

**Invermere Timber Supply Area
Socio-Economic Analysis**

May, 1995

**Economics and Trade Branch
British Columbia Ministry of Forests**

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Executive Summary

Introduction

- This report profiles the Invermere Timber Supply Area (TSA) and discusses the potential socio-economic and environmental implications associated with three harvest scenarios chosen to present a range of possible impacts.
- The Invermere TSA is located in the south-east corner of B.C. The TSA covers just over one million hectares and is administered by the Invermere Forest District office located in Invermere.

Environmental Profile

- The TSA's main physical features include the southern portion of the Rocky Mountain Trench, the Continental Ranges of the Rocky Mountains, and the eastern Purcell Mountains portion of the Columbia Mountains.
- The area has some of the highest wildlife values in North America, supported by internationally significant wildlife winter range and wetlands.
- Environmental concerns include issues regarding ungulate winter range, caribou, riparian habitats, watershed protection and fish habitat, connectivity, access development, and forage protection issues.

Community Profile

- The 1991 Invermere TSA population was 7185, this represents a 9.7 percent increase since 1981. The area is experiencing rapid growth, with migrants attracted by the natural attributes and high quality of life the area has to offer.
- Due to in-migration and an increase in the labour force participation rate, the size of the labour force has been increasing. Between 1981 and 1991, both the TSA unemployment rate and average real personal income level have been below the provincial average.

First Nations Profile

- The Invermere TSA is located within the traditional territory of the Ktunaxa Kinbasket Tribal Council, which represents five bands. The Columbia Lake and Shuswap bands have communities within the TSA.
- First Nation concerns revolve around environmental, socio-economic, heritage and treaty negotiation-related issues.

Economic Profile

- The Invermere TSA has a growing, diversified economy, with tourism, forestry, the public sector, construction, mining, and agriculture serving as the primary generators of employment.
- Forestry, the public sector and tourism also provide the majority of employment income in the TSA.
- Non-employment sources of income such as pensions, unemployment insurance, investments and social assistance, also make significant contributions to the economy.

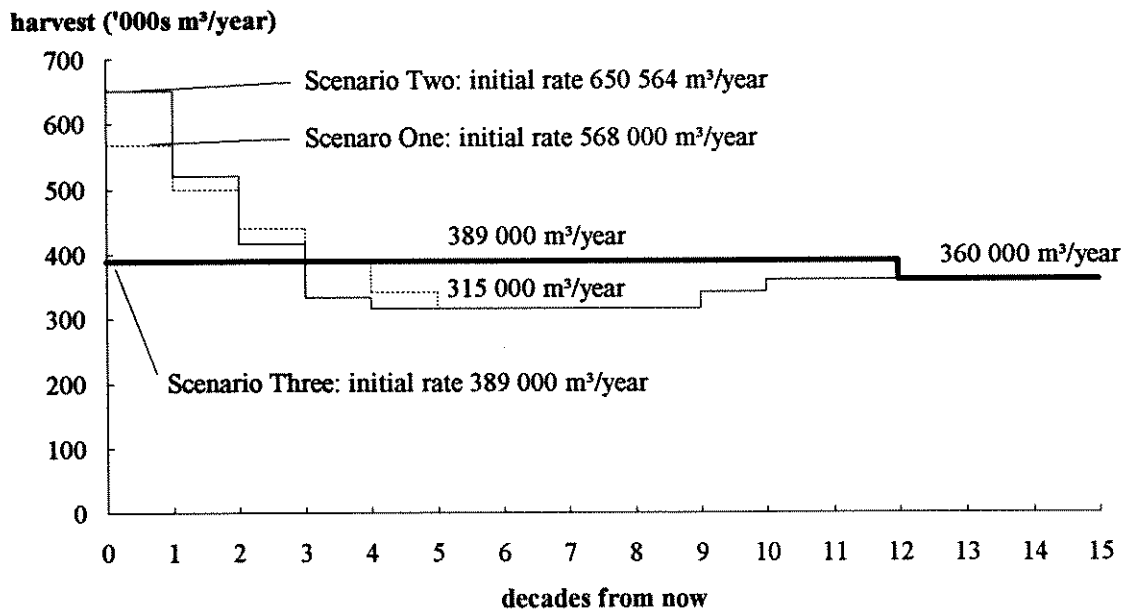
The Forest Sector

- Under current management practices, the long-term timber harvesting land base is 215 985 hectares. Approximately 53 percent of this area has special resource management emphases to account for wildlife habitat, water conservation, and aesthetics. The remaining area is managed for integrated resource management.
- The Invermere TSA AAC of 650 564 cubic metres supports a total of 572 direct PY and generates \$17.7 million in annual direct employment income. Indirect and induced employment is estimated to contribute 859 PY and \$21.0 million in employment income annually.
- Harvesting and processing timber in the Invermere TSA is estimated to generate approximately \$19.3 million in annual provincial government revenue. These estimates include the increased stumpage revenues generated to fund the Forest Renewal Plan.

Harvest Scenarios

- Three harvest scenarios, chosen to illustrate a range of possible socio-economic impacts were analyzed in this report. These scenarios are not AAC recommendations, but are meant to provide a focus for discussion of timber supply issues. Further, all three scenarios involve a decline from the current AAC to the same long-term harvest level (360 000 cubic metres). The only difference between the scenarios is the timing of the decline to the long-term level.

Figure E.1 Harvest Scenarios



Scenario One - Scenario One is the base harvest forecast from the *Invermere TSA Timber Supply Analysis* report. This harvest forecast begins with an immediate 12.7 percent or 75 864 cubic metre drop in harvest to 568 000 cubic metres per year. To avoid major harvest shortfalls, the harvest forecast declines by approximately 12 percent per decade over the next five decades to a low of 315 000 cubic metres per year. In approximately 90-100 years, the harvest level increases to the long-term harvest level of 360 000 cubic metres per year.

Scenario Two - Scenario Two maintains the current harvest level for one decade before dropping at a rate of 20 percent per decade to a low of 315 000 cubic metres per year after four decades. In approximately 90-100 years, this harvest level also increases to the long-term harvest level of 360 000 cubic metres per year.

Scenario Three - The harvest level in Scenario Three drops immediately by 40 percent to the highest non-declining rate achievable over the next 12 decades (389 000 cubic metres per year). After 120 years, the harvest then drops to the long run harvest level rate of 360 000 cubic metres per year.

TSA and Provincial Socio-Economic and Environmental Impacts

- TSA and Provincial-level impacts for the three scenarios are presented in Table E-1 and E-2.

Table E-1 Summary of Invermere TSA Impacts													
Invermere TSA	Scenario One			Scenario Two			Scenario Three			All			
Decades	Current	1	2	3	Current	1	2	3	Current	1	2	3	LTHL
Harvest Level (m³/year)	650 564	568 000	499 840	439 859	650 564	650 564	521 011	416 809	650 564	389 000	389 000	389 000	360 000
Employment (Person Years)													
Direct Employment	403	352	310	273	403	403	323	258	403	241	241	241	223
Indirect/Induced Employment	150	131	115	101	150	150	120	96	150	89	89	89	83
Total Employment	553	483	425	374	553	553	443	354	553	330	330	330	306
Employment Income (\$1993 M/year)													
Direct After-Tax Income	\$12.4	\$10.8	\$9.5	\$8.4	\$12.4	\$12.4	\$9.9	\$7.9	\$12.4	\$7.4	\$7.4	\$7.4	\$6.9
Indirect/Induced Income	3.4	3.0	2.6	2.3	3.4	3.4	2.7	2.2	3.4	2.0	2.0	2.0	1.9
Total After-Tax Income	15.8	13.8	12.1	10.7	15.8	15.8	12.6	10.1	15.8	9.4	9.4	9.4	8.8
	Decade One				Decade One				Decade One				
Community Implications													
Population	little effect due to high growth rates				no effect				moderate adverse effect				
Employment	little effect due to the expansion of other sectors				no effect				significant adverse effect - greater probability of threshold effects occurring				
Income	moderate adverse effect				no effect				significant adverse effect				
Forest worker/family	moderate adverse effect				no effect				significant adverse effect				
First Nations Implications													
Heritage values	moderate maintenance of heritage values				least maintenance of heritage values				greatest maintenance of heritage values				
Economic development	moderate economic opportunities associated with forestry activity				greatest economic opportunities associated with forestry activity				least economic opportunity associated with forestry activity				

Table E-2 Summary of Invermere Provincial Impacts

Table E-2 Summary of Invermere Provincial Impacts													
Invermere TSA Provincial Decades	Scenario One				Scenario Two				Scenario Three				All
	Current	1	2	3	Current	1	2	3	Current	1	2	3	LTHL
Harvest Level (m³/year)	650 564	568 000	499 840	439 859	650 564	650 564	521 011	416 809	650 564	389 000	389 000	389 000	360 000
Employment (Person Years)													
Direct Employment	572	500	440	387	572	572	458	367	572	342	342	342	317
Indirect/Induced Employment	859	750	660	581	859	859	688	550	859	513	513	513	475
Total Employment	1431	1250	1100	968	1431	1431	1146	917	1431	855	855	855	792
Employment Income (\$1993 M/year)													
Direct After-Tax Income	\$17.7	\$15.4	\$13.6	\$11.9	\$17.7	\$17.7	\$14.1	\$11.3	\$17.7	\$10.6	\$10.6	\$10.6	\$9.8
Indirect/Induced After-Tax Income	21.0	18.3	16.1	14.2	21.0	21.0	16.8	13.5	21.0	12.6	12.6	12.6	11.6
Total After-Tax Income	38.7	33.7	29.7	26.1	38.7	38.7	30.9	24.8	38.7	23.2	23.2	23.2	21.4
Government Revenue (\$1993 M/year)													
Stumpage and Rent	\$12.4	\$10.8	\$9.5	\$8.4	\$12.4	\$12.4	\$9.9	\$7.9	\$12.4	\$7.4	\$7.4	\$7.4	\$6.9
Personal Income Tax	3.0	2.6	2.3	2.0	3.0	3.0	2.4	1.9	3.0	1.8	1.8	1.8	1.7
Other Taxes	3.9	3.4	3.0	2.6	3.9	3.9	3.1	2.5	3.9	2.3	2.3	2.3	2.2
Total Government Revenue	19.3	16.8	14.8	13.0	19.3	19.3	15.4	12.3	19.3	11.5	11.5	11.5	10.7
Environmental Implications													
Old-age forest	moderate rate of conversion from old to younger forests				highest rate of conversion from old to younger forests				slowest rate of conversion from old to younger forest				
Wildlife	moderate adverse impact on old-growth dependent species				greatest adverse impact on old-growth dependent species				least adverse impact on old-growth dependent species				
	moderate adverse impact associated with logging road access				greatest adverse impact associated with logging road access				least adverse impact associated with logging road access				

Economic Impacts

- Over the first decade, total TSA employment impacts would range between zero for Scenario Two, to 222 PY for Scenario Three. Under Scenario One 70 PY are estimated lost. This total represents 1.8 percent of the total 1991 Invermere TSA labour force.
- Over the first decade, total provincial employment impacts would range between zero for Scenario Two, to 575 PY for Scenario Three. Under Scenario One 182 PY are forecast lost.
- Under Scenario One, TSA employment income would decline by \$2.0 million annually. Scenario Three would lead to the loss of \$6.4 million. As with employment, impacts would be postponed for a decade under Scenario Two.
- Under Scenario One, annual provincial employment income would drop by \$4.9 million. An estimated \$15.5 million would be foregone under Scenario Three.
- First decade provincial government revenue impacts would range between zero for Scenario Two to a loss of \$7.8 million under Scenario Three. Scenario One would lead to a \$2.5 million drop in annual revenue.
- Under Scenario Two, after three decades, decreases in harvest levels and associated impacts would surpass those incurred under Scenario One. After four decades, the total decrease in harvest and associated impacts would surpass those incurred under Scenario Three.
- As all scenarios share the same long-term harvest level, provincial impacts associated with this reduction will be the same: 256 PY direct and 384 PY indirect and induced employment and \$7.9 million direct and \$9.4 million indirect and induced annual income lost. An estimated \$8.5 million in annual government revenue would also be foregone with a movement to the long-term level.
- The analysis does not consider various income support and income replacement measures which could alleviate some of the induced employment and income impacts.
- The analysis assumes processing employment impacts are proportional to changes in the harvest level. Processing impacts are more likely to occur in a step-wise manner where, at some quantity of fibre supply (a threshold), the number of shifts may be reduced or as a worst case, the mill may shut down.
- As mills in the area rely on significant amounts of extra-TSA fibre, actual impacts would depend on changes in these other sources of fibre.

- The short-term economic impacts of harvest level changes on other basic sectors, such as tourism, mining, and agriculture would be relatively minor. In general, these industries, along with outdoor recreation are more sensitive to location of harvesting and specific management practices.

Community Implications

- Community implications relate to the level and timing of job losses.
- Factors such as the degree of diversification, the growth in other basic sectors of the economy, the growth in population, the educational and training support infrastructure and presence of economic development organizations, suggests that aggregate employment and population levels could be maintained in the face of Scenario One harvest reductions. Aggregate income, the third measure of successful community adjustment, would however likely fall.
- Scenario Three harvest reductions would have more serious implications for communities in the TSA, with a higher probability of threshold effects occurring. Smaller, marginally economic mills in the TSA would be particularly sensitive to any harvest reductions.
- The potential impacts of harvest reductions would likely be higher in communities with greater economic dependence on the forest sector. Impacts of employment losses on communities will depend on alternative economic strategies developed.

Environmental Implications

- The main difference between scenarios from an environmental perspective results from the timing of harvest reductions. Harvesting of older age forest would proceed most rapidly under Scenario Two, followed by Scenario One and then Scenario Three.
- The three harvest scenarios would ultimately result in a 45 percent drop in harvest levels. Scenario Three may be the most compatible with environmental values.

First Nations Implications

- First Nations people are concerned about the effect of timber harvesting on cultural, medicinal and food values. Reduced harvest levels, such as those proposed under Scenarios One and Three, are more consistent with these values.
- First Nations people recognize the economic opportunities associated with timber harvesting. The higher initial harvest level under Scenario One, relative to the other scenarios, would be more consistent with the economic development objectives of the Ktunaxa and Kinbasket people.

Conclusions

Scenarios One, Two, and Three project a reduction in harvest levels from the current AAC of 650 564 cubic metres to a long-term harvest level of 360 000, a 45 percent decrease. This study estimates the economic, social and environmental implications associated with these scenarios. The harvest reductions illustrated by each of the scenarios would involve significant employment and employment income impacts. However, as all scenarios share the same long-term harvest level, the main difference between them is the distribution of the impacts over time.

The findings of this report are based only on changes in the TSA harvest level and assume no change in variables such as land base, management, harvesting and processing technology, and timber and product prices. A change in any of these factors would require a re-examination of the impacts.

1.0 Introduction

1.1 Background

The British Columbia Forest Service (the Ministry of Forests) is presently conducting a provincial Timber Supply Review to assist the Chief Forester in setting the Allowable Annual Cut (AAC) levels in the province's Timber Supply Areas (TSA). Four reports are released for each TSA. The Timber Supply Analysis reports (TSAR) examine the short- and long-term effects of current forest management practices on the availability of timber for harvesting in the TSAs. The Socio-Economic Analysis (SEA) reports discuss the social, economic, and environmental implications of changing TSA timber harvest levels. The Public Discussion Papers (PDP) summarize the first two reports and encourage public comment on the findings. Finally, the AAC Rationale Statements outline the reasoning behind the Chief Forester's AAC determinations.

1.2 Approach

This report profiles the Invermere TSA area and discusses the socio-economic and environmental implications associated with three timber harvest scenarios presented in the *Invermere TSA Timber Supply Analysis* report. These harvest scenarios were chosen to illustrate a range of impacts; **they are not meant to suggest preferred AAC levels, nor will they be the only options considered in the AAC determination.**

The report follows a multiple accounts approach, which focuses on a range of values derived from the forest ecosystem, and recognizes the need to consider a variety of factors when examining options for forest land management. After a presentation of profile information, separate sections (or accounts) of the report discuss the potential economic, provincial government revenue, community, First Nations, and environmental implications associated with the three harvest scenarios. The report is the result of extensive research and interviews with key local stakeholders, including the forestry sector, the tourism and outdoor recreation sector, provincial government agencies, First Nations, and community representatives.

The analysis in this report considers only impacts attributable to changes in the harvest level, and assumes no change in factors such as the land base, management practices, harvesting and processing technology, and timber prices. Further, the terms of reference of this report are first the Invermere TSA, and second the rest of the province. It is important to note that local areas outside the TSA (Tree Farm Licence #14 and park areas) are only discussed for profile purposes.

2.0 Invermere TSA Profile

2.1 TSA Overview

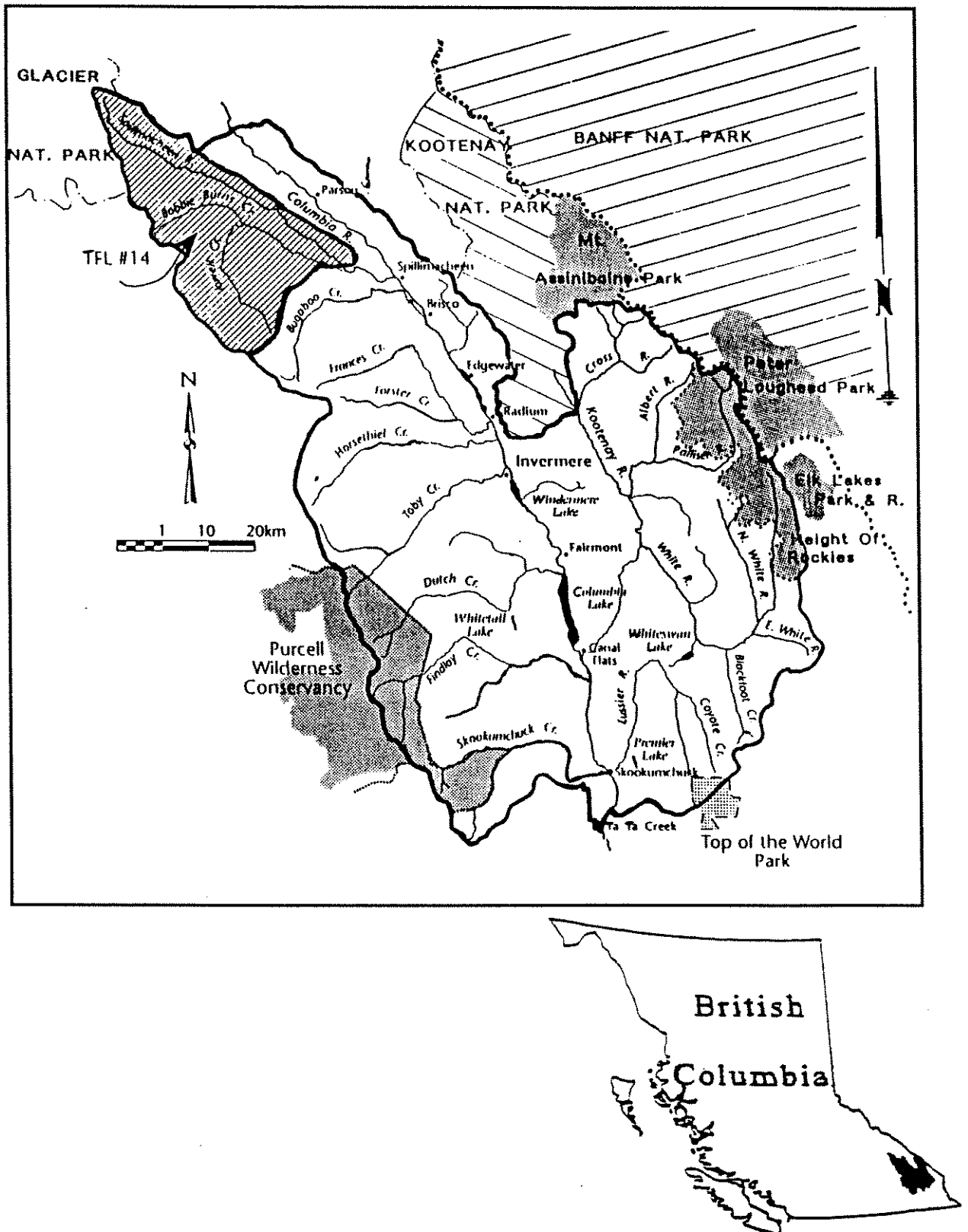
Covering an area of just over one million hectares in southeastern B.C., the Invermere Timber Supply Area (TSA) is one of seven TSAs in the Nelson Forest Region. The TSA is situated next to the Alberta-B.C. border between the Cranbrook and Golden TSAs (see Figure 2.1). The boundaries of the TSA correspond to those of the Invermere Forest District except that the area encompassed by Tree Farm Licence 14 is excluded. Forestry activities in the TSA are administered from the Invermere Forest District office located in Invermere.

Situated in a mountainous region, the TSA's main physical features include the southern portion of the Rocky Mountain Trench which bisects the TSA in a north-south direction; the Continental Ranges of the Rocky Mountains which flank the trench to the east; and the eastern Purcell Mountains portion of the Columbia Mountains which flank the trench to the west. The trench is divided by the meandering Columbia River that flows north from Columbia Lake through Lake Windermere, creating wetlands of international significance. Entering the trench just south of Columbia Lake, the Kootenay River flows south through the TSA. Important ecological values in the TSA are discussed in Section 2.2.

There are several communities in the TSA, the largest being Invermere. Profiles of each community are presented in Section 2.3. The TSA is part of the Ktunaxa First Nation traditional territory. Two Ktunaxa communities, Columbia Lake and Shuswap, are located in the TSA. The interests and concerns of these communities are discussed in Section 2.4.

Early economic development in the TSA was initiated by an interest in the area's natural resources. Gold prospectors came to the area in the 1860s and exploration for other minerals began in the 1880s. Some of the miners turned from prospecting to ranching to supply food to the area's growing population. The forest industry developed in response to the demand for timber for mining operations. In 1887, a mill was built near Canal Flats to supply lumber to construct a canal between Columbia Lake and Kootenay River. A housing boom on the prairies in the early 1900s contributed to the development of the forest industry throughout the Kootenays. The scenic beauty and the variety of wildlife in the area was recognized in the 1800s. Since the creation of Kootenay National Park and the completion of the road from Banff to Radium Hot Springs in the 1920s, tourism has been an important component to the area's economy. Today, tourism and forestry continue to be significant contributors to the local economy (see Section 2.5).

Figure 2.1 Invermere Timber Supply Area



2.2 Environmental Profile

This section provides an ecological profile of the Invermere TSA and identifies the main environmental issues in the TSA. The following discussion includes some information on areas outside the TSA land base. This information is presented to provide a more comprehensive overview of the area's environmental setting.

2.2.1 Physical Description

The Invermere TSA is located in the south-central portion of the East Kootenay region of British Columbia. Geological events and major glaciations in this region created two mountainous physiographic systems (Columbia Mountains and Rocky Mountains) separated by a wide inter-mountain plain (Rocky Mountain Trench) containing rivers and wetlands. The mountain landscape consists of peaks and ridges, rugged narrow valleys, snowfields, and lakes.

The primary drainages in the TSA are the Columbia River and the Kootenay River which flow through the Rocky Mountain Trench. Columbia Lake forms the headwaters of the north-flowing Columbia River. The headwaters of the south-flowing Kootenay River are located just outside the TSA in the valleys of the Rocky Mountains. The Kootenay River flows into the TSA from Kootenay National Park and enters the trench just south of Columbia Lake. In the western portion of the TSA, the eastern Purcell Mountains (part of the Columbia Mountains) are drained by numerous streams which flow into the Columbia and Kootenay Rivers.

The climate of the region is influenced by the mountains. Air flowing from the west descends the eastern side of the Columbia Mountains and flows into the Rocky Mountain Trench. The air then rises again over the Rocky Mountains. Since the Columbia Mountains act as a barrier to air from the west, a strong rainshadow effect exists leeward of these mountains. Occasionally during the winter, the Rocky Mountain Trench acts as a access route for cold Arctic air which leads to colder temperatures in the trench than in the surrounding mountains. In general, the climate is hot and dry in summer and cold in winter. Moisture precipitated over the region is from two main sources: the Pacific Ocean by way of lower passes in the southern portion of the Coast Mountains and from the Pacific Ocean by way of the lower Kitimat Ranges. Surface water within the Rocky Mountain Trench provides a minor source of precipitable water.

2.2.2 Ecosystem Profile

Two classification systems have been developed to describe ecosystems within B.C. The Ecoregion Classification System divides the province into discrete geographical areas at five hierarchical levels.¹ The Invermere TSA falls within the Southern Interior Mountains Ecoprovince. This ecoprovince, which lies east of the southern interior plateaus in the southeastern portion of the province, is comprised of six ecoregions and 18 ecosections. Ecosections are the lowest level in the Ecoregion Classification System and are useful for describing ecosystems at the TSA level. Each ecosection contains areas having similar landforms and climate. At different altitudes within each ecosection, there are climatic zones having specific soils, plant and animal communities, and aquatic systems. These ecological areas can be described using the Biogeoclimatic Ecosystem Classification System.² Biogeoclimatic zones are used in Section 2.2.4 to describe the TSA's plant communities.

There are three ecosections in the Invermere TSA: Eastern Purcell Mountains (EPM), East Kootenay Trench (EKT), and Southern Park Ranges (SPK).

Eastern Purcell Mountains - The Eastern Purcell Mountains (EPM) ecosection is one of eight ecosections in the Columbia Mountains and Highlands Ecoregion. The EPM ecosection is situated west of the Rocky Mountain Trench and extends down the length of the east slope of the Purcell Mountains from just south of Golden to the mountains west of Kimberly. This ecosection covers the western portion of the Invermere TSA.

This is a mountainous area consisting of the rugged inner Purcell Mountains that form the watershed divide and the lower Purcell Mountains to the east of that divide. The inner mountains are broken by high, wide, plain-like valleys. These rugged alpine areas have high snow depth and dense coniferous forests. Some areas adjacent to the East Kootenay Trench ecosection have more moderate snow depth. Elevations range from 800 metres in the valley bottoms to 3400 metres on the highest peaks. The mountains are underlain by folded sedimentary and metamorphic rocks, with granite intrusions. Glaciers are common in the central and northern part of the range. Examples in the TSA are the Bugaboo and Jumbo Glaciers.

There are five biogeoclimatic zones in this ecosection.

- | | |
|--|--|
| 1. Interior Douglas-Fir (IDF) | Low elevation |
| 2. Interior Cedar-Hemlock(ICH) | Low elevation in moister, northern areas |
| 3. Montane Spruce (MS) | Low to mid elevation |
| 4. Engelmann Spruce-Subalpine Fir (ESSF) | Mid to high elevation |
| 5. Alpine Tundra (AT) | High elevation |

¹ For an explanation of the ecoregion classification system see Campbell et al (1990) or Demarchi (1993).

² For an explanation of the biogeoclimatic classification system see Meidinger and Pojar (1991).

East Kootenay Trench - The East Kootenay Trench (EKT) ecosection is one of three ecosections in the Southern Rocky Mountain Trench Ecoregion. The EKT ecosection, includes the Rocky Mountain Trench from just north of Golden to the Tobacco Plains area just south of the Canada-U.S.A. border.

The ecosection is a broad, flat, glaciated valley floor lying between the Purcell Mountains and the Rocky Mountains. Elevations range from 700 metres to 1100 metres, with a few taller ridges reaching 1600 metres. The area is underlain by deep glacial debris. The low gradient of the Columbia and Kootenay Rivers, which flow through the trench, has created wide floodplains that form extensive marshland areas.

There are four biogeoclimatic zones in this ecosection.

- | | |
|-------------------------------|--|
| 1. Interior Douglas-Fir (IDF) | Low elevation |
| 2. Ponderosa Pine (PP) | Low elevation in southern areas |
| 3. Interior Cedar Hemlock | Low elevation in moister, northern areas |
| 4. Montane Spruce (MS) | Low to mid elevation |

Southern Park Ranges - The Southern Park Ranges (SPK) ecosection is one of three ecosections in the Southern Canadian Rocky Mountains ecoregion. The SPK ecosection includes most of the Rocky Mountains in the region, from the Bull River in the south to the Blaeberry River in the north.

The ecosection consists of rugged mountain ranges dissected by long rivers with moderately wide valleys. Elevations range from 1100 metres to 3500 metres. The mountains are formed by folded and faulted sedimentary and metamorphic rock. Prominent ridges are formed by resistant formations of limestone and quartzite. Glaciers have eroded the landscape into prominent U-shaped valleys filled with glacial debris. The ecosection lies in a rainshadow, and has a cool, dry climate.

There are five biogeoclimatic zones in this ecosection.

- | | |
|--|--|
| 1. Interior Douglas-Fir (IDF) | Low elevation in dry valleys |
| 2. Interior Cedar-Hemlock(ICH) | Low elevation |
| 3. Montane Spruce (MS) | Low elevations and above Rocky Mountain Trench |
| 4. Engelmann Spruce-Subalpine Fir (ESSF) | Mid to high elevation |
| 5. Alpine Tundra (AT) | High elevation |

2.2.3 Protected Areas and Maintaining Biodiversity

Biodiversity, or biological diversity, refers to the full range of life in an area. Biodiversity includes species diversity, genetic diversity and ecosystem diversity. When managing forest habitat for biodiversity it is important to maintain broad landscape features as well as specific stand level attributes such as snags and coarse woody debris. Protected areas are fundamental to maintaining biodiversity at both the landscape level and the stand level.

Protected Areas

Fully protected areas can include Class A provincial parks, ecological reserves, and wilderness conservancies. Partially protected areas include Class B and C provincial parks, recreation areas, forest wilderness areas and wildlife management areas.

Existing Protected Areas - There are currently seven large protected or partially protected areas bordering on the TSA. These include Bugaboo Alpine Recreation Area (11 375 hectares), Kootenay National Park (138 591 hectares), Mount Assiniboine Provincial Park (39 080 hectares), Height of the Rockies Wilderness Area (53 532 hectares), Top of the World Provincial Park (8777 hectares), Purcell Wilderness Conservancy (62 703 hectares) and Banff National Park. Smaller protected areas in the TSA include Whiteswan Lake Provincial Park and Premier Lake Provincial Park.

One goal of the provincial Protected Areas Strategy is to protect viable, representative examples of natural diversity in the province. Twelve percent protection within each ecosection is used as a benchmark for examining the degree of ecosystem protection currently in place. Analyses completed for the Commission on Resources and Environment (CORE) East Kootenay Land Use Plan³ found that the Southern Park Ranges ecosection has protection in excess of 12 percent (e.g. Kootenay National Park, Mount Assiniboine Provincial Park, and Height-of-the-Rockies Wilderness Area); the Eastern Purcell Mountains ecosection has some protection (2-12 percent) (e.g. Purcell Wilderness Conservancy and Bugaboo Alpine Recreation Area); and the East Kootenay Trench ecosection has less than one percent protection. Existing protected areas over-represent alpine and subalpine ecosystems and under-represent low-elevation habitats such as those found in the East Kootenay Trench. As noted above, the majority of these protected areas are located next to the Invermere TSA. The CORE analysis indicated that continuation of present management practices will further reduce options to provide protected areas in these ecosections.

³ Commission on Resources and Environment. *East Kootenay Land Use Plan*. Victoria: CORE, 1994.

Proposed Protected Areas - As part of the PAS and CORE processes several areas in the Invermere TSA with high environmental values have been identified as areas where protection from further development may be desirable. These areas are identified in Table 2.1.

Table 2.1 Proposed Protected and Special Management Areas		
Name	Area (hectares)	Ecosection
Bugaboo Park Extension ^{1,2}	11 026	EPM
East Purcell Mountains ¹	56 116	EPM
Magnesite Creek	6759	SPK
Upper Spillimacheen ²	6462	EPM
Jumbo and Upper Horsethief Creeks	29 649	EPM
Diorite Creek	11 190	SPK
Upper Buhl Creek	7079	EPM
Skookumchuck and Lower Buhl Creeks	41 714	EPM
Skookumchuck Flats	9009	EKT
Premier Ridge	4141	EKT
Columbia Lake (east side)	8576	EKT
Fir Mountain (north end)	3773	EKT
Columbia River Wetlands	11 553	EKT
Source: Commission on Resources and Environment. <i>East Kootenay Land Use Plan</i> . Victoria: CORE, 1994. Notes: 1. These areas are designated for protection under the East Kootenay Land Use Plan. All other areas are designated for special management. 2. Located in TFL 14.		

The East Kootenay Land- Use Plan delivered by the government of British Columbia in March, 1995 created seven new protected areas in the East Kootenays. Included in the new protected areas were the East Purcells and the Bugaboos Park Extension.

Biodiversity

Connectivity - At the regional and landscape level, it is relevant to maintain corridors or linkages between important wildlife habitat areas. Protected areas provide genetic banks for a wide range of species and there must be connectivity between these areas to ensure that biodiversity is maintained in the long-term. At the landscape level, connecting corridors of mature timber are required to link areas such as riparian habitats and old growth retention areas. This landscape level management is referred to as a Forest Ecosystem Network (FEN). Without this form of management, habitat fragmentation will occur resulting in the isolation of habitats and impairing their ability to provide genetic interchange. Table 2.2 summarizes connectivity between and within ecosections. While these ecosections encompass a large area outside the Invermere TSA, the information

indicates that areas within the TSA could potentially play an important role minimizing habitat fragmentation.

Table 2.2 Connectivity		
Ecosection	Within	Between
Eastern Purcell Mountains	low	high in southern portion; low elsewhere
East Kootenay Trench		
upper elevations	moderate	low
lower elevations	low	low
Southern Park Ranges		
north	high	moderate with EKT
south	low	low
Source: Commission on Resources and Environment. <i>East Kootenay Land Use Plan</i> . Victoria: CORE, 1994.		

Old Growth - Old growth forests contribute to biodiversity and forest productivity. Many species are dependent on attributes of old growth forests (e.g. coarse woody debris, vertical and horizontal structural diversity) or depend on these forests during some part of their life cycle. The amount of old growth will decrease under current management. Maintaining forest in older age classes was addressed in the timber supply analysis by establishing old growth requirements for various biogeoclimatic subzones. Specific targets for the net operable land base may vary depending on changing management targets, on the location within the TSA, and the amount of inoperable forest that is classified as old growth.

Undeveloped Watersheds - Watersheds are often viewed as important management units for monitoring ecosystem processes and undeveloped watersheds are receiving more attention as their numbers diminish.⁴ There are three large undeveloped watersheds in the Invermere TSA. The characteristics of these watersheds are outlined in Table 2.3.

⁴ B.C. Forest Service. "An Inventory of Undeveloped Watersheds in British Columbia". Victoria: Ministry of Forests, Recreation Branch, 1993.

Table 2.3 Undeveloped Watersheds ¹			
	Watershed		
	Upper Dutch Creek	Upper Findlay Creek	Upper White River
Area	30 000	30 000	31 000
Ecoregion²	CMH	CMH	SRM
Biogeoclimatic Zone³	ESSF 65% AT 35%	ESSF 55% AT 45%	ESSF 50% AT 50%
Degree of Protection⁴	Unprotected	Unprotected	Partially Protected
Degree of Development⁵	Fragmented	Fragmented	Fragmented
Land Status	Invermere TSA	Invermere TSA	Invermere TSA; Height-of-the -Rockies Wilderness Area
<p>Source: B.C. Forest Service. "An Inventory of Undeveloped Watersheds in British Columbia". Victoria: Ministry of Forests, Recreation Branch, 1993.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Undeveloped watersheds larger than 5 000 hectares as of 1990. 2. Ecoregion abbreviations: Columbia Mountains and Highlands (CMH); Southern Rocky Mountains (SRM) 3. Biogeoclimatic Zone abbreviations: Engelmann Spruce-Subalpine Fir (ESSF); Alpine Tundra (AT) 4. A watershed is considered partially protected if a significant portion (greater than 10 percent) is protected. A watershed is classified as unprotected if it is not significantly protected within the boundaries of a national park, provincial park, park reserve, ecological reserve, recreation area, or wilderness area. 5. A watershed is listed as fragmented if its headwaters are protected but the remainder of the watershed is developed. 			

2.2.4 Vegetation⁵

The vegetative characteristics of the biogeoclimatic zones in the Invermere TSA are outlined below.

Ponderosa Pine (PP) - The PP zone occurs as a thin band in the bottom and on the lower slopes of valleys in the Rocky Mountain Trench. In the Invermere TSA, the zone occurs in the Skookumchuck Creek area. Zonal sites have open and park-like stands of Douglas-fir and ponderosa pine with an understory of predominantly bluebunch wheatgrass. Other common species in the understory are saskatoon, prairie rose and rosy pussytoes. Areas within this zone tend to have an extensive fire, domestic grazing and logging history.

⁵ Information sources for this section include T.F. Braumandl and M.P. Curran, eds. *A Field Guide for Site Identification and Interpretation for the Nelson Forest Region* Victoria: B.C. Ministry of Forests, Research Branch, 1992 and D. Meidinger and J. Pojar, eds.. *Ecosystems of British Columbia*. B.C. Ministry of Forests, Research Branch, 1991.

Fluctuating disturbance and use have created a variety of vegetation communities in this area.

Interior Douglas-Fir (IDF) - The IDF zone dominates the low- to mid-elevation landscape of the southern Rocky Mountain Trench. Typically, the IDF zone occurs at elevations below the Montane Spruce zone. Where valleys are deep, the IDF zone may be found above the Ponderosa Pine zone. In the Invermere TSA, the IDF zone occurs in valley bottoms (e.g. Spillimacheen and Kootenay River valleys) and along the lower slopes of the Rocky Mountain Trench. The zone has climax stands of Douglas-fir, but mixed seral stands with Douglas-fir, western larch and lodgepole pine are more common. The understory is dominated by pinegrass and a high cover of shrubs. The most common shrubs are birch-leaved spirea, common juniper, soopolallie, saskatoon and common snowberry.

Soil and topographic conditions and wildfire history allowed grassland communities and transitional woodlands to develop in some parts of the IDF zone. These sites have open stands of Douglas-fir with practically no other tree species. Bluebunch wheatgrass and junegrass are the dominant understory species. These natural grasslands have been modified by grazing of domestic livestock, timber harvesting activities, and reduced fire activity. In the Invermere TSA, these areas occur on lower slopes and the valley floor from the south end of Columbia Lake at Canal Flats north to Windermere Lake near Invermere. These conditions also exist up side drainages off the main valley, especially on warm aspects.

Montane Spruce (MS) - The Montane Spruce zone occurs at middle elevations in the southern Rocky Mountains and the Rocky Mountain Trench. In most cases, the MS zone is located above the Interior Douglas-fir zone and below the Engelmann Spruce-Subalpine Fir zone. In the Invermere TSA, the MS zone occurs in the Rocky Mountain Trench south of the Spillimacheen River; in valley bottoms and on lower slopes of valleys on the eastern flanks of the Purcell Mountains south of the Spillimacheen River; and in valley bottoms and on lower slopes of the Rocky Mountains in the eastern portion of the TSA.

Climax sites in the MS zone have stands of hybrid white spruce and subalpine fir with some Douglas-fir. Seral stands of lodgepole pine are common in the MS zone because of widespread wildfires. The mountain pine beetle has caused damage in some areas. False azalea, Utah honeysuckle and soopolallie are common shrubs. Grouseberry, twinflower, pinegrass, and heart-leaved arnica are common herbs.

Interior Cedar Hemlock (ICH) - The ICH zone occurs at lower to middle elevation in certain areas along the lower slopes of the Columbia Mountains and the western side of the continental divide along the Rocky Mountains. The Engelmann Spruce-Subalpine Fir zone occurs above the ICH zone.

Two variants of the ICH zone occur in the Invermere TSA. The Kootenay Moist Cool ICH subzone occurs in the Rocky Mountain Trench near the Spillimacheen River. Climax

zonal sites in this subzone have stands of western red cedar, hybrid white spruce, and subalpine fir. However, this subzone has been extensively disturbed by wildfires making climax stands rare. Seral stands of lodgepole pine, Douglas-fir, and western larch are more common. The pine stands have extensive mountain pine beetle history. Falsebox, black huckleberry, and Utah honeysuckle are common shrubs. Common herbs are twinflower, bunchberry, queen's cup, and prince's pine. Red-stemmed feathermoss is very common.

The Golden Moist Warm ICH subzone occurs in mid to lower elevations in the Parson area. Climax zonal sites in this subzone have stands of western hemlock and western red cedar. Seral stands of hybrid white spruce, subalpine fir and Douglas-fir are common. A moderate fire history has led to a mosaic of climax and seral stands. Common shrubs include falsebox, false azalea, and western yew. The herb layer is sparse and includes queen's cup and bunchberry. Red-stemmed feathermoss and knight's plume moss are prevalent.

Engelmann Spruce-Subalpine Fir (ESSF) - The ESSF is the uppermost forested zone in most of B.C. It lies below the alpine tundra and above the Interior Cedar Hemlock zone or Montane Spruce Zone in the Rocky Mountains and the Columbia Mountains. The ESSF occurs in mountainous terrain which is often steep and rugged.

Two variants of the ESSF zone occur in the Invermere TSA. Both subzones, the Dry Cool ESSF subzone and the Wet Mild ESSF subzone, occur on upper slopes in the Purcell Mountains and in the Rocky Mountains in the eastern portion of the TSA.

The Dry Cool ESSF subzone has climax zonal sites with subalpine fir and Engelmann spruce. Douglas-fir and western larch are found at higher elevations in this subzone than in other areas of the region. The dominant shrub is false azalea with lesser amounts of black huckleberry and black gooseberry. Grouseberry, low bilberry, arnicas, western meadowrue and one-leaved foam flower are common herbs.

Only small pockets of the Wet Mild ESSF subzone are found in the TSA. Climax zonal sites in the Wet Mild ESSF subzone have stands of subalpine fir and Engelmann spruce. In areas with fire disturbance, a mix of climax and seral stands occur. The shrub understory consists of false azalea, black huckleberry, white-flowered rhododendron, and Utah honeysuckle. Oak fern, mountain arnica and one-leaved foam flower are common herbs.

In the ESSF zone, a transition to parkland begins to occur at an elevation of around 1900 metres. At this elevation, species such as mountain heathers occur and trees grow in islands. Tree growth at this altitude is very slow and regeneration is difficult.

Alpine Tundra - This zone occurs on high mountains usually at elevations above 2250 metres. Trees in this zone are stunted and vegetation is dominated by shrubs, herbs and lichens.

2.2.5 Fish and Wildlife

Species

The Invermere TSA is situated in the Southern Interior Mountains Ecoprovince, a region that is internationally renowned for its diversity and abundance of wildlife species. The East Kootenays in particular, support the greatest diversity of wild ungulates and large predators in North America. Ungulate species in the area include elk, bighorn sheep, white-tailed deer, mule deer, moose, caribou and mountain goats. Other large mammals in this ecosystem include cougars, wolves, coyotes, black bears and grizzly bears. No other area in the province has as many species of big game sharing common habitat. Small furbearing species include beaver, mink, muskrat, otter, fisher, marten, skunk, weasel, badger, wolverine, bobcat, lynx, several species of squirrel, fox and raccoon.

The Southern Interior Mountains ecoprovince supports 70 percent of the bird species known to occur in B.C. and 62 percent of all birds that breed in the province. Wetlands along the Columbia River, and the Canal Flats, Windermere Lake and Columbia Lake areas are important habitat. These wetlands are migration staging areas and support whistling swans, loons, trumpeter swans, cranes, gulls, terns, rails, bitterns, hawks, bald eagles, ospreys, ducks, great blue herons and 100 species of song birds.⁶ Upland game birds in the area include white-tailed ptarmigan, grouse, and common snipe.

The painted turtle and garter snakes are typical reptiles. Salamanders, toads and frogs are common amphibians.

A variety of fish species inhabit the lakes and streams in the Invermere TSA. Freshwater game species include: bull trout (Dolly Varden), westslope cutthroat trout, rainbow trout (native and introduced), eastern brook trout (introduced), kokanee, mountain whitefish, and smallmouth bass. The Skookumchuck system, with bull trout and westslope cutthroat trout populations, is the most important fishery in the TSA. Generally, fish populations are stable, however, some drainages have had declines due to timber harvesting activity. Timber harvesting has led to increased water temperatures, and sedimentation from roads and block run-off. There is concern that some species such as bull trout may be declining throughout the TSA.

The Invermere TSA provides habitat for a number of species considered at risk in B.C. These species are identified in Table 2.4.

⁶ Commission on Resources and Environment. *East Kootenay Land Use Plan*. Victoria: CORE, 1994.

Table 2.4 Listing of Rare Wildlife Species in the Invermere TSA		
Species	Status	
	Provincial Rank¹	Global Rank¹
Amphibians		
Northern Leopard Frog	S1-3	G5
Birds		
American Avocet	S3	G5
American Bittern	S3	G4
Bald Eagle	S3-4	G4
Black-chinned Hummingbird	S3	G5
Bobolink	S3	G5
Flammulated Owl	S3	G4
Great Blue Heron	S3	G5
Lewis' Woodpecker	S3	G4
Long-billed Curlew	S2-3	G5
Columbia Sharp-tailed Grouse	S2-3	G4
Swainson's Hawk	S3	G4
Turkey Vulture	S3	G5
Upland Sandpiper	S2	G5
Western Grebe	S1	G5
Williamson's Sapsucker	S3	G5
Fish		
Chiselmouth	S3	G5
Bull Trout	S3	G3

Table 2.4 (continued)		
Species	Status	
	Provincial Rank	Global Rank
Mammals		
Badger	S3	G5
Bighorn Sheep	S3	G4
Fisher	S3-4	G5
Grizzly Bear	S3	G4
Selkirk Least Chipmunk	S1	G5
Northern Long-eared Myotis	S1	G4
Columbia Red-tailed Chipmunk	S2	G5
Western Wolverine	S3-4	G4
Woodland Caribou	S2-3	G5
Reptiles		
Rubber Boa	S3-4	G5
Painted Turtle	S3-4	G5
Source: B.C. Conservation Data Centre, Wildlife Branch, Ministry of Environment and Forest Ecosystem Specialist, Invermere, Ministry of Environment. Notes: 1. The global rank is based on the status of the species throughout its entire range. The provincial rank is based solely on the species' status in B.C. An explanation of provincial and global ranks follows: 1 - Critically imperiled because of extreme rarity or because of factors making the species especially vulnerable to extirpation or extinction. 2 - Imperiled because of rarity or because of factors making it vulnerable to extirpation or extinction. 3 - Rare or uncommon; may susceptible to large-scale disturbances. 4 - Frequent to common; apparently secure but may have a restricted distribution; or there may be perceived future threats. 5 - Common to very common; demonstrably secure and essentially ineradicable under present conditions.		

Habitat

The Eastern Purcell Mountains in the TSA provide habitat for elk, mule and white-tailed deer, moose, grizzly bear, black bear, and mountain goat. Caribou occur in the old growth spruce forests and alpine meadows in the southwestern portion of the TSA. The grasslands, shrublands and wetlands of the East Kootenay Trench make it one of the most important wildlife areas in North America. Elk, mule deer, and white-tailed deer winter throughout the area, while bighorn sheep occur on steep south-facing grasslands and rocky forests on the east side of the trench. Moose occur in wetlands and riparian areas throughout the TSA. Numerous predators, such as cougar, wolf, coyote, black bear, bobcat, badger, and red fox occur throughout. The Columbia River wetlands and other riparian areas are important for ungulates, as well as a wide variety of waterfowl,

songbirds, Osprey, Great Blue Heron, muskrat, mink, and other species. The Rocky Mountains portion of the TSA provides habitat in valley bottoms for elk, moose, mule deer, white-tailed deer, grizzly bear and black bear. Bighorn sheep, elk and mule deer utilize upper forests and mountain goat occur on rocky bluffs in higher forests. Mule deer, elk, bighorn sheep, mountain goat and grizzly bear occur in alpine meadows. Habitat issues in the TSA included the following:

Ungulate Winter Range - During winter months most ungulate populations depend on forage found in areas at low elevations. Winter ranges have lower snow depths than surrounding areas and forest stands in winter ranges must provide thermal and security cover for ungulates. Some areas in the East Kootenay Trench have low snow depth, but in other areas mature forest stands with interlocking crowns are necessary for snow interception. Timber harvesting practices and rangeland alienation can reduce the quantity and quality of suitable winter range habitat. In the Invermere TSA, the Dry Cool Montane Spruce biogeoclimatic subzone defines important ungulate winter range. Maintenance of forest cover in desirable age classes through out this range is an important management consideration and was modeled in the timber supply analysis.

Caribou - Woodland caribou are a blue-listed species⁷ identified as being old-growth dependent. As with other ungulates, a critical element of caribou winter range is the presence of mature forest stands for snow interception. In addition, caribou must have access to arboreal lichen for forage. This lichen, which grows on trees, is most plentiful on mature and old-growth forests. The south Purcells caribou herd utilizes a small area in the south-western corner of the Invermere TSA. This is a small herd, distinct from other caribou populations, and its viability may be threatened under current forest management practices. Core caribou habitat in the Invermere TSA has been identified. In the timber supply analysis at least 43 percent of this area must have forest cover 121 years old.

Riparian Areas - Riparian areas are highly productive habitats which provide food and shelter integral to all fish and wildlife species. Timber harvesting, domestic grazing, road development and human settlement all have impacts on riparian areas. Degradation of riparian areas impacts not only wildlife, but can have impacts on water quality and fisheries. Under current management the diversity and composition of riparian areas may be impacted. Riparian areas have been identified for the timber supply analysis and are excluded from the operable land base. Protection of areas next to streams, rivers and lakes from machine traffic and logging disturbances have reduced the area available for timber harvesting.

Rocky Mountain Trench and Forage Production - Fire suppression has been an important factor contributing to the encroachment of forest habitat on open grassland communities in the Invermere TSA. Competition for available forage has increased and the quality and quantity of rangelands that meet the needs of domestic livestock and

⁷ Blue-listed species are sensitive or vulnerable species that could become candidates for designation as endangered or threatened.

wildlife has declined. A total of 6450 hectares of the Invermere TSA timber harvesting land base, which falls into the Rocky Mountain Trench, is being managed for both forage and timber production. Management guidelines specify the proportion of the area that should be in an open forest condition.

2.2.6 Water

There are numerous community and domestic watersheds in the Invermere TSA. Approximately 32 streams have at least one licenced user; 11 streams have six or more licenced users. Often, special management needs to be undertaken to protect water quality and quantity in these watersheds. Road construction, timber harvesting, silviculture and range activities can all affect water quality. In the Invermere timber supply analysis, forest cover guidelines restrict the rate of harvest in these watersheds.

2.3 Community Profiles

2.3.1 Communities

District of Invermere - Invermere is located 119 kilometres north of Cranbrook (along highway 93/95) on the north-west end of Lake Windermere. First settled around the turn of the century, the area was originally developed in support of the mining industry. Today the District of Invermere is the largest community in the TSA and fulfills the role of business and service centre for the area.

The 1991 Census estimated the District of Invermere permanent population at 2207; this represents a 84 percent increase since 1976. Attracted by recreational amenities, services, dining, and shopping, the district's population is known to increase dramatically during the summer months. Many non-BC resident Albertans own vacation homes near the lake and contribute to the tax base. These non-resident landowners help support a community infrastructure out of proportion to the number of permanent residents.

According to the 1991 Census, residents of Invermere work in a variety of economic sectors, the top five being; accommodation and food service (19.6 percent), retail trade (16.8 percent), health and social service (10.8 percent), construction (6.8 percent), and government (6.8 percent).⁸

⁸ Labour force estimates are derived from Statistics Canada experienced labour force data, defined as persons who, during the week prior to June 4, 1990, were employed or unemployed but who had worked since January, 1990. Census information is based on individuals who are residents of the Invermere TSA and does not include individuals who work in the area but live elsewhere. These employment numbers are not comparable with employment numbers (i.e. person-years) found elsewhere in this report.

Community facilities include a hospital, two elementary schools and one secondary school, a satellite branch of the East Kootenay Community College, a library, and a range of recreational facilities including an arena, a park, and a recreation centre. The city's water is sourced from Goldie Creek. City leaders cite development pressure as the major issue currently facing the community.

Windermere - Located three kilometres south-east of Invermere, on the eastern shore of Lake Windermere, Windermere is the site of the oldest non-aboriginal settlement on the Upper Columbia. The 1991 Census estimated the population to be 821, a 30 percent increase from 1976.

Due to its proximity to Windermere Lake, Windermere's local economy depends primarily on the tourism industry. Similar to Invermere, the summer months see an influx of people, many of whom own houses, time-shares and condominiums along the shoreline. A small craft industry which mainly caters to summer tourists is also located in the area.

Community infrastructure includes an elementary school, a community hall, and a beach. The community pumps its water from Lake Windermere and the system has a population capacity of 3000. Surrounded by attractive scenery, Windermere is characterized by high land and housing values.

Canal Flats - Situated 44 kilometres south of Invermere on the alluvial fan of the Kootenay river, lies the mill town of Canal Flats. Canal Flats was established in the late 1880s and was the site of an historic canal between the Kootenay River and Columbia Lake. In 1991, census estimates indicate the town had a population of 685, a 17 percent decrease since 1976.

Community facilities include, two schools, an arena, and a community hall. The community's water is sourced from wells.

Canal Flats is also the site of a Crestbrook Forest Industries Ltd. (CFI) sawmill. The mill dominates the local economy.⁹ Canal Flats is primarily a single-industry community and hence the town's outlook is closely tied to the future of the mill.

Edgewater - Edgewater is a small community located 25 kilometres north of Invermere on highway 95. The 1991 Census estimated population at 518, a 22 percent increase since 1976.

Traditionally a resource-based community, Edgewater can be considered a community in transition. Attracted by the relatively lower land and housing prices, people have been moving to the community. The close proximity to both Invermere and Radium Hot

⁹ See Section 3.5 for a complete description of the mill.

Springs allows for a short commute to jobs in both centres. Edgewater is the site of a medium-sized sawmill run by Seel Forest Products Ltd.¹⁰

Community infrastructure includes an elementary school and recreational facilities. The community's water is sourced from McCaulay Creek and the gravity driven system has a 1500 population capacity.

Radium Hot Springs - Radium Hot Springs is a small community located 16 kilometres north of Invermere, at the junction of highway 93 leading to Banff, and highway 95 leading to Golden. Situated at the foot of the western slopes of the Rocky Mountains, the village is surrounded by scenic beauty. The village was incorporated in December, 1990.

According to the 1991 Census, Radium had approximately 395 permanent residents, a 30 percent increase since 1976. The city's economy is quite diversified, based on tourism, forestry, and the small business sector. The natural hot springs, located in adjacent Kootenay National Park, serve as the focus of a relatively large accommodation and food service industry. The village is also the site of a Slocan Forest Products Ltd. sawmill.¹¹ The mill provides employment and income for many Radium residents. In addition, the mill contributes 12 percent of the village's total municipal tax. While the sawmill is the largest contributor to the local economy, the village cannot be considered a single industry community. One goal of the village is to further diversify the local economic base by developing the small business sector.¹²

Community infrastructure includes an elementary school, a golf course, and community hall. The town's water is sourced from Forster Creek and the gravity driven system has a 14 000 person capacity.

Fairmont Hot Springs - Situated 24 kilometres south of Invermere along highway 93/95, at the base of the western slopes of the Rocky Mountains, is the resort community of Fairmont Hot Springs. Originally a stage-coach stop, the first hot springs-based resort was erected in 1920.

The local economy is dominated by the tourism industry which in turn is dominated by the Fairmont Hot Springs resort. The tourism sector has seen considerable recent expansion with accommodation capacity being added. Area attractions include the hot mineral pools, golf courses and an alpine ski hill. As with other centres in the TSA, the primary tourism market is Alberta.

The area has grown rapidly over the past 20 years; the 1991 Census estimated the population of Fairmont Hot Springs at 249, a 133 percent increase since 1976.

¹⁰ See Section 3.6 for more detail.

¹¹ See Section 3.5 for a complete description of the mill.

¹² Mayor G. Deck, Radium Hot Springs.

Other Columbia Valley Communities - Other significant settlements located within TSA boundaries include Brisco, Parson, Skookumchuk, Wilmer, and Spillimacheen.¹³ The people in these smaller communities rely primarily on resource industries for income. Forest products are particularly important with small mills located in Brisco and Parson, and a large Crestbrook Forest Industries Ltd. pulp mill based in Skookumchuk.

2.3.2 Demographics

The 1991 Census estimated the population of the Invermere TSA to be 7185, this represents a 6.2 percent increase from 1986, and a 9.7 percent increase from 1981. Approximately 80 percent of this increase in population can be attributed to natural increase; over the next 20 years this trend is projected to reverse.¹⁴ The region is currently experiencing in-migration from larger centres such as Calgary, Vancouver, and the Okanagan.¹⁵ The in-migration trend is projected to continue, largely independent to changes in the economy, as many Alberta-based summer home owners reach early retirement age and move into the Columbia valley permanently.¹⁶

The in-migration of retirees, as well as lower birth and death rates, are projected to have the effect of increasing the median age in the Invermere area from 35 years in 1991, to 42 by the year 2011. Presently, the TSA and provincial median ages are nearly identical. Table 2.5 presents information on the Invermere population by five year age groups.

¹³ See Table 2.6 for population estimates.

¹⁴ BC STATS, *PEOPLE-Local Health Area 4: Windermere*. The reversal in trend is due, in part, to the aging population.

¹⁵ Employment and Immigration Canada, *Working Solutions; Economic Conditions in the East Kootenay Labour Market Area*. October, 1994.

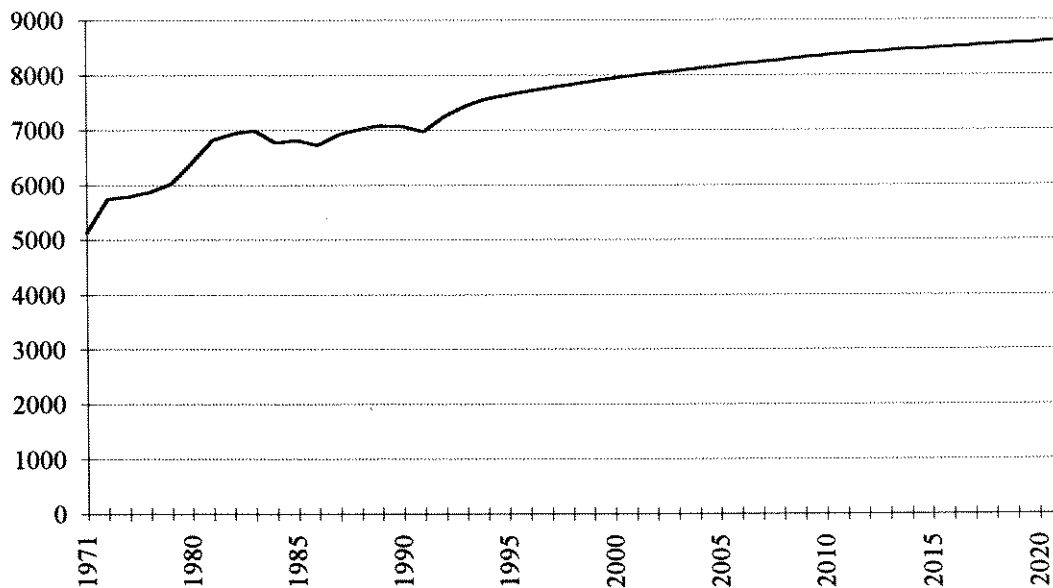
¹⁶ IBID.

Table 2.5 Invermere TSA Population by Five Year Age Groups								
Age Class	1981	% of Total	1986	% of Total	1991	% of Total	BC	% of Total
< 4	525	8	540	8	490	7	220 205	7
5-9	500	8	525	8	585	8	226 815	7
10-14	540	8	510	8	525	7	213 535	7
15-19	650	10	535	8	450	6	211 095	6
20-24	620	10	480	7	430	6	223 745	7
25-29	655	10	560	8	520	7	267 185	8
30-34	600	9	620	9	595	8	293 340	9
35-39	435	7	570	8	700	10	280 580	9
40-44	395	6	435	6	595	8	262 670	8
45-49	320	5	400	6	410	6	199 555	6
50-54	325	5	340	5	380	5	160 960	5
55-59	315	5	330	5	380	5	147 660	5
60-64	230	4	325	5	350	5	145 575	4
65-69	190	3	215	3	295	4	138 440	4
70-74	125	2	175	3	200	3	110 990	3
75+	120	2	155	2	240	3	171 470	5
Total	6490	100	6740	100	7185	100	3 275 490	100
Source: Statistics Canada, 1981, 1986 and 1991 Census of Canada								
Notes:								
1. Columns may not add due to Statistics Canada rounding procedures.								

The 9.7 percent increase in the Invermere TSA population since 1981 masks more complicated population dynamics occurring at the community level. As Table 2.6 indicates, since 1976 there has been considerable variation in the populations of communities in the TSA. These population estimates indicate an increase in the population of service-based centres such as Fairmont Hot Springs (+133 percent) and the District of Invermere (+83 percent) and a decrease in the population of resource-based communities like Skookumchuk (-55 percent) and Canal Flats (-17 percent). Figure 2.2 provides population projections for the Invermere TSA.

Table 2.6 Population of Selected TSA Communities (1976-1991)				
Community	1976	1981	1986	1991
District of Invermere	1200	1969	1998	2207
Brisco	77	44	77	136
Canal Flats	832	919	824	685
Edgewater	424	343	330	518
Fairmont Hot Springs	107	164	185	249
Parson	44	44	169	84
Radium Hot Springs	305	419	366	395
Skookumchuk	56	43	42	25
Spillimacheen	50	51	42	64
Wilmer	200	309	473	350
Windermere	635	611	582	821
Source: Statistics Canada Unincorporated Community Index				
Note: Figures are estimates				

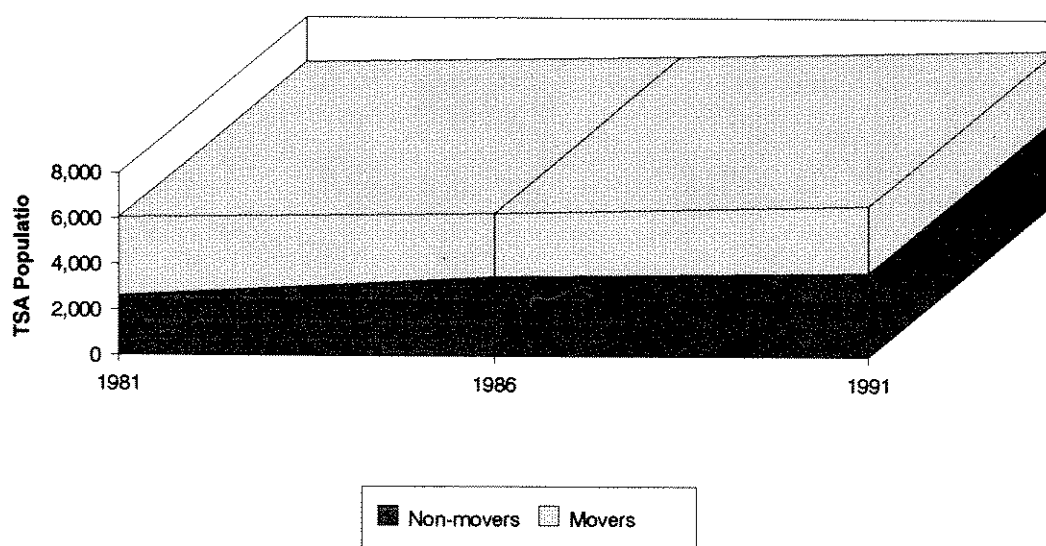
Figure 2.2 Population Projections for the Invermere TSA 1971-2021¹⁷



¹⁷ BC STATS, *PEOPLE-Local Health Area 4: Windermere*. Population projection is for Windermere Local Health Area 4, which encompasses the majority of the Invermere TSA.

Figure 2.3 describes TSA residents by mobility status. Movers are defined as people that have moved since the previous census, non-movers have not. The decreasing numbers of movers, together with the growth in population, suggests a tendency for people to remain in the TSA once they have moved there.

Figure 2.3 TSA Population by Migration Status 1981-1991¹⁸



2.3.3 Education Levels and Infrastructure

Residents of the Invermere TSA have undertaken comparatively less personal education than the B.C. average. Figures from the 1991 Census reveal that 57 percent of the over 15 years of age TSA population have graduated high school compared with the B.C. average rate of 78 percent. Additionally, five percent of the population have graduated from university compared with the B.C. average rate of 11 percent.

Table 2.7 Relative Education Levels of TSA 15 Year and Over Population		
Category	Percentage of Population	
	Invermere	BC
No high school diploma	43	22
High school diploma	57	78
Source: Statistics Canada, 1991 Census of Canada		

¹⁸ Statistics Canada, 1981, 1986 and 1991 Census of Canada

East Kootenay Community College (EKCC) - Opened in 1975, the EKCC offers a variety of programs designed to develop existing skills as well as to teach new skills. Some of the programs include adult basic education, apprenticeship training, and academic university transfer. In addition, the EKCC offers distance education where required. In the past, the college has demonstrated flexibility in tailoring programs to meet the needs of specific groups.¹⁹ The main campus of EKCC is located in Cranbrook, however, one of four satellite facilities serves the Invermere area.

2.4 First Nations Profile

This section provides an overview of First Nations communities in the Invermere TSA. The TSA is located in the traditional territory of the Ktunaxa and Kinbasket First Nations who are represented by the Ktunaxa/Kinbasket Tribal Council. There are five bands affiliated with the Ktunaxa/Kinbasket Tribal Council. Two of these, Columbia Lake and Shuswap, have communities in the Invermere TSA. The information presented in this section is based on a review of written material (see Appendix E).²⁰

2.4.1 Culture and Traditional Resource Use

The Ktunaxa are part of the Kutenai Tribe and speak Ktunaxa. Kinbasket people are the most eastern of the Interior Salish people and speak Shuswap or Ktunaxa which is part of the Interior Salish branch of the Salishan language family.

Ktunaxa is the tribe that has occupied this territory for the last 10 000 years. Present day Bands occupy reserves at Cranbrook (St. Mary's Band), Windermere (Columbia Lake Band), Invermere (Shuswap Band), Grasmere (Tobacco Plains Band), and Creston (Lower Kootenay Band).

The Kinbasket First Nations communities are from the North Thompson tribal division of the Shuswap culture complex. The name Kinbasket is derived from a Shuswap name meaning "children of Kenp'sket" which was the name of their original chief. Around 1840, Kenp'sket and other members of the North Thompson division, established a community on the Columbia River within the Ktunaxa tribal territory. Intermarriage with nearby Ktunaxa communities provided new alliances and kin relationships; eventually there was little interaction between the Kinbasket and other Shuswap.

The Ktunaxa and Kinbasket First Nations lived a nomadic life, migrating to follow seasonal resources. Hunting, fishing, trapping and gathering were the traditional means of subsistence. Every band had recognized hunting, trapping and fishing places.

¹⁹ In 1992, the college, in concert with the federal and provincial government provided adult education and re-training to Westar mining employees affected by the mine closure.

²⁰ KKTC - *First Nations, A Summary of Information & Personal Communication*. December, 1994.

Nonetheless, members of other bands were allowed to use them without restriction when they desired. The Ktunaxa and Kinbasket First Nations were traditionally more dependent on hunting than on fishing. Hunting, fishing, trapping and gathering remain important activities to the Ktunaxa and Kinbasket people today.

All the land and hunting grounds were looked upon as tribal property, all parts of which were open to every member of the tribe. Animals hunted included deer, elk, caribou, marmot, sheep, mountain goat, moose, hare, beaver, grouse, bear, moose, duck, goose, crane, squirrel and porcupine. Many of these species continue to be hunted today.

Fishing places, including salmon stations on rivers, were also tribal property. At lakes, everyone had the privilege of erecting weirs and trapping trout. The fish caught were distributed among all the families present. Species fished included Dolly Varden, trout, kokanee, ling, whitefish, sturgeon, sunfish and bass.

Berry patches were tribal property, but the most valuable locations were managed by the chief of the band in whose district they were situated. Root digging grounds were common tribal property. In addition to berries and roots, wild onions, mint, willow, lodgepole pine, cone seeds and tree saps were also gathered.

There are many areas having cultural significance to First Nations people. Two important areas in the Invermere TSA are identified in the East Kootenay Land Use Plan:²¹

Columbia Lake - The lower benches along the lake were used as access trails by First Nations people. The area includes 20 pre-contact archeological sites, including winter house pits. This area also has pictographs which are of spiritual significance to the Ktunaxa people.

Columbia River Wetlands - Artifacts dating from 5000 to 7000 years ago have been found along the marshes in the Windermere area. Camps of the Ktunaxa people and pit houses used by the Kinbasket people are found all along the edges of the marshes from Canal Flats to Golden.

First Nations communities in the Invermere TSA and the Invermere Forest District are currently working on a cultural resource inventory that will provide important detail on other areas of significance to First Nations people.

²¹ Commission on Resources and Environment. *East Kootenay Land Use Plan*. Victoria: CORE, 1994.

2.4.2 Communities

The Columbia Lake Band and the Shuswap Band have communities in the Invermere TSA. Table 2.8 provides some general information on these communities.

Table 2.8. First Nations Community Summary				
First Nation Band	Population ¹		Total Reserve Area (hectares)	Band Administration Location
	Total	On Reserve		
Columbia Lake	210	113	3401	Windermere
Shuswap	207	116	1106	Invermere
Source: Department of Indian and Northern Affairs Canada (INAC), 1994 Notes: 1. The bands and INAC use different criteria when producing membership statistics such as population statistics. INAC population statistics include only those people recognized as 'status' under the <i>Indian Act</i> . Bands often include everyone receiving band services in their population statistics.				

2.4.3 Issues and Concerns

The following issues and concerns were raised by the Ktunaxa/Kinbasket Tribal Council (KKTC).

Environment - The members of the KKTC are concerned about the cumulative effects of activities, such as timber harvesting, dams and subdivisions, on environmental values. They feel that provincial government ministries tend to look at their areas of responsibility in isolation and do not recognize the potential for cumulative impacts.

Socio-Economic Issues - Opportunities for economic development are a priority for the KKTC and they feel that a more detailed examination of socio-economic issues is needed to identify opportunities. For example, the role of non-timber resources (e.g. fish, wildlife, roots and berries) in the local economy should be examined. The socio-economic analyses should also examine barriers to First Nations participation in economic sectors such as forestry.

Heritage - New developments should not proceed until traditional use site inventories and archaeological potential overviews are completed.

Treaty Negotiation - The KKTC has submitted a letter of intent to enter into comprehensive land claims negotiations with the governments of British Columbia and Canada. The KKTC has expressed the concern that no consideration has been given to reserving a portion of the allowable annual cut in each timber supply area to satisfy future treaty obligations.

2.5 Economic Profile

2.5.1 Introduction to the Economy

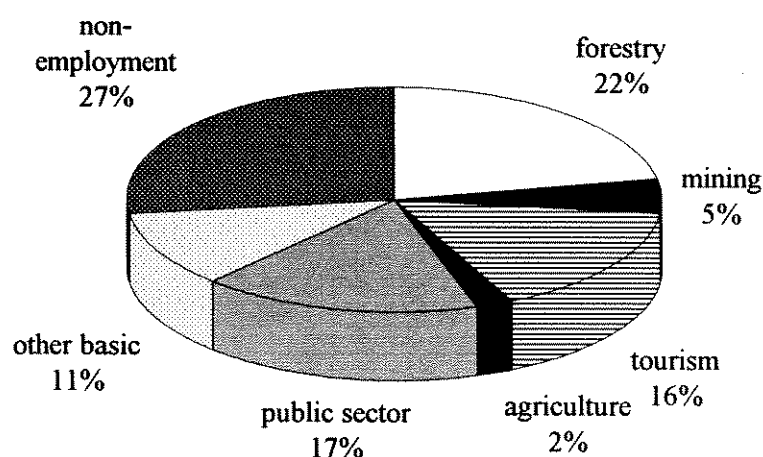
The Invermere TSA has a relatively small but diversified economy based mainly on forestry and tourism. The economy as a whole is growing, buoyed by the area's favourable natural asset endowments and growing population base.

For the purposes of this analysis, the Invermere TSA economy is separated into two parts, the basic and non-basic sectors. The basic sector is defined as the component of the economy that results in the in-flow of dollars from outside the local area. Examples of income sources considered to be part of the basic portion of the economy include sawmills and pensions. Although only one is classified as industrial, both the mill worker and the pensioner receive income from sources outside of the TSA. Conversely, the non-basic sector workers earn income by selling goods and services to individuals living in the local community. A pharmacist or grocery store clerk are two examples. The basic sector is assumed to be the driver of the local economy, in that employment and income generated in the non-basic sector ultimately depends on the spending of those employed in the basic sector.

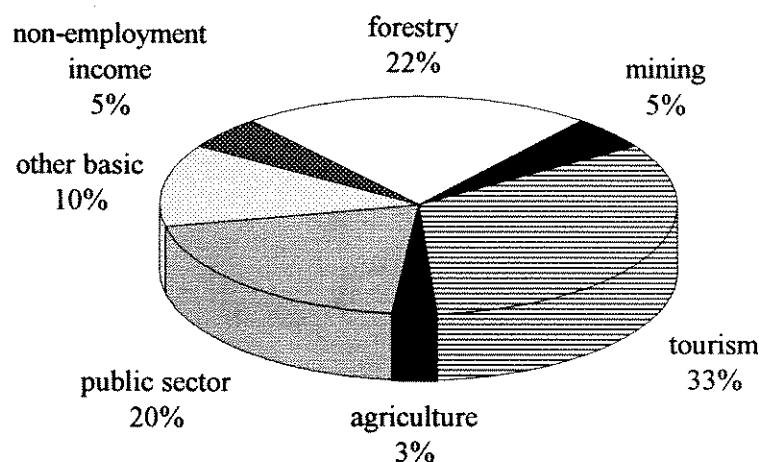
The Invermere area's economy has a diversity index of 76. This index, estimated by the Ministry of Finance, ranges between zero (the area's economy depends on one basic sector) and 100 (the area's economy is equally dependent on each basic sector). While an area with a diverse economy is not necessarily better off than one with one strong basic sector, it is widely held that a diverse economy will provide more stability in volatile economic times.²²

Though considered well diversified, 55 percent of the Invermere economy's total basic income is generated by the top three sectors. As Figure 2.4 shows, basic non-employment income, such as investment income, pensions, unemployment insurance and social assistance makes up 27 percent of basic income in the Invermere TSA. Basic employment income is dominated by forestry (22 percent), the public sector (17 percent) and tourism (16 percent).

²² Horne, G., and Powell, C. B.C. *Local Area Economic Dependencies and Impact Ratios*, Ministry of Finance and Corporate Relations, February, 1995.

Figure 2.4 Invermere TSA Income Dependencies²³

Industry employment totals also help describe the economy of the Invermere TSA. This data is presented below in Figure 2.5. The tourism (33 percent), forestry (22 percent) and public (20 percent) sectors employ the majority of the labour force. The remaining employment is fairly evenly distributed among the industries listed.

Figure 2.5 Invermere TSA Employment Dependencies²⁴

²³ Horne, G., and Powell, C. *The Forest District Tables*, Ministry of Finance and Corporate Relations, March, 1995.
Non-employment income includes pensions, investments, unemployment insurance, transfers and social assistance.

²⁴ IBID.
Percentage totals may not add due to rounding.
Refer to Appendix C, Tables C-4 and C-5 for a complete breakdown of total employment and income estimates.

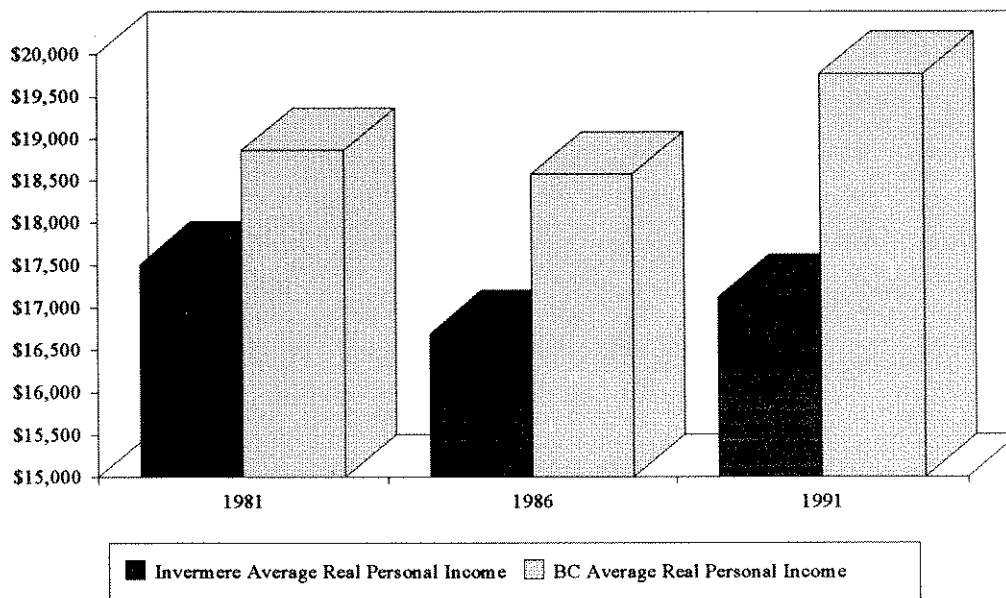
As Table 2.9 shows, between 1981 and 1991 the size of the labour force in the Invermere TSA has increased by 15.3 percent. This increase can be attributed to an increase in the general population level, as well as an increase in the labour market participation rate.²⁵ During the same period, unemployment rates for the Invermere TSA have been consistently less than the B.C. unemployment rate, averaging approximately 8.7 percent. Unemployment rates below the provincial average, despite a significant increase in the size of the labour force, indicate a growing economy.

Table 2.9 Invermere TSA Labour Force Characteristics			
	1981	1986	1991
Age 15 years and over	4930	5195	5530
Labour Force	3435	3615	3960
Employed	3230	3230	3655
Unemployed	215	425	325
Invermere Participation Rate	69.7%	69.6%	71.6%
BC Participation Rate	65.4%	65.7%	67.7%
Invermere Unemployment Rate	6.3%	11.8%	8.2%
BC Unemployment Rate	6.5%	13.0%	10.3%
Source: Statistics Canada, 1981, 1986 and 1991 Census of Canada			

The Canada Employment Centre (CEC) Labour Market Review indicates that most new job vacancies are in the tourism industry. While new jobs in this sector provide employment opportunities, the employment is typically seasonal, and the average compensation received is relatively low.²⁶ This last point is illustrated by Figure 2.6 which shows that despite lower than average unemployment rates, real income levels in the TSA remain consistently lower than the B.C. average.

²⁵ The participation rate is defined as the percentage of the age 15 and over population in the labour force, either employed or unemployed.

²⁶ Human Resources Development Canada, *Cranbrook and the East Kootenay Labour Market Review*, September 1994.

Figure 2.6 Invermere TSA and BC Average Real Personal Income (1981-1991)²⁷

2.5.2 Tourism and Outdoor Recreation

Since its inception early in the century, the tourism industry has been material to the Invermere TSA economy. The TSA's natural attributes such as spectacular scenery; hot springs; large warm lakes; powdered slopes; and wildlife populations; combine to draw hundreds of thousands of visitors to the area each year. As outlined in the previous section, the tourism sector generates 16 percent of employment income and employs 33 percent of the TSA labour force. Recent developments such as the ski resort expansion at Panorama Resort and the Fairmont Hot Springs time-share development, have contributed to the rapid growth of this part of the Invermere TSA economy.

Visitor Characteristics - Visitor '89, a travel survey of visitors to the Rocky Mountain tourism region, reports statistics describing the nature of travel by non-BC resident visitors to the region.²⁸ To round out the regional tourism picture, it is necessary to also describe B.C. resident tourism in the East Kootenays. To accomplish this, statistics from the B.C. Residents Survey are also included in the information presented below.²⁹

²⁷ Statistics Canada, 1981, 1986 and 1991 Census of Canada. 1986=100.

²⁸ *Visitor '89-A Travel Survey of Visitors to B.C. - Rocky Mountain Tourism Region*, October 1990. The Rocky Mountain tourism region closely corresponds to the Invermere and Cranbrook Forest Districts. It is not possible to provide statistics for the Invermere region alone.

²⁹ *BC Residents' Survey, The Resident Overnight Travel Market*, 1989.

With respect to the region of origin, Visitor '89 reported 49 percent of non-BC resident tourists visiting the Rocky Mountain tourism region were from Alberta, 27 percent from the United States, and seven percent from overseas. The remaining portion traveled from other parts of Canada. A large number (38 percent) of the visits made by B.C. residents were locally generated, that is, were made by residents of the East Kootenays. One in three of the visits were made by residents of southwestern B.C.

While twice as many non-BC resident visits occurred in the summer (36 percent) versus the winter (18 percent), the seasonal variation was less than is experienced in many other regions of the province.

For non-BC residents, touring was the most popular single reason for visiting the region (31 percent), followed by visiting friends/family (25 percent). Significant proportions of visitors also indicated that resort vacations (21 percent) and outdoors / wilderness / adventure experiences (14 percent) were the main reasons for travel. More B.C. residents cited visiting friends and family as the main purpose of their trip (41 percent). Outdoor activities (14 percent) and touring (7 percent) were also popular reasons.

Visitors participated in a variety of activities while traveling in the region. The most popular past-times included: outdoor activities (41 percent), sightseeing (37 percent) and 'other' sporting activities such as golf and fitness (22 percent). In addition, 20 percent of travelers were just passing through and 11 percent engaged in skiing during their stay.

Visitor '89 reports the average non-BC resident spends \$35.75 per person, per day.

While the above statistics are illustrative for the entire Invermere-Cranbrook area, it is necessary for the purposes of this report, to narrow the focus to tourism in the Invermere TSA. The ensuing detailed discussion of the tourism sector will be divided into two segments, front-country and back-country tourism. Due to the overlap in the participation in activities by both residents and tourists, resident users are included in the following discussions where applicable.

Front-country Tourism

Front-country tourism opportunities are found along or near major travel routes. In the Invermere TSA, these operations are concentrated at Radium and Fairmont Hot Springs and at Panorama Resort. Front-country tourists may also use private campsites or those provided by parks and Forest Service recreation sites.

Historically, tourism in the region was based around the mineral pools located at Radium Hot Springs and at Fairmont Hot Springs. These facilities operate year-round and draw large numbers of people. More recently, other activities have enjoyed increasing popularity with visitors to the area. Touring, down-hill and cross-country skiing, golf, and water-sports are all popular front-country activities in the Invermere TSA.

Accommodation - Accommodation facilities such as hotels, motels, condominiums, timeshares, and campsites are found throughout the TSA although many are located in the Radium area. The 1991 Census estimated that 895 people work in the accommodation, food and beverage sector. This figure represents a 13 percent increase from 1986 and 22 percent of the total labour force in 1991.

Alpine Ski Resorts - Panorama Resort and Fairmont Hot Springs Resort operate ski hills in the TSA. Both hills feature full facilities including accommodations, and modern lifts. During the 1993/94 ski season, the hills reported a combined total of 140 000 skier days. Approximately 260 people are employed at the resort facilities. The resorts are currently expanding their operations. For example, Panorama has invested \$2 000 000 for capital projects and maintenance over the past two years, adding accommodation and 500 vertical feet to the ski hill.³⁰ Both resorts are attempting to balance the tourist load more evenly throughout the year by offering a wider variety of year-round activities such as hiking, biking and wildlife viewing. An additional year-round ski facility potentially offering summer glacier skiing is proposed in the Jumbo Creek area.

Golf - The seven golf courses in the area enjoy a seven month golf season (March-November). Both Fairmont and Radium Hot Springs Resorts offer golf packages. The seven courses attract large numbers of tourists, with Fairmont alone registering approximately 30 000 golfer-days annually. The seven courses together generate an estimated \$7.6 million in total revenues which includes \$1.5 million in wages and benefits.³¹

Watersports - Windermere and Columbia Lakes are the largest warm-water lakes in the region. The lakes support a full-range of water-based activities including power boating,

³⁰ Sales Manager, Panorama Resort. Includes private investment.

³¹ *Financial Norms of 18 Hole Golf Courses in B.C. 1987-1990*. November, 1993.
The Golf Industry in B.C. : Financial Results and Economic Impacts. March, 1993.
Revenue and employment income estimates derived using interior averages for member controlled and private courses.

sailing, windsurfing, water skiing, swimming, and fishing, as well as snowmobiling in the winter months. The Columbia, Kootenay and White Rivers are navigable by canoe, kayak and rafts. The rivers offer a variety of courses for different skill levels and are popular with locals and tourists alike. White water rafting is a sport enjoying increasing popularity.

Back-Country Tourism

Back country tourism is located in relatively remote areas, not readily accessible from main travel corridors. While out-numbered by front-country travelers, back country tourists typically stay longer and spend more money. These operations include heli-skiing and heli-hiking, hunting and guide outfitting, horse back wilderness trips, skiing and hiking lodges, snowmobiling, rafting, guest ranches, and wildlife viewing tours.

Forest Service Recreation Sites - The trails, huts and 50 Forest Service recreation sites are important components of the outdoor recreation sector in the Invermere TSA. Based on user day estimates for the last three years, use of these sites has increased by an estimated 5 percent per year. The four most popular sites include White-tail Lake, Cartwright Lake, Mitten Lake and Mt. Swansey Lookout. Uncommon in B.C., the Invermere Forest District also manages and maintains four huts and cabins available for use by recreationalists. The goals for recreation sites in the TSA are to broaden the spectrum of recreation opportunities as well as increase the number of sites designed for one-day use.

Heli-skiing and Heli-hiking - Heli-skiing originated in the East Kootenays well over thirty years ago. Today, world-class heli-skiing occurs in the Jumbo Creek, Bugaboos and Upper Spillimacheen areas of the TSA. Heli-skiing facilities are centered at Panorama Resort and Bugaboos Lodge. The client-base changes from year to year, but most clients are from the U.S.A. and Europe. Recent technical innovations in ski equipment have reduced the basic skill level needed to participate, contributing to the increased popularity of the sport. Currently there are two heli-skiing firms operating in the TSA. Canadian Mountain Holidays (CMH) based in Banff, and RK Heliskiing based in Panorama. Combined, the Invermere TSA-based operations of these firms generate an estimated \$3.5 million dollars in revenue and directly employ 90 people during the four month ski season.³²

Heli-hiking is also increasing in popularity. During the summer months, CMH offers hiking packages in remote areas of the TSA. These trips typically combine sightseeing heli-tours with a alpine hikes. Costs vary according to duration and services included, but range between \$75 to \$200 per person.

Hunting - Due to the presence of a wide assortment of big game species, hunting is a popular activity in the Invermere TSA. Grizzly bear, black bear, deer, elk, moose,

³² Resource Officer, Planning, Invermere Forest District and RK Heliskiing Ltd..

mountain goat, mountain sheep, and cougar are some of the sought-after big game species. In addition, the Columbia River wetlands support a wide variety of game birds in an internationally significant water-fowl flyway habitat. Hunting is a major contributor to the economy, with resident and non-BC resident hunters spending an estimated \$7.1 million annually.³³ Table 2.10 illustrates the number of hunter days by species for the period 1990-1993.

Table 2.10 Invermere TSA Hunter Effort and Residence Status by Species								
Species	Number of Hunter Days per Year							% BC Resident
	1990	1991	1992	1993	Low	High	Average	
Black Bear	3023	3083	2311	3035	2311	3524	2863	81%
Cougar	397	375	385	43	43	406	300	97%
Elk	29 463	29 187	22 416	24 273	22 348	29 463	26 335	97%
Goat	1369	1851	1841	1987	1369	2024	1762	84%
Grizzly Bear	525	534	560	590	508	613	552	84%
Moose	2615	414	450	329	315	2615	952	98%
Mountain Sheep	1721	1713	2148	2105	1687	2162	1922	93%
Mule Deer	20 079	21 677	16 254	16 986	16 254	21 677	18 749	100%
White Tailed Deer	21 443	22 819	17 238	20 993	17 238	22 819	20 623	100%
Source: Hunter Harvest and Effort Database, Ministry of Environment, Lands and Parks								
Includes Management Units (MU) 4-21, 4-24, 4-25, 4-26 and 4-34								

Guide Outfitting - Guide outfitting is active throughout the Invermere TSA with 11 outfitting firms operating for eight months of the year. An outfitting operation typically provides knowledgeable guides, trail horses, maintained trail networks, and back-country cabins or guest lodges. During the hunting season, from September to November, the guides earn over 80 percent of their income. Increasingly, operators in the TSA are expanding the types of guiding activity to include more non-hunting activities from May to August. Activities such as wildlife viewing, photography, angling, trail riding, and wilderness retreats are now being marketed.

Historically, guides have mainly catered to non-B.C. resident hunters as all non-BC resident hunters must be accompanied by a licensed guide while hunting big game. The outfitter's hunter client base is 75 percent American, 15 percent European and 10 percent Canadian. Revenues depend on the species hunted and can range from approximately \$2400 per hunter for a seven day black bear hunt to \$10 000 per hunter for a 12 day sheep hunt.³⁴

The 11 guiding operations employ approximately 88 people, contributing 20 PY of employment in total. The average revenue varies with the type of species hunted and

³³ Reid, R. *Value and Characteristics of Resident and Non-Resident Hunting*, Wildlife Branch, BC Environment, 1985. Updated to 1992/93 dollars by B.C. Environment.

³⁴ Gord Burns, CORE back-country tourism sector representative.

species quota for each outfitter, however in 1992, revenues are estimated to be \$1.2 million annually for the Invermere TSA operators as a group.³⁵

The outlook for guide outfitting in the Invermere TSA will depend on the ability of outfitters to offer a high quality wilderness experience to clients. Over the long-term, this will vary according to the amount of inaccessible, undisturbed area available and the size and variety of wildlife populations. Relative to the hunting market, non-hunting activities show the most potential for expansion.

Angling - Recreational fishing is a popular past-time in the Invermere TSA. Major species fished include bull trout (Dolly Varden), westslope cutthroat trout, rainbow trout, eastern brook trout, mountain whitefish, kokanee salmon and smallmouth bass. The Skookumchuk river system is important as it supports both bull trout and westslope cutthroat trout. The remaining species of fish are fairly evenly distributed throughout the area, though trophy-sized catches have been reported at White-tail lake. Anglers tend to concentrate their fishing activity in the smaller streams and lakes prevalent in the TSA.

Trapping - Throughout the Invermere TSA, 34 registered trappers work an estimated 38 trap lines.³⁶ Species of animals trapped include beaver, bobcat, coyote, fisher, fox, lynx, marten, mink, muskrat, otter, raccoon, skunk, squirrel, weasel, and wolverine. Trapping in the TSA is characterized by relatively small trapping territories and low compensation. Unlike other areas of the province, trappers typically only work their line one or two days per week. For most of the trappers in the Invermere TSA trapping is considered to be more of a recreational income supplement rather than a primary occupation.

Snowmobiling - During the winter months snowmobiling takes place on a variety of back-country trails and on frozen Lake Windermere. This activity is enjoying a steady growth in popularity with the number of snowmobilers in the valley increasing over the past three years. Forster Creek, Jumbo Creek, Paradise Mines, Dutch Creek, Windermere Creek, and Panorama are all popular snowmobiling areas in the Invermere TSA.

Tourism Sector Outlook

The outlook for the tourism and outdoor recreation sector is positive as the sector is currently experiencing growth in employment and revenue. Continued growth in the industry is however, dependent on several factors which differ between the two broad categories of front-country and back-country products.

Continued growth in front-country tourism relies on the maintenance of the natural, scenic setting found in the Invermere TSA. Tourists are attracted to the area's image as a rugged undisturbed wilderness. Front-country operators are most concerned with the

³⁵ Estimate based on an average of \$110,500 per operation.

³⁶ Resource Officer, Planning, Invermere Forest District.

maintenance of scenic viewsapes along the major highway routes in the area (highway 93 and 95), around the resorts, and from the lakesides.³⁷

Front-country tourism is also dependent on the industry's ability to continue to offer more four-season products. If this trend continues the result will be a more diversified market base leading to less variable revenue flows and employment opportunities.

Back-country operations are dependent on scenic values/wilderness settings as well as other factors including, access to remote areas, and tenure. Back-country products rely on the ability to provide a wilderness experience. While there is variation across back-country products, in general, activities which impinge on the natural state of the forest and reduce wildlife viewing opportunities will negatively impact these operations. In the short-run however, some outdoor recreation activities such as hunting, angling and snowmobiling may benefit from forest development by increasing access through logging roads and trails.

Further development of this sector is also dependent on Crown land tenure issues. Currently, only alpine, heli-ski and guide outfitting (hunting) operations have tenure. The absence of long-term tenure makes for an uncertain future which discourages financial investment.³⁸ Currently, the tenure issue is under review by the provincial government.

2.5.3 Public Sector

The public sector is the third largest component of the economy after the forest industry and tourism. This sector contributes 17 percent of income and represents 20 percent of the Invermere TSA labour force.

The majority of the employment in this sector is concentrated in the District of Invermere. Top employers include School District #4 (Windermere), Windermere District Hospital, Windermere District Social Service, Invermere Forest District, and the District of Invermere office.

The size of the public sector depends, to a large degree, on the size of the overall population base in the TSA. The population forecast for the local area (Figure 2.2) indicates a steady growth pattern. This increase in population contributes to a positive outlook for this sector.

³⁷ Based on discussions with front-country operators.

³⁸ Cabinet Committee on Sustainable Development, *Sustainable Tourism*, Briefing paper, March 6 1992.

2.5.4 Mining

Historically, mining was an important resource staple that served to attract people to the area. Early mineral discoveries included, the Parridice silver-lead-zinc mine (1899), Swansea copper mine (1900), and Ptarmigan mine.

Mining, including petroleum and processing, accounts for approximately five percent of income and five percent of the TSA labour force. Industrial mineral mines quarrying gypsum, magnesite and barite dominate in the TSA. In total, four mines employ approximately 74 people. The following companies have operations in the TSA.

Baymag Mines Ltd. - Baymag owns the rights to a magnesite property located 35 kilometres north-east of Radium Hot Springs in the Mitchell River valley. The mine has been in operation since 1982 with approximately 31 employees and average annual output of 150 000 tonnes. The magnesite is crushed on-site and shipped to Alberta for further processing.

Domtar Ltd. - Domtar operates a gypsum mine 55 kilometres east of Canal Flats. In operation since 1984, the mine has an average annual output of 100 000 tonnes and employs seven people.

Westroc Industries Ltd. - The Westroc gypsum quarry located six kilometres east of Windermere has an average annual production of approximately 400 000 tonnes. The gypsum is shipped to building products plants in Vancouver and Calgary. In 1994 the mine reported 21 employees.

Mountain Minerals Ltd. - Mountain Minerals has sourced barite from the tailings pond at the Mineral King lead-zinc mine closed permanently in 1974 after 14 years of operation. Employment ranges seasonally, but peaks at about 15 people in the summer.

Exploration spending in the TSA is estimated at \$200 000 annually.³⁹ Currently, there is on-going exploration east of the Rocky Mountain Trench for diamonds and barite.

The outlook for the mining sector is stable, especially for Baymag and Westroc where ore reserve situations are very healthy. Commodity prices, access to land for exploration, and production and exploration costs (as impacted by the Forest Practices Code and the Commission On Resources and Environment) will determine the health of this industry in the future.

³⁹ Regional Geologist, Ministry of Energy Mines and Petroleum Resources.

2.5.5 Agriculture

Since the first non-native settlers arrived in the mid-1800s the agriculture industry has been an important contributor to the Invermere TSA economy. The 1991 Census revealed there were 94 farms covering 20 874 hectares of land. A total of 2344 hectares supported crops, with the majority in hay. Ranching is the main source of farming income, with beef cattle being the most important enterprise. In 1991, cattle and calves totaled 7031 head. Sales of \$10 000 or more were reported by 45 farms and total sales receipts were \$4.3 million.⁴⁰ Agriculture is estimated to make up approximately two percent of total income in the TSA.⁴¹

Similar to other small business ventures, families involved in agriculture may receive income from several sources. This is true in the Invermere TSA where it is common for agricultural operators to supplement farm income with employment income from other sectors.

The outlook for this sector is stable. While forest in-growth has negatively impacted the grazing opportunity on crown land, tenure rehabilitation could counteract this trend. With rehabilitation and interim grazing techniques there is some potential to increase the number of animal unit months (AUMs) allocated. High land prices and competing resources however, constrain the expansion of the farm land base.

2.5.6 Other Sectors

Other basic sectors of the Invermere TSA economy include non-forest manufacturing, construction and transportation. Combined, these industries employ 10 percent of the labour force and generate 11 percent of total income.⁴²

The non-forest manufacturing sector is relatively under-developed in the Invermere TSA. During 1993, manufacturing firms in the Invermere TSA engaged in producing concrete products, machining, printing and publishing, and craft production.⁴³ The general lack of non-forest processing can be attributed to the high costs of transportation and large distances to major markets.⁴⁴

⁴⁰ Statistics are provided for East Kootenay Census Sub Division A which covers 93 percent of the Invermere Forest District.

⁴¹ Horne, G., and Powell, C. *B.C. Local Area Economic Dependencies and Impact Ratios*, Ministry of Finance and Corporate Relations, February, 1995.

⁴² IBID.

⁴³ Ministry of Finance and Corporate Relations, *British Columbia Regional Index*, 1989.

⁴⁴ *RDEK Economic Profile-People and Resources* 1989.

With the large amount of development in the area, the construction industry is currently experiencing an upswing. Within the District of Invermere, 1994 housing starts increased 33 percent over 1993.⁴⁵

The outlook for growth in these sectors is stable with the majority of new enterprises likely to be entrepreneurial small business ventures.

2.5.7 Forest Industry

The forest industry has been active in the area now known as the Invermere TSA for over 100 years. The earliest uses of the area's timber resources was for log buildings and firewood. Eventually the demand for sawn lumber led to the construction of sawmills. An outline of the development of the forest industry follows:

- 1887** The first sawmill in the area was erected by W.A. Baillie-Grohman in 1887 between Kootenay River and Columbia Lake.
- 1910-1913** Toby Creek and Horsethief Creek watersheds were logged. Timber was floated to Golden for processing.
- 1920s** The valley bottom south of Canal Flats was logged. Timber was loaded on log decks and shipped via rail to a mill in Wardner for processing.
- 1928** The CPR built a large mill in Canal Flats.
- 1931** A rail line was built up Findlay Creek, sawn railway ties were brought to the Canal Flats mill for distribution.
- 1930-1950** Many portable mills operated in the valley. Primary products were railway ties and dimension lumber.
- 1950-1960** The move from valley logging to the mountain drainages required a change in methods and management practices to deal with different species and topography. Larger operators began trucking timber to stationary mills rather than using portable mills and camps.
- 1942-1943** CPR mill and logging operation at Canal Flats purchased by Columbia Contracting Co. (CCC)
- 1950** CCC purchased by Cranbrook Sash and Door Co.

⁴⁵ District of Invermere Building Permit Summary.

- 1955** Cranbrook Sash and Door Co. amalgamates with other logging and milling firms to become Crestbrook Timber Ltd.. Renamed Crestbrook Forest Industries (CFI) in 1967.
- 1956** Crestbrook obtains the Spillimacheen Tree Farm Licence (TFL #14) when it purchases Cranbrook Sawmill.
- 1965** Revelstoke Sawmill Co. purchased the Wilder Mill at Radium, the Moore Mill at Edgewater, and the Ronacher Mill at Athalmer. Operations were centralized at Radium and purchased by Slocan Forest Products in 1985.
- 1968** CFI built the Pulp Mill at Skookumchuk.

The forest industry, consisting of woodlands operations, and the production of wood products and pulp continues to play a central role in the Invermere TSA economy. Currently, 22 percent of employment income and 22 percent of the total labour force is employed by the forest sector.⁴⁶

Harvesting and processing operations are based throughout the TSA. These operations are fully documented in Sections 3.5 and 3.6.

The outlook for the forest industry in the Invermere TSA is positive. While the industry is in a period of transition brought about by possible changes in timber harvest levels, management practices and land use designations, the industry will continue to be a prime generator of employment and income in the area.

Ministry of Forests - Forestry activities in the Invermere TSA support an estimated 56 PY of employment at the Invermere Forest District office located in Invermere. This employment generates \$1.9 in after-tax employment income based on an average gross income of \$46 513 and a tax rate of 27.8 percent. There is also additional Invermere TSA related employment at the Nelson Forest Region office and at headquarters located in Victoria.

Forest Service employment is assumed to be dependent on government policy and budget decisions rather than to harvest levels and hence, is not included in the impact analysis calculations (Section 4).

⁴⁶ Horne, G., and Powell, C. *The Forest District Tables*, Ministry of Finance and Corporate Relations, March, 1995.

Christmas Tree Industry - The growing, improving, and harvesting of native stand Douglas-fir Christmas trees has been an important industry in the Invermere TSA for many years. Climatic and ecological conditions such as low annual rainfall, soil nutrient status, and early fall frosts all support the production of quality Christmas trees.

There are currently 51 Christmas tree permits issued on 8212 hectares of Crown land in the TSA. In 1993, approximately 85 000 trees were produced which represents 31 percent of the total Christmas tree production on provincial Crown land. Cut levels on Crown land are determined according to the site's growing capacity with allowances made for insect and disease outbreaks, fires, and market conditions.

Based on the 1993 production levels, it is estimated that Christmas tree production on Crown land supports over 1200 person-days of employment and generates \$210 000 in grower income and \$26 000 in provincial stumpage.⁴⁷

In addition to the Crown production, in 1993, 240 000 private trees were produced on private land in the Invermere Forest District. This figure represents 57 percent of the provincial private land total.⁴⁸

The industry is currently receiving competition from U.S. producers. The Kootenay Christmas Tree Association is meeting the challenge from the U.S. by starting a 'buy Canadian' campaign. The outlook for the industry is positive and depends on the ability of Canadian producers to maintain their share of the Canadian market.

⁴⁷ Special Tenures Forester, Invermere Forest District.

⁴⁸ IBID.

3.0 TSA Forestry Sector Overview

3.1 Timber Harvesting Land Base

Table 3.1 summarizes the timber harvesting land base as estimated in the *Invermere TSA Timber Supply Analysis*.⁴⁹ The Invermere TSA covers a total area of 1 018 351 hectares with 233 759 hectares comprising the timber harvesting land base.

Table 3.1 Invermere TSA Timber Harvesting Land Base		
Classification	Area (hectares)	% of Total Area
Total Land Base	1 018 351	100
Non-Crown land	(152 422)	15
Non-productive forest land	(363 443)	35.7
Productive Crown forest land	502 492	49.3
Reductions to Crown forest:		
Inoperable	(167 692)	16.5
Environmentally sensitive areas	(26 939)	2.6
Non-merchantable	(18 941)	1.9
Forest ecosystem networks / riparian areas	(22 598)	2.2
Other ¹	(53 477)	5.25
Total current reductions	(289 647)	28.4
Initial timber harvesting land base	212 845	20.9
Additions:		
Not satisfactorily restocked (NSR) ²	20 914	2.1
Future reductions:		
Future roads, trails, landings	(17 774)	1.7
Long-term timber harvesting land base	215 985	21.2
Source: <i>Invermere TSA Timber Supply Analysis</i> .		
Notes:		
1. 'Other' includes areas with non-commercial cover, steep slopes, sites with low growing potential, and existing roads, trails and landings.		
2. NSR are considered available for timber production and are added back into the timber harvesting land base once prescribed treatment plans have been specified.		

⁴⁹ A more detailed version of this table can be found in the *Invermere TSA Timber Supply Analysis* report 1995.

3.2 Current Forest Management Practices and Management Zones

Timber supply is determined by management practices and the size of the timber harvesting land base (divided into management zones). Staff in the Invermere Forest District provided descriptions of the following management practices: basic silviculture, unsalvaged losses, utilization levels, minimum harvest ages, cutblock adjacency, and green-up guidelines and forest cover objectives. The management zones recognize four different resource management emphases: recreation; water conservation; protection and maintenance of fish and wildlife habitat; and timber (integrated resource) management. Sixteen different management zones have been specified in the *Invermere TSA Timber Supply Analysis* report.⁵⁰

3.3 AAC Apportionment

The AAC for a TSA is set by the Chief Forester and apportioned by the Minister of Forests. In 1993, the AAC for the Invermere TSA was set at the current rate of 650 564 cubic metres per year. This AAC is apportioned over the various forms of tenure according to the stipulations described below.⁵¹

Forest Licence - A Forest Licence provides the holder (Licensee) with legal entitlement to TSA timber as well as an entitlement to licence renewal. Licensees may also acquire additional volumes of timber from private sources or commercial arrangements with Small Business Forest Enterprise Program (SBFEP) operators.

Small Business Forest Enterprise Program (SBFEP) - Through the Invermere TSA SBFEP the government sells Crown timber to qualified individuals and firms. Timber is allocated through competitive sales offered under Section 16 of the *Forest Act* or bid proposal sales offered under Section 16.1 of the *Forest Act*. Administration of the SBFEP involves dividing the apportionment into the following categories:

Category 1 - These operators compete for timber and then sell the logs they harvest. These sales are usually awarded for a term of one or two years. Currently, in the Invermere TSA, most of this timber is purchased by the major licensees.

Category 2 - These operators compete for the timber in the same manner as Category 1 operators. However, having access to (lease or own) a processing facility is also a condition to these sales. Currently, an estimated 20 percent of this timber is first processed by a major licensee who then supplies the SBFEP operator with an equivalent volume of lumber.

⁵⁰ More detailed information on current management practices and management zones is provided in the *Invermere TSA Timber Supply Analysis* report 1995.

⁵¹ Current AAC is presented net of Woodlot licences (6700 cubic metres).

Bid Proposals - These sales consist of tenders for timber based on the best combination of bonus bid and value-added proposal. Other factors, such as local and existing facilities and employment generated, may also be considered by the minister in awarding these sales. Sales terms range from two to 10 years.

Forest Service Reserve (FSR) - The FSR apportionment is allocated to cover harvesting of right of ways and the clearing of various Crown lands when there is not enough time to grant forest tenures.

Timber Sale Licences - This apportionment covers four licenses ranging in size from 1397 to 7505 cubic metres.

Woodlots - Woodlot licences are a legal agreement which allows the licensee to manage Crown land and private land as a single management unit. The apportionment is intended to cover pending licences. Once awarded, the AAC for that licence is excluded from the TSA. Woodlots are not included in the TSAR analysis.

Table 3.2 illustrates how the Invermere AAC was apportioned in 1994.

Table 3.2 Invermere TSA AAC Apportionment		
Classification	Coniferous (cubic metres)	Percent of Total AAC
Forest Licences		
Crestbrook Forest Industries Ltd	290 673	44.7
Slocan Forest Products Ltd	254 496	39.1
Total Forest Licences	545 169	83.8
Small Business Forest Enterprise Program ¹	81 579	12.5
Timber Sale Licence (TSL) <= 10,000 (major) ²	12 142	1.9
Forest Service Reserve	11 674	1.8
Total Invermere TSA	650 564	100
Source: Ministry of Forests, Timber Harvesting Branch, 1994		
Notes:		
1. Includes both Competitive sales (Section 16) and Bid Proposal Sales (Section 16.1).		
2. Includes four licences: Nelson, E.P.; North Star Planing Co. Ltd.; Palumbo, C&S; and Soles, J.L.		

Under the *Forest Act*, licensees are accountable for the volume of timber harvested in the TSA during a five year period referred to as a cut control period. Within this time-frame, licensees may vary their rate of cut by 50 percent in any given year provided the harvest volume balances out to within 10 percent of their apportionment over the cut control period. This allows licensees some management flexibility during fluctuating markets. The cut control period for the major licensees in the Invermere TSA runs from the beginning of 1992 to the end of 1996. Harvest levels have been within the cut control constraints for this period.

3.4 Wood Fibre Supply

Table 3.4 illustrates the degree to which major licensee sawmills rely on AAC fibre sources and gives an indication of the relative sensitivity of individual licensees to TSA AAC changes. The table indicates that in 1993, the CFI (Canal Flats) and SFP (Radium) sawmills relied on AAC fibre for an average of 54 percent of their throughput at capacity.⁵²

Table 3.4 Invermere TSA Sawmill Fibre Supply and Consumption (1993-m ³)			
Facility	Invermere TSA Apportionment	Forest Licence Share of Capacity ¹	Other Sources
Invermere TSA Major Licensee Sawmills	545 169 m ³	54%	46%
Source: Licensee Survey			
Notes:			
1. Does not include SBFEP purchases.			

The remaining B.C. fibre is sourced from Tree Farm Licence #14 (CFI), purchased from private land within the Invermere Forest District, and sourced from other TSAs (Cranbrook, Golden, and Kootenay Lake). On an aggregate basis, mills within the Invermere TSA can be considered net importers of fibre.

Over the past few years, relatively high wood product prices, coupled with supply constraints, have made distant transport of fibre economic for mill operators. This trend has impacted the fibre sources of local area mills in different ways. Major licensees and some of the smaller operators have responded to the market shift by sourcing wood from more distant areas, most recently private land in Alberta. The supply from extra-TSA sources is however, not secure. Announced AAC reductions in the Revelstoke, Golden and Kootenay Lake TSAs reduce the available supply from these areas. In addition, the fibre currently being sourced from private land in Alberta cannot be considered a stable long-term supply.

The trend toward increased movement of fibre has also led to the movement of Invermere SBFEP fibre out of the TSA for processing elsewhere. Some of the local SBFEP operators report experiencing increased competition for fibre from SBFEP operators based in other TSAs. This trend is confirmed by SBFEP records which indicate an increase in contracts being awarded to non-Invermere TSA-based SBFEP firms.⁵³

⁵² Does not include SBFEP purchases. Capacity is defined as 480 shifts per year.

⁵³ Resource Officer, Small Business, Invermere Forest District.

3.5 Major Licensees

There are two major Forest Licence holders operating in the Invermere TSA. The following discussion profiles the harvesting and processing operations for Crestbrook Forest Industries Ltd. and Slocan Forest Products Ltd.

Crestbrook Forest Industries Ltd (CFI) - Crestbrook is an integrated forest products company engaged in logging, lumber, and bleached kraft pulp operations. Crestbrook began in 1898 as Cranbrook Sash and Door Co. Ltd. (incorporated in 1905). In 1965, after a series of acquisitions and mergers, the company was consolidated into Crestbrook Timber Ltd. In 1967 Crestbrook Timber Ltd. was renamed Crestbrook Forest Industries Ltd.

CFI's woodlands division harvests and manages forests in the Kootenay Lake, Cranbrook and Invermere Timber Supply Areas. The company's timber base consists of 80 percent Engelmann spruce and lodgepole pine, 17 percent Douglas-fir and larch, and three percent other species. In 1993, CFI harvested approximately 1.4 million cubic metres of timber from Tree Farm Licence 14 and Forest Licenses in the East Kootenay area. The remainder of its required 1.6 million cubic metre input was purchased from private land in the East Kootenay's as well as from Alberta. In the Invermere TSA, CFI holds a Forest Licence with an annual AAC of 290 673 cubic metres and also purchases a timber from the SBFEP. In 1993/94 Approximately 66 percent of the harvesting has been conducted using conventional methods, with the remainder consisting of cable and helicopter logging. Due to increased harvesting on steeper terrain there is a trend towards more use of alternative harvesting techniques.

The wood products division operates sawmills in Cranbrook, Canal Flats and Elko, which produce dimension lumber and higher value specialty products including laminated beam lumber and machine stress-rated (MSR) lumber. CFI exports 95 percent of its lumber to the U.S.A., mostly to the Southwest, West and Midwestern markets. The Canal Flats mill, the only CFI sawmill located in the Invermere TSA, had an eight hour capacity of 325 mfbm in 1993.⁵⁴ Supplies for the mill are purchased from Cranbrook, Invermere, and the Lower Mainland. Improving wood quality and increasing flexibility in production are the two main goals this division is working toward.

The pulp division operates a bleached kraft pulp mill at Skookumchuk which lies just inside the southern boundary of the Invermere TSA. The mill began producing pulp for markets in the United States, Japan, and Mexico in 1968, and currently has an annual capacity of 177 430 Air Dry Metric Tonnes (ADMT). In 1993, approximately 40 percent⁵⁵ of the pulp mill's requirement of wood chips came from sawmills located in the Invermere TSA, the remainder came from the Cranbrook, Golden and Kootenay Lake TSAs. While logs are primarily used in the manufacture of lumber, 1994 saw a significant

⁵⁴ mfbm defined as thousand foot board measure.

⁵⁵ Economics and Trade Branch, Ministry of Forests.

increase in the input of low quality whole-logs in the pulp process. The majority of the mill employees (97 percent) live in the Cranbrook TSA. Supplies for the mill are purchased from firms in Cranbrook and the Lower Mainland.

CFI's operations in the region employed 1157 people in 1993. Approximately 560 PY of employment were located in the Invermere TSA⁵⁶. In addition Invermere TSA woodlands operations supported an additional 100 PY of employment.

Slocan Forest Products Ltd - Slocan is one of the largest integrated forest products organizations in British Columbia, with timber resources and production facilities in the northern, central and southern regions of the province. Slocan presently owns and operates eight sawmills and one plywood facility in B.C. Slocan was formed in 1978, and in 1985 purchased the timber, logging, and sawmilling assets of Revelstoke Concrete and Lumber Ltd located at Radium Hot Springs. The Radium mill is Slocan's only one in the Invermere TSA.

The woodlands division of the Slocan sawmill at Radium operates in the Invermere Cranbrook and Kootenay Lake TSAs. The timber base consists of predominantly mature, harvestable trees, comprised of approximately 55 percent lodgepole pine, 25 percent Douglas-fir, and 20 percent Engelmann spruce. Slocan holds forest licenses in the Invermere TSA for 254 496 cubic metres of wood. To make up the remainder of its fibre needs, Slocan also purchases wood from private lands within the TSA boundaries as well as from SBFEP Category 1 operators. Slocan has also purchased a quantity of private wood from other East Kootenay TSAs as well as from Alberta. Currently, harvesting consists of approximately 23 percent cable versus 77 percent conventional.

From its timber base, the Radium mill has the capacity to produce products of various lengths for the general lumber commodity market. In addition, the mill produces machine stress rated (MSR) lumber, which represents a growing proportion of the mill's production volumes and revenues. The mill has small-log and large-log lines designed to process the range of log diameters harvested from its timber base and in 1993 had an eight hour capacity of 190 Mfbm. Approximately 83 percent of Slocan's total lumber production is sold in the US and is shipped by rail and truck. Supplies for the Radium mill are purchased from Invermere, Cranbrook and the Lower Mainland.

In 1993, Slocan employed 1900 people of which 142 PY were associated with the Radium facility. In addition, woodlands operations associated with its Radium operation provided 71 PY of employment. All of these employees reside in the TSA.

560
142

⁵⁶ Includes woodlands division, Canal Flats mill, and pulp mill.

3.6 The Independent and Small Business Sector

Over the past four years, an average of 77 497 cubic metres of timber per year has been harvested by SBFEP operators. This harvest level represents approximately 11 percent of the Invermere TSA AAC over the same time period. Since 1990 an average of 10 firms have participated in this program. Currently approximately 20 percent of SBFEP timber is allocated to Category 1 operators, 40 percent to Category 2, and 60 percent to the Bid Proposal category.

The following is a profile of some of the small business mills and independent firms that operate in the TSA.

Seel Forest Products Ltd. - The Seel sawmill located at Edgewater has production capacity that includes primary breakdown, planing, chipping, and remanufacturing capability. The flexible nature of the mill allows production to be tailored to both available supply as well as market requirements. In the past, dimension lumber has been produced for export to the US, the UK and Japan. The company obtains its fibre through the Invermere TSA small business program as well as from private sources. All of its volume is processed at the Edgewater mill. Seel Forest Products has employed an increasing number of employees over the past three years, with 39 reported in 1994. The company representative echoed the concerns of the other small business operators in the region citing constrained timber supply and resulting high bid prices as the major impediment to viability. In addition the company is concerned with the amount of SBFEP fibre currently being shipped out of the Columbia Valley for processing elsewhere.

Brisco Wood Preservers Ltd. - A Division of Kootenay Wood Preservers Ltd, Brisco Wood Preservers operate a post and pole mill at Brisco. The mill produces fence posts for prairie agricultural use and utility poles for the B.C. market. In operation for many years under different owners, the mill obtains approximately half its fibre volume directly or indirectly through the Invermere TSA small business program. Although little fibre is obtained privately, the company trades with major licensees to obtain the specific types of wood necessary to make the specialty post and pole products. In 1993 the company reported employing 65 people. During 1994, due to timber supply constraints, resulting high stumpage rates and low post prices, employment was reduced to 28. The company reports accessing appropriate fibre at affordable prices to be the major upcoming challenge. To meet this challenge the company is working on maintaining trade agreements as well as working on alternative timber sources.

North Star Planing Company Ltd. - Founded in 1961, North Star produces dimension lumber for the Canadian market. The company operates a sawmill consisting of a head rig and planer in Athalmer. In 1994, approximately 14 people were employed. It obtains fibre through harvesting a Timber Sale Licence (Major) and by bidding on Small Business volumes. All of the company's fibre comes from the Invermere TSA. Over the past few years the company reports increasing difficulty in accessing small business sales due to

intense competition. The company representative contends maintaining production and employment levels are contingent on accessing SBFEP fibre at economic prices.

Mardis Logging Company Ltd. - Mardis Logging has operated in the Invermere TSA since 1964, and the sawmill located at Skookumchuk has been in operation for ten years. The mill produces primarily tongue and groove building lumber, 90 percent of which is exported to the US. In 1994, approximately 12 full-time employees were engaged in the companies operations. The company relies on small business volumes as well as direct purchases from private land. To access the necessary species and quality profiles, the company regularly trades equivalent volumes of wood with the major licensees. Timber supply constraints also top the list of concerns at Mardis. In particular, they feel that Category 2 small business operators cannot compete with major licensees when bidding for Category 1 wood. The mill purchases the majority of its supplies from Cranbrook.

Ukass Logging Ltd. - Ukass Logging has run a small family-owned enterprise at Wilmer Creek since 1956. The sawmill has produced a variety of products including, cants for remanufacture, as well as dimension lumber for export to the UK, Japan and Australia. To obtain fibre, Ukass logging has participated in the Invermere small business program. Over the past few years Ukass has found it increasingly difficult to procure enough timber at prices economic to its operation. Consequently, the company has not operated the mill since February, 1994. Historically the mill has employed approximately 8 employees.

Soles Bros. Lumber Ltd. - Soles Bros. have operated a small portable sawmill based in Parson since 1952. This independent company has produced specialty orders and rough-cut timber. Soles have harvested on a Timber Sale Licence (Major) and purchased private wood to obtain timber. Operations have been scaled down over the past few years with approximately 3 employees being hired from April to November.

Contract Logging Operations - Each of the mill operations listed above also participate in harvesting operations. In addition, there are a number of contract logging operations in the TSA. These operations compete to harvest timber in the SBFEP as well as serve as contract loggers for the major licensees. Invermere logging contractors also harvest non-TSA sources of wood found in other TSAs, on private land, and in Alberta.

3.7 Current Forest Industry Employment and Income

3.7.1 Employment

Employment supported by the current AAC is presented in Table 3.5. The coefficients can be interpreted as the number of person years (PY) supported by 1000 cubic metres of AAC timber. The table presents both TSA and provincial employment totals and coefficients. TSA level jobs are defined as those held by residents of the TSA. Provincial employment and employment coefficients include residents of the TSA, as well as the rest of BC.

Table 3.5 TSA and Provincial Employment and Employment Coefficients				
Sector Employment	Person Years¹ per 1000 m³		AAC-Supported Person Years	
	TSA	BC	TSA	BC
Harvesting / Planning	0.26	0.29	169	189
Silviculture	0.02	0.05	13	33
Wood Processing	0.33	0.40	215	260
Pulp Processing ²	0.01	0.14	7	91
Total Direct	0.62	0.88	403	572
Indirect/Induced	0.23	1.32	150	859
Total Employment	0.85	2.20	553	1431
Notes:				
1. One full time job was assumed to represent one person year (PY) of employment. Part-time jobs were converted to PY based on industry information.				
2. Although located within Invermere TSA boundaries, 92 percent of the employees at the CFI pulp mill at Skookumchuk actually live outside the TSA.				

As outlined in Appendix C, these estimates were based on information provided by forest industry operators, industry averages compiled by the Ministry of Forests, and discussions with Ministry of Forests staff and forestry consultants.

Currently, the Invermere AAC supports an estimated 189 PY in harvesting, 260 PY in wood processing, 91 PY in pulp processing and 33 PY in basic silviculture.

3.7.2 Income

Estimates of average forest industry wage rates are presented in Table 3.6. The wages are net of non-cash benefits and are shown before and after tax.

Table 3.6 TSA and Provincial Average Wage Levels ¹		
Sector	Pre-Tax (\$1993)	After-Tax (\$1993) ²
Harvesting / Planning	\$44 973	\$32 560
Silviculture	40 000	29 600
Wood Processing	39 829	29 473
Pulp Processing	51 506	36 467
TSA Direct³	\$42 180	\$30 884
Provincial Direct⁴	43 391	31 610
Indirect⁵	31 158	24 366
Induced⁶	-	20 854
Provincial Indirect/Induced⁷	29 178	23 051
Notes: 1. Includes cash benefits such as holiday pay, overtime and payroll supplements. Excludes non-cash benefits such as pension payments, contributions to insurance plans and health care premiums. 2. After-tax incomes are based on the 1993 tax rates. 3. Based on a survey of licensees. Average weighted by TSA share of employment. 4. Average weighted by provincial share of employment. 5. Average indirect to logging, pulp and paper and other wood processing incomes weighted by sector employment share. Source: MFCR estimates 6. Source: MFCR average non-basic after-tax income (1991) estimates. After-tax wage is increased by 1.5% per year for two years to account for wage inflation. 7. Provincial indirect/induced income is based on 1993 average pre-tax weekly earnings for B.C. from Statistics Canada, Catalogue No. 72-002.		

Average wage rates were determined through a survey of forest industry operations, discussions with union representatives and Ministry of Forest staff, and based on information supplied by Statistics Canada and the Ministry of Finance.

3.7.3 Harvest Scenarios

The purpose of this report is to assess the economic, social and environmental implications of alternative timber harvest levels within the Invermere TSA. The *Invermere TSA Timber Supply Analysis* report analyzes how current forest management practices affect the supply of wood available for harvesting and demonstrates possible harvest reductions that would lead to a sustainable long-term harvest level (LTHL).

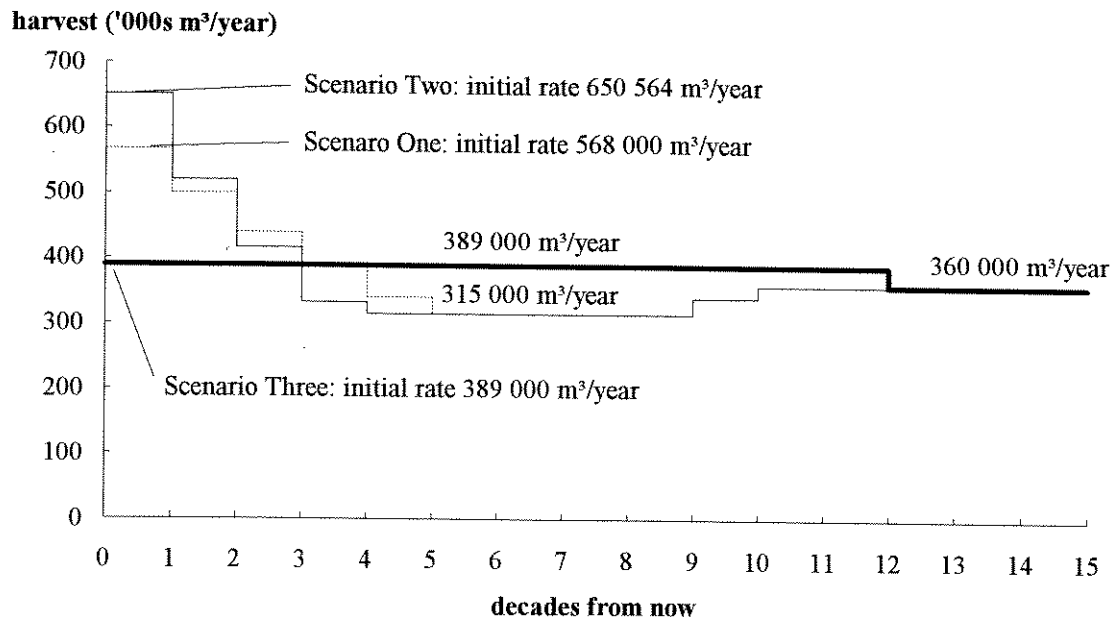
Three harvest scenarios, chosen to illustrate a range of possible economic, social and environmental impacts are examined in this report. The three scenarios are presented in Table 3.7 and Figure 3.1.

Table 3.7 Projected Timber Supply by Scenario and Decade									
Scenario One									
('000s m³)	Current	Decade							
	AAC¹	1	2	3	4	5	6-9	10	11+
Harvest Level	651	568	500	440	387	341	315	341	360
% of Current AAC	100%	87%	77%	68%	59%	52%	48%	52%	55%
Scenario Two									
('000s m³)	Current	Decade							
	AAC¹	1	2	3	4	5-9	10	11+	
Harvest Level	651	651	521	417	333	315	341	360	
% of Current AAC	100%	100%	80%	64%	51%	48%	52%	55%	
Scenario Three									
('000s m³)	Current	Decade							
	AAC¹	1-12				13+			
Harvest Level	651	389				360			
% of Current AAC	100%	60%				55%			
Source: Invermere TSA Timber Supply Analysis, Ministry of Forests, 1995									

Scenario One - Scenario One is the base harvest forecast from the *Invermere TSA Timber Supply Analysis* report. This harvest forecast begins with an immediate 12.7 percent or 75 864 cubic metre drop in harvest to 568 000 cubic metres per year. To avoid major harvest shortfalls, the harvest forecast declines by about 12 percent per decade over the next five decades to a low of 315 000 cubic metres per year. In approximately 90-100 years, the harvest level increases to the long-term harvest level of 360 000 cubic metres per year.

Scenario Two - Scenario Two maintains the current harvest level for one decade before dropping at a rate of 20 percent per decade to a low of 315 000 cubic metres per year after four decades. In approximately 90-100 years, this harvest level also increases to the long-term harvest level of 360 000 cubic metres per year.

Scenario Three - The harvest level in Scenario Three drops immediately by 40 percent to the highest non-declining rate achievable over the next 12 decades (389 000 cubic metres per year). After 120 years, the harvest then drops to the long run harvest level rate of 360 000 cubic metres per year.

Figure 3.1 Invermere TSA Harvest Scenarios

The TSAR identifies several factors which contribute to the decline in timber supply. The most important factor is that the base harvest forecast is above the steady, long-term harvest level. In this situation, harvest rates must decline toward the long-term level to avoid serious timber supply shortfalls in the future.

Also contributing to the decline in the timber supply are forest cover requirements for forest resources such as wildlife habitat, scenic values, biodiversity, and protection of community watersheds. Even if these cover requirements are removed entirely however, The harvest forecast still shows a decline in the near future.

The last contributing factor to harvest declines is the fact that there is significantly less area available for timber harvesting today than there was five or ten years ago. Riparian buffers, forest ecosystem networks, and steep slope sites are examples of areas not available for harvesting due to current standards of practice.⁵⁷

It is important to note that the timber harvest forecasts produced in the timber supply analysis are **not AAC recommendations**. The forecasts are meant to provide a focus for discussion of timber supply issues. Further, all three scenarios involve a decline from the current AAC of 650 564 cubic metres per year to a long-term harvest level of 360 000 cubic metres per year. The only difference between the scenarios is the timing of the decline to the long-term harvest level.

⁵⁷ Ministry of Forests, *Invermere TSA Timber Supply Analysis Report*, 1995.

4.0 Economic Impacts

4.1 Employment and Employment Income Impacts

This chapter presents the estimated impacts associated with the three harvest scenarios outlined in the previous section. Impacts on employment, employment income, and provincial government revenues are estimated.

The analysis identifies three types of employment that would be affected by changes in Invermere TSA harvest levels. Direct employment includes forest sector jobs associated with harvesting, re-forestry, and processing TSA timber. Indirect employment is generated by industries that support the forest sector, such as mill suppliers and transportation. Induced employment is generated through the re-spending of direct and indirect income, for example at local retail outlets. The methodology applied to estimate employment impacts relies on certain assumptions and is subject to limitations as outlined below. Please refer to Appendix C for a detailed discussion of the impact methodology.

Employment Coefficients - Future direct employment impacts are estimated by applying employment coefficients (PY / '000 m³) based on current employment, harvest and throughput levels. This approach assumes that market conditions and production technology remain constant over the harvest forecast. While the accuracy of the employment estimates will decrease as the length of the forecast period increases, for the short-term the estimates are considered reasonably accurate.

Timing of Impacts - The presentation of impacts suggests that employment changes occur simultaneously with harvest level changes. This assumption may not hold for all industry sectors. As there is a lag period associated with changes in business and consumer spending, induced employment impacts in particular, may arise over a longer period of time.

Proportional Impacts and Threshold Effects - Employment changes within the forest industry may vary across sectors. Changes in harvest levels are most closely tied to changes in harvesting employment. Processing employment impacts are less likely to be directly proportional to harvest level changes. Processing impacts are more likely to occur in a step-wise manner where, at some quantity of fibre supply (a threshold), the number of shifts may be reduced or as a worst case, the mill may shut down.

Distribution of Impacts - The methodology employed yields estimates of aggregate employment impacts. This methodology does not estimate the distribution of impacts among individual licensees, companies and communities within the TSA.

Income Support Programs and Migration - The impacts presented make use of a long run (migration) employment multiplier which is based on the assumption that the income of all impacted employees immediately falls to zero. In reality, income support programs would, in the short run, mitigate employment income and thus would lessen the induced

employment impacts. Note that direct and indirect employment impacts would not be affected.

Proportional Harvest Reductions - Harvest reductions are assumed to be spread evenly among all licensees and all forms of tenure.

The impacts presented below are estimated at both the TSA and provincial levels. Employment benefits accruing to individuals working in the TSA, but living outside the TSA, are considered at the provincial level. Provincial impacts include individuals living both in the TSA as well as other parts of B.C.

4.1.1 TSA Employment and Employment Income

TSA employment and employment income levels and impacts associated with Scenario One are illustrated in Table 4.1. The table presents direct, indirect/induced, total employment and income levels by harvest level. The table also shows the total incremental impacts associated with the change in harvest levels.

Table 4.1 Scenario One - TSA Employment Levels and Impacts									
Decade	Harvest (m ³ /yr)	Employment (PY)				Employment Income (1993 \$million)			
		Direct	Indirect/ Induced	Total	Change	Direct	Indirect/ Induced	Total	Change
Current	650 564	403	150	553	-	\$12.4	\$3.4	\$15.8	\$-
1	568 000	352	131	483	-70	10.8	3.0	13.8	-2.0
2	499 840	310	115	425	-58	9.5	2.6	12.1	-1.7
3	439 859	273	101	374	-51	8.4	2.3	10.7	-1.4
4	387 076	240	89	329	-45	7.4	2.1	9.5	-1.2
5	340 627	211	78	289	-40	6.5	1.7	8.2	-1.3
6-9	315 000	195	73	268	-21	6.0	1.7	7.7	-0.5
10	340 627	211	78	289	21	6.5	1.7	8.2	0.5
11+	360 000	223	83	306	17	6.9	1.9	8.8	0.6

The current AAC of 650 564 cubic metres supports an estimated 403 direct and 150 indirect and induced PY of TSA-based employment. Approximately \$12.4 million in direct and \$3.4 million indirect and induced annual employment income is associated with the current level of employment.

Scenario One - Immediately reducing the harvest to 568 000 cubic metres would lead to the loss of an estimated 51 PY in direct employment and \$1.6 million in annual direct employment income. Additionally, 19 PY of combined indirect and induced jobs would be lost implying a \$0.4 million corresponding loss in annual income.

The lowest harvest level under Scenario One (315 000 cubic metres per year) would lead to the loss of an estimated 208 PY in direct, and 77 PY in indirect and induced employment. Corresponding annual employment income losses would be \$6.4 million direct, and \$1.7 million indirect and induced.

Scenario Two - Under Scenario Two, employment and employment income impacts would be postponed for a decade. The trade-off for maintaining the initial harvest rate is a 8 percent higher subsequent rate of decrease to reach the long-term level (20 percent per decade for four decades). The first drop in harvest (after 10 years) would lead to a loss of 80 PY direct, 30 indirect and induced PY. Associated with this decrease in employment would be a loss of \$2.5 million direct income, and \$0.7 million indirect and induced income.

After three decades, the total decrease in harvest level and hence, associated impacts, would surpass those incurred under Scenario One. After four decades, the total decrease in harvest and associated impacts would surpass those incurred under Scenario Three.

Scenario Three - Scenario Three involves an immediate drop to the highest non-declining rate of harvest that can be sustained for the next 12 decades without causing major future harvest shortfalls (389 000 cubic metres). This 40 percent drop leads to a loss of 162 PY direct and 60 indirect and induced PY. Associated with this foregone employment is a loss of \$5.0 million direct and \$1.4 million indirect and induced employment income. After 12 decades, the harvest would decline to the long-term level which would involve a further loss of 18 direct and 7 indirect and induced PY. An estimated \$0.5 million direct and \$0.1 million indirect and induced employment income would also be lost with this final decline.

The long-term harvest level, common to all scenarios, represents 55 percent of the current AAC (360 000 cubic metres). A move to this harvest level would involve the cumulative loss of 180 PY direct and 67 PY indirect and induced jobs. These losses would result in \$5.5 million direct and \$1.5 million indirect and induced annual income being forgone.

4.1.2 Provincial Employment and Employment Income

Provincial employment and employment income levels and impacts associated with the Invermere TSA Scenario One harvest forecast are illustrated in Table 4.2. The table presents direct, indirect/induced, total employment and income levels by harvest level. The table also shows the total incremental impacts associated with the change in harvest level over the decades.

Table 4.2 Scenario One - Provincial Employment Levels and Impacts

Decade	Harvest (m ³ /yr)	Employment (PY)				Employment Income (1993 \$million)			
		Direct	Indirect/ Induced ¹	Total	Change	Direct	Indirect/ Induced	Total	Change
Current	650 564	572	859	1431	-	\$17.7	\$21.0	\$38.7	\$-
1	568 000	500	750	1250	-181	15.4	18.3	33.7	-5.0
2	499 840	440	660	1100	-150	13.6	16.1	29.7	-4.0
3	439 859	387	581	968	-132	11.9	14.2	26.1	-3.6
4	387 076	341	511	852	-116	10.5	12.5	23.0	-3.1
5	340 627	300	450	750	-102	9.2	11.0	20.2	-2.8
6-9	315 000	277	416	693	-57	8.6	10.2	18.8	-1.4
10	340 627	300	450	750	57	9.2	11.0	20.2	1.4
11+	360 000	317	475	792	42	9.8	11.6	21.4	1.2

Notes:

1. Indirect/induced employment levels and impacts are calculated using a provincial employment multiplier of 2.5.

Currently, the Invermere AAC supports an estimated 572 PY of direct forest industry jobs, and contributes \$17.7 million in annual direct employment income provincially. The current AAC also provides 859 PY indirect and induced employment. This employment generates \$21.0 annual indirect and induced income.

Scenario One - Immediately reducing the harvest to 568 000 cubic metres would lead to the loss of an estimated 73 PY in direct employment and \$2.2 million in direct employment income. Additionally, 109 PY of combined indirect and induced jobs would be lost implying a \$2.7 million corresponding loss in annual income.

Scenario Two - Under Scenario Two, provincial employment and employment income impacts would involve a loss of 114 direct and 171 indirect and induced PY after two decades. Associated with this decrease in employment would be a loss of \$3.5 million direct and \$4.2 million indirect and induced annual employment income. After three decades, employment and income impacts under Scenario Two overtake those associated with Scenario One. After four decades Scenario Two impacts overtake those associated with Scenario Three.

Scenario Three - The initial 40 percent drop in harvest incurs a loss of 230 direct and 345 indirect and induced PY at the provincial level. This foregone employment leads to a loss of \$7.1 million direct and \$8.4 million indirect and induced annual employment income. After 12 decades, the harvest would decline to the long-term harvest level which would involve a further loss of 26 direct and 39 indirect and induced PY. Direct employment income would be reduced by an estimated \$0.8 million and indirect and induced income would fall by \$1.0 million with this final decline.

The long-term harvest level, common to all scenarios, is reached in 12 decades. A move to this harvest level would involve the loss of 256 PY direct and 384 PY indirect and induced provincial jobs. These losses would result in \$7.9 million direct and \$9.4 million indirect and induced income being forgone.

4.2 Government Revenue Impacts

The impacts on provincial government revenue associated with the Scenario One forecast are presented in Table 4.3. The following categories of revenue are considered:

Table 4.3 Scenario One - Provincial Government Revenue Levels and Impacts (\$million 1993)						
Decade	Harvest (m ³ /yr)	Stumpage/ Rent	Personal Income Tax	Other Taxes	Total	Change
Current	650 564	\$12.4	\$3.0	\$3.9	\$19.3	\$-
1	568 000	10.8	2.6	3.4	16.8	-2.5
2	499 840	9.5	2.3	3.0	14.8	-2.0
3	439 859	8.4	2.0	2.6	13.0	-1.8
4	387 076	7.4	1.8	2.3	11.5	-1.5
5	340 627	6.5	1.6	2.0	10.1	-1.4
6-9	315 000	6.0	1.5	1.9	9.4	-0.7
10	340 627	6.5	1.6	2.0	10.1	0.7
11+	360 000	6.9	1.7	2.2	10.8	0.7

Stumpage and Rent - Annual stumpage information was provided by the Valuation Branch of the Ministry of Forests, and was calculated at a rate of \$18 767 per 1000 cubic metres. This figure represents the 1994 stumpage rates on licensee wood and SBFEP bonus bids for the Invermere Forest District deflated to 1993 dollars. Policy changes announced in April, 1994 as part of the Forest Renewal Plan, resulted in 1994 stumpage charges approximately 60 percent higher than the three year (1991/92-1993/94) average. Stumpage revenues will vary with changes in lumber prices, however, the 1994 rate is assumed to represent a structural shift in the market and hence future stumpage values are based on the 1994 rate. Provincial rent was applied at a rate of \$247 per 1000 cubic metres. Rent estimates are based on information from the Economics and Trade Branch of the Ministry of Forests, based on a three year average (1991/92-1993/94 inclusive).

Personal Income Tax - Personal income tax associated with employment income was calculated using a weighted average of the marginal tax rates on direct income (27 percent), and indirect and induced income (21 percent). The provincial share of total tax was assumed to be one-third.

Other Taxes - Other taxes include corporate, logging, property, sales, and electricity taxes. Based on a five year average (1988-1992) these taxes amounted to an estimated \$5995 per 1000 cubic metres.

Scenario One - The current AAC is estimated to generate \$12.4 million in provincial government revenue. The initial 12.7 percent reduction in harvest under the base harvest forecast would result in a loss of \$2.5 million of foregone government revenue. This total would include \$1.6 million in stumpage and related charges, \$0.4 million in personal income tax, and \$0.5 million in other taxes.

Scenario Two - The initial government revenue impacts would occur at the end of decade two under this scenario. The 20 percent reduction would involve a loss of \$2.5 million in stumpage and rent, \$0.6 million in personal income tax and \$0.8 million in other taxes for a total of \$3.9 million in foregone revenue.

Scenario Three - The 40 % percent initial reduction in harvest under Scenario Three would result in a loss of \$7.8 million in total government revenue. This total is made up of an estimated \$5.0 million in stumpage and rent, \$1.2 million in personal income tax and \$1.6 million in other taxes.

The reduction to the common long-term harvest level, reached in 120 years, would lead to an estimated \$8.5 million reduction in provincial government revenue. This reduction would consist of \$5.5 million in stumpage and rent, \$1.3 million in personal income tax and \$1.7 in other taxes.

4.3 **Impacts on Other Economic Sectors**

Tourism and Outdoor Recreation - The relationship between harvesting levels and tourism and outdoor recreation is complex, depending on the time frame, effect of harvesting on other forest resources and the tourism/recreation activity in question.

In the short-run, tourists are unlikely to respond to incremental changes in the harvest rate. In the long-run however, reductions in the harvest rate could potentially positively impact tourism. These impacts differ depending on the tourism/recreation product. The following details how each segment will likely be impacted.

Front-country Tourism - So long as visual quality objectives are maintained in the main travel corridors, it is unlikely that this segment of the tourism market will be significantly impacted by a reduction of harvesting. Tourism representatives do however indicate that the successful marketing of their tourism products rely on the maintenance of the natural image of the TSA. This image, as perceived by tourists, may best be protected under Scenario Three.

Guide Outfitting and Trapping - Guide outfitting and trapping rely on wilderness and wildlife. Harvesting impacts these operations by detracting from a client's wilderness experience and by increasing competition from local recreationalists (especially hunters) due to increased access. In general, the Scenario Three reduction in harvest would be preferred by these operators.

Local Recreation - Provided harvesting activities do not jeopardize the viability of game species, a reduction in harvesting has the potential to negatively impact hunting, angling, snowmobiling and other recreation activities that rely on logging roads for access. If the level of harvesting is such that wildlife species are compromised a reduction will likely positively impact these activities.

Public Sector - The public sector is, to a certain extent, dependent on the level of population in the TSA. Population forecasts for the area indicate a growing population. Hence, the loss of employment under Scenario One is unlikely to lead to the kind of population decrease that would begin to necessitate a decrease in employment in the public sector. Under Scenario Three, the probability of a decrease in population becomes higher leading to an increased chance of impacts being felt in this sector.

Mining - The link between timber harvest levels and mining activity is weak but positive. In general, increasing harvest levels leads to an increase in logging roads and a subsequent increase in access for mining exploration. In addition, the building of roads exposes soil and can give an idea of the underlying geology of an area. Hence, mining will be slightly negatively impacted by reductions in the harvest level.

Agriculture - Grazing opportunities and timber harvesting levels are somewhat positively correlated. A reduction in harvest levels could negatively impact agricultural grazing opportunities as less open land is available for forage production. Selective logging tends to open the forest canopy encouraging under-story growth which increases forage production. It is not likely however, that the reductions envisioned under Scenario One or Three will significantly impact this sector.

5.0 Community Implications

This section discusses the social and community implications of the TSA timber harvest forecasts. Social effects of TSA timber supply reductions are organized into two categories: (1) worker and family-based effects and (2) community-based effects. Discussions of potential social effects are limited to the first decade.

5.1 Threshold Impacts

Section 4.0 details that the reduction in harvesting that would occur under Scenarios One and Three would lead to harvesting and processing job losses. Another important issue from a community point of view would be the probability of a mill losing an entire shift or shutting down due to this reduction. Should a mill reach a threshold of operability, the immediate job losses would be higher than those estimated in this analysis, although the long-run losses may be smaller.

It is important to remember, as discussed in Section 3.4, that mills in the TSA are net importers of fibre and the ultimate effects of changes in the TSA harvest level depend in part, on the response from extra-TSA sources. Though the reliability of extra-TSA fibre supply is uncertain, announced reductions in surrounding TSAs, coupled with uncertain continued supply of fibre from Alberta, suggest potential reductions in extra-TSA fibre could compound the estimated impacts.

Scenario One - Taken in isolation, it is unlikely that the 12.7 percent reduction under Scenario One would lead to threshold impacts being realized by a major licensee mill. As outlined in Table 3.4, TSA mills also depend on significant amounts of fibre from other TSAs and private land, including fibre sourced from Alberta. Therefore, the 12.7 percent reduction would remove, assuming proportional reductions, approximately 70 871 cubic metres, or an average of seven percent of the 1993 major mill capacity requirements.⁵⁸

To replace this fibre and maintain employment levels, mills would have to purchase additional high cost incremental fibre from either the SBFEP or from extra-TSA sources. If the firms determined that it was economic to do so, the impacts of the harvest reductions could be limited. Even if the licensees did not replace the reduced TSA fibre, it is unlikely that a seven percent reduction would lead to an operability threshold being reached, hence the calculated linear impacts on PY would likely hold.

A reduction in the available supply from extra-TSA sources, taken in concert with the Scenario One reduction, has the potential to have more serious impacts on area mills. The size of the additional impacts would depend on the magnitude of the extra-TSA fibre reductions.

⁵⁸ Capacity is defined as 480 shifts per year.

Scenario Two - Under Scenario Two the timber harvest does not change until the second decade. In the absence of major changes in non-TSA sources of fibre the viability of major licensee mills in the area would not be affected.

Scenario Three - Under Scenario Three, the 40 percent harvest reduction would eliminate approximately 218 067 cubic metres or an average of 22 percent of the 1993 major licensee mill input requirements at capacity. All else held constant, such a reduction could well lead to an operability threshold being reached by the SFP Radium operation or by one of the three CFI mills in the East Kootenays. If the other sources of fibre are also constrained, this outcome becomes proportionately more likely. While such a decline could affect the viability of a mill somewhere in the East Kootenays, the opportunity for fibre substitution and inter-company fibre transfer makes it difficult to predict which of the TSA mills, if any, would be impacted.

All else held constant, CFI's timber supply situation is more secure relative to SFP in the Invermere TSA due to a higher proportion of the CFI Canal Flats mill's throughput volume under tenure. This is due to the additional fibre CFI sources from its Tree Farm Licence (TFL #14). Currently, the TFL has an AAC of 178 926 cubic metres which represents approximately 31 percent of CFI's Canal Flats mill capacity input requirements.

The above discussion has focused on the major licensee mills within the TSA. Smaller mills in the area will also be impacted by a reduction in TSA harvest. As discussed in Section 3.6, these operators revealed that competition from major licensees and SBFEP firms from other TSAs are making it increasingly difficult to access timber at prices that will allow them to continue operating at current capacity. In this situation, the reduction in the TSA rate of harvest under Scenario One and especially Scenario Three has the potential to force the closure of some of the marginally economic mills in the area. As above, impacts will be exacerbated by any reduction in the extra-TSA sources of fibre.

5.2 Worker and Family-based Effects⁵⁹

Research indicates that unemployment can affect the mental and physical health of individuals. Lee (1994), notes that unemployment has been associated with a higher probability for cardiovascular-renal disease mortality, numerous stress-related diseases, including hypertension, bone and joint ailments, gastrointestinal disturbances, and chronic headaches, as well as psychological effects such as diminished self-esteem and depression. Lee recognizes that unemployment is only one of many factors causing these effects, but contends that unemployment often precipitates physical and/or mental breakdown.

⁵⁹ This section relies heavily on the summary of research on effects on displaced workers originally found in the Queen Charlotte Islands Socio-Economic Analysis, Ministry of Forests, December, 1994.

While it is impossible to predict how individuals will react to job loss, a recent study (ARA, 1993) provides a sense of how workers and their families within resource industry dependent communities in B.C. may be affected:

- Increase in measures of behavioural stress, such as domestic violence, substance abuse, suicide or threats of suicides, and marital breakdown.
- Negative impact on children as a result of changes in parental roles and the economic stress of job loss. This was reflected in increases in school drop-out rates.
- Greater suffering by older, longer tenured workers (45-55 years old), versus younger workers. Older workers were the most vulnerable, still having sizable financial and familial responsibilities, but with reduced chances of finding new occupational opportunities.
- A definite pattern in the timing of effects: first, immediately following the layoffs, and then 18 to 24 months later, when the initial community response to the layoffs had died down.

Employee Transition Following Job Loss

Evidence suggests that many workers have strong ties to their communities. A report from the Pacific Northwest region of the United States (Lee, 1993) indicates unemployed forest workers tend to remain within their community, and follow one of three courses of action: (1) look for another forest industry job, while using unemployment insurance or other social assistance to get by in the interim; (2) undertake retraining and/or seek work in another industry; or, (3) adopt a subsistence lifestyle, relying on community programs such as food banks and short-term jobs to get by. The employee adjustment process is, however, dynamic and hence a unemployed worker may use all of the above options; often concurrently.

The high quality of life and natural resources of the Invermere TSA provide a strong incentive for residents to stay in the area even if they become unemployed. This trend is confirmed by Census data on migration status presented in Section 2, (Figure 2.3) residents of the Invermere TSA tend to remain in the TSA once they move there. In the face of major employment changes, those who do leave in search of different opportunities will tend to be younger, more skilled, and more occupational mobile individuals.

5.3 Effects on Communities

It is held that certain factors influence the social adjustment process in resource dependent communities. A social adjustment case study of small B.C. communities (Lee, 1993), identifies factors important in determining successful community adjustment, measured by maintenance of population, jobs and income after a shock to the local economy. These factors included economic diversity, education level and infrastructure, presence of local

economic development organizations and local control over land use decisions.⁶⁰ Other factors such as geographic proximity and transportation infrastructure were found to be less important. As a means of providing an indication of the social adjustment process that may occur in the Invermere TSA, information presented in the profile section of this SEA report (Section 2.0) will be summarized with regard to these factor headings.

Section 2.3.3 describes aggregate education levels and infrastructure in the Invermere TSA. In the event of employment losses resulting from reduced harvest levels, the relatively low education levels of displaced Invermere TSA workers could, depending on the new occupation, make the acquisition of new required skills more challenging. As a rule, increasing education levels leads to increased flexibility and opportunity for alternate employment.

Also important is the availability of education and other re-training programs. With the satellite campus of the East Kootenay Community College and the government programs based in Cranbrook, the infrastructure in the Invermere TSA is relatively well positioned to meet the retraining needs of potentially displaced workers.

Sources of training and assistance programs include:

Federal Government

Human Resources Development Canada (HRDC) located in Cranbrook also serves the Invermere area. HRDC provides such services as career counseling, and funds classroom and on-the-job training programs. These programs include:

- **Workplace Based Training Program** - Training to assist employers to meet current and future skill needs due to market, technological and regulatory change.
- **Worksharing Program** - Program offers temporary financial assistance to business to help retain skilled staff when experiencing a temporary slowdown.
- **Industrial Adjustment Services** - A Canada Employment Centre coordinated planning program to assist businesses or communities experiencing a major workforce adjustment.
- **Community Futures** - Formation and operation of a local board to recommend and implement programs in response to the changing community economic base. Includes Business Development Centre and Bank and the Rocky Mountain Community Futures Business Development Centre.
- **Self Employment Assistance Program** - Encourages individuals receiving unemployment insurance to look at self employment as an alternative source of

⁶⁰ Lee, R., Cariboo-Chilcotin CORE Table, *Case Study Communities: The Adjustment Process Associated with Major Economic Change*. March, 1994.

income. Provides a maintenance income and counseling for the first year of business to new entrepreneurs.

- **Job Creation Projects** - Programs for unemployed workers to maintain and utilize their work skills, and provide community service during periods of unemployment.

Provincial Government

Ministry of Skills Training and Labour - Programs for individuals on income assistance

Ministry of Forests / Ministry of Social Services - Forest Worker Development Program. Created to generate seasonal jobs, assist social assistance recipients, stimulate the development of a localized forest contracting industry.

As outlined in Section 2.5.1, the Invermere TSA has a fairly well diversified economic base, exemplified by a diversity index of 0.76. Sectors that contribute to basic income include, the forest industry, the public sector, tourism, pensions and investment income. The case study found small communities, some also located in the Kootenays, with diversified economies tended to weather economic shocks better than those with less diversified economies.⁶¹ In particular, the presence of the strong and growing tourism industry will help to facilitate the social adjustment process by mitigating two of the indicators of successful social adjustment, the aggregate population change and net employment loss. However, the third, aggregate income, would fall if forest industry jobs are reduced. In general, from a community stability point of view, harvest reductions with lower initial rates of decline (Scenarios Two and One), are preferred to more aggressive reductions (Scenario Three).

The spatial distribution of impacts throughout the various communities within the TSA are difficult to predict as they rely on individual mill impacts. Obviously, settlements which rely heavily on the forest industry, will be more heavily impacted than communities with a more diversified economic base. Based on this reasoning, it is likely that the District of Invermere, Windermere, Radium, Fairmont Hot Springs will, all else held constant, experience less social dislocation than the more resource-dependent communities such as Canal Flats, Skookumchuk and Edgewater.

The ultimate impact of employment and employment income losses on the affected communities will depend on the alternative economic strategies that are developed. There is potential for new opportunities in areas such as value-added manufacturing, silviculture, forestry planning as well as through initiatives of the Forest Renewal Plan.

⁶¹ Lee, R., Cariboo-Chilcotin CORE Table, *Case Study Communities: The Adjustment Process Associated with Major Economic Change*, March, 1994.

6.0 First Nations Implications

This section outlines the implications of the harvest scenarios on the Invermere TSA First Nations population. For the most part, First Nations concerns are outlined in Section 2.4. Some of these issues such as access to timber and forest licences are beyond the scope of the Timber Supply Review. These concerns will need to be addressed within processes outside the Timber Supply Review. The implications of the harvest scenarios for First Nations communities would be as follows:

Heritage Values - First Nations people are concerned about the effect of timber harvesting on cultural, medicinal and food values. Reduced harvest levels, such as those proposed under Scenarios One and Three, are more consistent with these values.

Economic Development - First Nations people recognize the economic opportunities associated with timber harvesting. The higher initial harvest level under Scenario One, relative to the other scenarios, would be more consistent with the economic development objectives of the Ktunaxa and Kinbasket people.

7.0 Environmental Implications

This section discusses the potential effects of current timber harvesting practices on environmental values. These effects are discussed in general terms and relate only to the timber harvesting land base which comprises 23 percent of the total Invermere TSA land base. Specific impacts for each harvest scenario are not identified because of the timber supply review's focus on aggregate changes in harvest levels as opposed to site specific changes. All of the harvest flows in the timber analysis are based on current management practices. The scenarios are not differentiated, for example, by different levels of environmental protection.

The following general forest management concerns may be applicable to some forest stands and operations in B.C. Current forest management practices, which are reflected in each of the three harvest scenarios examined in this report, could affect functional, natural ecosystems by:

- shortening the age class succession and eliminating old growth;
- simplifying ecosystems through intensive silviculture;
- simplifying the mosaic of habitats by managing for certain tree species (e.g. pine) and managing against others (e.g. aspen);
- increasing the fragmentation of habitats especially old growth forests through road construction and timber harvest;
- impacting watersheds thus affecting water quality and flow regimes to the detriment of fisheries, irrigation supply and domestic water users;
- impacting habitats required by threatened or vulnerable species.

The *Forest Practices Code of BC Act* has been passed by the legislature, with implementation expected this fall. The Code will require increased environmental protection during forest management activities, with tough standards and enforcement. Current practices in the Invermere Timber Supply Area will be adjusted where necessary to be consistent with the standards of the Code.

The *Forest Practices Code of BC Act* will deal with the above issues by:

- manipulating patch sizes so that larger leave areas of mature timber and old growth will exist into the future;
- manage forests at the landscape level through the introduction of corridors of biological connectivity;
- managing forests at the stand level through: wildlife tree and coarse woody debris retention, slash management and other practices;
- relaxing the standards for silviculture performance e.g. introducing longer "free to grow" periods;
- addressing threatened and vulnerable species and their habitats.

Environmental issues in the Invermere TSA were outlined in Section 2.2 and are summarized below.

Ungulate Winter Range - Forest harvesting practices can reduce the quantity and quality of suitable winter range habitat if logging is conducted without consideration of the structural forest attributes which contribute to the winter habitat requirements of ungulates. These requirements include forage availability in the form of litterfall or ground vegetation, security cover, thermal cover and snow interception. Conversely, removal of forest cover from specific aspects on winter ranges can enhance forage opportunities for wintering ungulates. In the Invermere TSA, 69 848 hectares have cover requirements designed to provide winter range for ungulates.

Caribou - There is concern about the long-term viability of the caribou herd in the South Purcells if liquidation of old growth forest habitat continues at the current rate. In the Invermere TSA, 2169 hectares are managed to provide caribou habitat. These areas have guidelines specifying the amount of cover that must be retained in older forest types.

Riparian Habitats - Riparian areas occur along the banks of streams, rivers, lakes and wetlands. These areas are very important to a variety of fish and wildlife species and provide habitat for the highest number of species of flora and fauna. Disturbance of riparian and in-stream habitat can result in the reduction of shade, large organic debris, food sources and stream bank stability. Logging conducted without recognition of the sensitivity of these ecosystems can adversely impact riparian habitat and subsequently the fish and wildlife species that rely on these sites. A total of 3652 hectares were removed from the timber harvesting land base to protect riparian areas throughout the Invermere TSA.

Watershed Protection and Fish Habitat - Natural water flow patterns may be affected by harvesting operations, insect or disease infestation and large fires. Disturbances such as these may impact water quality, quantity and timing of run-off. Components of fish habitat, such as large organic debris and stream bank vegetation can also be affected by natural or human caused forest disturbances.

Changes in stream flow or vegetative cover can impact stream temperatures which may be detrimental to fish populations. Increased sedimentation from poor road building practices and increased stream bank instability from increased flow can be detrimental to the survival of fish eggs. Excessive disturbance, or improper forest practices within a community watershed may also impact domestic water supplies. In the Invermere TSA 13 519 hectares from the timber harvesting land base fall within community watersheds. Harvesting in these areas is limited to ensure that at least 74 percent of the net operable area has cover taller than nine metres.

Connectivity - The continuation of current timber harvesting practices may exacerbate habitat fragmentation. Consequently, genetic exchange between wildlife populations and connectivity between seasonal habitats and watersheds may be impaired. The Invermere

TSA is addressing this issue by removing from the timber harvesting land base a total of 18 946 hectares that fall within connecting corridors. In addition to contributing to connectivity between habitats, these area also contribute to watershed protection and biodiversity maintenance.

Biodiversity - A key assumption underlying biodiversity objectives is that maintaining a variety of forest stand attributes and structures, patch sizes and seral stages across a variety of ecosystems and landscapes will meet the habitat needs of most forest organisms.⁶² In general, continuing with current management practices would narrow the age class distribution of the forest causing changes in the distributions and population levels of some wildlife species. Populations of species that use a wide range of habitat types, and species that use immature forests may increase in numbers. Populations of species that depend on mature forests may decline or be extirpated if ecosystem management is not fully adopted. In the Invermere TSA, district guidelines outline an objective to retain at least 10 percent of the productive forest in each biogeoclimatic subzone in old-growth conditions (141 years or older in most forest types) to help maintain biodiversity. This is in addition to the corridors and riparian habitat areas mentioned above.

On a site specific, short-term basis, biodiversity values have sometimes been enhanced through logging activity. However, continuation of current forest harvesting practices, will alter the ecosystems in which harvesting occurs, and will result in an overall decline in biodiversity values over the long-term.

Access Development - Current timber harvesting practices require the construction of extensive road networks. This development has led to significant increases in public contact with wildlife in all habitats throughout the Invermere TSA. The increased exposure of fish and wildlife populations to recreational and commercial activities has directly impacted these populations by increasing their vulnerability to over exploitation, and through increased harassment or displacement from preferred habitats.

Forage Production - Fire suppression has been an important factor contributing to the encroachment of forest habitat on open grassland communities in the Invermere TSA. Competition for available forage has increased and the quality and quantity of rangelands that meet the needs of domestic livestock and wildlife has declined. A total of 6450 hectares of the Invermere TSA timber harvesting land base, which falls into the Rocky Mountain Trench, is being managed for both forage and timber production. Management guidelines specify the proportion of the area that should be in a an open forest condition.

The main difference between scenarios from an environmental perspective results from the timing of harvest reductions. Harvesting of older age forest would proceed most rapidly under Scenario Two, followed by Scenario One and then Scenario Three. The three

⁶² Ministry of Forests and Ministry of Environment, Lands and Parks, *Guidelines to Maintain Biological Diversity in Coastal Forests*. 1992.

harvest scenarios would ultimately result in a 44 percent drop in harvest levels. Since Scenario Three calls for an immediate 40 percent decline in harvest levels, it may be the most compatible with environmental values.

8.0 Summary and Conclusions

8.1 Report Context

The Invermere TSA Timber Supply Analysis report indicates that the current AAC of 650 564 cubic metres cannot be maintained without risking serious timber supply shortfalls in the future. The fact that the current harvest level is above the long-term harvest level, forest cover constraints and the removal of land from the timber harvesting land base are contributing factors to the decline in timber supply.

The timber supply analysis did not consider items such as future changes in the land base due to such factors as new protected areas, or the impact of resource management provisions of the new Forest Practices Code. Potential timber volume reductions and resulting impacts would be additional to those necessary to reach the long-term harvest level. In addition, since major mills in the TSA depend on significant amounts of extra-TSA fibre, reductions in fibre from non-TSA sources would exacerbate impacts presented in this report. Conversely, market or technological changes that have the potential to expand the operable land base, and hence off-set a portion of the reductions are also not modeled.

This socio-economic analysis report has examined the social, economic, and environmental implications of alternative rates of harvesting reductions (scenarios) to reach the long-term harvest level. The alternative scenarios were chosen to provide a basis for examining a range of possible impacts, and should not be viewed as a finite set of choices.

8.2 Summary of Impacts

Economic Impacts - Significant provincial employment and resulting employment income impacts would be associated with a reduction of harvesting to the long-term harvest level. In total, 640 PY of employment and \$17.3 million in annual employment income would be foregone with a reduction from the current AAC of 650 564 cubic metres to the long-term harvest level of 360 000 cubic metres. Also, government revenue losses would total \$8.5 million annually.

There is however some flexibility, given current management practices, at which the rate of harvest could decline to reach the long-term level. Hence, the timing of the total employment and employment income impacts described above would differ depending on the rate of harvest chosen. Subject to avoiding major future timber supply shortages, Scenario Two attempts to maintain the current harvest level as long as possible, and Scenario Three drops immediately to the highest rate sustainable over the next 120 years. It is reasonable therefore, to infer that the timing of impacts from potential harvest rate changes would likely be bounded by the impacts associated with these two rates of harvest.

Community Implications - An examination of the characteristics of the Invermere TSA shows that communities in the area appear, for the most part, relatively well positioned to make a successful transition to harvest reductions of a Scenario One magnitude. The economy of the area is diversified, the area is experiencing growth in population and in other sectors of the economy, sources of education and training are available and people in the area are increasingly interested in local land use issues. The one area that has the potential to negatively impact the adjustment process is the relatively low education levels of the population.

While aggregate population and employment levels may not be seriously impacted by potential losses in forest sector jobs, it is likely that average income levels, already below the provincial average, would fall.

Scenario Three harvest reductions would have much more serious stability implications for communities within the TSA. In the event of a loss of shift or mill closure, the estimates of employment and income losses would be higher than forecast.

First Nations Implications - First Nations people are concerned about the effect of timber harvesting on cultural, medicinal and food values. Reduced harvest levels, such as those proposed under Scenarios One and Three, are more consistent with these values.

First Nations people recognize the economic opportunities associated with timber harvesting. The higher initial harvest level under Scenario Two, relative to the other scenarios, would be more consistent with the economic development objectives of the Ktunaxa and Kinbasket people.

Environmental Implications - The main difference between scenarios from an environmental perspective results from the timing of harvest reductions. Harvesting of older age forest would proceed most rapidly under Scenario Two, followed by Scenario One and then Scenario Three. The three harvest scenarios would ultimately result in a 45 percent drop in harvest levels. Since Scenario Three calls for an immediate 40 percent decline in harvest levels, it may be the most compatible with environmental values.

8.3 Concluding Remarks

This study assesses the economic, social and environmental implications of changing timber harvest levels in the Invermere TSA. Impacts that follow the same pattern as the harvest reductions were estimated for three scenarios, which were chosen to present a range of possible impacts. Common to all scenarios is a long-term harvest level of 360 000 cubic metres, realized in 12 decades. Therefore, choices between alternative rates of harvest amount to choices between the distribution of impacts over the 12 decades. The Forest Renewal Plan, announced in April, 1994 may assist in offsetting these impacts.

The analysis in this report considers only impacts attributable to changes in the harvest level, and assumes no change in factors such as land base, management, harvesting and processing technology, and timber and product prices. A change in any of these variables would require a re-examination of impacts.

Appendix A Glossary of Terms

Allowable Annual Cut (AAC)	The volume of timber that may be cut each year from a forest management unit (e.g., a Timber Supply Area), set by the Chief Forester in accordance with Section 7.0 of the <i>Forest Act</i> . It equals roughly the amount of new growth produced by the forest each year, including a proportion of the mature volume minus deductions for losses due to fire, insects, and disease.
Age-class	Any interval into which the age range of trees, forests, stands, or forest types is divided for classification. Forest inventories commonly group trees into 20 year age classes.
Basic Silviculture	The harvesting methods and silviculture operations, including seed collecting, site preparation, artificial and natural regeneration, brushing, spacing and stand tending, and other operations, prescribed for the purpose of establishing a free-growing crop of trees of a commercially valuable species.
Biodiversity	An umbrella term that represents the full variety of life. It is usually considered at three levels: genetic diversity, species diversity, and ecosystem diversity.
Biogeoclimatic Classification	The delineation of biotic regions or zones on the basis of vegetation, soils, topography and climate.
Climax Forest	A forest community that represents the final stage of natural forest succession for its locality. Often identified as those forests that can reproduce indefinitely in their own shade.
Coarse Woody Debris	Rotting logs and stumps that provide cover for plants, animals, and their predators.
Clear-cutting	A type of silviculture system in which the crop is cleared from an area at one time and an even-aged, replacement stand is established. Clear-cutting is designed so that most of the opening has full light exposure and is not dominated by the canopy of adjacent trees. The minimum size of a clear-cut opening is generally considered to be 1 hectare.
Class II Water	The Ministry of Environment, Lands and Parks introduced a classified waters system in 1990 in an effort to protect unique fishing opportunities within the province. A Class II designation requires non-BC residents of British Columbia to fish with a licensed angling guide; British Columbia residents require only a Non-Guided Classified Waters Licence.
Cultural Heritage Resource	An object, a site or the location of a traditional societal practice that is of historical, cultural, or archaeological significance to the province, a community, or an aboriginal people.
Direct Employment and Employment Income Impacts	Effects on forestry sector (harvesting, hauling, silviculture and processing) and employment and income resulting from changes in the timber harvest level.

Ecosystem	A functional unit consisting of all living organisms (plants, animals, and microbes) in a given area, and all non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be any size - a log, pond, field, forest, or an earth's biosphere- but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation, for example, forest ecosystem.
Environmentally Sensitive Areas (ESAs)	Areas requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, and other natural systems or processes. ESAs for forestry include potentially fragile, unstable soils that may deteriorate unacceptably after forest harvesting, and areas of high value to non-timber resources such as fisheries, wildlife, water, and recreation.
Forest Practices Code	A package of legislation, regulations, and standards that govern forest practices in British Columbia.
Forest Licence	A type of forest tenure that provides the holder with the right to harvest a specified volume of timber from within a TSA. It also bestows on the licence holder an obligation to reforest the land. The licence has a term of 15 to 20 years, and is generally replaceable every five years.
Hydrology	The science that describes and analyzes the occurrence of water in nature, and its circulation near the surface of the earth.
Indirect and Induced Employment and Income Impacts	Indirect employment and related economic activity is the result of direct businesses purchasing business related goods and services. Induced employment and related economic activity is the result of the employees of direct companies spending their incomes on consumer goods and services.
Inoperable lands	Lands that are unsuited for timber production now and in the foreseeable future by virtue of their elevation, inaccessible location, low value of timber, small size of timber stands, steep or unstable soils that cannot be harvested without serious and irreversible damage to the soil or water resources, or designation as parks, wilderness areas, or other uses incompatible with timber production.
Integrated Resource Guidelines	Guidelines requiring that forest management activities, such as harvesting, road building and silviculture treatments, be conducted in a special way in order to protect or enhance timber and non-timber forest values.
Land and Resource Management Plan (LRMP)	A plan for a forest district (one or more) that provides broad resource management objectives and strategies, and direction for more detailed resource planning by government agencies and the private sector.
Land and Resource Use Plan (LRUP)	A plan for a portion of a Timber Supply Area or Tree Farm Licence that provides management guidelines for resource use integration in this area.

Landscape Level	A watershed, or series of interacting watersheds or other natural biophysical (ecological) units, within the larger Land and Resource Management Planning (LRMP) areas. This term is used for conservation planning and is not associated with visual landscape management and viewscape management.
Long-Term Harvest Level (LTHL)	Timber harvesting levels whereby the volume of timber harvested in any given period can be replaced by a similar volume from regenerated stands within the same period.
Multiplier	Ratio of total income or employment impacts relative to direct impacts. Multipliers are generally greater than 1.0 since 1.0 represents the direct component.
Not Satisfactorily Restocked (NSR)	Productive forest land that has been denuded and has failed, partially or completely, to regenerate by natural or artificial means.
Protected Areas Strategy (PAS)	A process initiated by the government of British Columbia aimed at protecting representative examples of the major ecosystems across the province's 199 ecosections, as well as, special natural, cultural and recreational features. Under the PAS, the provincial government is committed to developing and expanding a protected areas system that will comprise 12 percent of British Columbia. The 12 percent target is applied at the biogeoclimatic level within each ecosection.
Person-year (PY)	A measure of employment representing one full-time job for one year. The length of a work year will depend on the type of job and working conditions that prevail in the area. A PY also takes into account part-time or seasonal full-time work. For example, if an employee works full-time for six months (i.e. one half of a year), he or she accounts for 0.50 PY of employment. Using person-years allows employment of different duration to be compared on a similar basis. The number of PY will not necessarily equal the number of people working full and part-time in an area.
Riparian Zone	The land adjacent to the normal high water line in a stream, river, lake, or pond and extending to the portion of land that is influenced by the presence of the adjacent ponded or channeled water. Riparian areas typically exemplify a rich and diverse vegetative mosaic reflecting the influence of available surface water.
Seral Stage	The series of changes occurring in the ecological succession of a plant community e.g. climax stage.
Silviculture	The art of producing and tending a forest, and the application of the knowledge of silvics in the treatment of a forest; the theory and practice of controlling forest establishment, composition and growth.
Small Business Forest Enterprise Program (SBFEP)	This program permits the Forest Service to sell Crown timber competitively to individuals and corporations who are registered in the SBFEP. Approximately 10 percent of the province's timber allocation is directed towards this program.
Snag	A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

Stand	A community of trees sufficiently uniform in species composition, age, arrangement, and condition to be distinguishable as a group from the forest or other growth on the adjoining area, and thus forming a silviculture or management entity.
Tree Farm Licence (TFL)	A stewardship agreement between an individual forest company and the Forest Service that allows the company to occupy, and continuously manage the forests of a specified area. The licence includes the right to harvest timber according to plans approved by the Forest Service, and the obligation to carry out all phases of forest management.
Timber Harvesting Land Base	The portion of the total land area of a management unit considered to contribute to, and be available for long-term timber supply.
Timber Licence (TL)	A type of forest tenure issued in the early 1900s. It includes a right to harvest timber according to plans approved by the Forest Service, and an obligation to reforest. After harvesting, the area is rolled back into either a TSA, or TFL.
Timber Sale Licence	A type of forest tenure offered to small business loggers and to timber processors who qualify for registration under the Small Business Forest Enterprise Program. These licences are short-term in nature (under ten years), and allow the tenure holder to harvest the timber within a specific area within a TSA. Under this form of tenure the Forest Service assumes much of the responsibility for forest management, including development planning, road construction to the licence area, timber cruising, timber sale layout, all silviculture and program administration.
Timber Supply (TSA)	An integrated resource management unit established in accordance with Area Section of the Forest Act.
Watershed	An area drained by a particular stream or river. A large watershed may contain several smaller watersheds.
Wildlife Trees	Dead, decaying, deteriorating, or other designated trees that provide present or future critical habitat for the maintenance or enhancement of wildlife.

Appendix B List of Contacts

Mark Aiyadurai	Senior Data Analyst, Ministry of Agriculture Fisheries and Food
Maureen Belding	Labour Market Analyst, HRDC
Pat Bluemel	Statistics Officer, BC Stats
Dugan Braisher	Independent Logger, Invermere TSA
Leo Bukovnik	North Star Planing Co. Ltd.
Gail Berg	Resource Officer, Range, Invermere Forest District
Gord Burns	CORE Sector Representative Commercial Fish and Wildlife
Chris Dadson	General Manager, Rocky Mountain Visitors Association
Greg Deck	Mayor, Village of Radium Hot Springs
Dave Grieve	Mineral Land Planner, Ministry of Energy Mines and Petroleum Resources
Paul Haley	Manager, Ministry of Environment Lands and Parks
Cat Hartwig	President, East Kootenay Environmental Society (Invermere)
Russ Hendry	Resource Officer, Planning, Invermere Forest District
Peter Holmes	Forest Ecosystem Specialist - Invermere, Ministry of Environment
Dan Hora	Industrial Mines Specialist, Ministry of Energy Mines and Petroleum Resources
Perry Horning	Special Tenures Forester, Invermere Forest District
Karen Kirby	Statistics Officer, BC Stats
Bob Konkin	Mardis Logging Co. Ltd.
Gerry Kopach	Kootenay (Brisco) Wood Preservers Ltd.
Betty Lazette-Bergen	Financial Services Supervisor, Invermere Forest District
Sylvie Lefebvre	Pierce Lefebvre Consulting
Brian Lyall	Sales Manager, Panorama Ski Resort
Hal MacLean	Regional Timber Supply Analyst, Nelson Forest Region
Roger Madson	RK Heliskiing Ltd.
Sherry Mallach	Check Scaler, Invermere Forest District
Mike Malmberg	Agriculture Resource & Industry Advisor, Ministry of Agriculture, Fisheries & Food
Clayton Mattson	Independent Logger, Invermere TSA
Sylvia McIver	Human Resources Development Canada
Kimberley McLean	Research Officer, Ministry of Small Business Tourism & Culture
Stan McMaster	Vice President, IWA Local 1-405
Frank Miklas	Silviculture Planner, Invermere Forest District
Harry Mitchell	Resource Officer, Small Business, Invermere Forest District
Steve Ostrander	Wood Manager, Slocan Forest Products Ltd.
Edelgard Panzenboeck	Statistics Officer, BC Stats
Sue Powell	Office Administrator, Columbia Valley Chamber of Commerce
John Reith	Head Accountant, Crestbrook Forest Industries Ltd.
Fred Riedel	Chief Accountant, Slocan Forest Products Ltd.
Sharon Robertson	Operations Manager, Integrated Resource Management, Invermere Forest District
Lillian Rose	Aboriginal Forestry Advisor, Invermere Forest District
Dennis Rounsville	Chief Forester, Crestbrook Forest Industries Ltd.
Brett Salmon	Kootenay (Brisco) Wood Preservers Ltd.
Gail Scott	Regional Economic Development Officer, Ministry of Small Business Tourism & Culture

Wanda Seel	Seel Forest Products Ltd.
Eric Sharpe	Planning Technician, Regional District of East Kootenay
Doug Singer	Financial Secretary, IWA Local 1-405
Kreg Sky	Resource Officer, Recreation, Invermere Forest District
Mark Smigelsky	Councillor, District of Invermere
Hugh Taylor	Director, Lands & Resources, Ktunaxa/Kinbasket Tribal Council
Fred Thode-Hamilton	Councillor, District of Invermere
Gary Weir	Manager, Statistical Analysis, BC Stats
Paul Wilton	Regional Geologist, Ministry of Energy Mines and Petroleum Resources

Appendix C Methodology

Methodology - Appendix C describes the methodology employed to calculate direct, indirect and induced employment and employment income levels and impacts associated with potential timber harvesting decreases. Direct employment includes forest industry activities involved with harvesting, processing and basic silviculture. Indirect employment results from the purchase of goods and services by direct forest industry firms. Induced employment is derived from the spending of direct and indirect employment income on consumer goods and services. Please see Section 4.1 for a discussion of the assumptions and limitations inherent in this estimation procedure.

Calculation of Direct Employment and Income - Estimates of direct employment and employment income supported by the current Invermere TSA AAC (650 564) were derived primarily from information provided by major licensees, other mill operators, contract logging operations, Invermere Forest District staff, Economics and Trade Branch, Ministry of Finance and Corporate Relations, and Statistics Canada. The data used in the analysis are based on 1993 employment, income and harvest levels.

The employment totals relate only to the TSA AAC, and do not include employment generated by the harvesting and processing of fibre from Tree Farm Licences, Timber Licences, private land or any other extra-TSA source.

To allow for direct comparison, employment figures are presented in person years (PY). Direct employment was considered to represent one PY if the normal work year ranged between nine and 12 months. Part-time and seasonal employment was translated into PY on the basis of a 205 work-day or 1640 hour work-year.

Employment income was estimated using information provided by licensees, SBFEP operators, the IWA Local 1-405 and from average income levels provided by the Ministry of Finance and the Ministry of Forests. To reflect only disposable income which can circulate in the local area and generate induced employment, wages in the analysis are after-tax and net of non-cash benefits. Employment income estimates are presented in 1993 dollars.

TSA-based and provincial-based estimates of direct, indirect and induced employment and average wages are presented in Tables C-1 and C-2. Provincial totals include TSA-based employment.

Employment Coefficients - Employment coefficients, presented in the form of PY per 1000 cubic metres of timber, reflect a linear relationship between the number of workers and amount of timber harvested and processed. Multiplying the direct employment coefficient by a harvest level will yield an estimate of direct employment associated with that particular harvest level. Employment coefficients are also presented in Table C-1.

Harvesting - Includes logging, road building and maintenance, and forest planning activities. Direct harvesting employment information was obtained through surveys of TSA licensees and SBFEP operators. Harvesting 1000 cubic metres of TSA timber requires approximately 0.26 PY of TSA, and 0.29 PY of provincial harvesting employment.

Harvesting employment income estimates are based on information provided by major licensees. The average yearly wage of \$44 973 was netted-down to an after-tax income of \$32 560 using an average tax rate of 27.6 percent.

Silviculture - Includes basic silviculture activity which involves site surveys and ground preparation, planting, and brushing. Incremental silviculture, comprising spacing, fertilizing, and pruning, was considered to be less dependent on the harvest level and hence was excluded from this analysis. Information on basic silviculture was obtained from major licensees and from Invermere Forest District staff. Harvesting 1000 cubic metres of TSA timber generates approximately 0.02 PY of TSA, and 0.05 PY of provincial silvicultural employment.

As the majority of silviculture activity is seasonal, job estimates were translated into PY based on a 1640 hour work-year. Approximately 40 percent of these PY were assumed to occur in the TSA.

An average wage of \$40 000, netted down to \$29 600 by applying an average tax rate of 26.0 percent, was estimated for this sector.

Wood Processing - Sawmilling and value-added processing are included in this sub-sector. Information such as volumes of fibre processed in 1993 (TSA and non-TSA), wage bills and total labour force was obtained through a survey of the two major licensees and through a telephone survey of the other sawmills in the TSA. Harvesting 1000 cubic metres of TSA timber is estimated to generate 0.33 PY TSA and 0.40 PY of provincial wood processing employment.

The estimation of provincial wood processing employment was simplified by the fact that the TSA is a net importer of fibre. For this reason, all AAC fibre harvested by the major licensees was assumed to be processed within the TSA. Approximately 20 percent of the SBFEP fibre that was not purchased by a major licensee was assumed to be processed by TSA mills. The remaining source of variation between the TSA and provincial coefficients was due to the location of the worker's residence.

The average wood processing wage of \$39 829 was based on information gathered through surveys of the mills in the TSA and information provided by the IWA local 1-405. This wage was netted down to \$29 473 using an average tax rate of 26.0 percent.

Pulp Processing - Information on TSA pulp milling was provided by a survey of Crestbrook Forest Industries and confirmed by Economics and Trade Branch statistics.

Variation between the TSA and provincial coefficients was due to the fact that only eight percent of the pulp mill employees lived in the Invermere TSA. All chips produced in TSA mills were assumed to feed into the Skookumchuk pulp mill. Harvesting 1000 cubic metres of TSA timber generates approximately 0.01 PY TSA and 0.14 PY of provincial pulp mill employment.

Average annual pulp mill employment income was estimated at \$51 506. This figure, also derived from information supplied by CFI, was netted down to \$36 467 using an average tax rate of 29.2 percent.

Indirect and Induced Impact Methodology - The Ministry of Finance and Corporate Relations has proposed a procedure for the estimation of regional-level impacts arising from economic shocks (Horne and Powell, 1995). This paper expands on earlier work conducted by the Ministry of Finance in the calculation and application of economic base income multipliers for 55 local areas of B.C. (Horne, 1994) and (Horne and Robson, 1993).

Economic base analysis assumes that the regional economy is comprised of two sectors, a basic, or export and non-basic, or service sector. The base sector of the regional economy is comprised of all activities whose final markets are external to the region. Examples of basic activity include sawmills that export lumber, mines that export ore, and activities that serve the tourist market. The basic sector is assumed to be the primary source of regional economic growth. Non-basic or induced activities include retail sales and local services which serve the residents of the community. Growth in this sector is assumed to be tied to growth in the basic sector. It is assumed the proportion of total activity that is non-basic remains constant over the period of the analysis.

The 1995 procedures suggest the following methodology for the application of employment ratios that represent the impact of a gain or loss of one job in the forest sector on the local economy.⁶³

1. estimate direct employment and separate into harvesting and silviculture, pulp and paper, and wood processing.
2. estimate total employment (comprised of direct, indirect, and induced) by applying the total employment ratio (logging: 1.44, processing: 1.35) to the direct employment totals estimated above (step 1).
3. estimate indirect employment by applying the indirect employment ratio (logging: 1.19, processing: 1.13) to the direct employment totals estimated above (step 1).

⁶³ For a more detailed account of the procedure please refer to Horne and Powell, 1995.

4. estimate induced employment by subtracting direct (step 1) and indirect employment (step 3) totals from total employment (step 2).
5. estimate direct, indirect and induced employment income levels by multiplying employment levels estimated above by the appropriate average after-tax wage levels (see Table C-2).

The above procedure yields estimates of direct income, indirect employment and income, and induced employment and income attributable to current AAC-related forest industry activities in the Invermere TSA.

Provincial Indirect and Induced Impacts - Provincial direct employment is defined as the total number of forest industry workers supported by the Invermere TSA AAC, regardless where in B.C. they reside.

Provincial impacts are estimated using an employment multiplier of 2.5. The application of the provincial multiplier to direct provincial employment levels results in the corresponding combined direct, indirect and induced employment levels.

Indirect and induced employment income levels were estimated by multiplying the indirect and induced employment levels by after-tax incomes of \$23 051 which represents the 1993 Statistics Canada average annual earning for B.C..

Table C-1 TSA and Provincial Employment Coefficients		
Sector Employment	Person Years (PY)¹ / 1000m³	
	TSA	BC
Harvesting/Planning	0.26	0.29
Silviculture	0.02	0.05
Wood Processing	0.33	0.40
Pulp Processing ²	0.01	0.14
Total Direct	0.62	0.88
Induced / Indirect	0.23	1.32
Total Employment	0.85	2.20
Notes:		
1. One full time job was assumed to represent one person year (PY) of employment. Part-time jobs were converted to PY based on industry information.		
2. Although located within Invermere TSA boundaries, 92 percent of the employees at the CFI pulp mill at Skookumchuk actually live outside the TSA.		

Table C-2 TSA and Provincial Average Wage Levels ¹		
Sector	Pre-Tax (\$1993)	After-Tax (\$1993) ²
Harvesting / Planning	\$44 973	\$32 560
Silviculture	40 000	29 600
Wood Processing	39 829	29 473
Pulp Processing	51 506	36 467
TSA Direct³	\$42 180	\$30 884
Provincial Direct⁴	43 391	31 610
Indirect⁵	31 158	24 366
Induced⁶	-	20 854
Provincial Indirect/Induced⁷	29 178	23 051
Notes:		
1. Includes cash benefits such as holiday pay, overtime and payroll supplements. Excludes non-cash benefits such as pension payments, contributions to insurance plans and health care premiums.		
2. After-tax incomes are based on the 1993 tax rates.		
3. Based on a survey of licensees. Average weighted by TSA share of employment.		
4. Average weighted by provincial share of employment.		
5. Average indirect to logging, pulp and paper and other wood processing incomes weighted by sector employment share. Source: MFCR estimates		
6. Source: MFCR average non-basic after-tax income (1991) estimates. After-tax wage is increased by 1.5% per year for two years to account for wage inflation.		
7. Provincial indirect/induced income is based on 1993 average pre-tax weekly earnings for B.C. from Statistics Canada, Catalogue No. 72-002.		

The procedure outlined above was used to derive estimates of economic impacts associated with three specific harvest scenarios. Table C-3 provides coefficients that can be applied to any harvest level to determine the employment and income levels and impacts associated with that particular level (per 1000 cubic metres). Note that estimates are subject to the assumptions and limitations outlined in Section 4.1.

Table C-3 TSA and Provincial Economic Levels per 1000 m ³				
Category	(PY/1000 m ³)		(\$/1000 m ³)	
	TSA	BC	TSA	BC
Employment				
Direct	0.62	0.88	\$19 060	\$27 146
Indirect/Induced	0.23	1.32	5 226	32 295
Total	0.85	2.20	24 287	59 411
Government Revenue	-	-	-	29 667

Tables C-4 and C-5 present employment and income estimates by industry sector for the Invermere Forest District.⁶⁴

Table C-4 Invermere Forest District - Employment				
Industry Sector	Direct	Indirect	Nonbasic	Total
Logging	230	44	60	334
Pulp and Paper	0	0	0	0
Other Wood Man.	357	48	82	487
Mining	83	12	22	116
Mineral Processing	8	1	2	11
Petroleum	13	23	7	43
Agriculture	107	5	14	126
Tourism	1104	12	104	1220
Public Sector	598	8	110	715
Construction	236	33	49	317
Other	83	18	21	122
Non-Employment	0	0	171	171
Total	2817	205	640	3662
Source: Ministry of Finance and Corporate Relations				

Table C-5 Invermere Forest District - After Tax Income (Millions)				
Industry Sector	Direct	Indirect	Nonbasic	Total
Logging	\$6.3	\$1.0	\$1.1	\$8.4
Pulp and Paper	0.0	0.0	0.0	0.0
Other Wood Man.	8.9	1.0	1.4	11.4
Mining	2.4	0.2	0.4	3.1
Mineral Processing	0.2	0.0	0.0	0.2
Petroleum	0.4	0.5	0.1	1.0
Agriculture	1.5	0.1	0.2	1.9
Tourism	12.4	0.3	1.8	14.6
Public Sector	13.3	0.2	1.9	15.4
Construction	5.3	0.7	0.9	6.9
Other	2.1	0.4	0.4	2.9
Non-Employment	20.9	0.0	3.0	23.9
Total	\$73.9	\$4.4	\$11.3	\$89.6
Source: Ministry of Finance and Corporate Relations				

⁶⁴ Horne, G., and Powell, C. *The Forest District Tables*, Ministry of Finance and Corporate Relations, March, 1995.

Appendix D Decade by Decade Cumulative Economic Impacts

Tables D-1 and D-2 present decade by decade TSA and provincial cumulative economic impacts by scenario for the first 4 decades.

Table D-1 Decade by Decade Cumulative Invermere TSA Economic Impacts

Invermere TSA	Scenario One				Scenario Two				Scenario Three				All
	1	2	3	4	1	2	3	4	1	2	3	4	
Decades													
Harvest Level (m ³ /year)	-82 564	-150 724	-210 705	-263 484	0	-129 553	-233 755	-317 117	-261 564	-261 564	-261 564	-261 564	-290 564
Employment (Person Years)													
Direct Employment	-51	-93	-131	-163	0	-80	-145	-197	-162	-162	-162	-162	-180
Indirect/Induced Employment	-19	-35	-48	-61	0	-30	-54	-73	-60	-60	-60	-60	-67
Total Employment	-70	-128	-179	-224	0	-110	-199	-270	-222	-222	-222	-222	-247
Employment Income (\$1993 M/year)													
Direct After-Tax Income	\$-1.6	\$-2.9	\$-4.0	\$-5.0	\$0.0	\$-2.5	\$-4.5	\$-6.0	\$-5.0	\$-5.0	\$-5.0	\$-5.0	\$-5.5
\$Indirect/Induced Income	-0.4	-0.8	-1.1	-1.4	0.0	-0.7	-1.2	-1.7	-1.4	-1.4	-1.4	-1.4	-1.5
Total After-Tax Income	-2.0	-3.7	-5.1	-6.4	0.0	-3.2	-5.7	-7.7	-6.4	-6.4	-6.4	-6.4	-7.0

Table D-2 Decade by Decade Cumulative Invermere Provincial Economic Impacts

Invermere TSA	Scenario One				Scenario Two				Scenario Three				All
	1	2	3	4	1	2	3	4	1	2	3	4	
Decades													LTHL
Harvest Level (m ³ /year)	-82 564	-150 724	-210 705	-263 484	0	-129 553	-233 755	-317 117	-261 564	-261 564	-261 564	-261 564	-290 564
Employment (Person Years)													
Direct Employment	-73	-133	-185	-232	0	-114	-206	-279	-230	-230	-230	-230	-256
Indirect/Induced Employment	-109	-199	-278	-348	0	-171	-309	-419	-345	-345	-345	-345	-384
Total Employment	-182	-332	-463	-580	0	-285	-515	-698	-575	-575	-575	-575	-640
Employment Income (\$1993 M/year)													
Direct After-Tax Income	\$-2.2	\$-4.1	\$-5.7	\$-7.2	\$0	\$-3.5	\$-6.3	\$-8.6	\$-7.1	\$-7.1	\$-7.1	\$-7.1	\$-7.9
Indirect/Induced Income	-2.7	-4.9	-6.8	-8.5	0	-4.2	-7.5	-10.2	-8.4	-8.4	-8.4	-8.4	-9.4
Total After-Tax Income	-4.9	-9	-12.5	-15.7	0	-7.7	-13.8	-18.8	-15.5	-15.5	-15.5	-15.5	-17.3
Government Revenue(\$1993M/year)													
Stumpage and Rent	\$-1.6	\$-2.9	\$-4.0	\$-5.0	\$0.0	\$-2.5	\$-4.5	\$-6.0	\$-5.0	\$-5.0	\$-5.0	\$-5.0	\$-5.5
Personal Income Tax	-0.4	-0.7	-1.0	-1.2	0.0	-0.6	-1.1	-1.5	-1.2	-1.2	-1.2	-1.2	-1.3
Other Taxes	-0.5	-0.9	-1.3	-1.6	0.0	-0.8	-1.4	-1.9	-1.6	-1.6	-1.6	-1.6	-1.7
Total Government Revenue	-2.5	-4.5	-6.3	-7.8	0.0	-3.9	-7	-9.4	-7.8	-7.8	-7.8	-7.8	-8.5

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