SOCIO-ECONOMIC ASSESSMENT OF TIMBER SUPPLY OPTIONS FOR THE NORTHERN PORTION OF THE KALUM TSA

Submitted to:

Resource Economics, Economics and Trade Branch
B.C. Forest Service
Victoria, B.C.

Submitted by:

Resource Systems Management International Inc. (RSMI)
#300 - 604 Columbia Street West
New Westminster, B.C. V3M 1A6

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Province of
British Columbia

Ministry of
Forests

June 22, 1993

This report provides information about the socio-economic implications of changing harvest levels for Kalum North.

The report has been prepared for the B.C. Forest Service by Resource Systems Management International Inc. Information was collected from a number of statistical sources and interviews with individuals from a wide spectrum of interests and responsibilities. Opinions expressed or documented in the report are a reflection of personal viewpoints and do not necessarily represent the position of the B.C. Forest Service.

Any comments regarding the Kalum North Socio-Economic Analysis should be submitted by August 31, 1993, to Brian Downie, District Manager, Kalum Forest District, Room 200, 5220 Keith Avenue, Terrace, B.C. V8G 1L1.

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INTRODUCTION

The purpose of this report is to carry out a socio-economic impact assessment of the effects of selected harvest scenarios for the Kalum North, using a Multiple Accounts Analysis evaluative framework. It is intended to accompany the Kalum North Timber Supply Analysis presently being completed by the B.C. Ministry of Forests.

SOCIO-ECONOMIC PROFILE OF THE STUDY AREA

The Kalum Timber Supply Area (TSA) lies within the Prince Rupert Forest Region. The *study area* in this report is comprised of those communities directly affected by wood flows from the northern portion of the Kalum TSA, referred to here as the **Kalum North**. These communities include:

- Stewart;
- Terrace;
- Prince Rupert;
- Kitimat;
- Hazelton;
- Kitwanga, Gitwangak and Gitanyow; and,
- the Nisga'a communities.

While the study area has several resources, such as tourism and recreation, fishing and trapping, and a small degree of mining potential, forestry is decidedly the most important sector in the study area. There are no wood processing operations located within the Kalum North, however most of the wood of the Kalum North flows to mills within the study area, or is shipped to other B.C. or export destinations through the port of Stewart. The Kalum North, as well as the Kalum South and Kispiox TSAs, is a principal source of wood for forest industry operations within the study, and therefore has direct economic effects within the study area, in terms of employment, income and government revenues.

The predominant species of the Kalum North are Hemlock and Balsam. Balsam comprises 42 percent of the total forested area, with Hemlock accounting for 52 percent. Lodgepole pine, spruce, cottonwood and other deciduous species account for minor components of the forest resource. The Kalum North encompasses several biogeoclimatic zones, namely Coastal Western Hemlock, Interior Cedar/Hemlock, Engelmann Spruce and Sub-alpine fir as well as Alpine Tundra on the mountain tops. It can be generally described as mountainous with wide river valleys especially in its southern portion, cold and subject to

heavy snow loadings. The valley bottoms and southern exposed slopes are an important source and represent the most critical habitats. They are also often the areas best suited for logging because they are the most productive lands and easily accessible for forestry use.

DESCRIPTION OF BASE CASE AND SCENARIOS

This analysis models the socio-economic impacts related to three different Allowable Annual Cut (AAC) scenarios:

Base Case: A decline of 9.5 percent per decade over the next 120 years until a long run harvest level of 385,000 cubic metres is achieved.

Scenario I: Continuation of current AAC for two decades, followed by a 10 percent per decade decline to long run harvest level of 385,000 cubic metres per year.

Scenario II: Immediate AAC decrease of 20 percent followed by a ten percent per decade decline after year 40.

This study focuses on the socio-economic impacts related to each of the alternative scenarios versus the Base Case.

IMPLICATIONS OF THE BASE CASE

The Base Case involves a 9.5 percent per decade reduction in AAC for the Kalum North, starting in the second decade of the forecast period. Currently, most harvesting in the Kalum North takes place in the valley bottoms. However, for all three scenarios, it is assumed that an increasing amount of harvesting will take place further up the hillsides. This implies a shift from predominantly ground-based skidding towards greater use of cable harvesting systems and manual felling, and a greater degree of labour intensity.

Under the Base Case scenario, it is estimated that:

- Direct annual regional employment in forestry and tourism generated by wood flows from the Kalum North would decline from 501 PY in year 0, to 382 PY in year 60. While there would be some growth in the tourism and recreation sector, this would be significantly offset by losses in the forest industry.

- Total direct and indirect jobs at the regional level related to the Kalum North would decline from 723 in year 0 to 550 in year 60. Corresponding direct and indirect income would decrease from $24.9 million in year 0 to $18.7 million in year 60.

- At the provincial level, total direct and indirect jobs related to the Kalum North are estimated to be 1,428 in year 0, declining to 1,038 in year 60. Aggregate direct and indirect income would be $45.3 million in year 0, declining to $32.9 million in year 60.

- Total annual provincial government revenue would decline from $10.4 million in year 0, to $7.2 million in year 60.

Table 1: REGIONAL AND PROVINCIAL ECONOMIC IMPACTS BASE CASE SCENARIO

Years	0	10	20	60
REGIONAL				
Total Direct Jobs (PY/yr)	501	529	543	382
Total Direct and Indirect Jobs (PY/yr)	723	764	785	550
Total Direct and Indirect Income ($M/yr)	$24.9	$26.4	$27.0	$18.7
PROVINCIAL				
Total Direct and Indirect Jobs (PY/yr)	1,428	1,491	1,516	1,038
Total Direct and Indirect Income ($M/yr)	$45.3	$47.3	$48.1	$32.9
Provincial Government Revenue ($M/yr)	$10.4	$11.6	$10.8	$7.2

- The AAC reduction implicit in the Base Case would very likely incur some out-migration from the communities of the study area and, in the case of Stewart, result in further population reductions if no local wood processing facility is built. It is expected that there would be greater demand for social and employment-related services throughout the study.

- With regard to the environmental account, there would be several impacts at the regional level:

- preservation of biodiversity and old growth related values would be affected;

- increased accessibility for recreation, although offset to some degree by diminished wilderness opportunities;

- only partially responds to residents' existence value concerns.

At the provincial level, it is expected that biodiversity and preservation of old growth related values would be affected, and that there would be little or no impact on recreation use or existence value. The importance of the Nass river for its fisheries resources is of provincial significance, and there are concerns about future water quality and fish habitat as a result of logging and road building activity.

- The AAC reductions of the Base Case scenario appear to fall short of local Native objectives.

IMPACT OF ALTERNATE SCENARIOS

Scenario I

Scenario I involves the continuation of the current AAC for two decades, followed by a ten percent per decade decline to the long run harvest level of 385,000 cubic metres. This means that for the first twenty years of the forecast period, more jobs and income would be generated under Scenario I than the Base Case, however a harvest shortfall is predicted in years 110 to 130. The results of Scenario I are as follows:

- Direct regional employment related to the Kalum North is estimated to be 501 PY in year 0, declining to 398 PY in year 60 of the forecast period. Growth in the tourism sector would be less than in the Base Case, while forestry employment would increase during the first 20 years, then decline for the rest of the forecast period.

- Total regional direct and indirect jobs are estimated to be 723 in year 0, declining to 573 in year 60. Total income (direct and indirect) would be $24.9 million in year 0, dropping to $19.7 million in year 60.

- At the provincial level, total direct and indirect jobs related to the Kalum North are estimated to be 1,428 PY in year 0, declining to 1,100 PY in year 60. Corresponding direct and indirect income is estimated to be $45.3 million in year 0, declining over the forecast period to $34.9 million.

- Total annual provincial government revenue would decline from $10.5 million in year 0, to $7.8 million in year 60.

Table 2: REGIONAL AND PROVINCIAL ECONOMIC IMPACTS SCENARIO I

Years	0	10	20	60
REGIONAL				
Total Direct Jobs (PY/yr)	501	583	594	398
Total Direct and Indirect Jobs (PY/yr)	723	842	859	573
Total Direct and Indirect Income ($M/yr)	$24.9	$29.1	$29.6	$19.7
PROVINCIAL				
Total Direct and Indirect Jobs (PY/yr)	1,428	1,646	1,660	1,100
Total Direct and Indirect Income ($M/yr)	$45.3	$52.2	$52.7	$34.9
Provincial Government Revenue ($M/yr)	$10.5	$12.8	$11.9	$7.8

- The harvest reductions of Scenario II would be less dramatic than those of the Base Case scenario during the sixty year forecast period, however in the longer term there would be a significant harvest shortfall, with serious social consequences for forestry dependent communities such as those in the study area.

- It is expected that there would be a more immediate impact on regional biodiversity and old growth related values in years 0 to 20 than the Base Case. In the short to medium term, Scenario I would result in the poorest preservation of current forest characteristics. At the provincial level, there would be a more immediate impact on biodiversity and preservation of old growth related values, as well as the Nass River, however little impact is expected at the provincial level for recreation use or existence value.

- Scenario I least addresses Native concerns of all the scenarios.

Scenario II

- Scenario II assumes an immediate 20 percent reduction in the AAC of the Kalum North, which is sustained for four decades, after which there would be a ten percent per decade decline. This represents the most dramatic AAC cut of all scenarios, and it is expected that it would have the most dramatic socio-economic impacts. Under Scenario II, the following results have been evaluated:

- Wood flows from the Kalum North would generate regional employment in forestry and tourism of 402 PY in year 0. However, growing labour intensity in harvesting and a growing tourism sector would result in an increase in employment by year 20, tapering off to 412 by year 60. Gains in the tourism sector would be greatest under this scenario, but they would be dramatically outstripped by losses in the forestry sector (compared to the Base Case), particularly in the first 20 years.

- Total direct and indirect jobs related to the Kalum North under Scenario II would be 580 PY in year 0, rising slightly to 591 by year 60. There would be a negligible increase in total income related to this change.

- At the provincial level, aggregate direct and indirect income related to the Kalum North would be $36.2 million in year 0, declining to $35.2 million in year 60.

- Total annual provincial government revenue would be $8.5 million in year 0 and would decline to $7.7 million in year 60 of the forecast period.

Table 3: REGIONAL AND PROVINCIAL ECONOMIC IMPACTS SCENARIO II

Years	0	10	20	60
REGIONAL				
Total Direct Jobs (PY/yr)	402	472	540	412
Total Direct and Indirect Jobs (PY/yr)	580	681	779	591
Total Direct and Indirect Income ($M/yr)	$20.0	$23.4	$26.7	$20.2

PROVINCIAL				
Total Direct and Indirect Jobs (PY/yr)	1,141	1,322	1,492	1,110
Total Direct and Indirect Income ($M/yr)	$36.2	$42.0	$47.3	$35.2
Provincial Government Revenue ($M/yr)	$8.5	$10.3	$10.6	$7.7

- The AAC reduction implicit in Scenario II would result in the greatest number of job losses during the entire forecast period. It would seriously constrain the wood fibre available for processing, and could present the greatest risk of mill closure during the first two decades. Scenario II would result in the greatest level of out-migration of all the scenarios, and would result in the highest requirement for social services. In the event of a mill shutdown, it could affect the tax base of the community where the shutdown occurs.

- Scenario II would longer preserve the regional biodiversity and old growth related values of the Kalum North, and would result in greater preservation of recreation and existence values over the Base Case. It is expected that the results would be the same at the provincial level, and that there would be little or no effect on recreation use or existence value.

- Scenario II best addresses Native concerns.

1.1 Background and Objectives

The provincial Ministry of Forests is presently carrying out a province-wide timber supply review, with the purpose of documenting the short and long term timber supply effects resulting from current forest management in B.C. As a part of this review, the Ministry recently completed a timber supply analysis for the northern portion of the Kalum Timber Supply Area (hereinafter referred to as **Kalum North**[1]). As a supplement to this analysis, Resource Systems Management International (RS*MI*) has been commissioned with a socio-economic impact assessment study of the effects of selected AAC scenarios for the Kalum North. It is the objective of this study to evaluate the economic, environmental and social impacts of alternative harvest rate scenarios within a "multiple accounts" context, at both the regional and provincial levels.

Multiple accounts analysis is an evaluative framework which is intended to address the full range of values inherent in a given resource, in this case the provincial forests. This methodology analyses the impact of various harvest scenarios for a given forest resource from a number of social, economic and environmental perspectives (or "accounts"), both on a provincial and a regional basis. The final result, a matrix of information which integrates indicators of how these different accounts are affected under the various scenarios, serves as a tool for decisions on land use. Wherever possible, quantitative measures are used, however this is not always possible or practical. For example, to address environmental existence values which people ascribe to an area, appropriate quantitative measures, such as calculating "willingness-to-pay", would be very difficult, requiring work considerably beyond the scope of this study, and of questionable additional contributing value. As a result, qualitative appraisals are provided.

The primary goals in carrying out multiple accounts analysis are to objectively analyze and evaluate the different dimensions or trade-offs of the scenarios in question, and to convey the findings in as value-neutral a fashion as possible. The measure of success of the analysis is whether the framework fairly represents the divergent concerns of competing interests. Its value is to integrate these sometimes opposing perspectives into one non-adversarial document. It should be noted that multiple accounts analysis is not intended to culminate in a recommended course of action. Its function is to inform decision-making, and not to supplant it.

[1] Kalum North Timber Supply Analysis, Integrated Resource Branch, B.C. Ministry of Forests, February, 1993.

1.2 Approach and Methodology

It is an essential part of any social impact assessment to consult with a wide variety of community stakeholders in order to gain a thorough understanding of regional issues and values, and to encourage "ownership" of the final report results. No matter how well executed the analysis may be, community input and acceptance is a vital factor in lending the results credibility. Therefore, the first stage of this analysis involved visits to Terrace, Stewart, Kitwanga and Gitwangak, and extensive consultation with representatives from various local government agencies, the business community and aboriginal groups. This included participation in a public meeting at Stewart and a meeting with the Nisga'a Tribal Council in Vancouver.

In light of the land claims issues in this area, it was important to consult with the Nisga'a, Gitksan and Gitanyow communities, all of whom cite traditional and historical use of the study area and have overlapping land claims. However, our consultation with the Nisgä'a, Gitksan and Gitanyow was concerned only with the issues related to AAC changes in the Kalum North and, in the view of the hereditary chiefs of the Gitksan and Gitanyow, does not constitute a fulfilment of the provincial government's fiduciary obligation regarding land claims. The Nisga'a are presently negotiating their land claims with the provincial and federal governments, and have an Interim Protection Measures Agreement in place.

It is critical to note that, as the multiple accounts approach is designed to focus on the socio-economic impacts of the various scenarios, the environmental account addresses impacts on the environmental attributes of the study area from a human or anthropocentric perspective, rather than an ecological one. Specifically, the environmental account documents the impacts on the values or non-commercial benefits derived by people from the environmental resources and qualities of the study area. Generally speaking, these values and benefits can be categorized as follows:

- user-related values - food gathering, recreational, or air and water uses; and
- existence-related values - the importance or value placed on the existence and perpetuation of the inherent environmental characteristics of the area.

Although the environmental impact assessment is necessarily based on biophysical analyses, the study is not intended to produce or provide an assessment or inventory of the environmental resources and attributes of the area. The environmental impact assessment relies on previous reports and/or data derived from interviews with knowledgeable environmental authorities.[2] Similarly, a comprehensive study to determine the value which residents place on the region's environmental attributes has not been

[2] See Appendix A.

done and is beyond the scope of this study. As noted previously, interviews were carried out with both local community and native representatives on which this assessment is based.

The starting point for a multiple accounts analysis is the specification of the various scenarios being considered for the forest resource in question. In this case, we define the **Base Case** as that defined in the Kalum North Timber Supply Analysis, based on current forest management practices. While the Base Case forest management practices may not change over the projected time horizon, the volume of wood, biophysical characteristics, and socio-economic conditions in the planning area will continue to be dynamic, and this must be built into the model. The alternative scenarios being considered in this analysis involve different reductions in the AAC of the Kalum North.

Having defined the base and alternative cases, the next step is to model these within the context of economic, social and environmental criteria, and document the incremental gains or losses of benefits associated with the alternative scenarios vis a vis the Base Case scenario. The analysis documents both the regional and provincial impacts of the alternative scenarios.

The accounts to be considered are provided in Table 1-1.

TABLE 1-1: REGIONAL LEVEL ACCOUNTS - Kalum North

Economic Development	local income and employment effects
Environment	impacts of the scenarios on the benefits people derive from, or the values they attach to, environmental resources and attributes in the area
Community	impacts on population, provision of local services, local government revenues and the provision of local government services and infrastructure and, ultimately, the impact on community goals such as stability, cohesiveness and economic autonomy and diversity
Specific Native	impact on native community resources, cultural values and traditional activities (eg; income, food harvest levels)
PROVINCIAL LEVEL ACCOUNTS	
Economic Development	impact of different scenarios on economic activity in communities outside area and in the province as a whole; direct and indirect
Environment	impact on environmental values/attributes and resource use
Provincial Government	government resource-related taxes and other revenues less expenditures associated with the scenarios

The final product is a matrix of results for each provincial and regional account, either in qualitative or quantitative form. It should be noted that the assessment is comparative between the given scenarios and

does not purport to identify the AAC volume which would best reconcile native concerns or environmental values.

This analysis uses a 60 year time horizon and all figures are expressed in 1992 constant dollars.

We would like to acknowledge that our interviews produced a great amount of very valuable information, however time and budget constraints have allowed us to include only that which is germane to the task at hand. We acknowledge and thank all those individuals who provided us with this excellent information, as well as their insights and their time. A list of individuals interviewed for this study is provided in Appendix A.

1.3 Structure of Report

This report uses the following framework in the evaluation of AAC scenarios for the Kalum North:

- definition of the study area, both in general and with respect to each of the resources in the area, for example forestry or tourism;
- description of the communities within the planning area, including demographics, economic factors, the environmental setting and specific aboriginal concerns where appropriate;
- description of the AAC scenarios;
- impact assessment of each scenario, from both regional and provincial accounts perspectives; and,
- summary of results.

2.0 SOCIO-ECONOMIC PROFILE OF THE STUDY AREA

The Kalum Timber Supply Area (TSA) lies within the Prince Rupert Forest Region, and is administered by the Kalum Forest District office in Terrace and a field office in Stewart. (A map of the Prince Rupert Forest Region is provided in Figure 2-1.) The northern portion of the Kalum TSA (Kalum North), ie. that area north of the Nass River, encompasses approximately 1.7 million hectares, and includes the Bell Irving and Nass River drainages.

The predominant species of the Kalum North are Hemlock and Balsam. Balsam comprises 42 percent of the total forested area, with Hemlock accounting for 52 percent. Lodgepole pine, spruce, cottonwood and other deciduous species account for minor components of the forest resource.

The Timber Supply Analysis of the Kalum North divides the area into seven geographic zones based primarily on watershed boundaries, and these are illustrated in Figure 2-2. The western part of the Kalum North is mostly rugged and mountainous; almost all the forest in this area is either not merchantable, or is situated on environmentally sensitive locations, and therefore inaccessible for timber harvesting.

The Kalum North is relatively remote, and very thinly populated, apart from some logging camps and a small number of aboriginal communities. The Kalum North's wilderness characteristics and spectacular scenery attracts some recreational visitors, in particular the area's mountains and glaciers, the Swan Lakes Wilderness Area and the Meziadin, Bonny, Fred Wright and Bowser lakes. (The latter three lakes are accessible only by logging road.) For the most part, however, the Kalum North remains an isolated wilderness area, portions of which are pristine.

2.1 Forestry Sector

There are no wood processing operations located within the Kalum North. However, there is a Kalum Forest District Field Office in Stewart which helps administer the TSA. All timber harvested in the area is shipped to sawmills or pulp mills at Terrace, Prince Rupert and Kitimat, or are exported to offshore markets such as the US, Japan or Korea. Occasional volumes of wood are also directed to the sawmills at Hazelton or Kitwanga. Stewart is the major coastal shipping point for timber destined to coastal B.C. or foreign markets.

Figure 2-1: PRINCE RUPERT FOREST REGION

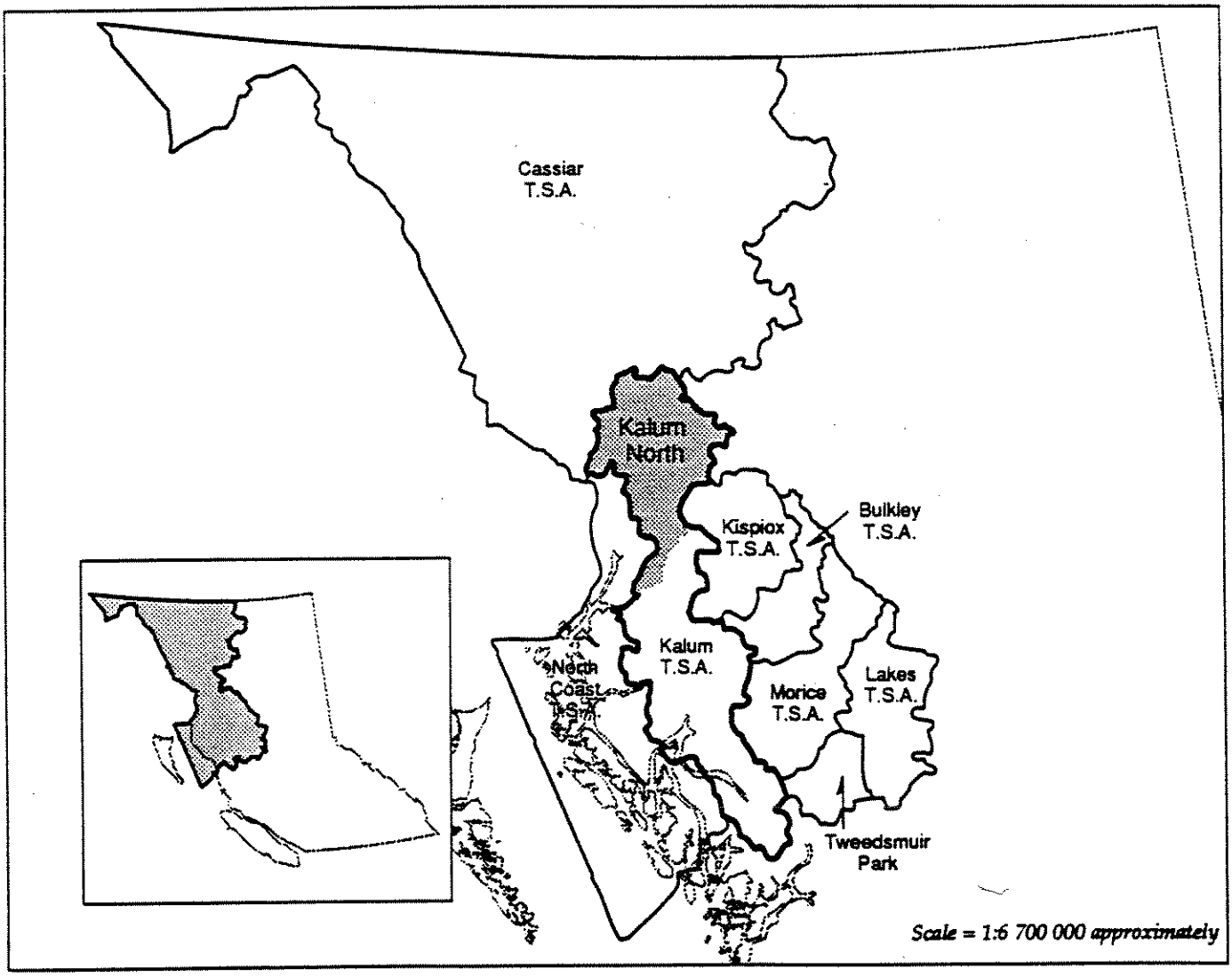
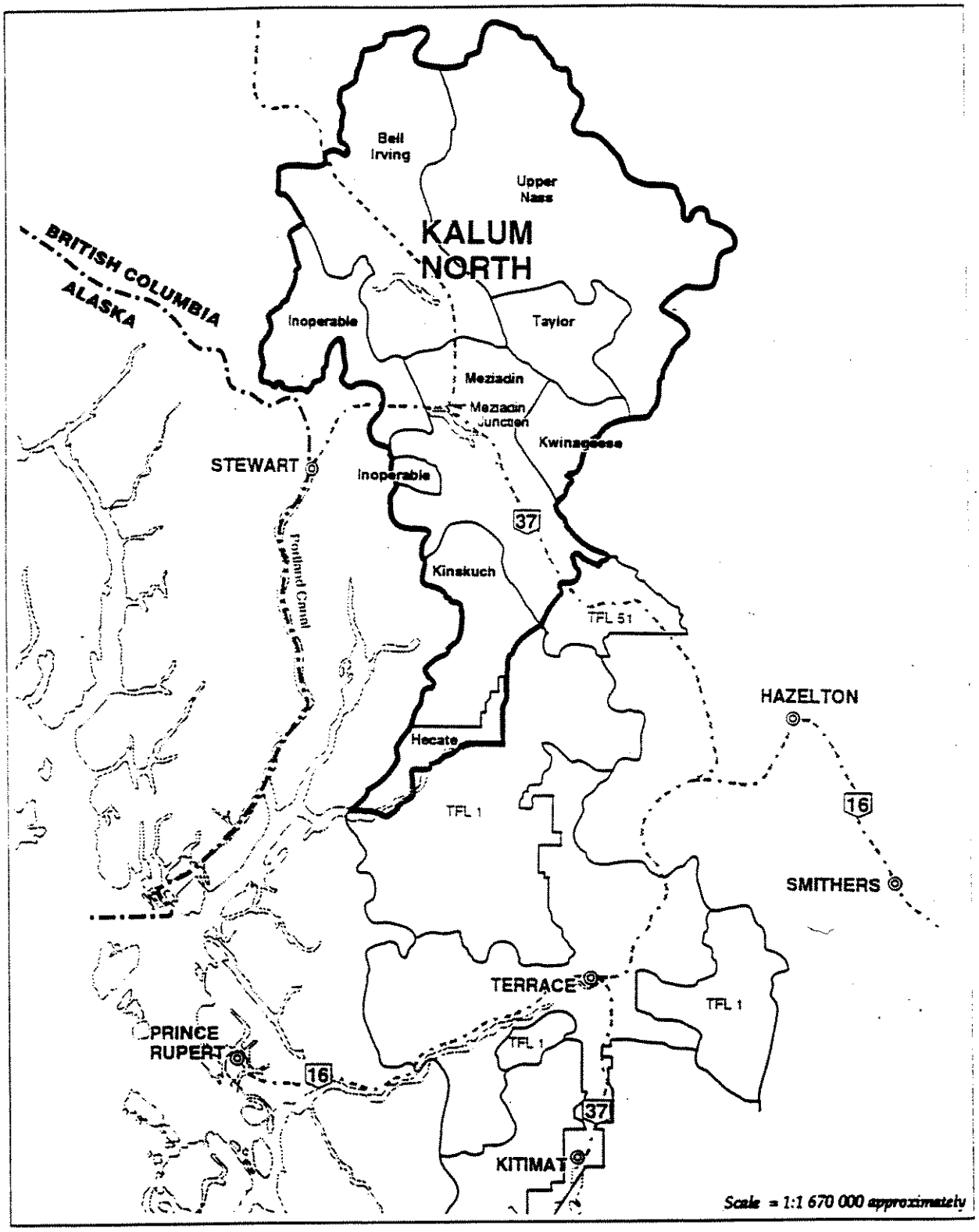


Figure 2-2: KALUM NORTH ZONES



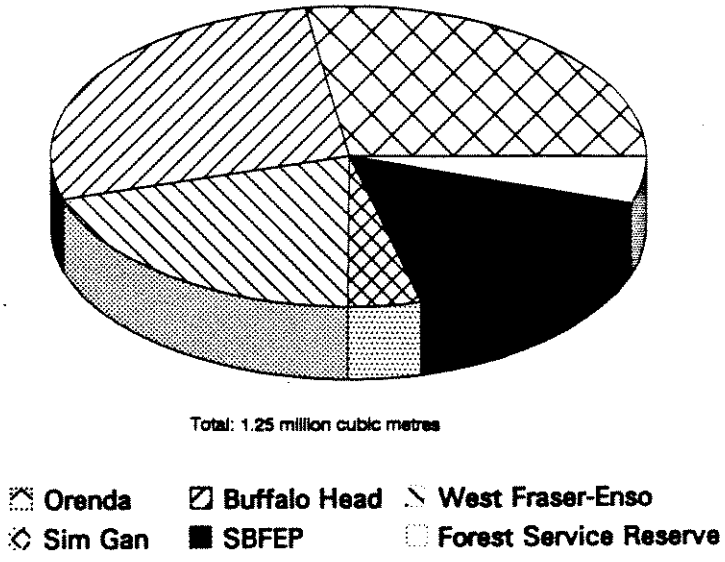
The Kalum North has an AAC of 1.25 million m^3. While the proportion varies by area, approximately 80 percent of the timber harvested is pulpwood, and 20 percent is sawlog quality. The annual cut is distributed among major licensees and small business operators (SBFEP) as follows:

Table 2-1: KALUM NORTH ALLOWABLE ANNUAL CUT BY LICENSEE

Licensee	Annual Cut (m^3)
Orenda Forest Products	342,000
Buffalo Head	342,000
West Fraser-Enso	252,700
Sim Gan	50,000
Sub-total	**986,700**
Small Bus. Forest Enterprise Program	200,000
Forest Service Reserve	63,300
Total	**1,250,000**

Source: B.C. Ministry of Forests.

Figure 2.3: Kalum North Allowable Annual Cut by License (share of total)



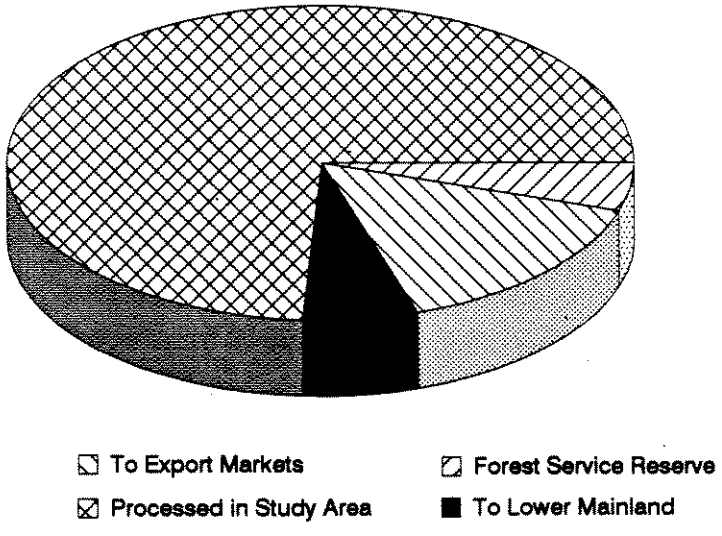
Orenda and Buffalo Head are strictly logging operations, and both ship their pulpwood and sawlogs to coastal sawmills and pulp mills in Terrace, Prince Rupert, Kitimat and the Lower Mainland; they also export sawlogs to offshore markets. Transportation is either through Stewart port or by truck to the Terrace area. The distribution varies from year to year, with approximately 135,000 m^3 of wood being shipped to export markets.

West Fraser sends most of its cut to its sawmill in Terrace, where it is either sawn into lumber or chipped and transferred to the Kitimat pulp mill. It exports approximately 20,000 m^3 of wood per year in the form of sawlogs. The Sim Gan operation is also strictly logging, with approximately half of its cut going to local sawmills, and the rest to offshore markets.

The cut which accrues to SBFEP operators varies from year to year. Approximately 85 to 90 percent of SBFEP wood is pulpwood and domestic sawlogs, with the remaining ten to fifteen percent destined for markets like Japan. While there are eleven SBFEP operators licensed in the Kalum North, only two are presently active due to a short term reduction in the timber sale program.

It is estimated that 75 percent of the cut from the Kalum North is shipped through the port of Stewart.

Figure 2.4: Wood Flows from Kalum North (1992-93) (share of total)



Because of the diverse wood flows from the Kalum North, only a small percentage of the economic benefits are incurred within the TSA. In fact, most of the economic benefits accrue in those communities outside the Kalum North where the wood is either transported or processed. For this reason, we define the "study area" in our analysis as follows:

The study area is the area which encompasses the Kalum North as well as those communities where most of the economic benefits (timber and non-timber) from the Kalum North accrue, specifically:

- Stewart
- Terrace
- Prince Rupert
- Kitimat
- Hazelton
- Kitwanga, Gitwangak and Gitanyow
- the Nisga'a communities

These communities are profiled in Section 2.5.

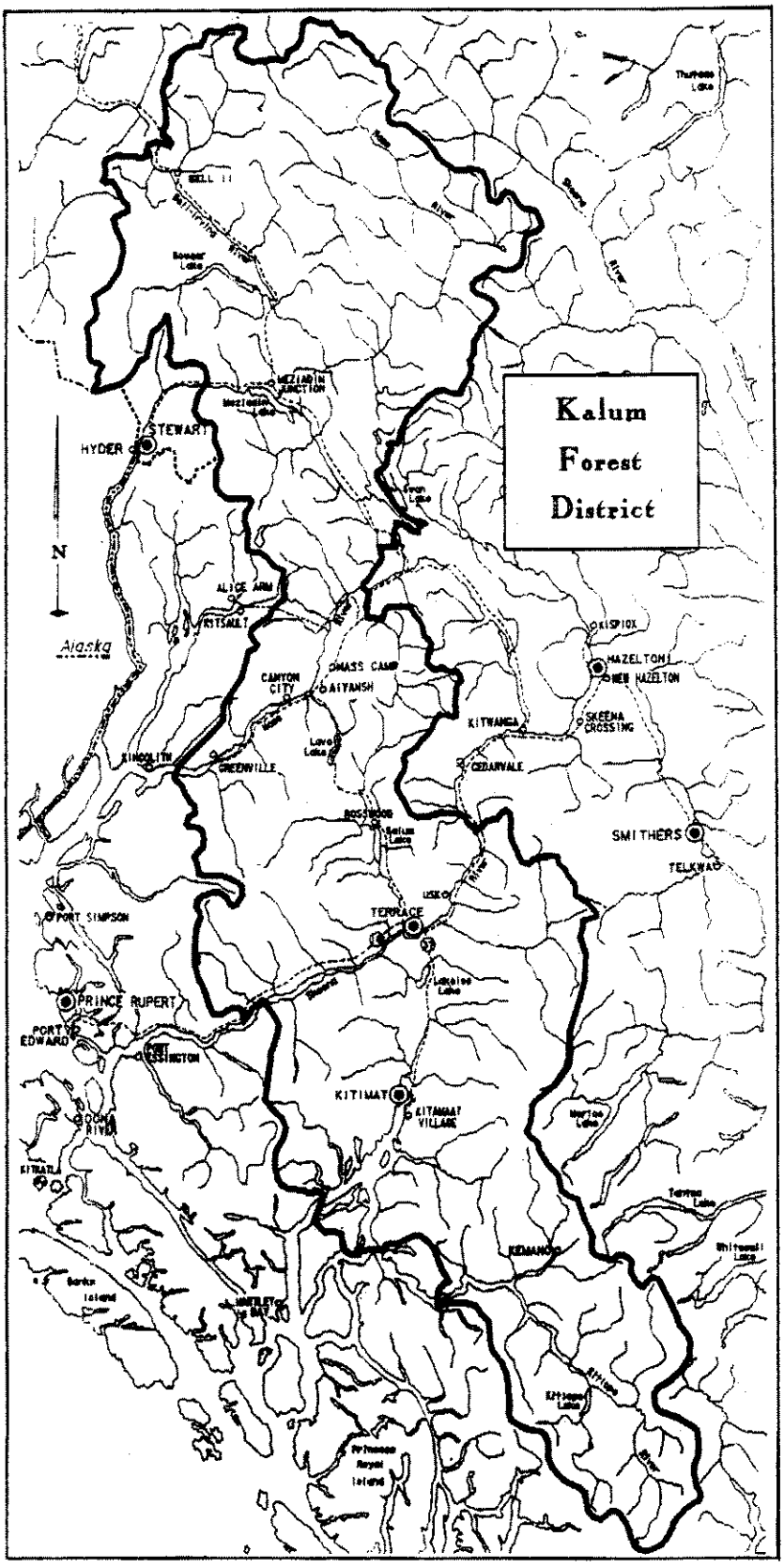
2.2 Tourism and Recreation Resources

The tourism industry accounts for approximately seven percent of the combined labour force in the communities of Terrace, Stewart and New Hazelton. Terrace is the regional transportation distribution centre for the area, while Stewart is a popular tourist destination in the summer months, as it is located on the Canada-Alaska border. While forestry development dominates in the Kalum North, there is some wilderness-based tourism and recreational activity and it is expected to grow at a moderate rate. Spectacular scenery and recreational opportunities such as hiking, fishing and camping are attracting growing numbers of wilderness and adventure tourists, both local and foreign.

Accessibility to the Kalum North is limited, with the exception of the areas accessible via Highway 37. There is approximately 25 percent less traffic travelling along Highway 37 north of Meziadin Junction than south of it, based on counts by the Ministry of Transportation and Highways. Most traffic (approximately 75 percent) travelling the northern portion of Highway 37 is heavy trucks, with passenger vehicles, recreation vehicles and light trucks northbound accounting for approximately 124 movements per day during the summer months[3]. There are a number of logging roads in the area, however they are relatively difficult to negotiate for the average tourist.

[3] B.C. Ministry of Transportation and Highways.

Figure 2-5: KALUM TSA (North and South)



There are three designated forestry trails either within or bordering on the Kalum North study area. However, only two of these trails, both outside the study area, are currently in use. One located within the study area has been closed due to bridge washouts and hazard trees. The B.C. Forest Service indicated that there is no immediate plan to re-open this trail, although this is likely at some point in the future.

Meziadin Junction is the location of the area's only provincial park, a popular 42 campsite destination on Meziadin Lake with excellent fishing and situated close to the spectacular Bear Glacier. The Swan Lake wilderness area is another key attraction. There are also two B.C. Forest Service campsites in the area: Clements Lake, located near Stewart, and Dragon Lake, located near Aiyansh.

The primary road access north of Meziadin Lake is along the Cassiar Highway 37, however this is a gravel roadway and therefore is not as heavily travelled as the section below Meziadin which is an important connector to the north. Wildlife sightings of moose, deer, coyote, fox and black bear are common along Highway 37 and the logging roads in the study area.

2.3 Fishing, Trapping and Guide Outfitting

The Kalum North has an abundance of wildlife habitat, making it ideal for fishing, hunting, trapping and guide outfitting. Although most of Kalum North is somewhat remote, highway accessibility is reasonably good via Highways 37 and 37A. There are three officially licensed wildlife guide outfitters operating in the study area and three registered traplines. Most of the trapping takes place in close proximity to the highways in the area, while the guides tour more remote areas within the TSA. The guides reach their destinations via helicopter, boat or vehicle.

There are also a number of freshwater angling guides, licensed by the Fisheries Program of B.C. Environment, operating in the area. The fisheries program introduced the Classified Waters System in 1990 to balance the increasing demand for quality fisheries with limited provincial freshwater resources. The objective of this system is to control the number of non-resident users of fresh-water resources by requiring them to obtain a special license or hire the services of a licensed guide.[4] At the present time, two rivers within the study area qualify for Class II protection: Damdochax Creek and Kwinageese River. Although special licenses are required to angle on these rivers, there are no other limits to angling activity. In order to sustain species populations, "catch and release" guidelines are in effect on all watercourses for steelhead, sockeye, pink and chum, and any species under 30 cm in length. These regulations may constrain potential demand for freshwater angling opportunities in the area.

[4] Residents of B.C. do not have any location restrictions at this time.

The hunting guide outfitter industry averages approximately 500 customer days per year, mostly Europeans and Americans, with the most popular times for these activities being late spring and early fall. The freshwater angling guides average approximately 4,200 customer days per year, primarily in late summer and early fall.

In addition to the professionally guided tours, the frequency of day visits to the study area has been increasing, as the resources of the area become better known and more traffic travels Highway 37.

2.4 Mining

There is some limited mining activity in the Kalum North. Presently, there is one small silver mine in operation which is accessible only by helicopter, and there is also ongoing exploration activity throughout the TSA for gold and silver.

2.5 Community Profiles

The following summary provides a brief profile of the key communities within and close to the Kalum North all of which have been included in the study area for this analysis. A map of the TSA which shows their locations is provided in Figure 2-5.

- **Stewart**

Located at the head of the fjord-like Portland Channel, Stewart acts as a key shipping point for timber and minerals from northern operations, and is heavily dependent upon the fortunes of the natural resource sector. Historically, the Stewart economy has been driven by the mining industry, however timber harvesting and log exports have assumed a dominant role in recent years. With an estimated 1991 population of 1,150,[5] it acts as a key service and trade centre for remote communities to the north. The extension of the B.C. Hydro integrated grid in December 1989 has resulted in better availability of power resources, and could potentially act as a catalyst to a more diversified economy.

Due to its heavy dependence on natural resource extraction, Stewart has experienced several fluctuations in its population during its history. A cyclical economy is not new to Stewart, however two recent events have hit the community particularly hard: the closure of the Cassiar Mine in early 1992, and the scaling back of employment at the Westmin Premier Gold mine in June 1992. These losses have had

[5] Source: 1991 Census. The population of Stewart has declined since 1991, according to local sources, but accurate population figures are not available.

repercussions throughout the local economy, including the shut down of one stevedoring company which was a key employer.

All wood from the Kalum North is shipped elsewhere in the province for processing or to offshore markets through Stewart, or trucked south to Terrace and Kitimat. With the shutdown of the Cassiar mine, there is increasing pressure on the forest industry to develop a wood processing facility in Stewart, in order to provide employment and economic stability for the community.

- **Terrace**

The City of Terrace is located in the Skeena Valley at the junction of the Trans-Provincial Highway 16 to Prince Rupert and Highway 37 to Kitimat. According to preliminary 1991 Census data, the City of Terrace has a population of 11,430 while Greater Terrace has a population of 18,910.

The forest industry plays a major role in the economy of Terrace. There are two major sawmills in Terrace, Skeena Cellulose Inc. and Skeena Sawmills (owned by West Fraser), both of which produce sawn lumber and wood chips. Wood to these mills is from the Kalum North and South TSA's. Although the forest industry dominates, the employment pattern in the Terrace area has diversified in recent years. Over 50 percent of employment is in the trade, service and administrative sectors, reflecting the community's growing importance as a regional service and retail centre. There is also a growing tourism industry which focuses on the unique natural features of the surrounding area.

- **Hazelton and Kitwanga Area**

A population of 6,475 people is scattered among fifteen small communities in the Middle Skeena area, with the largest single community being Hazelton, with a 1991 population of approximately 339.[6] This is also the location of several aboriginal communities, including Gitwangak and Gitanyow. Activities related to the extraction of forest products, in particular sawmilling, have traditionally dominated the economy of this area. Key operations include:[7]

- Carnaby Mill (Repap), South Hazelton: This is a new, high technology sawmill, and one of two LINCK operations in the province. Produces sawn lumber for domestic and foreign markets and chips for Repap pulp mill at Prince Rupert.

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[6] Source: 1991 Census

[7] Source: B.C. Ministry of Forests and industry contacts.

- Kitwanga Lumber (Hobenshields), Kitwanga: produces dimension lumber for domestic and export markets and chips for Repap pulp mill.

- Isolite-Stege, South Hazelton: produces dimension lumber, and chips destined for Repap and Eurocan pulp mills.

- Whole Log Chipper, New Hazelton: produces chips for Repap pulp mill in Prince Rupert.

There is also a second sawmill located at Kitwanga, formerly owned by Westar, which has been shut down. It was recently sold to the Gitksan-Wet'suwet'en, but is not yet operational. Wood for all the foregoing operations come from the Kispiox TSA and occasionally from the Kalum North.

Tourism has also begun to play a significant role in the economy of the area because of the many cultural and scenic attractions, including the 'KSAN Village Centre.

◆ Prince Rupert

The population of the Prince Rupert area decreased slightly during the 1980s to its 1991 level of approximately 17,500. The local economy is dominated by commercial fishing and fish processing, however this industry has undergone considerable rationalization and consolidation in recent years. The other key player in the local economy is the forest industry, with the large Skeena Cellulose pulp mill (owned by Repap) and market logging in the adjacent coastal area.

Prince Rupert has excellent transportation facilities, including a deep sea harbour which handles general cargo as well as bulk commodities such as coal and grain. With international ferry service and high quality highways, Prince Rupert is well situated to capitalize on the increasing interest in travelling through B.C.'s northwest and in particular, the Inside Passage.

◆ Kitimat

Located at the head of Douglas Channel, the city of Kitimat maintained a relatively constant population throughout the 1980's of approximately 11,000. The 1991 population of Kitimat was 11,305.

The economy of Kitimat is based on the employment and economic activity generated by three large manufacturing operations, the Alcan Smelter, the Eurocan Pulp and Paper Company and the Methanex ammonia plant. Together, these three operations employ approximately 2,700 people. As this shows, the economy of Kitimat is dominated by the manufacturing sector, which accounts for over 75 percent of employment in this area. The retail trade sector (6.2 percent) and government services (3.0 percent)

are the second and third most important employers. While tourism is growing, it is still regarded as a relatively small player in the local economy.

- **Nisga'a**

Five small communities comprise the Nisga'a area, specifically New Aiyansh, Canyon City, Greenville, Nass Camp and Kincolith. These are located at the southern border of the Kalum North. The combined population of the area is approximately 2,300 people. Access to these communities is constrained, with the primary mode by road from Terrace; Kincolith requires boat access. This area is the site of lands long settled by the Nisga'a people and was one of the first to be identified under aboriginal title claims. The cash economy is built on timber harvest and mineral extraction. There is one small sawmill in this area, but it is now shut down.

Traditionally, the Nisga'a people engage in hunting, trapping and sustenance fishing in order to meet their own needs. Like many areas of northwestern British Columbia, tourism is also seen as a potential source of future economic growth.

- **Other Communities Within the Kalum North**

There are a number of small logging and aboriginal settlements within the Kalum North, including:

- Nass Camp (Tillicum Lodge);
- Ellsworth Camp (permanent logging camp);
- Meziadin Junction;
- Meziadin Highways Camp (permanent residents and motel);
- Bell II (Northern Mountain Helicopter Base, with few residents); and,
- Spruce Camp (Buffalo Head logging camp, just north of Bell I).

It is our understanding that there are a growing number of settlements along the shores of Meziadin Lake.

2.6 Aboriginal Communities and Use of Kalum North

The study area encompasses the traditional lands of the Nisga'a tribal council, as well as the Gitanyow and Kispiox houses[8] of the Gitksan people. As a result, each of these groups have established land claims in the Kalum North. The Nisga'a claim is by far the largest, accounting for much of the TSA, with the other two land claims overlapping it. Presently, the Nisga'a are negotiating with the

[8] A house is a family (can be comprised of 100-300 people); a clan is 2-4 houses.

governments of B.C. and Canada on their land claims with a view to greater involvement in the management of all natural resources in the study area, in particular forestry and fisheries. A settlement is expected later this year.

There are nine Gitksan bands located throughout the Hazelton and Kitwanga area, but none of them are located in the Kalum North. The population of the Gitksan-Wet'suwet'en is approximately 7,500.

The Nisga'a live in five principal communities, several of which are located in the Kalum North. New Aiyansh is the largest of these communities with a population of approximately 1,200 people, including non-Nisga'a. It is the site of the main school, diagnostic/treatment centre and school district office. In total, the Nisga'a population numbers approximately 5,000 with 2,300 living in the study area.

Social assistance supports a significant share of the community, whereas only a small percentage is employed in the forest industry. The issue of forestry practices and local employment has long been a bone of contention to both the Nisga'a and Gitksan peoples.

Presently, there are four Nisga'a logging contractors who operate in the Kalum TSA. One contractor has a 50,000 m^3 forest license in the Kalum South. There is one Nisga'a logging contractor who employs seven Nisga'a, and another who employs six Nisga'a in the Kalum North. In addition, a Nisga'a family carries out clean ups in the Kalum North on a contractual basis.[9] There are also four independent native silviculture contractors in operation. Fishing is another important mainstay of the native community, as well as trapping and hunting. The Nisga'a Economic Enterprises also employs about 60 people, primarily in ship loading, timber sorting and logging. While it is variable, some of this employment has been in the Kalum North.

In the Kitwanga area, fishing, hunting and trapping are also important sustenance activities to the Gitksan people. Several Gitksan and Gitanyow people are employed at the Hobenshields sawmill. Another sawmill operated in the area until two years ago, when it shut down due to problems with operating costs. This put approximately 110 people out of work, and had a significant impact on the Gitksan and Gitanyow communities.

Historically, native peoples have made use of the lands of the Kalum North for food gathering, hunting, fishing, trapping, medicinal, shelter and spiritual purposes. Of particular note is the gathering of medicinal plants, such as Devil's Club. According to representatives of the Nisga'a and Gitksan peoples, logging activities in the area have disrupted both their traditional way of life and land tenure system. The establishment of commercial forest licence areas in the Kalum North has interfered with the boundaries

[9] Source: Collier Azak, Nisga'a; Bruce MacNicol, West Fraser.

delineating each clan's lands, and therefore traditional sustenance activities on these lands, for example burning to encourage berry growth. It has also interrupted the historic "grease trails" or trading routes between the Nisga'a and their neighbours, the Gitksan, to the north. These trails are of great historic significance, although several have been covered or severed by highways or Hydro corridors in the Gitksan territory.[10]

The spiritual link with the land is especially important to the native peoples and they state that their identity is inexorably tied to it. The Nass river figures prominently in the history of the Nisga'a people. Their traditional stories speak of the origin of the people being linked with the river. There is a strong association with the river from its start to where it joins the saltwater. The Nisga'a have traditionally relied heavily on the fisheries resources of the Nass for sustenance and more recently are contemplating co-management of the resource and possible commercial operations. For all these reasons, the environmental quality of the entire Nass ecosystem, including its tributaries, are of profound concern to the Nisga'a.

We were informed that there are a number of sites with spiritual and cultural significance located throughout the Kalum North but, for security and confidentiality reasons, their specific locations were kept secret. However, two general areas of significance were identified, namely Meziadin Lake and the Nass headwaters.

The aboriginal representatives with whom we met indicated that they were not opposed to logging per se but had serious concerns about sustainability of the resource given current practices. Furthermore, they want local control of these resources.

2.7 Environmental Setting

The Kalum North study area encompasses several biogeoclimatic zones, namely Coastal Western Hemlock, Interior Cedar/Hemlock, Engelmann Spruce and Sub-alpine fir as well as Alpine Tundra on the mountain tops. This range of habitat contributes to the wide variety of wildlife species found in the area. The study area can generally be described as mountainous with wide river valleys especially in its southern portion, cold and subject to heavy snow loadings. The valley bottoms and southern exposed slopes, which thaw first and are, therefore, an important source of food, represent the most critical habitats. These are also often the areas best suited for logging because they are the most productive lands and easily accessible for forestry use.

[10] This is based on conversations with the Nisga'a and Gitksan nations.

It should be noted that for the purpose of assessing regional environmental values, unlike the regional economic development account, it was decided to consider the communities of Prince Rupert, Terrace, Kitimat, Hazelton, Kitwanga, Gitwangak and Gitanyow as outside the "region" or study area. It was felt that these communities are too far distant from the Kalum North for residents to perceive a direct relationship with the area other than for economic or occasional recreation purposes. Within this region, the vast majority of the local population is native. Therefore, to avoid duplication, the environmental account focuses exclusively on recreation and sustenance uses and existence values of the environment, whereas the account dealing with native concerns, addresses spiritual and cultural values as well as traditional activities (i.e., medicinal uses, etc).

As there are no comprehensive wildlife inventories of the study area, precise information on species presence, particularly rare species, as well as population size and distribution is unavailable.[11] Generally, as a high snowfall area, wildlife population of the various species, particularly big game species, is considered to be low, with the exception of grizzly and black bear and some high localized concentrations of goats. Specifically, there are not many deer. The moose population is considered moderate to low, with some concern expressed that it may be declining due to harvesting.[12] Caribou have historically been present in the study area but are now considered scarce, if at all present.

Table 2-2 presents a list of species of management concern according to the Ministry of Environment classifications of red-listed (threatened or endangered), blue-listed (sensitive or vulnerable and of management concern) and yellow-listed (managed) species which may be found in the study area, with qualifying comments related to each. Generally, however, the Ministry ranks the Kalum North of low wildlife management concern, as hunting pressure is not that intense. Although many species are thought to benefit from and some may be dependent on old growth or cavity trees, none are considered to dependent on large areas of old growth forest, as is the Spotted Owl for example.

Table 2-2: PRESENCE OF WILDLIFE SPECIES OF MANAGEMENT CONCERN IN KALUM NORTH

Red-Listed (threatened or endangered)	
• Marbled Murrelet	Slight possibility based on sightings at coast and presence of old growth habitat in study area but considered highly unlikely to be present.
• Keen's Long-eared Myotis	

[11] B.Fuhr, Regional Habitat Biologist and, R.Marshall, Wildlife Biologist, Ministry of Environment (Smithers), Pers.Comm., April 1993.

[12] R. Marshall, Wildlife Biologist, B.C. Ministry of Environment (Smithers), Pers.,Comm., April 1993.

Table 2-2: PRESENCE OF WILDLIFE SPECIES OF MANAGEMENT CONCERN IN KALUM NORTH	
Blue-listed (sensitive or vulnerable and of management concern)	
• Tailed Frog	- likely to be present but unconfirmed.
• Bald Eagle	- seasonal high concentrations associated with Eulachon run.
• Grey-Checked Thrush	- possible but unconfirmed.
• Great Blue Heron	- low density inland; not much concern.
• Caribou	- historically present; now scarce, if at all.
• Grizzly Bear	- high values.
Yellow-listed (managed species)	
• American Widgeon	- likely.
• Barrow's Goldeneye	- "
• Blue Grouse	- "
• Blue-winged Teal	- "
• Mallard	- "
• Osprey	- probably but at low densities.
• Pileated Woodpecker	- likely.
• Trumpeter Swan	- "
• Tundra Swan	- "
• Beaver	- reasonable population.
• Black Bear	- reasonable densities.
• Cougar	- probably absent.
• Coyote	- low density, if at all.
• Ermine	- present.
• Fisher	- low density, if at all.
• Gray Wolf	- present.
• Lynx	- "
• Marten	- "
• Mink	- "
• Moose	- moderate-low population; possible concern.
• Mountain Goat	- reasonable population.
• Mule Deer	- generally absent; odd group may occur.
• Muskrat	- present.
• Red Fox	- "
• River Otter	- "
• Wolverine	- low density.

Several areas within the Kalum North have been noted as having special wildlife and habitat significance. The Hanna Ridge and Damdochax Creek areas are both study areas under the Protected Areas Strategy. It should be noted that some of the old growth forests in the Hanna Ridge area were deferred in the 1993 Timber Supply Review. However, although the Timber Supply Review achieved the minimum 12 percent of goal of "representativeness" for productive forested land in valley bottoms, and well above 12 percent

in the mid and upper slopes, it has been suggested that the Gap analysis to take place later this year may recommend additional deferral areas of old growth that include representative timber types.[13]

Kalum North is particularly important for its fisheries resources, which include all species of salmon as well as a wide variety of freshwater fish.[14] The two principal watersheds in the study area are the Nass and Bell-Irving rivers; the Nass river being one of B.C.'s largest drainages, ranking third after the Fraser and Skeena in terms of its fisheries values. The Nass is especially significant for native sustenance fishery.

Of particular significance is the Eulachon run which occurs on the Nass each spring. Described as being of world-class interest, the Eulachon run was the basis for the pre-historic grease trade by the Nisga'a and serves to draw an abundance of birdlife, in particular Bald Eagles, which feed on the Eulachon to the river.

Various lakes and streams within the drainage are important as spawning grounds for both salmon and freshwater fish species. Bowser lake, Meziadin lake and its tributary streams, Cranberry creek, Domdochax creek as well as the Bell-Irving river are considered significant in this regard. Hanna and Tintina creeks, which both flow into Meziadin Lake, were cited by the Ministry of Environment and the Nisga'a as the most important sockeye salmon spawning grounds in the Nass drainage.

- **Recreation**

Recreation has been evaluated based on the range of recreational opportunities available to and enjoyed by local residents as well as foreign visitors, wildlife viewing opportunities and the aesthetic value of prominent visual landscapes. Part of the forest inventory includes an inventory of environmentally sensitive areas which identifies areas which are important for recreation. The last inventory was carried out in the 1970's and is expected to be updated soon.

The principal recreational activities by local residents include camping, hunting, fishing, some hiking and boating as well as wildlife viewing. Recreational use of the study area is presently fairly limited because of the low population density of the region and because the majority of the area is inaccessible. Fishing is the foremost activity. Angling opportunities abound and are valued for the range of opportunities

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[13] B.Fuhr, Regional Habitat Biologist, B.C. Ministry of Environment (Smithers), Pers.,Comm., April 1993. Regarding the Protected Areas Strategy, Gap analysis is a process which identifies the gap which exists between the provincial goal of "representativeness", ie., full and comprehensive representation of all the biodiversity in the province, and what is protected today.

[14] Rainbow trout, Dolly Varden and char throughout, mountain whitefish at higher elevations and cutthroat and kokanee at lower elevations.

available, from drive-to, hike-in and fly-in sites. The clarity of the watercourses is credited as "blue ribbon" fish habitat. In the fall, hunting is said to be a dominant recreational activity while commercial mushroom picking is also carried out. Like fishing, it is the wide range of hunting opportunities presently available which are highly valued.

An inventory which establishes recommended Visual Quality Objectives along Highways 16 and 37 throughout the Kalum North, is now complete.[15] Although there are relatively few roads which traverse the study area, Highway 37, which passes through both the Nass and Bell-Irving river valleys, and Highway 37A offer both scenic and wildlife viewing opportunities that are considered significant. Existing cut blocks are visible today and are likely to be more visible in future as logging continues.

- **Existence Values**

With regard to existence values, interviews with local residents revealed that they consider the existence of a high quality environment important to their quality of life. It is worthwhile noting, however, that among non-natives, this was rated second to job/income opportunities. Interviews with native representatives indicated that they ascribe a higher value to environmental quality generally as well as in specific reference to the study area. Undoubtedly, this reflects the more extensive and long standing historic use of the area for sustenance activities by natives as compared to non-natives and the lesser involvement of natives in the cash economy related to forest resource use.

- **Timber Resources and Integrated Resource Management**

As discussed in Section 2.0, the Kalum North covers 1.7 million hectares, including the Bell Irving and Nass river drainages. The Kalum North Timber Supply Analysis[16] describes the resources of the area as follows:

> "Forests of Kalum North are dominated by hemlock (*Tsuga*) and balsam (*Abies*) species. Of the total forested area, stands of predominantly hemlock species cover 52 percent, while stands of predominantly balsam species cover 42 percent. Lodgepole pine (*Pinus contorta*) (2.2 percent), spruce (*Picea*) (1.5 percent), cottonwood (*Populus*) (1.2 percent) and other deciduous species form minor components of the forest."

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[15] The guidelines which would accompany this report are, at the time of writing, incomplete. Source: Lloyd Davies, Prince Rupert Forest Region.

[16] Integrated Resources Branch, B.C. Ministry of Forests, February 1993

In order to arrive at a net land base for the AAC calculations carried out in the AAC analysis for the Kalum North, several types of land and forest were deducted from the total area. Areas were sequentially deducted from the total Kalum North area in the following order:

- non-Crown land;
- non-forest area;
- not satisfactorily restocked land (NSR);
- non-commercial cover;
- environmentally sensitive areas;
- non-merchantable forest types;
- inoperable areas;
- existing roads;
- streamside buffers and integrated management plan areas; and,
- representative forest types.

Each of these deductions from the gross land base are discussed in detail in Appendix A.3 of the Kalum North Timber Supply Analysis.

Because AAC is also related to forest management activity, the AAC analysis of the Kalum North incorporates certain assumptions about management objectives, priorities and constraints.[17] Harvesting activity in the Kalum North generally follows the Prince Rupert Interior Harvesting Guidelines.

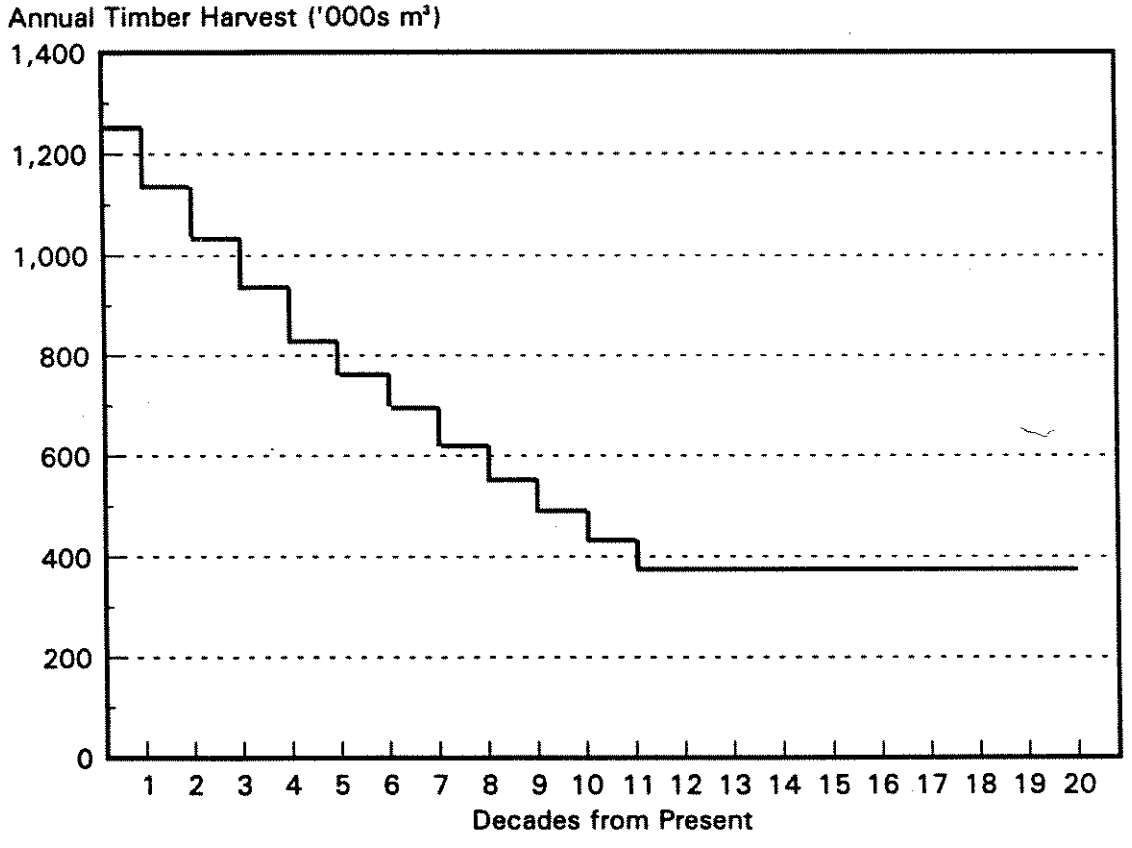
[17] These are defined in the Kalum North Timber Supply Analysis.

For this analysis, three scenarios are being considered for the Kalum North. All of the three scenarios model a reduction in AAC over the planning horizon, however each one represents a different timing for these AAC reductions. It is important to note that, for all scenarios, no change or reduction in the operable land base is being implied - it is the timing and rate of harvest on this land base which is being reduced.

The AAC figures which will be discussed in this chapter, and which form the basis of the ensuing economic analysis, are the absolute AAC volumes of timber harvested under each scenario. Thus, all the employment, income and government revenue figures in the following chapters represent the total generated by the Kalum North under the assumptions of each different scenario.

Base Case **Decline of 9.5 percent per decade over next 120 years to long run harvest level of 385,000 m^3**

Figure 3-1: Base Case: AAC Decline of 9.5% Per Decade (000 m^3)



The Base Case scenario is a continuation of the existing forest management practices, as outlined in the Kalum North Timber Supply Analysis.[18] Presently, the AAC in the Kalum North is 1.25 million m^3 per year, with approximately one million m^3 accounted for by four major licensees, 200,000 m^3 accruing to SBFEP operators, and the remaining volume in a Forest Service Reserve; the year-to-year harvest varies by licensee. (This was discussed earlier in Section 2.1.) For all three scenarios, it is assumed that the timber in the Forest Service Reserve is held for only five years, after which time it is returned to the SBFEP program.

Under the Base Case scenario, the forecast begins at the current AAC of 1.25 million m^3 in year 0, with a subsequent AAC reduction of 9.5 percent per decade starting in the second decade. This would continue over the next 120 years, with harvest levels finally stabilizing at a long term target level of 385,000 m^3 per year. Thus in year 10, AAC would be approximately 1.1 million m^3, declining to 1 million m^3 in year 20. By year 60, AAC would be 687,000 m^3.

The long term operable land base is estimated to be 238,000 hectares. Hemlock and balsam are the predominant species, and it is assumed that the current mix of 80 percent pulpwood and 20 percent sawlog quality wood will continue to be the case for the time horizon of this analysis.

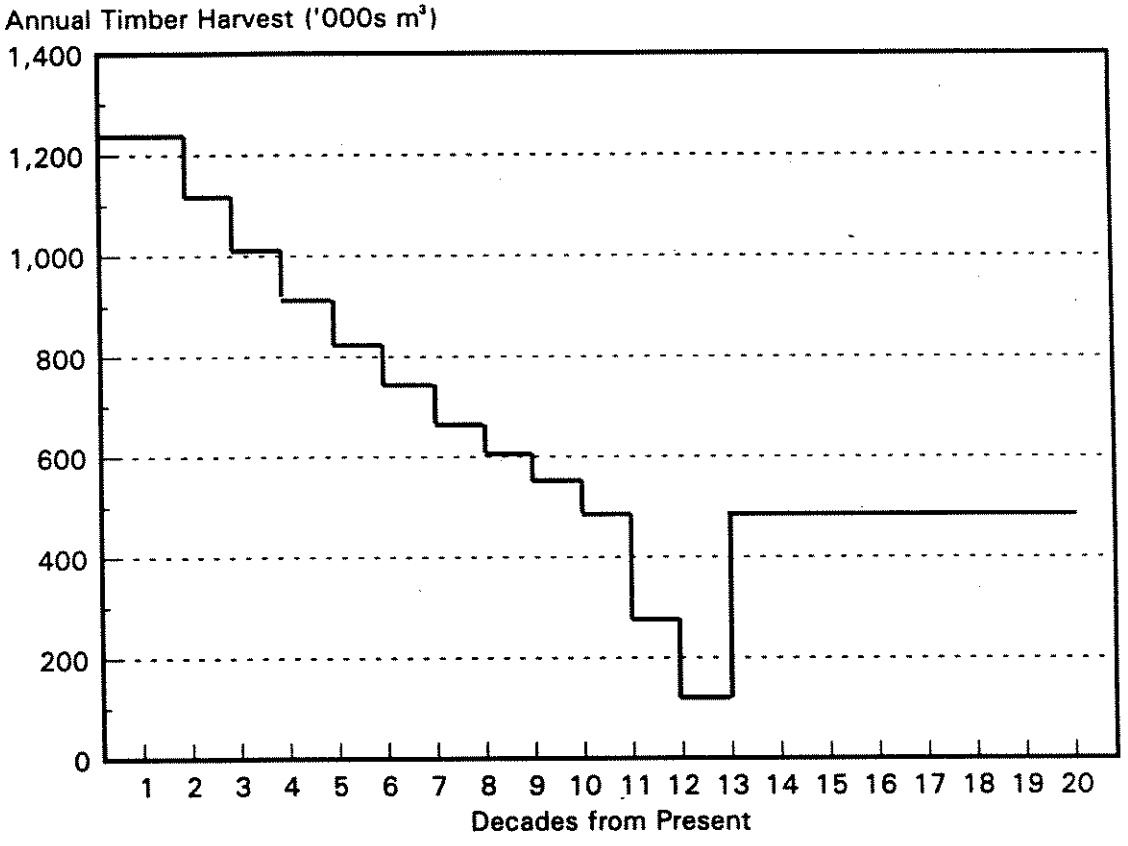
Some of the key timber harvesting and silvicultural assumptions, as outlined in the Timber Supply Analysis report, are as follows:

- basic re-forestation practices will be carried out, with no incremental silvicultural activity;
- streamside buffers and some biodiversity protection areas are excluded from the timber harvesting land base;
- the Upper Nass has been deferred from harvesting for the next two decades, because of its inaccessibility; and,
- a three-pass harvesting system is used in order to meet green-up requirements.

[18] B.C. Ministry of Forests, February 1993.

Scenario I **Continuation of current AAC for two decades, followed by a 10 percent per decade decline to long run harvest level of 385,000 m^3 per year.**

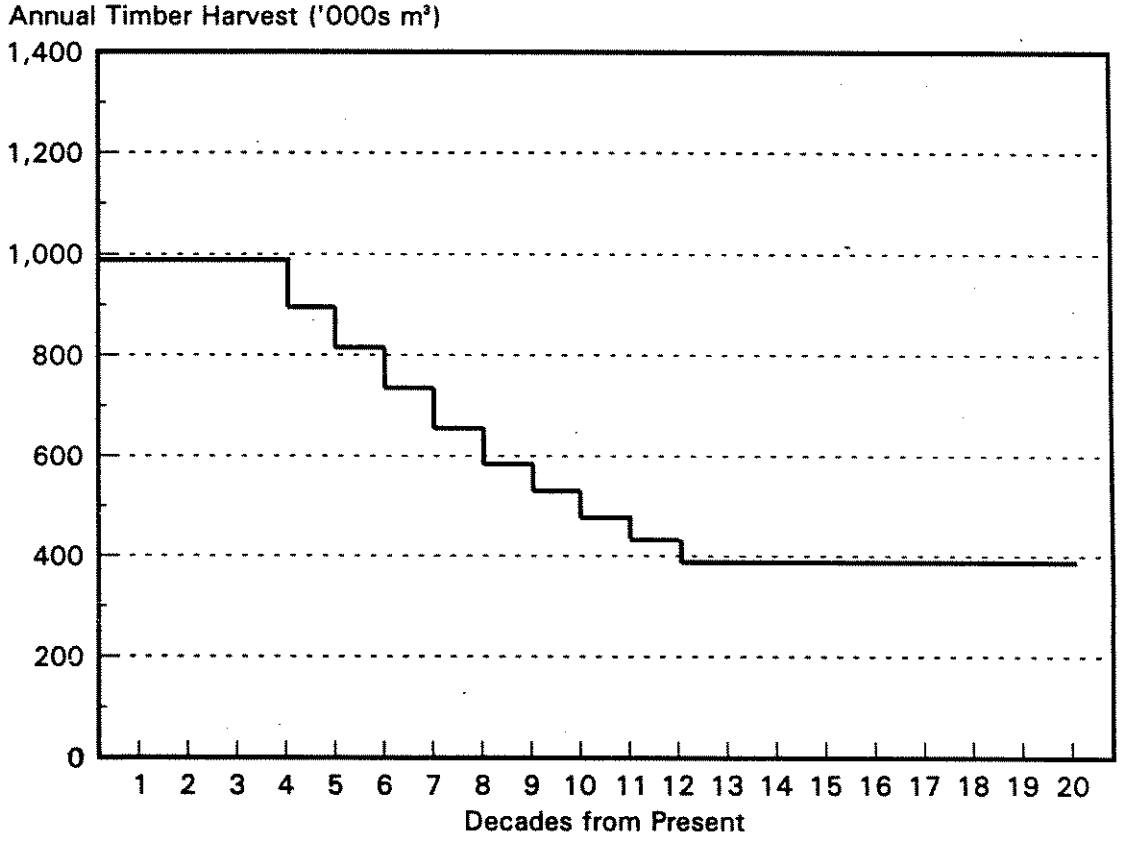
Figure 3-2: Scenario I: Maintain Current AAC for Two Decades (000 m^3)



Under this alternate scenario, the current harvest level of 1.25 million m^3 would continue for two decades, followed by a ten percent per decade decline to the long term harvest level. Thus, in year 20, the harvest would be 1.1 million m^3, reaching 738,000 m^3 by year 60. In the long term, there would be a "stock rupture", or harvest shortfall, due to an insufficient number of second-growth stands having reached minimum harvest age to maintain the timber harvest target. The long term target rate of harvest is 385,000 m^3.

Scenario II **Immediate AAC decrease of 20 percent followed by a ten percent per decade decline after year 40.**

Figure 3-3: Scenario II: Immediate 20% AAC Decline (000 m³)



Under this, the most dramatic reduction scenario, the harvest forecast would start at one million m^3 in year 0 and hold at this level until year 40, when an AAC decline of ten percent per decade would begin. Therefore, in years 0, 10 and 20, the AAC would be 1 million m^3, declining to 900,000 m^3 in year 40 and 729,000 in year 60.

Table 3-1: SUMMARY OF HARVEST LEVEL SCENARIOS FOR BASE CASE AND ALTERNATIVE SCENARIOS (000 m^3)					
AAC Schedule	**Base Case: AAC decline of 9.5%/decade**	**Scenario I: Maintain current AAC for two decades**	**Incremental change over Base Case**	**Scenario II: Immediate 20% AAC decline**	**Incremental change over Base Case**
Year 0	1,250	1,250	0	1,000	−250
Year 10	1,131	1,250	119	1,000	−131
Year 20	1,023	1,125	-102	1,000	-23
Year 60	687	738	-51	729	-42
Year 120	385	100	−285	385	0
Years to long run harvest level (385,000 m^3)	120	130	---	120	---

For all three options, i.e., the Base Case and the two alternative scenarios, the timber harvest would ultimately reach a long term harvest rate of 385,000 m^3, however, in Scenario I where the current AAC is initially sustained for two decades, there is a harvest shortfall between years 110 and 130 of the forecast period, as discussed earlier. There is no harvest shortfall for either the Base Case or Scenario II.

The foregoing table illustrates that for Scenario I, there is a greater net harvest level for each decade vis a vis the Base Case, however this difference declines over time and becomes negative by year 120. Under Scenario II, there are relatively significant losses of timber volumes, vis a vis the Base Case, during each of the first two decades of the forecast period. After this time timber harvest levels decline over time to match those in the Base Case by year 120.

4.1 Background

As Table 2-1 indicated earlier, the current AAC for the Kalum North is 1.25 million m^3 per year, with almost one million m^3 allocated to four major licensees, 200,000 m^3 allocated to SBFEP operators, and the rest in a Forest Service Reserve. All of the wood from the Kalum North flows to processing operations outside the Kalum North, primarily in Terrace, Kitimat and Prince Rupert, with approximately 15 percent destined for offshore markets and the remainder to other coastal sawmills or pulp mills (primarily the Lower Mainland).

Presently, there is one major capital investment which may take place in the study area, and this is the proposed Orenda pulp and paper mill which would be built near Terrace. This operation, which would produce mechanical pulp integrated to a machine finished calendared paper machine, would employ approximately 182 employees.[19] Because of the uncertainty of this project, we have not included it in any of the scenarios modelled in this analysis, however it is important to note that this project, if it goes ahead, would have major direct and indirect economic effects in the study area, both during the construction and operation phases.

Under the Base Case scenario, it is expected that overall forest sector employment will decline as the supply of wood fibre becomes more constrained. In the wood processing sector this decline will be compounded by ongoing labour-saving technological changes. However, it is predicted that there will be some increase in the future demand for labour in the harvesting sector, as harvesting operations move out of the valleys (where most timber is cut now in the Kalum North) and up the hillsides. This will precipitate a shift in harvesting operations from ground-based skidding to cable systems and hand felling, and during the next 20 years it is expected that labour productivity in the Kalum North will become more similar to that of coastal cable systems than ground-based systems.[20]

There are other factors which could partially offset the long term decline in forest sector employment in the study area:

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[19] Source: Frank Foster, Orenda Forest Products

[20] This shift in harvesting systems has implications for the labour coefficients used in the alternative scenarios, and this is discussed in Chapter 5.

- A province-wide shift towards the manufacture of products which add value at the source and make the best possible use of the available resource mix. The proposed Orenda mill is an excellent example of this. As a producer of mechanical pulp, it would be manufacturing a less wood-intensive product than kraft pulp, thereby maximizing the use of a shrinking wood resource. By integrating this pulp to a paper machine, it would also be adding value, and creating further jobs locally.

- The trend towards value-added manufacturing would also have a positive effect on employment by reducing provincial forest industry dependence on the cyclical markets for commodity grades of market pulp, newsprint and lumber.

- Growing US and Asia Pacific demand for pulp and paper products. There is particular future potential in these markets for higher quality mechanical-pulp based grades of paper, and value-added products.

- Future demand for pulp chips may allow profitable whole log chipping of presently unused fibre.

It is assumed in the Base Case that there will be no dramatic shift in the harvest profile of the Kalum North, and that pulpwood will continue to make up approximately 80 percent of timber harvested. Therefore, this should have no significant effect on forest sector activity levels.

4.2 Regional Forecasts

It is estimated that total forest sector employment in the study area (defined in Section 2.1) was approximately 2,560 in 1992.[21] This includes employment in harvesting, transportation (road and marine), sawmill and pulp mill processing, administration and silviculture, and it accounts for both company employees and contractors.[22] In addition to these industry jobs, there are approximately 55 Full Time Equivalent (FTE) Ministry of Forests positions in Terrace and Stewart.[23]

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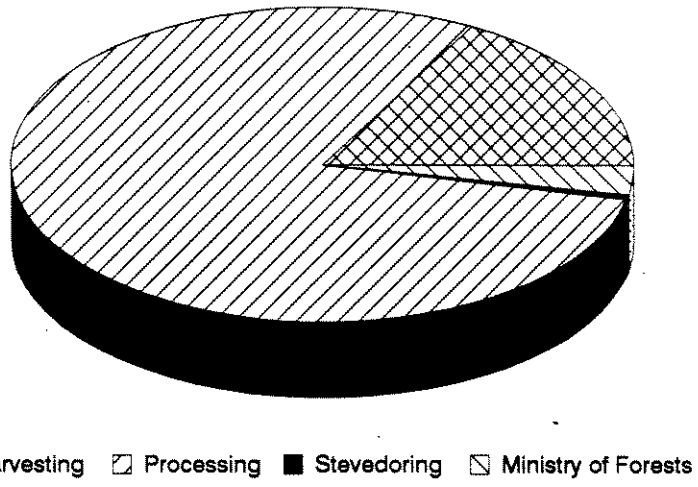
[21] Source: Industry contacts and B.C. Ministry of Forests.

[22] It should be noted that this estimate also includes stevedoring positions. There are approximately 34 "casual" stevedoring positions in Stewart. In 1992 they averaged 400 hours each during the course of the year, which was a significant drop from 1991. For our calculations in Section 5, we have converted these to Full Time Equivalent positions based on approximately 1800 hours per year.

[23] Source: Ian Delisle, Prince Rupert Forest Region. There are another 26 FTE positions in Smithers, but this is excluded from the study area.

Figure 4-1: Forest Sector Employment in Study Area (Share of Total)



Note: Study area includes North Kalum, Terrace, Stewart, Kitimat, Prince Rupert, New Hazelton

Wood flows into the study area (as defined in Section 2.1) from a number of TSA's, including the Kalum North and South and the Kispiox for processing or transportation to operations outside the region. Based on our assumptions about wood flows from the Kalum North and labour productivity, it is estimated that the forest industry in the Kalum North directly accounts for approximately 20 percent of industrial forest sector employment in the study area.

In order to calculate the number of direct jobs associated with the volumes of foregone wood from the Kalum North, it was necessary to use a labour coefficient which accurately captures the number of persons employed per thousand m^3 of timber in harvested and processed. An average wood processing coefficient of .36 PY per 000 m^3 has been used in this analysis, based on coastal information provided by the Ministry of Forests.

For the purpose of this analysis, it was also necessary to construct a harvesting labour coefficient which captures the future changes in harvesting systems employed in the Kalum North, which is regarded as a transition zone between the Coast and Interior. Presently, harvesting in the Kalum North is predominantly ground-based skidding (approximately 95 percent), and most harvesting now takes place in the valley bottoms. However, in future years it is expected that harvesting will occur further up the hillsides, and this will require much greater use of cable harvesting systems and manual felling, much like on the South Coast. Therefore, a weighted average labour coefficient has been constructed which captures this trend towards greater use of cable harvesting. In year 1, the harvesting coefficient is .16

PY per 000 m^3 (the Interior average), and this changes annually until year 20, when it stabilizes at .27 PY per 000 m^3.

Under the Base Case, which assumes a 9.5 percent per decade decline in the Kalum North AAC over the next 120 years, there is expected to be a corresponding decline in the number of forestry-related jobs, income, and industry and government revenues. These are discussed below.

- **Economic Development**

For the economic development and government revenue accounts, representative years of 0, 10, 20 and 60 have been chosen. It should be noted that each year represents the ensuing decade. For example, year 0 represents the first decade, i.e., years 0-9, while year 10 is the start of the next decade, i.e., years 10-19.

Based on the foregoing labour coefficients, and a logging waste adjustment of 8 percent,[24] it is estimated that, under the Base Case scenario, forest sector employment in the study area directly related to wood from the Kalum North is expected to be 493 PY in year 0, 520 PY in year 10, 532 PY in year 20 and 357 PY in year 60.[25] These calculations take into account the assumption that timber exported from the Kalum North (approximately 15 percent) does not create jobs in the domestic pulp and lumber sector. It also assumes that wood shipped to the Lower Mainland creates only harvesting and stevedoring positions locally (i.e., within the region), but that processing jobs are created elsewhere in the province. (These jobs are accounted for in the provincial account.) During the first five years of the forecast period, the timber held in the Forest Service Reserve is reserved from harvesting and, subsequently, does not generate any employment or government revenues. However, by year 10, this timber would be returned to the SBFEP program, therefore increasing the overall cut. Thus, employment is shown to increase between years 0 and 10 for all scenarios. The overall rise in employment between years 0 and 20 can also be explained by the increasing labour requirements for harvesting during the first 20 years. However, by year 20, the labour coefficient is expected to stabilize and from this point on there would be ongoing job losses.

Recreational and tourism activity in the Kalum North is oriented towards outdoor experiences such as fishing, hunting, sightseeing and wildlife viewing. Under the Base Case scenario, it is conjectured that

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[24] Source: Kalum Forest District Office

[25] It is assumed that there would be no change in administrative or B.C. Ministry of Forest jobs. Given that these positions are more a function of provincial government budgetary considerations than wood supply, this is a reasonable assumption.

continuation of the existing harvest levels will still allow an annual growth rate in tourism and recreation activity of two percent per year. In light of the fact that real growth in tourism activity in the Kitimat-Stikine Regional District has been at a much higher rate, this can be regarded as a conservative estimate.[26] It can be justified by the fact that much of the Kalum North is remote, and that our interviews with guide outfitters in the region reveal that growth in this activity has been moderate in recent years.

Based on the assumption of a two percent annual increase in real tourism activity, the number of tourism jobs in the Kalum North would approximately triple from 8 PY in year 0 to 25 PY in year 60 under the Base Case. However, the net change in total forestry and tourism related jobs in the Base Case scenario during this time would be a loss of 120 PY, declining from 501 in year 0 to 382 PY in year 60, as employment losses in forestry outstrip the gains in tourism.

TABLE 4-1: REGIONAL ECONOMIC DEVELOPMENT: BASE CASE

Years	0	10	20	60
Direct Jobs (PY/yr)				
Forestry	493	520	532	357
Tourism	8	9	11	25
Total Direct Jobs (PY/yr)	501	529	543	382
Direct & Indirect Jobs (PY/yr)	723	764	785	550
Net Direct After-Tax Employment Income ($M/yr)	$15.4	$16.3	$16.7	$11.6
Direct and Indirect Income ($M/yr)	$24.9	$26.4	$27.0	$18.7

See Table 6-1 for assumptions.
Each year represents the first in the ensuing decade.

The decline in AAC under the Base Case would result in a decline in total net after-tax income during the forecast period. In year 0, it is estimated that after-tax income from forestry and tourism would be $15.4 million; in year 10 this would be $16.3 million, in year 20 it would be $16.7 million, and in year 60 it would decline to $11.6 million.

[26] Between 1985 and 1990, real rental expenditures, which reflects regional tourism growth in the Kitimat-Stikine, grew at 6.2% annually. Source: B.C. Ministry of Finance and Corporate Relations.

The regional indirect income loss/gain related to the harvest reductions in the Base Case were calculated using an income multiplier of 1.62 for the Kitimat-Terrace area.[27] The wage component of indirect income was divided by an average wage of $24,000 in order to calculate indirect employment impacts. Based on this methodology, it is estimated that total net direct and indirect employment income would be $24.9 million in year 0, $26.4 million in year 10, $27.0 million in year 20 and $18.7 million in year 60.

- **Community Impact**

The communities in the study area have a high degree of dependence on the forest industry. There is little doubt that a significant reduction in the AAC of the Kalum North would translate into a loss of employment in the region, particularly if the harvest levels in surrounding TSA's are reduced and there is less possibility of substitution from other regions. This loss of jobs would result in some out-migration from these communities and, in the case of Stewart, incur further reductions in population size if no local wood processing facility is built.

The social distress related to job losses would be felt throughout the study area, but would be particularly acute in Terrace, Kitimat and Prince Rupert, and particularly in Stewart which is largely dependent on the forest sector for employment. It is expected that there would be a greater demand for social and employment-related services such as retraining or drug and alcohol counselling throughout the region. In Stewart, where there has been dramatic out-migration over the past few years due to the poor economy, property values have declined accordingly. It is likely that this trend would continue in the event of a AAC reduction, with subsequent economic losses to homeowners. The reduction in wood supply associated with the Base Case would, to varying degrees, impact outmigration and stability in the communities of the study area.

While the phased wood reduction of the Base Case is unlikely to result in the shutdown of any of the major sawmill or pulp mill operations in the study area, the effects on the proposed Orenda project are uncertain. This is strictly conjecture at this point, however, and there is not enough information available to determine this with certainty.

- **Environmental Impacts**

Although in certain instances, logging can be said to improve biodiversity, this is highly dependent on the harvesting practices used, including the size of cut blocks and their distribution, the leaving of patches

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[27] Source: G. Horne and L. Robson, B.C. Community Economic Dependencies, Treasury Board Secretariat, B.C. Ministry of Finance and Corporate Relations, March 1993.

within successsional stands as well as snags and fallen logs, and so on. The significance of biodiversity within this analysis relates to how it contributes to recreation and sustenance use or perceived quality of life by local residents. However, as many local residents either rely entirely on or supplement their existence through hunting and fishing, the abundance and diversity of wildlife are important considerations.

Under current clearcut practices, even with the application of environmental considerations in the Timber Supply Review and gradual reduction in the AAC, it is the opinion of the Ministry of Environment wildlife biologists that biodiversity in the study area is likely to be diminished with continued logging.[28] This concern stems from several factors, namely the difficult biogeoclimatic conditions, low existing wildlife population densities and the dependence of many of these species on current old growth conditions.

Given the lack of data on either the population size or distribution of wildlife within the study area, impact assessment is difficult. It is felt that increased accessibility into the study area due to the construction of logging roads will inevitably lead to more animals being taken both legally and illegally. However, while the quantity of hunting or animal kills may be increased, it is felt that the range of hunting opportunities, which are highly valued, would be diminished by encroachment into back country and the reduction of wilderness area.

The Nisga'a have also expressed concern over silviculture regeneration problems in the Kalum North, as well as the replacement of indigenous species with other, more readily available seedlings and the long term effect this may have on wildlife diversity.[29]

The problem of regeneration delays is addressed in the Kalum North Timber Supply Analysis:

> "Establishment of new tree crops after logging has been difficult in some areas of Kalum North, specifically the Bell-Irving drainage in the north. While regeneration delay estimates used in this analysis reflect current standards, it is possible that regeneration delays may actually be longer in this drainage...."

Regional Ministry of Forests stocking standards specify that only "preferred or acceptable" species will replace existing stands, and this has been in effect since 1987. Stocking standards and silviculture practices are being revised as the Ministry of Forests gains experience in the area.

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[28] B.Fuhr, Regional Habitat Biologist, B.C. Ministry of Environment (Smithers), Pers.,Comm., April 1993.

[29] Based on conversations with Nisga'a.

Fisheries resources are of particular concern throughout the Nass and Bell-Irving drainages. There are several important spawning grounds in the area as cited in Section 2.7, and there is concern about how logging and particularly road building in support of logging could affect these spawning areas, thereby impacting availability of fish stock and those species which feed on fish as well as the quality of angling and fishing experiences. However, while the rate of cut may contribute to impacts on fisheries resources, it is harvesting and road building practices that are of greater concern.

While the environmental considerations adopted in the Timber Supply Review include setbacks from streams which should mitigate impacts, there remains concern over reduced water quality due to sedimentation, particularly resulting from road construction, and the adequacy of these setbacks. Also, as trout and salmon are visual feeders, a reduction of water clarity, although not life threatening, could diminish the quality of angling experience as well as angling opportunities.

There are presently two areas in the Kalum North which are being considered for designation as Protected Areas. As well, further areas may be protected as a result of the Gap analysis being carried out under the Protected Areas Strategy. None of these areas have been specifically netted out in the calculation of the operable land base. Therefore, if they do receive protected status, there will be a decline in the operable land base of the Kalum North, although how much depends on what share of these sites has been included in the operable land base.[30]

Due to a lack of inventory information for the Kalum North, visual quality was not modelled in the Timber Supply Analysis. However, the ESA for recreation did net out area for landscape purposes, thus some visual concerns have been addressed. Harvesting in the TSA will likely meet some minimal Visual Quality Objectives on the visible land base in the short to medium term, and in the longer term, it is expected that there will be growing emphasis on these Visual Quality Objectives.

From the perspective of existence value, the gradual reduction of the AAC only partially responds to local residents' concerns about long term sustainability of the forest resources. Most of the local population residing within the Kalum North depend entirely or supplement their existence with hunting and fishing for sustenance and, therefore, put a high value on the preservation of these resources. As a result, a more substantial reduction in the AAC would be preferable on these grounds.

There is presently a relatively small amount of wilderness-based tourism and recreational activity in the Kalum North. This includes camping, hunting and guide outfitting, fishing, hiking, boating, sightseeing and wildlife viewing. Under a continuation of the current management practices, it is reasonable to

[30] No information was available from the B.C. Ministry of Forests.

expect that this recreational activity would continue to grow, albeit at a slower rate than if harvesting is curtailed.

- **Specific Native Concerns**

Native representatives have indicated that they are in favour of sustainable harvesting practices. They believe that a drastic reduction in the AAC will be required in order to derive more non-timber values from the Kalum North. Therefore, the Base Case scenario appears to fall short of these objectives.

4.3 Provincial Forecasts

- **Economic Development**

In order to calculate the total direct and indirect employment losses/gains in the provincial economy, total forestry jobs were estimated using a provincial labour coefficient of .9 PY per 000 m^3.[31] These estimates were based on net wood adjusted for logging waste, as well as wood exports of approximately 15 percent.[32] It is assumed that the direct tourism jobs generated in the study area are the same as those generated provincially.[33]

Based on an average pre-tax wage of $24,400/PY in non-forestry sectors,[34] and a provincial income multiplier of 2.0, it is estimated that the phased harvest reduction of the Base Case scenario would result in a decline in direct and indirect employment and income during the forecast period. In year 0, total direct and indirect jobs and employment income would be 1,428 PY and $45.3 million respectively. This would increase to 1,491 PY and $47.3 million in year 10, and to 1,516 PY and $48.1 million in year 20. By year 60, total direct and indirect employment would decline to 1,038 PY and $32.9 million.

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[31] These employment figures include jobs within the study area. (Source: B.C. Ministry of Forests.)

[32] The multiplier is based on B.C. Ministry of Forests data.

[33] This may understate direct tourism employment as it excludes non-residents who are employed in the North Kalum tourism sector, however, the impact is likely to be small.

[34] Source: B.C. Ministry of Finance

TABLE 4-2: PROVINCIAL ECONOMIC DEVELOPMENT: BASE CASE				
Years	**0**	**10**	**20**	**60**
Direct Jobs (PY/yr)				
Forestry	538	561	570	382
Tourism	8	9	11	25
Total Direct Jobs (PY/yr)	546	570	581	407
Direct & Indirect Jobs (PY/yr)	1,428	1,491	1,516	1,038
Net Direct After-Tax Employment Income ($M/yr)	$22.7	$23.7	$24.0	$16.5
Direct and Indirect Income ($M/yr)	$45.3	$47.3	$48.1	$32.9

See Table 6-2 for assumptions.

- **Provincial Government Revenues**

The principal impacts on provincial government revenues related to the Kalum North harvest reductions in all scenarios will be foregone resource revenues and personal income taxes from both forestry employees and those employed in indirect sectors. Provincial government resource revenue is defined here as total stumpage, logging and corporate income tax from the forest resource.[35] For this analysis, we have used the indicated stumpage for the first fifteen months of the forecast period, and then the base stumpage rate for the Interior in all subsequent years. This is because of the Comparative Value Pricing System used in B.C., which involves quarterly adjustments of appraised rates in order to reflect changes in the Base Rate and average value index. As demonstrated by Shaffer in the Kispiox Resource Management Plan Socio-Economic Impact Assessment the base rate is appropriate for longer term analysis:

> By using the base rate the analysis captures the impact on provincial revenues. This need not equal the stumpage generated in the TSA. For example, the indicated stumpage rate for the TSA may be lower than the base rate, suggesting a lower revenue impact in the scenarios. However, excluding that volume of timber from the provincial harvest would tend to increase the indicated rate elsewhere in the Interior, leaving the net effect on provincial revenues determined by the base rate.[36]

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35 We have used average corporate income tax and logging tax estimates of $.94/m^3 and $.24/m^3 respectively (all in 1992$). Source: B.C. Ministry of Forests.

36 Marvin Shaffer and Associates Ltd., Kispiox Resource Management Plan Socio-Economic Impact Assessment, submitted to B.C. Ministry of Forests, July 1992.

Consequently, we have used an average Interior base stumpage rate of $8.00 per m^3, which is the average for 1989-1992.

Under the Base Case scenario, the average resource revenue accruing from the Kalum North would be $8.5 million in year 0, $9.6 million in year 10, $8.7 million in year 20 and $5.8 million in year 60. The total provincial share of personal income taxes was estimated based on average tax rates of 26 percent in the forestry sector, and 19 percent in other sectors, with a 27 percent share accruing to the provincial government.[37] In year 0, it is estimated that the provincial personal income tax associated with the wood from the Kalum North would be $1.9 million. This would be approximately $2.0 million in year 10, $2.1 million in year 20, and $1.4 million by year 60.

TABLE 4-3: GOVERNMENT REVENUES: BASE CASE ($MILLION)

Years	0	10	20	60
Resource Revenue ($M/yr)	$8.5	$9.6	$8.7	$5.8
Provincial Income Tax ($M/yr)	$1.9	$2.0	$2.1	$1.4
Total Revenue ($M/yr)	$10.4	$11.6	$10.8	$7.2

The sum of resource and income tax revenues under the Base Case scenario would be $10.4 million in year 0, $11.6 million in year 10, $10.8 million in year 20 and $7.2 million in year 60.

- **Environmental Values**

As in Section 4.2, this account deals with the valued, non-commercial uses and attributes of the Kalum North environment. However, in this case, it addresses these concerns from the perspective of B.C. residents outside the region, as opposed to local residents, and assesses the extent and significance of impacts of the AAC scenarios on these uses and attributes.

Recreational use of the study area by B.C. residents from other parts of the province appears to be minimal. The majority of visitors come from nearby communities, including Prince Rupert, Terrace and Kitimat, to enjoy camping, hunting and fishing activities. In addition, there are a number of people each year who traverse the area en route to/from Alaska or the Yukon as well as a few tourists who detour

[37] Tax rates are based on total income exclusive of benefits.

into the study area from the Inside Passage circle route. For these visitors, the principal attractions of the area are the wildlife viewing opportunities and scenic views from Highways 37 and 37A.

The importance of the Nass river for its fisheries resources, including the spectacular spring Eulachon run, as well as the various special habitat and wildlife areas, as identified in Section 2.7, are clearly of provincial significance. However, as the study area is quite remote from the major population centres and quite likely relatively unknown by most B.C. residents, it is unlikely that its existence value would be highly rated, particularly if it were to be compared to closer and better known wilderness areas such as the Carmanah or Walbran Valleys.

Under the Base Case, which involves a reduction of the Kalum North harvest rate starting in the second decade, biodiversity and old growth related values would be diminished from the current state, however the extent of this impact is difficult to quantify. Increased accessibility is seen to increase hunting activity but, at the same time, diminish the range of hunting opportunities. As the number of hunters from other parts of the province are few, the net impact is likely minimal.

Protection for the Nass River fisheries, special habitat and wildlife values in the region is provided by the environmental considerations applied in the Kalum North Timber Supply Analysis, although concerns remain about diminished water clarity and the adequacy of watercourse setbacks to fully preserve the quality and aesthetics of the fisheries resource. Nonetheless, little or no effect is anticipated for recreation use or existence value.

5.0 IMPACT ASSESSMENT OF ALTERNATE SCENARIOS

5.1 Regional Impacts

5.1.1 Scenario I: Continuation of current AAC for two decades, followed by a ten percent per decade decline to long run harvest level of 385,000 m^3 (harvest shortfall predicted years 110 to 130)

- **Economic Development**

As in Section 4.2, representative years of 0, 10, 20 and 60 have been chosen for the economic development and government revenue accounts, with each number representing the first year of the ensuing decade.

Under Scenario I, the AAC forecast for the Kalum North begins at the existing level of 1.25 million m^3, is maintained at this level for two decades, and then declines by ten percent per decade over the next 120 years. As a result, the annual harvest level under this scenario is 1.25 million m^3 in years 0 to 10, declining to 1.1 million m^3 in year 20, and 738,000 m^3 in year 60. By year 120, it is projected that the AAC will decline to below the long run sustainable harvest level of 385,000 m^3. It has been assumed that the loss in timber is pro-rated across all the producers in the region.

This scenario would result in fewer forestry job losses during the first 60 years than in the Base Case. However, because of the harvest shortfall predicted to occur in years 110 to 130, there would be dramatic losses later on. It is estimated that, under Scenario I, there would be more forestry employment, vis a vis the Base Case, during the first 20 years. This can be ascribed to a higher rate of harvest and greater employment in the harvesting sector, as logging moves out of the valley bottoms and further uphill, therefore requiring more labour-intensive techniques.

It is estimated that in year 0, under Scenario I, forestry employment related to wood from the Kalum North would be 493 PY, increasing to 575 in year 10 and 585 in year 20. By year 60, employment would decline to 384 PY, which is still greater than the Base Case. These calculations take into account logging waste and the assumption that exported timber (to other destinations in B.C. and abroad) does not create jobs in the processing sector.

Recreational and tourism activity in the Kalum North is oriented towards wilderness experiences such as fishing, hunting and wildlife viewing. Under the Base Case scenario, it is conjectured that the phased

decline of the existing harvest levels will allow an annual growth rate in tourism and recreation of two percent per year. However, with a sustained level of AAC such as that in Scenario I, there will be a more rapid erosion of the wilderness landscapes and wildlife habitats and population in the Kalum North. It is also reasonable to assume, however, that more emphasis would be put on visual quality for all scenarios, and that integrated resource management may also play a greater role in forest management. Furthermore, ongoing forestry use of the study area will mean more logging road construction, and therefore greater accessibility for recreational use. All of these factors would combine to have a positive effect on tourism growth in the long term.

This analysis assumes that sustaining the current level of AAC in the Kalum North for two decades, followed by a decline, would support tourism activity and employment growth of approximately one percent per annum. Based on this growth assumption for real tourism activity, it is expected that the number of tourism jobs in the Kalum North would increase at a slower rate than in the Base Case. Net annual tourism employment under Scenario I would be 8 PY in year 0, 8 PY by year 10, 9 PY by year 20 and 14 PY by year 60.

The net effect of the harvest reductions implicit in Scenario I would be employment losses during the forecast period of 60 years, as employment losses in forestry outstrip the gains in tourism. In year 0 there would be no net change in employment vis a vis the Base Case, however annual net employment would rise to 583 PY in year 10 and 594 PY in year 20, then decline to 398 in year 60.

TABLE 5-1: REGIONAL ECONOMIC DEVELOPMENT - SCENARIO I

Years	0	10	20	60
Direct Jobs (PY/yr)				
Forestry	493	575	585	384
Tourism	8	8	9	14
Total Direct Jobs (PY/yr)	501	583	594	398
Direct & Indirect Jobs (PY/yr)	723	842	859	573
Net Direct After-Tax Employment Income ($M/yr)	$15.4	$17.9	$18.3	$12.1
Direct and Indirect Income ($M/yr)	$24.9	$29.1	$29.6	$19.7

There would be a greater level of direct after-tax employment income during the forecast period compared to the Base Case, with a decline starting after year 20. Annual direct after-tax income would

be $15.4 million in year 0, $17.9 million in year 10, $18.3 million in year 20 and $12.1 million in year 60.[38]

It is estimated that total net direct and indirect employment under Scenario I would be 723 PY in year 0, 842 PY in year 10, 859 PY in year 20 and 573 PY in year 60. For all years but year 0, this would be greater than the Base Case scenario.

- **Community Impact**

The Kalum North AAC reductions of Scenario I would be less dramatic than those of the Base Case scenario during the sixty year forecast period however, in the longer term (years 110 to 130), there would be a significant harvest shortfall, as described in the Kalum North Timber Supply Analysis. Thus, during the first sixty years, under Scenario I, the community impacts would be more moderate than those in the Base Case, although much more severe in years 110 to 130.

For the first twenty years, no significant impacts are anticipated because the AAC would remain at its current level. The ten percent per decade decline starting in year 20 would gradually constrain the fibre supply in the study area, resulting in job losses and some possible outmigration from the study area. There could also be a greater demand for community services related to employment and education as unemployment increases.

For the sixty year time horizon, Scenario I presents the most optimistic outlook for employment and capital investment in the forest industry of the study area. However, in the longer term, specifically between years 110 and 130, insufficient second growth would result in a major wood shortfall (reaching an AAC level less than 200,000 m3), and this would have serious social consequences for forestry dependent communities such as those in the study area. Any employment and income gains in the tourism sector would be dramatically outstripped by losses in jobs, income and capital investment in the forestry industry at this time.

- **Environmental Impacts**

The Kalum North AAC reduction of Scenario I would result in a higher rate of habitat transformation from old growth to successional growth, and consequently, have a more immediate impact on the abundance of wildlife compared to the Base Case. This scenario would offer less protection to old growth dependent species as well as those which require either old growth or advanced regeneration as

[38] This is based on after-tax employment income of $19,440 in the tourism sector, and coastal B.C. after-tax compensation (wages and salaries excluding benefits) of $30,960 in the forestry section (Source: Price Waterhouse 1991).

a habitat. As indicated in Section 4.2, a loss of biodiversity in the Kalum North is expected in the Base Case, thus, it is likely to be more pronounced with Scenario I.

From the perspective of recreation use and visual quality, impacts related to a AAC reduction in Scenario I are likely to be greater than in the Base Case during the first two decades. This is despite the fact that in all cases integrated resource management measures will likely preserve the prime recreation areas and, assuming that Visual Quality Objectives are applied, the most sensitive visible landscapes.

The quicker development of roads in the first two decades, vis a vis the Base Case, to enable further logging will make the area more accessible for recreational activities such as fishing and hunting. However, any gains in accessibility could be offset by reductions in backcountry hunting and fishing opportunities, reduced wildlife resources and viewing opportunities and the diminished quality and quantity of the primitive areas. On the whole, Scenario I appears to be a less favourable scenario than the Base Case from a recreation and existence value perspective.

- **Specific Native Concerns**

Although stating that they are not opposed to logging per se, native representatives expressed concern over long term sustainability of timber and non-timber resources as a result of current forestry practices and the current AAC in the Kalum North. They indicated that they believe a drastic cut in the AAC would be required to ensure maintenance of these values. As a result, the AAC reductions of Scenario I appear not to address native concerns as well as the Base Case.

5.1.2 Scenario II: Immediate 20 Percent AAC Decline

- **Economic Development**

Under Scenario II, there would be an immediate 20 percent reduction in the AAC of the Kalum North. After four decades, there would be a ten percent per decade decline to the long run sustainable level of 385,000 m3 per year. Consequently, annual harvest levels would be 1.0 million m^3 in years 0, 10 and 20 declining to 729,000 m^3 in year 60. In all but year 60, the harvest levels would be less than in the Base Case scenario.

Using the same regional multiplier as that in Scenario I, total regional direct and indirect employment impacts resulting from an immediate 20 percent reduction in AAC were calculated. This scenario would result in direct and indirect employment levels of 580 PY in year 0 which is a significant decline compared to the Base Case. In years 10 and 20, total employment would rise to 681 and 779 PY respectively, due to the freeing up of the Forest Service Reserve, greater labour intensity in harvesting,

and greater tourism employment. By year 60, however, the effect of wood losses would dominate, resulting in a lower number of jobs, 591 PY. In this scenario, it is assumed that tourism related employment would grow at an annual rate of 2.5 percent annually, which is .5% higher than the Base Case.

TABLE 5-2: REGIONAL ECONOMIC DEVELOPMENT - SCENARIO II

Years	1	10	20	60
Direct Jobs (PY/yr)				
Forestry	394	460	520	379
Tourism	8	12	20	33
Total Direct Jobs (PY)	402	472	540	412
Direct & Indirect Jobs (PY)	580	681	779	591
Net Direct After-Tax Employment Income ($M)	$12.3	$14.5	$16.6	$12.4
Direct and Indirect Income ($M)	$21.3	$24.2	$26.6	$19.8

- **Community Impacts**

Scenario II is a more dramatic AAC reduction than the Base Case. Compared to the Base Case and Scenario I, this scenario would result in the greatest number of job losses during the entire forecast period. It would seriously constrain the wood fibre available for sawmilling and pulp/papermaking in the study area, unless other sources of fibre could be substituted. Of all the scenarios, it would present the greatest risk of mill closure during the first two decades.

The harvest reductions of Scenario II would result in greater local job losses in the study area than for the Base Case or Scenario I, and would result in even greater out-migration during the first 20 years of the forecast period. There would be a correspondingly greater requirement for social services and, in the possible event of a mill shutdown, it could affect the tax base of the community where the shutdown occurs.

All the forest industry dependent communities in the study area would be negatively impacted by the AAC reduction of Scenario II. The community of Stewart could be the most strongly impacted by this AAC reduction, as it would immediately reduce the volume of timber being shipped through the port. There is reason to believe that such a dramatic wood reduction would significantly reduce the population of the community in the short to medium term, and seriously affect the community's stability.

- **Environmental Impacts**

An immediate 20 percent reduction in the AAC of the Kalum North would ensure longer preservation of prime environmental attributes and values than the Base Case or Scenario I. However, depreciation of the state of the environment would still occur, albeit at a slower rate. Nevertheless, in terms of bio-diversity, recreation and existence values, this Scenario would be the preferred scenario compared to the Base Case and Scenario I.

- **Specific Native Concerns**

The AAC reduction of Scenario II would be the preferred scenario over the Base Case or Scenario I, in the view of the aboriginal communities in the study area, and would best integrate with their approach to land use.

5.2 Provincial Impacts

5.2.1 Scenario I: Continuation of current AAC for two decades, followed by a ten percent per decade decline to long run harvest level of 385,000 m3

- **Economic Development**

The incremental harvest reductions of Scenario I would translate into smaller provincial, as well as regional, net losses or gains in employment and income vis a vis the Base Case.

Based on an average pre-tax wage of $24,400/PY in non-forestry sectors, and a provincial income multiplier of 2.0, it is estimated that the harvest reduction of Scenario I would incur no net change in direct and indirect jobs and employment in year 0 compared to the Base Case. In year 0, total direct and indirect employment would be 1,428 PY, with $45.3 million in total income. This would increase slightly to 1,646 PY and $52.2 million respectively in year 10. In year 20, total jobs would be 1,660 PY, with $52.7 million in income, while these levels would decline to 1,100 PY and $34.9 million in year 60. Thus over time, there would be an incremental loss in total provincial employment and income which would be only partly compensated for by gains in tourism, or increasing labour intensity of harvesting.

TABLE 5-3: PROVINCIAL ECONOMIC DEVELOPMENT - SCENARIO I				
Years	**0**	**10**	**20**	**60**
Direct Jobs (PY/yr)				
Forestry	538	620	626	411
Tourism	8	8	9	14
Total Direct Jobs (PY)	546	628	635	425
Direct & Indirect Jobs (PY)	1,428	1,646	1,660	1,100
Net Direct After-Tax Employment Income ($M)	$22.7	$26.1	$26.4	$17.4
Direct and Indirect Income ($M)	$45.3	$52.2	$52.7	$34.9

- **Provincial Government Revenues**

Under Scenario I, the average annual resource revenue would be $8.6 million in year 0, $10.6 million in year 10 and $9.6 million in year 20; it would decline to $6.3 million in year 60. The increase between years 0 and 10 can be ascribed to greater stumpage revenue resulting from the freeing up of the Forest Service Reserve.

In addition to resource revenues, there would be changes in both federal and provincial personal income taxes, vis a vis the Base Case, in the event of Scenario I. The annual provincial personal income tax associated with Scenario I would be $1.9 million in year 0, $2.2 million in year 10, $2.3 million in year 20 and $1.5 million in year 60.

TABLE 5-4: GOVERNMENT REVENUE: SCENARIO I ($ MILLION)				
Years	**0**	**10**	**20**	**60**
Resource Revenue ($M/yr)	$8.6	$10.6	$9.6	$6.3
Provincial Income Tax ($M/yr)	$1.9	$2.2	$2.3	$1.5
Total Revenue ($M/yr)	$10.5	$12.8	$11.9	$7.8

Aggregating the resource revenue and provincial personal income taxes which would be generated in the event of Scenario I results in total government revenue of $10.5 million in year 0, $12.8 million in year 10, $11.9 million in year 20 and $7.8 million in year 60.

- **Provincial Environmental Values**

From a provincial perspective, the most significant environmental issues concern the preservation of biodiversity in an overall sense and, of particular significance, the preservation of its very significant fisheries resources. The retention of visual quality and aesthetics, particularly from the point of view of passing tourists is also a concern, although a lesser one as Visual Quality Objectives should address these concerns for the most part. On this basis, Scenario I appears to be a worse scenario in terms of these values than the Base Case.

5.2.2 Scenario II: Immediate 20 Percent AAC Decline

- **Economic Development**

An immediate 20 percent decline in the AAC of the Kalum North would result in dramatic job and income losses during the first 20 years of the time horizon compared to the Base Case. Comparing Scenario II to the Base Case, it is estimated that approximately 290 direct and indirect PY would be lost province-wide in year 0, and $9.1 million in direct and indirect income. Under Scenario II, total direct and indirect employment related to wood from the Kalum North in year 0 would be 1,141 PY, with $36.2 million in income. This would be 1,322 PY and $42 million in year 10. In year 20, there would be another net gain with employment at 1,492 and income of $47.3 million, while in year 60 employment would decline to 1,110 PY and income to $35.2 million. The gain during the first 20 years can be ascribed to rising harvest employment and growing direct and indirect jobs and revenues based on the tourism sector.

TABLE 5-5: PROVINCIAL ECONOMIC DEVELOPMENT - SCENARIO II

Years	0	10	20	60
Direct Jobs (PY/yr)				
Forestry	429	496	556	406
Tourism	8	12	20	33
Total Direct Jobs (PY/yr)	437	508	576	439
Direct & Indirect Jobs (PY/yr)	1,141	1,322	1,492	1,110
Net Direct After-Tax Employment Income ($M/yr)	$18.0	$21.0	$23.7	$17.6
Direct and Indirect Income ($M/yr)	$36.2	$42.0	$47.3	$35.2

- **Provincial Government Revenues**

The timber reductions of Scenario II would precipitate a total net provincial government revenue loss vis a vis the Base Case of $1.9 million in year 0. Net government revenues would be $8.5 million in year 0 and $10.3 million in year 10. By year 20, revenues would increase slightly to $10.6 million due to rising tourism and harvesting employment. Total net revenue would decline to $7.7 million in year 60, however, as a result of further decline in the wood supply. These figures include resource revenues and provincial personal income tax from forestry and indirect sectors.

TABLE 5-6: GOVERNMENT REVENUE: SCENARIO II ($ MILLION)

Years	0	10	20	60
Resource Revenue ($M/yr)	$6.9	$8.5	$8.5	$6.2
Provincial Income Tax ($M/yr)	$1.6	$1.8	$2.1	$1.5
Net Revenue ($M/yr)	$8.5	$10.3	$10.6	$7.7

- **Provincial Environmental Values**

The more dramatic AAC reduction of Scenario II would longer preserve the environmental and aesthetic attributes of the Kalum North than either the Base Case or Scenario I.

Tables 6-1 and 6-2 summarize the regional and provincial results of the analysis in this report. Again, it should be pointed out that these figures are based on the absolute AAC volumes of each scenario. Specifically, these are the jobs, income and revenues associated with the total AAC of the Kalum North under each scenario. Appendix B provides the decade-to-decade incremental changes for each scenario.

6.1 Regional Impacts

The regional impacts of the Base Case scenario as well as Scenarios I and II are summarized in Table 6-1. As these results indicate, the AAC reductions which would take place in the Kalum North in the Base Case would result in long term losses of employment and income over the sixty year time horizon of this study. The allocation to SBFEP licensees of timber in the Forest Service Reserve, rising labour intensity in the harvest sector and growth in tourism would offset losses due to reduced AAC during the first twenty years, but by year 60 there would be a net decline vis a vis year 0 in employment and income, both direct and indirect.

Scenario I, which would maintain the current AAC for two decades and then decline at 10 percent per decade, would translate into a greater level of total employment and income during the first twenty years compared to the Base Case, again due to a higher rate of harvest during this time, as well as increasing employment in harvesting. However by year 60, there would be a subsequent decline in total employment and income as the wood loss effects are felt, although these levels would still be slightly above those in the Base Case. With the Scenario II harvest reductions, where the greatest decline would take place immediately, there would be more dramatic economic losses in the forestry sector during the first 20 years, compared to either the Base Case or Scenario I. Tourism employment would grow at a faster rate than either the Base Case or Scenario I, but any gains in this sector would be surpassed by losses in forestry.

Community impacts in terms of population, the requirements for social and employment related services, community stability and the tax base would be most extreme under Scenario II. While all three scenarios would result in some degree of outmigration from the study area, Scenario II would seriously impact the economic health and, to varying degrees, the stability of communities in the study area in the short and medium term. It would also present the highest likelihood of a mill closure in the study area. In this event, the tax base of the affected community would be significantly reduced.

On the environmental side, the harvest reductions associated with Scenario II would go further than Scenario I in preserving the biodiversity and old growth related values of Kalum North. Scenario II

would also ensure greater protection of recreation and existence values in the region, and better address the concerns of the Nisga'a and Gitksan people.

Finally, it is important to note that the Base Case scenario and Scenario II would both avoid the "stock rupture" which is predicted to occur in years 110 to 130 of Scenario I, and the subsequent economic losses which would take place in this event.

6.2 Provincial Impacts

Table 6-2 summarizes the provincial impacts related to the three scenarios. Like the regional results, the AAC reductions of all three scenarios would result in the loss of direct forestry jobs and income over the sixty year time horizon, but these impacts would be of a greater magnitude at the provincial than the regional level. In the Base Case scenario, there would be a net loss of employment and income (direct and indirect) related to timber supply reductions in the Kalum North between year 0 and year 60. For Scenario I, the loss of jobs and income would be more gradual, while under Scenario II the losses would be most dramatic of all scenarios in the first decade. However, employment and income would be highest for Scenario II in year 60.

All three Scenarios would incur losses in government revenue during the sixty year forecast period. In the Base Case, there would be resource revenue losses for every year of the forecast period compared to year 0, and corresponding losses in income taxes from forestry employees. In fact, these losses of forestry income tax revenue would exceed the provincial tax revenue gains from employees in tourism, despite growth in the latter sector. This can be ascribed to the much smaller numbers involved in the tourism sector, lower average incomes and lower tax rates. Overall, the losses in resource and provincial income tax revenues would be the least under Scenario I, and most dramatic under Scenario II.

In terms of provincially significant resources, all three scenarios would to some degree compromise the present environment of the Kalum North. Scenario I would have more of a detrimental impact on the biodiversity and the preservation of old growth related values, as well as special habitat and wildlife values. The Nass River, which has achieved provincial prominence as a spawning ground, would be less protected than in the Base Case. Of all the scenarios, Scenario II would have the least negative effects on the environmental attributes of the Kalum North.

Table 6-1: REGIONAL ACCOUNTS - KALUM NORTH

	Base Case: 9.5% Deduction in AAC Per Decade				Scenario I: Maintain AAC For 2 Decades, Then 10% Deduction Per Decade				Scenario II: 20% Immediate Reduction			
Years	**0**	**10**	**20**	**60**	**0**	**10**	**20**	**60**	**0**	**10**	**20**	**60**
1. Economic Development												
Direct Jobs (PY/yr)												
Forestry[36]	493	520	532	357	493	575	585	384	394	460	520	379
Tourism[37]	8	9	11	25	8	8	9	14	8	12	20	33
Total Direct Jobs (PY/yr)	501	529	543	382	501	583	594	398	402	472	540	412
Direct & Indirect Jobs[38] (PY/yr)	723	764	785	550	723	842	859	573	580	681	779	591
Net Direct After-Tax												
Employment Income ($M/yr)	$15.4	$16.3	$16.7	$11.6	$15.4	$17.9	$18.3	$12.1	$12.3	$14.5	$16.6	$12.4
Direct and Indirect Income ($M/yr)	$24.9	$26.4	$27.0	$18.7	$24.9	$29.1	$29.6	$19.7	$20.0	$23.4	$26.7	$20.2
2. Community Impact												
Population	• some outmigration from study area • population decline in Stewart				• least amount of outmigration from study area in short to medium term • dramatic population decline in years 110 - 130				• more short to medium term outmigration from study area than for base case			
Community Stability	• greater demand for social and employment-related services				• least impact on community stability and cohesion in short to medium term • severe impact on community stability in years 110 - 130				• greater demand for social services than in base case in short to medium term • disruption of stability in several communities, especially Stewart			
Tax Base	• possible decline in property values in some communities				• least impact on tax base during forecast period • long term impacts related to mill closures in years 110 - 130				• highest possibility of mill closure, and subsequent impact on community tax base			
3. Environmental Impact	• preservation of biodiversity and old growth related values affected • increase accessibility for recreation offset by diminished back country wilderness opportunities • some mitigation of fisheries values, special habitat, and visual qualities • continued growth of wilderness tourism/recreational activity albeit slower than if harvesting significantly curtailed • only partially responds to residents' existence value concerns				• more immediate impact on biodiversity and old growth related values, in years 0 to 20 than base case • poorest preservation of current forest characteristics in short to medium term				• longer preserves biodiversity and old growth related values • greater preservation of recreation and existence values over base case			
4. Specific Native Concerns	• somewhat addresses Native concerns				• least addresses Native concerns				• best addresses Native concerns			

[36] Only workers within study area. Estimated total forest industry employment in study area is 2,560.

[37] Assumes real annual tourism growth rate of 2% in base case, 1% in Scenario I and 2.5% in Scenario II.

[38] Indirect impacts calculated with regional multiplier of 1.62.

Table 6-2: PROVINCIAL ACCOUNTS - KALUM NORTH

	Base Case: 9.5% Deduction in AAC Per Decade				Scenario I: Maintain AAC For 2 Decades, Then 10% Deduction Per Decade				Scenario II: 20% Immediate Reduction			
Years	**0**	**10**	**20**	**60**	**0**	**10**	**20**	**60**	**0**	**10**	**20**	**60**
1. Economic Development												
Direct Jobs (PY/yr)												
Forestry[39]	538	561	570	382	538	620	626	411	429	496	556	406
Tourism[40]	8	9	11	25	8	8	9	14	8	12	20	33
Total Direct Jobs (PY/yr)	546	570	581	407	546	628	635	425	437	508	576	439
Direct & Indirect Jobs[41] (PY/yr)[3]	1,428	1,491	1,516	1,038	1,428	1,646	1,660	1,100	1,141	1,322	1,492	1,110
Net Direct After-Tax Employment Income ($M/yr)	$22.7	$23.7	$24.0	$16.5	$22.7	$26.1	$26.4	$17.4	$18.0	$21.0	$23.7	$17.6
Direct and Indirect Income ($M/yr)	$45.3	$47.3	$48.1	$32.9	$45.3	$52.2	$52.7	$34.9	$36.2	$42.0	$47.3	$35.2
2. Provincial Government Revenues[42]												
Resource Revenue ($M/yr)	$8.5	$9.6	$8.7	$5.8	$8.6	$10.6	$9.6	$6.3	$6.9	$8.5	$8.5	$6.2
Provincial Income Tax ($M/yr)	$1.9	$2.0	$2.1	$1.4	$1.9	$2.2	$2.3	$1.5	$1.6	$1.8	$2.1	$1.5
Total Revenue ($M/yr)	$10.4	$11.6	$10.8	$7.2	$10.5	$12.8	$11.9	$7.8	$8.5	$10.3	$10.6	$7.7
3. Environmental Impact	• biodiversity and preservation of old growth related values affected • little or no effect on recreation use or existence value • some mitigation of fisheries values, special habitat and visual qualities				• more immediate impact on biodiversity and preservation of old growth related values, Nass River fisheries resources, special habitat and wildlife value • little or no effect on recreation use or existence value				• longer preservation of biodiversity and old growth related values • little or no effect on recreation use or existence value			

[39] Includes resident and non-resident jobs within the study area, as well as milling jobs outside the region supported by wood flow from North Kalum.

[40] Assumes regional and provincial direct impacts are the same.

[41] Indirect impacts calculated with provincial income multiplier of 2.0, which includes both inter-industry and induced impacts. All income is after tax.

[42] Resource revenues from forestry use only. Personal income tax rates as share of gross income including benefits are 26% for forestry, 19% for other sectors, and a provincial tax share of 27%.

The scenarios analyzed in this report all incorporate the assumption of a reduced AAC in the short to medium term and, as such, represent a departure from the historical trend in AAC in the study area. It is generally recognized that, given current harvesting practices, the AAC from the Kalum North will be constrained in the future, and the greatest challenge will be to select a harvest strategy which best balances the economic and social needs of the local communities with the need to preserve as much as possible the environmental values and attributes inherent in the timber resource. Thus, the objective of using a Multiple Accounts Analysis framework in this report has been to evaluate the outcome of each scenario in terms of the social, economic and environmental factors, and present the results both quantitatively and, where appropriate, qualitatively. The final determination of how to weight these results lies ultimately with the decision-maker.

The Base Case modelled in this analysis assumes a steady 9.5 percent per decade decline in AAC starting in the second decade of the forecast period. This decline would precipitate a long term loss of employment and income, as well as revenues to the provincial government and industry, and ultimately contribute to some degree to the loss of social cohesion and stability in the study area. It would also result in some depreciation of the environmental values and attributes intrinsic to the forests of the Kalum North.

Each of the alternate scenarios modelled in this analysis has different social, economic and environmental implications for the short and long term, depending on how the AAC reductions are phased in. As the summary of results in Chapter 6 indicate, Scenario II (which is an immediate 20 percent reduction in AAC) would have the most dramatic short term impacts in terms of jobs, employment income and revenues to government and industry. There would be a corresponding reduction in forest industry capital investment and a greater likelihood of mill closure in the region. These effects would be felt immediately and, as a result, would pose the greatest threat to short term community stability in the study area. However, the AAC reduction of Scenario II would preserve environmental values and attributes in the Kalum North for longer.

It appears that Scenario I, which sustains the current AAC level for twenty years then declines at ten percent per decade, would incur few economic or social impacts in the study area during the first two decades, however there would be steady employment and income losses starting after year 20 and lasting for the rest of the forecast period. Environmental values would be eroded most under this scenario during the short to medium term. It is also important to note that, of all three scenarios, Scenario I is the only one which would culminate in a "stock rupture", most likely between years 110 and 130, and that this would have dramatic economic and social consequences at this time. Clearly the long term

outcome of this harvest regime would be the most detrimental, in terms of the economic and social criteria.

In summary, the Base Case and Scenario II would be expected to have the greatest short to medium term impacts in terms of jobs, employment and revenues, but both scenarios would better preserve the environmental attributes of the Kalum North compared to Scenario I. Scenario I would have few economic or social impacts during the first 20 years of the forecast period but, in the longer term (ie. 110 to 130 years), would have profoundly detrimental economic and social consequences.

Appendix A

APPENDIX A
LIST OF CONTACTS FOR STUDY

Bruce MacNicol, General Manager, Northcoast Timber (West Fraser), Prince Rupert
Frank Foster, Exec. VP and CEO, Orenda Forest Products, West Vancouver
Bob Simpson, Buffalo Head Forest Products Ltd., Stewart
Al MacKenzie, All West Trading, Terrace
Bud Hobenshields, Hobenshields Mill, Kitwanga
Harold Demetzer, Regional Manager, Ministry of Economic Development, Small Business and Trade, Terrace
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Robert Good, Hereditary Chief, Gitanyow
Norman Johnson, Western Speaker, Gitksan West
Richard Overstall, Researcher, Gitksan-Wet'Suwet'en
Guy Morgan, Hereditary Chief, Gitanyow
Vernon Milton, Hereditary Chief, House of Skugumlahae
Henry Tait, Board Member, Hereditary Chief, Gitksan
Larry Moore, Chief Counsel, Gitskan, Kitwanga
Rob Robinson, Executive Director, Nisga'a Tribal Council
Collier Azak, Nisga'a Tribal Council
Steve Azak, Nisga'a Tribal Council
Tony Pierce, Nisga'a Tribal Council
Marcus Bartley, Rosenbloom & Aldridge (legal counsel for Nisga'a Tribal Council)
Darlene Cornell, Mayor, Stewart
Donna Hicks, District of Stewart
Anne Jefferson, President, Chamber of Commerce, Stewart
Michael Marson, Assistant Transportation Analyst, Ministry of Transportation & Highways

Appendix B

APPENDIX B
GLOSSARY OF TERMS

Allowable annual cut (AAC): The allowable rate of timber harvest from a specified area of land per year.

Anthropocentric: Interpreting or regarding the world in terms of human values and experiences.

Biodiversity: Diversity of life in all its forms and levels of organization, including genes, species, ecosystems and the evolutionary and functional processes that link them.

Biogeoclimatic zones: Area which are defined by biological, physical and atmospheric characteristics.

Blue-listed species: Sensitive or vulnerable and of management concern.

Environmentally sensitive area: An area with significant non-timber values, fragile or unstable soils, problems in establishing a new tree crop of where timber harvesting may cause avalanches.

Green-up period: The time needed for a stand of trees to reach a desired condition (e.g. height) to ensure maintenance of water quality, wildlife habitat, soil stablility or aesthetics.

Harvest forecast: The flow of potential timer harvests over time. A harvest forecast is usually a measure of the maximum timber supply that can b realized, over time, for a specific land base and set of management assumptions. It is an output of forest planning models and is affected by the size and productivity of the land base, the current growing stock, and management objectives, constraints and assumptions.

Indirect Income or Employment: Total income or employment generated in a local or provincial economy by the respending of an initial $1 increase in wage and salary income.

Not satisfactorily restocked: An area not covered by a sufficient number of tree stems of desirable species.

Protected Area:	Areas designated under the B.C. Protected Areas Strategy for protection in its current state, based on special physical and environmental qualities it may possess.
Red-listed species:	Threatened or endangered species.
Stock rupture:	Harvest shortfalls less than Long Run Sustained Yield, attributable to insufficient umber of second-growth stands achieving minimum harvest age to maintain the timber harvest target.
Timber Supply Area (TSA):	An integrated resource management unit established in accordance with Section 6 of the Forest Act.
Timber harvesting land base:	The portion of the total land area of a management unit considered to contribute to, and be available for, long-term timber supply. The harvesting land base is defined by reducing the total land base according to specified management assumptions.
Visual quality objective (VQO):	Defines a level of acceptable landscape alteration resulting from timber harvesting.
Watershed:	An area drained by a stream or river. A large watershed may contain several smaller watersheds.
Yellow-listed species:	Managed species.

Appendix C

APPENDIX C
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Appendix D

DECADE-TO-DECADE INCREMENTAL CHANGES

	BASE CASE				SCENARIO I				SCENARIO II			
	Year 0*	Year 10	Year 20	Year 20-60	Year 0*	Year 10	Year 20	Year 20-60	Year 0*	Year 10	Year 20	Year 20-60
REGIONAL												
1. Economic Development												
Direct Jobs: (PY/yr)												
- forestry	0.0	27.0	12.0	-175.0	0.0	82.0	10.0	-201.0	- 99.0	66.0	60.0	-141.0
- tourism	0.0	1.0	2.0	14.0	0.0	0.0	1.0	15.0	0.0	4.0	8.0	13.0
Total Direct Jobs (PY/yr)	0.0	28.0	14.0	-161.0	0.0	82.0	11.0	-186.0	- 99.0	70.0	68.0	-128.0
Direct & Indirect Jobs (PY/yr)	0.0	41.0	21.0	-235.0	0.0	119.0	17.0	-286.0	-143.0	101.0	98.0	-188.0
Net Direct After Tax Employment Income ($M/yr)	0.0	0.9	0.4	- 5.1	0.0	2.5	0.4	- 6.2	- 3.1	2.2	2.1	- 4.2
Direct & Indirect Income ($M/yr)	0.0	1.5	0.6	- 8.3	0.0	4.2	0.5	- 9.9	- 4.9	3.4	3.3	- 6.5
PROVINCIAL												
1. Economic Development												
Direct Jobs: (PY/yr)												
- forestry	0.0	23.0	9.0	-188.0	0.0	82.0	6.0	-215.0	-109.0	67.0	60.0	-150.0
- tourism	0.0	1.0	2.0	14.0	0.0	0.0	1.0	5.0	0.0	4.0	8.0	13.0
Total Direct Jobs (PY/yr)	0.0	24.0	11.0	-174.0	0.0	82.0	7.0	-210.0	-109.0	71.0	68.0	-137.0
Direct & Indirect Jobs (PY/yr)	0.0	63.0	25.0	-478.0	0.0	218.0	14.0	-560.0	-287.0	181.0	170.0	-382.0
Net Direct After Tax Employment Income ($M/yr)	0.0	1.0	0.3	- 7.5	0.0	3.4	0.3	- 9.0	- 4.7	3.0	2.7	-- 6.1
Direct & Indirect Income ($M/yr)	0.0	2.0	0.8	- 15.2	0.0	6.9	0.5	-17.8	- 9.1	5.8	5.3	- 12.1
2. Provincial Government Revenues												
Resource Revenue ($M/yr)	0.0	1.1	- 0.9	- 2.9	0.0	2.0	- 1.0	- 3.3	- 1.7	1.6	0.0	- 2.3
Provincial Income Tax ($M/yr)	0.0	0.1	0.1	- 0.7	0.0	0.3	0.1	- 0.8	- 0.3	0.2	0.3	- 0.6
Total Revenue ($M/yr)	0.0	1.2	- 0.8	- 3.6	0.0	2.3	- 0.9	- 4.1	- 2.0	1.8	0.3	- 2.9

* Represents incremental change in AAC from current actual level to first year (year 0) of the Scenario; Year 10 and Year 20 represent incremental change from previous decade, while Year 20-60 denotes incremental change from year 20 to year 60.