

**BULKLEY TIMBER SUPPLY AREA
SOCIO-ECONOMIC ANALYSIS**

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Table of Contents

<u>Section</u>	<u>Page</u>
Executive Summary	i
1.0 Introduction.....	1
1.1 Background	1
1.2 Objectives and Methodology	1
1.3 Report Structure	2
2.0 Community Profile	3
2.1 Study Area	3
2.2 Population.....	3
2.3 Education.....	3
2.4 Community Services.....	6
2.5 Economic Development	6
2.6 First Nations Community.....	7
2.6.1 Bands, Reserves and Populations	7
2.6.2 Land Claims	7
2.6.3 First Nations Economic Activities	7
2.6.4 First Nations Commercial Fisheries	8
2.6.5 First Nations Community Concerns and Values.....	9
3.0 Environment Profile	11
3.1 Biogeoclimatic Zones	11
3.2 Biodiversity.....	12
3.3 Fish and Wildlife	12
3.3.1 Fisheries and Fish Habitat	12
3.3.2 Wildlife and Wildlife Habitat	12
3.4 Protected Areas.....	13
3.5 Outdoor Recreation.....	13
4.0 Economic Profile.....	15
4.1 Background	15
4.2 Forestry	16
4.2.1 Pacific Inland Resources	16
4.2.2 Repap Smithers Inc.....	17
4.2.3 Kyah Forest Products Ltd	17
4.2.4 Other Forestry Operations	17
4.3 Mining	18
4.4 Agriculture.....	18
4.5 Tourism	19
4.5.1 Tourism Attributes	19
4.5.2 Tourism Industry	20
4.6 Government Sector	22

5.0	Current TSA Management and Forestry Operations.....	23
5.1	Timber Harvesting Land Base	23
5.2	Current Management Practices.....	23
5.3	Management Zones	24
5.4	Harvest Forecasts.....	25
5.5	Allowable Annual Cut Apportionment.....	27
5.6	Fibre Supply.....	27
5.7	Employment Ratios.....	29
6.0	Scenario Assessments	31
6.1	Scenario 1 Assessment	31
6.1.1	TSA Economic Development Impacts.....	31
6.1.2	TSA Community Impacts	32
6.1.3	TSA First Nations Community Impacts.....	34
6.1.4	Provincial Economic Development Impacts	34
6.1.5	Provincial Government Revenues.....	35
6.1.6	Environmental Impacts	36
6.2	Scenario 2 Assessment	39
6.2.1	TSA Economic Development Impacts.....	39
6.2.2	TSA Community Impacts	39
6.2.3	TSA First Nations Community Impacts.....	40
6.2.4	Provincial Economic Development Impacts	40
6.2.5	Provincial Government Revenues.....	41
6.2.6	Environmental Impacts	41
6.3	Scenario 3 Assessment	43
6.3.1	TSA Economic Development Impacts.....	43
6.3.2	TSA Community Impacts	43
6.3.3	TSA First Nations Community Impacts.....	44
6.3.4	Provincial Economic Development Impacts	44
6.3.5	Provincial Government Revenues.....	45
6.3.6	Environmental Impacts	45
7.0	Summary and Conclusions.....	47
7.1	TSA Impacts.....	47
7.2	Provincial Impacts.....	49
7.3	Concluding Remarks	49
	Appendix A - Bibliography.....	53
	Appendix B - List of Contacts	55
	Appendix C - Glossary.....	57
	Appendix D - Technical Background.....	61
	Appendix E - Incremental Impacts	65

Tables

<u>Number</u>		<u>Page</u>
ES.1	Summary of TSA Accounts	iv
ES.2	Summary of Provincial Accounts	vi
1.1	Summary of Multiple Accounts.....	2
2.1	Education Levels Achieved	6
4.1	Basic Sector Dependence for Selected Areas	15
4.2	Labour Force by Industry for Bulkley Timber Supply Area	16
4.3	Bulkley-Nechako Agriculture Statistics.....	19
5.1	Bulkley TSA Timber Harvesting Land Base	23
5.2	Bulkley TSA Harvest Forecasts	26
5.3	Bulkley TSA AAC Apportionment.....	27
5.4	Bulkley TSA Harvest (1990-1992).....	28
5.5	Bulkley TSA Major Licensee Sawmill Fibre Supply and Consumption (1992)	29
5.6	Employment Ratios for Bulkley TSA AAC (1992)	29
6.1	TSA Economic Development Account: Scenario 1	31
6.2	Provincial Economic Development Account: Scenario 1	35
6.3	Provincial Government Revenues: Scenario 1	36
6.4	TSA Economic Development Account: Scenario 2	39
6.5	Provincial Economic Development Account: Scenario 2	41
6.6	Provincial Government Revenues: Scenario 2	42
6.7	TSA Economic Development Account: Scenario 3	43
6.8	Provincial Economic Development Account: Scenario 3	44
6.9	Provincial Government Revenues: Scenario 3	45
7.1	Summary of TSA Accounts	48
7.2	Summary of Provincial Accounts	50
E.1	TSA and Provincial Incremental Impacts: Scenario 1	65
E.2	TSA and Provincial Incremental Impacts: Scenario 2	66
E.3	TSA and Provincial Incremental Impacts: Scenario 3	67

Figures

<u>Number</u>		<u>Page</u>
ES.1	Bulkley TSA Harvest Forecasts	iii
2.1	Location of Bulkley TSA.....	4
2.2	Bulkley TSA.....	5



Executive Summary

Introduction

- The Bulkley Timber Supply Area (TSA), located in the northwestern portion of the British Columbia interior, is one of eight TSAs in the Prince Rupert Forest Region. Its boundaries correspond with those of the Bulkley Forest District and encompass an area of approximately 736 000 hectares (see Figures 2.1 and 2.2).
- This report assesses major socio-economic impacts associated with three harvest forecasts presented in the Bulkley TSA Timber Supply Analysis Report.¹

Multiple Accounts

- The socio-economic impacts are examined using a "multiple accounts" framework. Impacts are categorized and defined according to three TSA accounts (Economic Development, Community, and First Nations Community) and three provincial accounts (Economic Development, Government Revenues, and Environment).

Community Profile

- In 1991 the Bulkley TSA had a population of 10 900. The main communities, Smithers (pop. 5 029), Telkwa (pop. 960), and Moricetown (pop. 650), are located along the Bulkley River in the southern portion of the TSA. Educational opportunities, community services, and economic development initiatives in the TSA are described in Section 2.
- First Nations communities in the TSA include Moricetown and Fort Babine (pop. 135). A profile of First Nations communities including land claims, economic activities, and community values is presented in Section 2.6.

Environment Profile

- The two main biogeoclimatic zones in the TSA are Sub-Boreal Spruce (42 % of the land area) and Engelmann Spruce-Subalpine Fir (35 %).
- The area within the Bulkley Valley is important for maintaining biodiversity in the TSA and is currently under pressure from various land use activities. The main concern for biodiversity in the TSA is the change in forest structure resulting from timber harvesting.
- The TSA has several high quality fisheries, including the Babine River, the Zymoetz (Copper) River, the Bulkley River, and Babine Lake. The most important areas for fish habitat are tributaries to these waters.
- Wildlife species in the TSA include populations of grizzly bear, goat, and caribou. Currently, the Telkwa caribou herd is under stress for reasons that may include human activity and predation by wolves.
- Protected areas in the TSA include three provincial parks, as well as the Babine Mountains Recreation Area, the Babine River Wilderness Area, and the Telkwa Wildlife Management Area.

¹ Ministry of Forests. (1993). *Bulkley TSA Timber Supply Analysis*.

Executive Summary

- A variety of recreation activities are enjoyed throughout the area, both by residents and visitors to the region.

Economic Profile

- Forestry, agriculture, mining, and tourism are the main economic activities in the Bulkley TSA.
- Two major forest companies have sawmills in Smithers. A native-owned sawmill and several smaller sawmills are located elsewhere in the TSA.
- Agriculture, including mixed farming and cattle ranching occur throughout the area.
- Summer and winter tourism activity, mining equipment supply and service, guiding, and trapping round out the list of economic activities.

Current TSA Management and Forestry Operations

- Under current management practices, approximately 278 000 hectares in the Bulkley TSA are available for timber harvesting. One quarter of this area has special cover requirements to account for biodiversity and integrated resource management, including wildlife habitat and travel corridors, water conservation, aesthetics, and recreation values. The remaining area is managed for integrated resource management with an emphasis on resource development.
- The predominant merchantable species include balsam mixtures, spruce, lodgepole pine, and a small amount of hemlock.
- The current allowable annual cut (AAC) is 895 000 cubic metres, the majority of which is apportioned between major licensees (48.5 %), the Small Business Forest Enterprise Program (21.0 %), and temporary licences (27.4 %). The temporary licences will expire by 1996.
- Sawlog quality timber represents 59 % of mature timber volumes. However, there are also large volumes of timber classified as marginal sawlog (24 %) or pulplog (17 %).
- In the past two years, 87 percent of volumes harvested in the TSA were sawlog quality, seven percent were marginal sawlogs, and six percent were pulplogs.
- The harvest forecast for the TSA over the next 20 years indicates that the timber profile will consist of 39 percent pulp and marginal sawlog and 61 percent sawlog. This indicates that the log species profile presently harvested is not sustainable in the short-term.
- Most of the timber harvested in the TSA is processed by local mills, with wood chips being shipped out of the TSA for further processing.
- The current AAC is estimated to support 645 PY of direct employment in harvesting, transportation, silviculture, and processing. The AAC also contributes 157 PY of related employment in pulp and paper mills in Kitimat and Prince Rupert.

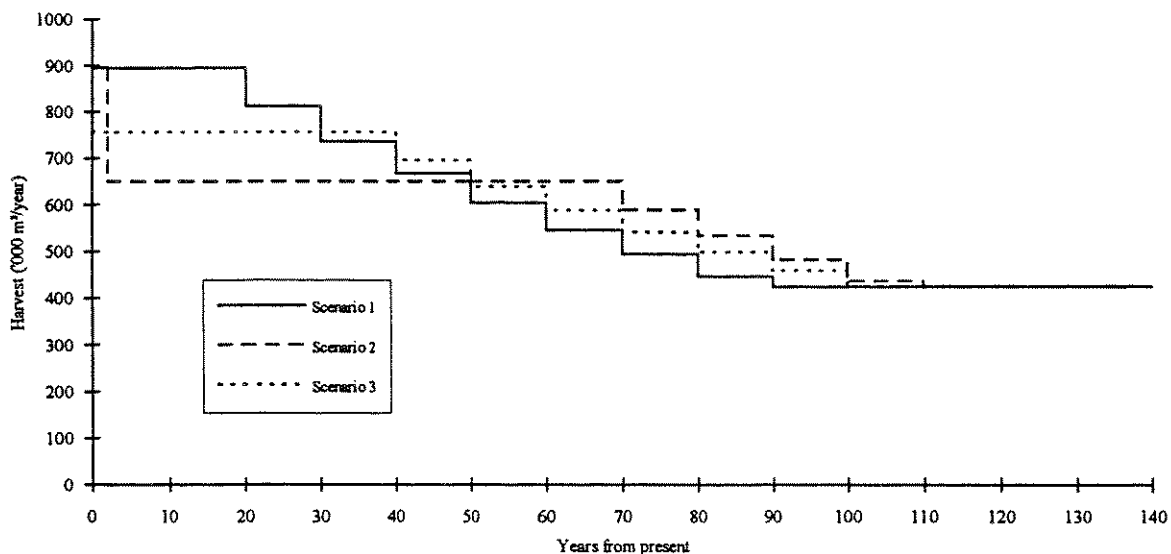
Harvest Forecasts

- Three harvest forecasts from the Bulkley TSA Timber Supply Analysis report were chosen to determine a range of possible socio-economic impacts. These harvest forecasts are meant for discussion purposes and do not imply that a particular harvest level is preferred. Figure ES.1 shows the harvest forecasts examined. The timber supply analysis estimated the long-term harvest level to be 424 000 cubic metres, which is 53 percent less than the current AAC.

Executive Summary

- Scenario 1, the base case from the timber supply analysis report, would maintain harvest at current AAC levels for two decades. Starting in the third decade, harvest would decline by approximately 9 percent per decade until the long-term harvest level is reached in year 90.
- Scenario 2 approximates the effects on harvest levels after the expiry of existing temporary licences. Harvest would continue at current AAC levels for two years. Thereafter, a harvest level of 650 000 cubic metres per year could be sustained for seven decades before declining to the long-term harvest level in Year 110.
- Scenario 3 illustrates the impacts associated with a forecast where the initial harvest level falls in between the starting levels of Scenarios 1 and 2. This is represented by a sensitivity analysis from the TSAR which assumes a five-pass harvest system. Harvest would be 755 000 cubic metres per year for four decades and then would drop 8 percent per decade, reaching the long-term harvest level in Year 100.

Figure ES.1 Bulkley TSA Harvest Forecasts



TSA Impacts

- The TSA impacts of each scenario are summarized in Table ES.1 and compared in the following discussion. Detailed results for each scenario are presented separately in the main report (see Sections 6.1, 6.2, and 6.3).

Economic Development

- Over the first two decades (Years 1-20), employment and employment income under Scenario 1 would remain at current levels. Scenario 2 would have the most severe impact during this period. Scenario 3 short-term employment and employment income impacts would be more moderate than those experienced under Scenario 2.
- Over the next three decades (Years 21-50), the employment and employment income impacts of the three scenarios would converge. Employment and employment income levels for Scenarios

Executive Summary

Table ES.1 Summary of TSA Accounts																
	Year	Scenario 1					Scenario 2					Scenario 3				
		1	3	20	40	110	1	3	20	40	110	1	3	20	40	110
Harvest ('000 m ³ /year)		895	895	812	667	424	895	650	650	650	424	755	755	755	695	424
Economic Development																
Employment (PY/year)	Direct	645	645	585	481	306	645	468	468	468	306	544	544	544	501	306
	Indirect	437	437	397	326	207	437	318	318	318	207	369	369	369	340	207
	Total	1 082	1 082	982	807	513	1 082	786	786	786	513	913	913	913	841	513
Labour Income (\$1992 millions/year)	Direct	\$20.0	\$20.0	\$18.1	\$14.9	\$9.5	\$20.0	\$14.5	\$14.5	\$14.5	\$9.5	\$16.9	\$16.9	\$16.9	\$15.5	\$9.5
	Indirect	9.2	9.2	8.3	6.9	4.4	9.2	6.7	6.7	6.7	4.4	7.7	7.7	7.7	7.1	4.4
	Total	29.2	29.2	26.4	21.8	13.9	29.2	21.2	21.2	21.2	13.9	24.6	24.6	24.6	22.6	13.9
Community		<ul style="list-style-type: none"> Impacts would be deferred until decade three, allowing TSA communities time to plan mitigation strategies. 					<ul style="list-style-type: none"> Impacts would be the most severe and occur almost immediately. 					<ul style="list-style-type: none"> Impacts would be immediate, but may be less severe than Scenario 2 due to fewer job losses. 				
Aboriginal Community		<ul style="list-style-type: none"> Least addresses aboriginal concerns related to land claims and preservation of resources having traditional and spiritual values; Lower negative impact on aboriginal employment in the forestry sector in the short-term. 					<ul style="list-style-type: none"> Best addresses aboriginal concerns related to land claims and preservation of resources having traditional and spiritual values; Higher negative impact on aboriginal employment in the forestry sector in the short-term. 					<ul style="list-style-type: none"> Somewhat addresses aboriginal concerns related to land claims and preservation of resources having traditional and spiritual values; Impact on aboriginal employment in the forestry sector would fall in between the impacts of Scenarios 1 and 2. 				

Executive Summary

1, 2, and 3 would decrease approximately 23, 25, and 20 percent below current levels respectively.

Community

- Scenario 1 would have fewer adverse impacts than Scenarios 2 and 3. Impacts would not be felt until the third decade, giving communities an opportunity to develop strategies for dealing with job losses and to mitigate some of the impacts.
- Employment and employment income losses under Scenario 3 are not as extreme as Scenario 2 impacts and, compared to Scenario 1, Scenario 3 may provide somewhat more flexibility for future land-use planning processes.

First Nations Community

- The lower harvest levels under Scenario 2 would best address First Nations concerns related to land claims and preservation of resources important to traditional and spiritual activities.
- The higher harvest levels under Scenario 1 may help ensure the viability of Kyah Forest Products Ltd.

Provincial Impacts

- A summary of provincial impacts is provided in Table ES.2.

Economic Development

- Impacts on provincial employment and employment income would reflect the TSA impacts described above. Scenario 1 would minimize short-term impacts and Scenario 2 would lead to the most severe short-term impacts. Scenario 3 impacts would fall in between those of Scenarios 1 and 2. By the end of the fifth decade there would be little difference between the three scenarios.

Government Revenues

- Government revenues would be affected in a similar manner. Under Scenario 1, annual government revenues would remain unchanged for the first two decades. Under Scenario 2, they would drop by \$5.4 million in Year 3, to \$14.5 million, and would remain at that level until Year 60.

Environment

- All scenarios examined involve a decline from the current AAC to the long-term harvest level, and therefore offer greater benefits to the environment than continuation of current harvest levels.
- All three scenarios incorporate important environmental management guidelines designed to protect habitat, fish and wildlife, and wilderness recreation opportunities. The benefits associated with these guidelines may have more important long-term implications for the environment than the absolute differences in scenario harvest levels examined in this report.
- The main difference between scenarios from an environmental perspective results from the timing of harvest reductions.

Executive Summary

Table ES.2 Summary of Provincial Accounts

	Scenario 1						Scenario 2						Scenario 3					
Year	1	3	20	40	110		1	3	20	40	110		1	3	20	40	110	
Harvest ('000 m ³ /year)	895	895	812	667	424		895	650	650	650	424		755	755	755	695	424	
Economic Development																		
Employment (PY/year)																		
Direct	802	802	727	597	380		802	582	582	582	380		676	676	676	622	380	
Indirect	1 202	1 202	1 091	896	570		1 202	873	873	873	570		1 014	1 014	1 014	934	570	
Total	2 004	2 004	1 818	1 493	950		2 004	1 455	1 455	1 455	950		1 690	1 690	1 690	1 556	950	
Labour Income (\$1992 millions/year)																		
Direct	\$25.3	\$25.3	\$23.0	\$18.9	\$12.0		\$25.3	\$18.4	\$18.4	\$18.4	\$12.0		\$21.4	\$21.4	\$21.4	\$19.7	\$12.0	
Indirect	27.2	27.2	24.7	20.3	12.9		27.2	19.7	19.7	19.7	12.9		22.9	22.9	22.9	21.1	12.9	
Total	52.5	52.5	47.7	39.2	24.9		52.5	38.1	38.1	38.1	24.9		44.3	44.3	44.3	40.8	24.9	
Government Revenues (\$1992 millions/year)																		
Stumpage and Rent	\$9.0	\$9.0	\$8.2	\$6.7	\$4.3		\$9.0	\$6.5	\$6.5	\$6.5	\$4.3		\$7.6	\$7.6	\$7.6	\$7.0	\$4.3	
Personal Income Taxes	5.8	5.8	5.3	4.4	2.8		5.8	4.2	4.2	4.2	2.8		4.9	4.9	4.9	4.5	2.8	
Other Taxes	5.2	5.2	4.7	3.9	2.5		5.2	3.8	3.8	3.8	2.5		4.4	4.4	4.4	4.0	2.5	
Total	20.0	20.0	18.2	15.0	9.6		20.0	14.5	14.5	14.5	9.6		16.9	16.9	16.9	15.5	9.6	
Environment																		
	♦ Most rapid liquidation of older age forest; ♦ Least flexibility for addressing future habitat, fish and wildlife, and recreation requirements.						♦ Slowest liquidation of older age forest; ♦ Most flexibility for meeting future habitat, fish and wildlife, and recreation requirements.						♦ Somewhat slower liquidation of older age forest than Scenario 1; ♦ Somewhat more flexibility than Scenario 1 for addressing future habitat, fish and wildlife, and recreation requirements.					

Executive Summary

- Harvesting of older forest proceeds would occur most rapidly under Scenario 1. The age class distribution of the forest would narrow and populations of species that depend on mature forests may decline. Also, Scenario 1, with its higher harvest levels in the short-term, may reduce flexibility for addressing future habitat, fish and wildlife, and recreation requirements.
- Scenario 2 would be preferred from an environmental perspective due to the lower harvest rate in early decades. The harvesting of older forest would proceed more slowly under this scenario. The lower harvest rates would allow greater flexibility in future land use planning processes.

Resource Management Issues

- The Bulkley TSA Timber Supply Analysis indicates that the current AAC could be continued for two decades before dropping to the long-term harvest level. This would allow TSA communities time to examine alternate resource management plans in the TSA. Impacts of the recently announced Forest Renewal Plan have not been included in this analysis. The Forest Renewal Plan will focus on sustaining forestry jobs and communities.
- The main short-term resource management issues in the TSA are the expiration of temporary licences, First Nations resource management concerns, and the changing harvest profile.

Harvest Profile

- Harvesting in the TSA must shift from spruce into pine and hemlock stands, and from high quality sawlogs into marginal sawlog and pulplog stands. Pacific Inland Resources is currently upgrading machinery to increase processing efficiency. Kyah Forest Products Ltd. is already experiencing difficulty in obtaining quality logs for its operation, and it can be expected that these difficulties will increase given wood profiles in the TSA.

Temporary Licences

- Impacts from changes in volumes associated with temporary licences would depend on the ability of licensees to supplement their TSA apportionment with logs from other sources (SBFEP purchases, private purchases, purchases from other TSAs).

First Nations

- First Nations groups have recently expressed concern over a number of resource management issues in the TSA and desire a formal commitment from government regarding consultation on resource development. Specifically, the Wet'suwet'en are seeking an assured log supply for Kyah Forest Products Ltd.



1.0 Introduction

1.1 Background

The B.C. Forest Service is presently conducting a provincial timber supply review to assist the Chief Forester in setting allowable annual cut (AAC) levels. The review examines the amount of timber available for harvesting in timber supply areas (TSAs) if current management practices continue. Four documents are being prepared for each of the province's 36 TSAs. Two technical documents (Timber Supply Analysis and Socio-Economic Analysis) offer information on timber supply and the social, environmental, and economic implications of changing timber harvest levels. A Discussion Paper summarizes the technical information and provides a focus for public discussion of issues surrounding timber harvest levels. A fourth report describes the rationale behind the Chief Forester's AAC decision.

1.2 Objectives and Methodology

The Bulkley TSA Timber Supply Analysis report was released in August, 1993.² Three harvest forecasts based on the timber supply analysis are examined in this socio-economic analysis. These forecasts represent possible harvest flow patterns given current land base and forest management practices in the Bulkley TSA. The forecasts were chosen to illustrate a range of social, environmental, and economic implications associated with different harvest levels. **The forecasts are not meant to suggest a preferred AAC level nor do they represent the only options that could be considered in the final AAC determination.**

As noted above, this report examines the social, environmental, and economic implications of harvest levels associated with current land base and forest management assumptions. There is also a Land and Resource Management Plan (LRMP) process underway in the Bulkley TSA which is examining land use alternatives and resource management practices. This socio-economic report can serve as a methodological and empirical reference for socio-economic analysis under the LRMP process.

The impacts of the three harvest forecasts are assessed within a "multiple account" framework. A multiple account analysis focuses attention on a range of values derived from the forest resource and recognizes that a number of factors may need to be considered when examining options for forest land management. The objective of multiple account analysis is to present the implications of alternatives in terms of these factors.

The multiple accounts framework used in this study, as outlined in Table 1.1, has been adapted from interim guidelines developed for land and resource management planning.³ The implications of the harvest forecasts are evaluated in terms of six accounts. Three accounts are used to consider economic development, community, and First Nations concerns from a TSA perspective. Provincial accounts include economic development, environmental implications, and government revenues. Information presented in each of the accounts was collected through in-person and

² Ministry of Forests, Integrated Resources Branch. (1993). *Bulkley TSA Timber Supply Analysis*. The Integrated Resources Branch is now called Resource Planning Branch.

³ Integrated Resource Planning Committee. (1993). *Social and Economic Impact Assessment for Land and Resource Management Planning in British Columbia: Interim Guidelines*.

1.0 Introduction

telephone interviews, and from a wide range of published and unpublished data sources. Some of the information was originally collected as part of the Bulkley TSA LRMP process. The assistance of Bulkley Forest District staff and individuals involved in the Bulkley TSA LRMP is gratefully acknowledged.

Table 1.1 Summary of Multiple Accounts	
TSA ACCOUNTS	
Economic Development	<ul style="list-style-type: none">• examines direct and indirect effects on employment and employment income in the TSA over the short- and long-term
Community	<ul style="list-style-type: none">• identifies effects on TSA population, services, and community goals;• examines effects on other aspects of community life in the TSA including stability, cohesion, and economic diversity
First Nations Community	<ul style="list-style-type: none">• examines impacts on First Nations communities in the TSA including cultural values and traditional activities
PROVINCIAL ACCOUNTS	
Economic Development	<ul style="list-style-type: none">• examines direct effects on employment and employment income in communities outside the TSA;• identifies total direct and indirect effects on employment and employment income in the whole province
Environmental Values	<ul style="list-style-type: none">• examines impacts on environmental resources valued by people because of their use or the importance attached to their existence and preservation
Government Revenues	<ul style="list-style-type: none">• examines impacts on government revenues derived from the timber resource
Source: Adapted from Integrated Resource Planning Committee (1993).	

1.3 Report Structure

Sections 2.0, 3.0, and 4.0, respectively, provide social, environmental, and economic profiles of the Bulkley TSA. Section 5.0 reviews the harvest forecasts and summarizes some of the timber supply analysis management assumptions. Section 6.0 presents the forecast analyses and Section 7.0 summarizes the results and offers conclusions. Appendices include a list of references, a glossary, a list of contacts, and a discussion of methodology.

2.0 Community Profile

2.1 Study Area

The Bulkley TSA is located in the coastal interior of B.C. and is one of eight TSAs in the Prince Rupert Forest Region (Figure 2.1). The boundaries of the TSA correspond to those of the Bulkley Forest District (Figure 2.2). The TSA spans the area between the Telkwa watershed in the south and the headwaters of the Nilkitkwa River in the north. The southern portion of the TSA is bisected by the Bulkley River Valley. The Bulkley, Telkwa, and Hudson Bay Ranges flank the western edge of the valley and the Skeena Mountains rise to the east. Part of the Sicintine and Bait Ranges reach in to the northern area of the TSA. The largest communities are Smithers, Telkwa, and Moricetown, all located in the Bulkley River Valley, along Highway 16 and the Canadian National Railway line.

2.2 Population

According to 1991 Statistics Canada census figures, the population of the Bulkley TSA was approximately 10 900. The town of Smithers⁴, the largest community in the area, had a population of 5 029, and the village of Telkwa, located 10 kilometres southeast of Smithers had a population of 960. These population statistics indicate that the population has increased seven percent since 1986. Other settlements in the area include the First Nations communities of Moricetown and Fort Babine. Moricetown has an estimated population of 650 and Fort Babine is home to approximately 135 people. These First Nations communities are described in more detail in Section 2.6. With the exception of the period from 1985 to 1987, the population of the TSA has grown steadily.

2.3 Education

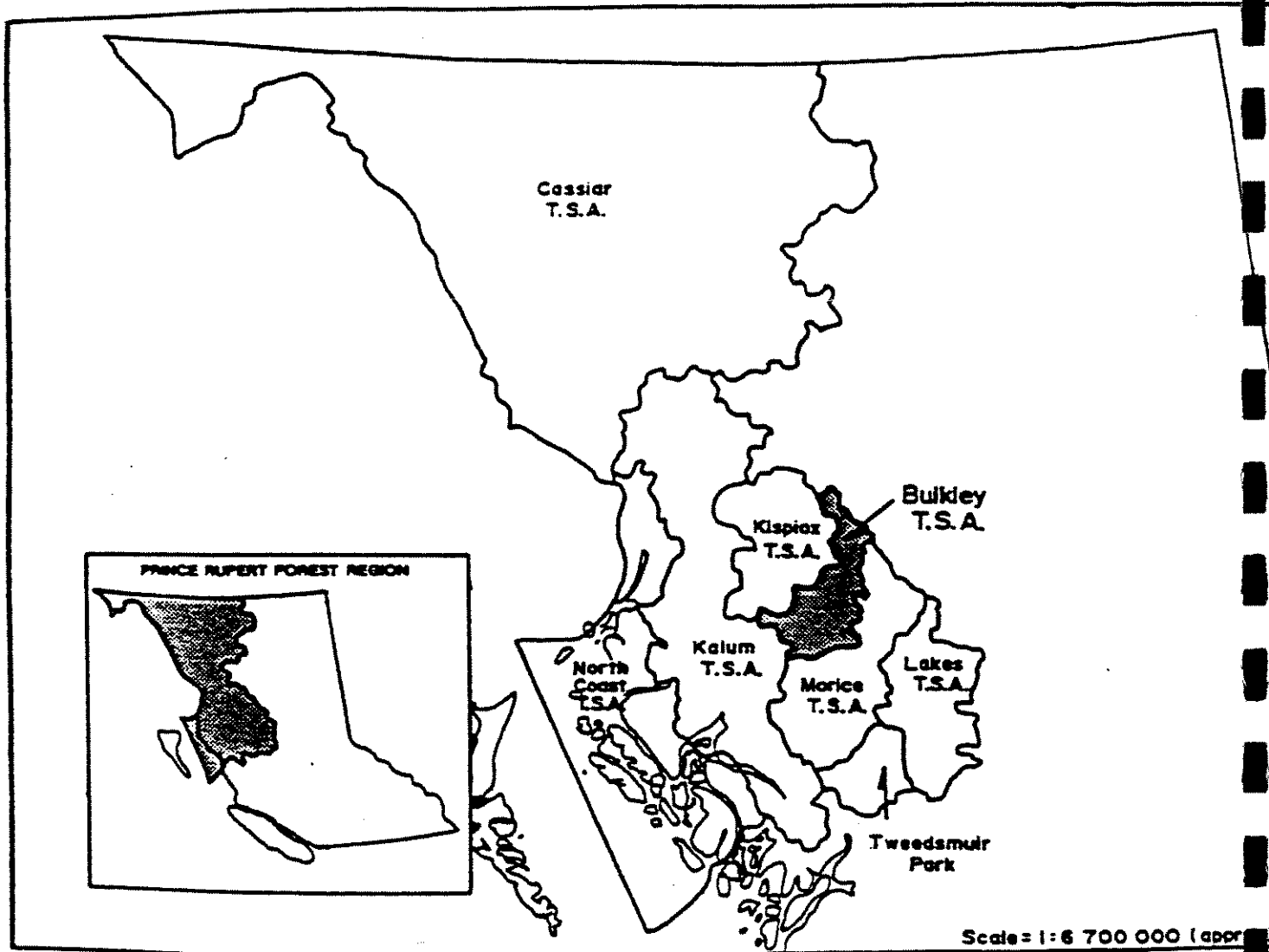
The percentage of population that has post-secondary education provides an indication of the availability of skilled labour in an area. Although data specific to the Bulkley TSA were not available, 1986 census statistics for the Smithers Local Health Area (which includes Houston), indicate that levels of education achieved compare favourably with provincial averages (see Table 2.1). Compared to other areas in northwestern B.C., Smithers has a higher percentage of individuals who have completed high school. This indicates that area residents may be better positioned to take advantage of advanced education and training programs.

Some post-secondary educational opportunities are available in Smithers through the Northwest Community College. The nearest post-secondary institution offering a full range of diploma and university transfer programs is the Terrace campus of the Northwest Community College. A significant proportion of students from the Smithers area, continuing their education at the post-secondary level, attend universities or colleges outside the region. The absence of a major academic institution in the northwest has been a significant drawback with respect to continuing education in the area. The new University of Northern British Columbia (UNBC) in Prince George may encourage individuals to continue their education and upgrade their skills, and there

⁴ Smithers will be officially designated a city in 1994.

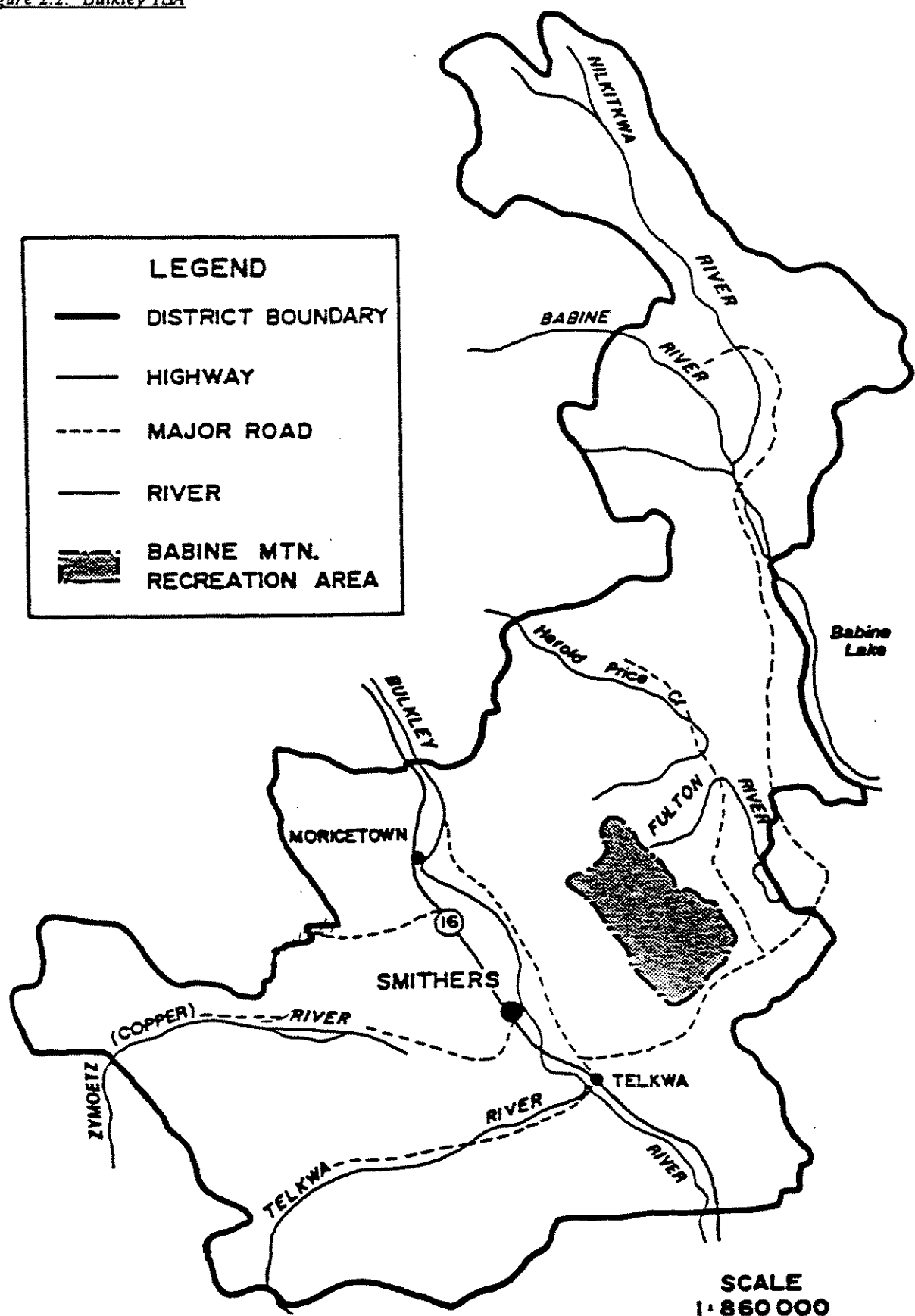
2.0 Community Profile

Figure 2.1: Location of Bulkley TSA



2.0 Community Profile

Figure 2.2: Bulkley TSA



2.0 Community Profile

is a possibility that the UNBC will offer extension courses in Smithers. The UNBC has also set up a fund to help increase post-secondary enrolment at educational institutions in northern B.C.

Table 2.1 Education Levels Achieved (% of population)		
Education Level	Smithers Area	B.C.
Less than Grade 9	11.1	11.2
Some High School	32.3	29.3
Completed High School	14.0	11.5
Trade School	24.7	26.4
Some University	8.7	10.7
Completed University	7.3	9.3
Source: Nicholls et al. (1992).		

2.4 Community Services

The town of Smithers serves as a health care centre for the immediate area and surrounding communities in the Bulkley TSA. In addition to the Bulkley Valley District Hospital, Health Unit Office, Ambulance Station, and Ministry of Social Services offices, most of the area's social service groups and programs are based in Smithers. Smithers Community Services Association has been established in the community for 20 years and currently offers 11 programs. Some of the services provided include employment counselling for individuals re-entering the workforce, early parenting and pregnancy support for young mothers, and a resident tenants program for young offenders. The association also operates the Smithers Youth Centre, the Smithers Volunteer Bureau, and the Smithers and District Transit Service. Other organizations offering programs include the Friendship Centre, Northwest Alcohol and Drug Services, and RCMP Victim Services.

2.5 Economic Development

Communities in the Bulkley TSA were included in an economic development strategy prepared for the Regional District of Bulkley-Nechako (RDBN) in 1991.⁵ This strategy identified some of the area's strengths, weaknesses, opportunities, and threats related to economic development. Local economic development initiatives underway in the TSA include updating economic development strategies for Smithers and Telkwa and the recent hiring of an economic development officer based in Smithers. Telkwa has completed their economic development strategy and Smithers has completed a draft of their strategy.

In 1990, the RDBN applied to the Canada Employment and Immigration Commission for acceptance as a Community Futures (CF) area. The application was approved in the spring of 1993 and six communities in the Bulkley Valley, including Smithers and Telkwa are eligible for assistance. The objective of the CF program is to assist communities facing severe labour market difficulties. The program helps communities assess problems, organize resources, and implement plans for local employment development and adjustment. The first CF initiative in the Bulkley

⁵ Crane Management Consultants Ltd. (1991). *Regional District of Bulkley-Nechako Economic Development Strategy*.

2.0 Community Profile

Valley will provide advice and extended financial support to individuals now receiving unemployment insurance or social assistance benefits, but who want to develop a small business.

2.6 First Nations Community

2.6.1 Bands, Reserves, and Populations

The Bulkley TSA is part of the traditional territories of the Gitksan-Wet'suwet'en and the Nat'oot'en peoples.⁶ The Wet'suwet'en community of Moricetown is situated along the Bulkley River northwest of Smithers. The community is made up of several small reserves and has an estimated population of around 650. The total population of the Moricetown Band is estimated to be 1 144 (1991), with many individuals living off the reserve and outside the TSA.

The Nat'oot'en people of Fort Babine are represented by the Carrier-Sekani Tribal Council. The community of Fort Babine is situated at the north end of Babine Lake and has a population of around 135 individuals. The Lake Babine Band has approximately 1 357 members (1991), many of whom reside outside the TSA, in Burns Lake and elsewhere.

2.6.2 Land Claims

One of B.C.'s largest land claims, approximately 5.8 million hectares around the Bulkley and Kispiox Valleys, is part of the Delgam Uukw action. The Gitksan and Wet'suwet'en peoples are seeking absolute title over their traditional territories, including ownership and jurisdiction over resources. A 1991 ruling by B.C. Supreme Court Chief Justice Allan MacEachern stated that aboriginal rights over the land had expired in the nineteenth century. In 1993, the B.C. Court of Appeal overturned this decision, stating that aboriginal rights had not been extinguished. While the Appeal Court said aboriginal rights are protected by the Canadian Constitution, the Appeal Court rejected the claim to outright ownership of traditional territories, including the right to harvest and manage all resources. The Gitksan - Wet'suwet'en Government decided to appeal this decision to the Supreme Court of Canada. In June, 1994, the Gitksan and Wet'suwet'en peoples and the province signed an agreement to adjourn the appeal for one year to allow treaty negotiations to begin. The Nat'oot'en people have also filed a land claim that covers a large part of the Bulkley TSA.

2.6.3 First Nations Economic Activities

Unemployment among aboriginal peoples in the Bulkley TSA is significantly higher than it is in other segments of the population, and both the Moricetown Band and the Lake Babine Band are interested in developing employment opportunities in the area. Options examined include commercial fisheries (see Section 2.6.4), forestry, and tourism.

⁶ See Gisday Wa and Delgam Uukw (1989) for a discussion on the history of Gitksan and Wet'suwet'en activities in the area. The Gitksan-Wet'suwet'en Government is one of 33 tribal councils in B.C. which deal with administrative, political, and land use issues on behalf of member bands.

2.0 Community Profile

The Fort Babine people recognize that the wilderness-like quality of the area in which they live has potential for supporting a fishing and hunting lodge. Fort Babine Enterprises Society, a Grouse Clan owned business, is currently constructing a lodge, twelve log cabins and serviced RV sites on Babine Lake.

By providing employment in rural areas, timber harvesting and associated transportation, manufacturing, and silviculture activities can provide important economic opportunities for aboriginal people. The Moricetown Band holds forest tenures in the Bulkley TSA and has developed a sawmill, Kyah Forest Products Ltd., in Moricetown. These contribute to employment and provide financial input to the Moricetown community (see Section 4.2). Many aboriginal people, trained at Kyah, have been successful in obtaining employment in larger mills in Hazelton and Smithers. The Repap sawmill employs approximately 20 aboriginal people, while Pacific Inland Resources (P.I.R.) has approximately six aboriginal people on staff. Aboriginal people from the Moricetown area have been employed by P.I.R. on a seasonal basis in a variety of activities including harvesting, road maintenance, silviculture, and road building. P.I.R. also has a road maintenance contract with band members from the Fort Babine area. Plans are in place to expand the equipment complement and hire more staff. P.I.R. is currently exploring the possibility of using a native owned forestry consulting company at Fort Babine to carry out work such as cruising, layout, road location, and general supervision. In addition, band members from Fort Babine and Moricetown have successfully completed a number of silviculture contracts designed to train forest workers and teach contract administration skills.

2.6.4 First Nations Commercial Fisheries

In 1993, the Gitksan-Wet'suwet'en Government and the Nat'oot'en signed a seven year agreement with the federal government for a commercial fishery on the Skeena, Bulkley, and Babine Rivers. The agreement is part of the commercial fishery taking place under the Aboriginal Fishery Strategy. Regulations under the agreement set out how the salmon fishery will be conducted by outlining terms and conditions for the sale of fish and for the monitoring of fishing activity. As part of the Aboriginal Fishery Strategy, the First Nations groups receive funding for fisheries research and co-management. Aboriginal people are receiving training as guardians to help with the enforcement and management of the fishery. In addition, the Aboriginal Fisheries Strategy provides for the collection of data about species and numbers of fish caught.

The Wet'suwet'en people can harvest up to 100,000 (75 000 for sale and 25 000 for food) pink salmon in the Moricetown Canyon. An agency, called the Gitksan - Wet'suwet'en Watershed Authority, presides over the fishery. All fish sales go through the GitWet Corporation, a holding company formed in 1992. This corporation buys salmon caught at predetermined locations only, not fish from the traditional food fishery.

For a number of years, the Nat'oot'en have sold "jack" sockeye to commercial canneries and to the public.⁷ The jacks are dip-netted at the Babine River counting fence. This fish fence is managed by Fort Babine Enterprises. Under the recent commercial fisheries agreement, the Nat'oot'en can also catch adult sockeye and sell them to the public and to canneries.

⁷ Jack are small sockeye and are considered a nuisance fish that can interfere with spawning.

2.0 Community Profile

2.6.5 First Nations Community Values and Concerns

Natural resources are sacred to aboriginal people because they are viewed as being part of the inter-connected relationship between the land, animals, humans, and the spirit world. To aboriginal people, environment includes all life forms and natural features in the area. Given this belief, some aboriginal people question the narrow focus on only certain natural elements in various land use plans. For example, during the development of options for the Babine River Area, the Fort Babine Nat'oot'en commented on the specific attention paid to grizzly bear management. They understood the special nature of this species from a non-native perspective, but in their view other animals are as important as the grizzly bear.

A traditional Nat'oot'en fishery existed at the site of the present fisheries weir on the Babine River. A traditional fishery has also been an important part of the history and culture of the Moricetown community. The Moricetown Canyon on the Bulkley River is ideal for fishing and this was the main reason why Moricetown was located there. For cultural reasons the traditional food fisheries are still important; however, commercial fisheries will potentially play a more important role in maintaining a livelihood for aboriginal people.

Trapping still occurs on territorial land and is an integral part of aboriginal life. It is important from an economic and sustenance perspective. The Fort Babine Nat'oot'en want to ensure that traditional trapping can continue in the future. They want protection of traplines in their territory, as well as protection of berry and herb picking sites. The people of Moricetown express similar views. They are concerned that land use activities such as forestry do not fully consider First Nations cultural values.

The Wet'suwet'en are emphasizing the education of their youth in the traditional language and activities of their people. In 1993, culture camps were held in four different locations in the Smithers-Houston area. Wet'suwet'en youth were instructed in language, history, and culture, including hunting and fishing techniques. Instructors for the camps were Elders associated with the territory in which the camp was located. There are plans to continue these camps in coming years.

In summary, aboriginal people want to be involved in the management of resources in their traditional territories. They want to see development of employment opportunities which utilize the TSA's resources in a sustainable manner.



3.0 Environment Profile

3.1 Biogeoclimatic Zones

The Bulkley TSA is located on the eastern drainage of the Skeena River and covers approximately 736 000 hectares. The area consists of two major and several minor biogeoclimatic zones: Sub-Boreal Spruce (42% of area), Engelmann Spruce-Subalpine Fir (35%), Interior Cedar-Hemlock (6%), Coastal Western Hemlock/Mountain Hemlock (5%) and Alpine Tundra (12%). These zones are described briefly below.⁸

The Sub-Boreal Spruce zone lies between the interior Douglas-fir forests to the south and the boreal forests to the north, and occurs primarily on gently rolling plateaus. Although the climate is severe, forest productivity is moderately good because the winters are shorter and the growing season longer than in boreal areas. Hybrid Engelmann-white spruce and subalpine fir are the dominant trees. In the Bulkley TSA, these areas are located primarily along the Bulkley River Valley and, in the northern portion of the TSA, along the Babine River and Babine Lake.

The Engelmann Spruce-Subalpine Fir zone is a subalpine zone occurring at high elevations throughout much of the interior. The climate is severe, with short, cool growing seasons and long, cold winters. The landscape at the upper elevations is open parkland with trees clumped and interspersed with meadow, heath and grassland. Engelmann spruce, subalpine fir, and lodgepole pine are the dominant species. These areas are located in the vicinity of the Telkwa and Babine Ranges in the Bulkley TSA.

The Alpine Tundra zone, found on high mountains in the Bulkley TSA, is essentially a treeless region characterized by a harsh climate. Long, cold winters and a short, cool growing season create conditions too severe for the growth of most woody plants, except in dwarf form. The zone is dominated by dwarf shrubs, herbs, mosses and lichens. This zone has high recreational appeal, and it provides important range for caribou, mountain goats and mountain sheep. Due to the severe climate it is extremely sensitive to use. Disturbed landscapes require decades, or even centuries to recover to their natural states.

The Interior Cedar - Hemlock zone occurs at lower to middle elevations in the interior wet belt of the province. In the Bulkley TSA this zone is located mainly in the western portion of the TSA around the Moricetown area. Winters are cool and wet and summers are generally warm and dry. This zone is the most productive in the interior and has the widest variety of coniferous tree species of any zone in the province. Western hemlock and western red cedar are characteristic species, but spruce and subalpine fir are also common.

The northern latitude rainforests comprising the Coastal Western Hemlock zone occur at low elevations in coastal areas. Western hemlock and amabilis fir are dominant trees. Abundant rainfall and mild temperatures make these forests the most productive in Canada. Small pockets of this zone can be found in the southwestern corner of the Bulkley TSA.

⁸ Information on biogeoclimatic zones is from *Biogeoclimatic Zones of British Columbia (1988)*.

3.0 Environment Profile

3.2 Biodiversity

Several biodiversity objectives have been incorporated into management assumptions outlined in the Bulkley TSA Timber Supply Analysis report (see Section 5.3). An important area for biodiversity in the TSA is the Sub-Boreal Spruce dry cool biogeoclimatic zone (SBSdk), which is the warmest sub-zone of sub-boreal spruce. This zone is located mainly along the Bulkley Valley. The area is important for spring bird migrations and ungulate winter range. It has high bioproductivity, but is under much pressure from various land use activities, including agriculture, forestry, and residential subdivision. The main concern for biodiversity in the TSA is the change in forest structure through clearcutting and the effect this has on wildlife. Many species need a complex forest structure to thrive.

3.3 Fish and Wildlife

3.3.1 Fisheries and Fish Habitat

There are several high quality recreational fishing opportunities within the Bulkley TSA. Two of five Class 1 rivers in the province are situated in the TSA.⁹ The Babine River, especially the area within the TSA, and the Zymoetz (Copper) River are considered internationally significant. The Babine River is the largest producer of sockeye salmon and steelhead trout in the Skeena drainage system. Large populations of chinook, coho and pink salmon, Dolly Varden char and cutthroat trout are also present. Next to the Fraser River system, the sockeye salmon population in the Skeena system is the largest in the province. The Bulkley River is a provincially significant Class 2 river. The TSA borders on the West Arm of Babine Lake which has the largest recreational sports fishery in the region. One area of the lake near Fort Babine, referred to as Rainbow Alley, is of international significance. In addition, there is angling in smaller lakes in the TSA. The most important areas for fish habitat are tributaries to the rivers mentioned above. In general, these tributaries are more important than the mainstems in terms of habitat for spawning and rearing.

3.3.2 Wildlife and Wildlife Habitat

The Bulkley TSA has populations of grizzly bear, mountain goat, and caribou. The Babine River watershed supports a provincially significant population of grizzly bears. In general, unregulated access and increased river use in the watershed would have a negative impact on grizzly bear populations. Access through grizzly bear habitat would typically increase poaching incidents and bear/human encounters.¹⁰ There is a high density of goat populations in the Telkwa, Hudson Bay and Bait Ranges and the Babine Mountains. The main concern related to goats is hunter and predator access. As timber harvesting shifts into the Engelmann Spruce-Subalpine Fir biogeoclimatic zone, access to goat habitat will increase which could place stress on goat populations. The Bulkley River Valley area has mule deer populations and the main concern with this species is the loss of mature forest on winter range. The area around Coffin Lake, in the

⁹ The Classified Waters system was implemented in 1990 to protect the superlative fishing opportunities on a group of 42 highly productive and popular trout streams. As angling pressures increase, the intent is to maintain a quality fishery over the long-term.

¹⁰ Babine Technical Advisory Committee. (1991). *Options for the Babine River*.

3.0 Environment Profile

southern region of the TSA, is of primary concern. However, most mule deer winter range in the TSA is located on private land.¹¹

There are some wildlife populations under stress in the Bulkley TSA. The Telkwa caribou herd range, which overlaps the Bulkley and Morice Forest Districts, is being affected by timber harvesting in areas of high elevation winter range and because of increased access to the area. The herd requires intensive study to determine factors contributing to their decline.

3.4 Protected Areas

In 1992, there were three cabinet approved study areas in the TSA under the Protected Areas Strategy (PAS): Babine River, Smithers Landing and the Howson.¹² Planning and public review are well advanced on the Babine River study area. A joint Ministry of Forests and Ministry of Environment, Lands and Parks decision regarding the Babine River recommended maintaining the wilderness qualities of the area adjacent to the river. Priority conservation and recreation values have been identified and are set out in the Babine River Interim Local Resource Use Plan.¹³

The Smithers Landing study area was designated a Provincial Park in 1993. This small area, on Babine Lake, was set aside primarily as a recreation reserve. The Howson study area in the Telkwa Mountains covers a large territory which overlaps the Bulkley and Morice TSAs. Resource issues in this area require a more thorough assessment. The Ministry of Forests and the Ministry of Environment, Lands and Parks have signed an agreement supporting the establishment of a wildlife management area in the Telkwa Mountains for the protection of high elevation forest habitat of woodland caribou and other species.

Other protected areas in the Bulkley TSA include the provincial parks Tyhee Lake and Driftwood Canyon, and the Babine Mountains Recreation Area. These areas are excluded from the timber harvesting land base. Provincial park use in the Bulkley TSA has been growing over the last five years. Estimates of use in 1992 are as follows:¹⁴

- Babine Mountains Recreation Area - 855 overnight visits, 14 670 day visits;
- Driftwood Canyon Provincial Park - 11 158 day visits;
- Tyhee Lake Provincial Park - 14 534 overnight visits, 102 746 day visits; and,
- Smithers Landing Provincial Park- 4400 visits.

3.5 Outdoor Recreation

The numerous and varied recreation activities occurring year round in the Bulkley TSA are testimony to the quality of the area's environmental attributes. Some of the activities include fishing, hunting, wildlife viewing, hiking, camping, kayaking, canoeing, rafting, cross-country and downhill skiing, snowmobiling, horseback trail riding, and mountaineering. These activities are

¹¹ Personal Communication. Ministry of Environment, Lands and Parks, Smithers.

¹² Ministry of Environment, Lands and Parks and Ministry of Forests. (1992). *Towards a Protected Areas Strategy for B.C. Parks and Wilderness for the 90s*.

¹³ Ministry of Environment, Lands and Parks and Ministry of Forests. (1993). *Draft Babine River Interim Local Resource Use Plan*.

¹⁴ Personal Communication. Ministry of Forests, Bulkley District Office, Smithers.

3.0 Environment Profile

enjoyed by TSA residents and by visitors from outside the area (see Section 4.5). Several areas in the TSA possess high quality wilderness recreation opportunities and attract visitors from the U.S. and overseas.

The greatest landscape assets of the Bulkley TSA are the mountains, lakes and rivers. The mountains, and the well established trails leading into them, provide a variety of opportunities for rock climbing, ice climbing, hiking, horseback riding and hunting enthusiasts. Babine Lake and approximately 40 smaller upland lakes offer numerous opportunities for angling. The rivers, in addition to providing angling experiences, also contribute to kayaking, canoeing and rafting activities. Activities such as snowmobiling, cross-country skiing, and hiking are dispersed across the TSA. In addition to provincial parks, there are nine official Forest Service recreation sites, 35 kilometres of groomed cross-country ski trails and many hiking trails. Wildlife viewing, as well as hunting and fishing, have benefited from timber harvesting because of access roads. The TSA currently has a good balance between areas easy to access from resource roads and areas that are not roaded.¹⁵

Statistics on recreation activity levels are difficult to determine. However, the best estimates available from the Ministry of Environment, Lands and Parks and the Ministry of Forests indicate that participation in most recreation activities is growing. Another indication of the high level of interest in outdoor recreation and the environment is the large number of outdoor recreation and nature related clubs based out of Smithers. Bulkley TSA residents place a great deal of importance on maintaining the quality of the area's natural resources.

¹⁵ Personal Communication. Ministry of Environment, Lands and Parks, Smithers

4.0 Economic Profile

4.1 Background

An analysis of community dependencies conducted in 1993 shows the importance of forestry to many communities in northwestern B.C.¹⁶ Table 4.1 illustrates basic sector dependence for the Smithers-Houston area and two nearby areas.¹⁷ In all areas, forestry is an important sector. In the Smithers-Houston area 44 percent of all basic income depends on forestry. Tourism (10% of basic income), investment income (10%) and mining (8%) are the next most important sectors. It appears that tourism and mining both play a more important role in the Smithers-Houston area than in nearby areas.

Table 4.1 Basic Sector Dependence for Selected Areas												
Area	Percent of Basic Income											
	FOR	MIN	F&T	AG	TOU	H&E	OTH	UN	PEN	INV	TRA	SOC
Smithers-Houston	44	8	0	3	10	0	5	7	7	10	3	3
Burns Lake	51	0	0	4	5	2	5	7	9	11	3	3
Hazelton	63	0	2	2	2	2	4	8	6	4	3	3
Source: Horne, G. and L. Robson. (1993).												
Notes: 1. Basic sectors in the table include forestry, mining, fishing and trapping, agriculture, tourism, health and education, other (government, parts of transportation, manufacturing, construction), unemployment insurance, pension, investment, other transfer payments and social assistance payments.												

Another indication of the diversity of the economic base in the Bulkley TSA can be determined by examining employment in each sector. The 1991 labour force by industry for the Bulkley TSA is shown in Table 4.2.

The labour force is defined to include both employed and unemployed individuals and, therefore, the labour force numbers presented in Table 4.2 exceed the direct employment estimates found elsewhere in the report. The average 1993 unemployment rate estimated by Statistics Canada for the northeast and northwest region of B.C. was 9.4 percent.¹⁸

¹⁶ Horne, G. and L. Robson. (1993). *British Columbia Economic Dependencies*.

¹⁷ Basic sector activity is defined to be activity which responds to demands from outside the community, or money which flows into the community. It is assumed that basic sector activity drives a community's economy.

¹⁸ The unemployment rates quoted are for Region 98/99 (northeast and northwest B.C.) and represent the smallest data area available from Statistics Canada for the northern part of B.C.

4.0 Economic Profile

Table 4.2 Labour Force by Industry for Bulkley Timber Supply Area

Industry	Labour Force	% Labour Force
Forestry	455	8
Agriculture	285	5
Mining	150	3
Fishing	20	<1
Manufacturing	650	11
Construction	410	7
Transportation	505	9
Communication & Utilities	80	1
Retail and Wholesale	1 040	18
Business Services	330	6
Accommodation Services	360	6
Government, Education & Health	1 150	20
Other	365	6
Total Labour Force	5 800	100

Source:

Statistics Canada 1991 Census Data

Notes:

1. Forestry includes forestry and logging.
2. Manufacturing includes the wood processing sector as well as other manufacturing.
3. Transportation includes some transportation associated with the forestry and wood processing sectors.
4. Business Services includes finance, insurance and real estate.
5. Accommodation Services includes food and beverage services.

4.2 Forestry¹⁹

Forestry based activities have long been a major component of the economy in the Smithers area. The principal forest industry operations in the Bulkley TSA are described in this section. A detailed description of current TSA management related to forestry is provided in Section 5.0

4.2.1 Pacific Inland Resources (P.I.R.)

P.I.R., a division of West Fraser Mills Ltd., operates a sawmill and a whole log chipper in Smithers. At capacity the sawmill utilizes about 700 000 cubic metres per year of sawlogs. Sawlog consumption in 1992 was about 644 000 cubic metres. Shop grade and clear products from the sawmill are shipped to Prince George to Canadian Woodworks Ltd., in which West Fraser has a minority interest. In addition to lumber manufacturing, P.I.R. has a whole log chipper that processes grade four and five logs not suitable for lumber production. The chipper presently utilizes 180 000 cubic metres per year of pulplogs. In 1992, total chip production from the sawmill and the whole log chipper amounted to about 157 000 bone dry units (440 000 cubic metres solid wood equivalent). Chips are transported to the Eurocan Pulp Mill (also a West Fraser operation) in Kitimat for processing. By-products from P.I.R., in the form of shavings and trim ends are utilized in two facilities. Northwest Panel Board Plant uses shavings and sawdust to produce particle board used in furniture making. P.I.R. is a major supplier of raw material to this Smithers plant which employs approximately 50 people. Trim blocks from P.I.R. are shipped to Quensel Laminators where they are used in door frames, window frames and mobile trailer

¹⁹ This section provides a general description of milling operations in the TSA. Section 5 provides a more detailed profile of TSA forestry operations.

4.0 Economic Profile

construction. Six full time people are employed in the Smithers plant for the ripping and grading of trim blocks. P.I.R. is currently purchasing low quality timber (pulplogs) from other licensees and the Small Business Forest Enterprise Program in two additional TSAs.

4.2.2 Repap Smithers Inc.

Repap Smithers Inc. is a wholly owned subsidiary of Repap Enterprises Inc. Repap Enterprises Inc. operates several production facilities in the Prince Rupert Forest Region. These include a bleached kraft pulp mill in Prince Rupert, a sawmill in Terrace, a sawmill in South Hazelton, a whole log chipper in New Hazelton and the sawmill in Smithers. The Smithers mill (formerly Groot Lumber Ltd.) was purchased in 1987. It produces finished forest products largely for Japanese, European and Australian markets. The sawmill is capable of processing logs up to 60 centimetres in diameter. Mill capacity is 225 000 cubic metres per year and 1992 log consumption was approximately 216 000 cubic metres. At the present time it operates on a two shifts basis, 250 days a year employing about 90 people. All chips produced by Repap operations in the Prince Rupert Region are transported to Skeena Cellulose in Prince Rupert. Repap Smithers chip production in 1992 was approximately 31 000 bone dry units (86 400 cubic metres solid wood equivalent).

4.2.3 Kyah Forest Products Ltd.

Kyah Forest Products Ltd. (formerly Moricetown Sawmill) is a native owned and operated sawmill located in Moricetown, which has historically exported rough, green lumber to Europe. The present Kyah mill is a two-line operation, with a scragg for small logs and a circular saw headrig for large logs (up to 150 centimetres in diameter). The mill began operation in 1986 and expanded in 1991. A whole log chipper was also installed to satisfy the requirements of a temporary timber sale licence obtained in 1984. Kyah is supplied with wood from licences held by the Moricetown Band Council (see Section 5.5), but it has a chronic shortage of quality, large logs. In the past four years the mill has not been able to operate year-round due to difficulties in acquiring logs and because of destruction of the chipping facility in a fire. When the mill is in operation it runs one shift, employing about 35 people. Another 14 people are employed in logging operations. Kyah represents the main local source of employment in the Moricetown community.

4.2.4 Other Forestry Operations

Several smaller mills in the TSA include Alpine Cedar Products, Veenstra Sawmills, Mount Seaton (planer mill) and Seaton Timber. In addition to the major wood processors in the Bulkley TSA, there is a large forestry service sector based out of the Smithers area. This includes various companies and consultants providing services such as logging, engineering, cruising, silviculture and hauling. As well, the Ministry of Forests District and Regional offices are located in Smithers.

4.0 Economic Profile

4.3 Mining

Although there are no mines actively operating in the Bulkley TSA, Smithers is one of the main supply and service points for mineral exploration and development in northern B.C.. Crews fly in and out of Smithers to northern mines on a rotational basis throughout the year. The convenience of daily flights, fixed wing, float plane and permanent helicopter bases makes Smithers an attractive base for mining-related activities. Many mining consultants, drilling operations, exploration companies, prospectors and surveyors are also based out of Smithers and Telkwa.

Deposits of molybdenum, copper, gold, silver and coal are found in the Smithers area. However, mineral exploration and mining activity is depressed compared to activity five years ago. Sagging mineral prices and uncertainty related to the many land planning processes in B.C. have contributed to a decline in activity. Exploration and evaluation expenditures in the Bulkley TSA in 1992 were \$933 500 for eight exploration programmes. This activity employed approximately 46 people. Studies are currently on-going to develop the Telkwa coal deposit which straddles the north and south banks of the Telkwa River. Such a project would have an economic impact in the area over the 10-15 year life of the project. A copper mine has been proposed by New Canamin Resources Ltd. of Vancouver. The site for this mine is situated just outside the Bulkley TSA, near Houston, but economic spin-offs are already benefiting Telkwa and Smithers. New Canamin Resources Ltd. has made a decision to hire locally and the project manager, geologist and camp workers are from the Smithers area. Seven sand and gravel quarries in the TSA also provide employment to local residents.

4.4 Agriculture

The richest agricultural areas in the Bulkley TSA are located in the Bulkley Valley. The main agricultural enterprise is cattle and dairy production. Beef and dairy herds utilize rangeland and locally produced forage. Members of the Bulkley Valley Dairymen's Association provide milk and milk products to most of northwest B.C. Dairyland has constructed a milk processing plant and a bulk storage plant in Smithers. A high percentage of farmers in the TSA supplement their farm income by working in the forest industry in some capacity.

Approximately 90 000 hectares in the Bulkley TSA are part of the agricultural land reserve. Of this total area, about 50 000 hectares are currently being utilized for some type of agriculture. Some of the remaining area in the agricultural reserve is forested, but it is considered arable. These arable lands are removed from the timber harvesting land base in the Bulkley TSA Timber Supply Analysis. As land is cleared for agricultural purposes timber is harvested and sold to local sawmills. In the short-term, the agricultural land reserve is contributing to timber supply in the TSA. However, once harvested this land may not be reforested.

There is potential for growth in the beef industry in the Bulkley Valley. The agriculture land base in the area is mostly suited to ranching and beef production rather than more intensive agriculture such as mixed farming. There is approximately 10 000 animal unit months (AUMs)²⁰ of utilizable

²⁰ The amount of forage required for one month by an average beef cow, aged six months or older.

4.0 Economic Profile

forage available within the Bulkley Stock Range.²¹ It is estimated that there will be a moderate increase in demand for range in the future. Existing Crown range production in the Bulkley TSA is approximately 6 100 AUMs.

Agriculture statistics specific to the Bulkley TSA are not available, but figures for Bulkley-Nechako Subdivision B from the 1991 Census of Agriculture provide some indication of the importance of agriculture to the region (Table 4.3).

Table 4.3 Bulkley-Nechako Agriculture Statistics	
Total number of farms	258
Total area of farms (ha)	55 057
Land in crops (ha)	20 000
Cattle and calves (No. of farms reporting)	159
Market value land and buildings (\$)	71 611 687
Wages and Salaries (\$)	2 362 258
Total Gross farm receipts (\$)	11 303 517
Forest products sold (No. of farms reporting)	28
Forest products sold (\$)	879 941
Sources: Statistics Canada 1991 Census of Agriculture Ministry of Agriculture, Fisheries and Foods	
Notes: 1. These figures reflect agriculture enterprises in Subdivision B of the Bulkley-Nechako Census Division and the geographical boundaries do not correspond exactly with the Bulkley TSA.	

4.5 Tourism

The tourism industry in the Smithers area, particularly outdoor/adventure tourism, has become a significant and growing component of the local economy (see Table 4.1). Although tourism ranks below forestry in terms of employment and employment income, it represents one possible opportunity for economic development in the area. Smithers, located halfway between Prince George and Prince Rupert, is an overnight or refreshment stop for highway travellers. Traffic volumes continue to grow due to highway improvements and the growing number of ferry passengers embarking or disembarking at Prince Rupert. Furthermore, Smithers benefits from being located along one of two highway routes to Alaska. Recently, the tourism industry in the Smithers area has expanded into the outdoor/adventure market. The area is well endowed with scenic attractions and abundant wildlife populations, making it extremely well suited to both winter and summer outdoor/adventure tourism activities.

4.5.1 Tourism Attributes

A 1991 study of tourism in northwestern B.C. revealed that tourism in this area is linked to the area's natural features, particularly for the non-resident component.²² According to 1989 figures,

²¹ A stock range is an administrative boundary. The Bulkley Stock Range coincides with the Bulkley TSA boundary.

²² Ethos Consulting. (1991). *Natural Resource Based Tourism in Northwestern British Columbia*. Northwestern B.C. refers to the North by Northwest Tourist Region which encompasses a large geographical area, including communities along the Yellowhead Highway 16 and the Stewart-Cassiar Highway 37.

4.0 Economic Profile

27 percent of resident travellers and 59 percent of non-resident travellers had a trip purpose that was natural resource-based. The Bulkley TSA has exceptional natural attributes that make the area attractive to both resident and non-resident travellers. These have been outlined in detail in Section 3.0 and are summarized as follows:

- high quality recreational fishing opportunities including two Class 1 (Babine and Zymoetz) rivers and one Class 2 (Bulkley) river and an internationally significant recreational sports fishery on Babine Lake near Fort Babine;
- abundant and diverse wildlife, including grizzly bear, caribou and goat populations which provide excellent opportunities for wildlife viewing and hunting;
- numerous mountain ranges and valleys offering a variety of opportunities for a broad range of outdoor activities, including rock climbing, ice climbing, hiking, trail riding, cross-country skiing and downhill skiing; and,
- numerous lakes and rivers offering a variety of opportunities for water-based recreation including kayaking, canoeing, rafting and fishing.

The Smithers region's natural attributes indicate potential to expand the tourism industry, but other areas in B.C. have similar attributes and compete for market share. Southern regions have the advantage of being easily accessible from the province's large population centres. However, the Smithers area offers wilderness opportunities which are diminishing as resources are developed in the more accessible regions of the province. If wilderness opportunities in the Smithers area are maintained the region's appeal to visitors may increase.

4.5.2 Tourism Industry

Historically, the tourism industry in the Smithers area has consisted of accommodation and food facilities which catered to highway travellers. In recent years, there has been an expansion of businesses catering to outdoor/adventure tourists. A 1992 study on tourism in the Smithers area identified 87 businesses that cater to tourists.²³ The tourism products offered by these businesses can be discussed in terms of touring products and outdoor/adventure products.

Communities in the Bulkley TSA are situated on the Yellowhead Highway 16 and have therefore benefited from touring traffic using this route to Alaska and the Inside Passage. Future growth in the touring market is expected to be negligible as higher gas prices and the popularity of resort destination travel is resulting in a decline in touring. However, due to their location enroute to Alaska and the Inside Passage (increasingly popular travel destinations), it may be expected that activity in Bulkley TSA communities from this type of travel will continue at present levels. In 1989, 37 percent of visitors to the North by Northwest Tourist Region indicated that they were passing through the area and 30 percent indicated that their primary destination was Alaska.²⁴

In the North by Northwest Tourism Region, outdoor/adventure tourism products (guide outfitting, fishing lodges and resorts, and other adventure activities) represented 14 percent of all

²³ ARA Consulting Group. (1992). *Economic Impact of Tourism on Smithers and Surrounding Area*. These include 68 outdoor/adventure businesses and 19 accommodation facilities.

²⁴ Ministry of Economic Development, Small Business and Trade and Department of Industry Science and Technology Canada. (1991). *Visitors '89*.

4.0 Economic Profile

non-resident visitor activity in 1991. This was six percent above the B.C. average. In 1992, there were approximately 68 businesses providing outdoor/adventure products in the Smithers trading area. Some of these businesses are located outside TSA boundaries, but, as in the mining industry, Smithers is used as a staging area for clients. Operators may specialize in one type of product or they may offer a variety of products at one site. These operators typically offer services to only a few clients at any one time and therefore the number of clients served annually is quite small. Sixty-eight percent of tourism-dependent businesses experienced a growth in revenues in 1990. The median growth rate was five percent over 1989 revenue levels, and 74 percent of operators felt that their revenues would continue to grow in 1991.²⁵ The potential for growth in this sector will depend on maintaining high quality mid- and back-country recreational experiences.

The Bulkley TSA is divided into five guide-outfitting territories. Hunting opportunities include moose, deer, wolf, mountain goat, caribou, grizzly and black bear. It is estimated that approximately 81 percent of northwestern B.C. guide-outfitter clients are from the U.S. The main concern of guide-outfitters is maintaining wilderness hunting experiences for the international market. As more roads go into these areas (from timber harvesting and mining exploration and development), hunting activity by local residents could increase. This could lead to more hunting pressures which would affect guide-outfitter operations.

The five fishing lodges in the Bulkley TSA attract clients primarily from western Canada (48% of clients) and the U.S. (41%). The sports fishing and fishing lodge industry is largely dependent on fishing quality, but scenic beauty and remoteness are also features which clients rate highly.²⁶ The northwest region is famous for its trophy sized steelhead from the Skeena system, which includes the Babine and Bulkley Rivers. Rainbow trout are also a prized species. As with guide-outfitting, increasing access to remote areas will reduce the wilderness quality of the sports fishing product. This could have an impact on fishing lodge operations. Another contentious issue which will affect the sports fishing lodges is allocation of fish between commercial, aboriginal and local recreational fisheries. Currently, the local Steelhead Association is concerned about declining steelhead populations and the possible link to commercial fishing at the mouth of the Skeena.

The interest in adventure tourism has stimulated growth in the number of businesses offering unique adventure tourism products. A number of these businesses are based out of the Bulkley TSA, but many also operate in other parts of northwestern B.C. Some guide-outfitters and fishing lodge operators are becoming involved in adventure tourism as well. Adventure tourism products include:

- ice climbing, ski mountaineering and rock climbing courses and packages;
- day trip or week long dog sled excursions;
- rafting and canoeing trips;
- guided snowmobile tours;
- guided trail rides;
- guided day hikes and backpacking tours;
- outdoor education programs; and,

²⁵ ARA Consulting Group. (1992). *Economic Impact of Tourism on Smithers and Surrounding Area*.

²⁶ Ethos Consulting. (1991). *Natural Resource Based Tourism in Northwestern British Columbia*.

4.0 Economic Profile

- guided backcountry skiing.

These operations rely on a relatively unspoiled natural resource base. To date, the scenic, wildlife and wilderness attributes of the Smithers area have made it a viable contender in the outdoor/adventure tourism market. However, increased access and resource development may reduce the potential for this component of the tourism industry to provide stable jobs and income in the long-term.

In addition to the activities and products noted above, Ski Smithers, a downhill skiing operation is located 26 kilometres from the town of Smithers. Hudson Bay Mountain is promoted as one of the best downhill skiing areas in north central B.C. due to the long, reliable ski season, mix of ski terrain, and good snow conditions. Its popularity is reflected in an increasing volume of winter tourist trade, primarily from communities in the Prince George - Prince Rupert corridor. The hill attracts approximately 50 000 users per season.

4.6 Government Sector

As indicated in Table 4.2 the Smithers area has a significant government sector employment base. The federal government's nine agencies or offices include Environment Canada, Transport Canada, Health and Welfare Canada, Fisheries and Oceans, a Canada Immigration and Employment Centre, Canada Customs, Public Works Canada, Canada Post, and the RCMP. Nine provincial government ministries have offices in Smithers. These include the following ministries: Attorney General; Agriculture; Energy; Environment, Lands and Parks; Social Services; Small Business, Tourism and Culture; Forests; Transportation; Health; and Housing. Included in the government sector are education services (9 public schools, three private schools and Northwest Community College Smithers campus), medical services (48 bed Bulkley Valley District Hospital and 50 bed Bulkley Lodge), and municipal government services such as the Smithers Fire Department.

5.0 Current TSA Management and Forestry Operations

5.1 Timber Harvesting Land Base

Table 5.1 summarizes the timber harvesting land base as estimated in the Bulkley TSA Timber Supply Analysis.²⁷ The Bulkley TSA covers a total area of 736 000 hectares with approximately 278 000 hectares comprising the timber harvesting land base. The timber harvesting land base is defined by reducing the total land base according to specific management assumptions. The following areas were not part of the timber harvesting land base: non-Crown areas; non-forest areas; non-commercial cover areas; inoperable areas; environmentally sensitive areas; non-merchantable forest types; and specific area exclusions.²⁸ Forest cover requirements are assigned to the timber harvesting land base for protection of non-timber values (see Sections 5.2 and 5.3). One quarter of the timber harvesting land base has special cover requirements to account for wildlife habitat and travel corridors, water conservation, aesthetics, and recreation values. The remainder is managed for integrated resource use (see Section 5.3). A more detailed version of this table can be found in the Bulkley TSA Timber Supply Analysis report.

Table 5.1 Bulkley Timber Supply Area Timber Harvesting Land Base			
Classification	Area (ha)	Area (ha)	% TSA area
TSA area		736 005	100
Non-Crown land	(62 231)		8
Non-forest land	(194 329)		26
Total Crown forest		479 445	65
Reductions to Crown forest	(212 133)		29
Additions	10 368		1
Timber harvesting land base		277 680	38
Future Reductions	(15 412)		2
Long-term timber harvesting land base		262 268	36
Source: Ministry of Forests, Integrated Resources Branch. (1993)			
Notes: 1. Reductions to Crown forest include non-merchantable forest, inoperable forest, environmentally sensitive areas and protected areas 2. Additions include current and backlog NSR (not satisfactorily restocked) areas 3. Future reductions include losses to future roads			

5.2 Current Management Practices

Timber supply is determined by forestry management practices, as well as the size of the timber harvesting land base. The Bulkley TSA Timber Supply Analysis report describes timber supply based on current management practices. Staff in the Bulkley Forest District provided descriptions of the following management practices: basic silviculture, unsalvaged losses, utilization level, minimum harvest ages, cutblock adjacency, and green-up guidelines and forest cover objectives. Current management practices for the Bulkley TSA, which are summarized below, are described in greater detail in the Bulkley TSA Timber Supply Analysis report.

²⁷ A more detailed version of this table can be found in the Bulkley TSA Timber Supply Analysis report.

²⁸ In the Bulkley TSA specific areas excluded from the timber harvesting land base are the Babine River Wilderness, the Telkwa Wildlife Management Area, arable agricultural land in the Bulkley Valley, and road, skid trail, and landing areas.

5.0 Current TSA Management and Forestry Operations

Harvesting Systems - Most areas are managed using a clearcutting harvest system followed by planting. However, selection management and diameter limit harvesting are being practiced in some forest stands.

Unsalvaged Losses - Unsalvaged losses are estimated to be 32 000 cubic metres per year. These losses are deducted from gross volumes to produce the net volumes shown in the timber supply forecasts.

Utilization Level - All coniferous species over 15 centimetres in diameter at breast height are utilized.

Minimum Harvest Ages - Harvest age depends on many factors, including the ages of surrounding stands, limits on overall harvest level, and forest cover requirements. In general, sawlog stands must reach 150 cubic metres per hectare and an average stand diameter of 25 centimetres at breast height. Marginal sawlog and pulplog stands must reach 175 cubic metres per hectare and a 20 centimetre diameter. Minimum harvest ages range from 70 to 160 years, with an average of about 95 years.

Cutblock Adjacency, Green-up and Forest Cover Objectives - Cutblock adjacency and green-up requirements specify the spatial pattern of cutblocks and amount of time required for regenerated stands to reach a specified condition before adjacent timber can be harvested. Forest cover objectives specify the desired distribution of areas by age or size class. The specific requirements set out for each management zone are discussed in the following section.

5.3 Management Zones

To address important forest management considerations in the TSA, the Bulkley TSA Timber Supply Analysis divides the timber harvesting land base into nine different management zones. These management zones consist of land base areas which can be managed with a common forest cover prescription. These zones and associated management practices are summarized below.

Integrated Resource Management Zone (IRM) - The IRM Zone includes all areas not specifically assigned to another zone and represents 75 percent of the total timber harvesting land base. Current management in this zone is three-pass harvesting (no more than 33% of the area may be below the green-up height of three metres at any time). This zone is subdivided into five sub-zones based on tree species and log quality considerations.

Riparian Zone - The Riparian Zone encompasses a connected network of lands adjacent to streams and rivers throughout the TSA. These corridors, ranging from 200 to 400 meters wide, protect wildlife habitat and wildlife movement routes. Cover requirements stipulate that 70 percent of the area must be 80 years of age or older.

Babine Special Management Zone - The Babine Special Management Zone is designed to maintain the wilderness qualities of the Babine riparian corridor and buffer the Babine River. This zone has been established approximately one kilometre on either side of the proposed Babine

5.0 Current TSA Management and Forestry Operations

River Wilderness Area and is subject to particular cover requirements. At most 30 percent of the area may contain trees under 10 metres tall, and at least 30 percent must be 140 years of age or older.

Grizzly Zone - The Grizzly Zone is based on mapping of high quality grizzly bear habitats and is located in the northern part of the TSA. The cover requirement is that 50 percent of the area be 140 years or older.

Smithers Community Forest Zone - The Smithers Community Forest Zone was set aside in order to demonstrate various timber harvesting practices, as well as to provide recreational and educational trails. Some of this area is visible from Highway 16 and the town of Smithers. Timber harvesting will take place, but not at the same rate as in IRM areas. The cover requirements are that at most 15 percent of the area may be less than five metres tall, and at least 40 percent must be older than 100 years.

Visual Quality Objective (VQO) Zones - Visual quality objective zones define a level of acceptable landscape alteration resulting from timber harvesting activities. Three zones are designated in the Bulkley TSA.

- (i) **Retention VQO Zone** - In the retention VQO zone, a maximum of five percent of the forested area may be less than five metres tall, in order to ensure that landscape alterations from harvesting activity are not easily visible. The retention VQO areas are located along Babine Lake, Nilkitkwa Lake and Nilkitkwa River in the northern part of the TSA, and along the Zymoetz (Copper) River and the Telkwa River in the southern portion of the TSA. Smaller retention VQO zones are scattered in other areas of the TSA.
- (ii) **Partial Retention VQO Zone** - In the partial retention VQO zone a maximum 15 percent of the area may be less than five metres tall. In these areas, alterations to the landscape are visible but not conspicuous. These areas are located throughout the TSA.
- (iii) **VQO plus Riparian Zone** - The VQO plus riparian zone accounts for overlaps between retention, partial retention and riparian areas. A maximum of 10 percent of the area may be less than five metres tall, and at least 70 percent of the area must be aged 80 years or older.

Future Roads Zone - This zone consists of 7.5 percent of all areas over 80 years of age in the timber harvesting land base. No cover requirements apply. The area is harvested at a steady rate over a 60 year period and does not regenerate to forest after harvest.

5.4 Harvest Forecasts

Based on the timber harvesting land base and management assumptions outlined in the previous sections, the Bulkley TSA Timber Supply Analysis generated harvest forecasts. These included a base case harvest forecast, as well as forecasts based on sensitivity analyses.²⁹ This report examines three harvest forecasts, which were chosen to illustrate a range of possible social, economic, and environmental impacts.

²⁹ Sensitivity analyses examine how uncertainty in data and assumptions affect the outcome of the timber supply analysis.

5.0 Current TSA Management and Forestry Operations

These harvest forecasts are meant for discussion purposes and do not imply that a particular harvest level is preferred. All three forecasts involve a decline from the current AAC of 895 000 cubic metres per year to a long-term harvest level of 424 000 cubic metres per year. However, the timing of the decline varies with each forecast. The harvest flows for each forecast are shown in Table 5.2.

Table 5.2 Bulkley TSA Harvest Forecasts			
Year	Scenario 1	Scenario 2	Scenario 3
Current	895 000 m ³	895 000 m ³	895 000 m ³
1	895 000	895 000	755 000
2	895 000	895 000	755 000
3	895 000	650 000	755 000
10	895 000	650 000	755 000
20	812 000	650 000	755 000
30	736 000	650 000	755 000
40	667 000	650 000	695 000
50	604 000	650 000	639 000
60	546 000	650 000	588 000
70	494 000	589 000	541 000
80	447 000	533 000	498 000
90	424 000	482 000	458 000
100	424 000	436 000	424 000
110	424 000	424 000	424 000

Source:
Ministry of Forests, Integrated Resources Branch. (1993).

Notes:
1. Scenario 1: base harvest forecast from the Bulkley TSA Timber Supply Analysis.
2. Scenario 2: harvest forecast if no temporary licences are issued after 1996.
3. Scenario 3: harvest forecast with initial harvest level between Scenario 1 and 2 starting levels.

Scenario 1, the base harvest forecast in the timber supply analysis report, maintains the harvest at current AAC levels for two decades. Starting in the third decade (Year 20), the harvest declines by approximately nine percent per decade until the long-term harvest level of 424 000 cubic metres per year per year is reached in year 90.

Scenario 2 represents the harvest forecast if the volumes associated with existing temporary licences are not reallocated after 1996.³⁰ A harvest level of 650 000 cubic metres per year is sustainable for seven decades. Starting in the eighth decade (Year 70), the harvest declines by approximately nine percent per decade, reaching the long-term harvest level of 424 000 cubic metres per year in year 110.

Scenario 3 illustrates the impacts associated with a forecast where the initial harvest level falls in between the starting levels of Scenarios 1 and 2. This is represented by a sensitivity analysis from the TSAR which assumes a five-pass harvest system.³¹ The harvest can be sustained at 755 000 cubic metres per year for four decades and then drops by eight percent per decade to the long-term harvest level of 424 000 cubic metres per year in Year 100.

³⁰ See Section 5.5 for a description of temporary licences in the Bulkley TSA.

³¹ In a five-pass harvest system, no more than 20 percent of the timber harvesting land base may be below the specified green-up height.

5.0 Current TSA Management and Forestry Operations

5.5 Allowable Annual Cut Apportionment

The current AAC for the Bulkley TSA was set in 1991 and is apportioned as shown in Table 5.3. The harvest level in the TSA was increased in 1983 from 650 000 cubic metres per year to 895 000 cubic metres per year in recognition of temporary timber sale licences. The two temporary timber sale licences, issued in 1983/84 to P.I.R. and the Moricetown Band Council, restrict harvesting to opportunity wood timber types, primarily balsam and hemlock stands. P.I.R.'s temporary timber sale licence (200 000 cubic metres per year) expired in October, 1993. However, the B.C. Forest Service invited applications for a new, two-year, temporary licence in the TSA. Applications for this licence were reviewed and P.I.R. was issued a forest licence to harvest 140 000 cubic metres annually of marginal sawlog and pulp timber. This licence runs from November, 1993 to January, 1996. Over the same period, 60 000 cubic metres per year will be allocated to the Small Business Forest Enterprise Program (SBFEP). Thus, the overall apportionment in the TSA remains at 895 000 cubic metres per year. The Moricetown Band temporary timber sale licence (45 000 cubic metres per year) will expire in August, 1994.

Table 5.3 Bulkley Timber Supply Area AAC Apportionment (1992)			
	m ³ /year	m ³ /year	% of total AAC
Forest Licences			
Repap Smithers Inc.	122 882		
West Fraser Mills Ltd. (Pacific Inland Resources)	311 562		
Sub-Total		434 444	48.5
Timber Sale Licences			
Moricetown Band Council	14 250		
Sub-Total		14 250	1.6
Small Business Forest Enterprise Program (SBFEP)			
Category 1	128 370		
Category 2	20 920		
Bid Proposals	36 186		
Timber Sale Licences	2 830		
Sub-Total		188 306	21.0
Temporary Licences			
Moricetown Band Council	45 000		
West Fraser Mills Ltd. (Pacific Inland Resources)	200 000		
Sub-Total		245 000	27.4
Forest Service Reserve		6 500	.7
Woodlot Licences		6 500	.7
Total Allowable Annual Cut		895 000	100
Source: Ministry of Forests, Timber Harvesting Branch.			
Note: These figures do not incorporate the changes to apportionment made in late 1993.			

5.6 Fibre Supply

The traditional sawlog harvest profile in the Bulkley TSA consists of spruce, lodgepole pine and the taller one-third of the balsam inventory. Sawlog quality timber represents 59 percent of

5.0 Current TSA Management and Forestry Operations

existing mature timber volumes. However, there are also large volumes of balsam and hemlock timber classified as marginal sawlog (24%) or pulplog (17%). All three types of timber contribute to the harvest flow potential in the TSA.

Table 5.4 presents timber harvest estimates for the Bulkley TSA based on volumes billed for stumpage under existing licences. These figures indicate that harvest levels in the TSA have been close to the current AAC.³² Data gathered for the timber supply analysis indicates that 13 percent of volumes harvested in the past two years were of pulp or marginal sawlog quality and 87 percent were of sawlog quality. The harvest forecast for the TSA over the next 20 years indicates that the timber profile would consist of 39 percent pulp and marginal sawlog and 61 percent sawlog. This indicates that the log species profile presently harvested is not sustainable in the short-term. Harvesting must shift from spruce stands into pine and hemlock, and from high quality sawlogs into marginal sawlog and pulplog stands.

Table 5.4 Bulkley Timber Supply Area Harvest (1990-1992)			
	1990	1991 '000 m ³	1992
Forest Licences	476	398	437
Timber Sale Licences	252	248	189
Small Business Forest Enterprise Program	195	127	152
Woodlot Licences	7	3	2
Licence to cut	34	32	56
Total Licensed Harvest	964	808	836
Source: Valuation Branch, Ministry of Forests			

Table 5.5 presents figures for fibre supply and consumption for P.I.R. and Repap Smithers. These figures indicate that both mills rely on fibre from sources other than their Bulkley TSA licences. Figures for all mills in the TSA are not available, but Bulkley Forest District staff indicate that the TSA is a net importer of wood from other TSAs. This is consistent with results from a recent study of the northwest forest industry which indicated a shortage of sawlogs or, alternatively, over capacity in the lumber processing sector in the Bulkley TSA³³.

Virtually all of the timber harvested in the Bulkley TSA is processed by local mills and only wood chips are shipped out of the TSA.³⁴ This indicates that the SBFEP volume in the TSA is an important source of fibre for the larger mills. The analysis in Section 6.0 assumes that the Forest Service Reserve volumes are available for timber harvesting. Some of this volume is currently being utilized and it is expected that this will continue in the future.

³² The annual harvest may vary by + or - 50%, provided the total harvest for the five year cut control period is within + or - 10%.

³³ Ministry of Forests, Economics and Trade Branch. (1993b) *The Northwest Forest Industry: An Overview of Current Wood Fibre Supply, Consumption and Processing Capacity*.

³⁴ Some wood does leave the TSA for processing elsewhere, but in the past five years this amount has been consistently less than five percent of scaled volumes.

5.0 Current TSA Management and Forestry Operations

Table 5.5 Bulkley TSA Major Licensee Sawmill Fibre Supply and Consumption (1992)					
Licensee	Bulkley TSA Apportionment	Mill Capacity (m ³)	Log Consumption	Bulkley TSA AAC Share (%)	Other Sources
Pacific Inland Resources	512 000	700 000	644 000	80	20
Repap Smithers	122 882	225 000	216 000	57	43
Source: Licensee information					
Notes: 1. P.I.R. also has a whole log chipper which utilizes approximately 180 000 cubic metres per year of pulp logs per year.					

5.7 Employment Ratios

In order to estimate employment and employment income impacts associated with the harvest forecasts presented in Section 5.4 it is necessary to determine employment ratios associated with forestry activities in the Bulkley TSA. The ratios used are calculated from information presented in Section 5.0 (current AAC apportionment, fibre flow) and information provided by licensees. A complete discussion of methodology is included in Appendix D. Estimated employment ratios (person-years³⁵ of employment per 1 000 cubic metres of harvested timber) for the Bulkley TSA are presented in Table 5.6.

Table 5.6 Employment Ratios for Bulkley TSA AAC (1992)			
Activity	PY	PY/000 m ³	Employment Income per PY
Harvesting	231	0.26	\$34 400
Processing	363	0.41	\$29 100
Forestry Services/Silviculture	51	0.06	\$28 700
Total TSA	645	0.72	\$31 000
Sources: Industry information Ministry of Forests, Bulkley Forest District Ministry of Forests, Economics and Trade Branch Statistics Canada			
Notes: 1. See Appendix D for a discussion of methodology. 2. Harvesting includes logging, road maintenance, gravelling, road construction and hauling. 3. Forestry/silviculture includes silviculture activities and cruising/development. 4. Total TSA figures refer to employment related to the Bulkley TSA AAC occurring inside the TSA. 5. Total TSA employment income per PY is a weighted average (by PY) of TSA employment incomes. All employment income figures are reported in after-tax \$1992 dollars.			

³⁵ A person-year (PY) is a standard measure of employment that allows comparison of part-time, seasonal full-time, and full-time employment. In this study one PY is equivalent to 1 800 hours of work.



6.0 Scenario Assessments

This section assesses the major economic, social and environment related impacts of the forecasts presented in Section 5.0. Impacts under three TSA accounts and three provincial accounts are discussed separately for each forecast. The analysis uses current relationships in the Bulkley TSA (fibre flow, employment ratios, cut apportionment) to examine the impacts of changes in timber supply. The analysis does not predict how these relationships might change should Bulkley TSA harvest levels change.

6.1 Scenario 1 Assessment

6.1.1 TSA Economic Development Impacts

The harvest of timber in the Bulkley TSA generates direct employment and employment income in harvesting, hauling, processing, and silviculture.³⁶ Indirect employment and employment income is created in sectors supplying inputs to the forest industry and from spending of forestry related employment income. Decade-by-decade estimates of TSA employment and employment income associated with Scenario 1 harvest levels are shown in Table 6.1.³⁷

Table 6.1 TSA Economic Development Account: Scenario 1							
Year	Harvest '000 m ³ /year	Employment PY/year			Employment Income \$1992 millions/year		
		Direct	Indirect	Total	Direct	Indirect	Total
Current	895	645	437	1 082	\$20.0	\$9.2	\$29.2
1	895	645	437	1 082	20.0	9.2	29.2
2	895	645	437	1 082	20.0	9.2	29.2
3	895	645	437	1 082	20.0	9.2	29.2
10	895	645	437	1 082	20.0	9.2	29.2
20	812	585	397	982	18.1	8.3	26.4
30	736	530	360	890	16.4	7.6	24.0
40	667	481	326	807	14.9	6.9	21.8
50	604	435	295	730	13.5	6.2	19.7
60	546	393	267	660	12.2	5.6	17.8
70	494	356	241	597	11.0	5.1	16.1
80	447	322	218	540	10.0	4.6	14.6
90	424	306	207	513	9.5	4.4	13.9
100	424	306	207	513	9.5	4.4	13.9
110	424	306	207	513	9.5	4.4	13.9

Notes:

1. Sources of direct employment and direct employment income include harvesting, transportation, processing, and silviculture. See Appendix D.
2. The estimated employment coefficient for the Bulkley TSA is 0.72 PY per 1 000 m³. See Appendix D.
3. Indirect employment for the TSA is obtained by dividing indirect employment income by an average annual after-tax income of \$21 000 (\$1992). See Appendix D.
4. The average annual after-tax income for a TSA forest industry employees is \$30 965 (\$1992). See Appendix D.
5. Indirect employment income for the TSA was derived using an income multiplier of 1.46. See Appendix D.
6. All employment income is after-tax.
7. The employment estimates indicate that every PY of direct forestry employment in the TSA supports 0.68 PYs of indirect employment in the TSA.

³⁶ Employment and employment income estimates do not include Ministry of Forests employment. Employment in the Ministry of Forests may be related more directly to government policy and budget decisions than to the volume of wood harvested and it is uncertain how this will change in the future. Currently, the Bulkley TSA AAC supports approximately 47 PYs of employment and \$1.3 million in employment income. See Appendix D.

³⁷ To allow comparisons between scenarios, Years 1, 2, and 3 are shown for each scenario. Harvest levels for Scenario 2 change during these years.

6.0 Scenario Assessments

Under Scenario 1, annual TSA employment and after-tax employment income remain constant at current levels during the first and second decades. In total, 1 082 PY of employment and \$29.2 million in employment income would be generated annually in the TSA in the first two decades. In Year 20, harvest levels would begin declining by nine percent per decade, with employment and employment income levels falling proportionally. The initial reduction in harvest (83 000 cubic metres per year) would lead to a direct job loss of 60 PY and an indirect job loss of 41 PY. The total job loss (100 PY) would be associated with a \$2.7 million drop in employment income. When the long-term harvest level (424 000 cubic metres per year) is reached in Year 90, total employment and employment income level off at 513 PY and \$13.9 million respectively.

6.1.2 TSA Community Impacts

Documentation on how employment losses affect forestry based communities in B.C. is limited. A recent study places possible impacts into two categories: worker/family based impacts and community based impacts.³⁸ Worker/family impacts include social/psychological stress, social service planning and worker re-employment/re-training. Community based impacts include economic stress and community adjustment initiatives. This section discusses potential impacts on individuals and communities in the Bulkley TSA as harvest declines under Scenario 1. This information will also be used in subsequent sections to examine impacts under Scenarios 2 and 3.

As harvest levels remain unchanged for the first two decades of Scenario 1, impacts from job losses would not be felt until the third decade. Communities in the TSA would therefore have time to plan for future job losses and could potentially mitigate some of the negative impacts. Recent trends in the Bulkley TSA, such as a growing population and an increasing emphasis on diversification, may enable forestry job losses to be partly offset by increased employment in other sectors. This would reduce the severity of the impacts described below.

The distinction between individual or family impacts and overall community impacts is an important one. In Scenario 1, initial job losses (direct and indirect) in the TSA at the beginning of the third decade are approximately 100 PY. It is unlikely that this would cause severe consequences in the TSA at the community level. However, individuals who lose their jobs are placed under stress. Signs of stress include increases in domestic violence, substance abuse, suicide and marital breakdown. Negative impacts on children related to changes in parental roles and family financial difficulties are common. These impacts are reflected in increases in school drop out rates. The degree to which these signs of stress could manifest themselves as the result of job losses in the Bulkley TSA is difficult to predict with existing information. However, it is useful for the TSA communities to be aware of potential problems so that effective social service, worker re-employment and re-training programs can be developed. Some of the community services and education opportunities now available in the Smithers area were discussed in Section 2.0. Programs may need to expand and be adapted to better meet individual needs as job losses occur.

³⁸ B.C. Ministry of Employment and Investment. (1993). *Resource Based Community Adjustments*.

6.0 Scenario Assessments

The job loss estimates for Scenario 1 (and the other scenarios) assume that workers leave the community once becoming unemployed.³⁹ However, there is evidence to suggest that many workers have strong ties to their communities. A report from the Pacific Northwest region of the U.S. suggests that an unemployed forest worker may choose one of three options: (1) stay in the community with the hope of finding another job in the forest industry, using unemployment insurance and/or social assistance to get by; (2) stay in the community and adopt a subsistence lifestyle relying on community programs such as food banks and short-term jobs, or; (3) remain in or near the community, but seek retraining and/or work in another industry.⁴⁰ The quality of life in the Smithers area and local environmental attributes provide a strong inducement to stay. Should similar or worse economic conditions and problems exist elsewhere in B.C., there would be little inducement for individuals to move from the Smithers area. Those who do leave in search of other opportunities tend to be younger, more skilled, and more occupationally mobile individuals. If these comments hold true in the Smithers area, the short-term indirect job loss estimates may overstated.

Older workers losing jobs would experience the most difficulty, due to large financial and family responsibilities leading to less flexibility in re-training or re-location. Another vulnerable group in the forestry sector are the young, inexperienced workers and part-time or seasonal workers, who have less job security than full-time permanent employees. Individuals working in marginal forestry sector operations that are not competitive under existing conditions would also be vulnerable when harvest reductions occur.

As Scenario 1 harvest levels continue to decline toward the long-term harvest level and job losses increase, the impacts would become large enough to affect TSA communities as a whole. Signs of economic distress are declines in real wage and income levels, declines in retail sales and increases in the numbers of those collecting unemployment insurance and social assistance. Many communities in northern B.C. were hard-hit by the economic recession of the early 1980s. Information on the Smithers area indicates that the community was affected by this recession, but to a lesser degree than surrounding communities. Smithers was able to bounce back and in recent years has had growth in population and growth in the number of jobs in the community. Per capita income levels have remained at or near provincial averages. The number of individuals making unemployment insurance claims fell between 1988 and 1990, but has since increased. Local economic development initiatives described in Section 2.0 may improve the area's ability to respond to pressures caused by job losses.

An examination of communities that have responded effectively to job losses indicates that these communities have focused on consensus seeking, public involvement, goal definition, and detailed specification of community objectives.⁴¹ The Bulkley Valley Community Resources Board was formed two years ago and is now involved in assisting with the development of a Land and Resource Management Plan (LRMP) for the Bulkley Forest District. One of the board's primary responsibilities is to consult with the public and represent the various value perspectives of the

³⁹ See Horne, Garry and Lee Robson (1993). *British Columbia Economic Dependencies*. The local area income multiplier used in this study is based on the assumption that there will be out-migration of unemployed workers from the study area or that unemployed workers in the study area do not have access to income support programs. In the short term, this would not necessarily be the case for reasons outlined above.

⁴⁰ Lee, Robert. (1993). "Effects of federal timber sales reductions on workers, families, communities and social services" in *Building Toward a Balanced Solution: Position Papers on Northwest Forestry Issues*.

⁴¹ Ministry of Employment and Investment. (1993). *Resource Based Community Adjustments*.

6.0 Scenario Assessments

community. In this respect, communities in the Bulkley TSA are preparing to deal with the complicated issues arising from possible timber supply reductions.

6.1.3 TSA First Nations Community Impacts

As described in Section 2.0, aboriginal people in the TSA have benefited from sustenance and cultural values associated with the forest environment. Certain areas have particular importance and continuation of the current AAC for two decades under Scenario 1 may diminish the traditional values aboriginal people derive from the forest.

First Nations want the right to manage natural resources in their traditional territories and are therefore concerned about forest harvesting activities and depletion of resources before land claims are settled. Scenario 1 least addresses this concern as the harvest continues at current levels for two decades before gradually stepping down to the long-term harvest level.

However, as noted in Sections 2.6 and 4.2, forest industry activity is an important source of employment and employment income for aboriginal people in the Bulkley TSA. Kyah Forest Products Ltd. of Moricetown is currently experiencing difficulty in obtaining logs of suitable quality and size to operate their mill. While continuation of the current AAC for two decades would not remedy this situation, at least it would not add to the difficulties being faced by Kyah. In addition, continuation of the existing AAC for two decades may result in a more stable employment environment for aboriginal people working with P.I.R. and Repap Smithers.

6.1.4 Provincial Economic Development Impacts

Wood fibre from the Bulkley TSA creates employment and employment income outside the TSA in pulp and paper processing operations in Prince Rupert and Kitimat. The impact of declining harvest levels on these operations is captured in the Provincial Economic Development Account. The estimates provided in this account are inclusive of the employment and employment income impacts described in the TSA Economic Development Account.

Provincial employment and employment income impacts for Scenario 1 are presented in Table 6.2. During the first two decades, annual provincial employment and after-tax employment income associated with the Bulkley TSA harvest remain at current levels (2 004 PY and \$52.3 million). It is estimated that processing of Bulkley TSA wood chips, in pulp and paper operations, creates 157 PY of employment annually during this period.

The initial reduction in harvest levels (83 000 cubic metres per year) in Year 20 would lead to a total direct job loss of 74 PY and a total indirect job loss of 112 PY. The total job loss (186 PY) would be associated with \$4.9 million in employment income. Provincial employment and related income fall in proportion to the decline in harvest levels, to 950 PY and \$24.9 million when the long-term harvest level (424 000 cubic metres per year) is reached in Year 90.

6.0 Scenario Assessments

Table 6.2 Provincial Economic Development Account: Scenario 1

Year	Harvest '000 m ³ /year	Employment PY/year			Employment Income \$1992 millions/year		
		Direct	Indirect	Total	Direct	Indirect	Total
Current	895	802	1 202	2 004	\$25.3	\$27.2	\$52.5
1	895	802	1 202	2 004	25.3	27.2	52.5
2	895	802	1 202	2 004	25.3	27.2	52.5
3	895	802	1 202	2 004	25.3	27.2	52.5
10	895	802	1 202	2 004	25.3	27.2	52.5
20	812	727	1 091	1 818	23.0	24.7	47.7
30	736	659	989	1 648	20.8	22.4	43.2
40	667	597	896	1 493	18.9	20.3	39.2
50	604	541	811	1 352	17.1	18.3	35.4
60	546	489	734	1 223	15.5	16.6	32.1
70	494	442	664	1 106	14.0	15.0	29.0
80	447	400	601	1 001	12.7	13.6	26.3
90	424	380	570	950	12.0	12.9	24.9
100	424	380	570	950	12.0	12.9	24.9
110	424	380	570	950	12.0	12.9	24.9

Notes:

1. Provincial impacts include TSA employment and employment income impacts.
2. Sources of direct employment and direct employment income include harvesting, transportation, processing, and silviculture. See Appendix D.
3. Indirect employment is based on a provincial employment multiplier of 2.5. See Appendix D.
4. Average after-tax income for provincial forest industry employees is \$31 593 (\$1992). See Appendix D.
5. Average after-tax income for provincial indirect employment is \$22 601 (\$1992). See Appendix D.
6. All employment income reported is after-tax.

6.1.5 Provincial Government Revenues

Forest sector activity in the Bulkley TSA generates revenues for the provincial government in the forms of stumpage and rents, personal income taxes from forestry related employment and other taxes (logging taxes, corporate income taxes, sales taxes, property taxes and electricity taxes). Provincial government revenue estimates for the Scenario 1 harvest flow are presented in Table 6.3.

In Year 1, with a harvest level equivalent to the existing AAC, annual provincial government revenues are estimated to be \$20.0 million. Stumpage and rent makes up approximately 46 percent of total government revenues and it is assumed that this relationship between stumpage and rent revenues to total government revenues continues in future years. Government revenues under Scenario 1 begin declining in the third decade, and in Year 90, when the long-term harvest level is reached, these revenues drop to \$9.6 million annually.

6.0 Scenario Assessments

Table 6.3 Provincial Government Revenues Account: Scenario 1
\$1992 millions/year

Year	Harvest '000 m ³ /year	Stumpage and Rent	Personal Income Taxes	Other Taxes	Total Revenue
Current	895	\$9.0	\$5.8	\$5.2	\$20.0
1	895	9.0	5.8	5.2	20.0
2	895	9.0	5.8	5.2	20.0
3	895	9.0	5.8	5.2	20.0
10	895	9.0	5.8	5.2	20.0
20	812	8.2	5.3	4.7	18.2
30	736	7.4	4.8	4.3	16.5
40	667	6.7	4.4	3.9	15.0
50	604	6.2	3.9	3.5	13.6
60	546	5.5	3.6	3.2	12.3
70	494	5.0	3.2	2.9	11.1
80	447	4.5	2.9	2.6	10.0
90	424	4.3	2.8	2.5	9.6
100	424	4.3	2.8	2.5	9.6
110	424	4.3	2.8	2.5	9.6

Notes:
1. See Appendix D for methods used to calculate government revenues.
2. Other taxes include logging taxes, corporate income taxes, sales taxes, property taxes, and electricity taxes.
3. Federal tax revenues associated with the forest industry are not included in this table (see Appendix D).

6.1.6 Environmental Impacts

All forecasts examined in this report illustrate a reduction in harvest levels from the current AAC to the long-term harvest level. Each forecast, therefore, offers environmental benefits over the continuation of current harvest levels. All three forecasts are based on the same assumptions with respect to important environmental management considerations in the TSA. For example, sensitive fish and wildlife areas are designated as part of the Riparian Special Management zone. In addition, prime moose and mule deer habitat on Crown forest land in the Bulkley Valley is excluded from the timber harvesting land base. Also excluded is the proposed Telkwa wildlife management area, intended primarily for the protection of high elevation forest habitat of woodland caribou and other species. An area identified as having high quality grizzly bear habitat is protected through special cover requirements. Many areas with unstable soil conditions are removed from the timber harvesting land base. The wilderness quality of the Class 1 rivers in the TSA is protected by including them in special management Visual Quality Objective (VQO) zones and the Babine River Wilderness is buffered on each side by a one kilometre strip having special cover requirements. Prime recreation areas are protected by various visual quality constraints placed on timber harvesting.

As the forecasts differ only in the timing of the harvest reductions, this is the focus of the discussion on environmental impacts (below and in Sections 6.2 and 6.3). The discussion of environmental impacts refers only to the timber harvesting land base. Forest land outside this area also contributes to the overall environmental quality of the TSA.

6.0 Scenario Assessments

Scenario 1 represents a continuation of current harvest levels for the next two decades, before a step down decline to the long-term harvest level. The Bulkley TSA Timber Supply Analysis indicated that harvesting under Scenario 1 would convert the present wide distribution of ages on the timber harvesting land base into a more compact distribution of younger-age forest. After 100 years, approximately seven percent of the forest would be aged over 200 years. This would have implications for biodiversity in the TSA. One assumption behind biodiversity objectives is that maintaining a variety of forest stand attributes and structures, patch sizes and seral stages across a variety of ecosystems and landscapes will meet the habitat needs of most forest organisms.⁴² In general, then, narrowing the age class distribution of the forest would cause changes in the distributions and population levels of some wildlife species. Populations of species that use a wide range of habitat types and species that use immature forests may increase in numbers. Populations of species that depend on mature forests may decline.

The TSA forest management guidelines described above provide for greater protection of fish and wildlife habitat, even under present harvest levels, than has been the case in the past. While it is difficult to say to what degree, a reduction in timber harvesting levels would likely lessen the impacts on wildlife from loss of habitat and possibly from increased access into wilderness areas on logging roads. A reduction in timber harvest levels today may make it easier to accommodate future land use considerations in the TSA. Scenario 1 with its higher harvest levels in the short-term may, therefore, reduce flexibility in making future land use decisions.

The impact of timber harvesting on recreation areas is somewhat mitigated since sensitive lakes, trails and visual landscapes are incorporated into special management VQO zones. Therefore, the visual quality associated with prime recreation areas is protected. Under Scenario 1, there may be a more rapid change in the spectrum of recreational opportunities available. As identified in Section 3.3 the Bulkley TSA currently has a good balance of available recreation opportunities. If harvesting continues for two decades at current levels, associated road building activity may lead to an increase in roaded recreation opportunities and a reduction in primitive, wilderness opportunities.

⁴² Ministry of Forests and Ministry of Environment, Lands and Parks. (1992). *Guidelines to Maintain Biological Diversity in Coastal Forests*.



6.0 Scenario Assessments

6.2 Scenario 2 Assessment

6.2.1 TSA Economic Development Impacts

Annual TSA employment and after-tax employment income associated with Scenario 2 harvest flows are presented in Table 6.4. Under Scenario 2, harvest flows remain at current levels (895 000 cubic metres per year) for two years, and therefore TSA employment and employment income for this period are the same as Scenario 1. In Year 3, the harvest level drops to 650 000 cubic metres per year, resulting in a direct job loss of 177 PY and an indirect job loss of 120 PY. The total job loss (297 PY) would be associated with a \$8.0 million drop in employment income. After Year 3, harvest levels under Scenario 2 remain constant until Year 70, when they begin to decline gradually with employment and employment income falling proportionally. The long-term harvest level is not reached until Year 110 (two decades later than in Scenario 1), at which time total TSA employment and employment income is 513 PY and \$13.9 million.

Table 6.4 TSA Economic Development Account: Scenario 2							
Year	Harvest '000 m ³ /year	Employment PY/year			Employment Income \$1992 millions/year		
		Direct	Indirect	Total	Direct	Indirect	Total
Current	895	645	437	1 082	\$20.0	\$9.2	\$29.2
1	895	645	437	1 082	20.0	9.2	29.2
2	895	645	437	1 082	20.0	9.2	29.2
3	650	468	318	786	14.5	6.7	21.2
10	650	468	318	786	14.5	6.7	21.2
20	650	468	318	786	14.5	6.7	21.2
30	650	468	318	786	14.5	6.7	21.2
40	650	468	318	786	14.5	6.7	21.2
50	650	468	318	786	14.5	6.7	21.2
60	650	468	318	786	14.5	6.7	21.2
70	589	434	288	712	13.1	6.1	19.2
80	533	384	261	645	11.9	5.5	17.4
90	482	347	236	583	10.8	5.0	15.8
100	436	314	213	527	9.7	4.5	14.2
110	424	306	207	513	9.5	4.4	13.9

Notes:

1. Sources of direct employment and direct employment income include harvesting, transportation, processing, and silviculture. See Appendix D.
2. The estimated employment coefficient for the Bulkley TSA is 0.72 PY per 1 000 m³. See Appendix D.
3. Indirect employment for the TSA is obtained by dividing indirect employment income by an average annual after-tax income of \$21 000 (\$1992). See Appendix D.
4. The average annual after-tax income for a TSA forest industry employees is \$30 965 (\$1992). See Appendix D.
5. Indirect employment income for the TSA was derived using an income multiplier of 1.46. See Appendix D.
6. All employment income is after-tax.
7. The employment estimates indicate that every PY of direct forestry employment in the TSA supports 0.68 PYs of indirect employment in the TSA.

6.2.2 TSA Community Impacts

Community impacts, and especially impacts on individuals, would be felt immediately under Scenario 2, as job losses would occur after two years. The drop in total TSA employment in Year 3 is estimated as 177 direct jobs and 120 indirect jobs. This is significant as TSA communities would have had little time to plan strategies to deal with the pressures caused by

6.0 Scenario Assessments

these job losses. In this case, individuals and their families would suffer as communities tried to cope with the implications of the job losses to the area as a whole. In the short-term, existing social service programs in the area would be relied upon to provide assistance to individuals.

Scenario 2 harvest flows may increase the possibility of a "threshold effect" occurring at mills in the TSA, especially if alternate sources of fibre can not be found. Threshold effects refer to the fact that a large reduction in fibre supply may force a mill to cut shifts or close entirely. Therefore, impacts under Scenario 2 could be larger than estimated and concentrated in the community where a mill closed or where a shift was lost.

After the initial drop in Year 3, employment and employment income would remain constant until Year 70. Therefore, while initial impacts could be severe, the TSA communities would experience a period of stability in harvest levels and associated employment and employment income levels. This would allow time to develop and pursue economic diversification initiatives.

6.2.3 TSA First Nations Community Impacts

Scenario 2 harvest flows may lessen the impacts on traditional values and thereby better address First Nations concerns related to these values. However, the more severe job losses under Scenario 2 could affect the aboriginal workers employed in the forestry sector. The lower harvest level will adversely impact Kyah Forest Products if replacement sources of timber cannot be secured.

6.2.4 Provincial Economic Development Impacts

Decade-by-decade estimates of annual provincial employment and after-tax employment income associated with Scenario 2 harvest levels are shown in Table 6.5. Harvest flows remain at current levels for two years under Scenario 2, therefore, total provincial employment and employment income levels for this period are the same as in Scenario 1 (2 004 PY and \$52.5 million). The initial reduction in harvest levels (245 000 cubic metres per year) in Year 3 would lead to a direct job loss of 219 PY and an indirect job loss of 329 PY. The total job loss (548 PY) would be associated with \$14.4 million in employment income. After Year 3, harvest levels under Scenario 2 remain constant until Year 70. The long-term harvest level is not reached until Year 110, at which time total provincial employment would be 950 PY and total provincial employment income would be \$24.9 million.

6.0 Scenario Assessments

Table 6.5 Provincial Economic Development Account: Scenario 2

Year	Harvest '000 m ³ /year	Employment PY/year			Employment Income \$1992 millions/year		
		Direct	Indirect	Total	Direct	Indirect	Total
Current	895	802	1 202	2 004	\$25.3	\$27.2	\$52.5
1	895	802	1 202	2 004	25.3	27.2	52.5
2	895	802	1 202	2 004	25.3	27.2	52.5
3	650	582	873	1 455	18.4	19.7	38.1
10	650	582	873	1 455	18.4	19.7	38.1
20	650	582	873	1 455	18.4	19.7	38.1
30	650	582	873	1 455	18.4	19.7	38.1
40	650	582	873	1 455	18.4	19.7	38.1
50	650	582	873	1 455	18.4	19.7	38.1
60	650	582	873	1 455	18.4	19.7	38.1
70	589	528	791	1 319	16.7	17.9	34.6
80	533	477	716	1 193	15.1	16.2	31.3
90	482	432	648	1 080	13.6	14.6	28.2
100	436	391	586	977	12.3	13.2	25.5
110	424	380	570	950	12.0	12.9	24.9

Notes:

1. Provincial impacts include TSA employment and employment income impacts.
2. Sources of direct employment and direct employment income include harvesting, transportation, processing, and silviculture. See Appendix D.
3. Indirect employment is based on a provincial employment multiplier of 2.5. See Appendix D.
4. Average after-tax income for provincial forest industry employees is \$31 593 (\$1992). See Appendix D.
5. Average after-tax income for provincial indirect employment is \$22 601 (\$1992). See Appendix D.
6. All employment income reported is after-tax.

6.2.5 Provincial Government Revenues

Government revenues under Scenario 2 are presented in Table 6.6. In Year 1, with a harvest level equivalent to the existing AAC, annual provincial government revenues are estimated to be \$20.0 million. Government revenues under Scenario 2 decline in Year 3 to \$14.5 million and remain at this level for about seven decades. In Year 70, revenues begin a gradual decline and in Year 110, when the long-term harvest level is reached, government revenues are estimated to be \$9.6 million annually.

6.2.6 Environmental Impacts

As was noted in the discussion of Scenario 1 impacts, the main difference between forecasts from an environmental perspective results from the timing of harvest reductions. In comparison to Scenario 1, Scenario 2 harvest levels fall steeper and sooner and therefore the rate of harvest of older age forest is slowed. A slower rate of harvest earlier on may allow more flexibility in addressing biodiversity, fish and wildlife habitat, and recreation opportunity concerns that have not already been addressed by existing forest management guidelines.

6.0 Scenario Assessments

Table 6.6 Provincial Government Revenues Account: Scenario 2 \$1992 millions/year					
Year	Harvest '000 m ³ /year	Stumpage and Rent	Personal Income Taxes	Other Taxes	Total Revenue
Current	895	\$9.0	\$5.8	\$5.2	\$20.0
1	895	9.0	5.8	5.2	20.0
2	895	9.0	5.8	5.2	20.0
3	650	6.5	4.2	3.8	14.5
10	650	6.5	4.2	3.8	14.5
20	650	6.5	4.2	3.8	14.5
30	650	6.5	4.2	3.8	14.5
40	650	6.5	4.2	3.8	14.5
50	650	6.5	4.2	3.8	14.5
60	650	6.5	4.2	3.8	14.5
70	589	5.9	3.8	3.4	13.1
80	533	5.4	3.5	3.1	12.0
90	482	4.8	3.1	2.8	10.7
100	436	4.4	2.8	2.5	9.7
110	424	4.3	2.8	2.5	9.6

Notes:

1. See Appendix D for methods used to calculate government revenues.
2. Other taxes include logging taxes, corporate income taxes, sales taxes, property taxes, and electricity taxes.
3. Federal tax revenues associated with the forest industry are not included in this table (see Appendix D).

6.0 Scenario Assessments

6.3 Scenario 3 Assessment

6.3.1 TSA Economic Development Impacts

Annual TSA employment and after-tax employment income associated with Scenario 3 harvest flows are presented in Table 6.7. Under Scenario 3, there is an immediate drop in the harvest level from 895 000 cubic metres per year to 755 000 cubic metres per year. This reduction in harvest (140 000 cubic metres per year) would lead to a loss of 101 PY in direct jobs and 68 PY in indirect jobs. The total job loss (169 PY) would be associated with a loss of \$4.6 million in employment income. After the initial step down, harvest levels under Scenario 3 remain constant for four decades, then decline until the long-term harvest level is reached in Year 100 (one decade after Scenario 1, but one decade before Scenario 2). As in Scenarios 1 and 2, total employment and employment income at the long-term harvest level would be 513 PY and \$13.9 million respectively.

Table 6.7 TSA Economic Development Account: Scenario 3

Year	Harvest '000 m ³ /year	Employment PY/year			Employment Income \$1992 millions/year		
		Direct	Indirect	Total	Direct	Indirect	Total
Current	895	645	437	1 082	\$20.0	\$9.2	\$29.2
1	755	544	369	913	16.9	7.7	24.6
2	755	544	369	913	16.9	7.7	24.6
3	755	544	369	913	16.9	7.7	24.6
10	755	544	369	913	16.9	7.7	24.6
20	755	544	369	913	16.9	7.7	24.6
30	755	544	369	913	16.9	7.7	24.6
40	695	501	340	841	15.5	7.1	22.6
50	639	460	312	772	14.3	6.6	20.9
60	588	424	287	711	13.1	6.0	19.1
70	541	390	264	654	12.1	5.6	17.7
80	498	359	243	602	11.1	5.1	16.2
90	458	330	224	554	10.2	4.7	14.9
100	424	306	207	513	9.5	4.4	13.9
110	424	306	207	513	9.5	4.4	13.9

Notes:

1. Sources of direct employment and direct employment income include harvesting, transportation, processing, and silviculture. See Appendix D.
2. The estimated employment coefficient for the Bulkley TSA is 0.72 PY per 1 000 m³. See Appendix D.
3. Indirect employment for the TSA is obtained by dividing indirect employment income by an average annual after-tax income of \$21 000 (\$1992). See Appendix D.
4. The average annual after-tax income for a TSA forest industry employees is \$30 965 (\$1992). See Appendix D.
5. Indirect employment income for the TSA was derived using an income multiplier of 1.46. See Appendix D.
6. All employment income is after-tax.
7. The employment estimates indicate that every PY of direct forestry employment in the TSA supports 0.68 PYs of indirect employment in the TSA.

6.3.2 TSA Community Impacts

Initially, individual/family impacts and community impacts from job losses under Scenario 3 (169 PY) would not be as severe as those experienced under Scenario 2. However, as with Scenario 2, the impact would be felt immediately, leaving the TSA communities little time to implement plans to assist individuals and families. As with Scenario 2, the initial job losses should be followed by a

6.0 Scenario Assessments

period of relative stability before further harvest reductions, and this would give the TSA communities time to pursue economic development strategies.

6.3.3 TSA First Nations Community Impacts

Scenario 3 falls in between Scenarios 1 and 2 in terms of the potential to impact traditional aboriginal values. The immediate drop in harvest levels would ensure a slower rate of timber harvesting in First Nations land claim areas. However, after Year 30, there is little difference between Scenarios 1 and 3 in this respect. Scenario 3 may be preferable to Scenario 2 in terms of maintaining aboriginal involvement in the forest industry.

6.3.4 Provincial Economic Development Impacts

Annual provincial employment and after-tax employment income associated with Scenario 3 harvest flows are presented in Table 6.8. The immediate reduction of harvest levels by 140 000 cubic metres per year would lead to a direct job loss of 125 PY and an indirect job loss of 188 PY. Twenty-five PY of the direct job losses would occur outside the TSA. The total job loss (313 PY) would be associated with \$8.2 million in employment income. After the initial drop, total provincial employment and employment income would remain constant for four decades at 1 690 PY and \$44.3 million respectively. At Year 40, harvest levels begin dropping gradually, with employment and employment income falling proportionally. The long-term harvest level is reached in Year 100, at which time total provincial employment is 950 PY and total provincial employment income would be \$24.9 million.

Table 6.8 TSA Provincial Development Account: Scenario 3							
Year	Harvest '000 m ³ /year	Employment PY/year			Employment Income \$1992 millions/year		
		Direct	Indirect	Total	Direct	Indirect	Total
Current	895	802	1 202	2 004	\$25.3	\$27.2	\$52.5
1	755	676	1 014	1 690	21.4	22.9	44.3
2	755	676	1 014	1 690	21.4	22.9	44.3
3	755	676	1 014	1 690	21.4	22.9	44.3
10	755	676	1 014	1 690	21.4	22.9	44.3
20	755	676	1 014	1 690	21.4	22.9	44.3
30	755	676	1 014	1 690	21.4	22.9	44.3
40	695	622	934	1 556	19.7	21.1	40.8
50	639	572	858	1 430	18.1	19.4	37.5
60	588	527	790	1 317	16.6	17.9	34.5
70	541	485	727	1 212	15.3	16.4	31.7
80	498	446	669	1 115	14.1	15.1	29.2
90	458	410	615	1 025	13.0	13.9	26.9
100	424	380	570	950	12.0	12.9	24.9
110	424	380	570	950	12.0	12.9	24.9

Notes:

1. Provincial impacts include TSA employment and employment income impacts.
2. Sources of direct employment and direct employment income include harvesting, transportation, processing, and silviculture. See Appendix D.
3. Indirect employment is based on a provincial employment multiplier of 2.5. See Appendix D.
4. Average after-tax income for provincial forest industry employees is \$31 593 (\$1992). See Appendix D.
5. Average after-tax income for provincial indirect employment is \$22 601 (\$1992). See Appendix D.
6. All employment income reported is after-tax.

6.0 Scenario Assessments

6.3.5 Provincial Government Revenues

Table 6.9 presents government revenues related to harvest flows under Scenario 3. Government revenues fall immediately under Scenario 3 from \$20.0 million to \$16.9 million. Annual revenues remain at this level until Year 40, and then decline gradually until the long-term harvest level is reached in Year 100. At this point revenues would be \$9.6 million annually.

Table 6.9 Provincial Government Revenues Account: Scenario 3 \$1992 millions/year					
Year	Harvest '000 m ³ /year	Stumpage and Rent	Personal Income Taxes	Other Taxes	Total Revenue
Current	895	\$9.0	\$5.8	\$5.2	\$20.0
1	755	7.6	4.9	4.4	16.9
2	755	7.6	4.9	4.4	16.9
3	755	7.6	4.9	4.4	16.9
10	755	7.6	4.9	4.4	16.9
20	755	7.6	4.9	4.4	16.9
30	755	7.6	4.9	4.4	16.9
40	695	7.0	4.5	4.0	15.5
50	639	6.4	4.2	3.7	14.3
60	588	5.9	3.8	3.4	13.1
70	541	5.4	3.5	3.1	12.0
80	498	5.0	3.2	2.9	11.1
90	458	4.6	3.0	2.7	10.3
100	424	4.3	2.8	2.5	9.6
110	424	4.3	2.8	2.5	9.6

Notes:

1. See Appendix D for methods used to calculate government revenues.
2. Other taxes include logging taxes, corporate income taxes, sales taxes, property taxes, and electricity taxes.
3. Federal tax revenues associated with the forest industry are not included in this table (see Appendix D).

6.3.6 Environmental Impacts

By dropping harvest rates immediately, Scenario 3 may better protect the TSA's environmental attributes in the short-term relative to Scenario 1 and allow flexibility in making future land use decisions. However, after Year 30, the environmental implications of Scenarios 1 and 3 would be similar.



7.0 Summary and Conclusions

All three forecasts in this study involve a 50 percent drop in harvest levels from the current AAC of 895 000 cubic metres per year to a long-term harvest level of 424 000 cubic metres per year. The forecasts differ in the timing and magnitude of initial harvest reductions. Scenario 1 projects current harvest levels for two decades before declining nine percent per decade starting in the third decade. Under Scenario 2, the initial harvest reduction (27%) occurs in Year 3. Thereafter, an annual harvest of 650 000 cubic metres is maintained for seven decades before stepping down nine percent per decade. Under Scenario 3, the initial harvest reduction (16%) occurs immediately, and the resulting annual harvest level of 755 000 cubic metres is maintained for four decades before declining eight percent per decade.

Impacts for selected years are summarized in Tables 7.1 and 7.2. An alternate comparison, the incremental changes in employment, employment income, and government revenues, is provided in Appendix E.

7.1 TSA Impacts

Direct, indirect, and total TSA impacts are summarized in Table 7.1. Scenario 1 minimizes the impact on employment and employment income in the short-term. The harvest remains at current levels, therefore, no job losses would occur in the first two decades. Scenario 2 would have the most severe short-term impact with a loss of approximately 296 PY and \$8.0 million in employment income over the first two decades. Scenario 3 employment and employment income impacts during this period would be more moderate at 169 PY and \$4.6 million respectively.

Over the next three decades, the employment and employment income impacts of the three forecasts equalize somewhat. Job losses under Scenario 1 begin in Year 20 and, by the end of the fifth decade, cumulative losses total 275 PY and \$7.4 million. Scenario 2 harvest levels are unchanged during this period. Therefore, the cumulative impact on employment and employment income would remain at 296 PY and \$8.0 million. After the initial job losses under Scenario 3, no further losses would occur until the beginning of the fifth decade. By the end of the fifth decade, employment and employment income losses under Scenario 3 would total 242 PY and \$6.5 million respectively.

From a community perspective, Scenario 1 may have fewer adverse impacts than Scenario 2 or 3. Under Scenario 1, impacts from job losses would not be felt until the third decade and TSA communities would have time to plan for future job losses and could potentially mitigate some of the negative impacts. Scenario 2 and 3 job losses would occur early in the first decade, with TSA communities having little time to implement mitigation efforts. In terms of community impacts, Scenario 3 illustrates a compromise between Scenarios 1 and 2. While shorter-term job losses under this forecast would be more severe than those experienced under Scenario 1, they are not as extreme as Scenario 2 impacts. Scenario 3 has lower harvest levels early on and would provide some flexibility for future land use planning processes. The lower harvest levels under Scenario 3 may also better preserve some of the non-timber values currently enjoyed by TSA residents.

7.0 Summary and Conclusions

Table 7.1 Summary of TSA Accounts												
	Year	Scenario 1				Scenario 2				Scenario 3		
		1	3	20	40	110	1	3	20	40	110	110
Harvest ('000 m ³ /year)		895	895	812	667	424	895	650	650	650	424	424
Economic Development	Direct	645	645	585	481	306	645	468	468	468	306	306
	Indirect	437	437	397	326	207	437	318	318	318	207	207
	Total	1 082	1 082	982	807	513	1 082	786	786	786	513	513
	Labour Income (\$1992 millions/year)	\$20.0	\$20.0	\$18.1	\$14.9	\$9.5	\$20.0	\$14.5	\$14.5	\$14.5	\$9.5	\$9.5
Community	Direct	9.2	9.2	8.3	6.9	4.4	9.2	6.7	6.7	6.7	4.4	4.4
	Indirect	29.2	29.2	26.4	21.8	13.9	29.2	21.2	21.2	21.2	13.9	13.9
	Total											
		<ul style="list-style-type: none"> Impacts would be deferred until decade three, allowing TSA communities time to plan mitigation strategies. 										
Aboriginal Community	Direct											
	Indirect											
	Total											
		<ul style="list-style-type: none"> Impacts would be the most severe and occur almost immediately. 										
Aboriginal Community	Direct											
	Indirect											
	Total											
		<ul style="list-style-type: none"> Best addresses aboriginal concerns related to land claims and preservation of resources having traditional and spiritual values; Higher negative impact on aboriginal employment in the forestry sector in the short-term. 										
Aboriginal Community	Direct											
	Indirect											
	Total											
		<ul style="list-style-type: none"> Somewhat addresses aboriginal concerns related to land claims and preservation of resources having traditional and spiritual values; Impact on aboriginal employment in the forestry sector would fall in between the impacts of Scenarios 1 and 2. 										

7.0 Summary and Conclusions

The lower harvest levels under Scenario 2 may best address First Nations concerns related to land claims and preservation of resources important to traditional and spiritual activities. However, the lower harvest levels may limit the options available to Kyah Forest Products Ltd.

7.2 Provincial Impacts

A summary of provincial impacts is provided in Table 7.2. Impacts on provincial employment and employment income would reflect the TSA impacts described above. Scenario 1 would minimize shorter-term impacts (no job losses in the first two decades) and Scenario 2 would lead to the most severe shorter-term impacts with a total loss of 549 PY and \$14.4 million in the first two decades. During this same period, Scenario 3 losses would total 313 PY and \$8.2 million. By the end of the fifth decade, the difference between forecasts would narrow.

Government revenues would be affected in a manner similar to employment and employment income impacts. In the shorter-term (first two decades), government revenues would be unchanged under Scenario 1 (\$20.0 million annually). By the end of this same period under Scenarios 2 and 3, annual government revenues would be \$14.5 million and \$16.9 million respectively.

All forecasts examined involve a decline from the current AAC to the long-term harvest level, and therefore, offer greater benefits to the environment than continuation of current harvest levels. All three forecasts incorporate important environmental management guidelines designed to protect fish and wildlife habitat and preserve wilderness recreation opportunities. The benefits associated with these guidelines may have more important long-term implications for the environment than the absolute differences in forecast harvest levels examined in this report.

The main difference between forecasts from an environmental perspective results from the timing of harvest reductions. Harvesting of older age forest proceeds most rapidly under Scenario 1. The age class distribution of the forest would narrow and populations of species that depend on mature forests may decline. Also, Scenario 1 with its higher harvest levels in the short-term may reduce flexibility for addressing future habitat, fish and wildlife, and recreation requirements. Scenario 2 may best address environmental concerns due to the lower harvest rate in early decades. The harvesting of older age forest would proceed more slowly under this forecast and the lower harvest rates would maintain flexibility for future land use planning processes.

7.3 Concluding Remarks

This study documents major impacts attributed to a drop in harvest levels. The analysis assumes that factors such as land base, management, harvesting and processing technology, and timber prices remain constant. A change in any of these variables would require a re-examination of impacts. The Bulkley TSA Timber Supply Analysis indicates that the current AAC could be continued for two decades before declining over time to the long-term harvest level. This would allow TSA communities time to examine resource management options for the TSA. The main short-term resource management issues in the TSA are discussed below.

7.0 Summary and Conclusions

Table 7.2 Summary of Provincial Accounts

[illegible]

7.0 Summary and Conclusions

Harvest Profile - The current harvest profile in the Bulkley TSA is not sustainable in the short-term. Harvesting must shift from spruce into pine and hemlock stands, and from high quality sawlogs into marginal sawlog and pulplog stands. P.I.R. is currently upgrading machinery to increase processing efficiency. The Kyah sawmill is already experiencing difficulty in obtaining quality logs for its operation and it could be expected that these difficulties would increase given future volume profiles in the TSA.

Temporary Licences - The expiration of temporary licences in the Bulkley TSA by 1996 is an issue in the TSA. The new temporary forest licence issued to P.I.R. in 1993 (140 000 m³ annually for two years) is for a smaller volume than their previous temporary licence (200 000 m³ annually). The 60 000 cubic metre difference is now part of the SBFEP. The Moricetown temporary licence will expire in 1994. This temporary licence represents approximately 75 percent of Kyah Forest Products' current fibre supply. A reduction in fibre supply to the mill would add to Kyah's business difficulties. Given this information, it is clear that operators in the Bulkley TSA are facing adjustments in fibre supply that are, as yet, unrelated to a reduction in harvest levels. If harvest reductions occur, the impacts would depend on how the reductions are allocated among licensees and the ability of licensees to supplement their TSA harvest with fibre from other sources (SBFEP purchases, private purchases, purchases from other TSAs). P.I.R. and Repap Smithers are associated with operations in other Forest Districts and may be in a position to adapt to changing fibre supplies. However, large drops in regional fibre supply could cause mill closures, either in the Bulkley TSA, or surrounding TSAs.

First Nations - First Nations issues will continue to be at the forefront of resource management discussions in the Bulkley TSA. Aboriginal people have recently expressed concern over a number of resource management issues in the TSA and desire a formal commitment from government regarding consultation on resource development. Specifically, the Wet'suwet'en are seeking an assured log supply for Kyah Forest Products Ltd.

Forest Renewal Plan - Activities taking place under the recently announced Forest Renewal Plan will play an important role in setting the future course for the forest sector in the Bulkley TSA. Impacts of the plan have not been incorporated into the analysis. Priorities under the plan include: investing in forest resources through more intensive silviculture; promoting value-added activities to derive more value from forest harvests; restoring the health of forest-based ecosystems; creating stable jobs and providing forest worker training responsive to new directions in forest management; and, strengthening forest-based communities affected by the challenges facing the forest sector.

As indicated above, there are many resource management, economic, and social issues on the horizon. Public and private resource managers, local and regional government officials, and the general public will be facing these issues over the next several decades.



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Appendix B - List of Contacts

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Walgren, Terry	Repap Smithers, Inc., Smithers
Zimmer, Ken	Ministry of Environment, Lands and Parks, Smithers



Appendix C - Glossary

Allowable Annual Cut (AAC)	The allowable rate of timber harvest from a specified area of land. The Chief Forester sets AACs for Timber Supply Areas (TSAs) and Tree Farm Licences (TFLs) in accordance with Section 7 of the <i>Forest Act</i> .
Animal Unit Month (AUM)	The amount of forage required for one month by an average beef cow, aged six months or older.
Basic silviculture	A term used to refer to the silviculture treatments that are carried out to ensure the establishment of a free growing tree crop. This may include: surveying, site preparation, planting, direct seeding, or brushing.
Biodiversity	The diversity of plants, animals and other living organisms and their habitats measured by factors such as genetic variability, number of species and variation in species composition.
Bone-Dry Unit (BDU)	A bone-dry unit of pulp chips weighs 2 400 oven dry pounds. The volume of solid wood in a BDU of chips varies with species density. In this study a conversion factor of 2.79 cubic metres per BDU has been used.
Cutblock adjacency guidelines	Integrated management guidelines that specify the desired spatial relationship among cutblocks. They can be approximated by specifying the maximum allowable proportion of a forested landscape that does not meet green-up requirements.
Diameter limit harvesting	A silvicultural system used to maintain established understory trees. All trees larger than a specified diameter are removed, with care being taken to not damage the residual stand. Horses are often used to harvest trees under this system.
Direct employment and employment income impacts	Employment and income impacts in the forestry sector (harvesting, hauling, silviculture and processing) arising from changes in the timber harvest level.
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.
Forest cover requirements	Specify desired distributions of areas by age or size class groupings. These requirements can be used to reflect desired conditions for wildlife, watershed protection, visual quality and other integrated resource management objectives. General adjacency and green-up guidelines are also specified using forest cover requirements.
Forest licence	This licence is the major forest-tenure in B.C. It provides a replaceable AAC in a TSA to an operator who has an established or proposed processing facility.
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 specified land base and set of management assumptions. It is a result 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.

Appendix C - Glossary

Indirect employment and employment income impacts	Spin-off employment and income arising from changes in harvest levels in sectors or industries which supply materials or equipment to the forestry sector. Also includes impacts from the spending of forestry-related employment income.
Inoperable areas	Areas defined as unavailable for harvest for terrain-related or economic reasons.
Land and Resource Management Planning (LRMP)	A sub-regional integrated resource planning process for B.C. LRMP considers all resource values and requires public participation, interagency co-ordination and consensus based land and resource management decisions.
Management assumptions	Approximations of management objectives, priorities, constraints and other conditions needed to represent forest management actions in a forest planning model. These include, for example, the criteria for determining the timber harvesting land base, the specification of minimum cutting ages, utilization levels and standards, integrated resource guidelines and silviculture and pest management programs.
Non-Crown areas	Areas not managed directly by the B.C. Forest Service (e.g., private land, Indian Reserves, and provincial parks).
Non-forest areas	Areas not occupied by productive forest cover (e.g., rock, swamp and alpine areas).
Non-commercial cover areas	Areas occupied by non-commercial tree or brush species.
Non-merchantable forest types	Areas occupied by timber stands that are accessible and otherwise available for timber harvesting but are assumed to be non-merchantable due to stand characteristics such as small size, incidence of decay and low stocking.
Person-year (PY)	A standard measure of employment that takes into account part-time or seasonal full-time work. For example, if an employee works full-time for six months, he or she represents 0.5 PY of employment. Using PY allows different types of employment to be compared on a similar basis. In this report, 1 800 hours per year is equivalent to one PY.
Selection management	A silvicultural system used to maintain or create areas containing a wide range of tree ages or sizes. The time interval between harvests in such areas is fairly short (usually less than 30 years) and during these harvests either single or scattered trees or small groups of trees are removed from across the entire area.
Small Business Forest Enterprise Program (SBFEP)	A program introduced in 1978 to provide opportunities for small businesses in the forest sector. Timber is sold to loggers, small sawmills, and remanufacturers.
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
Timber Sale Licence	Licences providing established operators with a 10 year AAC over undefined areas of Crown land in a TSA. These licenses are replaceable in their last year. Shorter-term timber sale licences are also issued to small business loggers and to timber processors who qualify for registration under the Small Business Enterprise Program.
Timber Supply Area (TSA)	An integrated resource management unit established in accordance with Section 6 of the <i>Forest Act</i> .

Appendix C - Glossary

Unsalvaged losses	The volume of timber killed or damaged annually by natural causes (e.g. fire, wind, insects and disease) and not harvested.
Visual Quality Objective	Defines a level of acceptable landscape alteration resulting from timber harvesting and other activities. A number of visual quality classes can be defined based on the maximum amount of alteration permitted.
Woodlot Licence	A licence issued to an individual to manage a specific area of Crown Timber, plus any private woodlands the individual holds. Requires the holder to file a management plan and to harvest at a pre-determined rate.



Appendix D - Technical Background

D.1 Employment and Employment Income Estimates

Estimates of forestry employment and employment income generated by the Bulkley TSA AAC rely on information obtained from major licensees, SBFEP registrants, Statistics Canada, the Ministry of Finance and the Ministry of Forests. Individual data provided by licensees are confidential. Average employment ratios and employment income figures for the Bulkley TSA are presented below. Employment figures are in person-year equivalents (1 800 hours per year) and income estimates are after-tax \$1992. Personal income tax paid by forest sector employees is reported separately (see Section D.2). The following provides a detailed discussion on the calculation of employment and employment income estimates for this study.

Activity	PY	PY/'000 m ³	Employment Income per PY
Harvesting	231	0.26	\$34 368
Processing	363	0.41	\$29 126
Forestry Services/Silviculture	51	0.06	\$28 721
Total TSA	645	0.72	\$30 965

D.1.1 Direct Employment and Employment Income

Direct employment and employment income are generated through harvesting, processing, and silviculture/forestry services.

Harvesting - In this study, harvesting includes logging, road maintenance, gravelling, road construction, and hauling. Major licensees provided employment information for 1992 harvesting activities. Harvesting employment associated with SBFEP activity is estimated from Ministry of Forests information.⁴³ Gross harvesting employment income is estimated to be \$48 000 per PY. This is a TSA average determined from licensee information and Statistics Canada data.⁴⁴ Using 1992 tax rates, after-tax employment income associated with harvesting activity is \$34 368 per PY.

Processing - Major licensees provided total employment figures for TSA mills. These figures include salaried and hourly staff and administrative employees. Processing employment for TSA SBFEP mills is calculated from information obtained through the Bulkley Forest District office. Employment at pulp and paper mills utilizing chips from the Bulkley TSA is estimated from Ministry of Forests information.⁴⁵ Processing employment income in the TSA is based on licensee information and Statistics Canada data.⁴⁶ Gross processing employment income in the TSA is estimated to average \$39 200 per PY, yielding an after-tax income of \$29 126 per PY. Processing employment income outside the TSA is based on Statistics Canada data.⁴⁷ Gross processing employment income outside the TSA averages \$47 300 or \$33 914 after-tax.

⁴³ Ministry of Forests, Bulkley Forest District and Economics and Trade Branch.

⁴⁴ Statistics Canada. (1993) *Employment Income by Occupation-The Nation*. Catalogue 93-332. Census category 751 - forestry and logging occupations.

⁴⁵ Ministry of Forests, Economics and Trade Branch.

⁴⁶ Statistics Canada. (1993) *Employment Income by Occupation-The Nation*. Catalogue 93-332. Census category 823 - wood processing occupations, except pulp and papermaking.

⁴⁷ Statistics Canada. (1993) *Employment Income by Occupation-The Nation*. Catalogue 93-332. Census category 8258 - occupations in labouring and other elemental work: pulp and papermaking.

Appendix D - Technical Background

Forestry services/silviculture - Employment in forestry activities such as cruising and development was obtained from licensees. Silviculture employment was estimated using information obtained from the SBFEP and Major Licensee Silviculture Information System (MLSIS). The number of hectares receiving specific silviculture treatments in the Bulkley TSA in 1992 were multiplied by employment factors for these treatments to determine total silviculture employment.⁴⁸ Gross employment income for the forestry services/silviculture sector averages about \$38 500 per PY or \$28 721 after-tax.⁴⁹

Ministry of Forests - Employment in the Ministry of Forests may be related more directly to government policy and budget decisions than to the volume of wood harvested. As it is uncertain how this will change in the future, the estimates of direct forestry employment in this report do not include Ministry of Forests employment associated with the Bulkley TSA AAC. Total Ministry of Forests employment in 1991/92 was 3 883 PY.⁵⁰ The Bulkley TSA portion of the provincial AAC is approximately 1.2 percent and total Ministry of Forests employment associated with the Bulkley TSA is therefore estimated to be 47 PY. The Bulkley Forest District office accounts for 35.5 PY. The remaining 11.5 PY of Ministry of Forests employment are attributed to the Prince Rupert Forest Region office also located in Smithers.⁵¹ With an average after-tax employment income of \$28 199, Ministry of Forests employment provides \$1.3 million in employment income in the Bulkley TSA.⁵²

D.1.2 Indirect Employment and Employment Income

Changes in TSA timber supply lead to changes in direct forest sector economic activity. However, changes in TSA timber supply would not only have direct impacts on the forest sector, but also indirect impacts on the other sectors. Indirect impacts would arise through changes in spending by forest sector companies and employees. For example, local retail trade is supported by the spending of people employed in forestry related jobs. In this study, indirect impacts are estimated through the use of multipliers.

The multiplier used to estimate indirect impacts at the TSA level was developed by Horne and Robson.⁵³ They use an economic base method to derive long-run and short-run community-specific income multipliers for 55 areas in B.C. This study uses the Smithers-Houston local area long-run income multiplier of 1.46. The inclusion of Houston area communities may bias results, but it is difficult to determine to what degree.

The Smithers-Houston multiplier is an income multiplier and indirect employment income is determined by multiplying direct employment income by 0.46 (which is the indirect income component of the multiplier). Dividing indirect employment income by average after-tax

⁴⁸ Silviculture employment factors used were developed by consensus after a review by Ministry of Forests and Forestry Canada officials of several silviculture studies.

⁴⁹ Statistics Canada. (1993) *Employment Income by Occupation-The Nation*. Catalogue 93-332. Census category 7511 - forestry conservation occupations

⁵⁰ Human Resources Branch, Ministry of Forests.

⁵¹ Based on available information, less than one PY of Ministry of Forests employment in Victoria is related directly to the Bulkley TSA AAC.

⁵² Ministry of Forests Annual Report 1991/92 (1993) and Government Personnel Services, Victoria.

⁵³ Horne, G. and L. Robson. (1993) *British Columbia Economic Dependencies*.

Appendix D - Technical Background

employment income per PY yields an estimate of indirect employment. In this study, average after-tax employment income is \$21 000, which is the income associated with the service sector in the Smithers-Houston local area.⁵⁴

At the provincial level, an employment multiplier of 2.5 is used to determine indirect impacts.⁵⁵ Indirect employment is estimated by multiplying direct employment by 1.5 (the indirect employment component of the multiplier). Direct employment includes direct forestry employment inside and outside the TSA. The estimate of indirect employment is multiplied by average after-tax employment income per PY to estimate indirect after-tax employment income. In this study average after-tax employment income is \$22 600. This is an average service sector income.

D.2 Government Revenues

Estimates of government revenues are based on information from the Ministry of Forests and Statistics Canada, and are expressed in \$1992 per 1 000 cubic metres of harvested timber. These estimates are summarized below.

Revenue Type	Revenues (\$1992/000 m ³)
Stumpage and Rent	\$10 060
Personal Income Tax	6 517
Other Taxes	5 800
Total	22 337

Stumpage and Rent - Stumpage figures are specific to the Bulkley TSA and reflect a three year average (1990 - 1992). Average stumpage payments over this period are \$9 789 per 1 000 cubic metres.⁵⁶ Using a five year average (1987/88 - 1991/92), rent is estimated at \$270 per 1 000 cubic metres.⁵⁷

Policy changes announced in April, 1994 as part of the Forest Renewal Plan will result in significantly higher stumpage revenues if the increase in lumber prices that occurred in 1993 represents a structural shift in the market. The revenue estimates above are based on historical inflation adjusted prices. Based on an average lumber selling price of \$350 U.S. per thousand board feet, initial estimates indicate that stumpage revenues may be 60 to 80 percent higher than in the past. Stumpage revenues will vary with changes in lumber prices and it is not possible to precisely project the impact of these new policy changes at the TSA level until the new policy has been implemented for a period of time.

Personal Income Tax - Provincial personal income tax payments are based on the estimates of employment and employment income per PY (calculated as described in Section D.1) and 1992

⁵⁴ Personal Communication G. Horne Ministry of Finance.

⁵⁵ Ministry of Forests, Economics and Trade Branch.

⁵⁶ Ministry of Forests, Valuation Branch

⁵⁷ Ministry of Forests, Economics and Trade Branch (1993a). *Economic Impacts of Timber Harvesting in British Columbia*.

Appendix D - Technical Background

tax rates.⁵⁸ Provincial personal income taxes are estimated to be \$6 517 per 1 000 cubic metres. Government revenue estimates in this report do not include personal income tax paid to the federal government. This represents approximately two-thirds of the total income tax paid by individuals. Federal personal income tax payments are estimated to be \$13 231 per 1 000 cubic metres.

Other Taxes - Other taxes include corporate, logging, sales, property, and electricity taxes. Using a five year average (1988 - 1992) these are estimated to be \$5 800 per 1 000 cubic metres.⁵⁹ Government revenue estimates in this report do not include corporate taxes paid to the federal government. Using a five year average (1988 - 1992), corporate taxes paid to the federal government average \$1 250 per 1 000 cubic metres.

⁵⁸ Ministry of Forests, Economics and Trade Branch

⁵⁹ Ministry of Forests, Economics and Trade Branch (1993a). *Economic Impacts of Timber Harvesting in British Columbia*.

Appendix E - Incremental Impacts

Table E.1 TSA and Provincial Incremental Impacts: Scenario 1

Year	Harvest '000 m ³ /year	TSA Impacts					Provincial Impacts					Government Revenues \$1992 millions/year	
		Employment PYs/year			Labour Income \$1992 millions/year		Employment PYs/year			Labour Income \$1992 millions/year			
		Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct		Indirect
1	0	0	0	0	\$0	\$0	0	0	0	\$0	\$0	\$0	\$0
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0
20	-83	-60	-41	-101	-1.8	-9	-74	-112	-186	-2.4	-2.5	-4.9	-1.9
30	-76	-55	-37	-92	-1.7	-8	-68	-102	-170	-2.2	-2.3	-4.5	-1.7
40	-69	-50	-34	-84	-1.5	-7	-62	-93	-155	-1.9	-2.1	-4.0	-1.5
50	-63	-45	-31	-76	-1.4	-6	-56	-85	-141	-1.8	-1.9	-3.7	-1.4
60	-58	-42	-28	-70	-1.3	-6	-52	-78	-130	-1.6	-1.8	-3.4	-1.3
70	-52	-37	-25	-62	-1.2	-5	-47	-70	-117	-1.5	-1.6	-3.0	-1.2
80	-47	-34	-23	-57	-1.0	-5	-42	-63	-105	-1.3	-1.4	-2.7	-1.0
90	-23	-17	-11	-28	-5	-2	-21	-31	-52	-6	-7	-1.3	-5
100	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix E - Incremental Impacts

Table E.2 TSA and Provincial Incremental Impacts: Scenario 2

		TSA Impacts				Provincial Impacts								
Year	Harvest '000 m³/year	Employment PYs/year			Labour Income \$1992 millions/year			Employment PYs/year			Labour Income \$1992 millions/year			Government Revenues \$1992 millions/year
		Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	
1	0	0	0	0	\$0	\$0	\$0	0	0	0	\$0	\$0	\$0	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	-245	-177	-120	-297	-5.5	-2.5	-8.0	-219	-330	-550	-7.0	-7.3	-14.3	
10	0	0	0	0	0	0	0	0	0	0	0	0	0	
20	0	0	0	0	0	0	0	0	0	0	0	0	0	
30	0	0	0	0	0	0	0	0	0	0	0	0	0	
40	0	0	0	0	0	0	0	0	0	0	0	0	0	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	
60	0	0	0	0	0	0	0	0	0	0	0	0	0	
70	-61	-44	-30	-74	-1.4	-6	-2.0	-55	-82	-137	-1.7	-1.8	-3.6	
80	-56	-40	-27	-67	-1.2	-6	-1.8	-50	-75	-125	-1.6	-1.7	-3.3	
90	-51	-37	-25	-62	-1.1	-5	-1.7	-46	-69	-115	-1.4	-1.5	-3.0	
100	-46	-33	-22	-55	-1.0	-5	-1.5	-41	-62	-103	-1.3	-1.4	-2.7	
110	-12	-9	-6	-15	-3	-1	-4	-11	-16	-27	-3	-4	-7	

Appendix E - Incremental Impacts

Table E.3 TSA and Provincial Incremental Impacts: Scenario 3

Year	Harvest '000 m³/year	TSA Impacts					Provincial Impacts					Government Revenues \$1992 millions/year	
		Employment PYs/year			Labour Income \$1992 millions/year		Employment PYs/year			Labour Income \$1992 millions/year			
		Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct		Indirect
1	-140	-101	-68	-169	-\$3.1	-\$1.4	-125	-188	-313	-\$4.0	-\$4.2	-\$8.2	-\$3.1
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0
40	-60	-43	-29	-72	-1.3	-0.6	-54	-81	-135	-1.7	-1.8	-3.5	-1.3
50	-56	-40	-27	-67	-1.2	-0.6	-50	-75	-125	-1.6	-1.7	-3.3	-1.2
60	-51	-37	-25	-62	-1.1	-0.5	-46	-69	-115	-1.4	-1.5	-3.0	-1.1
70	-47	-34	-23	-57	-1.0	-0.5	-42	-63	-105	-1.3	-1.4	-2.7	-1.0
80	-43	-31	-21	-52	-1.0	-0.4	-39	-58	-97	-1.2	-1.3	-2.5	-1.0
90	-40	-29	-20	-49	-0.9	-0.4	-36	-54	-90	-1.1	-1.2	-2.3	-0.9
100	-34	-25	-17	-41	-0.8	-0.3	-30	-46	-76	-1.0	-1.0	-2.0	-0.8
110	0	0	0	0	0	0	0	0	0	0	0	0	0

