almost half of the funds will be directed to silviculture.
- The B.C. 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 Plan initiative will include specific initiatives for First Nations.

The British Columbia Government will create a new Crown agency, *Forest Renewal British Columbia*, to manage and direct the forest renewal investments.

There are other initiatives of a general mitigative nature that some individuals and communities can access to soften the negative economic impacts of timber harvest reductions. Forest workers can access the various general employment development programs which are largely delivered or funded by the Federal Government. They include the Fee Payer and Full Sponsorship Programs, which permit a qualified unemployment insurance (UI) claimant to attend education classes. In the Mission-Agassiz area a federal program, Community Futures, is delivered that is not available elsewhere in the region. Community Futures oversees the operation of a local business development centre and also delivers a self-employment assistance program, which provides a subsidy to the unemployed who want to start a business. There is also a Community Futures program in Sardis, but it is available only to Sto:Lo Nation people.

Canada Employment and Immigration Centres (CEIC) place the unemployed into short career planning and job search courses to facilitate the transition to another job. The Maple Ridge CEIC Centre has sponsored a program for laid off mill workers.

Recent tracking studies of laid off British Columbia forest workers can provide some insight into the likely social infrastructure needs of further lay-offs resulting from reduced timber harvest levels. In its recent land use plan for Vancouver Island, CORE

[Commission on Resources and Environment, 1994] analyzed the recent experience of laid off forestry workers in British Columbia to estimate the short-term burden put on social services. The findings are summarized in Table 4-2.

The study also made predictions about 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

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

Expected Program Utilized	Expected Percent 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

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 British Columbia forest workers between 1978 and 1985 [Cohen, Courture Associates and Don R. Allen and Associates, 1988] found that workers who gained employment in other industries saw their incomes reduced by 33 percent.

The Carlson study of displace workers [Carlson 1991] 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. Displaced workers from rural areas tended to find lower paying jobs than those from urban areas. In general, a few workers left to look for work elsewhere and few became involved in retraining.

Based on the above tracking studies, forest workers in the communities furthest from the Greater Vancouver urban core, Boston Bar, Yale, Hope, Kent and Chilliwack, would have the greatest difficulty not only in obtaining alternative employment but also in securing adequate adjustment services.

Aboriginal Impacts[36]

Information collected through interviews with the major licensees in the Fraser TSA, indicate there are a minimum of 100 aboriginal people employed in either harvesting or manufacturing. Of these, approximately 40 are from the Boston Bar area (members of the Nlaka'pamux Nation Tribal Council) and at least 25 are from the Chehalis band, located near Kent. There also appears to be a concentration of aboriginal forest workers in Hope and Chilliwack.

Any loss of employment in the Fraser TSA due to reduced timber harvests would negatively affect the aboriginal community. The effects would be the greatest in the communities with the highest concentrations of aboriginal forest workers such as Boston Bar, North Bend, Kent, Hope and Chilliwack. The employment loss may be proportionately distributed among aboriginal and non-aboriginal forest workers, but the impact would be more dramatic among the aboriginal communities because their unemployment levels are already high, and proportionately more of the employed aboriginal people work in the forest sector.

A related issue concerns aboriginal access to tenures such as Forest and Woodlot licences. In the Fraser TSA no aboriginal organization has a tenure awarded by the Ministry of Forests although there are active applications involving aboriginal organizations. In the open bidding system, they must compete against, or joint venture with, more experienced companies. A lower AAC will increase competition and/or contribute to the closure of marginal operations. Under these conditions aboriginal organizations could find it even more difficult to obtain tenures.[37]

The other major impacts of the harvest scenarios involve historical and cultural resources of the First Nations. Although numerous archaeological sites have been identified, a documented inventory of historically and culturally significant sites in the Fraser TSA is not available. Nonetheless, any reductions in the Fraser TSA's AAC would likely reduce ground disturbance and site damage in the short-term. In the long-term, the impact on these resources would be similar under all these scenarios.

Comprehensive land claims cover the Fraser TSA. Until negotiations proceed on this matter, there is no way of gauging the impact of alternative harvest levels as there is no precedent which could serve as a reference point for assessing a potential impact.

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36 Several representatives of the aboriginal community in the Fraser TSA were contacted for this study. The described impacts represent the Consultant's consideration of the collected information and the client's review of the Consultant's draft. They are not intended to represent the full range of impacts on all aboriginal organizations. The large number of Aboriginal organizations in the Fraser TSA precluded comprehensive consultation.

37 This impact projection assumes that the present system of awarding tenures is retained. Some organizations, such as the Inter-Tribal Forestry Association, have advocated a form of special access tenure for Aboriginal groups.

4.2 Provincial Impacts

Economic Impacts

Provincial employment and employment income estimates for Scenario 1 appear in Table 4-3. Appendix 8 explains the coefficients and multipliers used in the table.

The estimated current direct employment in British Columbia from harvesting Fraser TSA wood consists of the following:

- Fraser TSA direct employment of 1579 PYs.
- Direct processing employment related to Fraser TSA sawlogs processed outside the region is estimated to be 114 PYs.
- Direct processing employment outside of the TSA related to pulp and paper production from Fraser TSA wood is estimated to be 368 PYs. Of this, 132 jobs result from the chipping and pulping of pulp logs. The other 236 pulp and paper jobs depend on chip and sawdust residue generated by processing Fraser sawlogs, peelers, and other wood.

Total direct provincial employment attributable to harvesting Fraser TSA timber is therefore estimated to be 2061 PYs.

In Scenario 1, at the outset, direct forest sector employment would drop 247 PYs below present employment levels. There would be a further 371 PYs of associated indirect jobs lost, amounting to a total decline of 618 jobs. The corresponding direct income and indirect employment income losses would be $8.1 million and $8.7 million, respectively. After year 10, there would be three more successive decades of significant declines. Total job losses would be 454, 408, and 250 in years 10, 20, and 30, respectively. Total cumulative job losses by year 30 would be 1730. The corresponding total employment income loss would be $12.3 million, $11.1 million, and $6.8 million, in years 10, 20, and 30, respectively. Total cumulative employment income losses by year 30 would be $47.0 million. No further changes would occur for 80 years. In year 120, the harvest increases slightly to the long-run harvest level of 1 182 500 m^3, resulting in the addition of 29 total jobs and $0.8 million in employment income.

Table 4-3: Scenario 1 - Provincial Economic Impacts

	Harvest	Employment (PY/Year)			Employment Income (1993 Millions/Year)		
Year	'000 m³	Direct	Indirect[38]	Total	Direct[39]	Indirect[40]	Total
Current	1 765	2 061	3 092	5 153	$67.77	$72.20	$139.97
0	1 553	1 814	2 721	4 535	59.64	63.54	123.17
10	1 398	1 633	2 448	4 081	53.67	57.18	110.85
20	1 258	1 469	2 204	3 673	48.30	51.46	99.77
30	1 173	1 369	2 054	3 423	45.02	47.96	92.98
40	1 173	1 369	2 054	3 423	45.02	47.96	92.98
50	1 173	1 369	2 054	3 423	45.02	47.96	92.98
60	1 173	1 369	2 054	3 423	45.02	47.96	92.98
70	1 173	1 369	2 054	3 423	45.02	47.96	92.98
80	1 173	1 369	2 054	3 423	45.02	47.96	92.98
90	1 173	1 369	2 054	3 423	45.02	47.96	92.98
100	1 173	1 369	2 054	3 423	45.02	47.96	92.98
110	1 173	1 369	2 054	3 423	45.02	47.96	92.98
120	1 183	1 381	2 072	3 453	45.40	48.37	93.77
130	1 183	1 381	2 072	3 453	45.40	48.37	93.77
140	1 183	1 381	2 072	3 453	45.40	48.37	93.77

Environmental Impacts

The environmental impacts discussed here refer to the timber harvesting land base in the Fraser TSA, which constitutes only 23 percent of the TSA's total land base. Seventy-seven percent of the TSA land base cannot be harvested for one reason or another as shown in Appendix 7. Thus, the environmental impacts refer to less than one quarter of the total land base. Further, there are two major provincial parks, Garibaldi and Manning, that adjoin the TSA and which provide additional habitat protection.

Each scenario presented would have fewer and less widespread environmental impacts than would the long-term retention of the current harvest level. Scenario 1 presents the smoothest and most manageable transition to long-run harvest levels. Scenarios 2 and 3

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38 Indirect employment for the province was based on the Ministry of Forests' multiplier of 2.5 See Appendix 9.

39 The average 1993 annual after-tax income for a provincial forest industry employee processing Fraser TSA wood is $33 996. The income is higher than the regional forest worker income owing to the presence of higher-income pulp and paper jobs. See Appendix 9.

40 Indirect employment income for the province was based on the $23 350 average income used to assess regional indirect employment income. See Appendix 9.

not only delay harvest reductions, thereby placing greater strain on the environment in the short-term, but they also exhibit sometimes widely fluctuating cut levels that would make management more difficult. IRM guidelines would apply equally to all the scenarios and thus help to mitigate general environmental impacts. However, even though all three scenarios would have fewer impacts than maintaining the present cut, there would still be changes or impacts to the current state of the Fraser TSA's environment.

Under all three scenarios, there would be a shift in the age-class distribution of forests within the TSA as in most of the mature old growth forests in the timber harvesting land base would be converted to younger managed forests. Some mature timber would be maintained for winter deer range (18 000 hectares), recreation (42 000 hectares) and visual quality (72 000 hectares). The most productive forests within the TSA, for biological diversity and species richness, occur in the lower elevations of the timber harvesting land base. Timber harvesting though, will result in a decrease in area of the most productive, mature forest stands and an overall reduction in the natural diversity.

In general, the widespread conversion of mature forests to immature forests under all three scenarios would cause changes in the distributions (both spatial and temporal) and population levels of many wildlife species. 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).

There are ongoing processes outside the scope of the Timber Supply Area Review which are attempting to address long-term habitat requirements for some wildlife and fish species and to improve harvesting practices and the state of the environment in general. These include but are not limited to: Spotted Owl Recovery Team project, Protected Areas Strategy, Forest Practices Code, and Coastal Biodiversity Guidelines.

Habitat Impacts

There may be some differences in habitat impacts between the three scenarios because of differences in harvest forecasts over the long-term planning horizons. However, these differences are expected to be subtle and insignificant when addressing the overall impacts to habitats.

Old growth forest - The shift in age-class distribution of forests from mature old growth to managed forests will reduce this habitat type. Many species in the Fraser TSA which are of management concern are dependent on this habitat type. However, 24 percent of the total land base, which cannot be harvested for one reason or another (Appendix 7), will remain under mature cover.

Ungulate winter range -Mountain goat winter range will be protected from harvesting as per recommendations from wildlife biologists. Road construction and disturbance to wintering goats would likely reduce populations in the long-term, since these animals are very vulnerable to disturbance. Deer winter ranges have been mapped and suitable habitat will be maintained over the long-term.

Riparian Habitat - Riparian habitats are very valuable to many species groups. Coastal Fish/Forestry Guidelines prescriptions may alleviate some concerns but harvesting in valley bottom areas could fragment and reduce viability of riparian ecosystems. Intact riparian habitats are already rare.

Wetlands - These rare habitats are sensitive and vulnerable to impacts not only from forest harvesting and roads, but also from other human activities. Harvest of forest adjacent to wetlands could alienate them from use and alter hydrological processes. Several species groups use these habitats. Wetlands are usually identified and protected through planning processes although upstream harvesting activity can cause some impairment to their productivity.

Wildlife Impacts

Assessing the impacts on wildlife species is difficult and impaired by a lack of survey information, a lack of inventory data, a limited understanding of population dynamics and habitat requirements and a limited understanding of predator/prey relationships. This section presents a brief summary of possible impacts based on information available to date. Some of the higher profile species are discussed.

Forest Bird Species (cavity nesters, woodpeckers, secondary cavity users, raptors) - These species are largely dependent on late successional forest and old growth attributes. As harvesting continues to reduce this habitat, populations would decline. Forest fragmentation also favours generalist species, which compete with forest birds for available habitat. A high profile example in the Fraser TSA is the Northern Spotted Owl[41].

Carnivores (grizzly and black bears, wolves etc.) - These species (except black bears) require extensive tracts of wilderness area, preferably unroaded and undisturbed with a variety of habitat types. Older forests are needed by grizzly bears for seasonal denning and day bedding requirements. As development moves into more remote areas and older forests are logged, the available habitat for carnivores is reduced.

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41 The Northern Spotted Owl is on the Endangered Status List of the Committee for the Recovery of Nationally Endangered Wildlife in Canada. In 1992 the Federal and B.C. Governments created the Canadian Spotted Owl Recovery Team to research, prepare and oversee a plan to down-list the species from Endangered to Threatened status. Since 1990, B.C. Environment has undertaken reconnaissance surveys in southwestern B.C. forests to document owl sightings and nesting sites. In mid 1993 the BC Government instituted an Interim Conservation Strategy. Information is being gathered which will form the basis for a long-term conservation strategy.

Ungulates (deer) - Creation by timber harvesting of some spring forage sites in close proximity to winter range would likely improve deer populations in the short-term. Retention of winter range though, is also important. As forest stand ages are gradually shifted towards second growth (particularly in deep snow packed zones) and roads and access are expanded negative impacts could occur. To mitigate this, a minimum of 18 000 hectares of forest suitable for deer winter range will be maintained in the Fraser TSA.

Ungulates (mountain goat) - Goat winter range is not compatible with forestry operations (roads, harvesting, silviculture). Any activities within goat wintering areas will have an adverse impact on goat habitat. Identified winter ranges are protected from harvesting.

Furbearers (pine marten, bobcat) - These species are largely dependent on older, intact forests and as habitat becomes fragmented, populations decline.

Fisheries Impacts

Fisheries in the Fraser TSA are especially important as over 50 percent of migrating Fraser River salmon spawn in the lower Fraser and its tributaries, and all use the lower Fraser as a corridor. Environmental damage to this habitat could have far-reaching impacts extending beyond the Fraser TSA.

The long-term impacts on the fisheries resources associated with forest harvesting is not well understood, although some practices such as clearcutting are known to alter hydrological processes and reduce long-term large organic debris (LOD)[42] recruitment. Hydrological impacts would usually be most pronounced within the first 15 years of logging a block (depending on site characteristics) after which time the opening should become hydrologically recovered and mostly stabilized. Impacts from reduced LOD availability would be realized much later than hydrology impacts since existing LOD would continue to function for some time after harvesting.

Existing resource management guidelines to apply across the TSA for all three scenarios, and expected guidelines (Biodiversity, Forest Practices Code) would help address some fisheries' concerns. However, in some instances and in those watersheds where harvesting has been largely completed, impacts have already occurred.

Fisheries managers continue to stress the importance of adequate habitat protection. Maintaining wild, indigenous fish populations or stocks is of the highest importance, regardless of whether they contribute to a sport or commercial fishery.

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

Government Revenue Impacts

Total gross government revenue impacts appear in Table 4.4. All assumptions are discussed in Appendix 8. Current annual provincial government revenues are approximately $51.01 million. The immediate harvest reduction results in an annual loss of $6.12 million in gross revenue. There are further reductions of $4.49 million, $4.04 million, and $2.47 in years 10, 20, and 30, respectively. A total of $16.83 million is lost yearly by the time the long-term harvest level is reached in year 120.

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.

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

Year	Resource Revenues[43]	Personal Income Tax[44]	Other Taxes[45]	Total
Current	$26.62	$14.64	$9.75	$51.01
0	23.43	12.88	8.58	44.89
10	21.08	11.60	7.72	40.40
20	18.97	10.44	6.95	36.36
30	17.68	9.73	6.48	33.89
40	17.68	9.73	6.48	33.89
50	17.68	9.73	6.48	33.89
60	17.68	9.73	6.48	33.89
70	17.68	9.73	6.48	33.89
80	17.68	9.73	6.48	33.89
90	17.68	9.73	6.48	33.89
100	17.68	9.73	6.48	33.89
110	17.68	9.73	6.48	33.89
120	17.83	9.81	6.53	34.18
130	17.83	9.81	6.53	34.18
140	17.83	9.81	6.53	34.18

43 Includes stumpage and other rents and revenues.
44 Includes provincial share of taxes on direct, indirect, and induced employment income.
45 Includes logging, corporate income, corporate capital, sales, property and electricity taxes.

5.0 SCENARIO 2 IMPACT ASSESSMENT

5.1 TSA Impacts

Economic Development

Projected employment and employment income impacts associated with Scenario 2 harvest levels are shown in Table 5-1.

Table 5-1: Scenario 2 - TSA Economic Impacts

	Harvest	Employment (PY/Year)			Employment Income ($1993 Millions/Year)		
Year	'000 m³	Direct	Indirect	Total	Direct	Indirect	Total
Current	1 765	1 579	1 895	3 474	$51.37	$44.24	$95.61
0	1 765	1 579	1 895	3 474	51.37	44.24	95.61
10	1 580	1 413	1 696	3 109	45.97	39.59	85.56
20	1 422	1 272	1 526	2 798	41.37	35.63	77.00
30	1 173	1 049	1 259	2 308	34.12	29.39	63.52
40	780	698	838	1 536	22.72	19.56	42.28
50	1 173	1 049	1 259	2 308	34.12	29.39	63.52
60	1 173	1 049	1 259	2 308	34.12	29.39	63.52
70	1 173	1 049	1 259	2 308	34.12	29.39	63.52
80	1 173	1 049	1 259	2 308	34.12	29.39	63.52
90	1 135	1 016	1 219	2 234	33.04	28.46	61.49
100	1 007	901	1 081	1 982	29.30	25.24	54.54
110	1 183	1 058	1 269	2 327	34.42	29.64	64.06
120	1 183	1 058	1 269	2 327	34.42	29.64	64.06
130	1 183	1 058	1 269	2 327	34.42	29.64	64.06
140	1 183	1 058	1 269	2 327	34.42	29.64	64.06

In Scenario 2, there would be no changes in harvest levels during the first 10 years. There would be major harvest declines in the subsequent three decades, and by year 30, the harvest would be very near the long-run harvest level. After year 30 there are two periods of substantial fluctuations in harvest levels which, although they balance out in the end, would result in major job and income impacts. The first period begins in year 40 when there is a 33 percent harvest reduction as the volume of second growth timber available for harvesting would be insufficient to meet a higher harvest level. In year 50, this 33 percent would be added back to the harvest as second growth volumes increase. The second period begins in year 90, when the harvest would be reduced by three percent. In year 100, another 11 percent reduction occurs. However, by year 110, there would be a final 18 percent increase to the long-run harvest level. Scenario 2 is marked by short-term stability and by severe mid-term and long-term adjustments.

In the first 10 years, current direct and indirect employment would remain unchanged at 3474 and employment income at $95.61 million. Total direct and indirect job losses would be 365, 311 and 490 in years 10, 20, and 30, respectively. The corresponding total employment income losses would be $10.1 million, $8.6 million, and $13.5 million. In year 40, the a very severe drop in harvest levels results in total job losses of 772 and total employment income losses of $21.2 million. However, in year 50, the harvest can increase by the same amount as the year 40 decline, and the lost jobs and income could return. No further changes would occur until year 90, when a total of 73 jobs and $2.0 million in employment income would be lost, followed by a loss of 253 jobs and $7.0 million in employment income in year 100. In year 110, the harvest would be increased to the long-run harvest level, resulting in the addition of 346 jobs and $9.5 million in employment income.

Community Impacts

Under Scenario 2 the current AAC would be maintained for one decade and as a result job loss and subsequent community impacts would be deferred one decade. The Forest Renewal Plan provides an opportunity to help offset the anticipated job reductions. By deferring harvest reduction in the first decade about 350 jobs would be lost at the beginning of the fourth decade. At issue here is whether deferred job dislocation at the expense of significant job loss in the future is the best social choice bearing in mind changing social values and possible mitigation and transition strategies.

Aboriginal Impacts

Over the long term impacts of Scenario 2 on the aboriginal community are expected to be similar to those of Scenario 1. However, in the short term employment opportunities would be maintained at the expense of opportunities in the medium term. Unemployment levels in the aboriginal communities are high and proportionately more of the workforce is employed in the forest sector. The employment impacts would be the greatest in Boston Bar, North Bend, Hope, Kent and Chilliwack.

The implication for heritage and cultural resources and land claims may be marginally better in the short term under Scenario 1. Reduced harvest levels may provide additional time for the identification of and consultation regarding heritage and cultural resources.

5.2 Provincial Impacts

Economic Impacts

The provincial employment and employment income impacts of Scenario 2 appear in Table 5-2. Maintaining the harvest at current levels would maintain employment and employment income in the first 10 years. Thereafter, total direct and indirect job losses would be 542, 461 and 727 in years 10, 20, and 30, respectively. The corresponding total employment income losses would be $14.7 million, $12.5 million, and $19.7 million. In year 40, there is a very severe cut in harvest levels resulting in total job losses of 1145 and

total employment income losses of $31.1 million. However, in year 50, the harvest could be increased by the same amount as the year 40 decline, and the lost jobs and income would be returned. No further changes would occur until year 90, when a total of 109 jobs and $3.0 million in employment income would be lost, followed by a loss of 375 jobs and $10.2 million in employment income in year 100. In year 110, the harvest would be increased to the long-run harvest level, resulting in the addition of 513 jobs and $13.9 million in employment income.

Table 5-2: Scenario 2 - Provincial Economic Impacts

	Harvest	Employment (PY/Year)			Employment Income ($1993 Millions/Year)		
Year	'000 m³	Direct	Indirect	Total	Direct	Indirect	Total
Current	1 765	2 061	3 092	5 153	$67.77	$72.20	$139.97
0	1 765	2 061	3 092	5 153	67.77	72.20	139.97
10	1 580	1 845	2 767	4 612	60.65	64.61	125.26
20	1 442	1 660	2 490	4 151	54.58	58.15	112.73
30	1 173	1 369	2 054	3 423	45.02	47.96	92.98
40	780	912	1 367	2 279	29.97	31.93	61.90
50	1 173	1 369	2 054	3 423	45.02	47.96	92.98
60	1 173	1 369	2 054	3 423	45.02	47.96	92.98
70	1 173	1 369	2 054	3 423	45.02	47.96	92.98
80	1 173	1 369	2 054	3 423	45.02	47.96	92.98
90	1 135	1 326	1 989	3 314	43.59	46.44	90.02
100	1 007	1 176	1 764	2 940	38.66	41.19	79.85
110	1 183	1 381	2 072	3 453	45.40	48.37	93.77
120	1 183	1 381	2 072	3 453	45.40	48.37	93.77
130	1 183	1 381	2 072	3 453	45.40	48.37	93.77
140	1 183	1 381	2 072	3 453	45.40	48.37	93.77

Environmental Impacts

The TSA environmental impacts of Scenario 2 are similar to those discussed under Scenario 1. However, Scenario 2 would place greater strain on the environment in the short-term, and reduce the flexibility for managing non-timber resources.

Wildlife

In general, the conversion of mature forests to immature forests on the timber harvesting land base would cause changes in the distributions and overall population levels of many wildlife species. Habitat generalists and species which use only immature forests would likely increase in numbers, but populations of species dependent on mature and old growth forests would decline. The greatest declines are expected to occur among habitat specialists, which are of the greatest management concern in the region.

Fisheries Resources

In the short-term, Scenario 2 would have a more adverse impact on the fisheries resource than Scenario 1. Generally, a higher rate of harvest would have more adverse impacts on fisheries resources than a lower rate of cut. Because forest sustainability in the TSA is based on the total land base rather than individual watersheds, the long-term impact on fisheries among the scenarios is similar.

Government Revenue Impacts

The gross government revenue impacts of Scenario 2 are shown in Table 5-3. Current annual government revenues are approximately $51.01 million. Annual government revenue losses would be $5.36 million, $4.57 million, and $7.19 million in years 10, 20, and 30, respectively. In year 40, there would be a very severe cut in harvest levels resulting in annual government revenue losses of $11.33 million, but this could be regained in year 50 when the harvest could be increased again. No further changes would occur until year 90, when a total $1.08 million could be lost, followed by a loss $3.71 million in year 100. In year 110, the harvest would be increased to the long-run harvest level, resulting in the addition of $5.08 million annually in government revenues.

Table 5-3: Scenario 2 - Provincial Revenue Impacts
($1993 millions/Year)

Year	Resource Revenues	Personal Income Tax	Other Taxes	Total
Current	$26.62	$14.64	$9.75	$51.01
0	26.62	14.64	9.75	51.01
10	23.82	13.10	8.73	45.65
20	21.44	11.79	7.85	41.08
30	17.68	9.73	6.48	33.89
40	11.77	6.47	4.31	22.56
50	17.68	9.73	6.48	33.89
60	17.68	9.73	6.48	33.89
70	17.68	9.73	6.48	33.89
80	17.68	9.73	6.48	33.89
90	17.12	9.42	6.27	32.81
100	15.19	8.35	5.56	29.10
110	17.83	9.81	6.53	34.18
120	17.83	9.81	6.53	34.18
130	17.83	9.81	6.53	34.18
140	17.83	9.81	6.53	34.18

6.0 SCENARIO 3 IMPACT ASSESSMENT

6.1 TSA Impacts

Economic Development

TSA level forestry employment and employment income impacts for Scenario 3 harvest levels are shown in Table 6-1.

Table 6-1: Scenario 3 - TSA Economic Impacts

	Harvest	Employment (PY/Year)			Employment Income ($1993 Millions/Year)		
Year	'000 m³	Direct	Indirect	Total	Direct	Indirect	Total
Current	1 765	1 579	1 895	3 474	$51.37	$44.24	$95.61
0	1 765	1 579	1 895	3 474	51.37	44.24	95.61
10	1 377	1 232	1 478	2 710	40.07	34.51	74.58
20	1 178	1 053	1 264	2 317	34.27	29.52	63.79
30	1 178	1 053	1 264	2 317	34.27	29.52	63.79
40	1 178	1 053	1 264	2 317	34.27	29.52	63.79
50	1 151	1 030	1 236	2 265	33.50	28.85	62.34
60	1 178	1 053	1 264	2 317	34.27	29.52	63.79
70	1 178	1 053	1 264	2 317	34.27	29.52	63.79
80	1 178	1 053	1 264	2 317	34.27	29.52	63.79
90	1 178	1 053	1 264	2 317	34.27	29.52	63.79
100	1 178	1 053	1 264	2 317	34.27	29.52	63.79
110	1 178	1 053	1 264	2 317	34.27	29.52	63.79
120	1 113	996	1 195	2 190	32.39	27.90	60.29
130	1 178	1 053	1 264	2 317	34.27	29.52	63.79
140	1 183	1 058	1 269	2 327	34.42	29.64	64.06

In Scenario 3, there would be no harvest levels changes for the first 10 years. In years 10 and 20 there would be severe declines in the harvest, 22 percent and 14 percent, respectively. These large declines would be required in order to bring harvest levels down to the long term harvest level without dropping substantially below the long term level. By year 20 the cut would be very near the long-run harvest level. Scenario 3 is similar to Scenario 2 as harvest reductions would not occur for 10 years. However, in Scenario 3, the major declines in harvest, and thus, the major impacts, occur relatively quickly in years 10 and 20.

In the first 10 years, current direct and indirect employment would remain unchanged at 3474 and employment income at $95.6 million. Total direct and indirect job losses would be 764 and 392 in years 10 and 20, respectively. The corresponding total employment income losses would be $21.0 and $10.8 million. In year 50, there would be a modest cut

in harvest levels resulting in total job losses of 52 and total employment income losses of $1.5 million. In year 60, the harvest could increase by the same amount as the year 50 decline, and the lost jobs and income could be required. Under this scenario, no further changes would occur until year 120, when a total of 127 jobs and $3.5 million in employment income would be lost. However, these would be gained back in year 130 as the harvest moves back up toward the long term level.

Community Impacts

As with Scenario 2, the community impacts of Scenario 3 would be markedly different in the first decade from Scenario 1 because the current AAC is maintained and the first round of job reductions are deferred. The issue in this scenario is whether deferring harvest reductions and the associated socio-economic impacts for ten years followed by fairly major declines in the next decade in order to not drop significantly below the long term harvest level is the appropriate social choice.

Under Scenario 3, because a full 22 percent reduction occurs in year 10, the ten year window of opportunity to introduce mitigation measures becomes more critical than in Scenario 2. Unlike Scenario 2, it does not have a dramatic fluctuation in economic activity between the fourth and fifth decades.

Aboriginal Impacts

The aboriginal impacts of Scenario 3 are similar to those of Scenario 2. Employment losses would negatively affect the aboriginal community, where unemployment levels are high and proportionately more of the workforce is employed in the forest sector. The effects would be the greatest in Boston Bar, North Bend, Hope, Kent and Chilliwack.

The impacts on heritage and cultural resources and land claims are similar to Scenario 2.

6.2 Provincial Impacts

Economic Impacts

The provincial employment and employment income impacts associated with Scenario 3 are shown in Table 6-2. In the first 10 years, current direct and indirect employment would remain unchanged at 5153 and employment income at $140.0 million. Total direct and indirect job losses would be 1133 and 582 in years 10 and 20, respectively.

Table 6-2: Scenario 3 - Provincial Economic Impacts

	Harvest	Employment (PY/Year)			Employment Income ($1993 Millions/Year)		
Year	'000 m³	Direct	Indirect	Total	Direct	Indirect	Total
Current	1 765	2 061	3 092	5 153	$67.77	$72.20	$139.97
0	1 765	2 061	3 092	5 153	67.77	72.20	139.97
10	1 377	1 608	2 412	4 020	52.86	56.32	109.18
20	1 178	1 375	2 063	3 438	45.21	48.17	93.38
30	1 178	1 375	2 063	3 438	45.21	48.17	93.38
40	1 178	1 375	2 063	3 438	45.21	48.17	93.38
50	1 151	1 344	2 016	3 360	44.19	47.08	91.27
60	1 178	1 375	2 063	3 438	45.21	48.17	93.38
70	1 178	1 375	2 063	3 438	45.21	48.17	93.38
80	1 178	1 375	2 063	3 438	45.21	48.17	93.38
90	1 178	1 375	2 063	3 438	45.21	48.17	93.38
100	1 178	1 375	2 063	3 438	45.21	48.17	93.38
110	1 178	1 375	2 063	3 438	45.21	48.17	93.38
120	1 113	1 300	1 950	3 250	42.73	45.53	88.26
130	1 178	1 375	2 063	3 438	45.21	48.17	93.38
140	1 183	1 381	2 072	3 453	45.40	48.37	93.77

The corresponding total employment income losses would be $30.8 and $15.8 million. In year 50, there would be a modest cut in harvest levels resulting in total job losses of 78 and total employment income losses of $2.1 million. In year 60, the harvest could be increased by the same amount as the year 50 decline, and the lost jobs and income could be regained. Under this scenario, no further changes would occur until year 120, when a total of 188 jobs and $5.1 million annually in employment income would be lost. However, these would be gained back in year 130 as the harvest is again increased.

Environmental Impact

The long-term environmental impacts of Scenario 3 would be similar to those discussed for Scenarios 1 and 2 as integrated resource management is the underlying principle in all three scenarios. In the shorter term, Scenarios 2 and 3 would place more strain on the environment than Scenario 1 since harvests would be maintained at current levels for one decade. Under Scenario 3 the harvest level would drop more in the subsequent two periods toward the long term harvest level than Scenario 2. This indicates lower environmental stress for Scenario 3 than Scenario 2 as harvest rates would be lower and there would be greater flexibility to manage for non-timber values. In addition, Scenario 3 does not drop significantly below the long term harvest level. The significant reduction in harvest below the long term level in the fourth decade under Scenario 2, indicates that a larger proportion of the timber harvest land base would be in younger age classes stands

than Scenarios 1 and 3. A higher proportion of lower age classes has implications for those species whose habitat preferences are older age class stands.

Wildlife Resources

In general, the widespread conversion of mature forests to immature forests would cause changes in the distributions and overall population levels of many wildlife species. Habitat generalists and species which use only immature forests would likely increase in numbers, but species dependent on mature and old growth forests would decline. The greatest declines would be among habitat specialists, which are of greatest management concern in the region.

Government Revenue Impacts

The gross government revenue impacts of Scenario 3 appear in Table 6-3. Current annual government revenues are approximately $51.01 million. In the first 10 years, these revenues would not change. Government revenue losses would then be $11.22 million and $5.76 million annually, beginning in years 10 and 20, respectively. In year 50, there would be a slight reduction in harvest levels resulting in government revenue losses of $0.77 million, but this could be recovered in year 60 when the harvest could increase. No further changes would occur until year 120, when a total of $1.86 million annually would be lost. However, this could be reversed in year 130.

Table 6-3: Scenario 3 - Provincial Revenue Impacts ($1993 millions/Year)

Year	Resource Revenues	Personal Income Tax	Other Taxes	Total
Current	$26.62	$14.64	$9.75	$51.01
0	26.62	14.64	9.75	51.01
10	20.76	11.42	7.61	39.79
20	17.76	9.77	6.51	34.03
30	17.76	9.77	6.51	34.03
40	17.76	9.77	6.51	34.03
50	17.36	9.55	6.36	33.26
60	17.76	9.77	6.51	34.03
70	17.76	9.77	6.51	34.03
80	17.76	9.77	6.51	34.03
90	17.76	9.77	6.51	34.03
100	17.76	9.77	6.51	34.03
110	17.76	9.77	6.51	34.03
120	16.79	9.23	6.15	32.17
130	17.76	9.77	6.51	34.03
140	17.83	9.81	6.53	34.18

7.0 SUMMARY

7.1 TSA Impacts

The TSA-level impacts of the three harvest scenarios are summarized in Table 7-1.

- Scenario 1 shows an immediate and sizable reduction in harvest when compared to the other scenarios. In Scenarios 2 and 3, the current AAC is maintained for 10 years, but then sizable decreases would occur in the subsequent two decades. By year 30, the harvest level under all scenarios is close to the long-run harvest level. However, whereas scenarios 1 and 3 experience further minor positive and negative harvest adjustments after year 30, Scenario 2 undergoes four major adjustments. A 33 percent reduction in harvest in year 40 to substantially below the long term harvest level, a 50 percent increase in year 50, an 11 percent reduction in year 100, and a final 17 percent increase in year 110 highlight Scenario 2's volatile harvest schedule. All three scenarios would have reached the long run harvest level of 1 182 500 m^3 by year 140.
- Employment and employment income distributions follow the same pattern as the harvest reductions. Under Scenario 1, 417 total direct and indirect jobs and $11.5 million annually in employment income would be lost immediately. A further cumulative total job loss of 749 and income loss of $20.6 million would occur between years 10 and 30. Under Scenario 2, no job losses in the first decade would be followed by a loss of 1166 total jobs and $32.1 million in income between years 10 and 30. Subsequent job and income losses later years balance each other out. Under Scenario 3, there would be no job or income losses in the first 10 years. Between years 10 and 20, cumulative total job loss would be 1157 and income loss $31.8 million. Some further minor adjustments would occur in year 50 and year 120.
- In a general sense, each scenario will likely have a similar impact on recreation and tourism activity because they are all subject to the same Integrated Resource Management rules and involve harvesting the same amount of timber over the long term. In the first decade Scenario 1 may have less impact on some recreational and aesthetic values because of its lower harvest.
- Community impacts would be immediate under Scenario 1, but would be deferred until year 10 under the other two scenarios. The deferral would provide a limited amount of time for mitigation measures to be introduced. However, Scenarios 2 and 3 have serious drawbacks in subsequent decades. Scenario 2 has a wide fluctuation in timber harvesting between the fourth and fifth decades and Scenario 3 has major harvest reductions starting in the second decade.

  Some minor population adjustments would occur as the result of job losses. Most of the social and community impacts would hit hardest at the smaller, rural communities of the upper Fraser Valley. Communities such as Yale, Boston Bar, North Bend, Hope, and Kent have significant forest workforces (particularly in harvesting), less diversified economies, and fewer support services than larger, neighbouring communities to the west. Demands for social services and employment in these communities would increase significantly.

Table 7-1: Summary of TSA Accounts

			Scenario 1					Scenario 2					Scenario 3				
			Years from Present					Years from Present					Years from Present				
		Current	0	10	20	30	60	0	10	20	30	60	0	10	20	30	60
Harvest in '000 m^3		1 765	1 553	1 398	1 258	1 173	1 173	1 765	1 580	1 422	1 173	1 173	1 765	1 377	1 178	1 178	1 178
Economic Account																	
Employment	Direct	1 579	1 390	1 251	1 125	1 049	1 049	1 579	1 413	1 272	1 049	1 049	1 579	1 232	1 053	1 053	1 053
(PY/Year)	Indirect	1 895	1 667	1 501	1 351	1 259	1 259	1 895	1 696	1 526	1 259	1 259	1 895	1 478	1 264	1 264	1 264
	Total	3 474	3 057	2 751	2 476	2 308	2 308	3 474	3 109	2 798	2 308	2 308	3 474	2 710	2 317	2 317	2 317
Employment	Direct	$51.4	$45.2	$40.7	$36.6	$34.1	$34.1	$51.4	$46.0	$41.4	$34.1	$34.1	$51.4	$40.1	$34.3	$34.3	$34.3
Income ($1993	Indirect	44.2	38.9	35.0	31.5	29.4	29.4	44.2	39.6	35.6	29.4	29.4	44.2	34.5	29.5	29.5	29.5
Millions/Year)	Total	$95.6	$84.1	$75.7	$68.1	$63.5	$63.5	$95.6	$85.6	$77.0	$63.5	$63.5	$95.6	$74.6	$63.8	$63.8	$63.8
Community Account																	
Population			▪ small long-term effect in Fraser Canyon					▪ small long-term effect in Fraser Canyon					▪ small long-term effect in Fraser Canyon				
Local Government			▪ reduced tax base in short-term if mill closes					▪ neutral in short-term; higher risk of mill closure medium-term					▪ neutral in short-term; higher risk of mill closure medium-term				
Social Fabric			▪ moderate strain in short to medium term - most vunerable areas are Fraser Canyon, Hope and Chilliwack					▪ neutral in short-term; more severe impact in medium term - most vunerable areas are Fraser Canyon, Hope and Chilliwack					▪ neutral in short-term; more severe impact in medium term - most vunerable areas are Fraser Canyon, Hope and Chilliwack				
Aboriginal Account																	
Economic			▪ decreased employment opportunities in the forest industry in Fraser Canyon, Hope, Kent and Chilliwack areas					▪ neutral impact in short-term; larger drop in employment opportunities in the forest industry in the medium-term					▪ neutral impact in short-term; larger drop in employment opportunities in the forest industry in the medium-term				
Cultural/Heritage			▪ potential impact on cultural/heritage sites					▪ potential impact on cultural/heritage sites					▪ potential impact on cultural/heritage sites				
Land Claims			▪ indeterminate					▪ indeterminate					▪ indeterminate				

7.2 Provincial Impacts

The provincial impacts of the three harvest scenarios are summarized in Table 7-2.

- Provincial employment, income, and government revenues would decline in the same manner as the regional impacts.
- Under Scenario 1, an immediate harvest decline of 12 percent in the first decade results in a total employment loss of 618, total employment income loss of $16.8 million, and total provincial government revenue loss of $6.1 million annually. A further cumulative total job loss of 1112, income loss of $30.2 million, and a $11.0 million British Columbia government gross revenue loss would occur between years 10 and 30. Under Scenario 2, no job losses in the first decade would be followed by a loss of 1730 total jobs, $47.0 million in income, and $17.1 million in government revenue between years 20 and 40. Under Scenario 3, there would be no job or job income losses in the first 10 years. Between years 10 and 20, cumulative total job loss would be 1715, job income loss $46.6 million, and government revenue loss $17.0 million.
- Long-term environmental impacts under all three scenarios are similar. These projected environmental impacts apply only to the timber harvesting land base which represents 23 percent of the TSA's total land base. A further 24 percent of the TSA's land base is productive forest which cannot be harvested for a number of reasons. In general, on the timber harvesting land base there would be a reduction of old growth and other valuable habitats supporting several wildlife species of key management concern in the region. Because Scenario 1's harvest is reduced immediately, it provides the greatest short-term flexibility for managing non-timber values.

Table 7-2: Summary of Provincial Accounts

			Scenario 1					Scenario 2					Scenario 3				
			Years from Present					Years from Present					Years from Present				
		Current	0	10	20	30	60	0	10	20	30	60	0	10	20	30	60
Harvest in '000 m^3		1 765	1 553	1 398	1 258	1 173	1 173	1 765	1 580	1 422	1 173	1 173	1 765	1 377	1 178	1 178	1 178
Economic Account																	
Employment	Direct	2 061	1 814	1 633	1 469	1 369	1 369	2 061	1 845	1 660	1 369	1 369	2 061	1 608	1 375	1 375	1 375
(PY/Year)	Indirect	3 092	2 721	2 448	2 204	2 054	2 054	3 092	2 767	2 490	2 054	2 054	3 092	2 412	2 063	2 063	2 063
	Total	5 153	4 535	4 081	3 673	3 423	3 423	5 153	4 612	4 151	3 423	3 423	5 153	4 020	3 438	3 438	3 438
Employment	Direct	$67.8	$59.6	$53.7	$48.3	$45.0	$45.0	$67.8	$60.7	$54.6	$45.0	$45.0	$67.8	$52.9	$45.2	$45.2	$45.2
Income ($1993	Indirect	72.2	63.5	57.2	51.5	48.0	48.0	72.2	64.6	58.2	48.0	48.0	72.2	56.3	48.2	48.2	48.2
Millions/Year)	Total	$140.0	$123.1	$110.9	$99.8	$93.0	$93.0	$140.0	$125.3	$112.8	$93.0	$93.0	$140.0	$109.2	$93.4	$93.4	$93.4
Provincial Revenue Account ($1993 Millions/Year)																	
Stumpage and Rents		$26.6	$23.4	$21.1	$19.0	$17.7	$17.7	$26.6	$23.8	$21.4	$17.7	$17.7	$26.6	$20.8	$17.8	$17.8	$17.8
Personal Income Taxes		14.6	12.9	11.6	10.4	9.7	9.7	14.6	13.1	11.8	9.7	9.7	14.6	11.4	9.8	9.8	9.8
Other Taxes		9.8	8.6	7.7	7.0	6.5	6.5	9.8	8.7	7.9	6.5	6.5	9.8	7.6	6.5	6.5	6.5
Total		$51.0	$44.9	$40.4	$36.4	$33.9	$33.9	$51.0	$45.6	$41.1	$33.9	$33.9	$51.0	$39.8	$34.1	$34.1	$34.1
Environmental Account			▪ same long-term impacts as scenarios 2 and 3; however, affords the greatest short-term (first 20 years) flexibility for managing the forest for biological diversity					▪ conversion of old growth forests to younger forests, especially at lower elevations ▪ short-term enhancement of some ungulates; long-term declines in population of key big game and old growth dependent species					▪ conversion of old growth forests to younger forests, especially at lower elevations ▪ short-term enhancement of some ungulates; long-term declines in populations of key big game and old growth dependent species				

7.3 Issues

This report identifies several issues which are critical to Fraser 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.

- 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 aboriginal community 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 the encroachment of urbanization in Chilliwack and Mission areas on the productive forest because of strong lower mainland population growth and high house prices in more westerly communities.

- Planning for more forest recreation areas, in response to strong population growth.

- Developing an improved understanding of the economic trade-offs between long and short rotation cycles for lower quality second growth stands.

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 BC Government'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 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, climate, 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 140 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 Fraser Timber Supply Analysis [1993] 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, processing, and government).
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 land slides.
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 Term Harvest Level	Refers to timber harvesting levels whereby the volume of timber harvested in any given period can be replaced by a similar volume 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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APPENDIX 5

FRASER TSA AAC APPORTIONMENT BY LICENSEE

AAC Apportionment by Licensee, Fraser TSA, 1993		
	m^3	% of AAC
J.S. Jones Holdings Ltd.	480 380	27.2%
Small Business Forest Enterprise Program	353 835	20.0
International Forest Products Limited	230 322	13.0
Pretty's Timber Co. Ltd.	191 786	10.9
Cattermole Timber	176 880	10.0
Canadian Forest Products Ltd.	80 144	4.5
Coast Mountain Hardwoods Inc.	65 000	3.7
Herman Log Sales Ltd.	60 088	3.4
Canadian Pacific Forest Products Limited	46 274	2.6
Tamihi Logging Co. Ltd.	25 022	1.4
McMahon Lumber Company Ltd.	18 562	1.1
International Forest Products Limited and Allison Pass Sawmills Ltd.	6 250	0.4
E.R. Probyn Ltd.	3 600	0.2
Joe Johnstone Ltd.	2 584	0.2
Scott Paper Limited	1 728	0.1
Allison Pass Sawmills Ltd.	1 492	0.1
Charley Chung	322	-
Rudy Schellenberg	284	-
Victor Jackson	200	-
Wesley Frederick Barber	200	-
Wiltshire Contracting Ltd.	190	-
Estate of W.A. Bell	124	-
Total Approved Allowable Annual Cut	1 745 267	98.9%

APPENDIX 6

ABORIGINAL ORGANIZATIONS

Regional Tribal Councils, Member Bands[1] and Independent Indian Bands in the Fraser TSA

Organization	Total No. of Bands	Total Population	On-Reserve Population	Head Office
Alliance Tribal Council	10	6 418	3 901	Delta
Burrard Band		277	178	N. Vancouver
Katzie		341	186	Pitt Meadows
Squamish		2 554	1 627	N. Vancouver
Tsawwassen		155	57	Delta
In-SHUCK-ch[2]	3	682	87	Mission
Douglas		164	49	Harrison Hotsprings
Samahquam		221	12	Mission
Skookumchuk		297	26	Pemberton
Sto:lo Nation Canada	10	1 221	521	Sardis
Aitcheltz		19	18	Sardis
Kwaw-Kwaw-A-Pilt		33	22	Chilliwack
Lakahahmen		249	88	Deroche
Matsqui		147	79	Matsqui
Peters		96	42	Hope
Skawahlook		58	7	Agassiz
Skowkale		150	99	Sardis
Skway		166	24	Chilliwack
Tzeachten		257	124	Sardis
Union Bar		76	5	Hope
Sto:lo Tribal Council	11	2 034	1 103	Sardis
Chawathil		303	187	Hope
Cheam		301	150	Rosedale
Langley		126	61	Ft. Langley
Ohamil		80	28	Hope
Popkum		8	5	Rosedale
Scowlitz		201	88	Lake Errock
Seabird Island		555	316	Agassiz
Soowahlie		239	80	Cultus Lake
Sumas		217	128	Abbotsford
Squiala		42	67	Chilliwack
Yakweakwioose		37	21	Sardis
Nlaka'pamux Nation	7	2 594	1 219	Lytton
Boothroyd		244	84	Boston Bar
Boston Bar		182	64	Boston Bar
Spuzzum		152	37	Yale

1 Only those member bands within the Fraser TSA are listed.

2 In-SHUCK-ch is an administrative arm of the Coast Mountain Development Corporation to deliver programs to Harrison bands.

Organization	Total No. of Bands	Total Population	On-Reserve Population	Head Office
Independent Bands				
Chehalis		775	400	Agassiz
Coquitlam		77	8	Coquitlam
Musqueam		877	469	Vancouver
Semiahmoo		57	26	White Rock
Skwah		354	171	Chilliwack
Yale		111	49	Hope

APPENDIX 7

TIMBER HARVESTING LAND BASE IN THE FRASER TSA, 1993

Classification	Area (ha)	Area (ha)	% of Total Area
Total Land Base		1 173 616	100.0%
Non-Crown Land		229 398	19.4
Non-forest land		373 952	31.9
Total Productive Crown Forest		570 266	48.7
Reductions to Productive Crown Forest:			
Not Satisfactorily Restocked (NSR)	13 989		1.2
Non-commercial Cover (NC)	1 022		-
Inoperable	189 836		16.2
Environmentally Sensitive	22 450		1.9
Low Productivity Sites	61 444		5.2
Streamside Buffers	5 653		0.5
High Recreation Values	83		-
Roads, Skid Trails, Landings	14 180		1.2
Total Reduction	308 658		26.4
Timber Harvesting Land Base (Less Additions)		261 608	22.3
Additions:			
Current NSR	13 989		1.2
Total Additions	13 989	13 989	1.2
Future Reductions for Roads, Trails, Landings	514		-
Total Reductions	514	514	-
Future Timber Harvesting Land Base		275 083	23.4%
[British Columbia Ministry of Forests, 1993]			

APPENDIX 8

METHODOLOGIES AND ISSUES

I. Economic Impact Methodology

Introduction

An economy is a system of inter-related sectors, and any change in the final demand of a business or industry will induce a sequence of changes in production and employment in the 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. 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.

This study examines economic impacts of TSA timber harvests at the TSA and province-wide levels[3]. The approach used is described below.

TSA IMPACTS

Direct Employment

Employment estimates were based on a review of licensee employee information. All information is expressed as a coefficient per 1000 m^3, which allows for a ready estimate of forest sector employment and income impacts based on timber harvest level changes.

Harvesting and Silviculture - Fraser TSA Licensees were solicited for five 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, Cattermole Timber, J.S. Jones Holdings Ltd., International Forest Products Limited, McMahon Lumber Company Ltd., Pretty's Timber Co. Ltd., Coast Mountain Hardwoods Inc., and Scott Paper Limited. Small business operators Tolson's Enterprises, Freeline Equipment and Forlog Logging provided SBFEP employment estimates. Licensee respondents accounted for 80 percent of the Fraser TSA harvest in 1993.

[3] The focus of this study is on TSA timber. It is not a comprehensive study of the Lower Mainland wood processing industry where many of the processing plants obtain their wood supply from other areas of B.C., especially from coastal areas. A critical examination of the future of these processing operations would require a broader examination than is undertaken in this report.

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 Fraser TSA.

The TSA harvesting (including logging, silviculture and administration) coefficient is estimated to be .52 PY per 1000 m^3. Harvesting employment is assumed to accrue to the TSA.

Processing - The licensee survey solicited processing facility employment information over the last five years. A sample of 18 mills throughout the region was obtained, representing approximately 7.8 million m^3 of average annual consumption. In 1993, these mills directly processed 36 percent of the Fraser TSA harvest. This is more than one half of the TSA wood processed within the TSA.

The regional processing coefficient is comprised of three separate coefficients, as follows:

- The regional processing coefficient for solid wood producers is estimated to be .52 PY per 1000 m^3 processed. According to wood flow information obtained from licensees, approximately 64 percent of all non-pulp wood from the TSA is processed in the TSA.

- TSA paper production is estimated to consume approximately one percent of Fraser TSA wood. This wood goes almost exclusively to Scott Paper's New Westminster mill, where there is significant value-added paper production. For confidentiality reasons, the company's processing coefficient is not divulged here.

- Approximately five percent of Fraser TSA wood is chipped in the TSA and shipped outside of the province for processing. Two of the three chippers in the region were solicited for their employment and consumption levels. The coefficient for chip processing in the region is .049 PY per 1000 m^3 processed. No further value-added production (e.g. pulp production) was assumed for these volumes.

When the above three coefficients are combined, the regional processing coefficient is estimated to be .37 PY per 1000 m^3 harvested.

The regional coefficient for all processing and harvesting activities is estimated to be .89 PY per 1000 m^3 harvested. The lack of pulp and paper processing facilities in the region largely explains why the regional coefficient is lower than the provincial coefficient discussed below.

Except for Scott Paper, we have not included any further paper production employment in the coefficient, even though it is known to exist. Island Paper Mills of Richmond, for

example, does purchase market pulp from coastal mills which themselves process Fraser TSA wood. However, tracing fibre flows in the pulp and paper sector is extremely difficult. Conversion rates and yield estimates fluctuate widely depending upon the type of mill, its technology, and its raw material inputs. Complicating the picture is the fact that some pulp mills utilize both kraft and mechanical technologies. In the end, providing a paper industry employment estimate for Fraser TSA wood would be highly speculative without significantly more industry information than is available to this study.

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 Fraser TSA wood would also be speculative. Additionally, because wood remanufacturers have alternative sources of supply (including imports) and can use substitute materials, we have assumed that their employment levels would not be a direct function of the Fraser TSA harvest.

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 TSA forestry employment is $45 279.

Employment income is reported as after-tax in this report. 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 TSA forestry workers is $32 532.

Indirect Employment

There is no regional multiplier for the Lower Mainland. UBC's Craig Davis estimated a 1971 total employment multiplier for the metro Vancouver forest industry of 1.43 [undated]. There are two problems with using this multiplier. It is based on more than 20 year old inter-sectoral relationships and it applies to metro Vancouver and does not include the Fraser Valley. Davis undertook a more recent modelling exercise in 1981, but that data is also dated, and the indirect multipliers were general, applying to all sectors. The total employment multipliers for the Lower Mainland was estimated as 54.5 jobs per $1 million of direct employment income [Davis 1986]. Converting this 1981 figure to 1992 dollars provides an estimate of 34.5 jobs per million dollars.

The BC Ministry of Finance 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 highest economic base multipliers in BC are 1.79 for the Kamloops and Nanaimo areas. These higher figures reflect their well developed service and retail sectors. An economic base multiplier for the Lower Mainland would be at least as high.

The direct employment and income estimates for the region have been produced through the survey of forest industry employers.

The provincial employment multiplier is 2.5. In this report, the provincial multiplier is used as a maximum for the region and a minimum is developed by considering the potential leakages from the Lower Mainland to the rest of the province. A July 1991 Vancouver Board of Trade study, which included a survey of four of the largest forest products companies in the province, indicated that they make 75 to 80 percent of their purchases in Metropolitan Vancouver. This data indicates a very low level of leakage of indirect purchases. The highly developed Lower Mainland service and retail sectors also means that there will be a low level of leakage in the induced category. A regional minimum multiplier is calculated by taking 80 percent of the 1.5 indirect/induced portion of the provincial multiplier. Therefore the minimum regional employment multiplier for the forest industry is estimated at 2.2.

Indirect 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

Thirty percent of Fraser TSA wood leaves the area for processing. According to licensee survey information, 16 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 .46 PY per 1000 m^3 processed.

A considerable volume of chip and sawdust residue is generated when non-pulp Fraser 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 .41 PY per 1000 m^3 to these volumes. Approximately

12 percent of Fraser TSA wood leaves the TSA for non-pulp processing. We have applied the TSA processing coefficient of .52 PY per 1000 m^3 to these volumes.

The final 2.0 percent of Fraser TSA wood that is processed outside the region is for chips. We have applied the TSA chip processing coefficient of .049 PY per 1000 m^3 to these volumes.

The provincial coefficient for all harvesting and processing of Fraser TSA wood is estimated to be 1.17 PY per 1000 m^3.

According to our survey responses, a small volume of logs are exported from BC annually, but not enough to alter the coefficients. This situation was verified with the Ministry of Forests' Vancouver Forest Region office, which indicated that there are no provisions for log exports in current licences. Additionally, a review of licensee advertisements for 1993 indicated a low level of exporting activity.[4]

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 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 provincial forestry employment is $47 400.

Employment income is reported as after-tax in this report. Based on the above harvesting, silviculture and processing incomes, a weighted average tax rate of 28.2 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 $33 996.

Indirect/Induced Employment

Multiplying direct employment by the Ministry of Forests' forest sector multiplier of 2.5 provides an estimate of total employment[5]. Indirect and induced employment is the difference between the total and direct figures.

Indirect/Induced Income

Indirect employment is obtained by dividing the estimated indirect employment income 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.

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4 Personal communication, Norm Cunningham, Ministry of Forests, Vancouver Forest Region.

5 The Ministry of Forests uses an employment multiplier of 2.5 for the timber harvest impact assessments after reviewing the literature and multipliers that various analysts have developed.

Summary Table of Key Economic Impact Values in the Fraser TSA		
	TSA	Provincial
Harvesting Employment Coefficient (PYs/1 000 m^3)	.52	.52
Processing Employment Coefficient (PYs/1 000 m^3)	.37	.65
Total Employment Coefficient (PYs/1 000 m^3)	.89	1.17
After-Tax Forest Wage	$32 532	$33 996
After-Tax Indirect Wage	$23 350	$23 350
Multiplier	2.2	2.5

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. Lower Mainland forests provide significant opportunities for people to enjoy the outdoors. There is no coefficient that measures the relationship between tourism/recreation employment and timber harvest, but a relationship can be estimated between visitorship and recreation/tourism employment. If harvest level changes affect visitorship, outdoor recreation and tourism employment will change.

Tourism and recreation have somewhat unique products and production processes. The trip is the product, rather than recreation sites and facilities. It involves the total experience, anticipation, travel and recollection. 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 interpret any experienced or perceived adverse impacts from timber harvesting and decide whether or not to go forward with a trip.

In a general sense, each scenario would have a similar effect on outdoor recreation and tourism opportunities because they are subject to the same forest management practices, including Ministry of Forests Integrated Resources Management (IRM) guidelines. The specific protection for biodiversity, landscape views and habitat should prevail in the same fashion and in the same quantity for each scenario. Recreation and tourism activity are site-specific. If a scenario included a site-specific IRM exemption, then it might experience a consequential reduction in tourism activity; however, all scenarios for Fraser TSA reference the same land base.

Timber cutting 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. And, since the same land base applies to all scenarios, there will not be differences between them in terms of logging road access.

One possible difference in recreation and tourism potential between the scenarios results from the lower near-term harvest for Scenario 1 over Scenarios 2 and 3. The immediate 12 percent drop in harvest may make it easier to manage visual and wildlife habitat impacts from timber harvesting. A reduced harvest would not enhance tourism features, but may help to maintain visitorship which may otherwise decline due to timber harvesting impacts. However, the different tourism/recreation impacts between the scenarios would likely only be experienced in the short-term, since the long-run harvest is the same in all three cases.

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 Chilliwack Valley, 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. Government Revenues

Historical government revenues per cubic meter of harvested timber were estimated and 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 non-SBFEP Fraser TSA volumes is $7.39 per m^3. Other rents are assumed to be $.25 per m^3. The total resource revenue rent per m^3 of non-SBFEP wood is therefore $7.64.

The weighted average 1989-1993 average for SBFEP Fraser TSA volumes is $44.84 per m^3. This is comprised of a five year average upset price of $12.84 and a five year average bonus bid of $32.00.

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 27.8 percent for regional forestry income, 28.2 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.[6]

Other Taxes - A composite tax rate of $5.53 per m^3 is used to cover corporate, logging, property, sales, and electricity taxes [Price Waterhouse 1993]. This was based on a 1988-1992 industry average.

6 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 9

INCREMENTAL IMPACTS

SCENARIO 1

	TSA Impacts				Provincial Impacts				
	Employment (PYs/Year)		After-Tax Income ($1993 Mill/Year)		Employment (PYs/Year)		After-Tax Income ($1993 Mill/Year)		Government Revenues
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	($Mill/Year)
0	-189	-417	-$6.16	-$11.47	-247	-618	-$8.13	-$16.80	-$6.09
10	-139	-306	-4.52	-8.41	-181	-454	-5.96	-12.32	-4.46
20	-125	-275	-4.07	-7.57	-163	-408	-5.37	-11.09	-4.02
30	-77	-168	-2.49	-4.64	-100	-250	-3.29	-6.79	-2.46
40	0	0	0.00	0.00	0	0	0.00	0.00	0.00
50	0	0	0.00	0.00	0	0	0.00	0.00	0.00
60	0	0	0.00	0.00	0	0	0.00	0.00	0.00
70	0	0	0.00	0.00	0	0	0.00	0.00	0.00
80	0	0	0.00	0.00	0	0	0.00	0.00	0.00
90	0	0	0.00	0.00	0	0	0.00	0.00	0.00
100	0	0	0.00	0.00	0	0	0.00	0.00	0.00
110	0	0	0.00	0.00	0	0	0.00	0.00	0.00
120	9	20	0.29	0.54	12	29	0.38	0.79	0.29
130	0	0	0.00	0.00	0	0	0.00	0.00	0.00
140	0	0	0.00	0.00	0	0	0.00	0.00	0.00

SCENARIO 2

	TSA Impacts				Provincial Impacts				
	Employment (PYs/Year)		After-Tax Income ($1993 Mill/Year)		Employment (PYs/Year)		After-Tax Income ($1993 Mill/Year)		Government Revenues
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	($Mill/Year)
0	0	0	$0.00	$0.00	0	0	$0.00	$0.00	$0.00
10	-166	-365	-5.40	-10.05	-217	-542	-7.12	-14.71	-5.33
20	-141	-311	-4.60	-8.56	-185	-461	-6.07	-12.53	-4.54
30	-223	-490	-7.25	-13.49	-291	-727	-9.56	-19.75	-7.16
40	-351	-772	-11.41	-21.23	-458	-1145	-15.05	-31.09	-11.27
50	351	772	11.41	21.23	458	1145	15.05	31.09	11.27
60	0	0	0.00	0.00	0	0	0.00	0.00	0.00
70	0	0	0.00	0.00	0	0	0.00	0.00	0.00
80	0	0	0.00	0.00	0	0	0.00	0.00	0.00
90	-33	-73	-1.09	-2.02	-44	-109	-1.43	-2.96	-1.07
100	-115	-253	-3.73	-6.95	-150	-375	-4.93	-10.17	-3.69
110	157	346	5.11	9.51	205	513	6.74	13.93	5.05
120	0	0	0.00	0.00	0	0	0.00	0.00	0.00
130	0	0	0.00	0.00	0	0	0.00	0.00	0.00
140	0	0	0.00	0.00	0	0	0.00	0.00	0.00

SCENARIO 3

	TSA Impacts				Provincial Impacts				
	Employment (PYs/Year)		After-Tax Income ($1993 Mill/Year)		Employment (PYs/Year)		After-Tax Income ($1993 Mill/Year)		Government Revenues
Year	Direct	Total	Direct	Total	Direct	Total	Direct	Total	($Mill/Year)
0	0	0	$0.00	$0.00	0	0	$0.00	$0.00	$0.00
10	-347	-764	-11.30	-21.03	-454	-1134	-14.91	-30.79	-11.16
20	-178	-392	-5.80	-10.79	-233	-582	-7.65	-15.80	-5.73
30	0	0	0.00	0.00	0	0	0.00	0.00	0.00
40	0	0	0.00	0.00	0	0	0.00	0.00	0.00
50	-24	-52	-0.77	-1.44	-31	-78	-1.02	-2.11	-0.76
60	24	52	0.77	1.44	31	78	1.02	2.11	0.76
70	0	0	0.00	0.00	0	0	0.00	0.00	0.00
80	0	0	0.00	0.00	0	0	0.00	0.00	0.00
90	0	0	0.00	0.00	0	0	0.00	0.00	0.00
100	0	0	0.00	0.00	0	0	0.00	0.00	0.00
110	0	0	0.00	0.00	0	0	0.00	0.00	0.00
120	-58	-127	-1.88	-3.50	-75	-189	-2.48	-5.12	-1.86
130	58	127	1.88	3.50	75	189	2.48	5.12	1.86
140	4	10	0.15	0.27	6	15	0.19	0.40	0.14