

Final Report

**REVELSTOKE TSA
SOCIO-ECONOMIC ASSESSMENT**

**Prepared by:
The ARA Consulting Group Inc.**

February, 1994

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Executive Summary

Introduction

The Revelstoke Timber Supply Area (TSA) is part of the Nelson Forest Region, and covers an area of approximately 504,000 hectares. Because of the area's rugged topography, only a relatively small proportion of the total TSA is productive forest land.

The Ministry of Forests released a new Timber Supply Analysis for the Revelstoke TSA in June 1993. As part of the overall timber supply review process, a requirement exists to assess the major socio-economic impacts that might be associated with the range of possible new harvest scenarios identified in that analysis. This report is aimed at fulfilling that requirement.

This socio-economic impact report uses a "multiple account" framework, evaluating impacts under separate account headings, i.e.: Economic Development, Environmental, Community, and Government Revenues. These accounts are evaluated as appropriate at both the TSA and the provincial levels.

This Executive Summary summarizes the report's approach and findings, which are highlighted in the accompanying Tables ES1 and ES2.

Revelstoke TSA Socio-Economic Profile

The Revelstoke TSA lies in an area of outstanding mountain scenery, and includes Revelstoke Lake and the Columbia River, Mount Revelstoke National Park, a portion of Glacier National Park, and several smaller provincial parks. The TSA is bisected by the Trans-Canada Highway, over which an estimated 3.1 million automobile occupants travel each year.

The Revelstoke TSA is thinly populated, with approximately 8,400 residents. Over 90% reside in the town of Revelstoke. The town's population base has been gradually increasing since the late 1980's, as the economy recovers from a major downturn in the mid-1980's. This downturn was caused by the termination of a number of major construction projects (such as the Revelstoke Dam) around that time.

In contrast to many other small B.C. towns, the economic base of Revelstoke is relatively diversified, and includes: forestry (five major mills and affiliated service activities); non-forestry resource extraction (copper mining and mineral water); tourism (oriented both to the Trans-Canada highway traffic and to the area's outdoor summer and winter amenities); the public sector (including Parks Canada and B.C. Hydro); and road and rail transportation (in particular CP Rail's operations).

The Revelstoke Forestry Sector

Revelstoke has five sizeable wood-processing operations, all dependent to varying degrees on TSA supplies: Downie Street Sawmills, Joe Kozek Sawmills, Bell Pole, Cascade Cedar, and Revelstoke Cedar. Downie Street is the largest, processing approximately 420 000 m³ of wood-fibre annually, and with an employment base of approximately 315 PY (person-year) equivalents. The other four mills account for approximately 120 000 m³ annually of fibre throughput, and support a direct employment base of approximately 100 PY's. Cascade and Revelstoke Cedar are shake and shingle operations. These five mills are estimated to rely on Revelstoke TSA apportionments (both through their own licences and through the Small Business Forest Enterprise Program), for approximately 48% of their total wood supply (the dependence of individual mills on TSA supplies may vary from this average).

Additional forestry sector employment (of approximately 250 PY's), is generated through independent logging and shake operators, through affiliated forestry services (such as timber cruising, silviculture, and equipment repair), and through the harvesting of timber under various Tree Farm Licences (TFL's), which is then shipped to mills outside of Revelstoke (e.g. Evans in Malakwa and Pope and Talbot in Castlegar) for processing.

Based on information directly obtained from licensees, we estimate that the current AAC of 269 000m³ directly supports a total of 288 PY's (including harvesting, silviculture/forestry services, sawmilling, and machinery repair), and generates \$12.6 million (\$1993) annually in pre-tax employment earnings in the Revelstoke area. We also estimate that for every direct forestry job, an additional .78 jobs are generated elsewhere in the Revelstoke economy. This translates to an additional 225 area jobs indirectly supported by the local TSA-based forestry sector.

Almost all of the forestry-based work-force are Revelstoke-area residents.

Revelstoke TSA Timber Supply Profile

Based on the Ministry of Forest's June 1993 Timber Supply Analysis report, the present Allowable Annual Cut of 269 000m³ is unsustainable over the long-term. This is for a variety of reasons that are explained in detail in that report, including: the large removals required from the productive forest land base for reasons of inoperability, environmental sensitivity, roads, and so forth (all of which reduce the long-term timber harvesting land base to 58 342 ha.); the highly uneven age profile of the existing forest, with high concentrations of very old and very young stands; and, the harvest restrictions that flow from meeting integrated resource management standards.

The Timber Supply Analysis report documents a range of possible future harvest scenarios for the Revelstoke TSA, based on varying assumptions regarding forest growth rates and management actions. All trend over a number of decades to a long term sustainable annual harvest of 98 000m³ (one-third of the present level), varying principally in the time path of movement to that level.

From the many timber supply scenarios considered in that report, we selected three, to represent a range of impacts for socio-economic assessment purposes. The differences between the three largely revolve around the magnitude of the initial harvest reduction, as all terminate at the same long-run harvest level of 98 000m³. The initial harvest reduction for Scenario One was set at 5.6% for the first decade (from the current harvest level); for Scenario Two at 21%; and for Scenario Three at 33%.

For all three scenarios, a range of socio-economic impacts was assessed at both the Revelstoke TSA and at the provincial levels. The TSA impacts are summarized in the accompanying Table ES1, while the provincial impacts are summarized in Table ES2.

TSA Impacts

Economic Development Account

Under Scenario One, we estimate that a total of 29 jobs (all job references are on a Person Year, or PY, basis), would be lost in the first decade. Sixteen of these would be direct forestry jobs, and thirteen would be indirectly supported jobs. An additional 297 jobs (167 direct and 130 indirect) would be lost over the following seven decades, until the long-term harvest level is reached in decade eight. This scenario is therefore associated with a relatively modest employment decline in the first decade, but with much more serious job attrition in the later decades.

These estimated job losses would be associated with a drop in annual pre-tax employment income of \$1.06 million in the first decade, down from the \$19.03 million in annual employment income currently supported (directly and indirectly) by the TSA harvest. Annual incomes would be reduced by another \$11.03 million over succeeding decades.

Under Scenario Two, job losses in the first decade are estimated at 107 PY's, 60 of which are direct forestry-based jobs, and 47 of which are indirectly supported jobs. Additional job losses of 219 PY's (123 direct and 96 indirect) would be experienced over the following four decades, until the long-term harvest level is reached by the sixth decade. Because they each gravitate to the same long-term harvest level, the cumulative job loss of 326 PY's is similar to Scenario One, and also to Scenario Three.

Scenario Two gives rise to a drop in pre-tax annual employment income in the first decade of \$3.96 million, with a subsequent drop over succeeding decades of \$8.13 million annually.

Scenario Three job losses are estimated at 166 PY's (93 direct and 73 indirect) in the first decade, and an additional 160 PY's (90 direct and 70 indirect) up to the point at which the harvest level stabilizes (in decade nine). Pre-tax annual employment income declines from the present level of \$19.03 million to \$12.89 million annually in the first decade, and to the \$6.94 million level by the ninth decade.

The reliability of these estimates is dependent on two estimation assumptions that potentially could cancel each other; on the one hand, the very strong underlying assumption that all those that lose their jobs will leave the Revelstoke area (and take their spending power with them); and on the other hand, the assumption that job losses would be no more than proportional to the harvest reductions, and not exacerbated by entire shift or even plant shutdowns.

No solid basis existed for the attribution of economic impacts outside of the forestry sector. As the full report discusses in more detail, the net effect on the outdoor winter recreation sector (heli-skiing, snowmobiling, cat-skiing) is very mixed. There appears to be less ambiguity regarding the positive effect of lower harvest levels on the summer outdoor recreation sector, although no solid basis exists for quantifying the exact extent of this effect. With the aim of at least explicitly acknowledging this effect, we have allowed for a modest (and highly subjective) outdoor recreation job creation effect arising from the lower harvesting rates of 10, 20, and 30 positions respectively, for Scenarios One, Two, and Three. The timing of these possible job additions is very uncertain.

Environmental Account

From an environmental perspective, the three scenarios differ only with respect to the timing and rate at which the harvest level is reduced, from the current 269 000m³ level, to the 98 000 m³ long-run sustainable level. Specifics are lacking on any other environmentally significant differences between the scenarios. The environmental benefits of a lower rate of harvest are tied to a slower rate of depletion of the area's old growth/mature forest cover, and a moderated level of impact on the area's old growth dependent wildlife species, i.e. mountain caribou, cavity nesting birds, and other mammals.

Common to all three harvest scenarios are special forest management guidelines of specific benefit to the mountain caribou, and visual quality objectives along the principal traffic corridors. These will confer some significant environmental benefits, but do not provide a basis on which to choose between the three scenarios.

Community Account

Community concerns are very concentrated on the level and timing of the job losses (and income losses) associated with the different harvest scenarios. Because all three scenarios eventually gravitate to the same long-run harvest level, all three eventually give rise to similar levels of job loss. From a community perspective however, the deferral of significant job losses for at least a decade can be of crucial significance, as it allows the community time to prepare and adapt. For that reason alone, Scenario One would be preferred to Scenario Two, which in turn would be preferred to Scenario Three. For a community of Revelstoke's size, whereas the immediate loss of 29 jobs (under Scenario One) could foreseeably be absorbed, such would not be the case with immediate job losses of 107 or of 166 jobs.

At the economic level, community adjustments would probably focus on the potential for increasing the proportion of wood value added at the local level. Currently, over 50 000m³ of

TSA wood is shipped to remanufacturing locations elsewhere in B.C.; the Revelstoke Community Forest Corporation controls 50 000m³ that could potentially be used for local value added operations. While increased local processing of either of these wood supply sources could go some way to offsetting the first decade job losses of Scenario One, they would have far less leverage for offsetting the impacts of Scenarios Two and Three.

Any value added jobs that are added to the Revelstoke economy in this way would effectively be transferred from elsewhere in the province.

For many Revelstoke residents, real concern over the potential loss of forestry-based jobs is mixed with a sense that current harvest levels are in fact unsustainable, and that for environmental and other reasons, the prospect of at least some harvest reductions is unavoidable. In other words, notwithstanding the potential for some serious economic and social impacts, there is a segment of community opinion that would support a lower harvest option.

Provincial Impacts

Economic Development Account

Additional employment and income losses at the provincial level are associated with all three scenarios. These arise in two principal ways: firstly, the direct and indirect effects arising from the processing of Revelstoke TSA wood-fibre elsewhere in the province (both as pulp and as remanufactured wood); and secondly, the indirect effect of wage earner expenditure leakages, and materials and supplies sourcing from the Revelstoke forest sector to other B.C. communities. We currently estimate the additional employment generated elsewhere in the province in this manner at 33 direct PY's, and 257 indirect PY's. The large number of jobs indirectly supported elsewhere in the province illustrates the high level of interdependence between the basic forestry sector and the rest of the provincial economy.

The reduced harvest levels of the three scenarios are estimated to result in provincial job losses, over and above those arising at the TSA level, as follows: losses in the first decade of 16, 61, and 94 PY's respectively, for Scenarios One, Two, and Three; and cumulative job losses in succeeding decades of 168, 123, and 90 PY's, respectively.

Overall, we estimate that movement to a long-run sustainable harvest level of 98 000m³ would be associated with a total provincial job loss of 510 PY's, of which an estimated 326 PY's would be lost in the Revelstoke area, and an estimated 184 PY's would be lost elsewhere in the province. If effective forestry job replacement measures were to be taken in the Revelstoke area (e.g. by increasing local value added manufacture), the TSA/provincial job loss ratio might change, but not the total number.

Environmental Account

The primary provincial-level environmental impact relates to the enhanced winter habitat protection for the mountain caribou. This is based on the proposed establishment of a wildlife management zone, the implications of which are similar for all three scenarios.

Any additional environmental impacts would be tied to the reduced harvesting rates under all three scenarios, and the slower rate of old growth/mature forest cover depletion. Scenario Three is the most preferred from this perspective, followed by Scenario Two, and lastly by Scenario One.

Government Revenues

Provincial government revenues associated with the harvest are: stumpage, rent, and royalties; personal income taxes; provincial corporate income and other taxes; and local property taxes. Under Scenario One, annual provincial revenues for the first decade, following harvest reductions, fall from \$6.45 million to \$6.09 million; under Scenario Two from \$6.45 million to \$5.11 million; and under Scenario Three from \$6.45 million to \$4.36 million (all in \$1993). Under all three scenarios, annual revenues eventually decline over succeeding decades to the \$2.35 million level.

Table ES1: Summary of Revelstoke TSA Impacts

**Economic Account
(PY's/Year)**

Forestry **Scenario 1** **Scenario 2** **Scenario 3**

Direct Job Loss

Decade One	16	60	93
Future Decades	<u>167</u>	<u>123</u>	<u>90</u>
Total	183	183	183

Total Job Loss

Decade One	29	107	166
Future Decades	<u>297</u>	<u>219</u>	<u>160</u>
Total	326	326	326

Outdoor Recreation

Direct Job Gain (Long-Term)	10	20	30
--------------------------------	----	----	----

Environmental

Caribou
Protection

Caribou
Protection

Caribou
Protection

-

Old Growth
Retention

Superior
Old-Growth
Retention

-

-

Fragmented
Roading

Visual
Quality

Visual
Quality

Visual
Quality

**Community
Account**

Time to
Adjust

Upfront
Impact

Extreme
Upfront
Impact

Table ES2: Summary of Total Provincial Impacts

**Economic Account
(PY's/Year)**

Forestry	Scenario 1	Scenario 2	Scenario 3
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Direct Job Loss

Decade One	18	67	104
Future Decades	<u>186</u>	<u>137</u>	<u>100</u>
Total	204	204	204

Total Job Loss

Decade One	45	168	260
Future Decades	<u>465</u>	<u>342</u>	<u>250</u>
Total	510	510	510

Outdoor Recreation

Direct Job Gain (Long-Term)	10	20	30
--------------------------------	----	----	----

Environmental

Caribou
Protection

Caribou
Protection

Caribou
Protection

Old Growth
Retention

Superior
Old-Growth
Retention

**Provincial Government
Revenue
(\$1993 Million/Year)**

Current	\$6.45	\$6.45	\$6.45
Decade One	6.09	5.11	4.36
Final Decade	2.35	2.35	2.35

1.0 Introduction

The following report evaluates the socio-economic and environmental impacts of three alternative timber harvest scenarios for the Revelstoke Timber Supply Area. These three scenarios were selected from a more complete set contained in the Revelstoke TSA Timber Supply Analysis report, prepared by the Integrated Resources Branch of the Ministry of Forests in June 1993. This is one of a series of new Timber Supply Analyses being prepared for all Timber Supply Areas. When completed, these updated analyses will be used to establish new Allowable Annual Allowable Cut (AAC) levels for the TSA's.

All new AAC determinations are required to take into consideration the associated socio-economic implications. This is the rationale for the following report. It follows the multiple account guidelines framework laid down by the Ministry of Forests¹, the aim of which is to focus attention on the full range of economic and non-economic impacts and values that are derived by all forest-land user groups.

The report could not have been completed without the co-operation of many parties, identified at various points in the report. With due allowance for the limitations of data and time under which it was completed, it is hoped that the findings will provide a reasonably complete and accurate frame of reference for the important forest management decisions that still lie ahead.

¹ "Social and Economic Impact Assessment of Forest Land Management Options in British Columbia", Ministry of Forests, August 1992.

2.0 Revelstoke Area Profile

2.1 General

2.1.1 Location

The Revelstoke TSA lies within the Regional District of Columbia-Shuswap, and straddles the Columbia Mountain Range and Columbia River valley, which run in a north-south direction. The Monashee Mountains are directly to the west, while the Selkirk, Rocky, and Purcell Mountain ranges all lie to the east.

Bisected by the Trans-Canada highway, this is an area of outstanding mountain scenery. The Rogers Pass lies a short distance to the east, and the area contains two major national parks, Mount Revelstoke and Glacier. As the most direct road route between Vancouver and Calgary, this stretch of the Trans-Canada is very heavily travelled. The town of Revelstoke and the surrounding area is relatively isolated within the mountain ranges, and is in many ways considered a region distinct from the neighbouring Kootenays, Shuswap, and North Okanagan regions.

The Revelstoke TSA is part of the Nelson Forest Region. The Golden TSA is immediately to the east. The Revelstoke TSA covers that part of the Columbia River valley which extends from the Mica Dam in the north, to the Upper Arrow Lakes in the south. Aside from Highway 23, which runs north to south beside Revelstoke Lake and the Columbia River, the Trans-Canada is the only significant paved stretch of road within the TSA. Along with the CP rail main line, these two stretches of highway are the primary transportation corridors within the TSA.

2.1.2 Population

The 1991 census estimated the population of the Revelstoke census area at 8,376, a seven percent decline from the estimated 1986 population of 9,007. The town of Revelstoke is the only community of any significant size, and its 1991 population of 7,729 accounted for most of the area total. The community of Mica Creek, at the dam site at the north end of Revelstoke Lake, is the only permanent settlement north of Revelstoke. The communities of Shelter Bay, Galena Bay, Beaton, and Trout Lake, are clustered around the southern end of Revelstoke Lake, where it joins with the Arrow Lakes.

The Revelstoke area experienced strong population growth in the late 1970's and early 1980's, attracted by the economic activity associated with the construction of the Revelstoke Dam, the commencement of the Rogers Pass tunnelling project, and double tracking by CP Rail. The area population peaked at around the 10,000 level in 1982. With the ending of these major construction projects, and recessions in mining and forestry, the population subsequently declined. In 1989 the population stabilized at about the 8,200 level, and has since increased slightly.

2.2 The Economy

2.2.1 General²

Revelstoke went through a significant economic downturn in the mid-1980's. This was brought about by a combination of factors, in particular: the completion of the Revelstoke Dam and Rogers Pass construction projects; the loss of CP Rail's car repair facility; the closure of the Goldstream copper-zinc mine; and the 1985 closure of the town's largest sawmill. By 1986, the town was experiencing an unemployment rate of 20%.

Revelstoke has since experienced a solid turnaround. The mine and sawmill have re-opened, a tourism development strategy has been implemented, and the downtown has been transformed through an ambitious \$2.8 million Heritage Revitalization Initiative. The combined impact has been a transformation of the public mood, a stabilization of the population base, and a general air of confidence in the community's long term future.

One recent initiative has been the creation of the Revelstoke Community Forest Corporation. Its goals are to secure access to local wood supplies for local processing, and to generate revenues to advance the area's economic diversification. In pursuit of these goals, the Corporation (with the aid of a 50% investment share from three of the area's major licensees) purchased the harvest rights to 100 000 m³ of the old TFL 23 (which used to be held by Westar), which heretofore was largely destined for processing outside of the Revelstoke area. This now constitutes the new TFL 56.

In contrast to many other small B.C. towns, Revelstoke's economic base is quite diversified. Its employment base is an approximate four-way split, between transportation, resource-based processing (including forestry), tourism and tourism related services, and the public sector. For those sectors other than forestry and tourism (which are more dependent on the forest land-base and evaluated in more detail below), the following highlights some major features:

Transportation

Historically, Revelstoke's economic development has been driven by its natural resources, and by the area's significance as an east-west transportation corridor. From CP Rail's initial operations in the late 1800's, to the selection of Revelstoke as the administrative base for its mountain operations, the rail transportation sector has been a mainstay of the area economy. Revelstoke is the base for the administrative offices of C.P Rail's Mountain Sub-Division; provides crews for east-west trains and for track maintenance; and is the central dispatch point for the entire Okanagan-Kootenay region. C.P Rail employs approximately 450 people in these operations, a level which is seen as generally stable, though subject to some future attrition.

² Much of this section is based on information provided by Doug Weir, Revelstoke Economic Development Commissioner.

Revelstoke lost out to Golden in 1987 in the bid for C.P. Rail's car repair and diesel maintenance facility, at which time Revelstoke's repair facility was closed down with the loss of 50 jobs. The completion of new tunnels, and double tracking through the Rogers Pass have consolidated rail traffic, but maintenance of rail volumes will continue to be dependent on trends in Canada's resource exports, and on fierce competition from other transport modes and routes (in particular from the USA). While there is some apprehension over the erosion that has occurred in this sector in recent years, Revelstoke is at the same time positioning itself to contend for the new centralized site for CP Rail's overall dispatching services. This prospect constitutes both a threat (to the existing 25 to 30 dispatch jobs) and an opportunity (with the prospect of an additional 50 to 100 jobs).

In so far as road traffic is concerned, this grew significantly with the completion of the Rogers Pass section of the Trans-Canada highway in 1962. This provided a major boost to tourist and commercial traffic travelling the highway. Over three million people annually now travel this stretch of the Trans-Canada Highway.

Power Generation

The Revelstoke area contains two major hydro-electric dams and power stations, the Revelstoke and Mica Creek dams. These have huge reservoirs adjacent to them, suitable for boating and fishing. B.C. Hydro employs about 85 people (including contract labour) at these two sites. The Revelstoke Dam, which at its peak generated 2,800 construction jobs, was completed in 1985. Along with the Rogers Pass project (peak employment of 1,100), it led to a significant expansion of the building trades sector, the subsequent downsizing of which was the major cause of Revelstoke's population decline in the late 1980's. One legacy of those projects is a large pool of construction industry expertise in the general area.

Non-Forestry Resource Sectors

The area's one mine is the Bethlehem Resources Goldstream copper-zinc mine, 90 km north of Revelstoke. This was re-opened in 1991 after being shut down for seven years. Its average employment level is in the 65 to 80 person range. Potential prospects include the Big Ledge lead-zinc property west of Upper Arrow Lake, and the Trout Lake molybdenum property, 68 km south-east of Revelstoke. Another resource-based operation is the Canadian Natural Springs Water operation, 40 km east of Revelstoke, which employs approximately 15 people. There are also two smaller mineral water plants, each employing about six people.

Public Sector

Revelstoke has a significant public sector, which supports approximately 685 full time employment positions. About 60 of these are with the municipal government. Federal Government offices include Employment and Immigration, and Environment Canada (including Parks Canada). Provincial Government offices include the Attorney General, Finance, Forests, Health, Social Services, and Transportation and Highways. Included in the public sector employment total are those employed in education (5 elementary schools, 1 secondary school,

and Okanagan College extension programs); health care (46 bed hospital and community health care services); social services (75 senior housing units); fire protection services; and, an RCMP detachment.

2.2.2 Forestry and Tourism

Forestry³

Forestry-based activities have long been a major component of the Revelstoke economy, and account for between 25% and 30% of total area employment. The principal forest operations are the following:

- **Downie Street Sawmills:** This has historically been the major sawmill in the Revelstoke area. It has passed through a number of distinct phases since it first opened as a relatively small operation in 1944. It underwent a major expansion (to 35 MBF capacity) in the mid-1970's, was sold to Federated Co-Operatives Ltd. in 1980, and was closed in December 1985 (due to licensee non-performance). It re-opened in June 1988 (with a 40 to 45 MBF capacity), under new management and the original Downie name. A major capital investment in the 1991/1992 period expanded capacity to the current 75 to 80 MBF level. White wood (i.e., non-cedar) and cedar upper grades destined for the offshore market comprise 75% of production. Cedar merchant grades for the North American market make up the balance of production (bevel and board blanks and associated lower grades). Between 30% and 35% of mill output is further processed at various remanufacturing plants in B.C. The Downie mill also supplies approximately 50 000 m³ annually in pulp logs from its Revelstoke and Golden TSA licences to Georgia-Pacific's pulp mills, mostly to the Cache Creek mill. Downie Street Sawmills currently accounts for approximately 315 full time employment positions, 190 of whom are employed at the mill site, and 125 of whom are contracted for various woodlands operations, such as logging and road building, log hauling, silviculture, and forestry contract services such as cruising. Gross sales for 1992 were \$31.5 million. This was a substantial jump from the 1991 sales level of \$18.8 million, and was largely due to higher lumber prices. Downie has a 30% investment share in the Revelstoke Community Forest Corporation.
- **Joe Kozek Sawmills:** This sawmill and planer mill was established in the Revelstoke area in 1928. It provides direct employment for approximately 20 people at the mill site, and another 18 in woodlands operations (partly contracted out). Length of employee service ranges from six months to 40 years, with the average being 10 years. The mill was extended and upgraded in 1989 following the acquisition of a more secure wood supply. They have a TSA apportionment, as well as a 10% investment share in the Revelstoke Community Forest Corporation. Annual gross

³ This information is based on interviews with representatives of the different forestry operations identified.

sales are approximately \$2.3 million. Products are varied (e.g. garden fencing, frames, and ties), and markets are largely within Canada.

- **Cascade Cedar Ltd.:** This shake and shingle mill was established in 1985. It is affiliated with Columbia River Shake and Shingle in Nakusp. The mill provides full-time, direct employment to about 25 people, with logging handled separately through largely independent wood suppliers. They do not have a direct TSA licence allotment, and acquire their wood from a variety of sources, in particular through the Ministry of Forests' Small Business Forest Enterprise Program (SBFEP). They have a 10% investment share in the Revelstoke Community Forest Corporation, which will guarantee them future wood supplies from that source. The mill used to depend on Westar for its timber supply. Markets are 80% U.S. (Colorado, Arizona), 20% Alberta.
- **Bell Pole Co. Ltd.:** This pole yard provides approximately 15 full-time employment positions, at the mill and in its woodlands operations. It separately contracts out its logging and silviculture requirements. The Revelstoke yard is one of four in B.C., the others being at Lumby, Haney, and Terrace. The company was started in 1906, and is now U.S. owned. 20% of the yard's output is shipped to the company's treatment plant in Carseland, Alberta, with the remaining 80% going to the company's second treatment plant in Minneapolis, Minnesota. The mill has a TSA apportionment, which (through trades) meets approximately one-third of its fibre requirements. Annual shipments are between \$3 million and \$4 million.
- **Revelstoke Cedar Products Ltd.:** This shake and shingle operation commenced business in 1988 (with start-up financial assistance from the Revelstoke Community Futures Fund), and provides approximately 15 full-time employment positions. It does not have a wood supply tenure, and is constrained from continuously operating to capacity (three resaw machines) because of wood supply problems. It relies heavily on cash Timber Sale Licences and the shake block program for its supplies. A six-person harvest crew has recently been added, based on recent access to a new timber supply area.
- **Independent Cedar Shake Block Cutters:** There are an estimated 50-60 individuals employed in small shake block cutting operations in the district;

The Revelstoke area also has harvesting of wood that is shipped out of the District for processing elsewhere (wood is also shipped into Revelstoke from other areas). There are three Tree Farm Licences (TFL's) within the Revelstoke Forest District. They are: TFL 23 (approximately 600 000 m³ annually), held by Pope and Talbot, with much of the fibre going to their operations in Castlegar; TFL 55 (just under 100 000 m³ annually), held by Evans Ltd., and shipped to Evan's operations in Malakwa and Golden; and TFL 56 (100 000 m³ annually), now held by the Revelstoke Community Forest Corporation, of which half is directed to Downie, Kozek, and Cascade, with the other half sold on the open market. TFL 55 and TFL

56 were created out of the breakup of the last of Westar's forest holdings in the Revelstoke district.

In addition to the wood processing sector, there is a sizable forestry service sector based in Revelstoke. Various companies provide services such as engineering, cruising, silviculture, log marketing, and fire-fighting and mop-up services. There are seven or eight such companies, including Treadstone, Ramrose, Columbia Valley, and G.H. Murray. Collectively they account for an estimated 40 to 45 positions (full-time basis).

Other forestry-dependent operations include the machinery supply and repair companies, such as Finning, Mount Begbie Machine Works, Price and Markle, Wrights Machinery and Acklands, and a miscellaneous group that includes truck repair and tire shops. While this sub-sector is by no means exclusively forestry dependent, forestry is very significant to its overall viability. There are an estimated 70 to 80 positions in total (full-time basis) accounted for by this sub-sector.

Tourism and Outdoor Recreation

Revelstoke's tourism and outdoor recreation industry is a significant and growing component of the local economy. Ever since the opening of the Rogers Pass in 1962, the drive through trade, and the associated overnight custom, has comprised the bulk of the area's tourist activity. While this is still predominantly the case, it is increasingly being rivalled by the growth in visitors drawn by the area's outstanding winter skiing and snowmobiling attractions.

The Revelstoke area has a solid base of high-grade tourist attractions. These include:

- The Mount Revelstoke and Glacier National Parks (only a portion of the latter lies within the Revelstoke Forest District);
- The general roadside viewsapes, especially along the Trans-Canada highway, but also along Highway 23 south to Shelter Bay and the Arrow Lakes, and north to Mica Creek;
- The future potential of the Mount Mackenzie Ski Hill, on the outskirts of Revelstoke, for which land has been set aside but which is still awaiting firm development proposals;
- The Mica and Revelstoke Dams and associated reservoirs, with good camping and boating amenities, and the future potential of improved fishing. Lying just off the Trans-Canada, the Revelstoke Dam attracted 68,000 visitors in 1992. The wider Revelstoke area has many more waterways and lakes (e.g. the northern Arrow Lakes).

- Downtown Revelstoke, whose attractions include the historically restored downtown, heritage walking tours and nightly open air concerts in the summer season, and a recently opened heritage railway museum; and
- Extensive back country hiking, heli-skiing, snowmobiling, sport fishing, and wild game hunting opportunities;

The tourism sector generally may be divided into two principal sub-sectors; the in-transit highway traffic, and the destination back-country or outdoor recreation market.

In-Transit Tourism

Because of the proximity of the Trans-Canada highway, and the presence of major attractions such as Mount Revelstoke Park, the potential for in-transit tourism within the Revelstoke area is substantial. Based on two-way traffic counts through Mount Revelstoke Park, between 1.3 and 1.4 million vehicles pass by in any given year, carrying an estimated 3.1 million passengers.⁴ Attracting a bigger share of this traffic is a primary objective of the City's Tourism Development Strategy. The aim is to build on the completed \$2.8 million Downtown Heritage Revitalization Project, with new attractions such as the Heritage Railway Museum, walking tours, and so forth. Short-duration back-country excursions that travellers could take advantage of, particularly in the summer months, is a primary strategy objective. The Revelstoke area is well supplied with basic traveller amenities, and has approximately 30 restaurants and 20 hotels/motels (there are an estimated 630 hotel rooms in the area), for most of whom the major source of business is the drive through trade. Getting more of this trade to spend time in the Revelstoke area is a major tourism strategy objective.

Accurate employment estimates for the Revelstoke tourism sector are not readily available. The "best guess" of local sources is a peak employment base of around 700 positions. Because of the seasonal and non-resident content of many of those positions however, the full-time, resident employment total would be substantially less than this.

Outdoor Recreation (Winter)

Revelstoke's snow-based winter recreation opportunities are world class, and are the basis of a substantial destination outdoor recreation industry. The major industry segments are:

Heli-Skiing

The glaciated mountains, and deep snow conditions of the interior mountain ranges of eastern British Columbia, provide what many regard to be the most challenging and exciting sport skiing in the world. In the general Columbia Valley area, there are five heli-skiing operations and three snowcat skiing operations; two of the heli-skiing operations (Canadian Mountain Holidays

⁴ Source: Brad Punt, Canadian Parks Service, Revelstoke.

and Selkirk Tangiers), and one of the cat-ski operations operate out of Revelstoke. In addition to the open glaciers, the tree skiing in the Columbia Valley is a major attraction; 70% of ski activity occurs below the tree line. The reasons for this are that weather patterns and snow stability concerns often preclude glacier skiing, and because much of the client profile is low to intermediate skill, for whom safety is a primary concern.

The largest operator in the Revelstoke area is Canadian Mountain Holidays (or CMH Heli-Skiing).⁵ Their head office is in Banff, and they operate nine separate ski areas within the wider region. Four of these (Revelstoke, Gothics, Adamants, and Monashee), lie at least partially within Revelstoke Forest District and TSA boundaries. While skiers in the latter three areas are accommodated at self-contained back-country ski chalets, the Revelstoke area skiers are accommodated at hotels in the town of Revelstoke itself. This ski area lies within a 30 to 40 km. radius of downtown (five minute flight time), and overlaps active or proposed logging areas. As discussed below in Section 4.1.1, while there are areas of potential conflict, there also are significant areas of complementarity (e.g. cleared landing areas) between heli-skiing and the area's forestry activities.

For the combined heli-ski operations of CMH and Selkirk Tangiers, we estimate direct employment (on a full-time equivalent basis) in the Revelstoke area to be approximately 30 people. This is made up of some year-round management and maintenance staff, and peak season (December-May) hirings. While this may seem low to some (CMH alone has peak employment levels of around 300), it should be noted that the strictly Revelstoke employment content of the full work force is quite low. Both CMH and Selkirk Tangier maintain their main administration and year round activities elsewhere (Banff and Golden respectively), and the large majority of their seasonal hirings (e.g. ski guides), are temporarily brought in from outside the area (most of the experienced ski guides are European).

The indirect impact on the Revelstoke area of the heli-skiing industry is however substantial. This is a high-income clientele. Discretionary spending is estimated at \$150-\$200 per person per day, i.e. over and above the packaged accommodation arrangements (which carry at least two hotels through the low season, and provide cabin lease revenue to B.C. Hydro at Mica Creek). For the heli-skiing clientele that are accommodated in Revelstoke hotels, full seasonal occupancy would translate to roughly 5,000 visitor days for the winter season. At \$200 per day, this is equivalent to \$1 million per season being injected into the local economy. This level of spending would be repeated at the other three CMH lodges, though the trickle down to Revelstoke would be much less.

In addition to client discretionary spending, the heli-ski operators also spend substantial amounts each year (\$9 to 10 million) on helicopter leasing, supplies, and repair. Most of this flows outside of Revelstoke to other Okanagan/Kootenay communities such as Kelowna, Vernon, and Nakusp. Finally, the heli-ski operations also occasionally spend significant amounts on construction, e.g. for the building or renovation of their lodges.

⁵ Source: Hank Krawczyk, CMH, Revelstoke.

Snow-Cat Skiing

Attracted by the same deep snow conditions, cat-skiing is also an important component of the winter economy. There is one main operation, which operates a year round lodge/restaurant, and which averages 2,000 guest skier visits a year. In addition to the discretionary expenditures of these visitors, the company estimates local expenditures on supplies, materials, etc., at about \$200,000 per year. Winter operations generate employment of approximately 10 FTE's. As compared to heli-skiing, logging and cat-skiing are more complementary activities, with logging roads providing cat-ski operators with ready access to desirable ski areas.

Snowmobiling

Snowmobiling activities also comprise a very important component of the winter tourism market.⁶ They are co-ordinated by the volunteer-run Revelstoke Snowmobile Club, which, along with the Forest Service, maintains and extends trails and a back-country lodge. Revelstoke is widely regarded as having some of the best snowmobiling conditions in North America; one attractive feature is that the major trail areas are within 5 miles of downtown Revelstoke. The season extends from December through May, and attracts as many as 11,000 visitors annually. Based on average stays of 3 days, and average per diem expenditures of between \$100 and \$150, this translates to an annual injection of between \$3.3 million and \$5 million in expenditures into the community, the bulk of which flows through the local hospitality industry. Visitors are predominantly from Alberta, arrive by coach or by personal vehicle, and generally bring their own equipment. Snowmobiling activities are significant beneficiaries of area logging, essentially because of the improved access benefits, i.e. from more roads, maintained roads, signage, etc.

Outdoor Recreation (Non-Winter)

Revelstoke's non-winter outdoor recreation sector is also significant. Much of it revolves around the area's park amenities. In addition to the two national parks, there are seven provincially operated small parks/campsites in the area. Four of these (Downie Creek, Martha Creek, Blanket Creek, and Shelter Bay) are lakeside sites on Highway 23 north and south of town; two (Columbia View and Three Valley Gap) are right on the Trans-Canada; and one (Monashee Park), is inaccessible from the highway and used only by serious recreationists. The area's wilderness appeal may be boosted with the addition of new protected areas due to the protected areas strategy currently underway. The Commission on Resources and the Environment (CORE) will issue recommendations to Cabinet on protected areas in 1994.

The four provincial parks are the most heavily used facilities, and offer overnight camping and boat launch facilities. Much of this usage is from Trans-Canada drive-through traffic. 1992 levels of use were 20,523 day-use parties and 4,313 overnight parties, up slightly from 1990 and

⁶ Source: Ron Laroy, Revelstoke Snowmobile Club.

1991 levels. Average party sizes were 3.2 for overnight, and 3.5 for day use.⁷ With new paving at Blanket Creek and Shelter Bay, usage is anticipated to increase. TSA area logging is visible from all four parks.

Relative to the other parts of B.C., the fishing potential of Lake Revelstoke is fairly limited. This is, in part, the result of the impact construction of the Revelstoke dam had in stopping the traditional pattern of fish coming upstream from the Arrow Lakes, and dispersing into tributaries to spawn. In addition, the water is very cold and low in nutrients, so that fish that are present have to struggle to survive. However, unlike Kinbasket Lake, Revelstoke Lake is relatively calm and safe for boating, and there are some spawning beds that are the target of a rainbow trout repopulation project (the lake also has some kokanee that make it through from Kinbasket Lake). User days are also increasing.

In addition to the lakeside/park business, there also is a still small but growing destination outdoor recreation sector. Some of the bigger operators are summer offshoots of the winter skiing industry, while others are stand alone backpacking and adventure travel operators. There are currently five separate heli-hiking operators in the area, offering half-day to week long packages (the terrain is too steep to simply hike in). There are at least five back country lodges, the largest being Durrand Chalet and Selkirk Lodge. Precise employment estimates are difficult to obtain. Based on interviews with area operators, we estimate that 20 to 25 person-years of employment are supported by this sector. This is a sector where potential conflict with area logging does exist. It is also a sector seen by some as having long-term growth potential.

Guide Outfitting

The Revelstoke TSA takes in four separate guide outfitting areas, as designated by the Ministry of the Environment in Victoria. Only two of these are currently active, however, and one of the two is operated only on a part-time basis. The one active, full-time operation⁸ is solidly established, with an annual client total in the 30 person range; clients are 60% European and 40% American. Grizzly and black bear are hunted in the spring, and moose, deer, mountain goat and caribou in the fall. Employment is limited to the husband and wife operator, and seasonal employment (up to three months) for two or three guides in the hunting seasons. The major points of contention with logging are the threat of access into previously unaccessed drainages (Ruddock Creek, Nagle Creek, Encampment Creek), and the potential threat to wildlife population numbers (particularly caribou), from the removal of mature forest cover at low elevations.

⁷ Source: Martin Johansen, B.C. Ministry of Environment.

⁸ Volker Scherm, Guide Outfitter, Revelstoke.

2.3 Environmental Issues⁹

From an overall environmental point of view, the overriding issue within the Revelstoke TSA is the retention of sufficient old growth and mature forest inventory. Old growth currently accounts for an estimated 50% of the TSA's forest cover (including inoperable as well as operable areas), and the critical ecological and wildlife habitat issues are almost all old growth based. While old growth objectives are not explicitly allowed for under Integrated Resource Management (IRM) planning, the decisions reached under the IRM process will unavoidably impact old growth inventories, and by implication Revelstoke's primary environmental attributes. The following summarizes the principal issues.

2.3.1 *Old Growth Dependent Wildlife*

As stated, the Revelstoke TSA's overriding wildlife habitat issues are intertwined with the preservation of its old growth base. There are three sets of old-growth dependent species for which this is an issue: mountain caribou; cavity-nesting species of birds; and smaller mammals.

Mountain Caribou

The Revelstoke TSA area and Mount Revelstoke National Park are home to one of only three viable populations of mountain caribou in Western Canada (the other two areas being Wells Gray Park and the Yellowhead area east of Prince George). The Revelstoke herd size is estimated at 280; Wells Gray and Yellowhead herd sizes are respectively estimated at 500 and 700. While another 150 or so are in herds south of Revelstoke, the three core herds are considered the crucial elements in the ecotype's long-term survival (because of their larger critical mass, and because a significant portion of their range is protected within the National Parks). Because of the importance of the Revelstoke area to the caribou's persistence, the B.C. Forest Service and Parks Canada have been collaborating on an information gathering project to accurately document the animals feeding, habitat, and general sustainability patterns in the area (the Mountain Caribou Project).

The exact nature of the caribou's winter feeding and snow cover requirements is still a source of some disagreement among Forest Service, MOE, and Parks Canada representatives. The following attempts to summarize the middle ground among the varying points of view.

The two main issues affecting the relationship between caribou and forest cover are firstly, the animals winter requirement for travel corridors, and secondly, its need for accessible forage. While caribou are more efficient at moving through deep snow than other ungulates, the snow depths in the Revelstoke area are still such that they require canopy cover to move between feeding areas. Old growth forests provide an effective canopy and travel corridor (with a less dense understorey). As explained in Section 3.2.2, by extending the green-up standards under

⁹ The following is largely based on interviews with Susan Hall of Parks Canada, and Denis Hamilton of the B.C. Ministry of Environment.

the proposed new wildlife management zone, the intent is to retain a canopy cover within a longer rotation second growth forest, that will be effective for the caribou's needs.

The forage requirement issue is more complex, and more open to debate. The caribou's dependence on mature lichen-bearing forests for late winter feeding range (January-March) has long been known. The caribou is relatively well adapted to navigating the deep snow packs typical of the Revelstoke TSA area, and in the late winter period it typically uses the deep, consolidated snow-packs at higher elevations as a "platform" to feed on the tree-borne lichen. What is more controversial is evidence of a pattern of caribou old-growth preference at all elevations, and at all seasons. In particular, when snowpacks are still soft and unconsolidated at the higher levels, (late fall/early winter), the caribou are thought to migrate to the old-growth habitat at lower elevations, where they can feed on the understorey vegetation (false box and lichen that has fallen to the ground). This early winter period is of most interest to the researchers, as it is a very critical time for the caribou. Under the proposed new wildlife management zone, this critical part of caribou habitat would now be subject to unique harvest constraints.

As winter progresses, and as the snow deepens and consolidates, the caribou begin feeding on lichens growing in the trees. These lichens grow slowly, and can take more than a century to re-grow in a disturbed forest. Some concern remains that there is insufficient old growth valley bottom habitat remaining in the general Revelstoke TSA area to perpetuate this lichen feed (some was originally lost at the time of railway construction). Those who have this concern (in particular Parks Canada staff), have suggested modified logging patterns that they feel would better ensure it's transference to second-growth forest.

Cavity Nesting Birds

The second group of old-growth dependent species found in the Revelstoke TSA are the different varieties of cavity-nesting birds, e.g. raptors (eagles, ospreys), pileated woodpeckers, and owls. The dependence of these bird species on old-growth attributes (such as large diameter snags, uneven aged forests, etc.), is generally accepted. As compared to caribou, they are more vulnerable to the disappearance of lower elevation old growth habitat, as the higher elevation, "inoperable" old growth area lacks the biological diversity (small mammals etc.) they need to survive. The specific requirements of this wildlife group have not been explicitly allowed for in the IRM harvest guidelines proposed for the Revelstoke TSA.

Small Mammals and Other Groups

Other old-growth dependent species include a number of small mammals (e.g. pine marten), and certain species of bat (Keens Myotis). They are not explicitly allowed for in the IRM harvest guidelines.

2.3.2 *Non-Old Growth Dependent Wildlife*

Grizzly Bear

Differences of opinion exist as to the size of the grizzly population in the Revelstoke TSA. In general terms, the provincial MOE staff tend to be more optimistic on this issue than do Parks Canada staff. While not considered a threatened species, the demographic health of the grizzly bear population is of concern to Parks Canada staff. The evidence of increased kills in their view indicates nothing more than easier hunter access, and certainly not (as some would argue), a larger population. This is notwithstanding the fact that hunting is operated on a limited entry basis. What is undisputed is that the grizzlies reproductive rate is extremely low. For that reason, any increase in mortality rates through increased human contact is of demographic concern. Logging has mixed effects for the grizzly population. They do benefit from the improved forage opportunities, and as long as some thermal tree cover is maintained, they are not negatively impacted. Old growth as such is not critical to their survival. They can however be negatively impacted by logging damage to watersheds, and, perhaps more critically, by the increased contact with humans that increased logging road networks inevitably entail. This increased exposure to humans can be fatal to grizzlies, either directly by being hunted, or indirectly, as their attraction to human food sources sooner or later results in them having to be killed. This prime source of danger to grizzlies is not only a logging-related phenomenon; it is also inherent in an expanded tourism or back-country recreation sector.

Moose and Deer

Because of the terrain and deep snow packs, moose and deer are not present in large numbers in the general Revelstoke area. Unlike caribou, neither is a threatened species. Logging benefits them through the increase in young, shrubby vegetation which they feed on. Moose can also get around the snow depths by travelling the valley bottoms or river beds, and are not as dependent on heavy old growth canopies for winter survival. Old growth canopies do benefit the moose somewhat, providing shelter and protection when required. The major negative impact on moose from increased logging is the increased road building, particularly in valley bottoms, and the increased hunting that accompanies that road network.

3.0 Current TSA Profile

The Revelstoke TSA covers an area of 504,000 hectares. Because of the rugged topography, only a relatively small proportion is productive forest land. The TSA includes three major biogeoclimatic zones: Alpine Tundra (30% of the total area); Engelmann Spruce - Subalpine Fir (38% of the total); and Interior Cedar - Hemlock (32% of the total area). The dominant tree species are mixtures of spruce and balsam (49% of the forested area), hemlock (39%), western red cedar (16%) and douglas fir (11%). The Interior Cedar-Hemlock zone is the most significant from a forestry perspective. It is overall the wettest zone in the interior of B.C., and is second in productivity only to the Coastal Western Hemlock zone. In wetter parts of the zone wildfires have been infrequent, and large areas are dominated by very old climax stands.

3.1 General TSA Management Issues¹⁰

3.1.1 Timber Management

Timber Quality: Because of advancing age, as much as 25% of the existing timber supply base is of marginal economic value. This is mostly decadent hemlock, with some balsam. Much of this wood is of value only as pulpwood; and even then only under strong market conditions, required to offset high logging and transport costs. One timber management objective is to replace these problem forest types with vigorous young stands that could increase the long-term production of sawlogs.

Harvesting Constraints: The Revelstoke TSA features a high proportion of difficult terrain, which increases harvesting costs, and renders marginal many mature stands. As much as 30% of mature timber in the Revelstoke TSA is on slopes graded 50% or higher. Accessing this timber requires not only higher cost cable harvesting systems, but also suitable snowpacks. Snowpack logging is associated with a range of problems, including high stumps and lower wood utilization rates; unsightly areas; spruce beetle outbreaks; more difficult silviculture (because of undisturbed brush); and occasional site degradation and reduced productive land base.

Cut versus Inventory Volumes: Scaled wood volumes delivered to the mills have consistently been below Forest Service volume estimates based on standing inventory. As a result, AAC levels have overstated available wood volumes, and unit harvesting costs have been higher. The problem is especially acute with stands of old growth cedar and hemlock.

¹⁰ Much of this section is based on the "Terms of Reference: Revelstoke Resource Management Plan", prepared by the Revelstoke Forest District, June 1990.

3.1.2 Integrated Resource Use

Watersheds: Because of community concern that harvesting operations might adversely affect their water supply, harvesting within the Dolan watershed has been restricted, while Greeley Creek has been removed from the harvesting land base.

Scenic Landscapes: Preservation of the scenic landscapes along the principal tourist corridors (the Trans-Canada and CP Rail line, and to a lesser extent Highway 23 south to Shelter Bay and north to Mica Creek), is an important management issue. Additional areas of concern are the scenic vista points within the two main parks, and Mica Mountain and Mount Begbie (directly opposite Mica and Revelstoke respectively).

Wildlife Management: The principal concerns are:

- Protection of riparian ecosystems;
- Maintenance of sufficient old growth habitat for dependent species;
- Achieving sufficient hiding or thermal cover on previously cut blocks prior to second pass harvesting; and
- Maintaining sufficient forest cover to provide winter forage and snow-free mobility for moose, caribou, and deer.

Ski Hill: To keep open the future possibility of a major ski hill development, the west face of Mount MacKenzie is being taken out of the harvesting landbase.

Backcountry Recreation: Backcountry recreation is growing in popularity, increasing the landbase over which conflicts with harvesting may arise.

National Parks: Uncontrolled access to the Park boundaries by logging roads; the quality of the viewscape from park vista points; and the potential for negatively impacting the wildlife found within Park boundaries, are all forestry management issues that are of concern to Parks Canada staff.

3.1.3 Silviculture/Environmental

Vegetation Management/Herbicides: There is concern over the use of herbicides to reduce brush competition in recent cut over areas. Alternatives are more costly and may be less effective, and may result in longer timber regeneration delays.

Site Preparation/Burning: Prescribed burns is the site preparation procedure used on 90% of the blocks logged in the Revelstoke TSA. This is because of the local conditions (such as the wet, steep terrain), which limit the alternatives (such as scarifying the growing site using heavy

machinery). Public pressure is growing to reduce the amount of smoke from such burns. There are also some fire-related insect and disease problems that may limit the use of this tool.

Incremental Silviculture: The focus of incremental silviculture has been on rehabilitating backlog NSR (Not Sufficiently Restocked) sites through Federal-Provincial program funding. However, not all of these sites are silviculturally treatable.

3.1.4 Other

Slide Hazards: There are specific areas where the risk of slides is of concern, i.e.: Lake Revelstoke; the CPR mainline; the Trans-Canada highway; the Albert Canyon; the Downie Slide; parts of Highway 23 north; Dutchman Ridge; Spikers Road; Carnes Creek; and Liberty Creek.

3.2 Timber Harvesting Landbase

Table 3.1 illustrates the long-term timber harvesting landbase, as recently estimated by the Ministry of Forests.¹¹ As is shown, only 11.6% of the TSA total land base of 503 984 ha is available for commercial timber production. Major categories of exclusions are:

- 282 577 ha of Non-Forest land;
- 108 993 ha of Inoperable land;
- 21 086 ha of Environmentally Sensitive sites;
- 8 265 ha of Non-Merchantable Forest types; and,
- 6 128 ha for existing and future roads.

The resulting long-term landbase available for timber harvesting is 58 342 ha. This is the harvest landbase used in the timber supply analyses that follow.

3.2.1 Management Zones

For analysis purposes, this land base was divided into four separate management zones, in an attempt to mimic current forest management practices.

Zone 1 (Timber Zone)

- Area: 43 554 ha (69.4% of the total)
- Management: This is a general zone covering all land not specifically included under one of the other three zones, and is subject to normal timber access guidelines. Forest cover requirements for this zone specify a 3 metre (18 year) green-up with a maximum 33 % green-up area.

¹¹ "Revelstoke TSA Timber Supply Analysis", Integrated Resources Branch, Ministry of Forests, June 1993.

Table 3.1: Timber Harvesting Land Base for the Revelstoke TSA

Classification	Area (ha)	% of Total Area	% of Productive Forest Area
Total land base	503 984	100.0	
Non-Crown land	19 309	3.8	
Non-forest	282 577	56.1	
Total productive forest	202 098	40.1	100.0
Reductions:			
Inoperable	(108 993)	21.6	53.9
Environmentally sensitive	(21 086)	4.2	10.4
Greeley Creek	(708)	0.1	0.4
Mt. MacKenzie	(1 552)	0.3	0.8
Non-merchantable types:	(8 265)	1.6	4.2
Other ^a	(7 615)	1.4	3.9
Total current reductions	(148 221)	29.4	73.3
Current timber harvesting land base	53,877	10.7	26.7
Additions ^b	8 849	1.8	4.4
Reductions ^c	(4 383)	0.9	2.2
Long-term timber harvesting land base	58 342	11.6	28.9

a. Other refers to NSR, Riparian/Avalanche, and existing roads.

b. Additions refer to operable NSR and restocked, and timber licence reversions.

c. Future Roads.

Zone 2 (Visual Quality Zone)

- Area: 6 769 ha (10.8% of the total)
- Management: This zone takes in some of the district's most significant roadside viewsapes, i.e. all of the TransCanada Highway that lies within the TSA, and the southern half of Highway 23 (from Revelstoke as far as the Galena Bay ferry at the TSA's southern end). The northern stretch of Highway 23, from Revelstoke to Mica Creek, is specifically not included. Forest cover requirements specify a 5 metre (25 year) green-up, with a maximum 18% green-up area.

Zone 3 (Wildlife Zone)

- Area: 11 903 ha (19.0% of the total)
- Management: This is a zone delineated to provide winter habitat and snow cover (specifically critical early winter range) for mountain caribou and other ungulates. It includes that part of the land base north of the TransCanada, and west of the Columbia River (Lake Revelstoke), that is below 3000 feet. Forest cover requirements specify a 10 metre (40 year) green-up with a maximum 25% green-up area. This cover requirement implies no logging in the area within the first decade.

Zone 4 (Selection Management Zone)

- Area: 499 ha (0.8% of total)
- Management: This zone includes the sensitive Dolan Creek watershed and Begbie Falls areas. Forest cover requirements are not applicable as only small cleared patches are created during harvest.

3.2.2 Harvest Forecasts

On the basis of the landbase calculations and Management Zone assumptions explained above, the June 1993 Timber Supply Analysis generated a range of future harvest forecast scenarios for the Revelstoke TSA. All were based on current management practices. To cover a reasonably broad range of possible socio-economic effects, three of these scenarios were selected for comparative analysis. They are as follows:

- Scenario One: This corresponds to the Base Case presented in the Timber Supply Analysis, under which the harvest level is initially reduced to 254 000 m³, or 5.6% less than the current AAC. After the first decade, the harvest level then declines at approximately 13.5% per decade, until a long-term harvest level of 98 000 m³ is reached in decade 8. This scenario is illustrated in Figure 8 of the Timber Supply Analysis Report.

- Scenario Two: A "Low Yield" scenario, based on the assumption that current yields are 10% lower than assumed for the Base Case. This scenario is represented in Figure 23 of the Timber Supply Analysis Report.
- Scenario Three: A "Four Pass" scenario, based on a requirement that no more than 25% of the timber zone be below green-up. This scenario is represented in Figure 31 of the Timber Supply Analysis Report.

It should be emphasized that the choice of these three scenarios was largely with a view to illustrating the full range of potential impacts, from relatively low to relatively high. It should not be assumed that there were features inherent to these scenarios that would make their eventual selection more probable than the many others in the Timber Supply Analysis Report, not considered here.

The projected harvests for each of these scenarios are shown in Table 3.2.

3.3 Current TSA AAC Apportionment

Ministry of Forests current policy is to allocate harvest reductions among licensees in proportion to their current shares of harvest. If this policy were to be followed, the impact of the harvest reductions shown in Table 3.2 would be in proportion to the current licensee AAC apportionment, as shown in Table 3.3.

3.4 Overall Fibre Supply Base

While the initial impact of any TSA harvest reductions would be proportional to the AAC apportionments shown in Table 3.3, the final impact within the Revelstoke area would also depend on the availability and distribution of supplies from other sources, i.e. TFL's, private purchases, or other TSA's. This estimated full fibre supply base of the principal wood processors operating in Revelstoke, is presented in Table 3.4.¹²

¹² These entries have been rounded off to better match the aggregated data that these operators work with and which they communicated to us. It must be emphasized that many of these estimates (other than for the Forest Licence column), are approximations only. In any given year, the allocation of the SBFEP component in particular is very uncertain. Only the 7 500 m³ allotment to Joe Kozek, and the 5 000 m³ to the smaller operators under the TSL tenure, may be taken as a relative constant. An estimated 20% to 30% of the 62 000 SBFEP m³ balance has in recent years been sold or traded outside the TSA (mostly to the Evans operation in Malakwa). This transfer is offset by equivalent amounts (and more) coming in from SBFEP operators in other TSA's. The reader should also note that the volume totals shown under the other column include, in addition to supplies from outside the Revelstoke area, substantial amounts from within the non-TSA portion of the Revelstoke Forest District. This includes a 50 000 m³ commitment to three local firms (Downie, Kozek, and Cascade) under the terms of their investment in the new Revelstoke Community Forest Corporation; the TFL component of Revelstoke Forest District's SBFEP program (the total volumes available under which amount to 50 000 m³); and private purchases.

**Table 3.2: Revelstoke TSA Net Harvest Volumes^d (cubic metres):
Current Management Practices**

Current AAC 269 000	Scenario One	Scenario Two	Scenario Three
Future Years	"Base Case"	Current Yields Down 10%	"Four Pass"
Decade 1	254 000	213 000	182 224
Decade 2	219 900	183 800	185 000
Decade 3	189 900	158 200	185 000
Decade 4	163 500	135 600	185 000
Decade 5	140 300	115 700	163 500
Decade 6	119 900	98 200	144 100
Decade 7	101 900	98 000	126 700
Decade 8	98 000	98 000	111 100
Decade 9	98 000	98 000	98 000
Decade 10	94 806	94 980	96 345
Decade 11	98 000	98 000	98 000
Decade 12	98 000	98 000	98 000
Decade 13	98 000	98 000	98 000
Decade 14	98 000	98 000	98 000
Decade 15	98 000	98 000	98 000
Decade 16	98 000	98 000	98 000
Decade 17	98 000	98 000	98 000
Decade 18	98 000	98 000	98 000
Decade 19	98 000	98 000	98 000
Decade 20	98 000	98 000	98 000

Notes: d. Net Volumes are Gross Volumes minus nonrecoverable losses of 30 000 m³/year. The indicated long term harvest level of 98 000 m³/year is less than the (theoretical) Long Run Sustained Yield of 134 000 m³/year. See the Revelstoke TSA Timber Supply Analysis for an explanation.

Table 3.3: Revelstoke TSA: AAC Apportionment

	Volume (m ³)	Share
Forest Licences, replaceable:		
Downie Street Sawmills Ltd.	151 050	56.2%
Joe Kozek Sawmills Ltd.	21 000	7.8%
Bell Pole Ltd.	<u>21 806</u>	8.1%
Sub-Total:	193 856	72.1%
SBFEP:		
General (including cash sales)	48 956	18.2%
TSL (major): ^e	<u>12 925</u>	4.8%
Sub-Total:	61 881	23.0%
Woodlot Licences:	1 300	0.5%
Forest Service Reserve:	11 963	4.4%
Total AAC:	269 000	100.0%

Note: e. A 7 496 m³ allotment within the overall SBFEP TSL component is held by Joe Kozek Ltd., with the balance allocated among smaller independent operators (principally Arrow Lakes Cedar Pole and Begbie Shingles).

Table 3.4: Revelstoke Area: Total Fibre Supply Sources^f

Operator	Revelstoke TSA Forest Licence	Revelstoke TSA SBFEP ^g	Revelstoke TSA Share	Other Sources	Total
Downie Street	151 000	35 000	44 %	234 000 ^h	420 000
Joe Kozek	21 000	7 500	70 %	12 500	41 000
Bell Pole ⁱ	22 000			19 000*	30 000*
Cascade Cedar	---	8 000	32 %	17 000	25 000
Revelstoke Cedar	---	8 000	40 %	12 000	20 000
Arrow Lakes Pole	---	3 500	100 %	---	3 500
Total	194 000	62 000	48 %	298 500*	539 500*

Notes: f. These are gross volumes, before deductions for pulpwood and waste. For the Revelstoke TSA, the average pulpwood component (99% hemlock and balsam) is around 20%; this is equivalent to approximately 52 000 m³ in pulpwood shipped out of the Revelstoke TSA on an average annual basis. Because it is currently not open for purchase by area operators, the Forest Service Reserve allotment of 11 963 m³ is absent from Table 3.4.

g. The allocation of SBFEP volumes may vary considerably from year to year.

h. Downie's other sources are: Golden TSA 82 000m³; Arrow TSA 15 000m³; TFL55 30 000m³; Private 73 000m³; and other SBFEP 35 000m³.

i. Some clarification is required for the fibre volumes attributed to Bell Pole's operations. Bell Pole trades away almost 95% of its F.L. allotment for the particular type of log it requires within its pole yard. Because of the higher value of these pole logs, the two trade roughly on a 2:1 basis, i.e. the 30,000 m³ of pole log throughput shown, if traded back to a general sawlog basis, would equate to approximately 60,000 m³ of fibre. The volumes indicated with asterisks are on a "pole log" as opposed to a general log basis (for presentation consistency, this is also done for the totals that are partly made up of these pole logs). This "gearing down" at the mill level was allowed for in the calculation of the economic coefficients used in the subsequent analysis.

The dependence of the Revelstoke area mills on general Revelstoke area supply sources is significantly higher than the 48% share arrived at on the basis of the TSA allotment only. Depending on how the wood volumes controlled by the Community Forest Corporation and by private and SBFEP sources are allocated, the overall level of dependence on Revelstoke area fibre could lie in the 70% to 75% range.

This potential local area "feedstock" base may become an issue if supplies become more constrained in the future. Revelstoke mills (particularly Downie Street, but to a lesser extent also all of the others) currently obtain some of their wood requirements from the Golden, McBride, Arrow, and Okanagan Forest Districts. These external supply sources are subject to the same supply pressures as the Revelstoke Forest District, and the likelihood of any one of them meeting any Revelstoke area supply shortfalls is highly remote. In such circumstances, the disposition of local supply potential may become an issue.

3.5 TSA Reference Coefficients

To support the employment and income estimates associated with the proposed new harvest levels, which are presented in Chapters 4.0, 5.0, and 6.0, reference impact coefficients were first required. These were calculated on the basis of the material and tables already presented, and additional background information provided by the licensees themselves. These are shown in Table 3.5. Additional information regarding the calculation and use of coefficients for economic impact calculations is presented in Appendix B.

Table 3.5: Revelstoke TSA: Estimated Impact Coefficients

Category	Total PY's	PY's/000m ³	Average Wage
Harvesting ⁱ	129	.50	\$55,000
Silviculture/Forestry ^j	29	.11	\$35,000
Mill	110	.43	\$35,580 ^k
Repair/Service ^l	20	.08	\$28,600
Total	288	1.12	\$43,772^m

-
- Notes: j. Harvesting covers logging, hauling, road building and road maintenance. The \$55,000 average wage is an estimated figure, based on a review of harvest contractor total budgets, and exchange of information with licencees regarding the approximate wage share of those contracts. Much of this "wage" income is in fact made up of owner-operator income.
- k. The "forestry" component of Silviculture/Forestry refers to timber cruising, engineering, and other miscellaneous forestry-based services and is estimated at 9 of the 29 jobs. Silviculture covers site preparation as well as tree planting and is estimated at 20 of the 29 jobs. Included in this total are approximated silviculture and other expenditures by MOF for treatments on SBFEP land. The \$35,000 average wage is based both on contract information and on general provincial data sources.
- l. The average mill wage of \$35,580 is a weighted average of actual wages at the five area mills (weighted by their respective employment shares).
- m. The estimated 20 repair/service jobs is an approximation of the share of that sector's employment accounted for by TSA based forestry activity. The \$28,600 average wage is a provincial industry average as of January 1993.
- n. The overall average wage of \$43,772 is a weighted average (by #jobs) of the four individual categories.
-

4.0 Scenario One Impact Assessment

Scenario One corresponds to the Base Case scenario presented in the Timber Supply Analysis Report. The projected future annual harvest flows are as shown in Table 3.2.

The basis of this harvest scenario is set out in Section 5.1 of the June 1993 Revelstoke TSA Timber Supply Analysis report. The harvest level starts at 254 000 m³, 5.5% below the current AAC, and then declines at approximately 13.5% per decade until the long term harvest level is achieved in decade eight. Initial harvests higher than the 254 000 m³ level would require faster rates of decline, if future harvests were not to fall significantly below the long term sustainable level.

4.1 Revelstoke TSA Impacts

4.1.1 Economic Impacts

Forestry

The estimated employment and employment income impacts associated with the annual harvest levels of Scenario One, occurring within the Revelstoke TSA, are presented in Table 4.1. The "Direct" columns refer to the employment and employment income directly generated within the forestry sectors,¹³ while the "Indirect" columns refer to the Revelstoke area employment and employment income this direct forestry activity supports.¹⁴ From this table, we can derive the losses in employment and income that follow from the targeted lower harvest levels. These impacts may be grouped into two main phases:

- For the first decade, following reduction of the annual harvest by 15 000 m³ (from the 269 000 m³ level to the 254 000 m³ level), Table 4.1 indicates a direct job loss of 16 PY's, and an indirect job loss in the community of 13 PY's, for a total Revelstoke area decline of 29 PY's. Associated with this is a \$1.06 million loss in annual, pre-tax, employment income.

¹³ Direct impacts are based on employment and wage information provided by the TSA licensees, as presented in Chapter 3, and illustrated in Table 3.5.

¹⁴ The indirect impact estimates are based on a Basic Income Multiplier of 1.56 for the Revelstoke area, as estimated by the B.C. Ministry of Finance and Corporate Relations. See "British Columbia Community Economic Dependencies", Gary Horne and Lee Robson, March 1993. This approach is discussed in more detail in Appendix B.

Table 4.1: Scenario One: Revelstoke TSA Employment and Income Impacts

	Employment (PY's/Year)			Employment Income (Pre-tax: \$1993 Millions)		
	Direct	Indirect	Total	Direct	Indirect	Total
Current	288	225	513	\$12.61	\$6.42	\$19.03
Decade 1	272	212	484	11.91	6.07	17.97
Decade 2	235	183	418	10.29	5.24	15.53
Decade 3	203	158	361	8.89	4.53	13.41
Decade 4	175	137	312	7.66	3.90	11.56
Decade 5	150	117	267	6.57	3.35	9.91
Decade 6	128	100	228	5.60	2.86	8.46
Decade 7	109	85	194	4.77	2.43	7.20
Decade 8	105	82	187	4.60	2.34	6.94
Decade 9	105	82	187	4.60	2.34	6.94
Decade 10	101	79	180	4.42	2.25	6.67
Decades 11-20	105	82	187	4.60	2.34	6.94

- Over the following six decades, we estimate an additional cumulative job loss of 297 positions, 167 of which are direct forestry-based PY's, and 143 of which are indirectly supported PY's. Job losses cease at the end of the seventh decade, when the long -term harvest level of 98 000 m³ is reached.

As Table 4.1 indicates, the estimated ratio of indirect to direct forestry jobs (PY's) in the Revelstoke TSA is .78. In other words, for every direct forestry job, there are .78 additional jobs supported in the Revelstoke area.

In reviewing Table 4.1, the following points should be noted:

- Firstly, direct job losses are calculated in proportion to the harvest reductions envisaged. In reality, job reductions might not be implemented in such a simple manner, and partial or total shift shutdowns might also result. Attempts to estimate such "threshold effects" would be highly speculative, and proportion-based estimates

are probably equally reliable for estimates of general impact over time. The likelihood of threshold effects does increase the greater the harvest reduction.

- Secondly, these impact estimates are upper bound estimates, in the sense that they are based on the assumption that those that lose their jobs migrate away from Revelstoke in search of employment. By so doing, the offsetting effect of the support payments they would receive while unemployed would be lost to the Revelstoke economy. This is certainly an extreme assumption, and one that should be kept in mind when evaluating these estimates.
- Thirdly, the calculated impacts do not reflect any reduced staffing levels in the Forest Service. While Forest Service staff levels must ultimately be related to harvest and forest revenue levels, that relationship isn't nearly as direct as it is in the private sector, and new management responsibilities may well offset any negative employment effects of a lower harvest.

Outdoor Recreation

With the reduced harvest levels associated with Scenario One, and new management guidelines that are aimed at protecting non-timber values, some increase in the area's outdoor recreation potential could materialize. In our view, while this is a possibility, it is so only over the longer term, and only for the summer and not the winter outdoor recreation sector.

As outlined in Section 2.2.2, logging activities are generally quite compatible with (and in some respects complement), the winter destination sports of snowmobiling and cat-skiing. The potential for conflict with heli-skiing is greater, and can arise in one of three main ways:

- The generally negative visual effect for the heli-ski clientele of the aftermath of logging;
- The intrusion by logging interests into the few remaining high value/high use old growth drainages; and,
- The interrelationship between the general types of forestry management practices being pursued (e.g. cut-block patterns, replanting densities) and the kinds of ski-runs created.

Unfortunately, there is nothing specific to the proposed harvest levels or management plans of Scenario One that would allow us to attribute improvements in any of these three areas. The old growth river drainages of interest to the heli-skiing sector are quite specific (i.e., Jordan and Copeland creeks close to Revelstoke, and Soards Creek close to Mica), but are not explicitly provided for in the new harvest scenarios. Likewise, for areas to be harvested, the plans do not provide for any pattern of vertical strip logging, or of lower planting densities, as sought by the heli-ski interests. Consequently, there is no basis to attribute some offsetting benefits to the heli-

ski sector from the new harvest scenarios, other than the very general one of an overall decelerated rate of harvest.

Insofar as non-winter outdoor recreation activities are concerned, the positive impact of reduced levels of logging, and of strengthened multiple-use guidelines is less arguable. In general terms, these changes should result in better preservation of the area's wilderness qualities (though the road network associated with logging also opens up the area to recreationists).

4.1.2 Environmental Impacts

With respect to the possible impact of Scenario One harvesting plans on the area's old growth inventory, we should first note that there is no specific old growth management objective incorporated into these plans. While Scenario One (and Scenarios Two and Three), projects lower annual harvest rates, the result will not necessarily be a reduced rate of depletion of the area's old growth and mature forest inventory. This is for a number of related reasons. The first is the uneven age profile of the existing forest, with the bulk of the timber belonging to either very young or very old stands (25% of the timber is less than 20 years old, while another 50% is over 200 years old). The bulk of accessible timber over the next few decades is therefore largely made up of old stands. A second reason is that the minimum harvest age for regenerated stands has been set at 120 years; this may have the effect of biasing the harvest emphasis toward the older stands (the minimum harvest age for TFL's is set at 80 years). As a result, we have no basis for concluding that the reduced harvests under Scenario One will provide for the retention of the desired old growth inventory. The aim is to move to a more balanced age class distribution over the longer term, which, while it would have 25% or more over 120 years old, would all be comprised of second growth, regenerated forest.

There are at least two governing characteristics of old growth forests that should be distinguished. The first is the innate biodiversity of the old growth forest; the second relates to the specific attributes of the old growth forest that certain wildlife groups require for their sustenance. If the entire original old growth base were to be liquidated, then whatever is unique about this forest from a biodiversity perspective would be lost. Based on available information, this is not something that we feel qualified to comment on with respect to the Revelstoke TSA. With respect to the second characteristic, (the wildlife-sustaining attributes), possibilities do exist through new forestry management practices¹⁵ for the transfers of desired attributes (e.g., lichen) to second growth forests. Since there is no reference to such measures within the new harvest scenarios, we cannot legitimately identify this as a source of environmental benefit.

The wildlife category that has attracted most attention in the Revelstoke area is the mountain caribou. The Zone 3 guidelines are specifically aimed at enhancing the survivability of this wildlife category. While considerable differences of opinion still seem to exist, it does seem a safe assumption that the implementation of this zone will at best maintain the status quo for mountain caribou. Because of the forest cover guidelines, logging will be prohibited in this zone

¹⁵ For example, shelterwood logging, that leaves parcels of old-growth habitat within cut-over areas.

for at least the next ten years. In addition, the new green-up requirement for this zone will ensure a snow cover canopy that will improve the mobility and forage opportunities for the mountain caribou in the critical early winter period.

Finally, there is the issue of fisheries habitat and spawning bed protection. As indicated earlier, the Revelstoke area is not at this point in time a prime fishing area. However, there are efforts underway to repopulate the lake and to restore the area's fishing potential. While the original demise of the area's fishing is largely attributable to the construction of the Revelstoke Dam, individual instances of loose logging practices were also reported as contributing to damage to area spawning beds (e.g. in the Goldstream River tributary). Since there are no new fisheries habitat initiatives explicitly set out under Scenario One, no fisheries benefits attributable to this Scenario could be identified.

4.1.3 Community Impacts

Insofar as the community of Revelstoke is concerned, the potential job losses associated with the proposed lower levels of harvest is the principal concern. As presented in Section 4.1.1, these have been estimated for Scenario One at a total of 29 full-time equivalents (16 direct and 13 indirect) in the first decade, following the initial round of harvest reductions. While these are not insignificant numbers in a community of Revelstoke's size (with a projected future population in the 8,000 to 9,000 range), they are not at a level that would likely cause major community disruption. They also comprise an upper bound estimate of job losses, one that is premised on the rather extreme assumption that all those that lose their jobs migrate from Revelstoke, and thereby withdraw from the community the support payments they would then receive.

Options certainly exist for the replacement of these jobs within the Revelstoke area. In addition to the area's general business development prospects, as discussed in Section 2.2, there are more specific possibilities that exist directly within the local forestry sector, in particular, the remanufacturing potential at the Downie sawmill. Downie's most recent investment in plant upgrading (e.g. a small log line, new edging equipment for non-standard boards), and the planned construction of new dry kilns, may provide a base to carry out some of the value added locally that is now carried out in other parts of the province. The future allocation of the uncommitted 50 000 m³ held by the Community Forest Corporation could also be directed at absorbing a portion of this job loss. The direct job implications (at least for the first decade) of Scenario One are therefore small enough, that they might be accommodated through some changes to the current forest industry production profile in the Revelstoke area.

This is not to diminish the consequences for the individuals involved of losing their jobs. There is a large body of evidence that clearly documents the potentially serious psychological impacts of job loss.¹⁶ While it is impossible to predict how different individuals may react, the

¹⁶ Much of this evidence is reviewed in a recent report, "Resource Based Community Adjustments", September 1993, by the ARA Consulting Group.

likelihood of at least some experiencing major difficulties in adjusting to their new situation is quite high. A mitigating factor, at least in the first decade, would be the relative youth of those most likely to be first laid off; most research is fairly consistent in establishing the relatively greater adaptability of the younger age-group to becoming unemployed. The young have a greater degree of occupational flexibility, are less tied down in terms of fixed assets (e.g. homes), and should be more mobile in search of new employment opportunities.

Regarding the profile of those most likely to lose their jobs, application of the seniority rule would imply those most impacted would be young, 20 to 30 year olds. Based on the age distribution of the Downie work force (over 56% of whom are between the ages of 20 and 33), the large majority of those most at risk fall into this young age group. While some of the other mills have an older age profile, the Downie work force would be the one that would bear the brunt of any layoffs.

In considering these projected job losses and the possible community response, the point should also be made that, to the extent that some of the job losses are absorbed through new initiatives, a job deficit for the Revelstoke area to the degree indicated will still remain; in other words, the measures that might be taken to absorb these job losses are ones that under unchanged circumstances could equally be used to generate net new jobs within the community.

Over the longer term, the community-wide implications of a two-thirds reduction in the TSA harvest, and the elimination of a total of 183 direct forestry jobs, and up to 156 indirect jobs, may be more serious.¹⁷ Since this is a scenario the community is eventually faced with under all of the harvest scenarios proposed, from that longer term perspective, there may be little to choose between the three scenarios.

Finally, from a fiscal perspective, the implications for the municipality of the scale of layoffs predicted for the first decade under Scenario One are not significant. Not only are property tax payments to the municipality from the wood industry sector relatively minor, but these would continue to be paid as long as the mills remain operational.

4.2 Provincial Impacts

4.2.1 Economic Impacts

The estimated province-wide employment and employment income impacts associated with Scenario One harvest levels are presented in Table 4.2. The provincial direct job totals differ from the TSA-level direct job totals, because of the additional employment and income effects associated with the shipment of Revelstoke TSA wood for processing elsewhere in the province. Based on information obtained from area licensees, approximately 20% of the Revelstoke TSA's

¹⁷ Because of the earlier onset of larger levels of job loss under Scenarios Two and Three, the possible community consequences are more fully discussed with reference to those scenarios in Chapters 5.0 and 6.0.

annual harvest is shipped out as pulp wood, most of it destined for the chipping and pulp-making facilities at Cache Creek. This is equivalent to approximately 52 000 m³ of annual pulpwood shipments, which we estimate generate an additional 16 pulp sector jobs at the provincial level. The second source of additional employment at the provincial level arises with the remanufacturing of a proportion of the Downie mill shipments (estimated at about 30%), at a variety of remanufacture locations throughout the province. On the basis of an estimated 50 to 60 000m³ of fibre that is value added in this way, we estimate an additional 17 jobs thus created at the provincial level.

Indirect impacts at the provincial level are estimated on the basis of a provincial employment multiplier for the forest industry of 2.5.¹⁸ These include the spinoff effects in communities such as Golden, Salmon Arm, etc. of expenditures by those directly employed in Revelstoke, as well as the spinoff effects associated with the direct pulp and value-added wood activity occurring outside of Revelstoke.

On the basis of these additional employment and income impacts arising at the provincial level, the total provincial impacts associated with the present Revelstoke TSA harvest, and with the potential future harvests of Scenario One, are shown in Table 4.2. As illustrated, the reduced harvest levels of Scenario One, in Decade One, would result in a total employment loss of 45 positions; 18 of which would be lost to the forestry sector, and 27 of which would be lost elsewhere in the economy. This 45 P.Y. job loss is inclusive of the estimated 29 PY's that would be lost within the Revelstoke area, as discussed above in Section 4.1.1.

Over the longer term (by Decade 8), the cumulative harvest reductions required to reach the sustainable harvest level of 98 000m³ would eliminate a total of 510 PY's of employment in the province as a whole; 204 of these would be direct forestry positions, while the other 306 PY's would be positions indirectly supported by the forestry sector. As indicated in Table 4.1, 326 of the 510 total P.Y. employment losses are estimated to occur in the Revelstoke area.

¹⁸ Based on direction from the Economics and Trade Branch, Ministry of Forests, Victoria.

Table 4.2: Scenario One: Provincial Employment and Income Impacts

	Employment (PY's/Year)			Employment Income (Pre-tax: \$1993 Millions)		
	Direct	Indirect	Total	Direct	Indirect	Total
Current	321	482	803	\$14.02	\$13.78	\$27.80
Decade 1	303	455	758	13.24	13.01	26.25
Decade 2	262	393	655	11.44	11.24	22.68
Decade 3	226	340	566	9.88	9.71	19.59
Decade 4	195	293	488	8.52	8.37	16.89
Decade 5	167	251	418	7.30	7.18	14.48
Decade 6	143	214	357	6.23	6.12	12.35
Decade 7	122	182	304	5.31	5.21	10.52
Decade 8	117	176	293	5.11	5.02	10.13
Decade 9	117	176	293	5.11	5.02	10.13
Decade 10	113	169	282	4.92	4.83	9.75
Decades 11-20	117	176	293	5.11	5.02	10.13

4.2.2 Environmental Impacts

Because of its threatened status, the improvement to the mountain caribou habitat allowed for under the new Wildlife Management Zone will have provincial significance.

4.2.3 B.C. Government Revenue Impacts

Provincial government annual revenue impacts are shown in Table 4.3. They were calculated as follows:

- Annual stumpage was calculated at \$9.625/m³. This is a weighted average of recent (1992/93) stumpage rates on licensee wood (estimated at 75% of the total AAC), and

of recent SBFEP bonus bids (estimated at 25% of total AAC).¹⁹ Additional rent and royalties were estimated at \$0.99/m³, on the basis of MoF provincial guidelines.²⁰

- Personal Income Tax impacts were calculated based on the province's assumed one third share of overall (federal and provincial) employment income taxes, respectively calculated at 26% for forestry based income, and 19% for non-forestry income.
- "Other" taxes comprise corporate, logging, property, sales and electricity taxes, and were estimated at \$5.80/m³.²⁰

Not shown in Table 4.3 are the foregone federal tax revenues associated with lower harvests. Based on an approximate two-thirds share of personal income taxes, and federal corporate income tax, these foregone federal revenues could exceed those shown for the provincial level.

Table 4.3: B.C. Government Revenue Impacts (\$1993 Millions/Year)

Scenario 1	Stumpage + Royalties	Personal Income Tax	Other Taxes	Total
Current	\$2.86	\$2.03	\$1.56	\$6.45
Decade 1	2.70	1.92	1.47	6.09
Decade 2	2.34	1.66	1.28	5.27
Decade 3	2.02	1.43	1.10	4.55
Decade 4	1.74	1.23	0.95	3.93
Decade 5	1.49	1.06	0.81	3.36
Decade 6	1.27	0.90	0.70	2.87
Decade 7	1.08	0.77	0.59	2.44
Decade 8	1.04	0.74	0.57	2.35
Decade 9	1.04	0.74	0.57	2.35
Decade 10	1.01	0.71	0.55	2.27
Decades 11-20	1.04	0.74	0.57	2.35

¹⁹ Source: MoF staff, Revelstoke Forest District.

²⁰ Source: "Economic Impact of Timber Harvesting in British Columbia", (Tables 9 and 11), based on Price Waterhouse Annual Survey of the Forest Industry, adjusted to 1993 values.

5.0 Scenario Two Impact Assessment

Scenario Two comprises the so-called low yield scenario, according to which current yields are reduced by 10% from what was assumed for Scenario One. The specific timber supply considerations that underlay this particular scenario were factors such as averaging errors in the inventory, as well as uncertainty in regenerated forest yields. In addition, Forest District staff suspect that the volumes for mature timber used in the base case analysis (i.e. Scenario One), could be optimistic, given the inferior site quality on mature as compared to immature stands, and the resulting lower timber volumes.

As Table 3.2 has shown, the 10% lower yield assumption generates a 21% reduction in harvest levels in the initial decade, from the present 269 000m³ annual cut to a 213 000m³ cut level. Harvests are then successively reduced by approximately 14% per decade, over the next five decades, before stabilizing at the steady long-term harvest level of 98 000m³ at the beginning of the sixth decade.

5.1 Revelstoke TSA Impacts

5.1.1 Economic Impacts

Forestry

The estimated employment and income impacts associated with Scenario Two harvest levels, occurring within the Revelstoke TSA, are presented in Table 5.1. The procedure for estimating these impacts is identical to the procedure followed for Scenario One, and assumes that direct job losses occur in direct proportion to the harvest reduction envisaged. As was pointed out in Section 4.1.1, this may not be an entirely legitimate assumption for all operations. Articulating how specific operations might in practice deviate from this assumption is beyond the scope of this report. However, it should be noted that, for at least some of the area licensees, the 21% harvest reduction envisaged under Scenario Two in decade one is seen as a threshold point beyond which overall business viability concerns could arise. This means that, over and above any proportionally estimated job losses, under Scenario Two there is an added risk of complete shift shutdown or business failures, the full effects of which have not been captured in Table 5.1.

The following points of comparison with Scenario One should also be noted:

- The direct job loss in decade one is estimated at 60 PY's, with which are associated another 47 indirect PY's, for a combined PY employment loss of 107. This compares to a combined employment loss in the first decade under Scenario One of 29 PY's.

Table 5.1: Scenario Two: Revelstoke TSA Employment and Income Impacts

	Employment (PY's/Year)			Employment Income (Pre-tax: \$1993 Millions)		
	Direct	Indirect	Total	Direct	Indirect	Total
Current	288	225	513	\$12.61	\$6.42	\$19.03
Decade 1	228	178	406	9.98	5.09	15.07
Decade 2	197	154	351	8.62	4.39	13.02
Decade 3	169	132	301	7.40	3.77	11.17
Decade 4	145	113	258	6.35	3.23	9.58
Decade 5	124	97	221	5.43	2.77	8.19
Decade 6	105	82	187	4.60	2.34	6.94
Decade 7	105	82	187	4.60	2.34	6.94
Decade 8	105	82	187	4.60	2.34	6.94
Decade 9	105	82	187	4.60	2.34	6.94
Decade 10	102	80	182	4.46	2.28	6.94
Decade 11-20	105	82	187	4.60	2.34	6.94

- Over the following five decades, we estimate an additional direct job loss impact of 123 PY's, with which would be associated an additional indirect job loss of 96 PY's. At that point the harvest and employment situation stabilizes, with forestry-supported employment reduced to 36% of its present level. In other words, movement toward the indicated long-term harvest rate could eventually shrink the area's TSA dependent forestry economy by as much as two-thirds. As already discussed in Section 4.1.1, increasing local value-added operations may offer some potential for mitigating these job losses at the local level.

Outdoor Recreation

There is nothing specific to Scenario Two that one can point to as supporting economic benefits within the outdoor recreation sector. As indicated earlier, the specific requirements of the heli-skiing sector are such that no clear effects can be linked to the proposed harvesting guidelines. We believe that a more plausible basis exists for asserting some positive impacts for the non-

winter outdoor recreation sector. This is based on the simple assumption that, with reduced harvesting rates, the area's general wilderness appeal will be enhanced, and the area will as a result lend itself more to increased backcountry and other outdoor recreation activities. On the other hand, much of the Revelstoke TSA is a relatively inaccessible wilderness area, with entry to the prime backcountry areas being dependent on some means of mobility, such as trail guides or helicopters. The existing logging road network therefore serves a role in rendering the entire area more accessible to the outdoor recreationists. Given the generally negative impact of logging on the general wilderness and aesthetic values, a precise quantification of the net trade-off between these two influences has not been possible for this report.

5.1.2 Environmental Impacts

As discussed under Section 4.1.2, the primary environmental impacts are those related to the retention or depletion of the area's existing old growth inventory, and to the related impact on the old growth dependent wildlife groups. This item has already been discussed in chapter 2, and in Section 4.1.2. With everything other than the lower harvest rates being comparable to Scenario 1, the environmental impact of Scenario 2, and specifically the old growth attrition impact, would certainly appear to be more benign. By reducing the rate of harvest, and by implication the take down of the existing old growth, this scenario would also buy more time to resolve the outstanding uncertainties and differences of view regarding the precise nature of the interaction between the mountain caribou and the area's old growth habitat.

5.1.3 Community Impacts

As compared to Scenario One, the community would be confronted under Scenario Two with a much more severe immediate job loss, totalling 107 PY's, as compared to a 29 PY job loss in the first decade under Scenario One.

Some of the related issues, such as the potential for more value-added jobs in the Revelstoke area, have already been covered in Section 4.1.3. As Scenario Two entails a much higher up-front scale of job loss, the resulting social dislocation would be correspondingly much more severe. With the mounting pressures on the forestry land base, the potential for social and community dislocation in forestry-dependent communities in British Columbia and the Pacific Northwest has begun to attract research attention.²¹ Possible community stressors include such phenomena as family breakdown, domestic violence, drug and alcohol dependency, general social disintegration, and greatly increased strains on the formal and informal social support systems. The extent to which these can develop into serious problems at the community level is very much a function of the underlying social cohesiveness and economic strength of the community. While Revelstoke's social and economic base may be sufficiently robust to cope with this indicated level of job loss without undue strain, the experiences of other, less stable

²¹ See ARA (September 1993), and R. Lee (1993), "Effects of Federal Timber Sales Reductions on Workers, Families, Communities, and Social Services".

forestry-dependent communities provide lessons that should not be overlooked in preparing an adjustment response.

5.2 Provincial Impacts

5.2.1 Economic Impacts

The provincial employment and employment income impacts associated with Scenario Two are illustrated in Table 5.2. As shown, the principle difference with Scenario One is the more rapid rate of harvest reductions, and, the related employment and income losses that occur. Thus, whereas the long-term lower harvest and employment base is not reached until decade eight under Scenario One, this point is reached under Scenario Two at the beginning of decade six. The cumulative employment impacts are the same in both cases, but are absorbed more gradually under Scenario One. The initial round of impacts under Scenario Two is much more severe, with an immediate job loss at the provincial level of 168 PY's (67 direct and 101 indirect), as compared to an immediate job loss under Scenario One of 45 PY's (18 direct and 27 indirect).

Table 5.2: Scenario Two: Provincial Employment and Income Impacts

	Employment (PY's/Year)			Employment Income (Pre-tax: \$1993 Millions)		
	Direct	Indirect	Total	Direct	Indirect	Total
Current	321	482	803	\$14.02	\$13.78	\$27.80
Decade 1	254	381	635	11.10	10.91	22.01
Decade 2	220	329	549	9.59	9.42	19.01
Decade 3	188	283	471	8.23	8.08	16.31
Decade 4	162	243	404	7.06	6.94	13.99
Decade 5	138	207	346	6.04	5.93	11.97
Decade 6	117	176	293	5.11	5.02	10.13
Decade 7	117	176	293	5.11	5.02	10.13
Decade 8	117	176	293	5.11	5.02	10.13
Decade 9	117	176	293	5.11	5.02	10.13
Decade 10	114	171	284	4.97	4.88	9.84
Decades 11-20	117	176	293	5.11	5.02	10.13

5.2.2 Environmental Impacts

Environmental impacts at the provincial level comprise improvements to the mountain caribou habitat, and, due to the more rapid reduction in harvesting rates as compared to Scenario One, a slower rate of depletion of old growth habitat.

5.2.3 B.C. Government Revenue Impacts

These would be as shown in Table 5.3, with the calculations as explained in Section 4.2.3.

Table 5.3: B.C. Government Revenue Impacts (\$1993 Million/Year)

Scenario 2	Stumpage + Royalties	Personal Income Tax	Other Taxes	Total
Current	\$2.86	\$2.03	\$1.56	\$6.45
Decade 1	2.26	1.61	1.24	5.11
Decade 2	1.95	1.39	1.07	4.41
Decade 3	1.68	1.19	0.92	3.79
Decade 4	1.44	1.02	0.79	3.26
Decade 5	1.23	0.88	0.67	2.78
Decade 6	1.04	0.74	0.57	2.35
Decade 7	1.04	0.74	0.57	2.35
Decade 8	1.04	0.74	0.57	2.35
Decade 9	1.04	0.74	0.57	2.35
Decade 10	1.01	0.72	0.55	2.28
Decades 11-20	1.04	0.74	0.57	2.35

6.0 Scenario Three Impact Assessment

Scenario Three comprises the so called four-pass harvest scenario. This Scenario is equivalent to a requirement that no more than 25% of the timber zone be below green-up level at any given time. As Table 3.2 shows, the imposition of this requirement entails a 33% harvest reduction in the initial decade from present AAC levels. As compared to Scenarios 1 and 2, however, the impact in subsequent decades is proportionately reduced.

6.1 Revelstoke TSA Impacts

6.1.1 Economic Impacts

Forestry: The estimated employment and income impacts occurring within the Revelstoke TSA are presented in Table 6.1. The procedures followed are identical to those followed under Scenarios One and Two. The initial round of impacts is much greater, with a loss of 93 direct forestry jobs and 73 indirect jobs, for a total first round job impact of 166 PY's. This compares respectively to combined job losses in the initial decade of 29 PY's under Scenario One, and 107 PY's under Scenario Two. Because more of the harvest reduction is up-front, the job reductions that follow in subsequent periods are correspondingly lower.

Outdoor Recreation: The four-pass harvesting scenario seems to have the most to offer in terms of an expanded outdoor recreation sector. This is because of the joint effect of the significantly reduced rate of logging and encroachment into wilderness areas, combined with the access benefits of a more extensive road network.

6.1.2 Environmental Impacts

The TSA-level environmental impacts are essentially similar to those already discussed under 5.1.2. While the slower rate of harvest should constitute a net benefit, this might be offset were this harvesting scenario to result in a more fragmented cutting pattern and a more intrusive road network.

6.1.3 Community Impacts

These are similar to those discussed under Sections 5.1.3 and 4.1.3, but would occur on a much larger scale in the first decade. The observations made in Section 5.1.3 with respect to the potential for social dislocation are therefore even more pertinent under this scenario. Some community adjustment planning to cope with this possibility would therefore seem to be warranted.

Table 6.1: Scenario Three: Revelstoke TSA Employment and Income Impacts

	Employment (PY's/Year)			Employment Income (Pre-tax: \$1993 Million)		
	Direct	Indirect	Total	Direct	Indirect	Total
Current	288	225	513	\$ 12.61	\$ 6.42	\$ 19.03
Decade 1	195	152	347	8.54	4.35	12.89
Decade 2	198	154	352	8.67	4.42	13.08
Decade 3	198	154	352	8.67	4.42	13.08
Decade 4	198	154	352	8.67	4.42	13.08
Decade 5	175	137	312	7.66	3.90	11.56
Decade 6	154	120	274	6.74	3.44	10.18
Decade 7	136	106	242	5.95	3.03	8.99
Decade 8	119	93	212	5.21	2.65	7.86
Decade 9	105	82	187	4.60	2.34	6.94
Decade 10	103	80	183	4.51	2.30	6.81
Decades 11-20	105	82	187	4.60	2.34	6.94

6.2 Provincial Impacts

6.2.1 Economic Impacts

The provincial employment and income impacts associated with Scenario Three are illustrated in Table 6.2. As already alluded to, the negative impacts are heavily concentrated in the first decade. After that point, harvest levels increase somewhat, from decades two to four, before declining gradually to the long-term level by decade nine. Provincial employment impacts closely follow this trend.

Table 6.2: Scenario Three: Provincial Employment and Income Impacts

	Employment (PY's/Year)			Employment Income (Pre-tax: \$1993 Million)		
	Direct	Indirect	Total	Direct	Indirect	Total
Current	321	482	803	\$ 14.02	\$ 13.78	\$ 27.80
Decade 1	217	326	544	9.49	9.33	18.82
Decade 2	221	331	552	9.64	9.47	19.11
Decade 3	221	331	552	9.64	9.47	19.11
Decade 4	221	331	552	9.64	9.47	19.11
Decade 5	195	293	488	8.52	8.37	16.89
Decade 6	172	258	429	7.50	7.37	14.86
Decade 7	152	227	379	6.62	6.51	13.13
Decade 8	133	199	332	5.79	5.69	11.49
Decade 9	117	176	293	5.11	5.02	10.13
Decade 10	115	172	287	5.01	4.93	9.94
Decades 11-20	117	176	293	5.11	5.02	10.13

6.2.2 Environmental Impacts

At the provincial level these are: improvements to the mountain caribou habitat; and, a generally slower rate of depletion of old growth habitat.

6.2.3 B.C. Government Revenue Impacts

These would be as shown in Table 6.3, with the calculations as explained in section 4.2.3.

Table 6.3: Scenario Three: B.C. Government Revenue Impacts (\$1993 Million/Year)

Scenario 3	Stumpage + Royalties	Personal Income Tax	Other Taxes	Total
Current	\$ 2.86	\$ 2.03	\$ 1.56	\$ 6.45
Decade 1	1.93	1.38	1.06	4.36
Decade 2	1.96	1.40	1.07	4.43
Decade 3	1.96	1.40	1.07	4.43
Decade 4	1.96	1.40	1.07	4.43
Decade 5	1.74	1.23	0.95	3.93
Decade 6	1.53	1.09	0.84	3.45
Decade 7	1.35	0.96	0.74	3.05
Decade 8	1.18	0.84	0.64	2.66
Decade 9	1.04	0.74	0.57	2.35
Decade 10	1.02	0.73	0.56	2.30
Decade 11-20	1.04	0.74	0.57	2.35

7.0 Conclusions

The timber supply scenarios analysed in this report all involve annual harvests at levels significantly below the current harvest level of 269 000m³. All three scenarios involve a gradual two-thirds decline to a long-term harvest level of 98 000m³; they largely differ in terms of the rate at which they approach that long-term level. Under Scenario One (the "Base Case" scenario), annual harvests in the first decade are reduced by only 5.5%, but then decline, on average, by 13.5% per decade, until the long-term harvest level is reached by decade eight. Under Scenario Two (the "Low Yield" scenario), the initial harvest reduction is 21%, followed by additional harvest reductions of 14% for each of the following five decades, until the long-term harvest level is reached by decade six. Finally, under Scenario Three (the "Four Pass" scenario), harvests are initially reduced by 33%, remain relatively unchanged for the following three decades, and then are reduced at approximately 12% per decade before approaching the long-term harvest level beginning in decade nine.

The different rates at which harvests decline underlie the findings in this report. The Timber Supply Analysis that generated these harvest scenarios focused primarily on differential harvest flows, and significantly less on other possible differences between the scenarios. What this means is that the differences between the three scenarios are essentially limited to those that can be attributed to a slower or faster rate of harvest reduction. This pertains especially to the Environmental Account.

The differences in rates of harvest reduction manifest themselves in a slower or faster rate of old growth/mature forest cover depletion (this currently accounts for approximately 50% of the area's working forest cover). Scenario One is the least preferred on this account, while Scenario Three is arguably preferred to Scenario Two, because of Scenario Three's larger harvest reduction in the initial decade; however this advantage could be offset by Scenario Two gravitating sooner to the long-term lower harvest level. Old growth related impacts are largely wildlife-based, in particular, mountain caribou, cavity-nesting birds, and some smaller mammals. With the exception of mountain caribou, these are issues of local as opposed to provincial significance. The issues surrounding protection of the mountain caribou's habitat have been similarly addressed under all three scenarios with the designation of a special wildlife management zone. The forest cover requirements of this zone will unquestionably be of benefit to the caribou population, though whether that is completely sufficient remains a point of debate for some.

The varying employment implications of the three scenarios are much more pronounced, at least in the short-run. Because of the relatively small initial harvest reduction under Scenario One, the immediate job loss is quite small, both at the Revelstoke (29 direct and indirect), and at the provincial (another 16 PY's) levels. Because the much larger future levels of job loss (297 PY's at the local level) are postponed for over a decade under this scenario, it would be preferred by those whose focus is Revelstokes economic prosperity and social stability. Potential also currently exists to add more local forestry jobs through increased value added operations, in an

amount that could almost offset the indicated job loss within the first decade. This expanded value added potential would fall far short of what would be needed to offset the jobs lost in the first decade under both Scenario Two (107 PY's) and Scenario Three (166 PY's).

With regard to the differences between Scenario Two and Three in terms of the community's ability to cope, opinions were expressed to the consultant that the harvest reductions associated with Scenario Two (21% in the first decade), are just at the limit beyond which business failure implications (over and above any proportionately-based job losses), would have to be encountered. For some of the smaller companies, in particular the shake and shingle operations, the margin of viability might even be less than this. For all area licensees, that viability margin would also be crucially impacted by overall timber supply constraints in the wider area. For all three scenarios, the existence of a Forest Service Reserve allotment of approximately 4.3% of the current AAC, which is withheld from the current harvest, should also be noted. It could potentially be used to lessen the impact of the harvest reductions noted above.

The potential does exist under all three scenarios for some modest employment gains in the non-winter outdoor recreation sector. These are essentially tied to the decelerated rate of logging intrusion into previously unharvested areas. These gains cannot be reliably quantified, but we have allowed for long-term job gains from this source of 10, 20, and 30 PY's respectively, under Scenario's One, Two, and Three. Because of the sometimes high levels of interdependence between logging and winter recreation activities (i.e. skiing and snowmobiling), the implications of reduced levels of logging for this general sector are less clear.

There are also significant forestry-driven employment impacts at the provincial level. Over the full term, these add up to a total of 184 PY's, over and above the total of 326 PY's that would be lost at the TSA level over the full term.

Additional impacts at the provincial level also arise through losses in government revenue from reduced harvests within the TSA. Combined sources of revenue (stumpage, personal income taxes, corporate taxes, and other taxes) currently generate \$6.45 million annually; this would be reduced over the full term, under all three scenarios, to \$2.35 million annually.

APPENDIX A

GLOSSARY OF TERMS

Appendix A

Glossary of Terms

Allowable Annual Cut (AAC):	The volume of timber which may be cut each year from a forest management unit (e.g., a TSA), set by the Chief Forester in accordance with Section 7.0 [Forest Act].
Biodiversity:	Biological Diversity. The diversity of plants, animals and other living organisms and their habitats measured by factors such as genetic variability, number of species, and variation in species composition..
Biogeoclimatic Zones:	Areas which are defined by similar biological, physical and atmospheric characteristics.
Cutblock adjacency guidelines	Integrated management guidelines that specify the desired spatial relationship among cutblocks. They can be approximated by specifying the maximum allowable proportion of a forested landscape that does not meet green-up requirements.
Direct Income and Employment Impacts:	Income and employment impacts, within those sectors directly impacted by any proposed changes (e.g. forestry).
Ecosystem:	Any complex of living organisms together with all the other biotic and abiotic (non-living) factors which affect them.
Environmentally Sensitive Area:	Areas with notable non-timber values, fragile or unstable soils, or areas that have problems in establishing a new stand or where timber harvesting may result in land slides.
Forest Cover Requirements:	Specify desired distributions of areas by age or size class groupings. These objectives can be used to reflect desired conditions for wildlife, watershed protection, visual quality and other integrated resource management objectives.
Green-up Period:	The time needed for a stand of trees to reach a desired condition (i.e., height) to ensure maintenance of water quality, wildlife habitat, soil stability or aesthetics. Green-up requirements refer to the desired conditions.
Indirect Income or Employment Impacts:	Spin-off effects on related sectors or industries which supply materials or equipment to the forestry sector (i.e., provisions for logging camps) arising from changes in the timber harvest. Also includes impacts from the spending of forestry-related employment income.

APPENDIX B

TECHNICAL BACKGROUND

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APPENDIX C
LIST OF CONTACTS

Table D.2: British Columbia: Incremental Employment Impacts (Annual PY's)

	Scenario One		Scenario Two		Scenario Three	
	Direct	Total	Direct	Total	Direct	Total
Decade 1	18	45	67	168	104	259
Decade 2	41	103	34	86	+4	+8
Decade 3	36	89	32	78	-	-
Decade 4	31	78	26	67	-	-
Decade 5	28	70	24	58	26	64
Decade 6	24	61	21	53	23	59
Decade 7	21	53	-	-	20	50
Decade 8	5	11	-	-	19	47
Decade 9	-	-	-	-	16	39
Decade 10	4	11	3	9	2	6
Decades 11-20	+4	+11	+3	+9	+2	+6
Total	204	510	204	510	204	510

Table D.3: British Columbia: Government Revenue Impacts (\$1993 Millions/Year)

	Scenario One	Scenario Two	Scenario Three
Decade 1	\$0.36	\$1.34	\$2.09
Decade 2	0.82	0.70	+0.07
Decade 3	0.72	0.62	-
Decade 4	0.62	0.53	-
Decade 5	0.57	0.48	0.50
Decade 6	0.49	0.43	0.48
Decade 7	0.43	-	0.40
Decade 8	0.09	-	0.39
Decade 9	-	-	0.31
Decade 10	0.08	0.07	0.05
Decades 11-20	+0.08	+0.07	+0.05
Total	\$4.10	\$4.10	\$4.10

