

MINISTRY OF FORESTS
TIMBER SUPPLY BRANCH
1st. FL. 1450 GOVERNMENT ST.
VICTORIA BC V8W 3E7

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

December 1994

Prepared by:

**Resource Systems Management International
New Westminster, B.C.**

Table of Contents

EXECUTIVE SUMMARY	i
1.0 INTRODUCTION	
1.1 Background	1
1.2 Study Objectives and Approach	1
1.3 Structure of the Report	2
2.0 AREA PROFILE	5
2.1 Location and General Features	5
2.2 Environmental Setting	7
2.2.1 Overview	7
2.2.2 Wildlife Resources	9
2.2.3 Fisheries Resources	12
2.2.4 Water Resources	13
2.2.5 Protected Areas	13
2.3 Socio-Economic Setting	15
2.3.1 Population Characteristics and Trends	15
2.3.2 Labour Force	17
2.3.3 Unemployment and Social Assistance Ratios	19
2.3.4 Income	20
2.3.5 Education	21
2.4 Economic Base of the Boundary Forest District	22
2.4.1 Forestry	22
2.4.2 Agriculture	23
2.4.3 Outdoor Recreation	25
2.4.4 Mining	27
2.4.5 Botanical Forest Products and Wildcrafts	27
2.5 First Nations	28
2.6 Summary of Issues and Concerns	29
3.0 TSA Forestry Sector Overview	31
3.1 Timber Harvesting Land Base	31
3.2 Current Management Practices	32
3.3 Potential Changes Affecting Land Base and Timber Supply	34
3.4 Critical Factors	36
3.4.1 Forest Health	36
3.4.2 Timber Management	37
3.5 Current Timber Apportionment	38
3.6 Harvest and Wood Flows	39
3.7 Overview of Forestry Employment and Operations	41
3.7.1 Harvesting	41
3.7.2 Wood Processing	42
3.7.3 Kraft Pulp	46
3.7.4 Reconstituted Board	46

3.7.5	Silviculture	47
3.7.6	Ministry of Forests	47
3.8	Summary of Employment and Employment Coefficients	48
4.0	TIMBER HARVEST FORECASTS	51
4.1	Timber Harvest Forecasts	51
5.0	ECONOMIC IMPACTS	53
5.1	Base Harvest Forecast - Economic Impacts in Forest Sector	53
5.1.1	Forestry Related Employment and Employment Income Impacts	53
5.1.2	Government Revenue Impacts	59
5.2	Alternative Initial Harvest Forecasts - Economic Impacts in Forestry	63
5.2.1	Comparison of Case 1 with Base Harvest Forecast	63
5.2.2	Comparison of Case 2 with Base Harvest Forecast	65
5.3	Other Economic Sectors	65
5.3.1	Agriculture	66
5.3.2	Outdoor Recreation	66
5.3.3	Mining	67
5.3.4	Botanical Forest Products and Wildcrafts	67
6.0	SOCIAL IMPLICATIONS	69
6.1	Implications for Communities	69
6.1.1	Community Issues	69
6.1.2	Base Harvest Forecast	69
6.1.3	Alternative Initial Harvest Forecasts	70
6.1.4	Mitigation of Forest Industry Job Losses	71
6.2	First Nations Concerns	72
7.0	ENVIRONMENTAL IMPLICATIONS	73
7.1	Environmental Implications	73
7.1.1	Implications of Base Case Timber Harvest Forecast	73
7.1.2	Alternative Initial Harvest Forecasts	74
8.0	SUMMARY OF RESULTS	77
8.1	TSA Impacts	77
8.2	Provincial Impacts	79

List of Figures

Figure ES:1	Boundary TSA Timber Harvest Forecasts.....	v
Figure 2-1:	Boundary Forest District	6
Figure 2-2:	Ecosections within the Boundary Forest District.....	8
Figure 3.1:	Distribution of Wood Harvested from Boundary TSA (1993)	41
Figure 4-1:	Boundary TSA Timber Harvest Forecasts.....	52

List of Tables

Table 2-1	Most Common Sequence of Biogeoclimatic Zones	7
Table 2-2	Summary of Species Information for the Boundary TSA.....	9
Table 2-3	Red and Blue Listed Species.....	11
Table 2-4	Priority 1 & 2 Pas Study Areas in Boundary TSA.....	14
Table 2-5	Boundary Forest District Selected Demographic Information.....	16
Table 2-6	Boundary Forest District Labour Force by Industry	18
Table 2-7	Major Employers in the Area.....	18
Table 2-8	Unemployment Insurance Claimants	19
Table 2-9	Comparison of ESAR and UIC Beneficiaries to Total Working Age Population.....	20
Table 2-10	Basic Sector Dependence in the Okanagan-Boundary Region	20
Table 2-11	Average Income.....	21
Table 2-12	Education Levels.....	21
Table 2-13	Estimated Employment and Pre-tax Income in Grazing Sector.....	25
Table 3-1	Boundary TSA Timber Harvesting Land Base	32
Table 3-2	Boundary TSA Special Management Zones.....	33
Table 3-3	Coordinated Resource and Access Management Plans	35
Table 3-4	Boundary TSA Allowable Annual Cut.....	38
Table 3-5	Apportionment within Boundary Forest TSA.....	39
Table 3-6	1993 Fibre Sources of Major Licensees	45
Table 3-7	Estimated Direct Forest Sector Employment Attributable to Boundary Timber Harvest	48
Table 3-8	Boundary TSA Employment Coefficients	49
Table 4-1	Base Timber Harvest Level Assumptions.....	52
Table 5-1	TSA Annual Forestry Related Employment and Employment Income Impacts	55
Table 5-2	Provincial Annual Forestry Related Employment and Employment Income Impacts.....	58
Table 5-3	BC Average Forest Industry Tax Revenues (1993).....	60
Table 5-4	Provincial Forestry Revenue Impacts.....	61
Table 5-5	Federal Forestry Revenue Impacts.....	62
Table 8-1	TSA Socio-Economic Development Impacts.....	81
Table 8-2	Provincial Socio-Economic Development Impacts	83
Table 8-3	Provincial and Federal Government Revenue Impacts.....	84
Table D1	Estimate of Tourist/Local Resident Outdoor Recreation User Days	104

Appendices

APPENDIX A	LIST OF CONTACTS	87
APPENDIX B	GLOSSARY OF TERMS	91
APPENDIX C	BIBLIOGRAPHY	93
APPENDIX D	NOTES ON METHODOLOGY	95
D1.0	CALCULATING EMPLOYMENT AND INCOME IMPACTS	95
D1.1	Direct Forestry Employment and Income Impacts.....	95
D1.1.1	Employment Coefficients	97
D1.1.2	Other Direct Employment (Non-harvest Dependent).....	98
D1.1.3	Determining Forecast Employment and Income Levels.....	99
D1.2	Indirect and Induced Economic Impact Methodology	100
D2.0	GOVERNMENT REVENUES	102
D3.0	OUTDOOR RECREATION IMPACTS	103
APPENDIX E	INCREMENTAL IMPACTS OF BOUNDARY TSA BASE TIMBER HARVEST FORECAST.....	105

EXECUTIVE SUMMARY

- This report has been written as a companion document to the *Boundary TSA Timber Supply Analysis* by the Ministry of Forests. Together, the timber supply analysis report and this socio-economic impact analysis will be used as input to a public discussion paper. The discussion paper will be used as a focus for public discussion regarding issues surrounding changes to the timber harvest level.
 - This report has two components:
 - a profile of the local economy, and the physical and community setting within the Boundary Forest District, and
 - an assessment of the socio-economic and environmental implications within the Boundary TSA related to the various forecast harvest levels specified in the *Boundary TSA Timber Supply Analysis*.
 - A multiple accounts analysis approach has been used to evaluate the various impacts, both quantitative and qualitative, related to different harvest levels of the forecast period for the Boundary TSA. The harvest scenarios evaluated are as follows:
 - **Base Harvest Forecast** for the Boundary TSA, referred to as the Base Case in the Timber Supply Analysis report maintains the current AAC level of 700 000 m³ for eight decades, after which it declines by ten percent in Decade 8 and another ten percent in Decade 10. After Decade 10, the harvest remains at a long-term level of 560 000 m³ per year.
 - **Case 1: an immediate increase of 15 percent above the base harvest forecast.**
This higher initial rate of 805 000 m³ can be maintained for three decades. It would have to drop to the long-term level of 560 000 m³ annually by Decade 7.
 - **Case 2: an immediate decrease of 15 percent below the base harvest forecast.**
The 15 percent lower initial rate of 595 000 m³ would be sustained for over 200 years.
- The choice of scenarios was made by the Ministry of Forests as a means of illustrating the sensitivity of employment, income and government revenue, as well as the social and environmental impacts, to different harvest levels. It does not indicate a preferred option.

- While the results of this analysis are based on the best available information, some limitations of the analysis must be acknowledged.
 - It is assumed that the current timber harvesting land base and forest management practices will not change. The study does not take into account the implications of changes in forest management practices, land use processes such as the Protected Areas Strategy, Land and Resource Management Plans, C.O.R.E., Local Resource Use Plans, or comprehensive land claims negotiations.
 - The quantitative results focus on the forest sector only. Impacts in other sectors such as agriculture and outdoor recreation have been treated qualitatively.
 - Impacts are presented as if they would occur concurrently with a change in the harvest level, which means that "lag effects" are not captured in the model.
 - Employment coefficients used to derive future employment levels are based on the assumption that the current level of labour-intensity per level of harvest will hold over time. Threshold effects, such as mill closure due to a shortage of wood, are not accounted for in the analysis.

Profile of the Boundary Forest District

- The Boundary TSA is part of the Boundary Forest District situated approximately 500 kilometres east of Vancouver and 450 kilometres west of the BC-Alberta border on the Canada-US border. The forest district encompasses 658 000 hectares of land that comprise the Kettle and Granby drainages.
- Within the Boundary Forest District, the Boundary TSA (which is the focus of this analysis) covers 580 110 hectares, and Tree Farm Licence #8 another 77 540 hectares. Of the total TSA land base, 73 percent is classified as productive forest land and 52 percent (298 991 hectares) is included in the long-term timber harvesting land base.

Environmental Setting

- The Boundary Forest District falls into portions of three different ecosections:
 - Northern Okanagan Highland ecosection of the Thompson-Okanagan ecoregion;
 - Selkirk Foothills ecosection of the Selkirk-Bitterroot ecoregion; and,
 - Southern Okanagan Highland ecosection of the Okanagan Highland ecoregion.

- The forest district supports an abundance and wide variety of wildlife species, some of which are unique and may be endangered. Over 320 species, of which 249 are birds, may reside or be present at some time during the year in the forest district. All wildlife species common to southern BC can be found here.
- Issues and concerns identified are as follows:
 - protection of unique or limited habitats;
 - harvest impacts on forest age class distribution;
 - maintenance of old growth and old growth diversity;
 - provisions for retention of cavity trees, snags and coarse woody debris;
 - provisions for forest ecosystems networks;
 - improved protection of riparian habitat;
 - harvest distribution impacts on special habitats and wildlife species;
 - enhanced forest management practices;
 - harvesting and road maintenance impacts on water quality;
 - the ability to manage second growth forests to provide old growth values.

Socio-Economic Setting

- The Boundary Forest District is a sparsely populated area that includes several small communities, the largest being the City of Grand Forks. Most of the population is concentrated at the southern end of the forest district.
- In 1991, the population of the forest district was 10 850. This was an increase of 5.3 percent from 1981, which represents a slower growth rate than that of the province as a whole during this time. In recent years, however, the forest district has experienced an influx of new residents, many of whom are retirees, semi-retirees and professionals seeking a change of lifestyle.
- Historically, the communities in the area have been largely forest-sector dependent, and their fortunes linked to that of the industry, but this is changing. The population increase has spurred economic growth and diversification. It has also introduced increased demand for local community and infrastructure services, as well as divergent views about resource use.
- The Boundary Forest District does not contain any First Nation reserves or communities; however, the long standing presence of First Nations' people has been documented and is evident from various archaeological finds. Presently, a major portion of the forest district is under claim by the Westbank Band, which is affiliated with the Okanagan Tribal Council, for negotiation under the BC Treaty Commission.

➤ Issues and concerns:

- a chronic high unemployment rate, and lack of well-paying jobs;
- uncertainty about future job losses in the forest industry;
- a continuing shift from high paying, full time jobs in the resource sector to lower income jobs or self-employment in other sectors;
- increased economic pressure on families who must rely on second income sources or subsistence activities;
- growth management and economic diversification;
- growing polarization between those concerned with environmental protection and those economically dependent on the resource sectors;
- First Nations' interest pertaining to land claims;
- a desire for local control over resource management; and,
- a need for the recognition of "non-timber" forest values, and the growth potential for sectors such as tourism/recreation and botanical forest products.

TSA Forestry Operations

- The Allowable Annual Cut (AAC) in the Boundary TSA is 700 000 m³. In 1993, the AAC was raised to 900 000 m³, due to a temporary timber uplift aimed at salvaging timber which would otherwise have been destroyed by a pine beetle infestation. In 1994, the uplift was removed and the AAC reduced to 700 000 m³.
- The timber apportionment for the Boundary TSA is as follows:
- | | |
|---|-------|
| • Forest Licences (Pope & Talbot, Weyerhaeuser) | 71.8% |
| • SBFEP Program | 25.6% |
| • Woodlot Licences | 1.6% |
| • Forest Service Reserve | 1.0% |
- The predominant merchantable species are lodgepole pine (which makes up approximately 41 percent of all species), Douglas fir, spruce, larch, balsam. Some cedar is also harvested within the TSA.
- Timber from the Boundary TSA generates approximately 518 PY's of direct employment within the TSA annually, based on an average harvest rate of 700 000 m³.¹ Related to this employment is \$18.4 million in after-tax employment income. In addition, another 209 indirect and induced jobs are generated, and \$4.7 million in income. Altogether, wood from the Boundary TSA generates 727 PY's of annual direct, indirect and induced employment within the TSA, and \$23.1 million

¹ In recent years, the harvest level in the Boundary TSA has exceeded the AAC, although part of this is due to the effects of the uplift. For purposes of comparison, we have chosen to use the long-term average harvest rate of 700 000 m³ as the "current" harvest level.

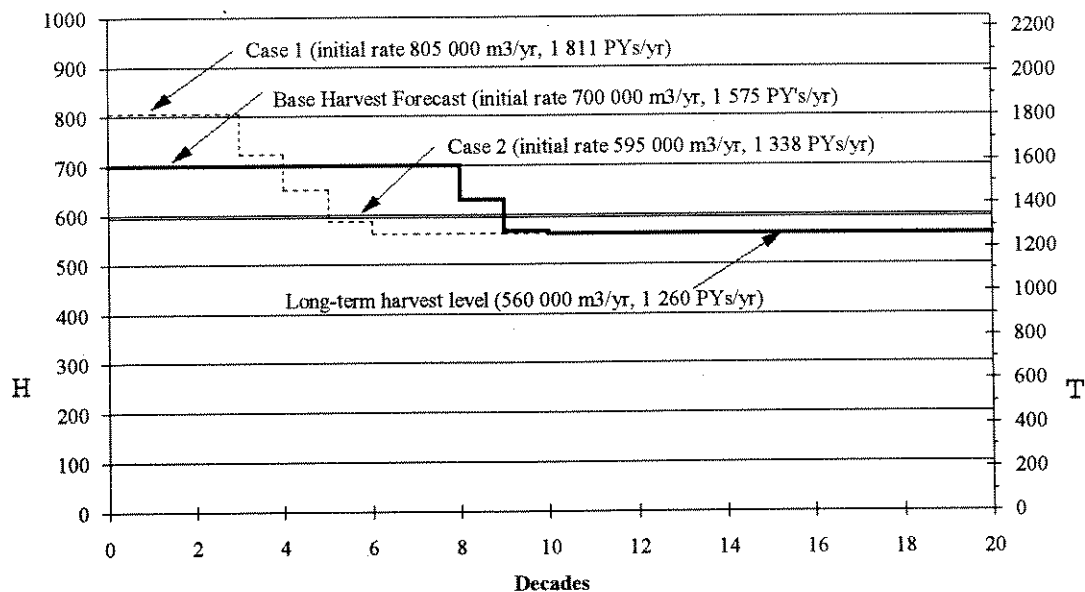
in income.

- At the provincial level, the current harvest level supports 1 575 PY's of direct, indirect and induced employment, and \$47.6 million in after-tax income on an annual basis.
- Forest sector activity also creates tax revenue at the provincial and federal government levels. Based on a current harvest level of 700 000 m³, we estimate that forestry generates approximately \$16.0 million in provincial revenue, and \$12.3 million in federal revenue. Stumpage and personal income tax make up the largest share of the provincial revenues, while personal income tax dominates the federal government revenues.

Timber Harvest Forecasts

- As indicated earlier, three harvest forecasts in the *Timber Supply Analysis* report are being considered in this analysis: specifically the base harvest case, Case 1 (which models an initial increase of 15 percent over the base harvest), and Case 2 (initial decrease of 15 percent below the base harvest). These forecasts are illustrated below.

Figure ES.1
Boundary TSA Timber Harvest Forecasts
(Provincial employment levels, PY's)



Impacts and Implications of Timber Harvest Forecasts

Economic Impacts

➤ Base Harvest Forecast

- If the initial harvest level of 700 000 m³ were sustained until Year 80, direct forest sector employment would remain relatively stable during this time, both at the TSA and provincial level. This would also hold true for indirect and induced activity, and for provincial and federal government revenues. In the TSA, 518 direct PY's and 728 total PY's are supported by this forestry activity. Provincially, forestry activity supports 630 PY's of direct forestry employment, and 1 575 PY's of total, direct, indirect/induced employment.
- In Year 81, harvesting levels under the base harvest forecast would begin declining from 700 000 m³ to the long-term harvest level of 560 000 m³ by Year 101.
- From Year 81 to Year 101, approximately 103 PY's of direct forestry employment would be lost, while 145 PY's of total direct, indirect/induced would be lost. A corresponding loss of \$4.6 million in total after tax employment income would be incurred, with \$3.7 million of this in the direct forest sector.
- Province-wide, approximately 126 PY's of direct forestry employment would be lost, while 315 PY's of total direct, indirect/induced would be lost over the 20 years. This would correspond to \$9.5 million in total income, with direct forestry accounting for \$4.4 million of this. During the same time, provincial and federal government revenues would decline by \$5.4 million.

➤ Case 1

- A 15 percent increase in the initial harvest level from 700 000 m³ to 805 000 m³, as illustrated by Case 1, could be sustained for the first three decades of the forecast period, before declining over a 30 year period to the long-term level of 560 000 m³.
- Case 1 could initially increase employment from 518 direct PY's to 596 direct PY's, with total employment rising from 728 PY's to 837 PY's. The higher initial employment would be maintained for the first three decades of the forecast. In Year 41, economic activity would begin to decline and would fall below that of the base harvest forecast by Year 51. The trend

would be the same at the provincial level. The long term harvest level would be reached in Year 61.

➤ **Case 2**

- The 15 percent decrease in the initial harvest level from 700 000 m³ to 595 000 m³ would have immediate economic impacts. Approximately 78 PY's of direct forestry employment would be lost, with a total employment loss of 109 PY's. Case 2 would support 440 PY's (619 total) of direct employment and \$15.7 million (19.6 total) in income annually within the TSA for the entire forecast period.
- By Year 91, this level of jobs and income would exceed that of the base harvest case, which would continue to decline. Thus, while initial losses would occur compared to the base harvest, this level of employment and income could be sustained in the long-term. The same would be true at the provincial level.
- Other sectors of the economy, with the exception of agriculture and outdoor recreation, would be affected little by harvest forecasts. In the livestock grazing sector, the long-term decline in the harvest level would reduce the availability of clearcuts and subsequent grazing activity, with some negative results for the local economy. Outdoor recreation use for certain activities and in specific locations may be negatively impacted, but the number of affected participants is relatively small compared to the total tourism market.

Social Implications

- The stable forest sector employment of the first 80 years of the base forecast would be beneficial to TSA communities, providing a secure base for future economic diversification. In addition to benefiting forestry workers and their families, the long-term stability of the timber supply would generate ongoing growth for businesses and services that depend on forest industry or employee expenditures. By preventing an outflow of population, stable forest sector employment would also ensure the "critical mass" required to maintain property values and a solid tax base.
- A fifteen percent higher initial harvest level would result in a small number of immediate additional jobs vis a vis the base harvest, at the expense of longer term employment losses. However, a fifteen percent lower harvest level would compound the current jobless rate, and fuel population loss and related social problems.
- A fifteen percent reduction in the harvest level could cause a temporary, or

permanent, mill shutdown of Pope & Talbot's Grand Forks sawmill. This would compound the social impacts identified in this analysis.

- Issues of specific native concern other than the preservation of cultural heritage sites and land claims are unknown.

Environmental Implications

- Current management practices already include provisions to protect critical environmental features of the TSA, specifically wildlife corridors and ungulate winter range, riparian habitats, and community watersheds. However, the Ministry of Environment, Lands and Parks has a number of concerns that have not been fully addressed, such as some of the information used in the timber supply analysis, and the potential impacts of some current practices on water, wildlife, and biodiversity. These concerns are common to all the harvest forecasts.
- Under the base harvest regime, the forest age class distribution will be narrowed. This narrowing could negatively affect species that rely exclusively on early successional growth, or are dependent on old growth, or old growth attributes, and could result in population declines in these species. Conversely, species that are more adaptable may benefit. Unfortunately, most species that would benefit are not of management concern.
- The impacts of the rate and distribution of harvest on the TSA's grizzly bear population is another concern. Harvesting may affect grizzly bear forage, and logging roads may lead to more human-bear encounters that could be detrimental to the bear population. However, harvest rotation assumed in the base harvest forecast does not appear to present a concern for these ungulates.
- The higher initial harvest level of Case 1 could accentuate the foregoing concerns, whereas the lower initial harvest level implicit in Case 2 could diminish them. Case 1 would also result in a more substantial reduction of mature forest cover that may be detrimental to snow cover and forage opportunities for ungulates.

1.0 INTRODUCTION

1.1 Background

The British Columbia Forest Service is presently conducting a provincial timber supply review (TSR) to assist the Chief Forester in re-evaluating provincial Allowable Annual Cut (AAC) levels. Four documents are being prepared as part of this review process for each of the province's 36 Timber Supply Areas (TSAs):

- *A Timber Supply Analysis* - provides a technical analysis of the amount of timber available for current and future harvesting in the TSA based on current management practices. The analysis addresses critical factors that influence harvest levels and the implications of a base harvest forecast level² over time as well as variations in initial harvest levels.
- *A Socio-Economic Analysis* - evaluates the social, economic and environmental implications of different harvest levels examined in the *Timber Supply Analysis*.
- *A Public Discussion Paper* - summarizes the technical information and provides a focus for public discussion of the issues surrounding timber harvest levels.
- *An AAC Rationale Statement* - presents the AAC level set by the Chief Forester and describes the rationale for this decision.

This report represents the second of these documents for the Boundary Timber Supply Area, namely the *Boundary TSA Socio-Economic Analysis*. The assessment contained in this report was carried out by Resource Systems Management International (RSMI) on behalf of the Ministry of Forests, based on information provided by the Ministry as well as interviews and research by RSMI documented in the Appendix of this report. RSMI acknowledges and thanks the Ministry of Forests — Economics and Trade Branch, Boundary Forest District and Nelson Forest Region personnel for their helpful direction and input.

1.2 Study Objectives and Approach

The Socio-Economic Analysis is intended to evaluate and, where possible, quantify the impacts of different harvest levels identified in the *Timber Supply Analysis* in terms of direct and indirect jobs, employment income and government revenues generated by the forest sector, and their implications for other economic sectors (e.g., tourism) and to community, environmental and First Nations' concerns.

² The "base harvest forecast level" represents the flow of potential timber harvests that (1) begins at or as close to the current AAC as possible, and (2) declines/increases to the long term sustainable harvest level at a gradual rate of change.

We have adopted a Multiple Accounts Analysis approach in carrying out this study. Multiple Accounts Analysis is an evaluative framework which focuses on a range of values inherent in a given resource, in this case the provincial forests. This methodology analyzes the implications of various harvest levels from a number of social, economic and environmental perspectives (or "accounts") on a TSA and provincial basis.³ The final result is a matrix of information which integrates, in as objective a way as possible, indicators of how these different accounts are affected by the various harvest levels.

Table 1-1: REGIONAL LEVEL ACCOUNTS	
Economic Development	local income and employment effects
Environment	impact on environmental values/attributes and resource use
Community	impacts on population, provision of local services, local government revenues and the provision of local government services and infrastructure and, ultimately, the impact on community goals such as stability, cohesiveness and economic autonomy and diversity
First Nations	impact on First Nations' communities, cultural values and traditional activities.
PROVINCIAL LEVEL ACCOUNTS	
Economic Development	impact of different options on economic activity in communities outside area and in the province as a whole; direct and indirect
Provincial and Federal Government Revenue	government resource-related taxes and other revenues less expenditures associated with the options

1.3 Structure of the Report

The remainder of this report is organized into seven chapters as follows:

Chapter 2.0: Area Profile - profiles the socio-economic and environmental setting of the Boundary TSA by describing the communities, economy and environmental features of the Boundary Forest District as a whole.

Chapter 3.0: TSA Forest Sector Overview - focuses on the forest resource and industry of the Boundary TSA. The overview addresses the timber harvesting land base, management practices, critical factors, and potential changes affecting the future land base and timber supply. Having discussed those factors which determine the net operable land base, Chapter 3 goes on to review existing forest industry operations and employment related to timber from the Boundary TSA.

³ Federal government revenues are also addressed.

Chapter 4.0: Current and Future Harvest Levels - presents the current harvest figures, and discusses the timber harvest forecasts, which form the basis of the socio-economic analysis.

Chapter 5.0: Economic Impacts - presents an analysis of the economic development and government revenue impacts of timber harvest on the regional and provincial economies.

Chapter 6.0: Social Implications - evaluates the community and First Nations' impacts related to the timber harvest forecast for the Boundary TSA.

Chapter 7.0: Environmental Implications - evaluates the environmental implications related to the timber harvest forecast for the Boundary TSA.

Chapter 8.0: Summary of Results - elicits the key findings at the TSA and provincial levels.

2.0 AREA PROFILE

Although the assessment documented in this report focuses on the Boundary Timber Supply Area (TSA), timber harvesting and other activities within the TSA are inextricably linked with, and have a major influence on the people, economy and environmental resources of the Boundary Forest District as a whole. To properly understand the implications of changes in the timber supply from the TSA, therefore, requires a complete understanding of the TSA's socio-economic and environmental setting. This chapter describes the communities, economy, and environmental features of the Boundary Forest District, thereby providing a context and reference point for the ensuing analysis.

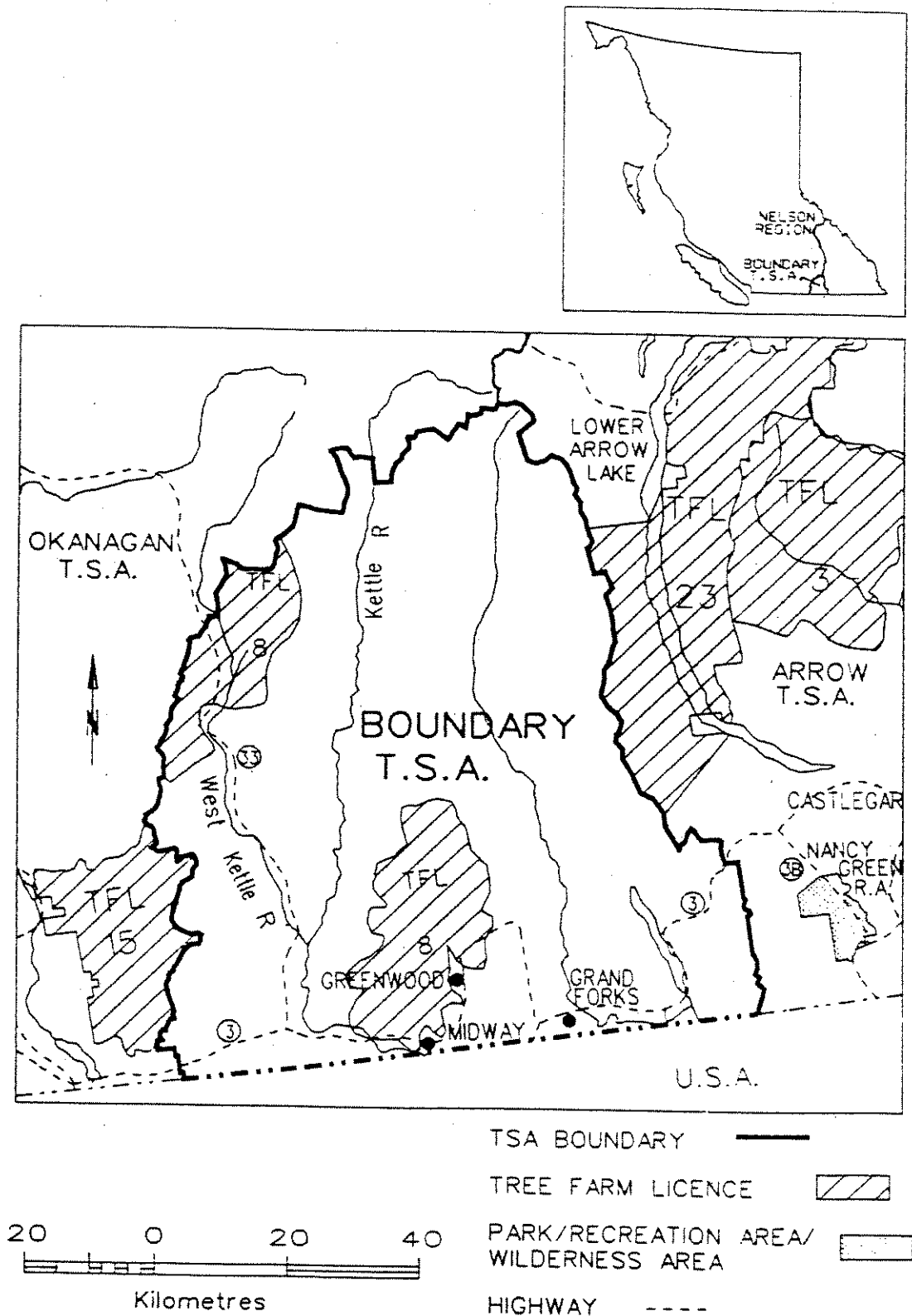
This chapter is organized into six sections. Section 2.1 describes the location of the Boundary Forest District and its broad physical characteristics. Sections 2.2 summarizes the principal environmental attributes of the area. Section 2.3 discusses the socio-economic setting. Section 2.4 describes the main economic activities in the area and their significance. Section 2.5 outlines First Nations' interests in the area. Section 2.6 summarizes the key socio-economic and environmental issues and concerns in the area.

2.1 Location and General Features

The Boundary TSA is part of the Boundary Forest District, one of seven districts in the Nelson Forest Region. Situated in the southwestern corner of the Region, the forest district is located on the Canada-US border, approximately 500 kilometres east of Vancouver and 450 kilometres west of the BC-Alberta border, and overlaps the Regional District of Kootenay-Boundary. The forest district encompasses 658 000 hectares of land that comprise the Kettle and Granby drainages. The crestline of the Okanagan Highland Range of the Monashee Mountains forms the forest district's western boundary; the crestline of the Christina Range forms its eastern boundary. The Penticton Forest District abuts the Boundary Forest District on the west, whereas the Arrow Forest District abuts it on the east.

Figure 2-1 shows the Boundary Forest District which includes the Boundary TSA covering 580 110 hectares and Tree Farm Licence (TFL) #8 with a total area of 77 540 hectares. Lands excluded from forest district jurisdiction and management (thus not considered in this study) include Conkle Lake Park, a 587 hectare provincial park situated in the southwest corner of the forest district approximately 21 kilometres west of Westbridge, as well as privately-owned lands concentrated primarily around communities and along the main river valley bottoms.

Figure 2-1: Boundary Forest District



2.2 Environmental Setting

2.2.1 Overview

The Boundary Forest District falls into two ecosections and two ecoregions⁴ of the Southern Interior ecoprovince. It also lies in one ecosection and ecoregion of the Southern Interior Mountains ecoprovince, as shown in Figure 2-2. The western portion of the forest district, centering on the West Kettle and Kettle Rivers, is within the Northern Okanagan Highland ecosection of the Thompson-Okanagan ecoregion. The eastern portion, centering on the Granby River, is within the Selkirk Foothills ecosection of the Selkirk-Bitterroot ecoregion. The third and smallest ecosection represented in the forest district, the Southern Okanagan Highland ecosection of the Okanagan Highland ecoregion, consists of a narrow band situated along the southern boundary of the forest district at the Canada-US border.

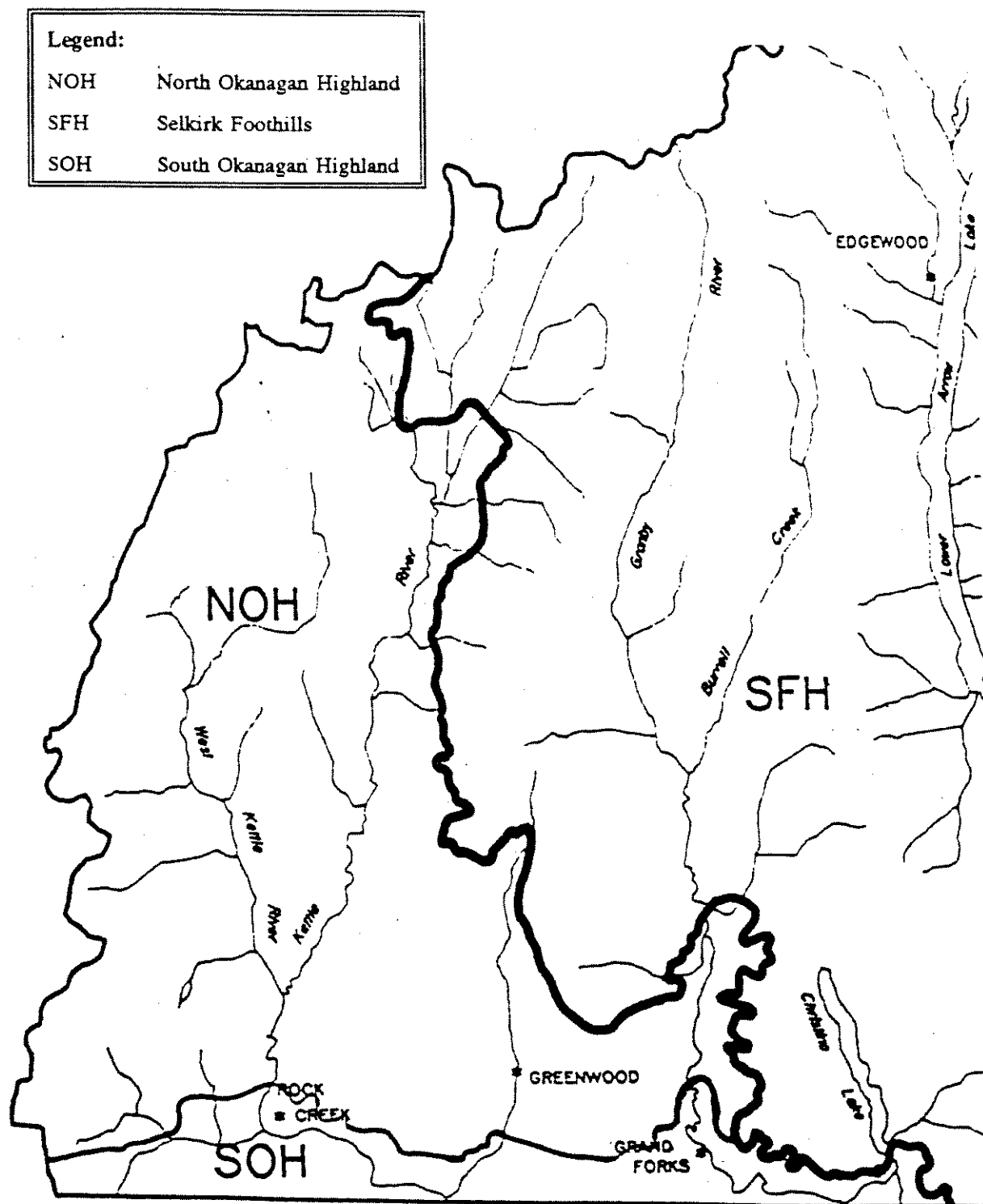
The Northern Okanagan Highland ecosection consists of a rolling highland with wide, deep valleys that are north-south in orientation, and is drained by the Kettle River and Boundary Creek. Elevations range from 500 metres in valley bottoms to 2 100 metres on the highest ridges. The ecosection is the transitional area between the dry, hot Okanagan Basin to the west, and the wetter Columbia Mountains to the east. Stands include Douglas fir, lodgepole pine, ponderosa pine and western larch at low elevations, and extensive stands of lodgepole pine and some Douglas fir at mid to higher elevations. Major species within the relevant biogeoclimatic zones are summarized as follows:

Table 2-1: MOST COMMON SEQUENCE OF BIOGEOCLIMATIC ZONES			
	Lower Slopes & Valley Bottoms	Mid Elevations	High Elevations
Northern Okanagan Highland	Interior Douglas Fir	Montane Spruce	Engelmann Spruce-Subalpine Fir
Southern Okanagan Highland	grasslands, Ponderosa Pine and Interior Douglas Fir	Montane Spruce	
Selkirk Foothills	Interior Cedar-Hemlock	Engelmann Spruce - Subalpine Fir	Alpine Tundra (AT) only on a few high ridges.

Source: Ecosection Summaries for the Kootenay-Boundary Region, Quesnel and Theissen, November 1993.

⁴ There are ten ecoprovinces, areas of consistent climate or oceanography and physiography, in B.C. Within an ecoprovince, ecoregions denote areas with major physiographic, minor climatic or oceanographic differences within the ecoprovince. There are 43 ecoregions in B.C. Within the ecoregions, ecosections comprise areas with minor physiographic, climatic and oceanographic differences. There are 110 ecosections in B.C. (Demarchi, D.A., Ecoregions of British Columbia, Ministry of Environment, Lands and Parks, 1993).

Figure 2-2: Ecosections within the Boundary Forest District



The area contained within the Selkirk Foothills ecosection is characterized by subdued mountain terrain marked by wide valleys and trenches throughout, and is drained by the Granby River. Like the Northern Okanagan Highland ecosection, valleys are north-south in orientation. Elevations range from 450 metres in the valley bottoms to 2 400 metres at the highest peak. Seral stands include western larch, Douglas-fir, lodgepole pine, western white pine, ponderosa pine and, occasionally, grand fir on low to mid elevations, and lodgepole pine at higher elevations. Low elevations of this ecosection have the distinction of having the greatest diversity of tree species in the province.

Unlike the two other ecosections, the topography of the Southern Okanagan Highland ecosection is east-west in orientation, characterized by rounded forested hillsides on north slopes and open grasslands on south slopes. Its topography consists of low rounded ridges and wide valleys, ranging in elevation from 500 metres to 1 600 metres. The valley bottoms are the hottest and driest in the Kootenay region. The ecosection is the transitional zone between the dry Columbia Basin in Washington State and the moist Columbia Mountains to the east. Stands include ponderosa pine and Douglas-fir at lower elevations, and Douglas-fir, western larch, and lodgepole pine at mid elevations. Lodgepole pine with a few Douglas-fir stands occur at higher elevations. Much of this ecosection is municipal land or privately-owned, thus excluded from consideration in the environmental section of this study.

2.2.2 Wildlife Resources

The Boundary Forest District supports an abundance and wide variety of wildlife, including some unique and potentially endangered species. Over 320 species, of which 249 are birds, may reside or be present at some time during the year in the forest district. All wildlife species common to southern British Columbia can be found here.

Table 2-2: SUMMARY OF SPECIES INFORMATION FOR THE BOUNDARY TSA

Ecosection	Number of Different Species				
	Total	Amphibians	Reptiles	Birds	Mammals
Northern Okanagan Highland	288	3	5	219	61
Southern Okanagan Highland	277	5	9	207	56
Selkirk Foothills	298	4	7	233	54
Total ⁵	329	5	9	249	66

Source: *Wildlife in Ecosections: A First Approximation*, V. Stevens, March 31, 1993.

Of particular note is a small population of grizzly bears. Although known to reside in the

⁵ Total does not represent the total of the number of species identified in each eco-section as there are many similar species in each of the three eco-sections. Therefore, the total indicates the total number of different species found in the three eco-sections.

forest district, the precise number of bears, and the level of endangerment, is unknown. The ecotype may be unique in the province, as finding grizzly bear in forested plateau landscapes is not typical. The grizzly bears are found primarily in the northeast half of the district in the Upper Kettle and Granby/Burrell drainages as well as north of Christina Lake.

Habitat within the forest district is generally considered poor for grizzly bear. As a consequence, the home ranges of individual bears may be quite large. For this reason, retention of spring range as well as other seasonal forage sites throughout the grizzly's range may be critical to the survival of the population. Some mapping has been done of spring ranges but identification of new areas is ongoing. In addition, plans are in place to study grizzly bear travel and habitat use patterns in the near future. Grizzly bears may be affected by forest activities in the following ways:

- Roads and road use may discourage normal travel patterns of bears. They may avoid areas adjacent to roads, crossing roads with regular traffic, or eliminate roaded areas from their home ranges. In addition, increasing vehicular access increases the chances of human-bear interaction.
- Removing forest cover adjacent to feeding areas and from travel routes may discourage bears from using these areas.
- Some silvicultural activities such as planting to minimum stocking standards, site preparation and juvenile spacing, where they occur in important berry foraging areas, may be detrimental to bears as berry production may be reduced.

Ungulates, particularly deer, are plentiful in the forest district. The prevalence of these species, in part, reflects the fact that no significant forest age gaps exist, as ungulates need a variety of habitats ranging from early seral to old growth forests. Mountain goats, for example, use different forest habitats according to time of year. In summer, goats often frequent the fringes of alpine areas seeking thermal relief, whereas in winter, they are typically found at lower elevations. Availability of deer and elk winter range and goat spring range, which are concerns in other TSA's, are not perceived as being a problem in the Boundary at this time. As with grizzly bears, road development and logging can impact on ungulates by improving hunting accessibility and reducing the availability of necessary tree cover.

Table 2-3 identifies rare or threatened species (red⁶-listed) and sensitive or vulnerable species (blue⁷-listed) which may be found in the forest district. These species are

⁶ The red-listed species are the Tiger Salamander, Western Grebe, Ferruginous Hawk, American Peregrine Falcon, Prairie Falcon, American White Pelican, Forster's Tern, White-headed Woodpecker, Pallid bat and Northern Long-eared Myotis.

⁷ Blue-listed species include 5 reptiles, 29 birds, and 9 mammals.

associated with grasslands, lakes and shorelines, cliffs and deciduous shrub as well as forest habitat. Red or blue-listed species dependent on old growth or old growth attributes include the white-headed woodpecker, northern long-eared myotis, flammulated owl, "MacFarlane's" western screech owl, western small-footed myotis, fringed myotis, "Townsend's" big-eared bat, "western" Williamson's sapsucker, Lewis woodpecker and wolverine.⁸

Table 2-3: RED LISTED SPECIES	
AMPHIBIANS	
Tiger Salamander	
BIRDS	
Western Grebe	Ferruginous Hawk
American Peregrine Falcon	Prairie Falcon
American White Pelican	Forster's Tern
White-headed Woodpecker	
MAMMALS	
Northern Long-eared Myotis	Pallid Bat
BLUE-LISTED SPECIES	
REPTILES	
Painted Turtle	Western Rattlesnake
Western Yellow-bellied Racer	"Great Basin" Gopher Snake
Rubber Boa	
BIRDS	
American Bittern	Great Blue Heron
Oldsquaw	Turkey Vulture
Swainson's Hawk	Bald Eagle
Rough-legged Hawk	Grey Falcon
Sandhill Crane	Long-billed Curlew
Red-necked Phalarope	California Gull
Flammulated Owl	"MacFarlane's" Western Screech Owl
White-throated swift	Black-chinned Hummingbird
Lewis Woodpecker	"Western" Williamson's Sapsucker
Gray Flycatcher	Lark Sparrow
Surf Scoter	Tundra Swan
Trumpeter Swan	Lesser Golden Plover
American Avocet	Short-billed Dowitcher
Canyon Wren	Barn Owl
Bobolink	
MAMMALS	
Spotted Bat	Western Small Footed Myotis
Fringed Myotis	Nuttall's Cottontail
Great Basin Pocket Mouse	"Western" Wolverine
Badger	"California" Bighorn Sheep
Townsend's Big-eared Bat	

Source: Wildlife in Ecoregions: A First Approximation, V. Stevens, March 31, 1993.

⁸ Ministry of Environment, Lands and Parks.

American peregrine falcon, prairie falcon, ferruginous hawk and Swainson's hawk, all of which are again either red or blue-listed species, use snags associated with old growth, although are not old growth or attribute dependent. Other species, including some which are of management concern (yellow-listed), include lynx, marten, northern flying squirrel, pileated woodpecker, cavity nesting ducks as well as several types of owl and woodpecker. These use mature or old growth for some or all living requirements.

2.2.3 Fisheries Resources

The Boundary Forest District has numerous lakes and streams that support both sport and non-sport fish. Within the forest district, 73 lakes and all streams are managed to varying degrees. Sports fish found within the forest district include rainbow trout, kokanee, bass, walleye, sunfish, brook trout, brown trout, westslope cutthroat trout, and mountain whitefish. However, rainbow trout make up an estimated 85 percent of the sports fish caught.⁹ Non-game species include mottled sculpin, umatilla dace, shorthead sculpin, chiselmouth, speckled dace, carp, redbelt shiner, tench, leopard dace, longnose sucker, largescale sucker, prickly sculpin, and slimy sculpin.

Five rare or endangered fish species, all non-game species, are found in the forest district: mottled sculpin, shorthead sculpin, chiselmouth, umatilla dace and speckled dace. Although these species are all well-represented elsewhere in the world, they are rare or endangered within British Columbia. Mottled sculpin, shorthead sculpin and chiselmouth are designated "rare", and have only been found in the Kettle river below Cascade.¹⁰ Umatilla dace, which are found in the Kettle river below Cascade, and speckled dace, which are found in the Kettle, West Kettle (up to Wilkinson Creek) and Granby Rivers, are designated "threatened".

Information on species in streams, particularly non-game species, is not well-documented other than for the Kettle, West Kettle, and Granby Rivers, and Burrell and Boundary Creeks. Most sport fish spawn in tributaries of these systems, or in their headwaters. Fish distribution is quite variable from year to year within smaller streams, depending on such factors as water flows. Although sport fish do not usually occupy habitat where stream grades exceed 5 percent, they may migrate through steep reaches, if stream gradients of less than 5 percent or microhabitats, such as plunge pools in boulder habitat, exist upstream.

Important waterways for fisheries values include:

- | | |
|---------------------|--------------------|
| • West Kettle River | • Trapping Creek |
| • Main Kettle River | • Sutherland Creek |
| • Granby River | • Saunderson Creek |

⁹ Ministry of Environment, Lands and Parks - estimate based on Region 8 harvest information.

¹⁰ Chiselmouth has also been found below Midway.

- McRae Creek
- Burrell Creek
- Rendell Creek
- Goatskin Creek
- Copperkettle Creek
- Wilkinson Creek
- Rock Creek

Christina Lake is the most important lake in the forest district from a biodiversity perspective, and is the only lake that has sport fish spawning along the lakeshore (bass and kokanee), as well as in tributary streams (kokanee and rainbow trout).

2.2.4 Water Resources

Although the Boundary region has an abundance of water resources, significant demands are placed on these resources for domestic and agricultural consumption as well as ecological maintenance of fisheries values. Maintenance of high water quality is an important consideration in all instances.

In the previous section, water bodies having particular importance for fisheries values were identified. Other streams that have importance from a consumptive perspective include watersheds in the vicinity of area communities, as well as numerous creeks with individual licences. Upwards of 10 000 water licences are issued in the TSA.¹¹ Water quality and the effect of logging on water quality is a concern, which has precipitated the development of the Italy-Sutherland integrated watershed management plans.

2.2.5 Protected Areas

Although approximately 7 percent of the provincial land base is formally designated as protected, many existing protected areas do not capture the full range and diversity of biological, natural, recreational, and cultural heritage resources found in the province. As a result, the provincial government announced the Protected Areas Strategy (PAS) on June 15, 1993 to deliver an expanded and integrated system of protected areas that will protect 12 percent of the biogeoclimatic features of each eco-section in the province by the Year 2000. The PAS has two major goals: to protect viable, representative examples of natural diversity, and to protect special natural, cultural heritage and recreational features of the province.

In the Kootenay-Boundary Region, a list of 102 candidate study areas was developed for consideration. In June 1993, a draft report, *An Assessment of Candidate Protected Areas in the Kootenay Region* was issued. In December 1993, the results of a second assessment, the *Best PAS Report* was released, which evaluated and ranked the significance of the candidate study areas. An *Alternatives Report* dealing with some of the impacts associated with designating the candidate areas for study was then issued in

¹¹ Ministry of Environment, Lands and Parks, pers. comm.

January 1994.

The *Best PAS Report* lists 53 candidate study areas ranked according to their significance and priority¹² and another 49 unranked areas within the Kootenay-Boundary region. Three candidate areas are within the Boundary Forest District. All are situated within the Boundary TSA. Table 2-4 identifies the Priority One and Two ranked study areas, their principal PAS value and location.

Table 2-4: PRIORITY 1 & 2 PAS STUDY AREAS IN BOUNDARY TSA		
	PAS Value¹³	Location
Priority One Areas (ranked)		
Gladstone	<ul style="list-style-type: none"> - covers lakeshore to alpine elevations capturing a diversity of habitats which are not captured elsewhere. - includes important kokanee spawning areas and important winter ranges for elk and deer. - encompasses significant recreation values and is a nationally significant area for cultural heritage. 	Consists of the Texas, Sandner and Lynch Creek drainages adjacent to Christina Lake and covers 39,872 hectares.
Granby	<ul style="list-style-type: none"> - the last large, unroaded, drainage in the southern Okanagan - supports a significant grizzly bear population and old growth forest 	The area consists of the headwaters of the Granby River and covers 38,504 hectares.
Priority Two Areas(ranked)		
Gilpin	<ul style="list-style-type: none"> - only unit available to represent the grassland and dry forests of the Granby and Kettle valleys and the Southern Okanagan Highlands. - supports a range of red and blue listed species - contains provincially significant cultural values. 	Consists of the south facing slopes between Christina Lake and Grand Forks covering 3,431 hectares.

¹² Areas with high conservation, recreation and cultural heritage overlap areas with high Protected Areas Strategy values in close proximity, and areas possessing global, national or provincial significance are rated as Priority One areas. Areas enhancing priority one areas or having the potential to substitute for Priority One areas are rated as Priority Two. Priority Three areas were identified as areas possessing less overall PAS value but providing elements of landscape ecosystem connectiveness that could serve as support zones to enhance the PAS values of Priority One and Two areas.

¹³ Best PAS Report, Kootenay Regional Protected Area Team, November 1993.

2.3 Socio-Economic Setting

The Boundary Forest District is situated in the southwest corner of the Kootenay Region. The forest district is a sparsely populated area that includes several small communities, the largest being the City of Grand Forks. Grand Forks is regarded as the service centre for the entire region, although residents and businesses also rely on Castlegar, Kelowna and Spokane for large purchases and more varied shopping. As a result, there is a considerable outflow of income from the region. Two smaller incorporated municipalities within the region are the Villages of Greenwood and Midway. The forest district also includes several small, unincorporated communities, namely Bridesville, Christina Lake, Beaverdell, Westbridge and Rock Creek.

Isolation has historically been an issue for the Boundary area. In fact, the Kettle Valley railway built by Canadian Pacific between 1910 and 1915, was constructed expressly to ensure the continued inclusion of the Kootenays within Canada. Following the CP Rail line rationalization, this direct line no longer serves the area. Today, local airports and improved highways link the region to the rest of the province and country, but the Boundary nevertheless remains somewhat isolated, and retains strong north-south ties to the U.S. This tendency is likely to be reinforced in the future by the proposed development of State Route 395, an improved highway link in Washington State from North Spokane to the Canadian border.

2.3.1 Population Characteristics and Trends

Table 2-5 compares the population of the Boundary Forest District and Nelson Forest Region (including the Boundary Forest District) based on 1981 and 1991 Census data. Forest district population decreased by 2.7 percent between 1981 and 1986, and then increased by 8.2 percent from 1986 to 1991. By comparison, the population in the Nelson Forest Region as a whole decreased by 4.8 percent between 1981 and 1986, and then increased by 1.1 percent from 1986 to 1991. Although the percentage increase in forest district population was higher than that experienced in the region, this increase was below the overall provincial growth rate of 13.8 percent over the same time period.

Within the forest district, population changes have also varied. From 1986 to 1991, the population of Grand Forks increased by 10 percent to 3 610. Local authorities¹⁴ indicate that growth has continued at a similar rate since 1991, and estimate the current population of Grand Forks to be 3 924.¹⁵ During the same period, the smaller communities of Greenwood and Midway experienced population decreases of 5.8 and 4.6 percent respectively. However, local realtors report that most of the recent residential development is concentrated in the rural areas of the forest district.

¹⁴ Personal communication with City Administrator and Economic Development officials.

¹⁵ Personal communication with City Administrator.

Table 2-5: BOUNDARY FOREST DISTRICT SELECTED DEMOGRAPHIC INFORMATION		
	Boundary Forest District	Nelson Region
Total Population (1991)	10 850	149 420
% Change since 1981	5.3	-3.8
Age Structure (1991)		
% under 15 years of age	21	22
% 15-34	24	27
% 35-44	16	17
% 45-54	12	11
% 55 and over	27	23
Mobility (1991)	53	57
% population in the same household/community for last 5 years		
Unemployment		
1991 - % of labour force 15 years and older	15	12
1986 - % of labour force 15 years and older	16	15
Average Income by Census Family		
1991	41 633	46 397
1986	27 753	34 585

Source: Statistics Canada

Population losses in the early 1980s primarily reflect downsizing in the forest industry as a result of the economic recession. However, more recent economic setbacks have not affected population stability. The closure of Bradford Enercon (a mineral-filled insulation board manufacturer), and the subsequent lay-off of approximately 100 people in early 1992, did not result in a population loss in Grand Forks.¹⁶ Similarly, Beaverdell has thus far been able to maintain a stable population after the Highland Bell silver mine closed in 1992. In both cases, ties to the community, new job opportunities resulting from population in-migration and optimism about the possible re-opening of Bradford Enercon appear to have forestalled any significant out-migration.

The impact on the forest sector of the recent end of a temporary accelerated cut is only just being felt. Reduced opportunities in logging have resulted in an estimated loss of 167 harvesting jobs this year.¹⁷ As well, Pope & Talbot have announced the elimination of 90 jobs at their Grand Forks sawmill effective January 1995. Although some of the mill lay-offs may be eased by early retirements and possibly one or two job openings at Pope & Talbot's Midway sawmill, the majority of affected workers will likely be faced with finding

¹⁶ Note that the Bradford Enercon plant is expected to re-open in 1995.

¹⁷ RSMT, Socio-economic Impact Assessment of Grand Forks Area, Prepared for the Ministry of Employment & Investment, Ministry of Small Business, Tourism & Culture, and Economic Development Commission, Regional District of Kootenay-Boundary, May 1994.

employment outside the forest sector or relocating outside the area.

Recent population increases are attributed to an influx of retirees, semi-retirees and professionals into the Boundary forest district in search of lifestyle changes and an improved quality of life. This trend has been observed in a number of BC communities, most notably on Vancouver Island and in the Okanagan, but now appears to be spreading into the Kootenays. The trend has been more pronounced in the Nelson/Kootenay Lake and Arrow regions than the Boundary thus far. However, as the neighbouring Okanagan becomes increasingly popular and expensive, spillover into the Boundary is expected to increase.

Low housing prices, a moderate climate and a well-developed community service infrastructure are some of the reasons credited for this in-migration. The trend had both positive and negative results. Population increase has spurred economic growth and diversification but has also placed a strain on existing infrastructure and community services and introduced divergent views about resource use.

2.3.2 Labour Force

Historically, the labour force in the area has been primarily dependent on the forest sector. Forestry has been the largest employer and has provided the benefit of relatively high paying, full time jobs. Now, job opportunities are shifting to lower income service sector jobs or self-employment. As a result, when job losses occur in the forest sector, alternative employment, if available, frequently does not wholly compensate income loss. This trend is resulting in increased economic pressure on families who must rely on more than one job, or subsistence activities, and a declining tax base for communities to pay for infrastructure and services.

Table 2-6 shows labour force breakdown by industry sector in 1986 and 1991, illustrating a strong reliance on the forest sector both for logging/forestry and manufacturing, which is predominantly forestry-related. Note that these figures do not necessarily represent actual jobs as they include workers who may presently be unemployed.

Table 2-6: BOUNDARY FOREST DISTRICT LABOUR FORCE BY INDUSTRY		
Employment Sector	1986	1991
Experienced Labour Force	4 185	5 210
Agriculture	425	340
Fishing and Trapping	0	0
Logging and Forestry	440	440
Mining	80	65
Manufacturing	685	1 065
Construction	235	275
Transportation and Storage	175	195
Communication and Utilities	85	60
Wholesale Trade	15	80
Retail Trade	490	575
Finance, Insurance and Real Estate	130	135
Business Services	60	30
Government Services	195	225
Educational Services	300	440
Health and Social Services	285	400
Accommodation, Food and Beverage Services	370	515
Other Service Industries	185	325
TOTAL¹⁸	4 155	5 165

Source: Statistics Canada

Table 2-7 also illustrates the heavy dependence of the local economy on the forest sector, as three of the top four employers (Pope and Talbot, Canpar and Interior Mill Equipment) are involved in forestry-related manufacturing.

Table 2-7: MAJOR EMPLOYERS IN THE AREA	
EMPLOYER	NUMBER OF EMPLOYEES
Pope and Talbot: Logging	86
Processing	420
School District #12	175
Canpar	165
Interior Mill Equipment	50 - 100
Overwaitea	50
Grand Forks Credit Union	44
City of Grand Forks	28
Emcon	28
Giant Foods	24
Total	1 070 - 1 120

Source: Grand Forks Chamber of Commerce

A substantial increase in the number of small and home-based businesses has occurred in

¹⁸ Totals do not equal experienced labour force due to rounding of sector numbers by Statistics Canada.

recent years. While this trend is generally considered as a sign of increased diversification by economists, most of these businesses constitute a source of secondary income to their owner-operators rather than a primary source.

2.3.3 Unemployment and Social Assistance Ratios

The annual average unemployment rate in the Okanagan Boundary Region #93¹⁹ was 11.2 percent in 1993 — the highest in the province, although down from 12.9 percent in 1992.²⁰ Note, however, that the Okanagan economy, with a relatively high unemployment rate, tends to skew labour force statistics reported for the Okanagan-Boundary region as a whole. Unemployment in the communities within the Boundary Forest District (which is part of the Okanagan Boundary Region) is lower than the regional average,²¹ as illustrated by Table 2-8 below.

Table 2-8: UNEMPLOYMENT INSURANCE CLAIMANTS (as a % of working age population) ²²											
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Grand Forks	8.2	9.7	9.6		7.2	7.9	7.7	7.5	8.6	9.2	7.2
Greenwood	5.2	6.3	6.0	7.1	5.5	6.6	6.9	6.9	9.4	11.0	8.4
Midway	4.5	5.6	5.7	7.0	5.4	4.8	4.6	5.7	6.6	7.8	6.6

Source: BC Stats prepared from information from CEIC's administrative files.

Typically, the unemployment rate varies seasonally with lower levels of unemployment in the summer months as a result of opportunities in construction as well as in seasonal sectors, such as fruit picking and silviculture. As Table 2-8 indicates, the number of UIC claimants, as a percentage of working age population, has decreased from 1992 to 1993.

The Canada Employment Centre reports that a considerable number of people have come to the area in the past few years, attracted to the economic growth and potential work. However, not all have been successful in finding work. This is demonstrated by examining the proportion of UI recipients and Employable Social Assistance Recipients (ESAR's) in relation to the working age population within the Okanagan-Boundary Region. Table 2-9 demonstrates that this has increased during the previous three years: a rise from 12.4 percent to 16.2 percent of the working age population between 1991 and 1993.

¹⁹ Consisting of Trail, Grand Forks, Penticton, Kelowna and Vernon.

²⁰ Canada Employment Centre.

²¹ Personal communication with CEIC and local residents.

²² This percentage is generally lower than Statistics Canada's official unemployment rate, partly because not all unemployed persons are entitled to claim UIC benefits.

Table 2-9: COMPARISON OF ESAR AND UIC BENEFICIARIES TO TOTAL WORKING AGE POPULATION					
	UI Beneficiaries Annual Avg	ESARs Annual Avg	Combined UI and ESARs	Est. Pop 15-64	Ratio²³
1993 (est)	582	392	974	6032	16.2%
1992	534	275	809	6109	13.2%
1991	502	233	735	5930	12.4%

Source: CEIC

2.3.4 Income

A recent province-wide analysis of economic dependence found that a significant portion of basic income is attributed to the forest and mining industries in many BC communities.²⁴ The study also revealed that pensions, investment and government transfer payments comprise a significant share of basic income. Table 2-10 confirms the dependence of the Boundary Forest District communities (Grand Forks-Greenwood) on forestry.

Table 2-10: BASIC SECTOR DEPENDENCE IN THE OKANAGAN-BOUNDARY REGION (Sector Income as a share of total basic income)											
Sectors²⁵	FOR	MIN	F&T	AG	TOU	H&E	OTH	UN	PEN	INV	TR
Grand Forks/ Greenwood	35	3	0	4	6	3	6	5	20	12	6
Kelowna Area	6	2	0	7	3	0	11	7	29	28	8
Trail-Rossland Area	4	43	0	0	6	3	1	5	22	12	4
Oliver- Osoyoos Area	4	2	0	17	7	0	7	6	31	21	5

Source: G. Horne and L. Robson, BC Community Economic Dependencies, Round Table on the Environment and the Economy, 1992.

As the table shows, forestry accounts for slightly more than one-third (35 percent) of basic income in the study area. Pensions and investment income accounted for another 32 percent of basic income and all other sectors (excluding unemployment and transfer payments) comprised 22 percent of basic income. The study found that, of all communities in the Okanagan-Boundary region, the Grand Forks-Greenwood area is the most reliant on the forest sector.

²³ Ratio of UI and ESAR's to population aged 15-64.

²⁴ Basic income flows into the community from outside and is considered the source of regional growth. Source: G. Horne and L. Robson, BC Community Economic Dependencies, prepared for the Round Table on the Environment and the Economy, February 1992.

²⁵ FOR=Forestry, MIN=Mining, F&T=Fishing and Trapping, AG= Agriculture, TOU=Tourism, H&E=Health and Education, OTH=Other Basic Industries, UN=Unemployment Insurance, PEN=Pension, INV=Investment, TR=Other transfer payments and social assistance payments.

As Table 2-11 illustrates, the average family income in the Boundary Forest District is below the regional average. At the same time, an important point to note is that incomes in the forest sector tend to be significantly higher than average regional income. As a consequence, if forestry jobs in the forest district are replaced by alternative employment, lower family incomes are likely to result.

Table 2-11: AVERAGE INCOME - Current \$ (15 yrs+ with income)				
	1981	1986	1991	% change 1981-91
Boundary Forest District	\$22 172	\$27 753	\$41 633	88
Nelson Forest Region	\$26 946	\$34 585	\$46 397	72

Source: Statistics Canada

2.3.5 Education

Elementary schools are located in most communities of the Boundary Forest District. Secondary schools are located in Midway and Grand Forks. Selkirk Community college, located in Grand Forks, offers extension services to outlying areas, while the Central Okanagan or Lower Mainland offer the closest opportunities for university education. Table 2-12 shows the education levels of the population 15 years and over.

Table 2-12: EDUCATION LEVELS (% of population over 15 years old)				
	Boundary Forest District		Nelson Forest Region	
	1986	1991	1986	1991
Population over 15	7 925	8 550	112 490	114 615
Less than High School Certificate	21.3	16.1	14.3	10.6
Gr 9-13, No Certificate	31.6	30.3	32.3	29.1
High School Certificate	10.0	12.2	10.5	12.8
Trades Certificate or Diploma and other Non-university	24.5	27.4	28.5	31.6
University without Degree	7.5	8.4	8.8	9.8
University Degree	5.2	5.4	5.7	6.2

Source: Statistics Canada Census Data.

The general education level in the forest district increased substantially from 1986 to 1991, and is showing continuing improvement.²⁶ As Table 2-12 shows, the percentage of the forest district population over the age of 15 with less than a high school certificate fell from 52.9 percent to 46.3 percent between 1986 and 1991. During this same period, the percentage of the Boundary population with post secondary education increased. This same trend was seen in the forest region although the percentages of residents with post secondary education is about 7 percent higher than in the forest district. Anecdotal

²⁶ Discussions with School Districts, Selkirk College and others.

information about newcomers to the area suggests that many have some level of post-secondary education.²⁷ A more skilled labour force bodes well for the area in terms of increased potential for economic diversification and a resource pool for mentoring and training people within the area.

2.4 Economic Base of the Boundary Forest District

The following sections provide brief descriptions of the main sectors of economic activity within the Boundary Forest District. Historically, the economy of the Boundary area has been dependent on forestry, agriculture and mining. However, diversification of the local economy in recent years includes a growing service sector, increasing tourism activity as well as growth related to retirement.

Note that the forest sector will be described in detail in Chapter 3.0 of this report. However, given its importance to the local economy of the Boundary Forest District, general highlights of forest industry activity are also provided here.

2.4.1 Forestry

The forest sector provides direct employment totalling about 990 Person Years (PY) annually within the Boundary Forest District²⁸. Not all employment, however, is attributable to wood harvested in the TSA, as this figure also includes jobs related to wood harvested in TFL #8 and on private lands as well as wood derived from outside the forest district. Not all of the wood from the TSA is processed in the TSA, and TSA licensees do not supply 100% of the timber processed in the TSA. Thus, total employment in the TSA will be larger than that supported by the TSA harvest alone. These jobs provide basic employment in several areas, including harvesting, processing, silviculture and the provincial government through the Ministry of Forests, and represent approximately 20 percent of the total labour force within the forest district.²⁹

This level of employment in the forest sector provides a substantial economic base for the area, injecting an after tax income of about \$31 million into the local economy. Moreover, the forest sector supports another 415 or so indirect and induced jobs (e.g., industry suppliers and people employed providing services to forest sector employees) with a corresponding \$10 million in after-tax employment income. In total, then, approximately 1 300 direct and indirect jobs can be ascribed to the existence of the forest industry in the Boundary TSA, and \$41 million in after-tax income.

²⁷ Personal communication with Community Futures, CEIC and others.

²⁸ See Appendix D for a definition of PY.

²⁹ Total employment is based on the 1991 labour force according to Statistics Canada less the percentage of the labour force represented by active UIC claims and employable social assistance recipients.

Apart from the basic employment and income provided by the forest sector, the major processing operations in Grand Forks and Midway generate further economic impetus through substantial ongoing investments in plant and equipment, although often much of the equipment and plant materials are purchased from outside the forest district. Finally, the forest sector also contributes to the local tax base through municipal business taxes.

The study area's dependence on forest sector exports has made it highly susceptible to price fluctuations in the international market. The fortunes of the forest industry are once again improving, and this means economic growth for the communities of the Boundary Forest District. However in a climate of growing international competitiveness and an increasingly scarce wood supply, indications are that the local forest industry in the Boundary Forest District (and the province as a whole) is beginning a structural shift away from a "commodity" approach to harvesting and production and towards more intensive use of existing resources. Opportunities for growth in the forest sector lies in value-added manufacturing, selective harvesting methods, and better utilization of the resource with techniques such as species separation and commercial thinning.

2.4.2 Agriculture

Agricultural activity is concentrated in the valley bottoms of the Boundary Forest District. Cattle ranching is the main agricultural activity in the area with most of the cultivated land used for forage or feed grains. Historically, dairying, seed production and tree fruits have also been key agricultural products.

In terms of employment, the study area is more reliant on agriculture as a source of labour than the province as whole (6.7 percent of labour force versus 2.4 percent). Certain areas within the forest district, such as Greenwood and Christian Valley, are particularly reliant on agriculture, with this sector making up 7.8 and 8.1 percent respectively of the labour force.

Some diversification in the agricultural sector is now occurring with potatoes, vegetables and, to a lesser extent, tree fruits increasing in importance. Interest is also increasing in value-added and niche (i.e., ginseng) products as well as market gardening and nurseries.

Agricultural activity in the Boundary will likely continue to expand as a result of the area's good soil and climatic conditions, as well as attractive land prices. However, as is the case in most parts of the province, agricultural income is frequently subsidized by employment in other sectors because of the uncertainties of growing conditions and market prices.

Livestock Grazing

Livestock grazing has a direct link to forest harvesting activity in the Boundary Forest District. Clearcut areas on Crown lands provide an interim source of interim forage for cattle during the spring, summer and fall. Presently, 85 tenures are issued in the Boundary Forest District, compared to 6 in the Arrow Forest District. While the range units cover

all areas of the forest district, grazing activity is concentrated around populated areas such as Rock Creek, Midway and the Christian Valley.

Grazing tenures can be either short-term permits of 1-5 years duration, or longer-term licences of 10 years duration. At present, licences comprise 60 percent of all tenures in the Boundary Forest District, and permits the remaining 40 percent. However, the trend is towards a larger proportion of licences. Each tenure corresponds with a certain number of "animal unit months" (AUM's), defined as the forage required to keep one cow and its calf alive for one month. In 1994, a total of 28 452 AUM's were issued in the Boundary Forest District. Approximately ten percent of the tenure holders are situated in TFL #8, the remaining 90 percent in the TSA. It should be noted, however, that several tenures straddle both the TSA and TFL #8, and that an estimate of economic impacts related to the TSA can only be roughly calculated.

The livestock grazing tenures are held primarily by family ranches. Generally, each ranch has a principal operator, and two to three other family members who help run the ranch year round. The ranch is often a full-time occupation for the principal operator and at least one other family member, and may also generate part time work for the other members of the family (for example, teen-age children). In addition, each ranch hires two to four workers, who may work on the ranch anywhere from two months to a full year.

Given that there are 85 ranches within the forest district, the foregoing implies that at least 85 full time positions are supported among families which run the ranches. Furthermore, adjusting for seasonality, approximately 25-50 PY's of employment are generated annually within the Forest District for ranch hands.³⁰ In total, this means a minimum of 110 to 135 PY's are related directly to grazing on Crown lands within the Boundary Forest District. In order to calculate the share of employment which accrues only within the TSA, 10 percent is netted out, leaving a total of 100 - 120 PY's.

The reader should note that *approximately 75 percent of the ranches which hold tenures in the Boundary Forest District are viable because of the range program.*³¹ Therefore, of the total ranch employment on Crown lands in the Boundary TSA, 75 percent (i.e., between 75 - 90 PY's) is linked to the forest sector. We stress that this estimate is conservative. Assuming an average family pre-tax income of \$40 000, and a monthly pre-tax income of \$2 400 for ranch hands (including benefits),³² an estimated \$2.5 million to \$3.5 million in pre-tax employment income is generated annually as a result of forest sector activity in the Boundary TSA.

³⁰ Source: Boundary Forest District office.

³¹ *ibid.*

³² *ibid.*

Table 2-13: ESTIMATED EMPLOYMENT AND PRE-TAX INCOME IN GRAZING SECTOR RELATED TO BOUNDARY TSA (1994)	
PY's	\$ Million
100 - 120	\$2.5 - \$3.5

Also, 2.5 PY's are supported in the forest district related to range management. However, as these positions are already included in our estimates of Ministry of Forests employment, they have been excluded in the above figures.

2.4.3 Outdoor Recreation³³

Because of poor access, the Boundary region has yet to become as popular a destination for tourists as the Okanagan to the west or the East Kootenays to the east. Tourism plays a relatively minor role in the local economy, accounting for only 6 percent of basic income.³⁴ However, the natural and historic assets of the region offer considerable potential for expanded tourism activity. Tourist accommodations in the area are currently filled during the summer, but have vacancies at other times of the year.³⁵

The recreation resource base of the Boundary Forest District is diverse, providing varied activities including hiking, mountain biking, hunting, fishing, boating, back country recreation, and wildlife viewing in summer and fall. In winter, snowmobiling, cross-country skiing, and downhill skiing are popular activities. Key access corridors and popular lakes, such as Jewel and Christina, are highly valued for their scenic qualities. The City of Grand Forks is also famous for its baseball tournaments, and hosts a major North American invitational tournament. However, in contrast to the East Kootenays and the Okanagan, there has been comparatively little commercial development to serve visitor needs.

Recreation resources in the Boundary Forest District can be accessed by highways and logging roads. The main east-west highway in the area is Highway #3, which passes through the southern portion of the forest district. Highway #33 serves as a north-south route through the West Kettle River valley in the western portion of the forest district, and provides access to Big White ski resort and Kelowna in the Okanagan.

³³ In general, recreation is defined by the Ministry of Tourism as any recreational activity performed by individuals living within 50 kilometres of the activity. All other recreational activity is considered to be tourism.

³⁴ Source: G. Horne and L. Robson, BC Community Economic Dependencies, prepared for the Round Table on the Environment and the Economy, February 1992.

³⁵ Chamber of Commerce surveys suggest that both expansion and upgrading of facilities should be explored to promote increased tourism both in summer and the off peak seasons.

Access to the backcountry is provided by an extensive network of logging roads throughout the forest district. The Kettle Valley Railway right-of-way also provides an interesting and unique route for hikers and cyclists. More remote areas are popular for hiking, camping, mountain-biking, fishing, wildlife viewing, nature study and other wilderness-related outdoor activities. The distribution of angler activity in the forest district is 80 percent on small lakes, 11 percent on rivers and streams, 8 percent on large lakes (i.e., Christina Lake) and 1 percent on alpine lakes.³⁶

We have concentrated our investigations on the outdoor recreation and adventure travel sectors of the tourism market. These sectors are the most sensitive to changes in land use associated with timber harvesting. Other sectors, such as touring, sightseeing and boating, are less impacted by forestry activity as they are concentrated primarily in forecountry areas away from most harvesting activities. The application of the Ministry of Forests' Visual Quality Objectives (VQO) ensures that sensitive view corridors, including those from Christina Lake and highways, are properly considered when developing logging plans. VQO's have not been developed for the many small lakes in the forest district, but are likely to be added in future.

Outdoor recreation activities require little in terms of infrastructure and/or supervision, and can be undertaken at a relatively low cost. Adventure travel is a small, elite component of the outdoor recreation market which centres around wilderness resources, and is considered to be highly sensitive to forestry activities. It includes activities such as guide outfitting, cat-skiing and heli-skiing/hiking, and appeals largely to foreign visitors willing to pay a premium to be guided through undisturbed wilderness areas of the province. Presently, very little activity of this nature occurs in the Boundary Forest District, with the exception of some guide outfitting.

Estimating Outdoor Recreation Expenditure and Employment

Figures on total employment and income generated by outdoor recreation use of the Boundary Forest District are based on an average daily expenditure of \$18.85 for tourists and \$4.00 per local recreation user. For every thousand dollars of tourism expenditure, an estimated 0.044 person years of employment results from outdoor recreation activities.³⁷ We estimate that outdoor recreation tourists expend \$311 000 to \$622 000 in the Boundary Forest District, and that local recreationists account for another \$264 000 to \$528 000. This results in annual outdoor recreation tourism and local recreation expenditures of between \$575 000 and \$1.15 million. Based on the foregoing employment coefficient, we estimate that this level of expenditure generates between 25

³⁶ Source: BC Ministry of Environment.

³⁷ Guiding Hands Recreation Society, Outdoor Recreation: A Kootenay Industry, 1989. Coefficients derived using figures for total expenditures and total employment in PY's for outdoor recreation and adventure tourism sectors of the Kootenay Region, which includes the Regional Districts of Central Kootenay, Kootenay Boundary and East Kootenay.

and 50 direct jobs annually within the study area related to outdoor recreation and tourism use.

2.4.4 Mining

Historically, considerable mining activity has occurred within the forest district, with the main areas of activity being Grand Forks, Boundary Falls, Greenwood, Rock Creek, and Beavertown. As a result of large mine closures, such as Phoenix and Highland Bell³⁸, mining does not account for the same level of economic activity as it once did. The 1991 census found that only 65 people in the study area were employed in the mining sector. Today, no significant large-scale mines operate in the forest district. However, as the area is richly mineralized, exploration is ongoing and has recently increased as a result of the higher world prices for metals.

Current mining activity includes quarries for limestone, building stone, facing rock, sand and gravel. Some undeveloped potential exists in decorative stone and building stone. Possible new quarry sites are being considered in both the Grand Forks and Westbridge areas.

Activities in mining and forestry are relatively unrelated except at the exploration stage where the cost of exploration can be reduced by the availability of logging roads. Logging roads provide easy access to areas which would otherwise be inaccessible. Therefore, a reduction in the harvest rate and the possible associated reduction in road development could negatively impact on mineral exploration activity in the area. Conversely, an increased harvest rate may facilitate access for mineral exploration.

2.4.5 Botanical Forest Products and Wildcrafts

Although botanical forest products have been harvested for centuries throughout the world, they are only now being recognized in British Columbia as a serious area of economic potential. Numerous species of herbs, floral greenery, mushrooms and other native vegetation are known to grow in commercial quantities in BC's forests. Cottage industries that are associated with wildcrafting include such activities as basket making, twig furniture construction, Christmas decoration crafting, salve-making, herbal medicine, and floral greenery harvesting.

Activities related to botanical forest products occur throughout the Boundary Forest District, but are not as well-developed as in the neighbouring Arrow district. These activities include Christmas tree and baby's breath harvesting. As well, potential exists for certain products, such as wild mushrooms and other floral greenery. Historically, in this

³⁸ These mines closed because their reserves were exhausted. Therefore, they will not re-open in response to increased world prices unless significant new reserves are discovered in the area around them.

part of the Interior, opportunities to pick morel mushrooms have occurred after forest fires. However, no information is available to indicate whether mushrooms grow in sufficient quantities to be commercially viable, as they are in the Nass Valley in Northern BC. Although a wide variety of wild mushrooms grow in the southern portion of the Boundary Forest District, relatively dry climatic conditions suggest that, while some mushroom picking on a seasonal basis is possible, the area is unlikely to be as productive as other parts of the province.

Floral greenery, such as boxwood, moss and baby's breath, may also offer some market potential. According to local sources, baby's breath grows in abundance during the summer months in the southern portion of the forest district near Grand Forks, and a number of harvesters pick it for local use, or for sale on the coast.

In summary, some individual or informal harvesting activities of botanical forest products occurs within the forest district but none of these activities are of a commercial scale. As a result of the relative newness of this industry, statistics are not available to describe the extent of employment or disposable income generated.

2.5 First Nations

The Boundary Forest District does not contain any First Nation reserves or communities. However, the long standing presence of First Nations' people has been documented and is evident from various archaeological finds. The Gladstone area, for example, has nationally significant historical areas of settlement, and contains pictograph sites and a lithic scatter. The Gilpin area has regionally significant historical sites of native economic and cultural activity. As a result, a major portion of the forest district is under claim by the Westbank Band, which is affiliated with the Okanagan Tribal Council, for negotiation under the British Columbia Treaty Commission.

The comprehensive claims settlement process is aimed at concluding agreements that will resolve the legal ambiguities associated with the common law concept of aboriginal rights. The objective is to negotiate modern treaties that provide clear, certain and long-lasting definitions of rights to lands and resources. The comprehensive claim agreement to be negotiated between the Westbank Band, British Columbia and the government of Canada will define a wide range of rights and benefits, such as full ownership of certain lands, guaranteed wildlife harvesting rights, participation in land and resource management throughout the comprehensive claims area, financial compensation, resource revenue-sharing and economic development measures. The Westbank Band's filing of their intent to negotiate a comprehensive claim is the first step in a six-stage process, with no specified timetable for concluding the negotiations process.

2.6 Summary of Issues and Concerns

The foregoing sections have profiled the social, economic and environmental setting of the TSA within the Boundary Forest District. In developing this profile of the study area, several issues and concerns were identified by local residents. While the scope of this study does not address all of these matters, they are important, and should be cited here in order to provide a context for the socio-economic impact assessment.

Socio-Economic

- a chronic high unemployment rate, and lack of well-paying jobs;
- uncertainty about future job losses in the forest industry (most importantly, possible mill closure at the Grand Forks sawmill);
- an ongoing shift from high paying, full time jobs in the resource sector to lower income jobs or self-employment in other sectors;
- increased economic pressure on families who must rely on second income sources or subsistence activities;
- a need for growth management and economic diversification;
- growing polarization between environmental protection interests and those economically dependent on resource sectors;
- a desire for local control over resource management; and,
- a need for the recognition of "non-timber" forest values, and the growth potential for sectors such as tourism/recreation and botanical forest products.

Environmental

- protection of unique or limited habitats;
- harvest impacts on forest age class distribution;
- maintenance of old growth and old growth diversity;
- provisions for retention of cavity trees, snags and coarse woody debris;
- provisions for forest ecosystems networks;
- improved protection of riparian habitat;
- harvest distribution impacts on special habitats and wildlife species;
- enhanced forest management practices;
- harvesting and road maintenance impacts on water quality;
- the ability to manage second growth forests to provide old growth attributes.

First Nations

- interest pertaining to land claims;
- preservation of cultural heritage sites.

Forest Industry

- improved harvesting and processing methods required to better utilize and extract the maximum value from the existing forest resource;
- the need to shift away from a "commodity" approach to forest products towards more value-added manufacturing;
- the need to process more Boundary wood within the TSA, thereby creating more local jobs;
- growing competition for a shrinking wood supply, and subsequent increase in prices;
- industry uncertainty about future wood supply for their operations.

3.0 TSA FOREST SECTOR OVERVIEW

As indicated in the previous chapter, forestry and forestry-related manufacturing are vital to the economy of the Boundary Forest District. This section of the report is devoted to analyzing the timber resources and forestry operations in the Boundary TSA, with a view to determining sector-specific employment and regional employment coefficients.

Section 3.1 of this chapter addresses the land base of the Boundary TSA, and how the long-term timber harvesting land base is calculated. Section 3.2 briefly discusses management practices within the TSA, while Section 3.3 focuses on potential changes affecting the land base and timber supply. Section 3.4 is devoted to critical factors. Section 3.5 discusses the current AAC and timber apportionment. Sections 3.6 and 3.7 evaluate wood flows in the Boundary TSA and provide an overview of industry operations. Section 3.8 summarizes employment and provides estimates of TSA and provincial labour coefficients by sub-sector.

3.1 Timber Harvesting Land Base

The Boundary Forest District encompasses 658 000 hectares of the Kettle and Granby River drainages, and is one of seven forest districts located within the Nelson Forest Region. It includes the Boundary Timber Supply Area (TSA) which covers 580 110 hectares and Tree Farm Licence (TFL) #8 which has a total area of 77 540 hectares (see Figure 2-1).

Much of the timber resource in the Boundary TSA is lodgepole pine which accounts for approximately 41 percent of all species. The rest of the timber supply is comprised of Douglas fir (20 percent); spruce/balsam (16 percent); larch (22 percent); and cedar, hemlock and other species (collectively representing 1.6 percent).³⁹

Of the total 580 110 ha. in the TSA land base, 73 percent (425 070 ha.) is classified as productive forest land and 52 percent (298 991 ha.) is included in the long-term timber harvesting land base. Productive forest land is the total TSA land base, net of non-crown and non-forest lands. The timber harvesting land base is the portion of land area considered to contribute to, and be available for, long-term timber supply. Lands included in the harvesting land base are assumed to contain timber of sufficient economic value, and sites with adequate environmental resilience to accommodate timber harvesting while retaining other forest values.

Table 3-1 summarizes reductions and additions used to derive the Boundary TSA timber harvesting land base.⁴⁰ Uncertainty around reductions has fostered debate about whether the reductions for existing roads, landings, and skid trails should be two to two and a half

³⁹ Source: *Boundary TSA Timber Supply Analysis Report*.

⁴⁰ Ministry of Forests, Resource Planning Branch. *Boundary TSA Timber Supply Analysis* (Draft). June 30, 1994.

times as great as the amount given in the table.

Table 3-1: BOUNDARY TSA TIMBER HARVESTING LAND BASE			
Classification	Area (ha.)	% of TSA Area	% of Productive Forest Area
TSA land base	580 110	100.0	
Non-crown land	(71 867)	12.4	-
Non-forest land	(83 173)	14.3	-
Crown forest land	425 070	73.3	100.0
Reductions:			
Inoperable	(44 622)	7.7	10.5
Environmentally sensitive	(42 648)	7.4	10.0
Non-merchantable types	(21 152)	3.6	5.0
Not satisfactorily restocked	(17 171)	3.0	4.0
Other ⁴¹	(5 327)	1.0	1.3
Total current reductions	(130 920)	22.6	30.8
Additions ⁴²	17 171	3.0	4.0
Current timber harvesting land base	311 321	53.7	73.2
Future Roads, trails, landings	(12 330)	2.1	2.9
Long-term timber harvesting land base	298 991	51.5	70.3

Source: Ministry of Forests

3.2 Current Management Practices

Public forests in BC provide timber, recreational enjoyment, wildlife habitat, water for consumption, and many other benefits. The BC Ministry of Forests and the Ministry of Environment, Lands and Parks are responsible for managing the various resources of the Boundary TSA, and both subscribe to the principle of integrated resource management.

The Boundary TSA timber harvesting land base is split into Special, Management Zones for the purpose of assessing the timber supply impacts resulting from current integrated resource management practices. The following inset describes the five different types of Special Management Zones in the Boundary TSA.

⁴¹ Non-commercial cover, geographically defined areas, and existing roads, trails, and landings.

⁴² Operable NSR (including restocked NSR).

DESCRIPTION OF BOUNDARY TSA MANAGEMENT ZONES

- **Uneven-aged management** — entails a number of non-clearcutting silvicultural systems and covers areas where mainly dry belt Douglas-fir, larch and ponderosa pine forest types predominate. *Objective: manage these stands on an integrated resource management basis using partial cutting systems.*
- **Wildlife corridors and winter range** — covers areas mapped as wildlife corridors and designated as winter range based on desirable forest stand characteristics. *Objective: maintain integrity of corridors by managing the area on a longer timber harvest rotation (170 years).*
- **Community watersheds** — covers areas given a community watershed designation. *Objective: manage these areas based on guidelines developed for the Italy/Sutherland Watershed Plan.*
- **Retention and partial retention VQO** — covers areas classified and approved as having a visual quality objective (VQO) of either retention or partial retention and where the maintenance of scenic landscapes is a management priority. *Objective: maintain visual quality of the landscape as seen from major highway corridors, Christina Lake and Jewel Lake.*
- **Even-aged management** — covers all areas within the timber harvesting land base not specifically assigned to another zone and where normal integrated resource management takes place. *Objective: manage on an integrated resource basis using clearcut, seed tree and shelterwood silvicultural systems.*

Where several resource management concerns overlap onto one area, the resource with the most restrictive forest cover requirement is given priority. Areas with overlapping resource concerns are assigned to a zone based on the resource given the highest precedence.

Table 3-2 summarizes the distribution of the total harvesting land base by zone.

Table 3-2: BOUNDARY TSA SPECIAL MANAGEMENT ZONES		
Type Of Zone	Total Area (ha.)	% Share
Even-Aged Management	161 852	52.0 %
Uneven-Aged Management	71 472	23.0 %
Wildlife Corridor and Winter Range	59 278	19.0 %
Community Watersheds	10 819	3.5 %
Retention and Partial Retention VQO	7 900	2.5%
Total Timber Harvesting Land Base	311 321	100.0%

Source: Ministry of Forests

The size of these areas and the management practices carried out therein are expected to change over time for reasons including (but not necessarily limited to) the following:

- increasingly stringent Forest Ecosystem Networks (FENS) required by BC Environment as part of Development Planning;
- growing pressure to manage a portion of the land base to maintain old growth attributes and biological diversity; and,
- evolving forestry practice requirements, such as those set out in the new Forest Practices Code.

The more stringent environmental requirements inherent in these standards may mean less timber harvested in the long-term, and more labour in areas such as planning and biological sciences.

3.3 Potential Changes Affecting Land Base and Timber Supply

Several provincial government initiatives have the potential, either individually or collectively, to change the timber harvesting land base of the province. However, as these initiatives are either in progress or pending, their outcome cannot be predicted and, consequently, have not been reflected in the timber land base assumptions used in the *Timber Supply Analysis*. The following sections briefly describe each of these initiatives in relation to the Boundary TSA.

- ***Commission on Resources and Environment (CORE):***

CORE is an independent commission established by the BC legislature in July, 1992, to help resolve "valley-by-valley" conflicts over land use. The West Kootenay-Boundary region, which includes the Boundary TSA, is one of four regions in the province where a regional multi-sector land use plan is being developed under CORE's stewardship. The plan prescribes a land-use pattern for the particular area, including resource use, multiple use, and protected areas.

The East Kootenay and West Kootenay-Boundary Commissions submitted their reports to the provincial government in October of 1994. The reports contain a number of recommendations on land use and forest management practices that have the potential to impact the future TSA timber supply. The timing of the Commission's announcement did not allow for their inclusion in the timber supply analysis report, thus are not included in the socio-economic analysis. Three areas in the Boundary TSA proposed for protected area status are the Upper Granby, Gladstone, and an expansion of Conkle Lake park. Work is continuing under the PAS process to identify potentially important areas for old growth, recreation and other PAS areas not currently protected.

- ***Land and Resource Management Planning (LRMP):***

An LRMP is a sub-regional (i.e., forest district level) integrated, planning process that produces a Land and Resource Management Plan for review and approval by the provincial government. The process considers resource issues, such as wildlife management, ecosystem networks, recreation/tourism designated areas, and protected areas, and involves active participation by the public, aboriginal groups and government agencies. The plan specifies broad resource management objectives and strategies, and provides direction for more detailed resource planning by government agencies and the private sector. An LRMP is likely to be implemented some time after the completion of this timber supply review.

- ***Local Resource Use Plans (LRUP):***

An LRUP is carried out to develop area-specific resource management objectives and prescriptions (i.e., watershed level). Typically, LRUP's are used in response to conflicts that arise as a result of multiple demands on the resource base. Any resource can be the motivating issue to initiate an LRUP, including wildlife, fish or water resources. An LRUP can take the form of an Integrated Watershed Management Plan (IWMP), Coordinated Resource Management Plan (CRMP), or Coordinated Access Management Plan (CAMP).

Two LRUP watershed plans (similar to IWMPs), Italy-Sutherland and Goatskin, have been completed in the Boundary TSA. The District is currently developing an LRUP for all the lakes located in the District. There are 27 CRMPs and CAMPs, as identified in Table 3-3.

**Table 3-3: COORDINATED RESOURCE MANAGEMENT PLANS (CRMP'S)
COORDINATED ACCESS MANAGEMENT PLANS (CAMP'S)**

Anarchist/Baldy	Almond Creek
Beaverdell	Burrell
Castle Mountain (Deep Creek)	Copperkettle/Split
Cranberry Ridge	Crouse/Lost Horse
Fisherman/Hardy	Grano/Hellroarer
Howe/Knappen	Johnstone/James
Jones/Xenia	Kelly River
Kettle Valley/Rock Mountain	Lafferty/Paulson
Lynch/Morrell/St. Annes	Nicholson/Ingram
Overton/Moody	Pass Creek
Phoenix	South Pass
State/Dear	Taurus Lake
Toronto/Snowball	Traverse/Gable
Wildhorse/Blythe	

➤ ***Forest Practices Codes:***

The newly introduced Forest Practices Code outlines enhanced provisions for integrated resource management. The purpose of the Code is to ensure that a high level of forest and range stewardship is established and maintained in British Columbia. The new Code lays out basic mandatory requirements for forestry and range operations. The Code has the potential to change forest management practices. Potential impacts could include reductions in timber harvesting to meet biodiversity, and enhanced protection of lakes and streams.

3.4 Critical Factors

The Timber Supply Review (TSR) may ultimately result in a revision of the AAC in the area. The decision to revise the AAC up, down or not at all will be made by the Chief Forester based on the technical analysis of the resource base, the socio-economic assessment of impacts in this report, public input, and information provided by the forest district.

The timber supply forecasts upon which this analysis is based incorporates extensive technical forest inventory information, not only about the existing resource base, but also about those factors which will affect timber growth, health and availability in the years to come. Given the wide range of variables driving a timber supply forecast, it is to be expected that it will have some degree of uncertainty.

Several important factors have a bearing on the projections of future timber harvest levels in the Boundary TSA, and also contribute to the uncertainty of these forecasts. The key concerns as identified by the Ministry of Forests are outlined briefly below.

3.4.1 Forest Health

Mountain Pine Beetle: Mountain pine beetle has been a management problem over the last 15 years. The harvest of pine stands at risk to the beetle have been a priority over this time frame. Until 1993, up to 80 per cent of harvesting was directed at these priority pine forests. Currently, management direction is to direct 50 per cent of all harvesting into pine stands at risk to the beetle.

Root Rot: Non-recoverable timber losses as a result of root rot may be either greater or less than that allowed for in the harvest forecast calculations in the Ministry of Forests' *Timber Supply Analysis*. Currently, 5 percent of the total yield is assumed lost because of root rot, but a wide band of variation exists around this estimate. Furthermore, the issue of root rot raises questions both about harvesting practices (e.g., clear cut vs. selective harvesting) and harvesting levels. In terms of harvesting practices, public pressure is increasing to move toward selective harvesting, which raises concern that efforts to deal effectively with root rot will be hindered.

3.4.2 Timber Management

Uncertainty Regarding Volume and Availability of Existing Merchantable Timber: The harvest forecast is highly sensitive to variations in existing stand volumes. If current volumes are overestimated by 10 percent, for example, then the initial harvest level of 700 000 m³ could only be maintained for a decade before it must be reduced.

Forest Cover Requirements: Integrated resource management guidelines and the effects of previous harvesting patterns which predate the guidelines may require higher forest cover requirements, or restrict harvest opportunities. Presently, a three harvest entry system is used, which means that one-third of the available timber is initially harvested, with subsequent harvesting delayed until the logged areas are successfully reforested, or "greened-up". Once green-up is achieved, another one-third is available for harvest. Therefore, increasing the number of harvest entries constrains timber availability in the short term. If forest cover requirements were increased by 10 percent, the initial harvest level would be 630 000 m³, and the long-term harvest level would be 490 000 m³.

Increased Green-up Requirements: After a site has been logged, a minimum height is established at which the subsequent crop of trees is tall enough to be acceptable forest cover, and the period it takes for the trees to reach this height is determined. If the "green-up period" is lengthened, i.e., if the minimum tree height is increased, then the harvest level will decline sooner. Increasing green-up requirements by 50 percent would reduce the period over which 700 000 m³ could be sustained to one decade, and reduce the long-term harvest level to 510 000 m³.

Problem Forest Types: These forest types are not utilized, and are, therefore, excluded from the operable land base. For example, "problem" forest types in the Boundary TSA include deciduous species and high elevation forests with regeneration problems. The types of forest that are classified in this way change over time, which casts some uncertainty on projections of the future land base size.

Operability Lines: The lines of industrial operability (i.e., the point at which harvesting becomes no longer feasible) responds to two forces: environmental pressures, which impose a constraint on expanding operations, and the economic margin which shifts as technology improves and demand for timber changes. Operability lines will likely change in the future, and the operable land base of the TSA will expand or contract as a consequence.

Environmentally Sensitive Areas (ESA's): The proportion of the TSA that is classified as ESA is expected to increase in the future, thereby changing the TSA's operable land base. A growing focus on terrain analysis is likely to turn up more sites within the forest which could be designated as environmentally sensitive, thereby reducing the harvesting land base and, ultimately, the timber supply.

Yield from existing and regenerated stands: Yield estimates are based on a range of assumptions about site quality rating. Any error in parameters (for example stand age or

height) used in determining the rating could impart a significant bias into yield estimates for existing or regenerated stands.

In summary, variations in the harvesting land base and, subsequently, the harvest, as result of protected areas, special management zones, environmentally sensitive areas, and forest industry operability lines is expected to exert downward pressure on future harvest levels. However, this reduction could be offset over the long-term by increases in harvest yield on existing and regenerated stands. As well, forest health concerns are likely to result in short-term increases in the timber supply.

3.5 Current Timber Apportionment

The Boundary Forest District encompasses both the Boundary TSA, with a current Allowable Annual Cut (AAC) of 700 000 m³, and TFL #8 (under tenure to Pope & Talbot and some SBFEP operators), with an AAC of 145 000 m³.

In September 1992, the Chief Forester approved a three year temporary uplift of 200 000 m³ per year to the AAC of the Boundary TSA, in order to address a mountain pine beetle epidemic.⁴³ The uplift was only to be used if warranted. This raised the AAC to a potential 900 000 m³ from the previously established level of 700 000 m³ set in 1987. The program was initially expected to end in 1995; however, the beetle has declined substantially since the uplift was approved, and as a result, the Ministry of Forests has deemed its use unnecessary in 1994. Consequently, additional timber is no longer available to for harvest. Table 3-4 provides an historic summary of the AAC within the Boundary TSA.

Table 3-4: BOUNDARY TSA ALLOWABLE ANNUAL CUT (m³)			
Year	Allowable Annual Cut	TSA Lift	AAC + Lift
1980-1992	700 000	--	700 000
1993	700 000	200 000	900 000
1994	700 000	--	700 000

Source: Ministry of Forests.

The major forest licensees in the Boundary TSA are Pope & Talbot Ltd. and Weyerhaeuser Canada Ltd. Together, Pope & Talbot and Weyerhaeuser account for 72 percent (502 493 m³) of the AAC volume of 700 000 m³ in the TSA, as shown in Table 3-5.

Approximately 26 percent of the AAC within the Boundary TSA is apportioned to the Small Business Forest Enterprise Program (SBFEP). Most of this wood volume is allocated to Category 1 and 2 registrants.⁴⁴ In 1993, approximately 24 active SBFEP

⁴³ A temporary uplift of 167 000 m³ was also granted on TFL #8 over the years 1992 - 1994 for the same reason.

⁴⁴ Category 1 operators do not own or lease processing facilities, and work primarily in logging. Category 2 operators own or lease wood processing facilities.

Category 1 registrants⁴⁵ and 11 Category 2 registrants operated in the Boundary Forest District.

Table 3-5: APPORTIONMENT WITHIN BOUNDARY FOREST TSA (1993)		
	m3	% of Base AAC
Forest Licence (replaceable)		
• Pope & Talbot	434 549	62.1
• Weyerhaeuser	67 944	9.7
Sub-Total	502 493	71.8
Small Business Forest Enterprise Program (SBFEP)		
• Category 1 (Sec 16)	97 310	13.9
• Category 2 (Sec 16)	40 000	5.7
• Bid Proposals (Sec 16.1)	27 259	3.9
• TSL (major) <= 10,000 cm		
Riverside Forest Products	7 609	
Gorman Bros. Lumber Ltd.,	3 800	
Bell Pole Co. Ltd.,	993	
S & O Sawmills Ltd.,	1 976	
T.J. Kelly (surrendered)	608	
Sub-Total	14 986	2.1
	179 555	25.6
Forest Service Reserve	7 052	1.0
Woodlot Licences	10 900	1.6
Total TSA	700 000	100.0

Source: Ministry of Forests.

Bid proposals under the SBFEP program comprise four percent of the base AAC, while another two percent of the AAC is shared by the following four Timber Sale Licensees (TSLs):

- Riverside Forest Products, with mills in Armstrong and Kelowna (Okanagan TSA);
- Gorman Bros. Lumber Ltd., with a mill in Westbank (Okanagan TSA);
- Bell Pole Co. Ltd., which has four yards in BC (all outside the forest district); and,
- S&O Sawmills Ltd., located in Midway.

T.J. Kelly, another timber sale licensee, recently surrendered its licence in order to receive a one time allocation of 6 000 m³.

Woodlot licensees, numbering about 18 in 1993, account for 1.6 percent of the base AAC. Woodlots are an active sector in the Boundary TSA, however, and the number of woodlot owners is expected to grow. The remaining 1 percent of the base AAC is apportioned to a Forest Service Reserve.

3.6 Harvest and Wood Flows

The volume of timber harvested per year tends to vary in any TSA, or tenure regime. In

⁴⁵ Two other active Category 1 registrants are based outside the study area.

BC, harvests may fluctuate above or below the AAC in any given year, but over a five year cut-control period, must be within plus or minus 10% of the AAC. As a result of the variability of harvest rates, using any single year to represent forestry operations may be misleading if the year chosen does not reflect a longer-term average harvest rate, and may consequently lead to over- or under-estimating the level of forest industry impacts.

When calculating a base harvest level against which to compare impacts, an average will avoid the problem of fluctuations and provide a better estimation of labour force productivity. From 1991 to 1993, the Boundary TSA billed volumes ranged from a high of over 950 000 cubic metres to a low of about 789 000 cubic metres, for a three year average of approximately 862 000 cubic metres.⁴⁶ Reasons for this high average are as follows:

- the harvest included the TSA mountain pineuplift volumes for 1993;
- high harvests using cut control flexibility;
- some small licensees (non-SBFEP) acquired ten years worth of quota in one sale; and
- licensees used up undercut from previous years.

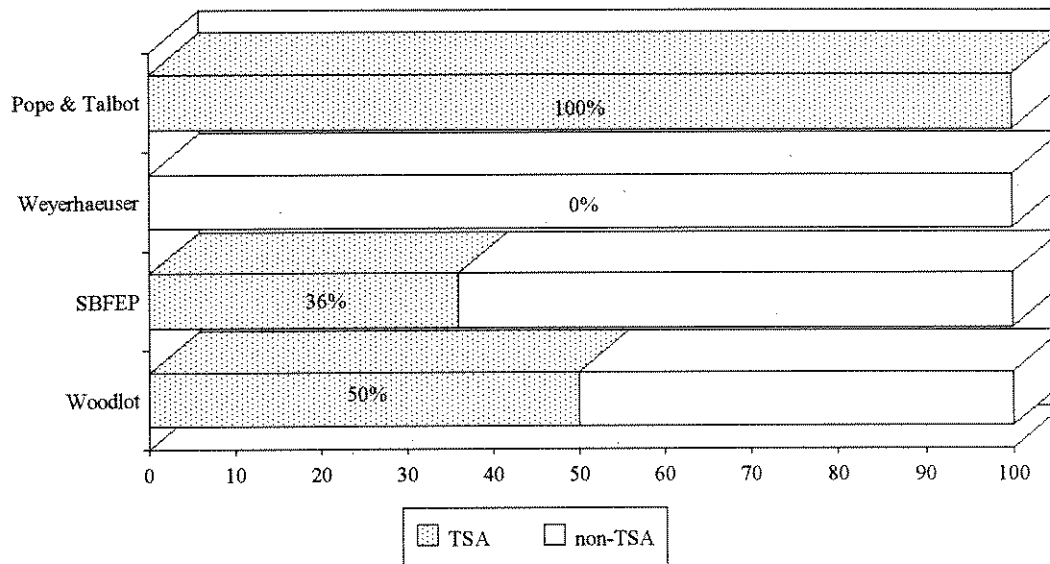
To best reflect longer-term harvest activity, the AAC of 700 000 cubic metres was chosen to represent a base harvest level in the TSA. The reasons for this choice are as follows: first, the Forest Act requires that the harvest approximate the AAC over a five year cut-control period, and as a result, TSA harvest levels are declining to offset past high harvest rates; second, the harvest level used in this analysis should be net of the temporary uplift volumes; and third, the current AAC best aligns with the base harvest forecast assessed in this report. The labour component of the Boundary TSA forestry operations was captured in the higher harvests, then used with the current AAC to approximate the level of employment under the current AAC.

Much of the timber harvested in the Boundary TSA is processed locally (i.e., within the TSA). This is due to the fact that Pope & Talbot has the largest apportionment of timber in the TSA (over 60 percent), and that most of their cut is directed to their manufacturing operations at Grand Forks and Midway, within the TSA.⁴⁷ Conversely, all wood apportioned to Weyerhaeuser is processed at their Okanagan Falls and Lumby sawmills, situated in the Okanagan TSA. An estimated 86 percent of the total major licensees' apportionment is processed within the TSA.

⁴⁶ Source: Ministry of Forests

⁴⁷ While some of Pope and Talbot's timber from the Boundary Forest District is sent to its sawmill in Castlegar, an equal volume of cedar harvested in the neighbouring Arrow Forest District is traded back to the Boundary Forest District. Therefore, the "equivalent wood volume" harvested by P&T in the Boundary Forest District is processed in its Grand Forks and Midway sawmills.

**Figure 3-1: Distribution of Wood Harvested from Boundary TSA (1993)
(Percentage of Total)**



The proportion of SBFEP and woodlot timber processed within the TSA varies according to market conditions. In recent years, a greater share of this timber has flowed from the Boundary TSA to Okanagan TSA wood processors, who were willing to pay higher prices. Industry information indicates that, for the base AAC without uplift (before 1993), approximately 36 percent of SBFEP and 50 percent of woodlot timber from the Boundary TSA was processed inside the TSA, while the rest was sent for processing in other TSA's. With the temporary uplift in 1993, the proportion of SBFEP and woodlot timber processed locally declined to 26 percent and 20 percent respectively, due to market conditions.

Most of the wood apportioned under bid proposals and TSL's is processed outside the TSA.

3.7 Overview of Forestry Employment and Operations

The rest of this chapter is devoted to estimating employment generated by wood harvested from the Boundary TSA, and developing the employment coefficients central to the analysis.

3.7.1 Harvesting

At an average harvest rate of approximately 700 000 m³, timber from the Boundary TSA generates approximately 259 PY's of harvesting employment per year. These jobs, which accrue to workers both inside and outside the TSA, include employment in permit development, logging, trucking, and road construction and maintenance.

Pope & Talbot and Weyerhaeuser have the major harvesting operations in the TSA. Each

company has its own woodlands employees, and also employs a large number of seasonal contractors for its harvesting work. Some contractors work exclusively for a particular licensee, but many bid for contracts from a combination of major licensees and the SBFEP program. Presently, 24 SBFEP Category 1 registrants and 11 Category 2 registrants are active in the Boundary Forest District.

In the Boundary TSA and throughout the Southern Interior, the level of harvesting employment per cubic metre of wood cut has increased during the past decade, and this trend is likely to continue. Reasons include the following:

- The labour requirements for harvest planning and operations are greater than in the past. This is due to a trend towards smaller cut blocks and selective logging techniques, in keeping with evolving forest management practices.
- The increasing use of cable harvesting techniques, which are more labour-intensive than conventional methods. Presently, Pope and Talbot harvests 30 000 to 40 000 m³ per year using cable harvesting, while SBFEP contractors cut approximately 10 000 m³ in this fashion. Although cable harvesting represents a relatively small share of total timber harvested, this share is expected to grow over time.

3.7.2 Wood Processing

Principal Wood Processing Operations

The following section discusses the wood processing operations of the two major licensees in the Boundary TSA: Pope & Talbot, and Weyerhaeuser. A summary of the principle fibre sources for each of these operators is also provided.

Pope and Talbot

The principle wood processing operations in the Boundary TSA are the Grand Forks and Midway sawmills, both owned by Pope and Talbot. Both the Grand Forks and Midway sawmills manufacture commodity grade dimension lumber, which is transported primarily to the US market. The Grand Forks mill, which is older and less efficient, is designed to handle large timber, while the Midway mill has been configured to process smaller wood. Recent renovations to the Midway mill make it one of the more efficient sawmilling operations in the southern Interior.

The two Pope & Talbot mills also produce the following:

- sawdust, shavings and fines, sold to the Canpar particleboard mill;
- approximately 320 000 m³ of wood chips, sold primarily to the Celgar pulp mill and export markets; and,
- hogfuel, shipped to a utility in Washington state.

The two Pope & Talbot mills, running two shifts each, presently have a total annual wood consumption of 950 000 to 1 000 000 m³ of wood. The Midway mill uses approximately

550 000 m³ annually, compared to the Grand Forks mill which processes 450 000 m³ per year.⁴⁸

The temporary mountain pine beetle uplift has enabled Pope & Talbot to sustain a high level of wood throughput by providing additional volumes from TFL #8 and the TSA. In addition, the company has augmented its wood harvest with open market purchases to bring supply to the level needed to continue a two-shift operation at both mills.

In 1993, billed volumes from Pope & Talbot's Boundary TSA forest licence were 542 316 m³, accounting for about 50 percent of its total wood throughput at the two mills. The rest of the wood was harvested from TFL #8, or purchased from SBFEP, woodlot or private sources in the Boundary TSA and elsewhere. Pope & Talbot also has some minor trade agreements with small operators in the region.

In 1993, a total of about 420 PY's of employment were generated at the Midway and Grand Forks mills in wood processing. It should be noted that this employment is generated not only by wood from the TSA, but also TFL #8, and other sources. According to Pope and Talbot, almost all employment at the two mills accrues to residents of the Boundary TSA. Residue from the Pope & Talbot mills also generates employment at the Canpar and Celgar operations, and outside the country in Washington State. Approximately 189 PY's of processing employment are related to the TSA harvest, net of the temporary uplift.

A high throughput since 1988 has enabled Pope & Talbot to achieve considerable production efficiencies at their two mills. The requirement for high mill throughput raises the fundamental issue of an assured long-term wood supply for the viability of both mills. The temporary uplift represented 17 percent of total mill input requirements, and its removal increases the shortfall between harvested wood and processing requirements from 235 700 to 402 700 m³, or to about 40 percent of mill input needs.

The removal of the uplift will bring the TSA wood volume allocated to Pope & Talbot back to their allocation of 434 549 m³ which, in itself, is not sufficient to keep both mills operating. As a result, Pope & Talbot has announced the elimination of one shift at the Grand Forks mill effective January 1995.⁴⁹ Temporary closures at both mills may also be required. In so doing, Pope & Talbot will reduce their combined mill input requirements to 775 000 - 800 000 m³ per year. This reduction will keep Pope & Talbot's wood purchase requirements to 25 to 30 percent of mill input needs. In the longer term, Pope & Talbot may be forced to reconfigure the older, less efficient Grand Forks mill to manufacture value-added products, or possibly shut it down altogether if they cannot obtain their required wood input.⁵⁰ Given that Pope & Talbot is a major employer in the

⁴⁸ Based on wood volumes including uplift timber.

⁴⁹ This will result in a loss of approximately 100 processing jobs.

⁵⁰ Resource Systems Management International Inc. Socio-Economic Impact Assessment of the Grand Forks Area. Prepared for the Ministry of Employment & Investment, Ministry of Small Business, Tourism and Culture and Economic Development Commission, Regional District of

Grand Forks area, any significant change in its production has major repercussions within the community of Grand Forks, and the Boundary TSA as a whole.

Weyerhaeuser

Weyerhaeuser, the other major licensee in the TSA, ships all of its timber harvest from the Boundary TSA to its operations in Okanagan Falls and Lumby, apart from some small volumes traded locally. In 1993, Weyerhaeuser had three operations at these locations:

- A sawmill at Lumby that produced 77.6 MMFBM of dimension lumber in 1993, which is shipped primarily to US and BC markets. The main species harvested are spruce-pine-fir (SPF) (68 percent), fir/larch (14 percent), WRC (14 percent) and hemlock (4 percent).
- A sawmill at Okanagan Falls that produced 90.6 MMFBM of dimension and Machine Stress Rated (MSR) lumber, as well as small quantities of MSR Lam Stock and Timberlam. Wood throughput consists entirely of SPF. Over 80 percent of its products are destined for the US, with BC, Alberta and Quebec comprising the rest of its market. The Okanagan Falls mill is more efficient than the Lumby mill but, according to industry sources, less efficient than the Pope & Talbot Midway mill.
- A chipper at Okanagan Falls that chipped approximately 125 000 m³ of wood in 1993, with a small volume coming from the Boundary TSA. However, it was a temporary operation which ran on uplift volumes, thus is not included in this analysis.

The primary source of wood for the three Weyerhaeuser operations is the Okanagan TSA and TFL #15, accounting for 35 percent of total wood consumption in 1993. Another third of the wood for these operations comes from private lands or purchased timber. Wood from the Boundary TSA constitutes approximately 8 percent of all wood processed at the Lumby and Okanagan Falls operations.

In 1993, Weyerhaeuser's Lumby and Okanagan Falls operations supported 305 PY's of employment, excluding contractors. Thirty of these positions were in harvesting (Boundary TSA and elsewhere), and the rest in processing. The processing positions are held primarily by residents outside the Boundary TSA.

Fibre Supply of Major Licensees

Table 3-6 identifies the principal sources of wood fibre for the major licensees' operations, and the degree to which they depend on the Boundary TSA for timber supply. In 1993, the Boundary TSA provided approximately 50 percent of the total fibre requirement at

Pope & Talbot's two TSA operations (the 5 year 1989 - 1993 average is 50%). In contrast, Boundary TSA wood comprises only 8 percent of wood throughput at the Weyerhaeuser sawmills, and 5 percent of wood for Weyerhaeuser's chipper operation. Note that variations do occur from year to year in the volumes of timber which licensees actually harvest in the Boundary TSA, in timber purchases, and in processing throughput. Also, significant volumes are traded, and not always at a 1:1 ratio.

Table 3-6: 1993 FIBRE SOURCES OF MAJOR LICENSEES (m³)⁵¹				
	Pope & Talbot Grand Forks & Midway	Weyerhaeuser Lumby and OK Falls Sawmills	Weyerhaeuser OK Falls Chipper	Total
Boundary F.L.	542 316	49 370	5 869	597 555
Okanagan F.L.	0	250 330	39 408	289 738
Merrit F.L.	0	0	6 708	6 708
TFL #8	304 750	0	0	304 750
TFL #15	0	158 905	39 408	198 313
Other ⁵²	135 000	207 535	33 992	376 527
Inventory Change	100 701	-33 239	0	67 462
Total	1 082 767	632 901	125 385	1 841 041
<i>Boundary TSA share</i>	<i>50%</i>	<i>8%</i>	<i>5%</i>	<i>32%</i>

Source: Pope & Talbot, Weyerhaeuser

Smaller Processors

In 1993, 7 to 8 Category 2 sawmills were active in the Boundary TSA, each of which employed between 2 to 15 employees. The larger mills include the following:

- S&O Sawmills (Midway) — Processes fir and larch in the manufacture of railway ties and other wood products. Most wood is derived from the Boundary TSA. S&O accounted for 8 to 10 PY's in 1993.
- Hilmoie Forest Products (Rock Creek) — Saws timber and specialty products from lodgepole and fir, larch and ponderosa pine. Over half of its wood is from the Boundary TSA. A major employer in Rock Creek area, the company presently employs 19 PY's annually.
- Tuzo Creek Manufacturing (Beaverdell) — This company is less than two years old, and processes lodgepole pine and small wood. In 1993, Tuzo Creek employed approximately 10 to 15 PY's.

In recent years, various other forest products initiatives in the Boundary TSA have included a window and door manufacturer, a truss manufacturer, and a log home builder

⁵¹ Based on wood volumes including uplift.

⁵² Includes wood from private lands and log purchases from private lands, other licensees, etc.

which ships to Japan. At the time of writing, a few smaller sawmills in the Boundary TSA were not operating.

3.7.3 Kraft Pulp

Most of the wood chips from sawmilling operations in the Boundary TSA are transported to the Celgar pulp mill in Castlegar, situated in the Arrow TSA.⁵³ The Celgar mill manufactures 1 200 tonnes per day of market kraft pulp for export, and it purchases all of its fibre requirements (2.2 million m³ per year) in the form of wood chips. Celgar's primary wood supply is chips from local sawmills and from the Forest Fibre chip plant in Salmo. Sawmills in the Boundary TSA account for approximately 6.5 percent of the wood supply to the Celgar kraft pulp mill.⁵⁴

Approximately 430 PY's (328 to 330 PY's of hourly employment) are supported annually by the Celgar operation in processing, administration, and chip transport. Based on the Boundary TSA share of total throughput at the pulp mill, and our estimate of jobs generated in chip transportation, we estimate that approximately 28 PY's of employment at the Celgar mill can be ascribed to wood from the Boundary TSA.⁵⁵ This employment is incurred outside the study area.

3.7.4 Reconstituted Board

Canpar, a BC-based manufacturer of particleboard, is the second largest local processor in the Boundary TSA. Canpar produces 85 million sq. ft. of board annually, with approximately 55 percent of its product destined for US markets, and 45 percent to markets in Western Canada.

Canpar uses sawdust, wood shavings and fines as input for its board manufacture. The operation receives approximately 35 percent of its total fibre throughput from Pope & Talbot's Grand Forks and Midway mills, with the remainder coming from mills in the Kootenays. Canpar presently generates 165 PY's in the Boundary TSA, largely to residents in and near Grand Forks.

Interviews with Canpar indicated that the plant does not rely heavily on any one source for its fibre. A decreased timber supply to the Pope & Talbot mills would translate into a reduction in the residual fibre available for Canpar. However, this would only temporarily reduce Canpar's production, as alternative sources of fibre would be sought. As a result, this operation is not considered dependent on the Boundary TSA harvest.

⁵³ Small quantities also go to other destinations such as Washington State.

⁵⁴ This is based on the assumption that the share of chips originating in the Boundary TSA is equal to the share of timber originating from the same TSA.

⁵⁵ See Appendix D for methodology.

3.7.5 Silviculture

Based on average annual licensee and Ministry of Forests' silviculture expenditures between 1988 and 1994, an estimated 42 PY's of employment is generated annually in silvicultural activity within the Boundary TSA. However, silviculture positions generally last for a short season, often less than six months. As a result, these estimated PY positions could, in fact, translate into at least 84 jobs in one season. This employment includes basic silviculture surveys, site preparation, planting, cone collecting, brushing, and stand tending. This estimate of employment is based on an average labour income component (60 percent) of the annual silviculture expenditures, and an assumed average annual pre-tax wage (including cash and non-cash benefits) of \$46 200.⁵⁶

While all the work is obviously carried out within the TSA, silvicultural contractors are highly mobile, and employment accrues to workers from both within and outside the TSA and varies from year to year. Insufficient information is available to determine exactly how many residents of the TSA benefit from silvicultural work.

Any decline in silviculture activity related to a reduction in harvest may be partially offset by an increase in silviculture resulting from the Forest Renewal Plan. Improved silviculture and a greater provincial ratio of employment to wood harvested are two primary objectives of the new provincial Forest Renewal Plan (FRP) announced earlier this year.

3.7.6 Ministry of Forests

The Boundary TSA is administered at the district level through the Boundary Forest District office in Grand Forks, and at the regional level through the Nelson Forest Region office in Nelson. Presently, Ministry of Forests' total staffing in the District office is 48 PY, including two new recent positions. Of this, 40 PY's can be ascribed to the management of the Boundary TSA. Based on the Boundary TSA share of the total Nelson Region AAC, another 13 PY of employment is generated at the Nelson Region office by activity related to the Boundary TSA. If the same method is applied to employment in Victoria, the resulting number of jobs is insignificant, and has not been included in our calculations.

Note that Ministry of Forests' silviculture employment has been netted out of these estimates, and is included in the silviculture employment estimates. For the purposes of this analysis, Ministry of Forests' employment is not regarded as harvest-dependent, and is excluded from calculations of indirect/induced employment.

⁵⁶ Source: Statistics Canada. Employment Income by Occupation - The Nation. 1991 Census publication. Note that 20% in non-cash benefits have been added to the average silviculture wage of \$38 500 cited in Section 3.7.1.

3.8 Summary of Employment and Employment Coefficients

As shown in Table 3-7, 558 PY's of direct forest sector jobs located in the Boundary TSA are attributable to timber harvested from the TSA. In addition, another 120 direct forest sector jobs are generated outside the Boundary TSA, resulting in a provincial total of 679 PY's.

Table 3-7: ESTIMATED DIRECT FOREST SECTOR EMPLOYMENT ATTRIBUTABLE TO BOUNDARY TSA TIMBER HARVEST⁵⁷	
	Person Years (PY's)
INSIDE TSA	
Harvesting	259
Processing: ⁵⁸	
Major sawmills (Pope & Talbot)	189
Small sawmills	28
Subtotal	217
Silviculture	42
MoF District Office	40
Total Inside TSA	558
OUTSIDE TSA	
Harvesting	0
Processing:	
Large Operations (Weyerhaeuser)	26
Small sawmills	54
Celgar pulp	28
Subtotal	108
Silviculture	0
MoF Regional Office	13
Total Outside TSA	120
GRAND TOTAL	679

Employment coefficients are used to determine the level of employment associated with any harvest level in the Boundary TSA. These coefficients, expressed as the ratio of employment to wood volume harvested (i.e., PY/000m³), are developed under the assumptions that this employment/harvest relationship will not change over time, and that the ratio is relevant for any harvest level. For a more complete discussion of the coefficients please see Appendix D.

⁵⁷ Based on long term average harvest volume of 700 000 m³.

⁵⁸ Canpar excluded from calculations because its production is largely independent of harvest volumes within Boundary TSA.

Table 3-8: BOUNDARY TSA EMPLOYMENT AND COEFFICIENTS (Based on Average Harvest Volume of 700 000 m ³) ⁵⁹				
	TSA Employment (PY)	Total Provincial Employment¹ (PY)	Inside TSA Employment per unit (PY/000m³)	Total Provincial employment per unit (PY/000m³)
Harvesting ²	259	259	.37	.37
Processing ³			-	-
Major licensees & woodlots	189	217	.27	.31
SBFEP Cat. 2	28	84	.04	.12
Pulp mill	-	28	-	.04
Total	217	329	.31	.47
Silviculture ⁴	42	42	.06	.06
Total Direct⁵	518	630	.74	.90
Total Indirect & Induced	210	945	.30	1.35
Total Direct, Indirect & Induced	728	1 575	1.04	2.25
Notes:				
1. Provincial employment includes TSA employment.				
2. Harvesting includes permit development, logging, trucking and road construction & maintenance.				
3. Processing includes sawmilling, pulp manufacture at the Celgar pulp mill and chip transport to Celgar.				
4. Basic silviculture includes surveys, site preparation, planting, brushing & stand tending.				
5. Canpar and Forest Service excluded.				

To calculate direct harvest-dependent jobs related to any given harvest level in the Boundary TSA, the direct coefficients are multiplied by the total volume of wood harvested. For example, average annual processing employment within the Boundary TSA is calculated by multiplying the coefficient 0.31 times 700 000 m³, divided by 1 000. Estimates of TSA and provincial indirect and induced employment are calculated using regional and provincial economic multipliers.⁶⁰

While the foregoing coefficients have been estimated based on recent employment and average wood volumes, several forces are at work which will change these values over time. These forces include:

- *A trend toward more labour-intensive harvesting practices*, such as cable logging, smaller harvest blocks, more partial/selective logging, and more complicated harvesting permit development, which will increase employment per cubic metre of timber harvest.

⁵⁹ Average long term harvest level in the Boundary TSA.

⁶⁰ Ibid.

- *More silviculture expenditure per cubic metre of timber harvested.* Silviculture expenditures per cubic metre of timber harvest are held constant over the forecast period of this analysis. To the extent that the province's new Forest Renewal Plan leads to increased silviculture expenditures in the Boundary TSA, employment per cubic metre of harvest will increase.
- *More value-added manufacturing.* Rising wood costs in BC are encouraging more manufacturers to shift towards value-added manufacturing in order to get the greatest return on wood throughput. The extent of this trend in the Boundary TSA will be determined by markets and the ability of local mills to compete in new markets. More value-added manufacturing would increase processing employment per cubic metre harvested.
- Some mills may *invest in labour saving processing equipment* in order to improve their cost competitiveness, especially in the face of increasing wood input costs. The effect would be to reduce processing employment per cubic metre harvested.

Note that if processing operations draw on alternative wood sources, mill employment will not necessarily decline, even though the employment attributable to Boundary TSA timber would be less. As a result, estimates of foregone employment and income may be overstated for those operations which obtain their fibre from a number of suppliers.

4.0 TIMBER HARVEST FORECASTS

4.1 Timber Harvest Forecasts

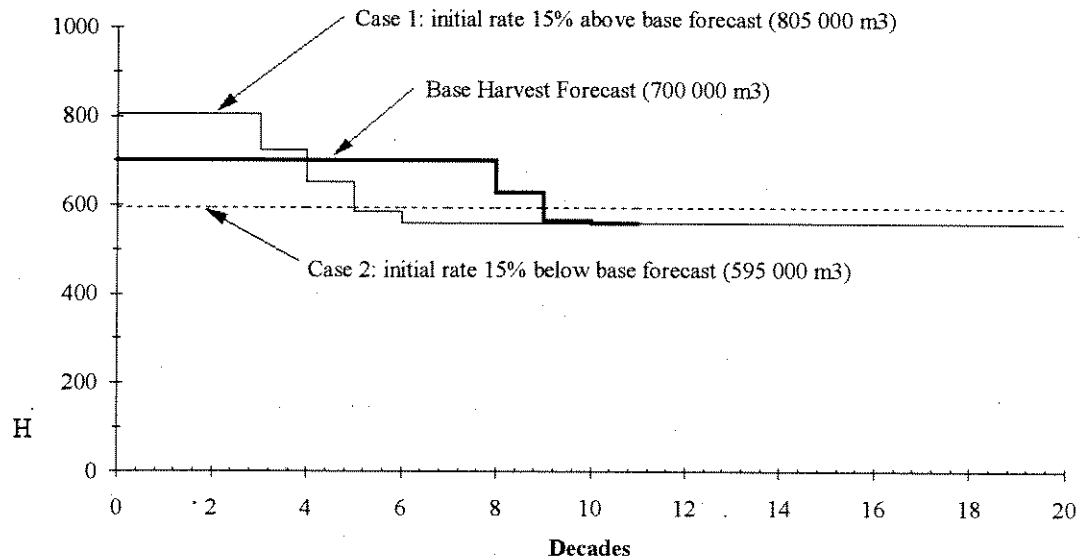
The remainder of this report is devoted to addressing the economic, social and environmental impacts of changing timber harvest levels within the Boundary TSA. The analysis uses three timber forecasts presented in the Ministry of Forests' *Boundary TSA Timber Supply Analysis*, which presents various paths to a long-term sustainable harvest level, based on current forest management practices.

The *Boundary TSA Timber Supply Analysis* also evaluates how the timber supply would be affected by changes in a variety of assumptions regarding forest management, for example, forest cover requirements. Some of the critical factors identified in Section 3.4 of this report are considered in these "sensitivity analyses". The timber supply forecasts developed in the *Boundary TSA Timber Supply Analysis*, and used as the basis of this analysis, are presented below.

- **The base harvest forecast** for the Boundary TSA, referred to as the Base Case in the Ministry of Forests' timber supply analysis report, begins at the current AAC level of 700 000 m³. This harvest level is maintained for eight decades, after which it declines by ten percent in Decade 9 and another ten percent in Decade 10. After Decade 10, the harvest remains at the long-term level of 560 000 m³ per year.
- **The effects of a 15 percent increase in the initial harvest rate (Case 1).** This higher initial rate of 805 000 m³ could be maintained for three decades. By Decade 6, it would have to drop to the annual long-term level of 560 000 m³ annually.
- **The effects of a 15 percent decrease in the initial harvest rate (Case 2).** The 15 percent lower initial rate of 595 000 m³ would be sustainable for over 200 years. The lower initial harvest rate and an even flow results in an increasing inventory between Decades 1 and 8, with the result of a greater inventory than in the base harvest forecast.

The choice of harvest levels was made by the Ministry of Forests as a means of identifying the range of implications for employment, income and government revenue at different harvest levels. *The harvest forecasts shown do not indicate preferred options.*

Table 4-1: BASE TIMBER HARVEST LEVEL ASSUMPTIONS	
Year	Cubic Metres
0-80	700 000
81-90	630 000
91 - 100	567 000
101 and beyond	560 000

Figure 4-1: Boundary TSA Timber Harvest Forecasts

The timber supply analysis examines short- and long-term implications of the various harvest forecasts in terms of timber supply. The socio-economic analysis assesses short- and long-term implications of the base harvest forecast in terms of TSA communities, the economy, and the environment. The socio-economic analysis also examines Cases 1 and 2 for short- to medium-term impacts, so that the shorter term sensitivity to different initial harvest rates is understood.

5.0 ECONOMIC IMPACTS

In this section, the TSA and provincial results of the economic impact analysis of changes in the Boundary TSA harvest level are presented. Changes in the harvest level will have a direct impact on forest industry employment, employment income, and government revenues, as well as indirect and induced economic activity related to forestry. Other sectors, such as agriculture and outdoor recreation, could also be affected, and while impacts are difficult to quantify, they can be addressed in a qualitative fashion.

Over the long-term, the harvest level in the Boundary TSA has approximated the AAC of 700 000 m³. This is also the starting value for the base harvest forecast. Consequently, the following analysis will focus on impacts incurred during the forecast years only. Section 6 discusses the impacts associated with other forestry issues not associated with the harvest forecast, such as the impacts related to the elimination of the pine beetle uplift.

Section 5.1 evaluates the forest sector economic impacts related to the base harvest forecast, while Section 5.2 focuses on those impacts related to Case 1 (15 percent higher initial harvest level) and Case 2 (15 percent lower initial harvest level). Section 5.3 discusses economic impacts in non-forestry sectors, including agriculture, outdoor recreation, mining, and botanical forest products.

5.1 Base Harvest Forecast - Economic Impacts in Forest Sector

As indicated in Section 4, the base timber harvest forecast begins at the current AAC of 700 000 m³, which is then sustained for eight decades. Between Years 81 and 101, two ten percent declines in the harvest level occur. After the second decline, the harvest settles at the long-term harvest level of 560 000 m³ for the rest of the forecast period. The intent of this analysis is to identify the major economic impacts related to these future changes in the harvest level, and make as accurate an estimate as possible of their magnitude.

5.1.1 Forestry Related Employment and Employment Income Impacts

In this section, economic analysis results for the TSA and province as a whole are presented. While these results are based on the best available information, some limitations of the analysis must be acknowledged.

- The quantitative results focus on the forest sector only. A significant change in the harvest level for the Boundary TSA would, to differing degrees, impact other sectors, most notably tourism and recreation, and agriculture. However, employment and income effects in these latter sectors are expected to be relatively small compared to forestry, and are difficult to calculate with any precision. As a result, these non-forestry sectors are dealt with qualitatively.
- The presentation of results indicates that employment impacts would occur immediately in response to changes in the harvest level. While this may be the case

for the harvesting sector, the repercussions in processing will likely be delayed as mills continue to operate on inventory. Silviculture would also experience a lag from the time of harvest to the start of re-planting.

- Indirect and induced impacts would also not decline immediately. As spending levels adjust over a longer period of time, businesses respond to this accordingly, although how long this takes is unknown.
- "Threshold effects" cannot be accounted for quantitatively. A harvest reduction may reduce timber throughput at a mill to the point at which a shift or total mill shutdown occurs, as opposed to proportionate processing job losses.
- Employment coefficients are developed based on the assumption that the current level of labour-intensity will not change. In light of ongoing technological changes, growth in other employment sectors, and a new provincial initiative (i.e., the Forest Renewal Plan) to add value to BC's wood harvested, it is unlikely that these coefficients will hold their current value in the medium- to long-term.
- Estimates of employment and income losses can be regarded as an upper bound, as a result of labour mobility, and that to some degree, migration of labour into other sectors of the economy will occur, thereby offsetting the loss in forestry. Furthermore, no attempt is made to conjecture how wood flows may change in the event of a harvest reduction in the Boundary TSA.

Finally, a basic assumption of this analysis is that the loss of timber during the forecast would be distributed across all tenures according to the current AAC apportionment.

The foregoing points are presented to remind the reader that the following results will capture general employment and income trends related to changes in the Boundary TSA harvest, but they cannot be regarded as definitive.

TSA Employment and Employment Income

As discussed earlier, the data for this analysis excludes any timber uplift volumes and related impacts. The cancellation of uplift in 1994 could result in the loss of harvesting and employment jobs in 1994 and 1995 (see Section 3.7.2). These jobs are not related to the timber supply review, and are not included in this analysis. *The harvest reduction of the base harvest case and corresponding economic impacts should be regarded as incremental to those incurred by the elimination of the uplift in 1994.*

The estimated TSA level employment and employment income impacts of the base timber harvest forecast are presented in Table 5-1. *Direct* impacts refer to jobs and employment income supported by forest sector activity in the Boundary TSA.

Table 5-1 also summarizes the indirect and induced impacts related to the base timber harvest forecast. *Indirect* impacts are jobs and income generated through the purchase of goods and services by forest companies, while *induced* impacts are created through the spending of earnings by forest company employees. The methodology used to determine these impacts is discussed in more detail in Appendix D on methodology.

Table 5-1: BOUNDARY TSA TSA Annual Forestry Related Employment and Employment Income Impacts⁶¹				
Years	0 - 80⁶²	81 - 90	91 - 100	101 & Beyond
Harvest (m ³)	700 000	630 000	567 000	560 000
% Change from Current	0	-10.0	-19.0	-20.0
Employment (PY's/year)				
Processing	217	195	176	174
Harvesting	259	233	210	207
Silviculture	42	38	34	34
Total Direct ⁶³	518	466	420	415
Indirect and Induced ⁶⁴	210	189	170	168
Total Direct, Indirect & Induced	728	655	590	583
Employment Income (\$ Millions/year, After Tax)				
Processing	\$7.6	\$6.8	\$6.1	\$6.0
Harvesting	\$9.6	\$8.6	\$7.8	\$7.7
Silviculture	\$1.2	\$1.1	\$1.0	\$1.0
Total Direct ⁶⁵	\$18.4	\$16.6	\$14.9	\$14.7
Indirect and Induced ⁶⁶	\$4.7	\$4.2	\$3.8	\$3.8
Total Direct, Indirect & Induced	\$23.1	\$20.8	\$18.7	\$18.5

⁶¹ Income figures are after-tax. See Appendix D for notes on methodology.

⁶² Year 0 represents the beginning of the forecast period and reflects current forestry activity.

⁶³ Processing and harvesting employment is estimated by multiplying the processing coefficients of Table 3-8 by the appropriate harvest level. For example, for a harvest of 700 000 m³, processing is calculated as follows: 0.314 PY's/1000 m³ * 700 000 m³ = 217 PY's.

⁶⁴ Indirect and induced employment can be found by multiplying the indirect/induced coefficient by a particular harvest. For example, for a harvest of 700 000 m³, indirect and induced employment equals 700 000 m³ * 0.3 = 210.

⁶⁵ Direct employment income is calculated using the following after-tax wage rates (include cash benefits): harvesting \$37 000, Processing \$34 830, Silviculture \$28,490.

⁶⁶ Assumes weighted average after-tax income of \$21 850 for indirect and induced employment related to forestry. Source: Horne, G. Recommended Procedure for Estimating Regional Economic Impacts Resulting from Direct Changes in the Forest Sector: An Interim Procedure. Ministry of Finance and Corporate Relations, March 1994.

Forest Service employment and income is not included in the impact tables as it is assumed to be more dependent on government policy, than on the level of harvest. The Forest District office in Grand Forks employs approximately 40 PY's in the administration of the TSA.

Direct Impacts

- From the current AAC to Year 80 of the forecast period, forest sector activity would account for 518 PY's of direct employment in the Boundary TSA, and \$18.4 million in direct after-tax employment income. In addition, the Forest Service employs 40 PY's and the district office in Grand Forks.
- A harvest decline in Year 81 of the forecast period from 700 000 m³ to 630 000 m³ would reduce annual TSA direct forest sector employment by 52 PY's to 466 PY's. Annual direct employment income would decline correspondingly by \$1.8 million to \$16.6 million. A further reduction would occur in Year 91 of 46 PY's, and \$1.7 million, and in Year 101 of 5 PY's and \$200 thousand.
- Starting in Year 101, when the long-term harvest level is reached, forestry activity would generate approximately 415 PY's of direct employment per year within the Boundary TSA, and \$14.7 million in employment income. Altogether, direct employment and income would decline by 103 PY's and \$3.7 million respectively during the forecast period.

The model does not capture any threshold effects that could cause a shift reduction or possible mill closure at the Grand Forks mill. A marginal mill operating close to minimum throughput requirements could suffer the loss of a shift, or possibly a complete mill shutdown, as a result of significant harvest reductions. However, it is very difficult to speculate whether this might happen in the Boundary TSA. A shift or total mill closure would result in greater negative effects than those quantified here.⁶⁷

Indirect/Induced and Total Impacts

- From the current AAC to Year 80, 210 PY's of indirect and induced employment would be supported annually by the forest sector in the Boundary TSA. This employment corresponds with \$4.7 million in indirect and induced employment income. When added to direct forest sector income, a total of 728 PY's of employment and \$23.1 million in employment income results in the Boundary TSA.

⁶⁷ The loss of processing jobs alone would be approximately 120 PY's, as discussed in Socio-Economic Impact Assessment of the Grand Forks Area, prepared by Resource Systems Management International, May 1994.

- A harvest decline from 700 000 m³ to 630 000 m³ in Year 81 of the forecast period would reduce annual indirect and induced employment in the TSA by 21 PY's, and income by \$500 thousand. Total direct, indirect and induced employment and income would decline to 655 PY's and total income to \$20.8 million.

A further loss of 19 PY's and \$400 thousand would occur in Year 91. From Year 81 to Year 101, a total of 42 PY's and \$900 thousand in indirect and induced income would be lost. Forest activity would support approximately 590 PY's annually of total direct, indirect and induced employment within the TSA, and \$18.7 million in corresponding employment income.

- Total annual employment and income associated with the long-term harvest level after Year 101 would be 583 PY's, and \$18.5 million respectively. Over the entire forecast period, annual direct, indirect and induced employment and income would decline by 145 PY's, and \$4.6 million, respectively. Note that the employment and income impacts would occur after 80 years of forest sector stability. Also note that indirect/induced jobs would account for 28 percent of total jobs lost, but would account for less than 20 percent of total income. This difference can be ascribed to the fact that forest sector jobs pay better on average than other sectors.

Provincial Employment and Employment Income

This section evaluates the potential economic impacts of the base harvest forecast on the provincial economy as a whole (including the TSA). Most of the direct forest sector employment and employment income generated by the Boundary TSA (approximately 80 percent) occurs within the TSA.

The methodology used to derive direct provincial impacts is essentially the same as that used to evaluate impacts at the TSA level. However, indirect and induced employment is calculated using a provincial employment multiplier of 2.5, instead of the regional income multiplier".⁶⁸ Please see Appendix D for a discussion of the methods used.

Provincial employment and income impacts associated with the Boundary TSA base timber harvest forecast are presented in Table 5-2. The Forest Service supports a further 53 PY's of employment in addition to the figures below.

⁶⁸ Source of multiplier: Ministry of Forests.

Table 5-2: BOUNDARY TSA				
Provincial Annual Forestry Related Employment and Employment Income Impacts⁶⁹				
Years	0 - 80	81 - 90	91 - 100	101 & Beyond
Harvest (m ³)	700 000	630 000	567 000	560 000
% Change from Current	0	-10.0	-19.0	-20.0
Employment (PY's/year)				
Processing	329	296	266	263
Harvesting	259	233	210	207
Silviculture	42	38	34	34
Total Direct ⁷⁰	630	567	510	504
Indirect and Induced ⁷¹	945	851	765	756
Total Direct, Indirect & Induced	1 575	1 418	1 275	1 260
Employment Income (\$ Millions/year, After Tax)				
Processing	\$11.5	\$10.3	\$9.3	\$9.2
Harvesting	\$9.5	\$8.6	\$7.7	\$7.6
Silviculture	\$1.2	\$1.1	\$1.0	\$1.0
Total Direct ⁷²	\$22.2	\$20.0	\$18.0	\$17.8
Indirect and Induced ⁷³	\$25.4	\$22.9	\$20.5	\$20.3
Total Direct, Indirect & Induced	\$47.6	\$42.9	\$38.5	\$38.1

Direct Impacts

- Current annual direct provincial forest sector activity generated by timber harvested in the Boundary TSA is approximately 630 PY's, and \$22.2 million in employment income. The base forecast would maintain this level of employment and income for eight decades. If these figures are compared to the TSA impacts of Table 5-1, it is evident that an additional 20 percent of direct employment and income accrues outside the TSA from timber harvested in the Boundary TSA.

⁶⁹ Income figures are after-tax. See Appendix D for discussion of methodology used in calculating employment and employment income impacts at the provincial level. Note that provincial results include TSA results.

⁷⁰ Employment is estimated by multiplying the coefficients of Table 3-8 by the appropriate harvest level. For example, for a harvest of 630 000 m³, processing employment is calculated as follows: 0.47 PY's/1000 m³ * 630 000 = 296 PY's.

⁷¹ Indirect and induced employment is calculated by multiplying direct employment by a provincial employment multiplier of 1.5. Total employment is the sum of direct and indirect/induced.

⁷² Direct employment income outside the TSA is calculated by multiplying the direct employment PY's by an average provincial after-tax income of \$35 120, which represents a weighted average of current harvesting, processing, silviculture incomes.

⁷³ Assumes weighted average after-tax non-forestry wage of \$26 910 (\$1993) for indirect and induced employment. Source: Statistics Canada (1993), Employment Income by Occupation in the Nation. 1991 Census. Cat. #93-332.

- The reduction of the harvest to 630 000 m³ in Year 81 of the forecast period would eliminate 63 PY's of direct forest sector employment, and \$2.2 million in employment income. In Year 91, a further loss of 57 PY's and \$2.0 million in employment income would occur.
- Beginning in Year 101, when the long-term harvest level of 560 000 m³ is reached, direct forestry activity in the Boundary TSA would support 504 PY's of direct provincial forest sector employment annually, and \$17.8 million in employment income. The total reduction after Year 81 would be 127 PY's and \$4.4 million in employment and income respectively.

Indirect/Induced and Total Impacts

- During the first 80 years, direct forest sector activity in the Boundary TSA would create a further 945 PY's of indirect and induced employment, and \$25.4 million in employment income within the province of BC. In total, approximately 1 575 PY's and \$47.6 million in direct, indirect and induced employment and income would be supported annually within the province by current forest sector activity in the Boundary TSA.
- The decline from 700 000 m³ to 630 000 m³ in Year 81 would lead to the loss of 157 PY's in total annual employment and \$4.7 million in annual employment income within the province of BC. Starting in Year 91, a further loss of 143 PY's and \$4.4 million in employment and income respectively would occur, corresponding with a decline in the harvest level to 567 000 m³.
- Beginning in Year 101, when the forecast volume declines to the long-term harvest level of 560 000 m³, forest sector activity in the Boundary TSA would support 1 260 PY's of direct, indirect and induced employment annually, and a corresponding \$38.1 million in total employment income. Overall, a loss of 315 PY's in total employment and \$9.5 million in employment income would result after Year 80.

5.1.2 Government Revenue Impacts

Forest sector activity in the Boundary TSA generates revenue for both the provincial and federal governments through resource use and resource-related tax revenues, as well as through personal income tax revenue. Revenues take the form of provincial stumpage, provincial personal income tax, other provincial revenues,⁷⁴ federal corporate, excise and withholding tax, and federal personal income taxes.

⁷⁴ Other provincial taxes include logging, corporate income tax, sales tax, property tax, and electricity.

Our estimates of provincial and federal forest industry tax revenues are calculated by applying tax coefficients, in dollars per cubic metre of harvest, to the different harvest levels of the forecast period.⁷⁵ The tax coefficients, which are averages derived from provincial and federal revenue and harvest information for the past five years, and adjusted for inflation, are provided in Table 5-3.⁷⁶

Table 5-3: BC AVERAGE FOREST INDUSTRY TAX REVENUES (1993 \$/m³)	
Provincial Revenue	
Stumpage	\$8.7
Rents	\$0.2
Other (corporate income tax, logging, sales, property and electricity taxes)	\$6.1
Federal Revenue	
Federal corporate income tax plus excise and withholding tax	\$1.7

The methodology used to derive the foregoing tax coefficients is discussed in Appendix D.

Over the period 1989/90 to 1993/94, approximately \$8.9 per cubic metre was generated annually in stumpage and rent revenues in BC. Stumpage comprises the largest share of provincial revenue, averaging \$8.7 per cubic metre during this time. Rents are comparatively small at \$0.2 per cubic metre, while other revenues are approximately \$6.1 per cubic metre. By way of comparison, average federal government revenues from the forest industry were \$1.7 per m³.

The personal tax component of both direct and indirect/induced provincial employment income related to Boundary TSA forest activity was calculated. This calculation is based on estimated total pre-tax employment income by sector (i.e., harvesting, processing, silviculture, and indirect/ induced), and the following tax rates:

- forest sector personal income tax rate: 26 percent,
- other sectors personal income tax rate: 24 percent.

The provincial share of personal income tax revenue is estimated to be 33 percent, with the residual accruing to federal tax revenue. Table 5-4 presents the estimated provincial taxes generated by the harvesting and processing of timber from the Boundary TSA. The average revenue per cubic metre of wood is calculated based on historic provincial

⁷⁵ Source: The Economic Impacts of Timber Harvesting in BC, Economics and Trade Branch, Ministry of Forests, 1994. Also unpublished information from Ministry of Forests.

⁷⁶ See Appendix D for methodology.

revenues⁷⁷ and harvest levels, and then multiplied by the appropriate forecast harvest volume.⁷⁸

Note that the new provincial Forest Renewal Plan is expected to increase stumpage fees significantly if lumber prices remain at their current high levels. We expect to see a shortage of sawlogs, not only in the US Pacific Northwest, but also in BC, as the provincial AAC is reduced over the next decade. This structural shift in the market may translate into a permanently higher level for lumber prices. The following calculations are based on historic stumpage revenues and may underestimate future stumpage to the provincial government.

Table 5-4: BOUNDARY TSA				
Provincial Forestry Revenue Impacts (\$millions/year)⁷⁹				
Years	0 - 80	81 - 90	91 - 100	101 & Beyond
Harvest (m ³)	700 000	630 000	567 000	560 000
Forest Industry tax				
Stumpage and rent	\$6.2	\$5.6	\$5.1	\$5.0
Other	\$4.3	\$3.9	\$3.5	\$3.4
Total	\$10.5	\$9.5	\$8.6	\$8.4
Income Tax				
Direct	\$2.6	\$2.3	\$2.1	\$2.1
Indirect & Induced	\$2.9	\$2.6	\$2.4	\$2.4
Total	\$5.5	\$4.9	\$4.5	\$4.5
Total Provincial Revenues	\$16.0	\$14.4	\$13.1	\$12.9

- Stumpage accounts for the largest share of provincial forestry revenue (38 percent), while income tax makes up another 35 percent, and "other" provincial tax makes up the remaining 27 percent. Forest activity associated with the harvest level of 700 000 m³ would generate about \$16.0 million in provincial government revenues. Of this, stumpage and rent represents \$6.2 million, income tax \$5.5 million and other provincial tax another \$4.3 million.
- A decline in the harvest rate from 700 000 m³ to 630 000 m³ would incur a corresponding loss of provincial government revenues. A loss of \$600 thousand in stumpage and rent would result because of a reduction in harvesting operations. Income tax would decrease by \$600 thousand as direct and indirect/induced employment income declines. Other provincial tax would decline by \$400 thousand. In total, provincial government revenues would decline by \$1.6 million.

⁷⁷ Translated to constant \$1993 with the Canadian Consumer Price Index.

⁷⁸ Source of information: The Economic Impacts of Timber Harvesting in British Columbia, June 1993, and information provided by the Ministry of Forests.

⁷⁹ Some estimates may be inexact due to rounding.

Although not quantified in this analysis, some offsetting revenue increases would result in other sectors, such as tourism and recreation, because of the reduced harvest. A portion of income tax losses would also be offset by the re-employment of laid-off forestry workers. However, previous work which quantifies these impacts has indicated that any gains in other sectors would be relatively small compared to forestry reductions.⁸⁰

- Beginning in Year 91, another decline of \$1.3 million would occur in total provincial tax revenue. By Year 101, annual provincial revenues would level at approximately \$12.9 million. In total, provincial revenues would decline by \$3.1 million as a result of reducing the harvest level from 700 000 m³ in Year 81 to 560 000 m³ by Year 101.

Federal Forestry Revenue Impacts

The forest sector generates significant federal government revenues in addition to provincial revenues. Those federal revenues generated by forest operations related to the Boundary TSA harvest are presented in Table 5-5. Included are personal income tax, other corporate income tax, and excise and withholding tax. As with provincial revenues, these estimates are based on historic averages, adjusted for inflation.

Table 5-5: BOUNDARY TSA Federal Forestry Revenue Impacts (\$millions/year)				
Years	0 - 80	81 - 90	91 - 100	101 & Beyond
Harvest (m ³ /year)	700 000	630 000	567 000	560 000
Forest Industry Tax ⁸¹	\$1.2	\$1.1	\$1.0	\$1.0
Personal Income Tax ⁸²				
Direct	\$ 5.2	\$ 4.7	\$ 4.3	\$ 4.2
Indirect & Induced	5.8	5.3	4.9	4.8
Total	\$11.1	\$10.1	\$9.2	\$9.0
Total Federal Revenues	\$12.3	\$11.2	\$10.2	\$10.0

- Personal income tax, derived from both the direct and indirect/induced forest sectors, is clearly the largest component of federal tax revenue. At 700 000 m³, personal income tax would account for \$11.1 million, while forest industry tax would make up another \$1.2 million.

⁸⁰ For example, this is demonstrated in reports by RSMI, Socio-Economic Assessment of Timber Supply Options for the Northern Portion of the Kalum TSA and the Kootenay Lake Timber Supply Area Socio-Economic Assessment (June and November 1993 respectively).

⁸¹ Includes corporate income tax, excise & withholding tax; excludes discontinued sales tax.

⁸² Based on provincial direct and indirect forest sector employment as summarized in Table 5-2.

- In Year 81, a decline in the Boundary TSA harvest from 700 000 m³ to 630 000 m³ would trigger a loss of \$1.1 million in annual federal tax revenues, with the largest losses incurred in personal income tax. In Year 91, a further decline in annual federal tax revenues of \$1 million would result, followed by a further loss of \$800 thousand in Year 101. Federal revenues would settle at approximately \$10.0 million annually at the long-term harvest level.
- Altogether, a loss of \$2.3 million in annual federal government tax revenues would result between Year 81 and Year 101 of the forecast period as a result of harvest reductions in the Boundary TSA.

5.2 Alternative Initial Harvest Forecasts - Economic Impacts in Forestry

The *Boundary TSA Timber Supply Analysis* report evaluates the sensitivity of the long-term harvest profile in the Boundary TSA in response to several different assumptions about the variables driving the model. The objective of the base timber harvest forecast is to sustain the current harvest of 700 000 m³ for as long as possible, after which time it declines to a lower long-term forecast for the remainder of the time horizon. However, many other harvest flows are possible. This section of our analysis evaluates the economic impacts of the two different initial harvest rates:

5.2.1 Comparison of Case 1 with Base Harvest Forecast

Case 1 harvest level begins at 805 000 m³, and could be sustained for three decades before starting a decline to the long-term harvest level of 560 000 m³, which is achieved in Decade 7.

Direct Employment and Employment Income Impacts

TSA

- Under Case 1, total, direct, indirect/induced forest sector employment in the Boundary TSA would be 837 PY's (596 PY's direct) during the first decade, compared to 728 PY's (518 PY's direct) in the base harvest forecast. For the first three decades of the forecast period, Case 1 would support higher employment and employment income in the forest sector than the base harvest. They would then decline to a lower level than in the base harvest forecast by the fifth decade.
- The same would be true of direct forest sector income. In the current decade, total employment income would be \$26.6 million (\$21.2 million direct) annually, compared to \$23.1 million (\$18.4 million direct) in the base harvest forecast. Starting in Decade 5, annual employment income would drop to below the income level of the base harvest forecast.

- Overall, under Case 1, the loss of forest sector employment and employment income would be delayed, in comparison with the base harvest forecast, until Year 41 of the forecast period. However, in the long-term, employment and income would start a more rapid decline in Year 41, and would achieve the levels associated with the long-term harvest level two decades before the base harvest case.

Province

- In the first decade, 1 811 total PY's (724 direct) of employment would be generated, compared to 1 575 total PY's (630 direct PY's) in the base harvest forecast. Case 1 would result in a greater number of jobs and employment income than the base harvest forecast for the first four decades, and then would begin a more rapid decline to the long-term harvest level compared to the base harvest.
- Provincial forestry related income would exhibit the same trend as employment under Case 1, starting out at 54.7 million total (\$25.6 million direct) in the first decade and then dropping off after Year 41.
- As in the case of TSA impacts, employment and income under Case 1 would decline to the long-term harvest levels two decades before the base harvest case.

Government Revenue Impacts

- Case 1 would hold annual provincial and federal revenues constant until Year 41 of the forecast period, after which time they would decline to the level associated with the long-term harvest level.
- Initial provincial stumpage and rent would be about \$7.2 million, compared to \$6.2 million in the base forecast, and would decline to \$5.0 million upon reaching the long-term harvest level. Provincial income tax would decline from \$6.3 million to \$2.1 million during the same period. The same trend would occur for other provincial government revenues.
- In total, provincial revenues would start out at \$18.6 million in the first decade, declining in Year 41 to \$16.7 million, then to \$12.9 million by Year 71, remaining constant for the rest of the forecast period.
- Total federal government revenues would decline accordingly, starting out at \$14.1 million, dropping to \$12.8 million in Year 41, then to \$10.0 million by Year 71, remaining at this level for the rest of the forecast period.

5.2.2 Comparison of Case 2 with Base Harvest Forecast

Case 2 begins at a harvest level of 595 000 m³ and can be maintained for over 200 years. The lower initial rate and an even flow harvest rate results in an increasing inventory between Decades 1 and 8, and over the forecast period, a significantly greater inventory than in the base harvest forecast.

Direct Employment and Employment Income Impacts

TSA

- An immediate loss of 78 PY's direct and 31 PY's total employment would result under the Case 2 harvest forecast. The lower initial harvest rate of 595 000 m³ in Case 2 would translate into a constant 619 PY's of total employment (440 PY's direct) and \$19.6 million (\$15.7 million direct) in employment income for the entire forecast period. Thus, employment would be lower than for the base harvest forecast until Year 91, after which Case 2 employment and income would exceed the latter for the duration of the 260 year forecast period.

Province

- At the provincial level, total employment would decline immediately by 95 direct PY's and 142 indirect/induced PY's. Total forestry related employment would start at 1 338 PY's (535 PY's direct) annually, and would remain at this level for the duration of the forecast period. Annual total income would be \$40.5 million (\$18.9 million direct). Thus, from the beginning of the forecast period to Year 90, provincial employment and income levels would be less than those under the base harvest forecast, but starting in Year 91 they would exceed those of the base harvest forecast.

Government Revenue Impacts

- Under Case 2, total provincial revenue would decline immediately to \$13.6 million, with federal revenues declining to \$10.5 million, for a total decline in provincial and federal revenues of \$4.2 million. These revenues would remain constant for the remainder of the forecast period, while government revenues in the base harvest forecast would continue to decline to a point below Case 2 by the tenth decade.

5.3 Other Economic Sectors

Non-forestry economic impacts related to the timber supply forecasts for the Boundary TSA would be relatively small compared to forestry, although agriculture, outdoor recreation, and botanical forest products would likely be affected. This section briefly

addresses potential effects of the base harvest forecast and Cases 1 and 2 on these other sectors.

5.3.1 Agriculture

Livestock grazing is the only agricultural activity which is directly linked to forestry activity. In the Boundary TSA, livestock grazing plays an important role in the local economy, accounting for at least 100 - 120 PY's of employment.

The level of grazing that can be supported by Crown timber lands is determined by clear cut size, ease of access and the rate of harvest. However, no satisfactory means is available to quantify the link between harvest levels and employment in the grazing sector. The long-term decline in the harvest after Year 80 would eventually reduce the availability of clearcuts, and as a result, the amount of open land for grazing activity. A corresponding loss of employment and income could result, but the magnitude of this loss is unknown. The reader should note that future grazing activity will also be determined by the location and size of cuts, which casts more uncertainty on the long-term impacts of the base harvest reductions in the Boundary TSA.

The higher initial harvest rate embodied in Case 1 could result in an increase in grazing activity vis a vis the base harvest, depending on where the increased harvesting takes place. However, job and employment income gains may not necessarily follow. As an example, an increase in the number of livestock may not support a significant increase in the number of ranch hands.

If harvest levels are 15 percent lower, as in Case 2, medium- to long-term grazing opportunities may be reduced even more than in the base harvest, once again depending on where the harvest reductions took place. However, other factors could offset the incremental losses in the grazing sector. For example, grazing could become more concentrated on privately owned land, or ranchers might choose to supplement grazing fodder with feed. Again, the number of livestock may not necessarily affect employment.

5.3.2 Outdoor Recreation

Possible conflict of outdoor recreation use with logging activity depends on the recreational activity and the time of Year it is undertaken. Many winter and summer activities are relatively unaffected and may, in fact, benefit from logging activity. Winter activities, such as snowmobiling and cross-country skiing, can benefit from forestry related activities, as logging roads provide access into areas otherwise inaccessible. Most summer activities, including casual frontcountry hiking, sightseeing, boating and driving for pleasure, are also relatively unaffected by harvesting, as the Ministry of Forests' Visual Quality Objectives guidelines are designed to protect view corridors in frontcountry areas.

Backcountry hiking and wilderness excursions (the activities most sensitive to harvest levels as they rely on unspoilt, natural settings) comprise only a small portion of the

current tourism market in the TSA. Although impacts to these activities depend more on location of harvest than harvest level, the rate of harvest does have an implicit effect in that undisturbed areas with older stands tend to have fewer restrictions for logging, thus possibly becoming the focus of more immediate and extensive harvesting. An important point to note is that while summer wilderness tourism is currently a relatively small component of overall tourism, potential for growth in this sector exists. Therefore, any impact will be on potential wilderness tourism development, if presently undisturbed areas become excluded from the tourism and recreation resource base.

Under the base harvest forecast, some disruption of outdoor recreation in the TSA is likely to result. Whether this activity is lost to the TSA, and possibly to the province, depends on the availability of alternative areas nearby. Some of this potential loss may be offset by benefits to other outdoor recreation tourists, as a result of improved access afforded by new logging roads.

5.3.3 Mining

Activities in mining are relatively unrelated to forestry activities. The only exception is in the mineral exploration stage, when access provided by logging roads into remote areas can reduce the cost of, and facilitate, prospecting. In the case of the Boundary TSA, an extensive network of logging roads already exists. Thus, any extra benefit would be minimal. Furthermore, mineral exploration and production and forestry activities are generally not mutually exclusive. For these reasons, no impacts to mining are perceived to result from the base harvest forecast, Case 1, or Case 2.

5.3.4 Botanical Forest Products and Wildcrafts

Botanical forest products are highly sensitive to forestry activities given that they rely on the same resource base. At this time, they represent a small market niche, which could generate a limited number of economic opportunities in the future.

6.0 SOCIAL IMPLICATIONS

6.1 Implications for Communities

As the preceding chapters have shown, the communities of the Boundary Forest District are highly dependent on the forest sector. As a result, a change in the level of harvest can translate into adverse impacts for entire communities, not only for workers within that sector and their families.

6.1.1 Community Issues

In the case of the Boundary Forest District, the use of the temporary AAC uplift for a beetle infestation is no longer necessary and has resulted in forestry sector job losses. The pine beetle uplift was approved for use from 1993 to 1995; however, it was not used in 1994 and will not likely be necessary in 1995. The elimination of the accelerated cut is associated with the decision of Pope and Talbot to reduce the number of shifts at its Grand Forks mill to one per day, with an associated loss of approximately 100 jobs. Harvesting and related transport activity has also been affected by the elimination of the beetle kill uplift. These impacts will occur on top of any employment losses resulting from the timber supply review. Note, however, that the uplift was introduced to combat a pine beetle infestation and was not intended as a permanent increase to the allowable annual cut. A recent study⁸³ determined that while job losses could be significant, its overall impact on the community is not expected to be severe, as long as population and job growth trends prevail.

6.1.2 Base Harvest Forecast

The base harvest forecast maintains the current harvest level for the first 80 years of the forecast period. Assuming no great change in the level of labour-intensity in the forest industry, the base forecast would provide long-term job stability and continued employment over the next 80 years. This stability is desirable in light of the local economy's dependence on the forest sector, and recent job losses as a result of the elimination of the uplift.

The long-term stability of the forest sector will be essential in providing a base for future economic development, including more value-added manufacturing of forest products and a shift towards economic diversification.

⁸³ Resource Systems Management International, Socio-economic Impact Assessment of the Grand Forks Area. Prepared for Ministry of Employment and Investment, Ministry of Small Business, Tourism and Culture, and Economic Development Commission, Regional District of Kootenay-Boundary. May 1994.

Sustaining a stable forest sector will help the communities of the Boundary TSA to maintain current population growth rates. The benefits of stable long-term forest sector employment would accrue directly to those employed in the industry and their families, and indirectly to other residents throughout the TSA. Under the base forecast, total forestry related employment of 728 PY's would be supported in the TSA for 80 years. Businesses and services depending on the forest industry and expenditures from forest worker families would profit from this ongoing stability. A stable population base would also help maintain property values and a solid tax base within the TSA.

While stable, long-term employment in the forest sector would benefit a large number of residents in the TSA, the long-term continuation of the current harvest level could also generate some offsetting negative impacts in other sectors, such as outdoor recreation or, possibly, botanical forest products. These negative impacts would be much smaller than the positive results related to forestry, and any corresponding social impacts would be small. Although VQO's are applied to the most prominent landscapes (i.e., around Christina Lake and along highway corridors), other areas frequented by locals and tourists, such as the many small lakes in the TSA, do not yet have VQO protection. Consequently, the assumptions used in the base harvest forecast have not taken these areas into account. As logging activities expand into previously undisturbed areas, visual impacts may become more of a concern.

6.1.3 Alternative Initial Harvest Forecasts

Case 1

If the initial harvest level was 15 percent higher than the base harvest forecast, the communities of the Boundary TSA would experience an increase in direct and indirect employment and income. Section 5.2.1 estimated that the initial increase in direct employment over and above the base harvest would be 78 PY's under Case 1. Based on an average household size of 2.5 persons,⁸⁴ a total of 195 persons in the community could be positively affected. This represents 1.8 percent of the local population. Indirect and induced employment could also increase by approximately 31 PY's.

The higher level of harvest could only be sustained for three decades before tapering to a lower long-term level, as discussed in Section 5.2.1. While initial economic gains would be incurred over and above the base harvest forecast, these gains would be lost in subsequent years. The nature of the local economy, the community's social and cultural cohesion, and the availability of social services would determine the degree of social stress which would ensue from these losses.

The potential for visual impacts would also increase as a result of more intensive encroachment into areas previously undisturbed by logging.

⁸⁴ 1991 Census, Average household size for the Boundary Forest District.

Case 2

An initial decrease in the harvest level from 700 000 m³ to 595 000 m³ would reduce direct employment within the TSA by 78 PY's to 440 PY's. This lower initial harvest rate could be maintained for over 200 years. As families of forest workers would also be impacted, the total number of people affected could total 195 people, or 1.8 percent of the total area population. A further 31 PY's of indirect and induced employment could also be negatively affected.

While this percentage may seem low, it must be looked at in the context of the recent job loss as a result of the end of the beetle infestation uplift, and the number of unemployment/social assistance recipients in the area. Moreover, the loss of forest sector jobs represents a loss of relatively high paying, full time jobs.

A recent study found that although the Boundary TSA, and Grand Forks in particular, could cope with the loss of jobs associated with the accelerated cut, any additional job loss could increase the demand for certain social services to the point that additional resources would be required.⁸⁵ The study also found that additional job losses could lead to population outmigration which, in turn, would result in decreased property values, and a decline in the rate of new job creation.

The foregoing does not take into account the possibility of industry threshold effects related to a significant loss of timber. A threshold effect occurs when a reduction in a mill's timber supply forces a shift reduction, or mill closure. These effects are impossible to predict with any accuracy, however, as discussed in Section 3.7.2 of this report, Pope & Talbot has announced the elimination of one shift at the Grand Forks mill effective January 1995 as a result of the loss of the temporary uplift. They have indicated that any further loss of wood may force them to also consider temporary mill shutdown.

In contrast to the base forecast and Case 1, Case 2 would be most beneficial to the development of sectors such as outdoor recreation or botanical forest products, as more of the resource base would be left in its natural state during the forecast period. The risk of potential visual impacts would also be reduced. However, this reduction in harvest is not expected to encourage the tourism sector to develop at a faster rate.

6.1.4 Mitigation of Forest Industry Job Losses

In light of the employment losses related to the forest industry, area representatives, through the Economic and Development Committee of the Regional District Kootenay-Boundary, are developing a mitigation strategy in association with the Ministry of Small Business, Tourism and Culture. The expected release of the strategy is in early 1995.

⁸⁵ Socio-economic Impact Assessment of the Grand Forks Area, Resource Systems Management International, 1994.

The Bradford Enercon plant in Grand Forks is also likely to re-open and may offset some of the losses in the forestry sector. Prior to closing, Enercon employed 100 people in the production of mineral-filled insulation board.

6.2 First Nations Concerns

As noted in Chapter 2, no First Nations reserves are situated in the Boundary TSA, and no direct activity by a tribal council or band in the forest sector has been identified. However, sites of First Nations cultural/heritage significance have been found within the TSA. Preservation of these sites may result in land base reductions. The key First Nations' issue within the TSA is the Westbank Band claim as identified in Chapter 2.

7.0 ENVIRONMENTAL IMPLICATIONS

This chapter addresses the environmental implications associated with potential future harvest levels.

7.1 Environmental Implications

Although current management practices already include provisions to protect critical environmental features of the TSA, specifically wildlife corridors, ungulate winter range, riparian habitats, and community watersheds, a number of concerns have not been fully addressed. These concerns include additional protection for old growth values, provision of Forest Ecosystem Networks (FENS), retention of wildlife trees and coarse woody debris, and improved protection of riparian areas as well as grizzly bear spring range.

Further concerns relate to assumptions used in the *Boundary TSA Timber Supply Analysis* that may not have adequately reflected the presence of riparian areas,⁸⁶ nor changes in stocking standards, spacing and brushing measures. These changes, together with the biodiversity measures cited above, may result in lower annual increments and a reduced land base, which could, in turn, require a reduction in the Long-Run Sustainable Yield.

Although these concerns are common to all of the harvest forecasts, some are accentuated or diminished as a result of the rate of harvest. In addition, the rate of harvest may have implications on forest age class distribution and the geographic distribution of harvests that affect species dependent on specific seral attributes or habitats.

7.1.1 Implications of Base Case Timber Harvest Forecast

In addition to the general concerns noted above, the Ministry of Environment has expressed concern that the base harvest forecast may create deficiencies in early and old growth forest stages, possibly eliminating ecological processes associated with both stages. Reduction of early growth results from management practices, such as thinning, whereas the elimination of old growth results partly from the tendency of giving first priority to harvesting old growth, and current safety standards that require elimination of snags prior to harvesting activities. The net effect is that the age class distribution of the forest may be narrowed.

As a result, species that are dependent on old growth or old growth attributes, such as soft dead snags or coarse woody debris, may be negatively impacted and experience population decline. Similarly, species that thrive exclusively on early successional forest growth may also suffer population declines. Conversely, more adaptable species may increase in numbers. However, most species that would benefit are not of management concern.

⁸⁶ Mapping of these areas was not available at the time of the analysis.

Another particular concern is the impact that both the rate and distribution of the harvest may have on the TSA's grizzly bear population. The focus of this concern is the Upper Granby, which is noted as prime grizzly territory, and has experienced little or no logging activity to date. At present, the base harvest forecast does pose concern for grizzly bear management, as the Upper Granby has a significant volume of mature timber, making it a likely area of immediate harvest interest. However, the CORE West Kootenay-Boundary Land Use Plan has suggested the Upper Granby, Gladstone, and an expansion of Conkle Lake Park for protected area status.⁸⁷

As indicated in Chapter 2, ungulates require a wide variety of habitats ranging from early to old growth stages. These stages are catered for adequately in the present forest age class distribution. Consequently, harvest rotation is a critical factor if this favourable age class distribution is to be maintained. Based on 20 percent removal in 20 - 34 years, the base harvest forecast does not appear to negatively affect this distribution, and is, therefore, not a concern for ungulates.⁸⁸

By introducing logging roads and harvesting into new areas, like the Upper Granby, possible impacts on streams and fisheries resources are also concerns. New provisions for riparian protection may alleviate these concerns; however, some disturbance inevitably results. Water quality for consumption purposes may also become a growing concern, if development continues to be increasingly focused on rural areas of the TSA.

7.1.2 Alternative Initial Harvest Forecasts

An initial harvest that is 15 percent higher (Case 1) would accentuate the concerns expressed above concerning the base harvest forecast. Old growth would be more rapidly depleted under Case 1, thus exacerbating concerns about a population decline of species that are either dependent on old growth, or old growth attributes. In order to achieve this higher rate of harvest, more extensive encroachment would also be required into areas previously undisturbed by logging. Increased harvesting activity would, in turn, increase possible detrimental impacts on the grizzly bear and ungulate populations in these remote areas. In addition, Case 1 would result in a more substantial reduction of mature forest cover than the base harvest forecast and may impact snow cover and forage opportunities for ungulates. Concern for fisheries values and water quality would also increase.

Conversely, an initial harvest that is 15 percent lower (Case 2) would diminish concerns related to the base harvest forecast. Case 2 would result in a higher proportion of old growth being retained, thus reducing pressure on old growth dependent and old growth attribute dependent species. Less intensive harvesting activity may also result in deferral

⁸⁷ West Kootenay-Boundary Land Use Plan. Commission on Resources and Environment, Victoria, October 1994.

⁸⁸ Ministry of Environment.

or slower encroachment into remote areas, and would benefit the grizzly bear population as well as ungulates. Case 2 may also diminish potential impacts on fisheries values and water quality.

8.0 SUMMARY OF RESULTS

The objective of this report was to evaluate the socio-economic impacts of the timber supply forecast in terms of employment, income, and government revenues for forestry and other related sectors, and to identify any implications at the community, environmental or First Nations' levels.

The assessment was done by analyzing the annual impacts of the base harvest forecast, in which the initial harvest level of 700 000 m³ would be sustained to Year 80, then gradually scaled down to a long-term harvest level of 560 000 cubic metres by Year 101. In addition, the implications of an immediate 15 percent increase and decrease in the harvest level were also assessed. These levels were obtained from the Ministry of Forests *Boundary TSA Timber Supply Analysis* and were intended to illustrate the sensitivity to changes in harvesting levels. None of the forecasts, however, are intended to represent preferred options.

8.1 TSA Impacts

Table 8-1 summarizes the TSA impacts of the forecasts. If the initial harvest level of 700 000 m³ were sustained until Year 80, approximately 518 PY's of direct forest sector employment would be generated within the TSA annually, and \$18.4 million in direct after-tax income. This direct forestry employment would support another 210 PY's of indirect and induced employment per year, and \$4.7 million in income.

In Year 81, timber harvest levels in the base harvest forecast would begin declining to a long-term level of 560 000 m³ by Year 101, with corresponding losses in jobs and employment income. Over the period between Year 0 and Year 101, cumulative annual losses in total direct and indirect/induced employment would be 145 PY's, with the forest sector accounting for 103 PY's. A corresponding loss of \$4.6 million in total after tax employment income would be incurred, with \$3.7 million of this in the forest sector.

The estimated losses are based on the assumption that all forest sector employment changes occur in fixed proportion to harvest changes, and that the regional and provincial economic multiplier used will remain constant over the forecast period. However, the time at which threshold effects may occur in the processing sector are not captured in the analysis. A prime example of this is would be a shift reduction or closure of the Grand Forks sawmill, as a result of insufficient timber supply. In addition, the employment coefficients themselves may change over time. Consequently, any future change in harvest levels may not necessarily result in proportional changes in jobs and employment income.

A 15 percent increase in the initial harvest level from 700 000 m³ to 805 000 m³, as illustrated by Case 1, could only be sustained for the first three decades of the forecast period, before a four decade decline to the long-term level of 560 000 m³. Thus, initial direct forest sector employment within the TSA under Case 1 would be 596 PY's, (837

total) compared to 518 direct PY's (728 total) in the base harvest forecast. By Decade 7, employment and income would reach levels associated with the long-term harvest level, three decades sooner than under the base forecast. Direct employment income which accrues within the TSA would follow the same pattern, starting out at \$21.2 million (26.6 total) initially compared to \$18.4 (23.1 total) in the base harvest forecast.

The 15 percent decrease in the initial harvest level from 700 000 m³ to 595 000 m³ in Case 2, would have the inverse results of Case 1. By Year 91, this level of jobs and income would exceed that of the base harvest forecast. This scenario would generate 440 PY's of direct employment (619 total) and \$15.7 million income annually (19.6) for the entire forecast period. There would be initial losses of 78 PY's and \$2.7 million compared to the base forecast; however, the new level of employment and income could be sustained in the long-term. Conversely, employment and income in the base forecast would continue to decline after Year 91.

Other sectors of the economy, with the exception of agriculture and outdoor recreation, would not be affected to any degree by forestry activities. In the livestock grazing sector, little change in activity would occur during the first 80 years of the forecast period; however, the long-term decline in harvest level after Year 80 would eventually reduce the availability of clearcuts and possibly grazing activity. Outdoor recreation use for certain activities and in specific locations may be negatively impacted, but the number of affected participants is relatively small compared to the total tourism market.⁸⁹ In addition, losses may be offset by some increases in other activities that benefit from accessibility provided by new logging roads. Therefore, employment and employment income related to tourism and recreation are expected to remain at their current levels with modest increases resulting from tourism and population growth.

The stable forest sector employment supported by the base harvest would be beneficial to TSA communities, providing a secure base for future economic diversification. Employment stability in the forest sector would also deter population loss, as well as economic and social problems resulting from job losses.

Stable employment would benefit forestry workers and their families, as well as those businesses and services which depend on forest industry or employer expenditures. By preventing an outflow of population, stable forest sector employment would also help to maintain property values and provide for a solid tax base.

Fifteen percent higher initial harvest levels would result in a small number of additional jobs in the short term, at the expense of a longer period of employment stability. Fifteen percent lower harvest levels would compound the current jobless rate and may contribute

⁸⁹ Interviews with local tourism/recreation providers revealed that current harvesting activities are not considered to be a major problem.

to population loss and social problems. However, this lower level of employment and job income would be sustained in the long-term.

Issues of specific native concern other than the preservation of cultural heritage sites and land claims are unknown. How native concerns may be affected by the base harvest forecast, Case 1 or Case 2, is unclear.

Although current management practices already include provisions to protect critical environmental features of the TSA -- specifically wildlife corridors and ungulate winter range, riparian habitats and community watersheds, a number of concerns have not been fully addressed. These concerns include additional protection for old growth values, provision of Forest Ecosystem Networks (FENS), retention of wildlife trees, coarse woody debris, and improved protection of riparian areas and grizzly bear spring range. Further concerns relate to assumptions used in the *Boundary TSA Timber Supply Analysis* (i.e., timber reductions) that may not have adequately reflected changes in stocking standards, the presence of riparian areas,⁹⁰ and the ability to achieve the long-term harvest level. These concerns are common to all the harvest forecasts.

The base harvest forecast would lead to a narrowing of the forest age class distribution and may negatively affect species that rely exclusively on early successional growth, or are dependent on old growth or old growth attributes. Conversely, species that are more adaptable, may benefit. Unfortunately, most species that would benefit are not of management concern. Another particular concern is the impact that both the rate and distribution of harvest may have on the TSA's grizzly bear population. The rotation used in the base harvest forecast, however, does not appear to present a concern for ungulates.⁹¹ A higher initial harvest level (Case 1) would accentuate these concerns, whereas a lower initial harvest level (Case 2) would diminish them. Case 1 would also result in a more substantial reduction of mature forest cover that may impact snow cover and forage opportunities for ungulates.

8.2 Provincial Impacts

Tables 8-2 and 8-3 summarize the provincial impacts of the base harvest as well as the implications of 15 percent lower and higher initial harvest levels. The base harvest forecast would generate approximately 630 PY's annually of direct forest sector employment for the first 80 years of the forecast period, and \$22.2 million in direct income. It would also support another 945 PY's of indirect and induced employment, and \$25.4 million in income during this time. The base forecast would generate approximately \$29 million annually in provincial and federal government revenues during the first 80 years.

⁹⁰ Mapping of these areas was not available at the time of the analysis.

⁹¹ Ministry of Environment.

Between the Years 81 - 101, the base forecast would incur a total job loss of 315 PY's, of which approximately 126 would be in the forest sector. Corresponding total direct income losses would be \$9.5 million, with \$4.4 million in the direct forest sector. During this time, provincial and federal government revenues would decline by \$5.4 million.

At the provincial level, a 15 percent increase in the initial harvest level would follow the same pattern as the TSA impacts, with a dramatic initial rise in income and employment vis a vis the base forecast, followed by a decline beginning in Year 41 to a lower level of employment than in the base harvest forecast. Total provincial and federal government revenues would exhibit the same pattern.

Case 2 would cause an initial loss of 95 direct PY's (237 total). These levels would then remain constant over the forecast period, but would be less than the levels under the base forecast. However, starting in Year 91, provincial employment and income would exceed that of the base harvest forecast. This would also be the case for government revenues.

Impacts related to other economic sectors, and social and environmental implications are expected to be the same as those for the TSA.

Table 8-1: TSA SOCIO-ECONOMIC DEVELOPMENT IMPACTS — BOUNDARY TSA						
Years	Case 1 Increase Harvest 15 Percent				Case 2 Decrease Harvest 15 Percent	
	0-80	81-90	91-100	101+		
Harvest	700 000	630 000	567 000	560 000		
Direct (PY/yr)	518	466	420	415	<ul style="list-style-type: none"> initial gain of 78 PY's in direct employment and \$2.8 million in employment income in Year 0 vis a vis base harvest achieves employment and income levels of long-term harvest three decades earlier than base case 	
Indirect and Induced (PY/yr)	210	189	170	168	<ul style="list-style-type: none"> initial loss of 78 PY's in direct employment and \$2.8 million in employment income in Year 0 vis a vis base harvest initial losses in Year 0 would be offset by a higher long-term level of employment and income after Year 90 compared to base harvest 	
Total Direct, Indirect & Induced (PY/yr)	728	655	590	583		
Direct After-Tax Employment Income (\$M/yr)	\$18.4	\$16.6	\$14.9	\$14.7		
Indirect and Induced (\$M/yr)	\$4.7	\$4.2	\$3.8	\$3.8		
Total (\$M/yr)	\$23.1	\$20.8	\$18.7	\$18.5		

8.0 Summary of Results

Agriculture Implications	<ul style="list-style-type: none"> • long-term reduction in grazing activity, with corresponding economic losses 	<ul style="list-style-type: none"> • possibly greater initial economic gains than base harvest 	<ul style="list-style-type: none"> • possibly less initial economic losses than base harvest
Tourism Implications	<ul style="list-style-type: none"> • neutral or slight negative impact on tourism 	<ul style="list-style-type: none"> • potentially greater negative impact on tourism than base harvest 	<ul style="list-style-type: none"> • potentially less negative impact on tourism than base harvest
Community Implications	<ul style="list-style-type: none"> • community stability in the area maintained for 80 years • provides strong base for economic diversification • long-term stability in the forest sector will encourage expansion/retention of service providers • possible visual impacts 	<ul style="list-style-type: none"> • initial increase in jobs vis a vis base case • provides base for economic diversification • maintains community stability • increases disposable income thus encouraging development of new/expansion of existing services • increased possibility of visual impacts 	<ul style="list-style-type: none"> • fewer initial jobs vis a vis base case • potential population loss • potential need for additional social service providers • reduced possibility of visual impacts
Environmental Implications	<ul style="list-style-type: none"> • negatively affects old growth values and dependent species • increased concern for protection of fisheries values and water quality • impact on grizzly bear forage areas and increased hunter access via new logging roads 	<ul style="list-style-type: none"> • reduces retention of old growth values and protection of fisheries values and water quality • may impact on ungulates • greater impact on grizzly bear forage areas and increased hunter access via new logging roads 	<ul style="list-style-type: none"> • improve retention of old growth values and protection of wildlife, fisheries values, and water quality • possible increased protection of grizzly bear and ungulate habitat
First Nations Implications	<ul style="list-style-type: none"> • specific impacts unknown 	<ul style="list-style-type: none"> • specific impacts unknown 	<ul style="list-style-type: none"> • specific impacts unknown

Table 8-2: PROVINCIAL SOCIO-ECONOMIC DEVELOPMENT IMPACTS — BOUNDARY TSA						
Years	Case 1 Increase Harvest 15 Percent				Case 2 Decrease Harvest 15 Percent	
	0-80	81-91	91-100	101+		
Harvest	700 000	630 000	567 000	560 000		
Direct (PY/yr)	630	567	510	504	<ul style="list-style-type: none"> initial gain of 95 PY's in direct employment and \$3.3 million in direct employment income in Year 0 vis a vis base harvest achieves employment and income levels of long-term harvest three decades earlier than base case 	
Indirect and Induced (PY/yr)	945	851	765	756	<ul style="list-style-type: none"> initial loss of 95 PY's in direct employment and \$3.3 million in direct employment income in Year 0 vis a vis base harvest initial losses in Year 0 would be offset by a higher long-term level of employment and income after Year 90 compared to base case 	
Total Direct, Indirect & Induced (PY/yr)	1 575	1 418	1 275	1 260		
Direct After-Tax Employment Income (\$M/yr)	\$22.2	\$20.0	\$18.0	\$17.8		
Indirect and Induced (\$M/yr)	\$25.4	\$22.9	\$20.5	\$20.3		
Total (\$M/yr)	\$47.6	\$42.9	\$38.5	\$38.1		

Table 8-3: PROVINCIAL AND FEDERAL GOVERNMENT REVENUE IMPACTS — BOUNDARY TSA						
Years	Case 1 Increase Harvest 15 Percent				Case 2 Decrease Harvest 15 Percent	
	0-80	81-91	91-100	101+		
Government Revenues						
Provincial Government	\$16.0 <u>\$12.3</u>	\$14.4 <u>\$11.2</u>	\$13.1 <u>\$10.2</u>	\$12.9 <u>\$10.0</u>		
Federal Government	\$28.3	\$25.6	\$23.3	\$22.9		
Total						
	<ul style="list-style-type: none"> in Year 0 of the forecast period, provincial & federal forest industry and direct personal income tax revenues would increase in comparison to the base harvest after decade 4, they would decline relatively quickly compared to base harvest to the level associated with the long-term harvest level 				<ul style="list-style-type: none"> total provincial & federal tax revenue would start at a lower initial harvest level in Year 0, but this would be sustained at a constant level for the duration of the forecast period 	

APPENDICES

LIST OF CONTACTS	
Ministry of Forests	
Al Barclay	Resource Officer, Silviculture, Boundary Forest District, Grand Forks
Dave Coffey	Economist, Victoria
Alison Coyne	Economist, Victoria
Gary Darychuk	Regional Planning/Inventory Officer, Nelson Forest Region, Nelson
Peter Fowler	Major Licensee Silviculture Information System, Nelson Forest Region, Nelson
Mike Geisler	Regional Staff Manager, Integrated Resource Management, Nelson Forest Region, Nelson
Rob Gretchen	Harvesting Systems Analyst, Timber Harvesting Branch, Victoria
Gordon Keir	Resource Officer, Protection/Recreation, Boundary Forest District, Grand Forks
Hal McLean	Nelson Forest Region
Cassandra Mann	TSA Forest Analyst, Integrated Resources Br., Victoria
Gord Nichols	District Manager, Boundary Forest District, Grand Forks
Dave Oswald	Regional Staff Manager, Nelson Forest Region
Harry Quesnel	Assistant Regional Research Ecologist, Forest Sciences, Nelson
Ken Weaver	Operations Manager, Forestry, Boundary Forest District, Grand Forks
Frank Wilmer	Resource Officer, Inventory/Planning, Boundary Forest District, Grand Forks
Carl Withler	Resource Officer, Range, Boundary Forest District, Grand Forks
Forest Companies	
Dennis Graham	Green Peaks Silviculture
Dale Hearne	Pope & Talbot Ltd., Grand Forks
R.L. Helfrich	Manager, Forest Administration & Planning, Weyerhaeuser
Clark Hilmoe	Hilmoe Forest Products Ltd., Rock Creek
Rick Jones	Pope & Talbot Ltd., Grand Forks
Dave Jukes	Pope & Talbot Ltd., Grand Forks
Cam Leadbeater	Weyerhaeuser, Okanagan Falls
Dave Lightner	Blumelein Lumber Sales Ltd., Rock Creek
George Lynn	S & O Sawmills Ltd., Midway
Derek Manning	Weyerhaeuser, Okanagan Falls
Gary McGarth	Pope & Talbot Ltd., Grand Forks
George Novotny	Canpar Industries, Grand Forks
J.C. Olsen	J.C. Olsen Ltd., Midway
Murray St. John	Production Manager, Celgar Pulp Co.
George Sherbinin	S & O Sawmills Ltd., Midway
James L. Zwick	Manager, Goose Creek Lumber, Crescent Valley

APPENDIX A

Local Representatives	
---	Boundary Women's Coalition
---	Grand Forks Women's Centre
---	RCMP, Grand Forks
Klaus Bialon	Ski Phoenix
Mickey Brooks	IWA, Grand Forks
Iain Brown	BC Access Centre, Trail
Garth Burnell	Boundary Hospital, Grand Forks
Joseph Calenda	City of Grand Forks, Grand Forks
Marilyn DeWinter	Drug & Alcohol Abuse Centre, Grand Forks
Howard Dirks	Nelson & District Chamber of Commerce, Nelson
Corporal Drisdale	RCMP, Midway
Phyllis Duncan	Community Futures, Grand Forks
Sandy Elzinga	Chamber of Commerce, Grand Forks
Corky Evans	MLA Nelson Region
Paul Fabri	CMHC, Kelowna
Brian Fichter	School District #13, Grand Forks
Maureen Gardner	Economic Development Officer, Nelson & District Economic Development Commission, Nelson
Michael Griffiths	Grand Forks
Kathy Hutton	Alderman, City of Grand Forks
Maria Kalesnikoff	Grand Forks
Marten Kryusse	Economic Development Commission, Regional District of Kootenay Boundary, Trail
O.G. (Denny) Kemprud	School District #12, Grand Forks
Leda Leander	Boundary Family & Independent Services, Grand Forks
Judith Lloyd	Century 21 Real Estate, Grand Forks
Richard Maddocks	Executive Director, Castlegar & District Development Board, Castlegar
Cathy Manson	Grand Forks District Savings Credit Union
Margaret Maximenko	Regional District of Kootenay Boundary, Christina Lake
John J. Ogloff	Re/Max Real Estate, Grand Forks
Doug Perry	Re/Max Real Estate, Grand Forks
Gary Peters	Independent Family Services, Grand Forks
Sonya Stairs	Greenwood
Yasushi Sugimoto	Mayor, City of Grand Forks
Dale Twa	Selkirk College, Grand Forks
Larry Widmer	Community Futures, Grand Forks

Other Government Agencies	
R.L. (Bob) Coombs	Employment & Immigration Canada, Grand Forks
Gord Enemark	Ministry of Employment & Investment, Victoria
Gerry Fox	Habitat Biologist, BC Ministry of Environment, Lands & Parks, Nelson Region
Rick Heinrichs	Ministry of Environment, Lands & Parks, Grand Forks
Gord McAdams	Visitor Services Coordinator Ministry of Environment, Lands and Parks, Nelson
Rob McArthur	Regional Hydrology Technician, BC Ministry of Environment, Lands & Parks, Nelson Region.
Judy McCanlish	Canada Employment and Immigration Centre, Nelson
Carrie Morita	Hydrology Technician, BC Ministry of Environment, Lands & Parks, Nelson Region
Wally Penner	Ministry of Small Business, Tourism & Culture, Nelson
Roger Reid	Economist, Wildlife Branch, MELP, Victoria
Al Soobotin	Habitat Section Head, Fish and Wildlife, Nelson
Jim Turner	Mineral Title Inspector, Ministry of Energy, Mines and Petroleum Resources, Nelson
Cory Waters	Ministry of Small Business, Tourism and Culture, Victoria
Mike Watkins	Water Management, CORE, Penticton
Guy Woods	Head, Wildlife Section, Fish and Wildlife, Nelson
Other	
Les Kiss	Council of Forest Industries, Vancouver
Silvie LeFebvre	Manager, Management Consultants, Price Waterhouse, Vancouver
Chief Robert Louie	Westbank Indian Band, Kelowna
Loretta Pedley	Job Protection Commission, Victoria

GLOSSARY OF TERMS

Allowable Annual Cut (AAC):	The allowable rate of timber harvest from a specified area of land per year.
Anthropocentric:	Interpreting or regarding the world in terms of human values and experiences.
Biodiversity:	Diversity of life in all its forms and levels of organization, including genes, species, ecosystems and the evolutionary and functional processes that link them.
Biogeoclimatic zones:	Areas which are defined by biological, physical and atmospheric characteristics.
Blue-listed species:	Sensitive or vulnerable and of management concern.
Environmentally sensitive area:	An area with significant non-timber values, fragile or unstable soils, problems in establishing a new tree crop or where timber harvesting may cause avalanches.
Green-up period:	The time needed for a stand of trees to reach a desired condition (e.g., height) to ensure maintenance of water quality, wildlife habitat, soil stability or aesthetics.
Harvest forecast:	The flow of potential timber harvests over time. A harvest forecast is usually a measure of the maximum timber supply that can be realized, over time, for a specific land base and set of management assumptions. It is an output of forest planning models and is affected by the size and productivity of the land base, the current growing stock, and management objectives, constraints and assumptions.
Indirect Income or Employment:	Additional economic activity created by direct forestry companies through the purchase of goods and services.
Induced Income or Employment:	Additional economic activity created by workers of direct forestry companies purchasing consumer goods and services.
Integrated Resource Guidelines:	Guidelines requiring that forest management activities be conducted in a special way to protect or enhance timber and non-timber forest resource values.

APPENDIX B

Long-Term Harvest Level:	The harvest rate at which the timber supply can be maintained at a constant level, given current management assumptions.
MMFBM:	Million Board Feet
Not satisfactorily restocked:	An area not covered by a sufficient number of tree stems of desirable species.
Protected Area:	Areas designated under the BC Protected Areas Strategy for protection in its current state, based on special physical and environmental qualities it may possess.
Red-listed species:	Threatened or endangered species.
Riparian Zone:	The stream bank and flood plain adjacent to streams or water bodies, with particular reference to vegetation.
SPF:	Spruce-Pine-Fir
Stock rupture:	Harvest shortfalls less than Long-Run Sustained Yield, attributable to insufficient numbers of second-growth stands achieving minimum harvest age to maintain the timber harvest target.
Timber Supply Area (TSA):	An integrated resource management unit established in accordance with Section 6 of the Forest Act.
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. The harvesting land base is defined by reducing the total land base according to specified management assumptions.
Visual quality objective (VQO):	Defines a level of acceptable landscape alteration resulting from timber harvesting.
Watershed:	An area drained by a stream or river. A large watershed may contain several smaller watersheds.
Yellow-listed species:	Managed species.

BIBLIOGRAPHY

- Baskerville, G.L. Forest Practices Code — Summary of Presentations by Stakeholder Groups. A Report to the Ministry of Forests. Faculty of Forestry, University of British Columbia. 1994.
- Braumandl, T.F. and Curran, M.P. A Field Guide for Site Identification and Interpretation for the Nelson Forest Region. BC Ministry of Forests, Nelson Region. May 1992.
- BC Ministry of Forests. Annual Report 1991-1992.
- BC Ministry of Forests, Integrated Resources Branch. Boundary TSA Timber Supply Analysis. Victoria, BC July 1994 (Draft).
- BC Ministry of Forests, Economics and Trade Branch. The Economic Impacts of Timber Harvesting in British Columbia. June 1994.
- BC Research, Campbell Goodell and Associates, and The Tourism Research Group. Visitor '89: A Travel Survey of Visitors to British Columbia. Prepared for BC Ministry of Tourism; Industry, Science and Technology Canada; and Ministry of regional and Economic Development. August 1990.
- Canada Employment Centre, Nelson. Labour Market Review - Nelson, Trail, Castlegar and Grand Forks. March, April and May 1993.
- Government of British Columbia. British Columbia Forest Practices Code — Rules. November 1993.
- Horne, G. Quantitative Analysis Branch, Ministry of Finance and Corporate Relations. Recommended Procedure for Estimating Regional Economic Impacts Resulting From Direct Changes in the Forest Sector - An Interim Procedure. March 1994.
- Horne, G. and Penner, C., Planning and Statistics Division, Ministry of Finance and Corporate Relations. British Columbia Community Employment Dependencies. Prepared for the BC Forest Resources Commission. February 1992.
- Howell, Robert, and Bentley, Marion, Assessing, Managing and Mitigating the Impacts of Economic Decline: A Community Perspective, Western Rural Development Center, Oregon State University, 1991.
- Interior Forest Labour Relations Association and Locals 1-405, 1-417 and 1-423, IWA-Canada — CLC. BC Southern Interior Master Agreement. July 1, 1991 to June 30, 1994.
- Kiss, Les, Council of Forest Industries. The Forest Renewal Plan - Its Impact on Stumpage and Royalty Rates. (Summary release). Apr. 18, 1994.

APPENDIX C

- Kootenay Regional Protected Areas Team. Assessment of the Impacts of Study Area Designation of the Best PAS Areas and Development of Alternative Areas within the Kootenay Region. (Alternatives Report). January 1994.
- Kootenay Regional Protected Areas Team - Conservation, Recreation and Cultural Heritage Subgroup. Identification, Evaluation and Ranking of Areas within the Kootenay Region that meet the Protected Areas Strategy Goals and Criteria. (Best PAS Report). November 1993.
- Lee, Robert, Effects of Federal Timber Sales Reductions on Workers, Families, Communities and Social Services, Northwest Forest Resource Council, April 1993.
- Ministry of Forests, Forest Renewal Plan, 1994.
- Pandion Ecological Research Ltd. Status and Habitat Relationships of Selected Red- and Blue-listed Species of the Kootenay Region. For BC Ministry of Environment, Lands & Parks, Wildlife Branch, Nelson, BC. March 1993.
- Pope & Talbot, Annual Report: 1992.
- Price Waterhouse. The Forest Industry In British Columbia. 1992.
- Quesnel, H.J. Forests Greater than 140 Years Old in the Kootenay Region - Status Report (First Draft). BC Ministry of Forests, Nelson Region. July 1993.
- Quesnel, H.J. and Theissen, F.N. Eco-Section Summaries For The Kootenay-Boundary Region. BC Ministry of Forests, Nelson Region. November 1993.
- Quesnel, Harry. Assistant Research Ecologist, Forest Sciences. BC Ministry of Forests, Nelson Forest Region.
- Resource Systems Management International. Socio-Economic Impact Assessment of the Grand Forks Area. Prepared for Ministry of Employment and Investment, Ministry of Small Business, Tourism and Culture, and Economic Development Commission, Regional District of Kootenay-Boundary. May 1994.
- Statistics Canada, 1991 Census.
- Statistics Canada. Employment Income by Occupation - The Nation. 1991 Census. Catalogue #93-332. 1993.
- Thomson, T.S. & Associates Ltd. Intensive Forest Management Plan for the Regional District of Central Kootenay. Prepared for the Central Kootenay Community Adjustment Committee, Nelson, BC. September 1986.

NOTES ON METHODOLOGY

The economic impact analysis is divided into two sections: employment and income effects, and government revenues. Evaluating the employment and income impacts for the Boundary TSA forest sector involved the following steps:

- identifying the direct impacts,
- calculating employment coefficients, and,
- estimating the indirect and induced effects of the forestry sector.

Government revenue estimates were calculated based on provincial average revenue coefficients.

Section 3.8 of this report describes briefly how the employment coefficients are derived, and Chapter 5.0 provides the results of the analysis. The following Appendix describes in more detail the methodology and assumptions behind the economic analysis.

D1.0 CALCULATING EMPLOYMENT AND INCOME IMPACTS

The results presented in Chapter 5.0 of this report are estimates of employment and income changes that would occur in response to changes in the harvest level. For the reasons cited in Section 5.1.1, the results should be regarded as illustrative, rather than definitive.

Changes in the timber harvest level would invoke both direct and indirect/induced economic responses. Direct activity comprises all forestry related activities involved with harvesting, processing, government and silviculture. Indirect impacts result from the purchase of goods and services by direct forestry businesses. Induced impacts arise as a result of employees spending their wages and salaries on consumer goods and services.

D1.1 Direct Forestry Employment and Income Impacts

The information used to evaluate the direct and indirect impacts related to timber harvest changes was acquired directly from industry operators within the Boundary Forest District, as well as from the Ministry of Forests, and published sources such as Statistics Canada. The key direct "harvest-dependent" sectors in the Boundary TSA are harvesting, processing and silviculture. The Ministry of Forests is also directly related to forestry within the TSA (as well as the Forest Region), however is not regarded as "harvest-dependent". As a result, Ministry of Forests' employment does not change for the duration of the forecast period.

The employment and income estimates of this report are the best which could be derived from available information. In order to provide relatively constant estimates, at least two years of data was used wherever possible.

Employment throughout the report is provided in terms of person years (PYs), based on a full-time equivalent position (FTE) defined as the hours per person-year (PY) regarded as full time for a particular occupation. All part-time and seasonal jobs have been translated into PY's in order to make them comparable, as discussed below.

The definition of Full-Time Equivalent (FTE) varies depending both on the type of occupation and on individual operators. We chose the approach of accepting the number of FTE's reported by the operators rather than basing FTE on a specific number of hours per person-year (PY), such as 1 800. As a result our estimates of FTE jobs closely approximate the actual number of people who consider themselves fully employed. The FTE estimates of current employment are based on information provided by TSA licensees, SBFEP registrants, and the Boundary Forest District office.

Harvesting jobs tend to be either contracted jobs or staff positions of the major licensees. Information on staff positions was given on an FTE basis. Information on contracted employees was given in terms of the number of months worked by employees in a year. Typically, FTE contracted harvesting employees work 10 - 11 months of the year. This translates into 1 950 to 2 275 hours per year, which takes into account seasonal restrictions on the hours worked, and the fact that employees often put in days of 10 hours or more and, in some seasons, work more than 5 days per week.

An FTE position in processing normally ranges from 1 950 - 2 000 hours per year. A typical employee at a large sawmill works 8 hours/day, 5 days/week, 48 weeks/yr (with 10 statutory holidays and 2 weeks paid vacation), which translates into 1 960 hours. For this analysis, part-time processing positions are converted into FTE positions by multiplying the number of part-time jobs times the ratio of total average annual hours for a part-time job to total average annual hours for a full-time job (1 960 hours). This calculation will result in fewer FTE's than actual jobs.

In silviculture, much employment is seasonal, with the seasons being relatively short. Length of working season and hours of work per week vary widely, depending on the type of activity. For this analysis, we adopted the definition of person-year (PY) used by Statistics Canada in the 1991 Census publication, Employment Income by Occupation - The Nation. PY in this publication is defined as a full-year of 49-52 weeks..¹

Direct income was calculated using information provided by the major licensees and selected operators in the Boundary Forest District, as well as from published sources (Ministry of Finance, Statistics Canada). Wages and salaries used in the analysis are after-tax, and include cash benefits..²

¹ A regional average income of \$38 500, pre-tax, and \$28 490, after-tax, is used for silviculture in the economic analysis.

² Cash benefits include holiday pay, statutory holiday pay where applicable, and other cash benefits.

D1.1.1 Employment Coefficients

Table 3-8 of this report presents direct and indirect/induced employment related to the current harvest level in the Boundary TSA and corresponding employment coefficients. The purpose of this section is to discuss how the employment coefficients were calculated for the "harvest-dependent" sectors, specifically harvesting, processing, and silviculture.

In general, employment and wood volume information for the major and SBFEP licensees and woodlot operators was analyzed in order to construct weighted average coefficients for the harvesting and processing sectors based on relative timber apportionment shares. Once developed, the employment coefficients were used to evaluate forest sector employment associated with changes in the harvest level. They reflect the linkage between the number of workers and the harvest level, and are presented as PY's/ '000 m³ harvested. When the coefficients are multiplied by harvest forecast levels, they provide an estimate of the numbers of workers that would be employed for that given level of harvest. There are some limitations to the use of these coefficients and are enumerated in Section 3.8 of the report.

Harvesting

Each of the major licensees and selected SBFEP operators provided estimates of total FTE employment in harvesting and the associated volume of timber harvested. Harvesting activity includes logging and trucking, planning (or cutting permit development), and road building and maintenance. To arrive at a total harvest coefficient, total estimated employment for the major, SBFEP and woodlot licensees which could be attributed to the Boundary TSA (259 PY's) was divided by 700 000 m³³ to arrive at .37 PY/000 m³. This factor was applied to all other harvest volumes of the forecast period in order to calculate related employment. Because all harvesting takes place within the TSA, the coefficient is the same at the provincial level as it is within the TSA.

Processing

Processing is comprised of inside- and outside-TSA activity in wood products milling, and pulp and paper manufacturing. For the purposes of this analysis, we have included chip transport to pulp mills as direct employment related to forestry.

Major Licensees

The two major licensees provided estimates of total FTE employment in processing and the associated volume of timber processed. A processing employment coefficient was calculated for inside the TSA using estimated FTE processing employment attributable to the Boundary TSA, and dividing by the Boundary TSA timber harvest. Similarly, a coefficient was estimated for outside the TSA. Woodlot timber was included with that of the major licensees. The resulting coefficients are .27 PY/000 m³ inside the TSA, and .04

³ Excludes any uplift volumes.

PY/000 m³ outside the TSA, which sum to a provincial total of .31 PY/000 m³.

SBFEP

The Boundary Forest District office and some selected operators provided employment data for a sample of Category 2 mills, as well as estimates of the share of SBFEP timber processed by major licensees. Based on this information, we estimate that 80 percent of SBFEP wood is processed by major licensees and 20 percent is processed by SBFEP operators. The processing coefficient for SBFEP timber is therefore an average of the employment coefficient for Category 2 mills and for processing operations of major licensees within the TSA, weighted by the share of SBFEP timber processed by each. The results are an average SBFEP coefficient of .04 PY/000 m³ within the TSA, and .12 PY/000 m³ for the province as a whole.

Pulp Mill

Based on information provided by Celgar pulp, a separate processing coefficient for the pulp sector was calculated. This coefficient accounts for hourly and salaried employment at the Celgar mill, and in chip transport, which can be attributed to wood from the Boundary TSA. Total employment which can be ascribed to the Boundary TSA harvest (28 FTE's) is divided by the average harvest of 700 000 m³ to arrive at a coefficient of .04 PY/000 m³. Note that the pulp mill is situated outside the TSA.

Silviculture

Silviculture labour coefficients are derived by dividing the labour component⁴ of total licensee and MoF District expenditures by an average silviculture wage of \$46 200 (including benefits) in order to calculate employment, and then dividing employment by annual harvest level. Between 1988 and 1994, this coefficient ranged between .05 PY/000 m³ and .07 PY/000 m³.

D1.1.2 Other Direct Employment (Non-harvest Dependent)

Employment with the Ministry of Forests is not determined by the harvest, but rather by policy and budget decisions. As discussed in Section 3.7.6, 40 FTE positions at the Boundary forest district office can be ascribed to the TSA. This is calculated by prorating the total of 48 FTE positions at this office by the share of committed volumes excluding uplifts, i.e., $48 * (700\,000 / 845\,000) = 40$ FTE's.⁵

To calculate the share of jobs at the Nelson Forest Region office that are dependent on the Boundary TSA, we multiplied the total number of jobs, 120, times the ratio of Boundary TSA committed wood (700 000 m³) to total AAC within the Region (6.333 million m³).

⁴ Assumes that 30% of expenditure is on site preparation with 15% labour component and 70% of expenditure on other, with 80% labour component. Source: Min. of Forests.

⁵ This nets out employment attributable to TFL #8.

This results in 13 FTE's.

On this basis of prorating, MoF employment in Victoria that can be directly attributed to the Boundary TSA is insignificant.

D1.1.3 Determining Forecast Employment and Income Levels

The following method was used to estimate direct forest sector jobs and employment income generated by timber harvested in the Boundary TSA.

- TSA timber distribution based on current apportionment (Table 3-5) was applied to the forecast harvest volumes (Table 4-1) in order to determine wood volumes processed inside and outside the TSA throughout the forecast period.⁶

Note: The timber distribution from the Boundary TSA is assumed to remain the same throughout the forecast period. Thus, as wood volumes decline in the forecast years, losses are prorated based on the following:

- current wood flows to major licensees, registrants and the Forest Service Reserve;
 - current wood flows outside and inside the TSA; and
 - current wood chip flows from different sources to the Celgar pulp mill.
- Employment coefficients (Table 3-8) were multiplied by the appropriate TSA harvest volume for each representative year to estimate employment in harvesting, processing and silviculture.
 - Ministry of Forests' employment was treated as constant.
 - Forest sector employment in harvesting, processing, silviculture and the MoF was multiplied by the following average annual after-tax incomes (including cash benefits) in order to calculate total after-tax employment income:

	\$ 1993
• Harvesting:	\$37 000
• Processing:	\$34 830
• Silviculture:	\$28 490
• Ministry of Forests (within TSA):	\$34 040
• Ministry of Forests (provincial) ⁷ :	\$27 000

An effective personal tax rate of 26 percent was used to calculate after-tax forest sector income. Incomes are in constant 1993 dollars and are assumed to remain unchanged over the forecast period.

⁶ Because logging waste is already accounted for in the Timber Supply Model, forecast wood volumes are not adjusted for logging waste in this analysis.

⁷ MoF Annual Report, 1992-1993.

D1.2 Indirect and Induced Economic Impact Methodology

TSA

The indirect/induced employment and income effects that occur within the study area as a result of harvest level changes were estimated using a regional income multiplier, developed by the Ministry of Finance using the economic base method.⁸ Economic base analysis is predicated on the assumption that a regional economy has basic (or export) and non-basic (service) sectors. The basic sector is assumed to be the driver of the local economy. Economic growth results from growth in the basic sector, as more goods and services are exported out of the region. All activity producing and providing inputs for export production is included in the base sector, while the non-basic sector encompasses all activity associated with the production and sale of goods and services for final consumer demand (induced).

The regional multipliers put forth in the Ministry of Finance publication are presently being revised. In the interim, the Ministry has suggested procedures for modifying these multipliers in order to properly capture both induced and indirect effects.⁹ The interim procedures paper suggests that the income base multipliers should be scaled down by a factor of 0.92 (this adjusted multiplier reflects the availability of more detailed information, and thus regional activity). As a result, the base income multiplier for the Boundary TSA is **1.11** ($1.21 * 0.92$). Base income multipliers produce induced impacts only, thus the multiplier must be applied to the sum of the direct and indirect impacts.

In order to ensure that direct, indirect and induced employment estimates are calculated using consistent wage estimates, a process suggested by Horne (1994) involves the following steps:

1. Separate direct forest sector employment into its various components (harvesting, pulp and paper processing, other wood manufacturing, and silviculture.
2. Determine direct income by multiplying the direct forest sector employment by the appropriate average after-tax direct incomes calculated by the BC Ministry of Finance as shown below:

Logging	\$29 900,
Pulp and paper	\$33 300,
Other wood manufacturing	\$27 700,

⁸ Horne, G. and Robson, L. B.C. Community Economic Dependencies. Prepared for the BC Round Table on the Environment and Economy. Ministry of Finance and Corporate Relations, March 1993.

⁹ Horne, G. Recommended Procedure for Estimating Regional Economic Impacts Resulting from Direct Changes in the Forest Sector: An Interim Procedure. Quantitative Analysis Branch, Ministry of Finance and Corporate Relations. March 1994.

APPENDIX D

Silviculture ¹⁰	\$23 020,
Ministry of Forests ¹¹	\$27 640.

3. Estimate indirect income using indirect factors of:¹²

0.21 for harvesting
0.17 for pulp and paper processing
0.11 for other wood manufacturing
0.21 for silviculture
0.21 for Ministry of Forests

4. Add the direct and indirect income levels then multiply the sum by the Boundary income multiplier of 1.11.
5. To estimate indirect and induced employment, divide the indirect and induced incomes by the appropriate average after-tax wages as specified by the Ministry of Finance:

Indirect:	
Logging	\$24 700
Pulp and paper	\$23 400
Other wood products	\$22 300
Induced	
All sectors	\$18 900

Once direct, indirect and induced employment have been estimated using consistent wage estimates as specified by the Ministry of Finance, average regional pre-tax direct incomes specific to the Boundary TSA can be substituted back in to calculate total income impacts. The final output of this process is an estimate of total direct, indirect and induced income and employment generated by the forest sector within the Boundary TSA.

¹⁰ Average provincial direct after-tax income for silviculture was not provided in the procedures paper. Generally, we found that the provincial averages were less than those derived from local employment information. Therefore, in order to develop a representative silviculture income which ranks properly with the average incomes provided by the Ministry of Finance, we prorated the estimated average regional silviculture income (based on information from the Boundary TSA) by the ratio of provincial average direct logging income to estimated regional logging income. Specifically, $\$28\,490 * (\$29\,900 / \$37\,000) = \$23\,023$.

¹¹ Same procedure as for silviculture.

¹² Factors for harvesting, pulp and paper and wood processing were provided by Ministry of Finance. Data is not presently available to calculate which factors apply to silviculture and Ministry of Forests and, upon consultation with the Ministry, we chose to apply the logging factor to silviculture and Ministry of Forests income. This is, of course, an ad hoc method, but the only procedure available at this time.

Provincial

To estimate total indirect and induced employment and income at the provincial level, direct forest sector employment was multiplied by a provincial employment multiplier of 2.5 to arrive at direct, indirect and induced income. Specific to the forest industry, this value is generated by the Economics and Trade Branch of the Ministry of Forests. The estimated indirect/induced component of employment was then multiplied by an after-tax non-forestry wage of \$26 910 to arrive at total indirect/induced after-tax income.

D2.0 GOVERNMENT REVENUES

Revenues accrue to both the provincial and federal governments. They include provincial and federal income tax, provincial stumpage, other provincial revenues including income tax, logging, sales, property and electricity taxes, and other federal revenues comprised of corporate income tax, excise tax, and withholding tax. For this analysis, it is assumed that 33 percent of personal income tax accrues to the province, and 67 percent to the federal government.

The forest industry tax rates used in Chapter 5.0 were calculated as follows:

- Stumpage and rent: total billed provincial revenue (\$699 839 million) divided by total billed provincial harvest volume (78.9 million m³), averaged over the years 1989/90 - 1993/94.¹³ This results in average of \$8.9 per m³.
- Other provincial tax revenues (corporate income tax, logging, sales, property, and electricity taxes): total billed provincial revenue (\$502 million) divided by total billed provincial harvest volume (82 million m³), averaged over the years 1987 - 1992.¹⁴ This results in an average of \$6.1 per m³.
- Federal tax revenue (corporate income tax, excise and withholding taxes): total billed federal revenue from BC forest industry (excluding the discontinued federal sales tax) (\$141 million) divided by total billed provincial harvest volume (82 million m³), averaged over the years 1987 - 1992.¹⁵ This results in \$1.7 per m³.
- All revenues have been converted to constant 1993 dollars using the BC Consumer Price Index.

¹³ Ministry of Forests, Economics and Trade Branch. The Economic Impacts of Timber Harvesting in BC. June 1993. Estimates for 1992/93 and 1993/94 were provided verbally by Economics and Trade Branch, Ministry of Forests.

¹⁴ Ibid.

¹⁵ Price Waterhouse. The Forest Industry in British Columbia. 1992.

D3.0 Outdoor Recreation Impacts

For purposes of this study, only those outdoor recreation activities which might be affected by changes in forestry activity are relevant. In order to provide a basis for the subsequent analysis, an understanding of three key factors is important, namely:

- the level of outdoor recreation use related to the forest resource;
- the average expenditures of tourists and recreation users; and,
- the linkage between these expenditures and employment.

These are evaluated as follows:

The Value of Outdoor Recreation Use

Recreation use generates economic value in the Boundary Forest District and the province as a whole. However, the current level of use, typically measured by user days and average daily expenditure, is not necessarily indicative of the full economic value that users place on resource use. In particular, actual expenditures for outdoor recreation activities by local residents undervalue the benefits residents derive from these experiences.

In economic terms, "consumer surplus" derived from non-timber values related to a forest (such as recreation use) can be approximated using methods such as contingency valuation. However, this kind of information is unavailable and, instead, we have used available statistical information, supplemented by interviews with local tourism/recreation providers. The estimated provincial daily average expenditure for outdoor recreation is \$4 per person.¹⁶ A value of \$18.85 per day is used to represent average daily tourist expenditures on outdoor recreation.¹⁷

Estimating User Days

In terms of user days, data obtained from the Visitor '89 and Resident Travel in British Columbia¹⁸ surveys provide an indication of the level of tourism activity in the Boundary Forest District, as well as a basis for estimating recreational use by local residents.¹⁹ These surveys found that 2.8 million tourist days (by people from within and outside the province) were spent in the Kootenays in 1989. Based on the provincial average growth rate for tourism of 2 percent per year, the adjusted figure for 1993 is 3 million tourist

¹⁶ BC Ministry of Tourism. Figures scaled to \$1993 with CPI.

¹⁷ BC Ministry of Tourism Visitor '89. Only those expenditures related to outdoor recreation have been included in the total expenditure figure. Items excluded include expenditures on activities such as shopping, restaurants, and entertainment. Figure have been scaled to \$1993 with CPI.

¹⁸ B.C. Ministry of Tourism.

¹⁹ Although these studies were undertaken in 1989, they are the most recent, comprehensive surveys available.

APPENDIX D

days. Assuming that the Boundary Forest District represents 5 to 10 percent of overall Kootenay visits,²⁰ between 150 000 and 300 000 tourist days per year would have been spent in the Boundary area in 1993.

Visitor surveys indicate that about 11 percent of non-resident visitors to the Kootenays reported that outdoor recreation was the main purpose of their trip.²¹ Applying this percentage to the Boundary results in between 16 500 and 33 000 tourist user days per year for outdoor recreation activities. According to local tourism operators, the seasonal split between summer and winter visitations to the area is approximately 75 percent and 25 percent respectively, resulting in 12 375 to 24 750 tourist user days in the summer and 4 125 to 8 250 in winter.

Interviews with BC Parks and local tourism/recreation providers found that the ratio of local recreational users to tourists is about 4 to 1. If this proportion is applied to the previous estimate of tourist user days, local residents engage in 66 000 to 132 000 outdoor recreation user days per year, of which 49 500 to 99 000 are in summer and 16 500 to 33 000 are in winter.

Table D1: ESTIMATE OF TOURIST/LOCAL RESIDENT OUTDOOR RECREATION USER DAYS (1993)		
Overall Outdoor Recreation	Summer	Winter
Tourists	12 375 - 24 750	4 125 - 8 250
Local Residents	49 500 - 99 000	16 500 - 33 000
TOTAL	61 875 - 123 750	20 625 - 41 250

Source: Estimate based on Visitor '89 and Resident Travel in British Columbia surveys, Ministry of Tourism.

²⁰ In Visitor '89, the Boundary Forest District is included within the larger Kootenay Country Region. Given the lack of data on tourism visits specifically within the Forest District, we have assumed, based on discussions with local industry participants and a comparison to the Arrow TSA immediately to the east that the Boundary Forest District would account for a maximum of 10% of visits to the Kootenay Country due to limited accommodation in the area.

²¹ Ministry of Tourism, Visitor '89.

APPENDIX E

Incremental Impacts of Boundary TSA Base Timber Harvest Forecast

Decade	Change in Harvest ¹	TSA					PROVINCE				
		Direct Labour	Indirect/ Induced	Total Labour	Direct Income	Indirect/ Induced	Total Income	Direct Labour	Indirect/ Induced	Total Income	Total Income
1-8	0	0	0	0	0	0	0	0	0	0	0
9	-70 (10%)	-52	-21	-73	-1.8	-0.5	-2.3	-63	-94	-157	-4.7
10	-63 (10%)	-46	-19	-65	-1.7	-0.4	-2.1	-57	-86	-143	-4.4
11	-7 (1%)	-5	-2	-7	-0.2	-0.0	-0.2	-6	-9	-15	-0.4
Total	-140 (20%)	-103	-42	-145	-3.7	-0.9	-4.6	-126	-189	-315	-9.5

Government Revenues

Decade	Change in Harvest ¹	Provincial Revenues (1993 \$millions)					Federal Revenues (1993 \$millions)			
		Stumpage	Other ²	Income Tax	Total Provincial	Corporate Taxes ³	Income Tax	Total Federal	Corporate Taxes ³	Total Federal
1-8	0	0	0	0	0	0	0	0	0	0
9	-70 (10%)	-0.6	-0.4	-0.6	-1.6	-0.1	-1.0	-1.1	-0.1	-1.1
10	-63 (10%)	-0.5	-0.4	-0.4	-1.3	-0.1	-0.9	-1.0	-0.1	-1.0
11	-7 (1%)	-0.1	-0.1	-0.03	-0.2	0	-0.2	-0.2	0	-0.2
Total	-140 (20%)	-1.2	0.9	-1.0	-3.1	-0.2	-2.1	-2.3	-0.2	-2.3

- 1 Thousand cubic metres.
- 2 Comprised of logging, corporate, sales, property, and utility revenues.
- 3 Comprised of corporate income tax, excise and withholding taxes.

