

**Arrowsmith TSA
Socio-Economic Analysis**

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**Economic and Trade Branch
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Executive Summary	iii
1.0 Introduction	
1.1 Background	1
1.2 Approach.....	1
2.0 Socio-Economic Profile	
2.1 Regional Background.....	2
2.2 Community Profiles	7
2.3 First Nations	11
3.0 Environment and Outdoor Recreation	
3.1 Ecological Setting	15
3.2 Wildlife.....	17
3.3 Fisheries.....	21
3.4 Outdoor Recreation	22
4.0 Forestry Sector Overview	
4.1 Arrowsmith TSA Land Base	28
4.2 Arrowsmith TSA AAC Apportionment and Historic Harvest Levels.....	30
4.3 Licensee Harvest Profile.....	33
4.4 South Vancouver Island Remanufacturing Sector.....	38
4.5 Arrowsmith TSA Direct Employment and Income Estimates.....	39
5.0 Harvest Forecast Scenarios	
5.1 Harvest Forecasts	41
5.2 Forest Management Processes.....	43
6.0 Economic Impacts	
6.1 Assumptions	45
6.2 Employment, Employment Income and Government Revenue Impacts	46
7.0 Implications for Communities and First Nations	
7.1 Community Implications	51
7.2 First Nations Implications	52
8.0 Environmental and Outdoor Recreation Implications	
8.1 Environmental Implications.....	53
8.2 Outdoor Recreation Implications.....	54
9.0 Summary and Conclusions	55
 Appendices	
Appendix A Glossary of Terms.....	A1
Appendix B Arrowsmith TSA: Incremental Economic Impacts.....	A5
Appendix C Economic Impact Methodology	A8
Appendix D List of Contacts	A18
Appendix E Southern Vancouver Island: Threatened and Endangered Species.....	A21

Tables

Table ES.1	Arrowsmith TSA: TSA Level Socio-Economic and Environmental Impacts ..	vii
Table ES.2	Arrowsmith TSA: Provincial Socio-Economic and Environmental Impacts....	viii
Table 2.1	Southern Vancouver Island: Populations Trends, 1986-1994.....	4
Table 2.2	Southern Vancouver Island: Employment Dependencies by Area, 1991	6
Table 2.3	Southern Vancouver Island: Forestry Based Employment by Area, 1991	7
Table 2.4	Southern Vancouver Island: First Nations Population Summary, 1993.....	14
Table 3.1	Southern Vancouver Island: Hunting Activity and Expenditures (\$1994).....	20
Table 4.1	Southern Vancouver Island: Harvest History, 1991-1994	28
Table 4.2	Arrowsmith TSA Timber Harvesting Land Base.....	30
Table 4.3	Arrowsmith TSA AAC Apportionment (Pre-Clayoquot Sound Decision)	31
Table 4.4	Arrowsmith TSA: Historic Harvest Levels (Coniferous), 1991-1994	32
Table 4.5	Arrowsmith TSA: Direct Employment Base (PY's), 417 000 m ³	40
Table 4.6	Arrowsmith TSA: Direct Pre-Tax Wage Rates (\$1994).....	40
Table 5.1	Incremental Harvest Changes (cubic metres)	42
Table 6.1	Arrowsmith TSA: Economic Impacts Associated with Scenario 1	48
Table 6.2	Arrowsmith TSA: Economic Impacts Associated with Scenario 2	50
Table B.1	TSA Level Incremental Employment and Income Impacts - Scenario1	A5
Table B.2	TSA Level Incremental Employment and Income Impacts - Scenario2	A5
Table B.3	Provincial Incremental Employment and Income Impacts - Scenario1	A6
Table B.4	Provincial Incremental Employment and Income Impacts - Scenario1	A6
Table B.1	Incremental Government Revenue Impacts - Scenario1	A7
Table B.1	Incremental Government Revenue Impacts - Scenario2	A7
Table C.1	Arrowsmith TSA Employment and Income (AAC 479 000 m ³)	A9
Table C.2	Outside Arrowsmith TSA Employment and Income (AAC 479 000 m ³)	A9
Table C.3	Provincial Employment and Income (AAC 479 000 m ³)	A9
Table C.4	Arrowsmith TSA Employment Ratios	A12
Table C.5	Arrowsmith TSA Government Revenues.....	A17
Table E.1	Southern Vancouver Island: Threatened and Endangered Species.....	A21

Figures

Figure ES.1	Arrowsmith TSA: Timber Harvest Scenarios.....	v
Figure 2.1	Location Map: Arrowsmith TSA.....	3
Figure 2.2	Southern Vancouver Island: Employment Dependencies, 1991	6
Figure 5.1	Arrowsmith TSA: Timber Harvest Scenarios.....	42

Introduction

- This report profiles the Arrowsmith TSA and discusses the potential socio-economic and environmental impacts associated with two harvest scenarios selected from the *Arrowsmith TSA Timber Supply Analysis* report.
- The Arrowsmith TSA is located on southern Vancouver Island. Relative to other forest land on southern Vancouver Island, the TSA represents a relatively small, and fragmented land base. It covers some 125 000 hectares of productive forest land (before reductions), which is approximately 10 percent of southern Vancouver Island's total productive forest land. The TSA is administered by the Port Alberni and Duncan Forest Districts.

Regional and Community Profile

- Southern Vancouver Island is one of the fastest growing regions in British Columbia. The estimated population in 1994 was 550 292, representing a 12 percent increase over 1991. The Nanaimo Regional District (including Nanaimo and Parksville/Qualicum Beach) has exhibited the greatest rate of growth (annual rate of 4.9%, 1986-94), followed by the Cowichan Valley (3.9%) and the Capital (2.7%) Regional Districts. Population growth within the Alberni-Clayoquot Regional District has been significantly below that experienced by the other three Regional Districts (1.2%).
- For all four Regional Districts the major source of population change is net migration. Major attractions to in-migrants include the area's quality of life, relative proximity to the Lower Mainland, and the relatively lower cost of housing in comparison with the Lower Mainland area.
- There are twenty-nine First Nations located within the boundaries of the Port Alberni and Duncan Forest Districts, with a combined 1993 population of 13 199.

Environmental Profile

- The Arrowsmith TSA lies within a general area that consists of three distinct ecosections: the Leeward Island Mountains ecosection; the Nanaimo Lowlands ecosection; and, the Windward Island Mountains ecosection. The first two lie within the eastern Vancouver Island ecoregion, while the Windward ecosection falls within the western Vancouver Island ecoregion. The variation in topography, landform and climate has created a complex mosaic of ecological conditions.
- Although relatively small in size, the Arrowsmith TSA areas acquire added ecological value from the fact that the forested habitat in the surrounding area is being steadily encroached upon (particularly in the Duncan Forest District) by human and industrial settlement. These pressures are generally less advanced in the western half of the TSA (mostly the Port Alberni Forest District, but also parts of the Duncan District in the Sooke/Port Renfrew area).
- Although covering a smaller landbase, a number of constraining processes have also been put into effect in the eastern portion of the TSA. Those modelled within the Timber Supply Review process include protection of deer winter range, riparian habitat protection and recognition of visual sensitivity on the forested landscape. For all parts of the TSA, the future

implementation of the new Forest Practices Code will also ensure biodiversity objectives will be met.

Economy

- Southern Vancouver Island has a growing, diversified economy, with the public sector, forestry and tourism serving as the primary generators of employment.
- Within the region, employment dependencies vary significantly. The Lake Cowichan, Alberni, Ladysmith and Duncan areas are all heavily dependent on the forest sector. Forestry is also important in the Parksville-Qualicum, Nanaimo and Sooke-Port Renfrew areas, but is not dominant (except in Jordan River and Port Renfrew). Only in the Victoria area does the forest sector play a minor role.

Forest Sector

- The contribution of the Arrowsmith TSA to the Southern Vancouver Island's timber harvest profile is a modest one - approximately 8 percent of the total harvest over the period 1991 to 1994.
- The Arrowsmith TSA covers a land area of 168 826 hectares, of which 74 436 hectares (44 percent) contributes to the long-term timber harvesting land base. In the eastern zones, forests are dominated by stands of Douglas Fir; in the western zones, they are dominated by western cedar and hemlock. Currently, the timber harvesting land base comprises almost equal areas of forest at or above minimum merchantable age, and areas younger than merchantable age.
- The TSA's allowable annual cut (AAC) is 482 250 cubic metres. Approximately 49 percent of the AAC is allocated to the Small Business Forest Enterprise Program (SBFEP), 46 percent is harvested by four major licences, 3 percent is reserved for woodlot licences, and the remaining 2 percent is apportioned for harvesting deciduous species or is unallocated. The volume of AAC used to generate the various timber supply forecasts modelled in the *Arrowsmith TSA Timber Supply Analysis* is 479 150 cubic metres. It differs slightly from the AAC of 482 250 as follows: (a) it does not reflect an AAC reduction of 16 000 cubic metres that flowed from the Clayoquot Sound Land Use Decision of April 13, 1993; and, (b) it excludes the AAC apportionments for woodlots and deciduous species totalling 19 100 cubic metres.
- The actual level of timber harvesting in the TSA over the past several years has generally been below the AAC level, largely due to undercutting in the SBFEP. During the four year period 1991-94, the average annual harvest level was approximately 417 000 cubic metres (87 percent of the AAC of 479 150 cubic metres). For the purposes of this study, this average figure is used to reflect the current harvest level, or base year. This is done in order to smooth out year-to-year harvest level fluctuations that commonly occur as part of the business cycle.
- The current TSA harvest level of 417 000 cubic metres supports an estimated 363 PY's and \$12.4 million of direct forest sector employment and after-tax income to TSA residents. Indirect and induced employment is estimated to account for a further 226 PY's, and after-tax employment income of \$4.7 million.

year. While this corresponds to an approximate 20% decline from the AAC, it represents a less than 8 percent decline from the average annual harvest level.

- **Scenario 2:** The harvest is immediately reduced to the long term harvest level of 385 000 cubic metres per year. A reduction to the 346 000 cubic metres level is still required during decades 6 through 15 because of an insufficiency of mature second growth timber in the TSA during that period.

Impacts of Harvest Scenarios

Summaries of TSA and province-wide forest sector impacts are provided in tables ES.1 and ES.2.

Economic Impacts

- The analysis assumes that the economic impacts would follow the trend in harvest level changes.
- Scenario 1, which provides a gradual step-down to the long-term harvest level, defers employment and government revenue reductions until 2015, after which harvest levels begin to decline below the current harvest level. During this twenty year period, employment and government revenues have the potential to increase above current levels (this assumes that the current challenges being faced by the SBFEP can be successfully addressed).
- In contrast, under scenario 2 there would be immediate employment and government revenue declines relative to the current situation. Within the TSA, direct and indirect/induced employment would fall by 45 full-time jobs. At the provincial level, a total of 108 full-time jobs would be lost, and approximately \$1.8 million in government revenues foregone.
- Under both scenarios, moving to a long-term harvest level of 385 000 cubic metres would eliminate an estimated 45 full-time jobs from the TSA economy, 28 of which would be direct full-time jobs.

Community Implications

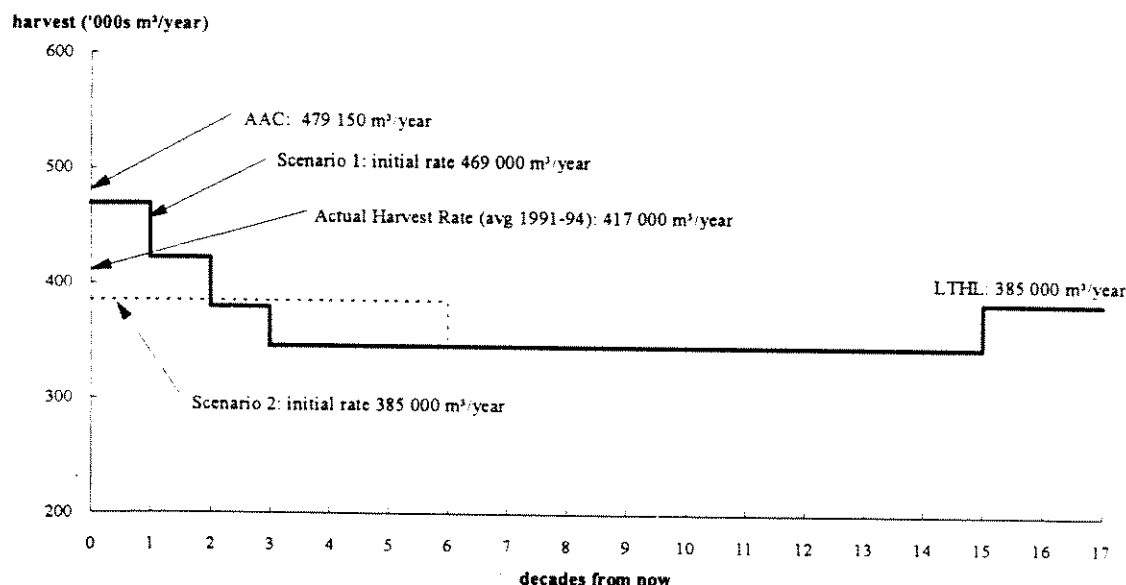
- The relatively small scale of the Arrowsmith TSA harvest, its dispersion throughout the area, and the relatively small overall changes being contemplated all suggest that a concentration of impacts in any one community is unlikely to arise. The one exception might be some smaller communities (e.g. Coombs, or Sooke) that are home to two or more small independent mills whose operations may be more vulnerable to any restriction, however incremental, in overall fibre supplies. This concern would arise only under the immediate reductions contemplated under Scenario 2.
- Although relatively small in the larger South Island fibre supply context, the Arrowsmith TSA Small Business component of approximately 200 000 cubic metres (Section 16) is important to a number of area mills and contract loggers as a valued source of incremental fibre. For these groups, the more immediate fall in harvest levels envisaged under Scenario 2 could pose some difficulties in maintaining existing levels of operations.

- At the provincial level (includes TSA residents), the current TSA harvest level supports approximately 560 direct PY's, with an after-tax income of \$19.6 million. Total provincial employment and income generated by the current TSA harvest is 1 400 PY's and \$40.0 million, respectively. The Arrowsmith TSA is also a source of revenue for the Province of British Columbia in the form of stumpage and rent, personal income tax, and corporate taxes. In total, the current TSA harvest level generates an estimated \$23.0 million in government revenues for the Province.

Harvest Scenarios

- Two harvest forecasts from the Arrowsmith TSA Timber Supply Analysis report were chosen to illustrate a range of possible socio-economic impacts (see Figure ES.1). These scenarios are intended for discussion purposes only and do not imply that particular harvest levels are preferred. Furthermore, both scenarios involve a decline to the same long-term harvest level (385 000 cubic metres). The only difference between the scenarios is the timing of the decline to the long-term level.

Figure ES.1 Arrowsmith TSA - Timber Harvest Scenarios



- Scenario 1:** The initial rate of harvest is set at 469 000 cubic metres, which, although approximately 2% below the timber supply AAC (479 150 cubic metres), represents close to a 12 percent increase over the average annual harvest level (417 000 cubic metres). At the beginning of the second decade, the harvest drops back to 422 000 cubic metres annually, almost the level of the current average harvest. It then continues to decline for the next two decades to an annual harvest level of 346 000 cubic metres, where it remains for another twelve decades, before rising again to the long term harvest level of 385 000 cubic metres per

Table ES.1 Arrowsmith TSA - TSA level Socio-Economic and Environmental Impacts

Decades	Current	Scenario 1					Scenario 2		
		1	2	3	4-15	16+	1-6	7-15	16+
Harvest Level (m³/year) • % of the current level	417 000	469 000 112%	422 000 101%	380 000 91%	346 000 83%	385 000 92%	385 000 92%	346 000 83%	385 000 92%
Employment (PY's) Direct Indirect/Induced Total • Cumulative difference	363 226 589	408 254 662 73	367 229 596 7	331 206 537 (52)	301 188 489 (100)	335 209 544 (45)	335 209 544 (45)	301 188 489 (100)	335 209 544 (45)
Employment Income (\$1994) Direct Indirect/Induced Total • Cumulative difference	\$12.4 4.7 \$17.1	\$14.0 5.3 \$19.3 \$2.2	\$12.6 4.8 \$17.4 \$0.3	\$11.3 4.3 \$15.6 (\$1.5)	\$10.3 3.9 \$14.2 (\$2.9)	\$11.5 4.4 \$15.9 (\$1.2)	\$11.5 4.4 \$15.9 (\$1.2)	\$10.3 3.9 \$14.2 (\$2.9)	\$11.5 4.4 \$15.9 (\$1.2)
Community		<ul style="list-style-type: none"> Employment and government revenue impacts deferred until 2015. Potential for employment and government revenue to increase above current levels, assuming current challenges faced by SBFEP can be addressed. 					<ul style="list-style-type: none"> Immediate adverse effect on employment. Unlikely, however, that impacts will be concentrated in any single community. Reduced fibre supply could pose difficulties for a number of area mills and contract loggers. 		
First Nations		<ul style="list-style-type: none"> Few resident First Nations up to now have had a direct involvement in the TSA and its AAC. This option, with its higher initial harvest level appears to offer First Nations more opportunity assume a more active and managerial role in timber harvesting. 					<ul style="list-style-type: none"> This option would be less likely to place "culturally sensitive lands" at risk. 		

Table E.S.2 Arrowsmith TSA - Provincial Socio-Economic and Environmental Impacts

Decades	Current	Scenario 1					Scenario 2		
		1	2	3	4-15	16+	1-6	7-15	16+
Harvest Level (m³/year) • % of the current level	417 000	469 000 112%	422 000 101%	380 000 91%	346 000 83%	385 000 92%	385 000 92%	346 000 83%	385 000 92%
Employment (PY's) Direct Indirect/Induced Total • Cumulative difference	560 840 1 400	630 945 1 575 175	567 850 1 417 17	511 765 1 276 (124)	465 697 1 162 (238)	517 775 1 292 (108)	517 775 1 292 (108)	465 697 1 162 (238)	517 775 1 292 (108)
Employment Income (\$1994) Direct Indirect/Induced Total • Cumulative difference	\$19.6 20.4 \$40.0	\$22.1 22.9 \$45.0 \$5.0	\$19.9 20.6 \$40.5 \$0.5	\$17.9 18.6 \$36.5 (\$3.5)	\$16.3 16.9 \$33.2 (\$6.8)	\$18.1 18.8 \$36.9 (\$3.1)	\$18.1 18.8 \$36.9 (\$3.1)	\$16.3 16.9 \$33.2 (\$6.8)	\$18.1 18.8 \$36.9 (\$3.1)
Government Revenue (\$1994) Provincial Federal Total • Cumulative difference	\$23.0 9.6 \$32.6	\$25.9 10.7 \$36.6 \$4.0	\$23.3 9.7 \$33.0 \$0.4	\$20.9 8.7 \$29.6 (\$3.0)	\$19.0 8.0 \$27.0 (\$5.6)	\$21.2 8.8 \$30.0 (\$2.6)	\$21.2 8.8 \$30.0 (\$2.6)	\$19.0 8.0 \$27.0 (\$5.6)	\$21.2 8.8 \$30.0 (\$2.6)
Environment		<ul style="list-style-type: none"> Under both scenarios, the age class distribution of TSA forest land would narrow. As a result, populations of species that depend on mature forests may decline. The TSA pattern of small dispersed operating areas, however, makes it difficult to be specific as to these effects. Scenario 2, with its immediate harvest reduction, provides forest and wildlife managers more flexibility to address habitat, fish and wildlife, and recreation requirements. 							

First Nations Implications

- The majority of the resident First Nations (with the exception of the Toquaht First Nation) have not had a direct collective stake in the TSA and its harvest. Many First Nations, particularly those located on the West Coast, are moving towards a more active and managerial role in the forest sector. The higher initial harvest levels of Scenario 1 would appear to provide more room to accommodate these interests.

Environmental Implications

- The main difference between the two scenarios from an environmental perspective results from the timing of harvest reductions. Harvesting of older age forest would proceed more rapidly under Scenario 1 than 2. Under both scenarios, however, the age class distribution of the forest would narrow and populations of species that depend on mature forests may decline. The pattern of small dispersed TSA operating areas, however, makes it very difficult to be specific as to these effects.
- Biodiversity management, particularly within the eastern portion of South Vancouver Island is currently constrained by the high proportion of land that is privately owned. This hampers the ability of forest and wildlife managers (who only have authority to manage biodiversity on Crown land) to implement landscape level biodiversity management strategies. Scenario 2, with its immediate harvest reduction, provides forest and wildlife managers more flexibility to address habitat, fish and wildlife, and recreation requirements.

1.0 Introduction

1.1 Background

The British Columbia Ministry of Forests is presently conducting a province-wide Timber Supply Review, the purpose of which is to assist the Chief Forester in setting Allowable Annual Cut (AAC) levels for each of the province's 36 Timber Supply Area (TSAs). Four separate reports are prepared for each TSA. The Timber Supply Analysis report examines the short-term and long-term effects of current forest management practices on the availability of timber for harvesting in the TSAs. The Socio-Economic Analysis (SEA) report discusses the social, economic, and environmental implications of changing TSA timber harvest levels. A Discussion Paper summarises the first two reports and encourages public comment on the findings. Finally, the AAC Rationale Statement outlines the reasoning behind the Chief Forester's AAC determination.

1.2 Approach

This report profiles the Arrowsmith TSA and discusses the socio-economic and environmental implications associated with certain timber harvest forecast scenarios presented in the *Arrowsmith TSA Timber Supply Analysis* report. These harvest scenarios were chosen to illustrate a range of impacts, and are not meant to suggest preferred AAC levels, they are not the only options considered in the AAC determination.

The SEA follows a multiple accounts approach,¹ which focuses on a range of values derived from the forest ecosystem, and recognizes the need to consider a variety of factors when examining options for forest land management. The report is the result of research and interviews with key local stakeholders, including the forestry sector, the outdoor recreation sector, provincial government agencies, First Nations, and community representatives.

The analysis in this report considers only impacts attributable to changes in the harvest level, and assumes no change in factors such as the land base, management, harvesting and processing technology, and timber prices.

¹ See *Interim Social and Economic Impact Assessment of Forest Land Management Options*, Marvin Schaffer, 1992.

2.0 Socio-Economic Profile

2.1 Regional Background

The Arrowsmith TSA is located on Southern Vancouver Island. It is one of eight TSA's in the Vancouver Forest Region, and falls within two Forest Districts - Port Alberni, and Duncan. Relative to other forest land on Vancouver Island, the TSA represents a relatively small, and fragmented land base (see Figure 1.1).

Productive forest land on South Vancouver Island covers some 1.25 million hectares. Only 10 percent of this total falls within the TSA. The majority of productive forest land is held either as Tree Farm Licences (five TFLs account for approximately 58 percent of the total), or is privately owned (32 percent).

The scattered blocks of the Arrowsmith TSA fall within four Regional Districts: Alberni-Clayoquot, Nanaimo, Cowichan Valley, and the Capital Regional District.² For the purposes of this profile, three of the Regional Districts are divided into sub-regions: Nanaimo Regional District includes the Parksville-Qualicum Beach, and Nanaimo areas; Cowichan Valley Regional District includes the Ladysmith, Lake Cowichan, and Duncan areas; and, the Capital Regional District includes the Sooke-Port Renfrew and, Victoria areas.

Population Trends

The B.C. Stats estimated 1994 population for Southern Vancouver Island is 550 292. This estimate represents an increase of 57 887 over the 1991 census of 492 405. A portion of this increase (about 26 percent, or 15 306) is a result of an adjustment made by B.C. Stats to account for the estimated 1991 provincial census undercount. Over the past fifteen years, the region has experienced population growth well above the provincial average. Table 2.1 outlines population trends by Regional District and area for the period 1981 to 1994.

The rate of population growth has varied by Regional District, and by area. The Nanaimo Regional District has exhibited the fastest growth rates over the period 1986-1994, growing at an annual rate of approximately 4.9 percent. The Cowichan Valley Regional District has exhibited similar, but slightly lower population growth rates than Nanaimo (annual growth rate of 3.9 percent), while the Capital Regional District is in third place (annual growth rate of 2.7 percent). Growth rates for the Alberni-Clayoquot Regional District have been considerably lower than its neighbours (1.2 percent).

For all four Regional Districts the major source of population change is net migration. Major attractions to in-migrants include the region's quality of life (including its outdoor recreation opportunities); relative proximity to the Lower Mainland, and the relatively lower cost of housing in comparison with the Lower Mainland area. Some uncertainty exists as to whether recent rates of population growth can be maintained, particularly in view of the increases that are occurring in property values, and greater congestion in some areas. Recent MLS (Multiple Listing Service)

² A very small portion of the TSA also falls within the Comox-Strathcona Regional District. See the Strathcona TSA Socio-Economic Analysis for a profile of this Regional District.

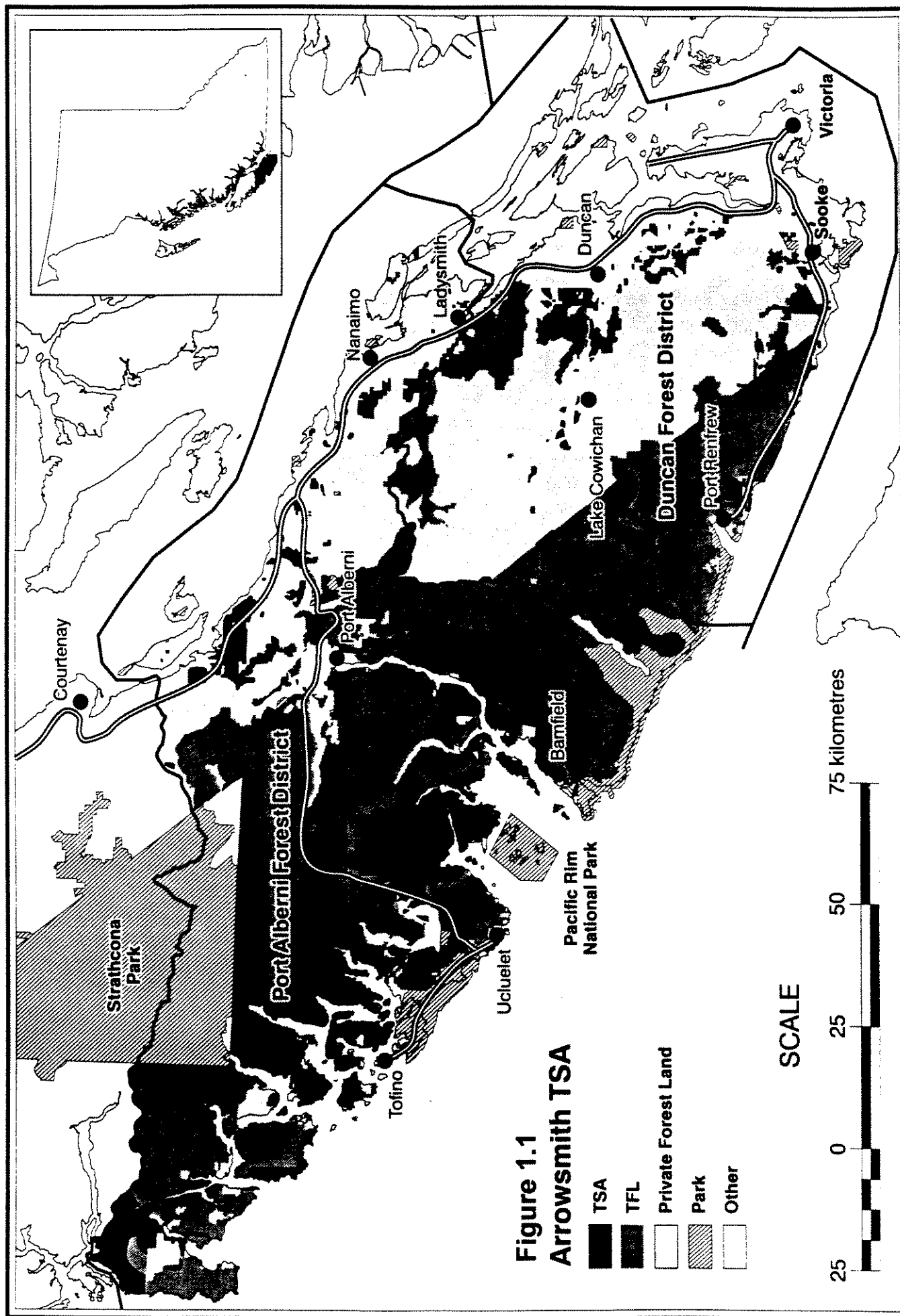


Figure 1.1
Arrowsmith TSA

- TSA
- TFL
- Private Forest Land
- Park
- Other

SCALE



Table 2.1 Southern Vancouver Island: Population Trends, 1986-94

	1986	1991	% Δ 1986-91	1994 Estimate	% Δ 1991-94
1 Alberni-Clayoquot Regional District (Alberni Area)					
• City of Port Alberni	30 240	31 090	3%	33 200	7%
• Village of Ucluelet	18 240	18 405	1%	19 035	3%
• District of Tofino	1 510	1 595	6%	1 689	6%
	940	1 105	18%	1 233	12%
Nanaimo Regional District					
2 Parksville-Qualicum Beach Area	82 060	101 600	24%	120 437	19%
• City of Parksville	21 745	28 315	30%		
• Town of Qualicum Beach	5 825	7 305	25%	8 743	20%
	3 410	4 420	30%	6 276	42%
3 Nanaimo Area	60 315	73 285	22%		
• City of Nanaimo	49 030	60 130	23%	69 494	16%
Cowichan Valley Regional District					
4 Ladysmith Area	52 285	60 400	16%	70 752	17%
• Town of Ladysmith	9 055	10 355	14%		
	4 390	4 875	11%	6 013	23%
5 Lake Cowichan Area	5 105	5 175	1%		
6 Duncan Area	38 125	44 870	18%		
• City of Duncan	4 035	4 300	7%	5 071	18%
• District of North Cowichan	18 670	21 375	15%	25 129	18%
Capital Regional District					
7 Sooke-Port Renfrew Area	264 385	299 315	13%	325 903	9%
8 Victoria Area (including Gulf Islands)	8 200	9 710	18%		
	256 185	289 605	13%		
Total South Vancouver Island	428 970	492 405	15%	550 292	12%

Sources: (a) B.C. Regional Index, Ministry of Government Services, 1995; (b) B.C. Stats.

Note: the 1986 and 1991 population figures are Census numbers. The 1994 population figure is an estimate only. It is based on a 1991 population figure which includes an estimate of the net 1991 census undercount. In addition, B.C. Stats does not identify sub-divisions in its 1994 population estimates. As a result, Regional District population estimates cannot be presented by Area.

data indicate signs of slowing turnover in the region's residential markets. Thus, for the 1994 over 1993 end of year period, percentage changes in price/sales volumes for the main non-Metro (Victoria) centres were as follows: Nanaimo +8%/-15%; Duncan +1%/-34%%; and Port Alberni +12%/-20%.³

Associated with this population influx are sizable expenditure injections into the south Vancouver Island economy. A large number of the in-migrants are economically self-reliant. Examples include retirees with independent sources of income, and self-employed entrepreneurs. By supporting regional spending, this population influx may help to mitigate some of the the downside effects that can accompany regional industry downturns. Overall however, the general outlook for the region's economy (plant expansions, public investments such as the Island Highway etc.), is a positive one.

Generally positive population and economic trends overlook the fact that industry restructuring impacts can be concentrated on specific individuals, operations, or communities. This can be the case with changes in TSA timber harvest levels. For the communities and individuals directly impacted, it is the conditions and prospects prevailing in the forestry sector that are of most direct interest, and for these groups, certain recent events (such as the Vancouver Island Land Use Plan) have created some uncertainty. The specific conditions and outlook for these directly impacted sectors is a crucial factor that must be considered.

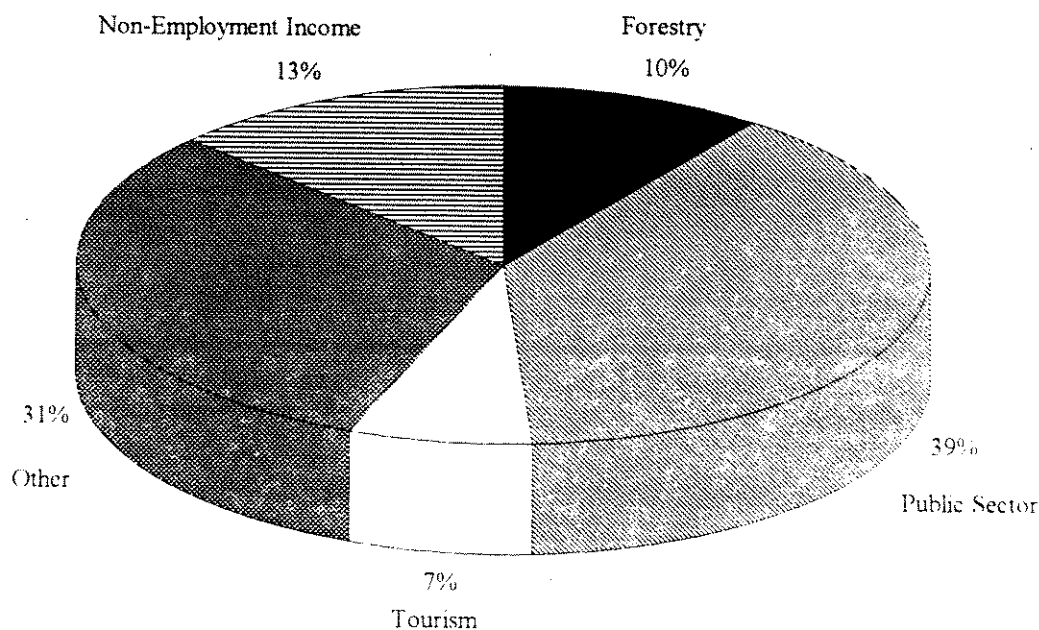
Employment Dependencies

Regional employment estimates, based on BC Stats data (1991), helps place this discussion in context. Figure 2.2 summarizes basic sector⁴ employment dependence within Southern Vancouver Island as a whole. It indicates that the public sector is the region's number one employer. The 'Other' category, which includes the mining (<2 percent), fishing and trapping (<2 percent), and agriculture (<3 percent) sectors, is the second largest source of employment. The 'Non Employment' category reflects non-basic employment associated with spending of investment, pension, unemployment insurance and social assistance income. The forestry and tourism sectors provide the remainder of the employment opportunities within the region.

Within the region, however, sector employment dependencies vary significantly. Table 2.2 presents employment dependencies according to the eight sub-districts located on South Vancouver Island. The Lake Cowichan, Alberni, Ladysmith and Duncan areas are all heavily dependent on the forest sector. The forest sector is important in Parksville-Qualicum, Nanaimo and Sooke-Port Renfrew, but not dominant. Only in the Victoria area does the forest sector play a minor role.

³ Source: Labour Market reviews (December 1994) for the Port Alberni, Cowichan, and Nanaimo CEC Regions.

⁴ For the purposes of this analysis, the Arrowsmith TSA economy is separated into two parts - the basic, and non-basic sectors. The basic sector is defined as the component of the economy that results in the in-flow of dollars from outside the local area. Examples of income sources considered to be part of the basic portion of the economy include sawmills and pensions. Although only one is classified as industrial, both the mill worker and the pensioner receive income from sources outside of the TSA. Conversely, the non-basic sector workers earn income by selling goods and services to individuals living in the local community. A pharmacist or grocery store clerk are two examples. The basic sector is assumed to be the driver of the local economy, in that employment and income generated in the non-basic sector ultimately depends on the spending of those employed in the basic sector.

Figure 2.2 Southern Vancouver Island - Employment Dependencies, 1990**Table 2.2 Southern Vancouver Island - Employment Dependencies by Area, 1990 ^a**

	Forestry	Public	Tourism	Other ^b	Non-Employment Income ^c
Alberni Area	39 %	21 %	11 %	20 %	9 %
Parksville-Qualicum Area	13 %	25 %	14 %	35 %	13 %
Nanaimo Area	14 %	28 %	6 %	39 %	13 %
Ladysmith Area	26 %	23 %	9 %	26 %	16 %
Lake Cowichan Area	50 %	22 %	7 %	12 %	9 %
Duncan Area	25 %	28 %	7 %	31 %	9 %
Sooke-Port Renfrew Area	9 %	39 %	8 %	36 %	8 %
Victoria Area	2 %	47 %	7 %	30 %	14 %
Arrowsmith TSA	10 %	39 %	7 %	31 %	13 %

a Note: the percentages shown above reflect each sectors' share of an area's total employment, i.e. in the Alberni area, 39 percent of the area's total labour force is either directly or indirectly employed in the forestry industry, or is employed in the local (non-basic) service sector supported by responding of employment income by direct and indirect forest sector workers.

b The "other" category includes several sectors, such as mining, fishing and trapping, and agriculture.

c The "non employment income" category refers to the share of non-basic employment (i.e. people who sell goods and services to individuals living in the local community) associated with the spending of investment, pension, unemployment insurance and social assistance income.

Despite a low relative employment ratio the actual employment numbers for Victoria are significant. Overall, the forest sector labour force accounts for an estimated 21 090 jobs out of a regional total of 225 281. Table 2.3 presents the actual forest sector employment numbers by sub-district. Note, the numbers identified here reflect total employment, i.e. include workers directly employed in the forest industry, as well as workers employed in industry sectors that supply the forest sector (indirect)⁵, and those employed in a service sector supported by re-sponding of employment income by direct and indirect forest sector workers (induced). Approximately 60 percent of the numbers shown in Table 2.3 represent direct employment, 15 percent indirect employment, and the remaining 25 percent induced employment.

Table 2.3 Southern Vancouver Island - Forestry Based Employment by Area, 1990

	Alberni	Parksville -Qualicum	Nanaimo	Lady- smith	Lake Cowichan	Duncan	Sooke Pt Renfrew	Victoria	Total
Forestry Workers	5 056	1 378	4 432	518	433	5 691	394	3 188	21 090

Source: G. Horne and C. Powell, The Forest District Tables, Ministry of Finance and Corporate Relations, March 1995. The database used to generate these employment dependencies was provided by B.C. Stats and is based on the 1991 Census. In general, the 1991 Census data reflects the labour force attachment that existed in 1990. Because of additional shrinkage in forest sector since 1990, the 1995 forest sector employment is probably less than indicated here.

The tourism/outdoor recreation sector is the other significant industry sector for which employment comparisons can be made. It has to be noted that this sector's links to TSA-based timber harvesting areas -- which are relatively small and fragmented -- are limited. The comparative BC Stats (1991) employment estimate for the tourism sector was 16 500 individuals.

2.2 Community Profiles⁶

The following briefly profiles the general economic structures for the distinct sub-regions that occur within the TSA.

Alberni Area

This area covers the Alberni-Clayoquot Regional District, and includes the City of Port Alberni, the Village of Ucluelet, the District of Tofino, and the communities of Bamfield and Sproat Lake. The area is heavily dependent on the forest sector as a basis for employment and income generation. The timber harvest comes from three sources: (1) TFL 44, operated by MacMillan Bloedel Ltd., (2) TFL 54, operated by International Forest Products Ltd., and (3) forest licences and timber sales as part of the Arrowsmith TSA. The Alberni area includes the majority of the TSA land base. In addition to timber harvesting activity, the City of Port Alberni is the location of two large sawmills (Alberni Pacific and Somass), as well as a pulp and paper mill. The City's

⁵ The estimate of indirect employment is a relatively conservative one, and only accounts for employment in firms or businesses that are closely identified with supplying the forest sector.

⁶ The primary source for the community profiles is the *British Columbia Regional Index*, Ministry of Government Services, 1995.

economy is dominated by MacMillan Bloedel Ltd., which owns and operates all three of these processing facilities. The City also has several smaller lumber mills (Coulson Manufacturing Ltd., Charlewood Forest Products, and Nagaard Sawmills Ltd.), and a host of smaller value-added and supply and service businesses. Outside of Port Alberni, the forestry activity is largely confined to harvesting and some administrative operations, mostly based at Ucluelet and Tofino. This area is also the administrative centre for the Port Alberni Forest District.

This area, particularly the west coast portion, also has outstanding outdoor recreation and scenic attractions. The principal attraction is the Long Beach segment of the Pacific Rim National Park. As a result, tourism is a key economic sector for the area, in particular for the communities of Tofino, Ucluelet and Bamfield. Its great natural attractions (Clayoquot Sound, Meares Island) have also been a flash point in the harvest/preservation debate. The recent conferring of protected and special management status to many areas through the Clayoquot Sound Land Use Decision (1993), and the timber harvest reductions that have resulted, has been a contributing factor to the recent downsizing and turbulence in the area's forestry sector. Aside from tourism/outdoor recreation, commercial fishing is also an important local economic activity. Unpublished DFO data indicate that there are approximately 300 commercial vessels registered with residents of the area. The major centres are Port Alberni (98 vessels), Tofino (71 vessels), Ucluelet (59 vessels) and Bamfield (27 vessels).

Parksville-Qualicum Area

This area includes the City of Parksville, the Town of Qualicum Beach, and the communities of Beachcomber, Coombs, Dolphin Beach, Errington and Nanoose Bay. Parksville-Qualicum was the fastest growing area in the Vancouver Island/coast region (and fifth in the province) over the period 1986-1991. Its long, safe beaches make this area one of the most popular family summer vacation areas on the Island. The area also boasts some excellent salmon, steelhead and trout fishing, and offers a large number of visitor accommodation units and public park facilities in addition to a wide range of marinas, golf courses and other commercial enterprises.

Forest industries also provide a substantial payroll to local residents, and are valued because of their stabilizing effect on the economy. Logging is the principal forestry activity, and MacMillan Bloedel Ltd. is the major logging operator. Virtually all of the harvest is from private lands. Small sawmills operate intermittently, but there are no permanent large processing facilities within this area.

Nanaimo Area

This area includes the City of Nanaimo, as well as the communities of Cassidy, Cedar, Cedar by the Sea, Extension, Gabriola Island, Lantzville, and South Wellington. Although growing rapidly and becoming increasingly diversified, the local economy is still dominated by forest industries, including logging, sawmills, veneer, and pulp and paper. The timber harvest in this area comes primarily from TFL 47 (including privately owned lands), operated by TimberWest Forest Ltd., and timber sales as part of the B.C. Forest Service Small Business Forest Enterprise Program. The principal logging operations are those of TimberWest and MacMillan Bloedel Ltd. The largest forest sector employer is the Harmac Pacific Inc. kraft pulp mill at Cedar, with a

workforce of approximately 1 000. There are also four large lumber mills operating in the area owned by Doman Forest Products Ltd, MacMillan Bloedel Inc., CIPA Industries Ltd., and Mayo Forest Products (majority owned by Pacific Forest Products Ltd.). Additional forestry employment is provided by a large nursery operated by MacMillan Bloedel, a veneer plant owned by Coastland Wood Industries, and a range of secondary manufacturing activities. This area is also the administrative centre for the Vancouver Forest Region.

The Nanaimo area also has a substantial forestry supply and equipment sector (e.g. Madill Ltd.), as well as a major shipment-industrial site located at Duke Point. The area is home base to a significant commercial fishing fleet of approximately 340 vessels.

Ladysmith Area

This area includes the town of Ladysmith and the communities of Saltair, Thetis Island and Yellow Point. The economy is based on forestry, principally sawmilling and logging, although some residents are employed at pulp mills in the Duncan and Nanaimo areas. The timber harvest in this area comes from TFL 47 (including privately owned lands), operated by TimberWest Forest Ltd. All timber harvested by TimberWest Forest Ltd is transported from Ladysmith Harbour to processing facilities on the lower mainland, or elsewhere on Vancouver Island. In 1994, there were two large lumber mills (owned by Doman Forest Products Ltd and Pacific Forest Products Ltd), and one small lumber mill (owned by Coastwise Industries Inc.) located in Ladysmith.

Tourism is also a significant sector of the local economy. The area experiences a high volume of highway traffic, with substantial numbers of visitors attracted to local camping facilities, and the Yellow Point resort.

Lake Cowichan Area

This area includes the Village of Lake Cowichan, and the communities of Youbou and Honeymoon Bay. The local economy is almost entirely forestry based. The timber harvest in this area comes from four sources: (1) private lands, (2) TFL 46, operated by TimberWest Forest Ltd., (3) TFL 44, operated by MacMillan Bloedel Inc., and (4) timber sales as part of the Small Business Forest Enterprise Program. Most of the mature timber on the private lands has been harvested, with the result that both logging and milling employment have declined steadily over the past two decades. The TimberWest sawmill at Youbou is the only remaining permanent large operation in the area. There are also a number of small independent mills and shake mills in the area.

With the decline in forestry, the Cowichan Lake area has witnessed some expansion and growth related to its natural outdoor attractions (steelhead and other freshwater fish, hunting and water based recreation), as well as its convenient commuting location to larger industrial centres. This area also includes Nitinat Lake on the west coast of the Island.

Duncan Area

This area includes the City of Duncan, the District of North Cowichan, and the communities of Cobble Hill, Cowichan Bay, Koksilah, Mill Bay, and Shawnigan Lake. Forest industries, particularly pulp and newsprint manufacturing, constitute the backbone of the local economy. The timber harvest in this area comes primarily from private lands (and, to a small extent, from timber sales as part of the Small Business Forest Enterprise Program). The area's largest employer is Fletcher Challenge, which employs over 1 000 people at the Crofton Pulp and Paper Mill. Doman Industries maintains its head office in Duncan, and operates two sawmills at Cowichan Bay, and at Chemainus. MacMillan Bloedel Inc. operates another sawmill at Chemainus. This area is also the administrative centre for the Duncan Forest District.

This area is experiencing rapid population growth, with much of the recent increase coming in the form of residential 'spill-over' from metropolitan Victoria. The area's general economy is quite diversified, with numerous small service and manufacturing businesses. It is estimated that there are about 105 commercial fishing vessels resident in the Duncan area. Local tourist attractions include Shawnigan Lake, salt water and fresh water fishing in Cowichan Bay and Cowichan River respectively, sailing off the east coast, the artisan village atmosphere of Chemainus, and the Native Heritage Centre in Duncan.

Sooke-Port Renfrew Area

This area includes the communities of Sooke, Port Renfrew and Jordan River. Forestry is the leading resource industry and the main support of the small communities of Port Renfrew and Jordan River. As well, forest industries provide much of the local employment base at Sooke. Population growth in the past decade, however, has occurred largely as residential spill-over from the Victoria area with many Sooke residents commuting to the city on a daily basis. The timber harvest in this area comes from three sources: (1) TFL 46 operated by TimberWest Forest Ltd, (2) TFL 25 operated by Western Forest Products, and (3) timber sale licences as part of the Small Business Forest Enterprise Program. The major logging operations are those of TimberWest Forest Ltd at Port Renfrew, Western Forest Products at Jordan River and Pacific Forest Products Ltd at Sooke. Most of the timber harvested moves to processing facilities outside of the area, although there is some interest in re-establishing small sawmills at Sooke and Port Renfrew.

At present tourism development within the area is largely restricted to the eastern portion which is easily accessible, has a more pleasing climate, and affords boaters more protection. Port Renfrew, in the western portion of the area, however, does possess a number of attractions which may eventually lead to increased tourism investment. It is located at the southern end of the popular West Coast Trail and close to the new Botanical Beach provincial park, and offers good fishing for salmon and steelhead in the nearby San Juan River.

Victoria Area

This area includes the Cities of Victoria and Colwood, the Districts of Esquimalt, Langford, Oak Bay, Central Saanich, North Saanich, Saanich and Metchosin, and the Towns of Sidney and View Royal. Service industries are the main sources of employment and income, with the largest payrolls being the Federal and Provincial governments. The second most important source of

employment is trade, which is supported in part by the large number of retired residents, and by the well developed tourist industry. Some loggers reside in Greater Victoria, but logging activity is minimal and limited to private holdings. Milling activity, which depends on logs from other parts of the province has declined markedly over the past two decades. Many forestry jobs continue to be provided by government administration and research activities.

2.3 First Nations

There are twenty nine First Nations with reserves and/or traditional territories located within the boundaries of the Port Alberni and Duncan Forest Districts.⁷

Based on 1993 Department of Indian and Northern Affairs population estimates, the native population affiliated with these twenty nine First Nations totals 13 199 (see Table 2.3). Of this total, an estimated 7 051 (approximately 53%) reside on reserves within the study area. The 29 First Nations are organized into the following five main tribal groupings:

- ***Nuu-chah-nulth Tribal Council:*** Affiliated with this Tribal Council are the following ten First Nations: Mowachaht-Muchalaht, Ahousat, Ditidaht, Hesquiaht, Opetchasaht, Clayoquot, Toquaht, Ucluelet, Ohiaht, and Uchuklesah.
- ***South Island Tribal Council:*** Affiliated with this Tribal Council are the following six First Nations: Cowichan Lake, Esquimaltm, Pauquachin, Tsawout, Tseycum, and Tsartlip.
- ***Mid-Island Tribal Council:*** Affiliated with this Tribal Council are two First Nations: Lyackson, and Penelakut.
- ***Alliance Tribal Council:*** The Chemainus, Nanaimo and Halalt First Nations are affiliated with this Tribal Council.
- ***Te'mexw Treaty Association:*** Affiliated with this association are the following five First Nations: Nanoose, Beecher Bay, Malahat, Songhees and T'souke.
- ***Independent:*** There are four unaffiliated First Nations, the Qualicum, Cowichan, and Pacheenaht.

Direct involvement of many of these First Nations and Tribal Councils in TSA-based forestry activities is limited. This is generally more true of those First Nations affiliated with the South Island, Mid-Island, and Alliance Tribal Councils. While individual members of some of the First Nations affiliated with these three Councils (notably the Nanaimo) are employed in forestry-related activities (e.g. in the Nanaimo area sawmills), their collective profile is that of an economic base geared more to other activities, e.g. operation of marinas, trailer parks and campsites, or general construction. Further, almost all of their reserves are located some distance outside TSA operating areas. This general profile could change in the future. Evidence of an increased interest in forestry involvement from among these groupings are the ongoing negotiations with the Ministry of Forests (Duncan District) regarding the processes/notification procedures to be followed in planning timber harvesting within their traditional territories. These negotiations are being conducted by two separate groupings that overlap the formal tribal council affiliations: the

⁷ The territories of the Mowachat-Muchalaht First Nation are mostly concentrated further north in the Strathcona TSA.

Hul'qumi'num (embracing the Cowichan, Lyackson, Chemainus, Lake Cowichan, Halalt, Malahat, and Penelackut First Nations) and the Te'mexw (the Nanoose, Songhees, Malahat, T'souke and Beecher Bay First Nations) groupings. Negotiations towards an Interim Measures "Forest Management Agreement" have been on-going for over a year, and appear to be close to reaching an agreement in principle.

As things currently stand, there is a greater level of involvement in forestry activities by the other First Nations groupings located within the TSA boundaries. The clearest example is that of the Toquaht First Nation, which was awarded a non-replaceable Forest License (Annual Allowable Cut of 25 000 cubic metres) in 1994 within the Arrowsmith TSA. As discussed in more detail later, this Forest License will be used to reactivate a small sawmill situated on the First Nation's main Macoah Reserve, thereby providing some sustainable employment for First Nation members. Another example is the Mowachaht-Muchalaht First Nation. Although their territories are concentrated within the Strathcona TSA (the main reserve is close to Gold River), they also extend south of Muchalaht Inlet and into Interfor's Mooyah Creek TSA operating area. The First Nation formed its own silviculture/creek cleaning company in 1993 (Mount Layton Contracting), and does occasional contract work with area licensees, including Interfor. Other First Nation members are employed logging for Pacific Forest Products in the Strathcona TSA. First Nation representatives have expressed a long-term interest in expanding forestry-based activities (through e.g. woodlots).

There are also signs of interest from other members of the Nuu-Chah-Nulth Tribal Council in acquiring greater access to timber harvesting rights. In addition to the Toquaht venture, the Ditidaht First Nation has submitted a joint bid with Rebco Ltd. of Port Alberni for a five year timber sale (totalling 90 000 cubic metres) under the Small Business value added (Section 16.1) program (although the timber in question is located in a TFL and not a TSA operating area). The Ahousaht First Nation is also reported to be engaged in negotiations with MacMillan Bloedel regarding a logging joint venture within MB's TFL areas on Flores Island.

These logging joint ventures represent an attempt by these First Nations to move from employee-based to owner-based involvement in the forestry economy. Many individual members of these West Coast First Nations are already working as loggers, tree planters, or as mill workers for MacMillan Bloedel, Coulson, Interfor, and TimberWest (to name the larger licensees) in Port Alberni and the general West Coast area. The emphasis varies between individual First Nations, but forestry, along with fishing and tourism (such as with the Clayoquot near Tofino) are their major sources of employment and income. Generally, the Nuu-chah-nulth Tribal Council has also been recognized as an equal stakeholder in the ongoing management and implementation of the Clayoquot Sound Land Use decision arrived at in April 1993.

Other First Nations that are indicating an increasing interest in forestry involvement are the Cowichan and Pacheenaht First Nations. The Cowichan First Nation is the largest of the 29, with an estimated population of approximately 3 000 individuals, most of whom reside on reserves in the Duncan and North Cowichan area. The Cowichan possess some significant economic assets, including retail stores and properties in the Duncan area, while their Native Heritage Centre in Duncan is a major tourist attraction. They also have interests in construction and trucking, and are

pursuing a broad range of joint venture partnerships through their Khowutzun Development Corporation. Forestry has not up to now been a focus, although First Nation representatives state that they wish this to change. They have plans to create their own forestry company to enter into joint logging and other ventures with non-native concerns, and have a two-year job creation target of 100 positions.

The Pacheenaht First Nation has four reserves situated on the southwestern coast of Vancouver Island, close to Port Renfrew. A few First Nation members are employed providing West Coast hiking trail services (campsites, small ferry), and in constructing the new Juan de Fuca Marine Trail. Some First Nation members have also received job training in silviculture, and the First Nation now actively competes for Ministry of Forests and industry silviculture contracts. The Pacheenaht First Nation have also expressed interest in obtaining a Forest Licence in the Duncan Forest District, as well as accessing future timber sales under the Ministry's Small Business Program.

Table 2.4: Southern Vancouver Island: First Nations Population Summary, 1993

First Nation	Population (1993)	On Reserve
Nuu-chah-Nulth Tribal Council		
Ahousaht	1 390	663
Ditidaht	453	178
Hesquiaht	511	138
Opetchesaht	199	91
Clayoquot	569	294
Toquaht	112	34
Ucluelet	509	327
Uctucklesaht	122	18
Mowachaht/Muchalaht	372	180
Ohiaht	462	129
South Island Tribal Council		
Esquimalt	131	58
Pauquachin	252	165
Tsawout	530	357
Tseycum	118	82
Tsartlip	633	395
Mid-Island Tribal Council		
Lake Cowichan	12	10
Lyackson	165	25
Penelackut	619	412
Te'mexw Treaty Association		
Beecher Bay	174	67
Malahat	210	71
Songhees	306	180
T'souke	139	55
Nanoose	176	81
Alliance Tribal Council		
Halalt	181	73
Chemainus	794	530
Nanaimo	993	412
Non-affiliated		
Cowichan	2 775	1 913
Qualicum	88	39
Pacheenaht	204	74
Total	13 199	7 051

3.0 Environment and Outdoor Recreation

The next three sections provide a general overview of the ecological, wildlife, and fisheries resources/issues within the Arrowsmith TSA. This material has been prepared using relatively standard sources, and with input from Ministry of Environment, Lands and Parks (MELP) staff. This general overview was not intended to be, nor should it be construed as, a comprehensive inventory of environmental issues in this area. Such a task lies well beyond the scope of this report.

3.1 Ecological Setting

The Arrowsmith TSA lies within a general area that consists of three distinct ecosections: the Leeward Island Mountains ecosection; the Nanaimo Lowland ecosection; and the Windward Island Mountains ecosection. The first two lie within the Eastern Vancouver Island ecoregion, and the Windward ecosection falls within the western Vancouver Island ecoregion.⁸ The variation in topography, landform, and climate has created a complex mosaic of ecological conditions.

Most of the forested land within the Arrowsmith TSA belongs to the Coastal Western Hemlock (CWH) biogeoclimatic zone. This is the most productive forest ecosystem in Canada. Western Hemlock is the most common tree species in the CWH zone, with Douglas-fir, Western Red Cedar, Sitka spruce, yellow cedar, amabilis fir, mountain hemlock, shore pine, big-leaf maple, and red alder occupying the forest canopy, commensurate with local conditions and the disturbance regime of the stands.

Old-growth forests in the CWH zone provide important habitat for many varieties of birds, mammals, reptiles and amphibians. The old-growth canopy is an excellent snow interceptor and the rain of arboreal lichens and needles provides a critical supply of winter forage for black-tailed deer. After clear-cutting, the regrowth of vegetation provides an abundant source of forage and habitat for many mammals and birds. Forest regeneration in the CWH zone is usually rapid, with openings quickly developing a dense canopy with little understory vegetation.

The other main forested ecosystem within the Arrowsmith TSA is the Mountain Hemlock (MH) biogeoclimatic zone. Mountain hemlock is the most prevalent tree species; others include amabilis fir, yellow cedar, western hemlock, western red cedar, Douglas-fir, and western white pine. Tree growth in the MH zone gradually diminishes with increasing elevation until the tree canopy becomes discontinuous and interspersed with alpine tundra. Old growth forests in the MH zone also provide important habitat for different varieties of birds, while mammals tend to be concentrated in avalanche tracks or south-facing rock outcrops. The endangered Vancouver Island Marmot is found in herb meadow habitat (although not within actual TSA areas).

⁸ The ecoregion classification system was adopted by the Wildlife Branch of the Ministry of Environment, Lands, and Parks in 1985 to serve as a framework for recognizing small-scale ecosystems in British Columbia (Dennis A. Demarchi). The attributes of ecosystems at the landscape level are a function of topography, geology and subregional weather patterns. Related biogeoclimatic systems occur in elevational bands and are based on diagnostic plant associations that provide insight into the forest and wildlife values within ecosections.

The eastern part of the TSA, within the rainshadow of the Vancouver Island and Olympic mountains, also contains the Coastal Douglas-fir (CDF) zone. The majority of forests here have regenerated after logging that occurred at the turn of the century, and consist of Douglas-fir often accompanied by Western red cedar, grand fir, arbutus and Garry Oak.

Wildlife impacts tend to be evaluated on the basis of altered ecological habitats. However, the pattern of small and dispersed operating areas within the Arrowsmith TSA makes it difficult to generalize regarding possible patterns of ecological disturbance arising from varying future timber harvest scenarios. Although relatively small in size, the Arrowsmith TSA areas acquire added ecological value from the fact that the forested habitat in the surrounding area is being steadily encroached upon (particularly in the Duncan Forest District) by human and industrial settlement. These pressures are generally less advanced in the western half of the TSA (mostly the Port Alberni Forest District, but also parts of the Duncan District in the Sooke area). This area also benefits from the more comprehensive protective influence of a large number of regional and local land-use planning processes, many of which have come about following years of high-profile debate. These include; the new Protected Areas created under the Vancouver Island Land Use Plan; the Clayoquot Sound land-use decision; and special protection measures (e.g. forest ecosystem networks, special management areas, or local resource use plans), for the following subregional areas of interest: Pretty Girl Lake; Easter Lake; Flores Island; Lower Kennedy River; Toquart Lake; and Effingham Creek.

Although covering a smaller landbase, a number of constraining processes have also been put into effect in the eastern portion of the TSA. Those modelled within the Timber Supply Review process include protection of deer winter range as environmentally sensitive areas. For all parts of the TSA, the future implementation of the new Forest Practices Code will also ensure target biodiversity objectives will be met, irrespective of wherever future timber harvest levels are set.

Some specific issues were identified by MELP staff that have particular application in the more populated eastern areas of the TSA. These are as follows:

- ***Proximity to large population centers:*** The easily accessible forest lands of the southern and eastern portion of the Arrowsmith TSA are heavily utilized by a wide variety of recreational users, many from the Greater Victoria metropolitan area. MELP has suggested recreational fishing corridors on certain rivers (including the Cowichan, Gordon, Nanaimo, and Chemainus Rivers). Timber harvesting within, or adjacent to these corridors, will be planned to accommodate maintenance of fish habitat, access trails and the aesthetic qualities of the fishing experience. Because of the highly visible nature of forest harvesting activities in parts of the Duncan Forest District, public concerns have resulted in District staff implementing new and innovative harvesting methods and silvicultural systems, such as selection harvesting and single tree retention.
- ***Provincial Forest Dispersion:*** The dispersed nature of TSA forest stands within the Duncan Forest District has important implications for biodiversity management. Surrounded by predominantly private lands on the east coast, forest and wildlife managers are hampered in their ability to implement landscape level biodiversity strategies (e.g. maintaining connectivity of ecosystems, or maintaining a variety of patch sizes and forest stand attributes and

ecosystem representation across a variety of landscapes). MELP considers it likely that the highest standards of stand level biodiversity management will be required on these fragmented chunks of TSA land, due to the lack of biodiversity management authority on adjacent private land.

- ***Second Growth Management Issues:*** Several of the TSA lands (e.g. Holland Creek, Coronation Mountain) are second growth stands that were harvested prior to integrated resource management concepts, and are now reaching economic rotation age. In the view of MELP, some of these areas are capable of becoming ungulate winter ranges. As such, MELP is interested in seeing this habitat restored for ungulate use. In addition, earlier silviculture systems resulted in a high proportion of coarse woody debris and snags left behind after harvesting. Coarse woody debris and wildlife trees provide habitat for a multitude of species, especially cavity nesting birds, small mammals and marten. More attention is being paid to maintaining higher levels of coarse woody debris while avoiding unnecessary waste in these areas.
- ***Rare and Endangered Species:*** Recent research undertaken in the course of planning for protected areas has resulted in the identification of ecosystem under-representation in the Duncan Forest District, as well as better documentation of rare plants and animals. It is MELP's view that proposed harvesting operations may conflict with the biodiversity goals of ecosystem representation in the Duncan Forest District. Old growth coastal Douglas Fir areas are considered especially rare and relatively vulnerable, however, remnants of old forests can still be found within the provincial and Regional District Park system.
- ***Coastal Watershed Assessment:*** The combination of terrain sensitivity, climate, soils, past harvesting rates, past road construction techniques and maintenance have resulted in cumulative impacts on stream channels and fish habitat. These impacts will need to be quantified as part of the new Forest Practices Code. The watershed restoration program under Forest Renewal B.C. will aid in restoring damaged coastal watersheds.
- ***Community Watersheds:*** Some of the TSA lands are within designated community watersheds (e.g. Holland Lake). New standards regarding riparian protection and rate of cut within these areas may impact the future availability of timber from these areas.

3.2 Wildlife⁹

The Port Alberni and Duncan Forest Districts contain a diverse array of wildlife. Native mammals include black-tailed deer, Roosevelt elk, black bear, wolf, Vancouver Island marmot, beaver, pine marten, wolverine, short-tailed weasel, and other fur-bearing species. Native and migratory birds in the forests of the area include species of management concern such as marbled murrelets, Queen Charlotte Island goshawks (coastal sub species of northern goshawks), great blue herons, and pileated woodpeckers. Adjacent marine habitats and estuaries support populations of species such as Peale's peregrine falcons, bald eagles, trumpeter swans, and harlequin ducks. Little is known regarding the current status and ongoing habitat requirements of the area's bird population, nor those of the amphibians and reptiles.

⁹ Source: Regional Wildlife Plan for the Vancouver Island Region, Wildlife Branch, Ministry of Environment, September, 1988.

Vancouver Island is a significant contributor to the provincial deer harvest, respectively contributing (1976 - 1986 average) approximately 36% and 10% of the total. Given relatively constant hunter participation rates, and continuing population growth on Vancouver Island, MELP is projecting a steady increase in demand for deer hunting over the next few decades. Deer hunting on the Island is almost entirely resident-based, with non-resident hunters accounting for 1% or less of the total deer harvest and effort.

Non-hunting uses, such as viewing wildlife, are also increasing, especially in areas relatively close to population centres, and in designated recreation areas. According to MELP officials, ungulates are second only to marine mammals as a species group generating most viewing interest.

Elk

Roosevelt elk occur in Canada only on Vancouver Island, in a small number of mainland inlets, and on the Sechelt Peninsula and Powell River areas (where they were transplanted to in the late 1980s). Historically, elk were more widely distributed in coastal British Columbia than they are now, but human settlement and excessive hunting pressure, particularly on the lower mainland and southern Vancouver Island, led to local exterminations. Although now abundant in some areas of Vancouver Island, Roosevelt elk are considered to be below their maximum sustainable population level.

MELP has estimated the 1986 population of elk in the Vancouver Island Region at between 2170 and 2770, approximately 35% of which (about 850 animals) are located in the seven Management Units within the Port Alberni and Duncan Forest Districts. As is the case with deer, a very small proportion of this South Island population total occurs specifically within TSA areas. Habitat requirements for elk are broadly similar to deer, except for more specific requirements for old growth winter range. Second rotation logging can create favourable habitat for elk, while thinning of second growth stands enhances forage production. Recent mild winters have helped increase elk populations. Wolf and possibly cougar predation are factors in areas where deer numbers are low. Because of the relatively clumped distribution of elk (which are herding animals), populations can be threatened through illegal kills.

In addition to controlling unregulated hunting and illegal kills, achieving particular forest management objectives (such as the treatment of regenerating stands to encourage forage production, the deferment of critical old growth winter range, and creation of second growth winter range) will be necessary to achieve MELP's population targets for elk. The legal hunting of elk is strictly controlled and divided between a native sustenance/ceremonial harvest and non-native Limited Entry hunt. There is a very high level of interest in elk hunting, as indicated by ratios of Limited Entry Hunt applications to available authorizations. Due to high native and non-native resident hunter demand, non-resident elk hunting is and will remain a very small proportion of any overall harvest allocation. As with deer, non-hunting uses such as wildlife viewing opportunities are high near human population centres

3.2.2 Predators

This wildlife category includes cougar, wolves, and black bear. The following population estimates were compiled by MELP staff, and are for those Management Units (MU's 1-2 through 1-8) that overlap with the Arrowsmith TSA.¹²

- **Cougar** (population 230 - 296): Population trends are believed to be positive. Cougars prey largely on deer, and tend to do well when the deer population is doing well.
- **Wolf** (population 65 - 140): After big increases in the 1970s and 1980s, the wolf population is now thought to be stable or possibly decreasing. This is partly in response to the wolf kill program, and partly in response to the earlier decline in deer numbers.
- **Black Bear** (population 2 415 - 3 049): The black bear population on the Island is relatively healthy, and can benefit from the improved forage available after timber harvesting. They are most at risk from hunters, who gain access by using logging roads

3.2.3 Wildlife Hunting and Guide Outfitting

Table 3.1 summarizes recent patterns (1993/1994) of wildlife hunting activities and related expenditures on Southern Vancouver Island, as estimated by the Fish and Wildlife Branch of MELP.

Table 3.1: Southern Vancouver Island: Hunting Activity and Expenditures (\$1994)^a

Species	Number of Resident Hunters	Number of Non-Resident Hunters	Total Expenditures
Black Bear	573	54	\$ 493 550
Cougar	89	5	158 490
Deer	7 333	3	4 450 760
Wolf	365	--	334 250
Upland Birds	n/a	--	467 000
Waterfowl	n/a	--	296 000
Total	n/a	n/a	\$ 6 200 050

a Source: B.C. Ministry of Environment, Lands and Parks, Fish and Wildlife Section.

As the Table shows, hunting in the TSA is mainly by residents, with deer being the primary target. Of the \$6.2 million in estimated total expenditures related to hunting, \$4.5 million related to deer hunting. MELP estimates place the total province-wide employment impact of these expenditures at 37 Person Years. This estimate is derived based on the simulation of the above level and pattern of expenditures through the BC Input Output Model. Wildlife viewing is also increasing

¹² Source: MELP, Fish and Wildlife Branch, Nanaimo. The numbers apply to Management Units 1-2 to 1-8. Population estimates based on Nimpkish black bear study; Northwest Bay cougar study; and wolf sightings reported to Wildlife Branch. Estimates are for adults only.

in significance. For the general area that overlaps and surrounds the Arrowsmith TSA, MELP has estimated related annual expenditures for this activity at \$54 million (\$1994) annually.

3.2.4 Guide Outfitters and Trappers

The land base of British Columbia is divided into guiding territories, for which MELP issues guide outfitting certificates. Non-resident hunters are required to use the services of guide outfitters. There are six licensed guide outfitters with operating areas that overlap the Arrowsmith TSA. The most common species hunted are black bear. Hunting values in the Arrowsmith TSA are lower than in more remote, wilderness parts of the province. For 1994, MELP has estimated a total of 55-60 non-resident hunters. Based on industry-wide client averages of 30-40 per operation, this estimate may be low.

MELP registered 76 trappers in the general Arrowsmith TSA area in 1994, with an estimated average net revenue of \$3 328 (this excludes non-registered native trappers).

3.3 Fisheries

3.3.1 Saltwater Fisheries

The coastal areas of southern Vancouver Island are important centres for commercial and sport saltwater fishing. The majority of this activity however, particularly in the commercial fishery, is driven by migrating, non-local stocks. Moreover, the contribution of those stream and lake systems specifically located within Arrowsmith TSA areas is proportionately even less.

The one area adjacent to a relatively large TSA block where there is a concentration of fishing effort (particularly of sport fishing) is in the waters of Barkley Sound and Alberni Inlet. This area has seen an explosion of sport fishing in the last decade, with the sport catch and number of boater days increasing twentyfold since the early 1980's; total boat days in the area are currently estimated at almost 150 000 annually.¹³ The major species caught (by both the sport and commercial fishery) are sockeye and chinook. The local stream systems that support this fishery however lie entirely outside TSA areas. For example, the Somass is by far the most significant salmon producing river in the Barkley Sound area (and one of the leading systems on Vancouver Island), and accounts for over 90% of area escapements (of sockeye, chinook, and coho). It, and the next top three streams (the Nahmint, Henderson, and Sarita), all lie outside TSA areas. Furthermore, the chinook sport fishery in the area is largely directed at Robertson Creek hatchery stock entering Barkley Sound.

Within Barkley Sound and adjacent areas, there is only one relatively prolific salmon producing water that crosses TSA lands - the Kennedy River and Lake system. It has recorded sockeye escapements in some years of up to 7 000 (the Somass regularly records escapements of 300-400 000). Although producing significantly less (100 or less annually), the Toquart and Effingham river systems are also identified for mention by MELP. The Toquart is currently the subject of a local land use planning process that is incorporating streamside protection measures.

¹³ Source: Barkley Sound Planning Strategy, November 1993.

Within the TSA generally, the following are the primary stream systems that flow in whole or in part through TSA areas:

- **West:** Toquart, Effingham, Kennedy, Escalante, and Gordon Rivers (the latter two only for relatively small stretches).
- **East:** Qualicum, Nanaimo, Haslam, Cowichan, Chemainus, Koksilah river systems (only portions of each).

The TSA stream systems located in the West are very low salmon producers, and are largely limited to sockeye runs. The stream systems in the East are much more prolific, particularly of chum (100 000+ annually), to a lesser degree of chinook (up to 10 000 annually for the Cowichan), and almost not at all for sockeye or pink (escapement data are unavailable for coho). The TSA portion of these stream systems accounts for a very small portion of their overall length.

3.3.2 Freshwater Fisheries

There is an extensive freshwater fishery in the South Vancouver Island area, some of which occurs within, or close to, TSA areas. Reliable user statistics exist only for the steelhead fishery. The South Island area has nine of the top twenty (ranked by user days) Vancouver Island steelhead streams. These are the Stamp (#1), Cowichan (#2), Little Qualicum (#4), Nanaimo (#5), Big Qualicum (#7), Englishman (#8), Harris (#15), China Creek (#17), and Chemainus (#19). Levels of use are closely correlated with proximity to centres of population. There are also several other popular but smaller steelhead streams in the area. Overall, for the most recent period for which statistics are available (1992/1993), a total of approximately 42 000 user days were recorded in the South Vancouver Island area (Port Alberni and Duncan Forest Districts), corresponding to approximately 70% of the total user days for the Island. Five of these major steelhead streams (Nanaimo, Cowichan, Big and Little Qualicum, Chemainus) extend for varying stretches through TSA areas, as does the Gordon River, which is known for its summer runs of steelhead.

Although user data are unavailable, there are also other valued lake and stream fisheries (e.g. trout) in the wider area. These generally inhabit the smaller river systems. Toquart Lake was identified by MELP staff as one to note; special lake-side protection measures will apply to it under the Toquart Local Resource Use Plan (LRUP) now being completed.

Generally, the stream and lake protection measures now in effect in the Arrowsmith TSA are viewed as adequate by MELP officials. These are also being enhanced as part of the new Forest Practices Code and the Forest Renewal B.C. program, as well as other area-specific processes.

3.4 Outdoor Recreation

The Arrowsmith TSA includes several important tourism/recreation areas. They can be divided into the following four general areas:

- **West Coast - Sooke to Port Renfrew area:** highway access with hiking and beach related activities;

- **West Coast - Barkley Sound:** marine related activities with road and marine access, high volume of highway visitors;
- **West Coast - north of Tofino:** marine related activities with marine access, more remote experience; and,
- **East Coast:** combination of land based activities, such as golf, hiking and touring with marine related activities, such as boating and fishing; high volume of highway touring visitors.

The following is a discussion of the recreation/tourism focus within each of these areas.

West Coast - Barkley Sound

The Barkley Sound area has numerous well-known scenic and recreation features. Popular activities include sport fishing, wildlife viewing, scuba diving and general boating (power, sail and kayak). The majority of the activities occur on the waterways and beaches throughout the Sound. The area's key recreational feature is the Broken Group of Islands, which form part of Pacific Rim National Park (and as a consequence are fully protected from industrial development). The key areas of concern with respect to Barkley Sound generally focus on the scenic resources, and specifically those areas seen from the waterways. Broughton Peak, which provides the backdrop for the Barkley Sound and Toquart Bay areas, has received extensive visual analysis, and cut blocks have been planned to avoid visually prominent areas.

The area has experienced significant growth in visitation over the past five years. Visitation to the Broken Group Islands has increased by 88 percent from 1986 to 1992, with an estimated 21 000 visitors in 1992 arriving by boat.¹⁴ Toquart Bay (a Forest Service Recreation Site providing marine access to Barkley Sound) has experienced a 50 percent increase between 1985 and 1991 to over 37 000 visitor nights in 1991.¹⁵ This site has the highest visitation of all Forest Service Recreation Sites within the province. The Lady Rose and Francis Barkley passenger/freight vessels, which provide access to the Sound from Port Alberni, have doubled their passenger traffic since 1983 to over 20 000 passengers in 1992 (Barkley Sound Planning Committee, 1993).

Sport fishing is the most popular activity within the Sound. Over 80 percent of private boaters, and 60 percent of campers (those arriving by car and typically bringing their own boat) visiting the region participate in fishing at some point during their stay (Environment Canada 1989 survey). The number of days spent on saltwater sport fishing within the Sound has increased significantly from an estimated 20 000 in 1981, to over 150 000 in 1992. It has now reached a point where serious concern is being expressed regarding the possible negative impacts of over-use. Sport fishing is often combined with other marine related activities such as viewing of marine mammals, birds and tidal pools. Hiking and beach exploration are also very popular.

Those visitors who arrive with their own boat utilize the various marine access points such as Alberni Canal, Toquart Bay, Ucluelet and Bamfield. Although having their own means of transportation they do utilize the facilities and services provided within the local communities.

¹⁴ Source: Barkley Sound Planning Committee, 1993.

¹⁵ Source: Ministry of Forests, 1991.

A second category of visitor is the one who arrives by car (or air) and purchases such local tourism services as accommodation, boat charters or rentals, or food, while in Barkley Sound. This group of visitors is increasing each year, and the number of businesses which support these visitors is also increasing. There are also several remote sport fishing lodges located within the Sound which offer multi-day fishing packages. A summary of the types of tourism businesses offering tourism related activities to Barkley Sound is provided below.

- ***Sport fishing charters:*** seven in Port Alberni, five in Ucluelet, one in Bamfield;
- ***Sport fishing lodges:*** two in Ucluelet, one in Bamfield, eight in Barkley Sound;
- ***Wildlife viewing charters:*** five in Port Alberni, three in Ucluelet;
- ***Scuba diving:*** one in Port Alberni, one in Barkley Sound.

Barkley Sound has recently undergone a planning process to provide overall direction for future development within the Sound. An area designation system has been developed to help guide future area uses. Specific area designations include: Environmental Protection Areas, Marine Recreation Areas, and Aquaculture Priority Areas. Specific local areas that lie within the Arrowsmith TSA include the following:

- The Marble Cove area of ***Tzartus Island*** and portions of the Deer Group of islands have been noted as Marine Recreation Areas. A floating sport fishing lodge and 10 float homes are located within the bays around Tzartus Island. Tzartus Island plays a key role with respect to the backdrop it provides for boats entering Barkley Sound from Alberni Inlet.
- ***Mouth of Alberni Inlet:*** This area provides access to Uchucklesit Inlet where two sport fishing lodges and 28 float homes are located. Rainy Bay to the south of this area is home to 15 float homes and a charter operation which provides year round scuba diving packages.
- ***Effingham Inlet across to Toquart Bay*** has several areas noted as Marine Recreation Areas (including Pinkerton Islands, Alma Russell Islands, Julia Passage and Stopper Islands). There are three sport fishing lodges and 24 float homes located in the general area. The Lady Rose will be operating a lodge near Alma Russell Islands to serve their camping and kayaking passengers. Nearby Lucky Creek is noted in the Forest Recreation inventory as a significant recreation area; Skull Lake has a high value for caving. The head of Effingham Inlet, Pipestem Inlet, and Toquart Estuary have all been noted as Environmental Protection Areas under the Barkley Sound planning process. Vernon Bay has been noted as an Aquaculture Priority Area.

West Coast - Sooke to Port Renfrew

The highway from Sooke to Port Renfrew provides beach viewing opportunities of Juan De Fuca Strait. Port Renfrew is at the end of the paved road, and provides access to the West Coast Trail segment of Pacific Rim National Park. Sport fishing charters are offered out of Port Renfrew. Although some marine activity accesses Port Renfrew and Barkley Sound from Victoria, recreational marine traffic along this part of the coast is limited due to the exposed marine conditions.

Three Provincial Parks provide beach access to the coast. The 1993 use levels for these three parks were as follows:

- **Botanical Beach** (2 km south of Port Renfrew): 9 530 day use parties;
- **China Beach** (5 km south of Port Renfrew): 18 718 day use parties;
- **French Beach** (5 km east of Jordan River): 8 004 camping parties, 39 472 day use parties.

The new Juan de Fuca marine trail connects the West Coast Trail at Port Renfrew to China Beach Provincial Park near Jordan River. The trail is a provincial parks initiative. It runs parallel to the beach along the San Juan ridge and has a number of vehicular access points.

The new Kludak trail follows the height of land along the San Juan Ridge. The ridge has high recreational values for short walks, or multi-day hikes by foot or on mountain bike. The area has been considered for Wilderness Area status under the Forest Act; it is currently designated as a low intensity area under the Vancouver Island Land Use Plan.

In addition, twelve short hiking trails have been developed near Port Renfrew to take pressure off of the West Coast Trail. The Sooke, Port Renfrew, Gordon River areas have also seen a tremendous increase in hiking enthusiasts over the past few years.

East Coast

The TSA areas on the eastern side mostly consist of small and dispersed pockets. Larger pockets are located near the Cowichan Lake/Duncan stretch of highway, and in the Bowser area north of Nanaimo. For both of these and the many other smaller areas, the TSA lands play an important role in providing access for hiking, trail riding and boating on crown lands. Most of the land on the east half of the island is either already developed, or consists of private land with restricted public access. This area also experiences high tourism and general recreation pressures. The most popular activities are marine related, as well as, hiking and golfing. Cowichan Lake in particular is very popular as it provides a lake boating experience close to an urban setting. Concerns have been expressed by both residents and tourism operators that, since there is so little crown land available for access on the eastern half of the island, access to TSA lands should be maintained. The larger blocks of TSA lands visible from the waterways are also a concern, especially with the demand for development on private lands. A community association at Shawnigan Lake have recently started mapping hiking trails on Crown land around the lake.

The following illustrates that, for both the Cowichan and Bowser areas, visitation to the various Recreation Sites and Provincial Parks sites is significant

Cowichan Lake and River Area

- Skutz Falls Recreation Site: 40 camp sites;
- Pine Point Recreation Site: 35 camp sites;
- Maple Grove Recreation Site: 35 camp sites;

- Nixon Creek Recreation Site: 25 camp sites (total annual number of visitors for these first four sites is estimated at 20 000);
- Gordon Bay Provincial Park: 131 camp sites, with 37 552 camping and 96 082 day use visitors;
- Spring Beach Recreation Site: trail access only, with 1 000 day use visitors;
- Bald Mountain Recreation Site: trail or boat access only, with 500 day use visitors.

Bowser Area

- Rath Trevor Beach: 326 camp sites, with 88 900 camping and 498 650 day use visitors;
- Horne Lake Caves Provincial Park: 51 300 day use visitors;
- Spider Lake Provincial Park: day use only, with 37 520 day use visitors.

It was noted by Forest District staff that the Forest Recreation sites in the Cowichan Lake Valley were under severe pressure. In response, a system of user fees have been implemented, and the sites are now closed to additional campers once all camp sites are full. Prior to initiating this system, the number of visitors for the four sites (Pine Point, Maple Grove, Nixon Creek and Skutz Falls) was over 50 000 per year. Numbers of visitors are now limited to 20 000 per year. This has resulted in overflow demand for new camp sites within the area. However, within the TSA lands, the land available for recreation has reached its limit.¹⁶

One Low Intensity Use Area is being proposed for the area near Bowser. This is the Upper Qualicum LIA - which includes the valley bottom land of the Upper Qualicum River drainage, upstream of Horne Lake Caves Provincial Park. This area was identified as suited for alternative forestry practices, and the intent is to have the second growth biodiversity and recreational values of this area managed under LIA status. The LIA committee recommended that the area be used to foster labour-intensive, low impact silviculture systems within the Ministry of Forest's Small Business program.

West Coast - Tofino North

There are small pockets of TSA lands which occur north of Tofino within Clayoquot Sound. They all will be managed within the parameters that flow from the Clayoquot Sound Land Use Decision (April 1993). Areas visible from the waterways are being managed for their scenic values under the Scenic Corridors Landscape Management Plan which is currently in its final draft stages.

There is a relatively large TSA area north of Clayoquot Sound which forms the backdrop to Zuciarte Channel (accessing Muchalaht Inlet). Access to this area is limited to boat access from Clayoquot Sound or from Tahsis. As a result, the number of boaters in this area is significantly less than in Clayoquot Sound to the south, or Kyuquot Sound to the north. However, there has been an increase over the past few years which has been attributed to boaters and anglers seeking out more remote locations. The Zuciarte face is the back drop to Friendly Cove, which has been

¹⁶ Personal communication: Gary Murdoch, Recreation Officer, Duncan Forest District.

designated a historic site (where Captain Cook came ashore in 1878). The western tip of Bligh Island is a proposed new protected area under the Vancouver Island Land Use Plan.

4.0 Forestry Sector Overview

The Arrowsmith TSA represents a relatively small proportion of Southern Vancouver's timber harvest profile. Overall, the contribution of timber from the Arrowsmith TSA accounted for approximately 8 percent of the total harvest over the period 1991 to 1994. The largest shares of the harvest were from TFL tenures and private land, which together accounted for approximately 74 percent of the total. Table 4.1 presents the recent harvest history profile for the Port Alberni and Duncan Forest Districts.

Table 4.1: Southern Vancouver Island - Harvest History, 1991-1994^a

	1991	1992	1993	1994	% Total Avg 1991-94
(millions of cubic metres)					
Tree Farm Licences (TFL) ^b	2.14	1.81	1.76	1.75	35.4%
Private Forest Land ^c	1.94	1.91	1.96	2.23	38.3%
Timber Licences ^d	1.03	0.89	0.88	0.97	18.0%
Timber Supply Area (TSA)	0.37	0.41	0.52	0.37	8.0%
Other ^e	0.01	0.02	0.01	0.02	0.3%
Total	5.49	5.04	5.13	5.34	100%

a Source: Harvest Database System, Valuation Branch, Ministry of Forests.

b TFL includes Small Business Enterprise Forest Enterprise (SBFEF) timber sales on TFL land. There are five TFL's within the Duncan and Port Alberni Forest Districts. Their operators, and approximate proportions of the TFL harvest are as follows: TFL 44, MacMillan Bloedel Inc. (71%); TFL 54, International Forest Products (4%); TFL 25, Western Forest Products (5%); and, TFLs 46 and 47, TimberWest Forest Ltd (20%).

c The major portion of the privately-held land originates with a single Crown grant awarded for the construction of the E&N railway. The same few companies that hold TFLs also own most of the private managed forest land. As of 1993, the top four holders of private managed forest land were MacMillan Bloedel Inc, TimberWest Forest Ltd, Pacific Forest Products Ltd., and Western Forest Products (Doman).

d Timber Licences (TLs) are area based tenures that were issued in the early 1900s. After harvesting, the area reverts back into either the TSA, or a TFL. The majority of the TLs on Southern Vancouver Island are incorporated within the TFL timber harvesting land base, and are owned by TFL licensees.

e Includes timber harvesting on woodlots, and federal and Indian Reserve lands.

4.1 Arrowsmith TSA Land Base

The Arrowsmith TSA covers a land area of 168 826 hectares. As illustrated in Table 4.2, approximately 44% of that total area, or 74 436 hectares, contributes to the timber harvesting land base.¹⁷ Areas excluded from the productive forest land base include the following:

- Non-forest areas (such as rock or swamp) - these cover about 19% of the total land base;
- Areas managed by other agencies (such as parks and recreation areas) -these cover about 7.2% of the total land base;
- Inoperable areas, i.e. areas unavailable for harvest for terrain related (for example slope or soil stability) or economic reasons - these cover an estimated 12.4% of the total land base;

¹⁷ This reflects the available land base prior to the Clayoquot Land Use Decision and the Vancouver Island Land Use Plan.

- Environmentally sensitive areas - these cover an estimated 7.8% of the total land base;
- Riparian areas (i.e. river and lakeside buffers) - these cover an estimated 1.5% of the total land base;
- Deciduous and non-merchantable forest types - these cover about 5.1% of the total land base; and,
- A variety of smaller classification areas, which include roads, specific park areas (Parkinson Creek), and miscellaneous smaller categories.

Overall, an estimated 19% of the Arrowsmith TSA is classified as non-forest, another 7.2% is not managed by the Forest Service, and a further 25.2% is removed for a variety of other reasons.

Forests available for harvesting in the Arrowsmith TSA are dominated by stands of Douglas Fir (mostly located in the eastern zones), and western cedar and hemlock (mostly located in the western zones). The stands of Douglas Fir are generally found in younger age classes (due to the early logging history of the area), and on good to medium growing sites. The cedar and hemlock stands are generally older, and mostly located on poor growing sites. Currently, the timber harvesting land base comprises almost equal areas of forest at or above minimum merchantable age, and areas younger than merchantable age. Most of the merchantable forest is older than 200 years. Over time, almost all of the very old forest (200 years plus) will be harvested, and the bulk of the area that remains will be 120 years old or younger.

Some uncertainty still exists concerning the estimate of the available harvesting land base under current management. The land base eventually made available for timber harvesting could be larger or smaller than that which contributes to what is shown in Table 4.1 for a whole variety of reasons, the final outcomes of which at this point in time are uncertain. These include: possible changes in harvesting technology or harvesting costs; possible changes in conditions of road access over private land; and the final outcomes of land use planning processes, such as the Vancouver Island Land Use Plan.

In generating a range of possible future harvest levels, the *Arrowsmith TSA Timber Supply Analysis* assumed current management practices. These incorporated existing guidelines such as the Coastal Fisheries/Forestry Guidelines, the Landscape Management Guidelines and the Coastal Planning Guidelines. One of the management assumptions made was that 34 percent of the timber harvesting land base would be managed for visual quality.

Table 4.2: Arrowsmith TSA Timber Harvesting Land Base

Classification	Area (hectares)	% of Total	% of Productive Forest Area
Total Land Base	168 826	100.0	
Not managed by Forest Service	12 105	7.2	
Non-forest	32 102	19.0	
Total Productive Crown forest^a	124 619	73.8	
Current reductions			
Non-commercial cover (brush)	26	<0.1	<0.1
Environmentally sensitive areas	13 229	7.8	10.6
Riparian	2 448	1.5	2.0
Cowichan Lake Research Station	143	0.1	0.1
Camper Creek	605	0.4	0.5
Parkinson Creek Park	51	<0.1	<0.1
Experimental Plots	221	0.1	0.2
Inoperable	21 009	12.4	16.9
New Island Highway	82	<0.1	<0.1
Deciduous Leading Species ^b	4 268	2.5	3.4
Non-merchantable forest types	4 340	2.6	3.5
Existing roads, skid trails, landings	2 953	1.7	2.4
Total current reductions	49 375	29.2	39.6
Future reductions (roads)	808	0.5	0.6
Long-term timber harvesting land base	74 436	44.1	59.7

- a. Includes 7 544 hectares of Timber licences that will revert to the TSA after the existing mature timber is harvested.
b. This refers to leading alder stands.

4.2 Arrowsmith TSA AAC Apportionment and Historic Harvest Levels

The Arrowsmith TSA was created in 1986 with an initial allowable annual cut (AAC) of 392 250 cubic metres. In 1992, the AAC was increased to 498 250 cubic metres as a result of transfer of land and AAC from major licences. This additional AAC of 101 360 was added to the TSA's Small Business Forest Enterprise Program. In June, 1994 the AAC was temporarily reduced by 16 000 cubic metres to account for the Clayoquot Sound Land Use Decision. The current Arrowsmith TSA AAC is 482 250 cubic metres.

The volume of AAC and apportionments used to generate the various timber supply forecasts modeled in the *Arrowsmith TSA Timber Supply Analysis* are shown in Table 4.3.

Table 4.3: Arrowsmith TSA - AAC Apportionment (pre-Clayoquot Sound decision)

Category	Volume (m ³)	% Sub-total	% Total
Forest Licences, replaceable			
International Forest Products	137 718		
Coulson Forest Products	51 528		
Total Forest Licences, replaceable	189 246	40%	38%
Temporary Forest Licences, non-replaceable^a			
Toquaht Enterprises	25 000	5%	5%
Timber Sale Licence (major), replaceable			
Texada Logging Ltd.	14 184	3%	3%
Small Business Forest Enterprise Program (SBFEP)^b			
Section 16: Any categories	213 405		
Section 16.1: Bid proposals ^c	33 346		
Total SBFEP	246 751	51%	49%
Forest Service Reserve	3 969	1%	1%
Sub-total AAC for Timber Supply Analysis (Coniferous)	479 150	100%	
Woodlots	15 100		3%
Deciduous	4 000		1%
Total AAC	498 250		100%

a Effective December 2, 1994, 25 000 m³ was reapportioned from SBFEP Section 16.1 to accommodate this Temporary Licence.

b This excludes SBFEP volumes within TFL areas, estimated at approximately 90 - 100 000 m³.

c This Section 16.1 apportionment is less than what is presently committed. Two Section 16.1 sales are currently outstanding: C. Mokko Manufacturing Ltd. (average sale commitment of 40 000 m³ per year, ten year term, expiry October 1999); and Allright Ladder Ltd. (average AAC/sale of 2 800 m³ per year, three year term, expiry September 1997). Additional Section 16.1 sales amounting to a further 20 000 m³ per year (80 000 m³ over four years) are currently being considered. The volumes associated with Section 16.1 bid proposals currently awarded/considered exceeds the TSA Section 16.1 AAC. This excess is covered by underselling the Section 16.1 sales on TFL lands.

Note, the total volume of 498 250 differs from the above mentioned AAC of 482 250 cubic metres in that it does not include the 16 000 cubic metres reduction for the Clayoquot Sound Land Use Decision. This is because the Clayoquot Sound Land Use Decision has not yet been implemented. Woodlot licences and deciduous species are also not included in the Timber Supply Review. As such, the 19 100 cubic metres apportioned to these licences were deducted from the AAC of 498 250 cubic metres. This results in an AAC of 479 150 cubic metres for this review.

Historic Harvest Levels

The actual level of timber harvesting in the Arrowsmith TSA over the past several years has generally been below the AAC level. During the four year period 1991-1994, the average annual harvest level was approximately 417 000 cubic metres (87 percent of the AAC of 479 150 cubic metres). For the purposes of this study, this average figure is used to reflect the current harvest level, or base year. This is done in order to smooth out year-to-year harvest level fluctuations that

commonly occur.¹⁸ The harvest level gap is largely a result of underselling in the SBFEP and is a function of several factors, including:

- Proposed Mt. Bolduc community forest - The SBFEP has spent a considerable amount of time and effort preparing blocks in this area for sale (i.e. road/bridge building, timber cruises). The area is important to the SBFEP because of its large size, and location (not immediately adjacent population centers). It was scheduled to provide several hundred thousand cubic metres of timber over a five year period. Timber sales, however, have been cancelled in light of a government announcement to establish a community forest in this area as part of the Vancouver Island Land Use Plan.
- Loup Creek - Results of the Gordon River watershed assessment has deferred the sale of two cut blocks within this area. Timber sales will be postponed for several years in order to wait for surrounding forest green-up.
- Juan de Fuca park - While there was no direct impact on the TSA from the establishment of the park, there has been an indirect one. TFL licensees TimberWest Forest Ltd and Western Forest Products are requesting Crown land in exchange for the TFL lands they gave up to the park. Until negotiations are complete, a portion of the TSA SBFEP forest land in this area is being excluded from development planning.
- Management challenges presented by the nature of TSA lands in the eastern portion of the TSA. In this area, the TSA tends to be organized in small, fragmented chunks, in close proximity to community watersheds, sub-divisions and heavily utilized recreation areas. Taken together, these factors significantly increase the time and effort required to generate substantial timber sale volumes.

Table 4.4 Arrowsmith TSA - Harvest Levels (Coniferous), 1991-1994^a

	AAC (m ³)	Actual Harvest (m ³)	% of AAC
1991	479 150	368 340	77%
1992	479 150	411 180	86%
1993	479 150	515 270	108%
1994	479 150	373 740	78%

^a Source: Billing History Report, Valuation Branch, Ministry of Forests.

Main Operating Areas

As noted earlier, the Arrowsmith TSA harvest land base is a fragmented one, and is dispersed over many relatively small operating areas. The following describes the larger of these areas:

¹⁸ Licensees are not obligated to harvest their total AAC allocations in any one year. A licensee's actual harvest may deviate by + or - 50 percent in any one year. In the case of a small AAC allocation, the licensee might harvest for only one or two years in the five year period. However, over a five year period each licensee's total harvest must be within + or - 10 percent of its total AAC for the entire five years.

- Interfor's primary operating area is in the Mooyah River drainage area on the Hesquiat Peninsula, to the south of Zuciarte Channel and Muchalat Inlet. This is adjacent to Interfor's TFL 54;
- The single largest operating area on the West Coast is one located between Kennedy Lake and Effingham Inlet, directly opposite Barkley Sound and the Broken Islands Group. This operating area is comprised of Small Business as well as major licensee (Interfor, Coulson) operations. There is another chartered area at the tip of Alberni Inlet (north side), in the area of Handy Creek;
- Smaller operating areas on the West Coast include Tzartus Island; small areas adjacent to middle stretches of the Gordon River; and small areas situated between Sooke and San Juan Point.
- The single largest operating area on the East Coast is one north of Nanaimo in the Bowser Area, that extends along portions of Rosewell Creek and the Qualicum River;
- The two other relatively large East Coast operating areas are outside of Ladysmith, and on either side of the Duncan-Cowichan Lake stretch of highway.

Because of the numerous relatively small operating areas, many of the logging crews that are involved in TSA harvesting supplement this with work in adjacent TFL and private timber lands. The interconnectedness of these various forms of land tenure and the forestry operations that they support in Southern Vancouver Island is a factor that has to be kept in mind.

4.3 Licensee Harvest Profile

The majority of the Arrowsmith TSA fibre is harvested by residents of Southern Vancouver Island, and then processed within the region. It is estimated that 58 percent of the TSA fibre is processed by Southern Vancouver Island mills. A small portion, about 5 percent, is transported to processing facilities on North Vancouver Island; the remaining 37 percent is shipped to the Lower Mainland for processing.

The following profiles the TSA's major licence holders and its Small Business Forest Enterprise Program.

4.3.1 Forest Licences

The following profiles the operations associated with the four Forest Licences currently supported by the Arrowsmith TSA AAC.¹⁹

Interfor

Interfor's Forest Licence (FL) A19235 is the single largest license in the Arrowsmith TSA, with an AAC (pre-Clayoquot) of 137 718 cubic metres. Operating areas are in the Mooyah River/Zuciarte Channel/Escalante Point areas; all in the general area immediately south of Muchalaht Inlet. Interfor's TFL 54 operations are located in adjacent areas to the south, as well

¹⁹ The following licensee operating profile is presented on the basis of "steady state" levels of operations, tied to each licensee's AAC. All four however in recent years have been harvesting at reduced levels, for reasons that vary with each.

as in the Clayoquot Sound area.²⁰ Interfor's AAC is logged through a combination of conventional (115-120 000 cubic metres) and helicopter (15-20 000 cubic metres) operations. The ground-based logging and roadwork is carried out by contract crews (Eldred River Logging of Campbell River, and A.M. Excavating of Parksville), while the helicopter logging is carried out by Helifor (a subsidiary of Interfor). An estimated 40 PY's are supported by the conventional logging operation, and 3 PY's by the helicopter logging operation. This corresponds to between 10-11 months of work for the ground crews, and between 4-6 weeks of work for the helicopter crew. About half of the ground crews are residents of the TSA (Parksville, Duncan, and Victoria), with the remainder drawn from the Campbell River/Comox Valley area. The helicopter crew is drawn from the Lower Mainland area. The amount to be helicopter-logged is anticipated to increase in 1995 and 1996.

Pulp logs on average account for up to 15 percent of the FL profile, and are mainly shipped to the Gold River or Port Alice pulp mills. Most of the balance is barged as sawlog material to the Lower Mainland for distribution among Interfor's sawmilling and wood remanufacturing network. Based on its relative contribution (about 4 percent, as of 1994) to Interfor's overall milling fibre requirements, this fibre flow is estimated to support approximately 58 PYs in Interfor's Lower Mainland head office and milling operations (based on Interfor's total 1994 direct employment base of 1 453 full-time equivalent positions).

An additional 4 direct PY's of employment are supported at Interfor's Tofino office (total office complement of 20 FTE's), which also administers TFL 54 and Forest Licenses in the Strathcona TSA. Additional direct employment is generated in log transportation (to Vancouver); in silviculture; and through the sale of chips to pulp mills. These are accounted for in the overall TSA estimates for these components as shown in Table 4.5.

Coulson Forest Products

The Coulson Group of Companies is based in Port Alberni, and has AAC apportionments in the Arrowsmith TSA which currently total 82 074 cubic metres. Operations are concentrated in the Toquart Bay area. The AAC total is comprised of FL A19234, with an AAC of 51 528 cubic metres (pre-Clayoquot), and a Section 16.1 sale to C. Mokko (a wholly owned Coulson subsidiary) with an estimated AAC of 30 546 cubic metres (the actual sale commitment is for more than this, i.e. 40 000 cubic metres; this sale commenced in 1990, and is due to expire in the year 2000). Of this total, approximately 25 000 cubic metres is helicopter-logged by a Coulson Airplane crew from Port Alberni. This provides an estimated 5 PY's of employment (about four months logging for a 15 man crew). The Airplane crew is made up about equally of Port Alberni and general South Island residents. Coulson representatives anticipate that the proportion helicopter logged will continue to increase.

The AAC balance of approximately 57 000 cubic metres supports an estimated 17 PYs of woodlands employment (hauling, logging, and sorting). This covers about nine months of work for a 23 man logging/roading crew in the Toquart Bay area. Most are residents of the Port Alberni, with a few from the Ucluelet area. An estimated additional 6 PY's are supported by both

²⁰ The Clayoquot Sound Land Use Decision has resulted in the AAC of TFL 54 being reduced by about 42 000 m³ annually. It now stands at approximately 138 000 m³.

licenses at Coulson Group administrative/support operations in the Port Alberni area (based on a pro-rating of Coulson licensed and AirCrane operations). Coulson Group Head Office employment stands at 15, and another 28 individuals are employed in Coulson's AirCrane service facilities (this is a major heli-logging contract operation).

The Coulson-owned C. Mokko mill in Port Alberni began operations in November 1993 to produce custom-cut lumber for the Japanese market. It is now reported to be fully operational (two-shift basis), with a workforce of 82 PY's. The C. Mokko Section 16.1 sale (and another 16.1 sale for about 60 000 cubic metres in the Strathcona TSA) was made contingent on the opening of this mill, which has an annual fibre input requirement of approximately 90 000 cubic metres. On the basis of a one-third share for the combined Section 16.1 sales, the Arrowsmith TSA Section 16.1 AAC is estimated to support 27 PY's at the Port Alberni mill. The Coulson Group of companies trades extensively in the Vancouver log markets, and it is assumed that the fibre tied to Coulson's FL in the Arrowsmith TSA is shipped to and processed in the Lower Mainland area. On the basis of average coastal milling coefficients of .49 PY's per 1 000 cubic metre, this is assumed to support another 25 PY's in the Lower Mainland area.

Toquaht Enterprises²¹

The Toquaht First Nation holds a non-replaceable Forest License in the Arrowsmith TSA (Toquaht Bay area) with an AAC of 25 000 cubic metres. This was acquired in 1994. First Nation representatives estimate that the harvesting of this License will support approximately eight PYs of employment, allocated roughly as follows: 5 PY's of sub-contracted logging and logging-related employment (crews from the Ucluelet and Nanaimo areas, all non-native); one PY of engineering/forestry employment (at Interfor's Tofino office - Interfor is helping to oversee the operation); and two PY's of native employment (operating a First Nation-owned portable woodmiser, which utilizes approximately 1 500 cubic metres of the total).

A rebuilt sawmilling facility on the Macoah reserve is reported to be currently processing close to 6 000 cubic metres of this fibre, producing rough lumber and cants for sale to MacMillan Bloedel and independent remanufacturing operations in the general Alberni Valley and Coombs area. Smaller amounts (currently estimated at about 2 000 cubic metres) are sold locally to local builders, for beach benches, or shingle blocks and logs to local shingle mills. The surplus is currently acquired by Interfor. When the mill is operating at full capacity, the predicted probable fibre flow pattern is one-half being locally processed, and the other half being moved as raw logs to the Lower Mainland.

Toquaht Enterprises, along with Toquaht Developments, currently provides full-time employment to nine individuals; three in management/administration, and six at the mill (i.e. nine PY's in total). All are from the Ucluelet area, and six of the nine are aboriginal. Full capacity operation would require another six workers at the mill. The acquisition of this licence, and the establishment of this milling facility is viewed as an essential part of the Toquaht First Nation's economic development aspirations. The Macoah Reserve (on Toquaht Bay) is seen as the future residential center for the First Nation. There are currently nine houses at this site, where ten years ago, there

²¹ Source: Gary Johnson, Forestry Manager, Du-Quah Enterprises.

were none. Aside from forestry, the only other current sources of employment and income are roe-on-kelp and clam licenses, both of which are on a very small, part-time basis.

Texada Logging

Victoria-based Texada Logging holds a Timber Sale License in the Arrowsmith TSA, the AAC of which (pre-Clayoquot) is 14 184 cubic metres. Logs are usually sold to South Island mills (e.g. Canadian Pacific Forest Product's, Coastland, or TimberWest). Based on Texada's company-wide operating and staffing profile, this timber license on average would support approximately nine direct PY's of employment. All would be TSA residents (Parksville, Cowichan, Qualicum, Duncan).²²

4.3.2 Small Business Forest Enterprise Program (SBFEP)

As Table 4.3 above showed, there is currently an official SBFEP AAC apportionment of 246 751 cubic metres in the Arrowsmith TSA. This accounts for approximately 51 percent of the total official AAC of 479 150 cubic metres and proportionally therefore, is very significant.²³

As explained earlier, the SBFEP AAC has been consistently undercut over the past four years (approximately 18 percent, or about 50 000 cubic metres, on an annual average basis for the period 1991-1994). This undercutting has had the effect of reducing the economic and employment generation within the Arrowsmith TSA from what it might otherwise have been, i.e. as indicated by the AAC.

Small business sales are an important source of timber for many independent loggers and non-tenured processing operations. They can be classified into one of two major categories:

- **Section 16 Sales:** These are competitive timber sales that are awarded on a highest monetary bid basis. Sales under this category are usually for a period of one or two years; and,
- **Section 16.1 Sales:** These are sales that are required to meet a value added and/or employment generation criterion, and can range in term from one to ten years.

The AAC officially committed to Section 16.1 sales in the Arrowsmith TSA currently stands at 33 346 cubic metres, with timber sale licences currently held by C.Mokko of Port Alberni, and Alright Ladder of Vancouver. Due to the openness of the bidding process, and the sometimes short duration of the sale, the apportionment of economic and employment benefits accruing to Section 16.1 sales is continually in flux. On balance, however, there is a clear preponderance among current and recent Arrowsmith TSA 16.1 sales to locally based operations (aside from C.Mokko, successful recent bidders have included C&C Lath of Chemainus, Pacific Builders of Cobble Hill, and Norse Log Homes of Lantzville). Since the wood remanufacturing sector on southern Vancouver Island area is a large and expanding one, it seemed reasonable to assume (for the purposes of allocating the employment and income benefits flowing from these sales) that

²² Texada and a related company are active in the use of commercial thinning and other harvesting methods, which a related company (Shortlog Thinning) is using on private timberlands in the Cowichan second growth forest.

²³ There also is a TFL SBFEP AAC of approximately 95 000 cubic metres.

local demand would continue to be more than sufficient to absorb most or all of any new Section 16.1 sales.

Although logged by locally-based contractors, the end user/processor destination for Section 16 sales is less easily traced than are Section 16.1 sales. A telephone survey of some of the larger SBFEP loggers and local sawmills, strongly supported the notion that what is logged under Section 16 sales in the Arrowsmith TSA (allowing for trades), is almost entirely processed within the TSA.²⁴

Almost all of the major and independent mills in the area have in the past acquired some of this SBFEP fibre. Among the majors, the ones most frequently identified as active purchasers of this wood included the Doman mill in Chemainus (Nanoose Forest Products), the independent Coastland and CIPA mills in Nanaimo, the Pacific Forest Products Ltd. mill in Ladysmith, and the MacMillan Bloedel Nanaimo and Chemainus (Island Phoenix) mills. Doman's Chemainus mill is especially dependent on Small Business sales, which, according to company representatives, account for between 40-45 percent of the mill's required log supply of approximately 190-200 000 cubic metres annually.²⁵ Additional Small Business sales (about half of what is consumed at Chemainus) are sorted at the Chemainus Division, and forwarded to Doman's three other Doman area sawmills (Cowichan Bay, Nanaimo, and Ladysmith), and to Doman's new wood remanufacturing plant in Chemainus. All chips and hog fuel from the Chemainus operation are trucked to the Fletcher Challenge Crofton pulp mill. Doman's Chemainus mill employs 82 people on a FTE basis, and has an annual production capacity of 48-50 million board feet. In 1994, the mill only operated at 60 percent of capacity due to the difficulties it experienced in acquiring logs.

The CIPA sawmill and the Coastland veneer mill, both located in Nanaimo, are independent, non-tenured operations, (CIPA also operates a plywood mill in Delta), and are for that reason interested in the fibre that comes available under the SBFEP program. Company sources contacted stated that SBFEP sales have become very competitive in recent years, and that their approach to these sales has had to become very selective. Each mill employs approximately 100 FTE's when fully operational, and requires between 300-350 000 cubic metres on an annual basis. This fibre is almost entirely purchased on the open market. The CIPA mill was temporarily reduced to a one-shift basis in 1994 due to difficulties and delays in acquiring fibre.

In contrast, both Pacific Forest Products Ltd. and MacMillan Bloedel have extensive tenured and private timber holdings in the South Island area. Nevertheless, they also have pursued Small Business sales, in particular for their Ladysmith (Pacific), Nanaimo, and Chemainus operations (MacMillan Bloedel).²⁶ The reasons relate to a general environment of fibre shortages and delays in access, which is inducing even larger tenured operations to go after any available sales.²⁷

²⁴ Those interviewed were: Pat Carson Bulldozing, Cobble Hill; Brian Dorman Timber, Nanaimo; Timber Mill Logging, Port Alberni; Moh Creek Contracting, Parksville; STS Logging, Shawnigan Lake; and Doidge and Smith, Lake Cowichan. For all of these contractors, the logging of SBFEP sales in the Arrowsmith TSA constituted a relatively small (but also important) source of work.

²⁵ Personal communication, CJ McLean, Log Coordinator, Doman Forest Products, Chemainus Division. Note, included in these SB purchases are sales off TFL lands.

²⁶ Canadian Pacific Forest Products is also an owner of the Mayo F.P. mill in Nanaimo, while Macmillan Bloedel has two other sawmills in the Port Alberni area. Although all three mills also on occasion acquire Small business wood, none were specifically identified by those contacted as regular purchasers.

²⁷ An additional factor exacerbating the generally tight supply situation is the increased interest in direct "pulp log" purchases by area pulp mills, driven by the pulp market strength and a general shortage of chip supplies.

In addition to the larger mills, there are an estimated 15-20 relatively small, independent sawmills located in the South Island area, that also on occasion pursue Small Business sales from the Arrowsmith TSA. These small mills are “clustered” in the Sooke, Lake Cowichan, and Alberni valley areas, although some are also found in the Nanaimo, Ladysmith, and other areas. The largest is the Nagaard sawmill in Port Alberni, others include the Jolliffe sawmill in Duncan, and the Mike Gogo mill in Nanaimo. Based on Ministry of Forests mill survey data, the combined production capacity of these mills is in the range of 15-20 million board feet, which would imply (assuming a lumber recovery factor of between 200-250 board feet per cubic metre), an annual fibre requirement of somewhere between 60 -100 000 cubic metres. While some of these mills have in the past successfully bid on Small Business sales in the Arrowsmith TSA, for most, their main “diet” appears to be from other sources, in particular intermittent small purchases from the large TFL holders in the area (e.g. MacMillan Bloedel’s TFL 44, and TimberWest’s TFL 46), and generally opportunistic purchases as they arise. Overall, however, the fibre supply position for these small mills appears to be relatively precarious, as is demonstrated by the number that have either temporarily or permanently closed over the last few years.²⁸

In summary, the evidence on fibre flows support the conclusion that virtually all of Section 16 sales made in the Arrowsmith TSA are logged and processed by Arrowsmith TSA/South Island operations. While there may be occasional “leakage” to mainland mills, the survey responses did not indicate that this is significant (leaving aside the normal trading for specific log types that is a standard feature of coastal log markets). Given the concentration of milling facilities in the South Island area, the keen competition for timber supplies, and transportation cost barriers, the local consumption of most or all small business timber is not such a surprising result.

Small business timber sales in the Arrowsmith TSA are concentrated in the following operating areas:

- **Port Alberni Forest District:** On Mount Benson near Nanaimo, and north of Qualicum Bay, to Fanny Bay.
- **West Coast Area (accessible by road from Port Alberni):** In particular, Lucky Creek, Mount Maitland, Marian Creek, Draw Lake, and Kennedy River.
- **West Coast area (accessible only by boat):** In particular, on Tzartus Island (Skull Lake and Cataract Lake).
- **West Coast Area—Section 16.1 Sales:** Lucky Creek and Effingham Inlet.

Small business operating areas in the Duncan Forest District generally fall in the second growth Cowichan Valley Area from Ladysmith to Shawnigan Lake, and in the first growth west coast areas close to Sooke and Port Renfrew. While most operating areas are in the Cowichan Valley, the west coast areas contribute proportionately more timber volumes.

²⁸ Also in a relatively tight position for fibre are the many cedar shake and shingle mills in the area (estimated at about fifteen). They have in the past relied on salvage material, which for a variety of reasons (including higher utilization standards) is becoming more and more difficult to acquire. This has forced many into scaling down or temporarily closing their operations.

4.4 Southern Vancouver Island Remanufacturing Sector

Outside of the Lower Mainland, southern Vancouver Island has the largest concentration of wood processing facilities in the province. There are approximately thirteen major sawmills, three pulp mills, one plywood/veneer plant, sixteen independent lumber mills, ten to twenty cedar shake and shingle mills and three log home builders operating within the region.

In addition, Southern Vancouver Island has a sizable wood remanufacturing/value added sector on south Vancouver Island, one which has steadily expanded in recent years. Wood is acquired from a wide variety of sources, including straight purchases from local sawmills, open market trading, as well as from individual Section 16.1 sales. In recent years, 16.1 sales have been made to Pacific Builders of Cobble Hill, C&C Lath of Chemainus, Norse Log Homes of Lantzville, and Rebco Remanufacturing of Port Alberni (the latter was off a TFL SBFEP sale). Overall, however, this industry group appears (so far at least) to be managing independently of the local Section 16.1 program. This they have managed to do through managing to remain competitive in their purchases from other sources. However, the existence of the Section 16.1 program is still very important to this sector, in that it is one potential additional source of supply in a generally tight market situation.

There are an estimated 25-35 independent wood remanufacturing operations in the study area, the direct employment associated with which is estimated at 800 -1 000 FTE's. Because this is a very dynamic and loosely defined sector, with some businesses expanding and others contracting, a more precise estimate would be feasible only with a more focused study.²⁹ There is a particularly large concentration in the Chemainus area (about ten establishments). The larger operations include: Pacific Builders, Cobble Hill; Cowichan Joinery, Cobble Hill; Aquila Cedar, Parksville; Adwood Manufacturing, Crofton; Paulcan Enterprises, Ladysmith; Plencks Ltd., Chemainus (MB joint venture); Mid-Island Remanufacturing, Nanaimo (new joint MB venture); Centurion Lumber, Chemainus (Doman affiliate); C&C Lath, Duncan; Hi-Tec Industries, Parksville; Errington Cedar, Errington; Sarita Furniture, Port Alberni; and Doman Remanufacturing, Chemainus (a new operation, expanding in two phases).

A somewhat distinct value added sector is the log home sub-sector. There are about a half dozen in the area, including Norse Log Homes at Lantzville; Cowichan Log Homes at Lake Cowichan; and Blue Mountain Log Homes at Parksville. Direct employment is 100-150 positions. This sector is experiencing strong demand, coupled with wood shortages.

4.5 Arrowsmith TSA Direct Employment and Income Estimates

Direct employment coefficients at the Arrowsmith TSA and provincial levels were estimated based on survey information collected for this report (see Appendix C). The direct employment coefficient at the TSA level is .87 PY's per 1 000 cubic metres; at the provincial level it is 1.344 PY's per 1 000 cubic metres. These coefficients can be applied to any particular harvest level to generate the related direct employment effects.

²⁹ In a 1992 study prepared for the Forest Resource Development Agreement (FRDA) by Jim McWilliams, and Price Waterhouse, a total of 69 value added establishments were estimated as existing on Vancouver Island (including log homes). This study identified access to lumber as the sector's most pressing problem.

4.0 Forest Sector Overview

Table 4.5 summarizes the direct employment base associated with the current Arrowsmith TSA harvest of 417 000 cubic metres. The estimated pre-tax direct employment income associated with the current average annual harvest level of 417 000 cubic metres is \$17.3 million for TSA residents, and \$27.9 million for all B.C. residents. Average pre-tax wage rates are presented in Table 4.6.

Table 4.5: Arrowsmith TSA - Direct Employment Base (PY's), 417 000 m³

Category	Arrowsmith TSA	Mid/North Island	Lower Mainland	Total
Harvesting	138	26	3	167
Silviculture	6	2	5	13
Log Barging/Towing	2	--	3	5
Processing				
Pulp & Paper	88	26	49	163
Sawmilling	<u>129</u>	<u>9</u>	<u>74</u>	<u>212</u>
Total Processing	217	35	123	375
Total	363	63	134	560

- a The employment totals are presented on a person-year (or full time equivalent) basis. This is the standard procedure for analyses of this nature, to facilitate common points of reference. Since some forestry employment occurs on a part-time or short-term basis (e.g. silviculture, and to some degree logging), this procedure will understate the total number of individuals that are employed in some capacity within the TSA. This arises in logging because the TSA volumes are often too small to maintain specific crews over a full season (particularly the helicopter and some small business contract crews). Many of these crews use the TSA volumes to supplement more continuous work in TFL areas or on private land.
- b The harvesting and sawmill PY's estimates are both based on licensee specific information.
- c Silviculture and log barging/towing PY estimates are estimated using Vancouver Island coastal averages (see Appendix for details). The log barging component is intended to cover the movement of raw logs to the Lower Mainland area (estimated at 160-170 000 cubic metres annually).
- d Pulp employment estimates were calculated using Ministry of Forests pulp PY coefficient averages for the 1987-1991 period of .39 '000m³. The distribution by area was based on the following approximate log and chip flow pattern: 30% to the Lower Mainland (mostly Interfor and Coulson volumes); 55% local TSA (particularly Fletcher Challenge in Crofton, but also Harmac Pacific in Nanaimo and MB in Port Alberni); and 15% to FC Elk Falls, Avenor Gold River, and Western Port Alice.

Table 4.6: Arrowsmith TSA - Direct Pre-Tax Wage Rates (\$1994)

	TSA	Non-TSA
Harvesting	\$46 000	\$51 000
Silviculture	\$32 000	\$32 000
Marine Transportation	\$58 300	\$58 300
Sawmill Processing	\$46 300	\$54 600
Pulp and Paper Processing	\$54 000	\$54 000

- a Employer funded non-cash benefits (e.g. Worker's Compensation, dental, pension, etc.) are extra, and can range from 10 to 30 percent.
- b Wage rates are based on information provided by licensees, and other sources (see Appendix C).

5.0 Harvest Forecast Scenarios

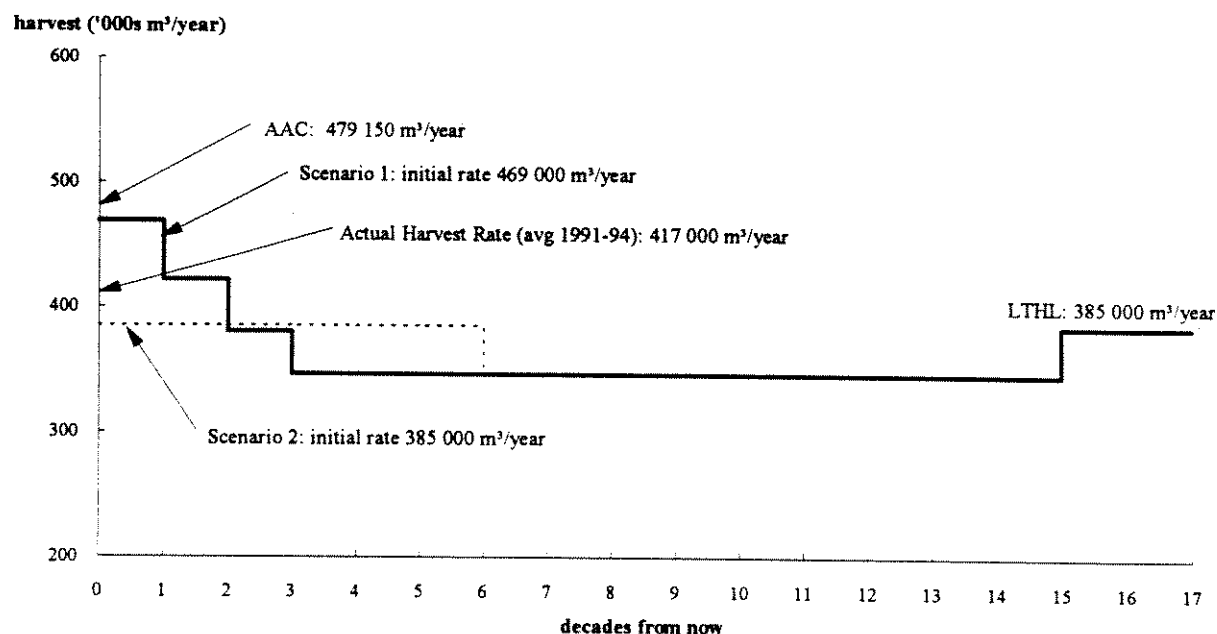
This report focuses on two of the harvest forecasts developed in the *Arrowsmith TSA Timber Supply Analysis* report. These scenarios, along with their respective incremental harvest changes, are illustrated in Table 5.1 and Figure 5.1.

5.1 Harvest Forecasts

Scenario 1 is the so called 'Base Case' Harvest Forecast. Under this scenario, the initial rate of harvest is set at 469 000 cubic metres, which, although approximately 2% below the timber supply AAC (479 150 cubic metres), represents close to a 12 percent increase over the average annual harvest level (417 000 cubic metres over the 1991-1994 period). At the beginning of the second decade, the harvest drops back to 422 000 cubic metres annually, almost the level of the average annual harvest. It then continues to decline for the next two decades to an annual harvest level of 346 000 cubic metres, where it remains for another twelve decades, before rising again to the long term harvest level of 385 000 cubic metres per year. While this corresponds to an approximate 20% decline from the timber supply AAC, it represents a less than 8 percent decline from the average annual harvest level.

A second possible harvest scenario (scenario 2) is one that immediately reduces the harvest to the long term harvest level of 385 000 cubic metres per year. A reduction to the 346 000 cubic metres level is still required during decades 6 through 15 because of an insufficiency of mature second growth timber in the TSA during that period.

The *Arrowsmith TSA Timber Supply Analysis* report explains in considerably greater detail the full range of possible future harvest scenarios, and the sensitivity of those scenarios to various management assumptions. The two scenarios illustrated in Figure 5.1 and discussed in the following sections correspond to the extreme ends of the harvest ranges that were considered. Table 5.1 identifies the incremental changes in the harvest (commencing from actual current levels) that occur at the beginning of each decade (with reductions denoted by parentheses). The changes in annual harvest levels shown are the basis for the impact analysis that follows later in this report.

Figure 5.1 Arrowsmith TSA - Timber Harvest Scenarios**Table 5.1: Incremental Harvest Changes (cubic metres)**

Year	Scenario 1		Scenario 2	
	Harvest (m ³ /year)	Incremental change	Harvest (m ³ /year)	Incremental change
Current ^a	417 000		417 000	
1 - 10	469 000	52 000	385 000	(32 000)
11 - 20	422 000	(47 000)	385 000	--
21 - 30	380 000	(42 000)	385 000	--
31 - 59	346 000	(34 000)	385 000	--
60 - 149	346 000	--	346 000	(39 000)
150+	385 000	39 000	385 000	39 000
Cumulative change		(32 000)		(32 000)

^a This refers only to the conventional conifer harvest, and excludes deciduous forests, low quality sites, and woodlots.

5.2 Forest Management Processes

The Arrowsmith TSA Timber Supply Review should be considered in conjunction with similar reviews occurring in adjacent TSAs (particularly in the Strathcona TSA), and on other Crown lands (TFLs), as well as with the outcomes of other land management processes completed or underway, such as the Vancouver Island Land Use Plan, the Clayoquot Sound Decision, and the B.C. Treaty Commission Process.

The following summarizes some of the major outcomes of these other processes that are known at this time:

- ***Vancouver Island Land Use Plan:*** The provincial government introduced the Vancouver Island Land Use Plan on June 22, 1994. It concludes many years of public debate over critical land-use issues on the Island. Among other things, the Plan establishes 23 large new provincial parks, and creates three forest utilization zones: low intensity (LIA), high intensity (HIA), and general forestry areas (GFA).³⁰ Of the seven new protected areas established within the Port Alberni and Duncan forest districts, only one, Cowichan River (total area of 1 600 hectares) impacts on the TSA land base. The precise TSA land base and associated timber supply impact that will result from this new protected area, however, has not yet been identified. Of the eight proposed new LIAs for Southern Vancouver Island, three include TSA forest land: Alberni Canal (total area of 4 558 hectares), Quadra Island (20 439 hectares), and San Juan Ridge (2,943 hectares)³¹. LIAs possess combinations of special environmental and resource values that require timber harvesting to be guided by a special set of management objectives based on principles of sustainable ecosystem management. While these areas are available for timber harvesting, they will likely support reduced timber harvesting volumes than are currently permitted. The exact impact on the Arrowsmith TSA timber supply has also not yet been identified. At the regional level (i.e. Vancouver Island), LIA standards should not exceed an average reduction to the Long Run Harvest Level of 10 percent over the effect of the Forest Practices Code. HIAs are intended to provide a stable land base within which suitable productive forest lands have an emphasis on short and long-term timber production, to sustain forest sector employment. HIAs for the Island have yet to be identified.
- ***Clayoquot Land Use Decision***³²: The provincial government announced its Clayoquot Land Use Decision on April 13, 1993. The area encompasses some 262 000 hectares of land in the west of the Port Alberni forest district. The Decision increased total protected areas in the Sound to 33 percent (from 39 100 hectares to 87 600 hectares), and placed approximately 18 percent of the land base under special management, where protection and management of scenic landscapes, wildlife or recreation take priority over other resource activities. These areas have been specified as designated areas under Part 15, section 165 of the Forest Act, and resulted in a temporary AAC reduction within the Sound totalling 280 000 cubic metres. The majority of the reduction (94 percent) was allocated to TFL holders MacMillan Bloedel, TFL 44 (222 000 cubic metres) and Interfor, TFL 54 (42 000 cubic metres). The remaining 6

³⁰ *The Vancouver Island Land Use Plan*, Government of British Columbia, no date.

³¹ *Low Intensity Areas for the Vancouver Island: Exploring a New Resource Management Vision*, The Report of the Low Intensity Area Review Committee, Victoria, January, 1995

³² Note, the Clayoquot Sound area is not included as part of the Vancouver Island Land Use Plan.

percent (16 000 cubic metres) was a temporary reduction to the Arrowsmith TSA. The temporary reductions are effective June 1, 1994.

- ***B.C. Treaty Process:*** It is impossible to forecast what impact the treaty process will have on the TSA timber harvesting land base. Moreover, this process is only in its early stages. Almost the entire Arrowsmith TSA area is under claim by resident First Nations.

6.0 Economic Impacts

This chapter presents the estimated economic impacts associated with two harvest forecasts - Scenario One, and Scenario Two. They include impacts on employment, employment income, and government revenues. Impacts are discussed in the context of the Arrowsmith TSA, and the province as a whole. In addition, federal government revenues are also presented. The incremental changes associated with the harvest scenarios are presented in Appendix B, and a detailed explanation of the economic impact assessment methodology is provided in Appendix C.

6.1 Assumptions

This analysis distinguishes three types of employment that would be affected by changes in the Arrowsmith TSA timber harvest level. Direct employment consists of forest sector jobs occurring in the areas of harvesting, silviculture, marine transportation, sawmilling, and pulp milling. Indirect employment is generated in supplier businesses by forest company spending on goods and services. Induced employment is generated through the spending of direct and indirect employment income, for example at local retail outlets.

Note, the employment impacts discussed in this section refer only to the TSA harvest, which accounts for an average of 8 percent of the total harvest from the Port Alberni and Duncan Forest Districts over the past four years. In addition, these impacts rely on certain assumptions, and are subject to certain limitations, which are noted below.

- **Employment Coefficients** - The direct employment impacts are calculated using employment coefficients (PY's per 1 000 cubic metre). This approach assumes that future employment levels can be predicted based on current conditions. While this may be reasonably accurate for the short term, because of unpredictable future factors, such as changing market conditions or production technologies, future employment coefficients may be very different than those observed today.
- **Timing of Impacts** - Employment losses are shown as occurring simultaneously with a change in the level of harvest. This, however, may not be the case for all industry sectors. Spinoff impacts in particular may arise over a longer period of time, rather than immediately, as business and consumer spending levels adjust.
- **Response Rate and Thresholds** - The employment response to changes to harvest levels may vary between different industry sectors. Harvesting job impacts would possibly be most closely tied to the level of harvest. Processing job impacts are unlikely to be directly proportional to harvest changes, but are more likely to occur in a step-wise manner related to thresholds where, at some quantity of timber supply, the number of shifts may be reduced or a mill may shut down. However, the points at which thresholds may be reached at particular facilities cannot accurately be predicted, and the proportionality assumption is considered to be reasonably accurate for estimates over long periods of time and a number of mills. Moreover, because of the possibility of fibre substitution, job loss projections in the processing sector are less certain than for harvesting. Finally, potential may exist to offset job losses through an

increased focus on value-added wood production or the use of more labour-intensive harvesting techniques.

- ***Distribution of Impacts*** - Impacts may either be dispersed over a large number of operations or concentrated on a few. While the aggregate job estimates indicated here should be generally valid, the distribution of these impacts among individual licensees, companies, and communities within the TSA could vary significantly. The closing of camps, the elimination of specific shifts, even the elimination of entire operations, are examples of the kinds of threshold (or non-proportional) impacts that could characterise the reaction of individual operators and operations. Conversely, operations not pushed to a threshold point may make very few changes.
- ***Government Expenditures*** - These are assumed to remain unchanged despite harvest changes. In reality, public expenditures in a number of areas, such as schools and hospitals, are likely to change as community population levels change. This would amplify the community impacts of forestry job losses.
- ***Income Support Programs*** - The impacts presented are based on an assumption of no short-term income support (in particular, Unemployment Insurance benefits). Income support programs would mitigate employment income losses and spin-off employment impacts (by helping maintain some level of re-spending in the community).
- ***Proportional Harvest Reductions*** - Harvest reductions are assumed to be spread evenly among all licensees and all forms of tenure.

6.2 Employment, Employment Income and Government Revenue Impacts

6.2.1 Description of current situation

The annual harvest level associated with the Arrowsmith TSA over the past four years (1991-1994) has averaged 417 000 cubic metres, or 87 percent of the AAC (479 150 cubic metres). For the purposes of this analysis, the current situation refers to the four-year average annual harvest level of 417 000 cubic metres.

The current TSA harvest level supports an estimated 363 PY's of direct forest sector employment to TSA residents. Associated with this employment base is an estimated after-tax income of \$12.4 million. This direct forestry activity in turn supports local indirect and induced employment of 226 PY's, and employment income of \$4.7 million. Total TSA resident employment and income associated with the current TSA harvest is 589 PY's and \$17.1 million, respectively.³³

At the provincial level (includes TSA residents), the current TSA harvest level supports approximately 560 direct PY's, with an estimated after-tax income of \$19.6 million. Total provincial employment and income generated by the current TSA harvest is 1 400 PY's and \$40.0 million, respectively. The Arrowsmith TSA also is a source of revenue for the Province of British Columbia in the form of stumpage and rent (\$15.2 million), personal income tax (\$4.5 million),

³³ There is additional employment at the B.C. Forest Service Port Alberni and Duncan Forest District Offices of approximately 123 PY's, of which a portion is attributable to the TSA. However, given the stewardship role of the Forest Service, it is difficult to determine the relationship between the changes to future timber harvest levels and Forest Service staffing levels. Consequently, no incremental Forest Service employment impacts arising from changed harvest levels are incorporated into the analysis.

and other taxes (\$3.3 million). In total, the current TSA harvest level generates an estimated \$23.0 million in government revenues for the Province.

Government revenues generated by the current TSA harvest also accrue to the federal government. These revenues include personal income tax and corporate taxes, and represent an annual income of approximately \$9.6 million to the Government of Canada.

6.2.2 Scenario 1 - Economic Impacts

Table 6.1 summarizes the TSA and provincial forestry related employment, income and government revenue impacts associated with Scenario 1, and compares them to the current situation.

- Over the first decade (years 1 to 10), Scenario 1 assumes a 52 000 cubic metre (12%) increase from the current average harvest level of 417 000 cubic metres, to 469 000 cubic metres (10 150 cubic metres lower than the current AAC level of 479 150 cubic metres). This annual harvest level increase would, in turn, generate additional total (direct, indirect and induced) employment and income within the TSA of approximately 73 PY's, and \$2.2 million. At the provincial level, the increase would be about 175 PY's, and \$5.0 million in associated employment income. Provincial government revenues would also rise by approximately \$2.9 million annually.
- Over the next three decades (years 11 to 30) the harvest level decreases by a total of 123 000 cubic metres, from 469 000 cubic metres, to 346 000 cubic metres. This harvest level is then maintained for the next 120 years. By decade 4 (year 31 to 40), total employment and income would have fallen to 489 PY's and \$14.2 million within the TSA, and 1 162 PY's and \$33.2 million at the provincial level. The cumulative reduction in total TSA employment and income versus the current situation is approximately 100 PY's and \$2.9 million, while at the provincial level, the cumulative decrease is 238 PY's, and \$6.8 million. Similarly, provincial government revenues would have fallen to approximately \$19.0 million, \$4.0 million below what is generated by the current harvest level.
- Under Scenario 1, the long-term harvest level of 385 000 cubic metres is achieved in decade 16 (151 years from now). This represents a 30 000 cubic metre (7%) decrease from the current harvest level of 417 000 cubic metres. From decade 16 on, total TSA employment and income would be 544 PY's and \$15.9 million; total provincial employment and income would be 1 292 PY's and \$36.9 million. Provincial government revenues would be \$21.2 million annually.

Table 6.1: Arrowsmith TSA - Economic Impacts Associated with Scenario 1

Scenario 1 - Harvest Forecast												
	Current		Year 0 - 10		Year 11 - 20		Year 21 - 30		Year 31 - 150		Year 151+	
	PYs	Income (\$millions)	PYs	Income (\$millions)	PYs	Income (\$millions)	PYs	Income (\$millions)	PYs	Income (\$millions)	PYs	Income (\$millions)
Harvest Level (000s m ³) • % of the Current Level	417		469 112%		422 101%		380 91%		346 83%		385 92%	
EMPLOYMENT & INCOME TSA Direct Indirect & Induced Total TSA ¹ • Cumulative Difference												
	363	\$ 12.4 4.7	408	\$14.0 5.3	367	\$12.6 4.8	331	\$11.3 4.3	301	\$10.3 3.9	335	\$11.5 4.4
	226		254		229		206		188		209	
	589	\$17.1	662 73	\$19.3 \$2.2	596 7	\$17.4 \$0.3	537 (\$2)	\$15.6 (\$1.5)	489 (100)	\$14.2 (\$2.9)	544 (45)	\$15.9 (\$1.2)
	560	\$19.6	630	\$22.1	567	\$19.9	511	\$17.9	465	\$16.3	517	\$18.1
Province Direct Indirect & Induced Total Province ¹ • Cumulative Difference	840	20.4	945	22.9	850	20.6	765	18.6	697	16.9	775	18.8
	1 400	\$40.0	1 575 175	\$45.0 \$5.0	1 417 17	\$40.5 \$0.5	1 276 (124)	\$36.5 (\$3.5)	1 162 (238)	\$33.2 (\$6.8)	1 292 (108)	\$36.9 (\$3.1)
GOVERNMENT REVENUES Provincial Federal Total Government Revenues • Cumulative Difference												
		\$23.0 9.6		\$25.9 10.7		\$23.3 9.7		\$20.9 8.7		\$19.0 8.0		\$21.2 8.8
		\$32.6		\$36.6 \$4.0		\$33.0 \$0.4		\$29.6 (\$3.0)		\$27.0 (\$5.6)		\$30.0 (\$2.6)

1 Excludes Forest Service employment.
() represents a decrease

6.2.3 Scenario 2 - Economic Impacts

Table 6.2 summarizes the TSA and provincial forestry related employment, income and government revenue impacts associated with Scenario 2, and compares them to the current situation.

- Under Scenario 2, the harvest level decreases immediately to the long-term harvest level of 385 000 cubic metres, 32 000 cubic metres below the current harvest level (and 94 150 cubic metres below the AAC). The harvest is maintained at this level for six decades (year 0 through 60). Compared to the current situation, this harvest level decrease would result in reductions to total (direct, indirect and induced) employment and income within the TSA of approximately 45 PY's, and \$1.2 million. At the provincial level, the decrease would be about 108 PY's, and \$3.1 million. Provincial government revenues would also fall by approximately \$1.8 million.
- The long-term harvest level, however, cannot be maintained throughout the forecast period. In decade seven (year 61), it is forced to drop a further 39 000 cubic metres, to 346 000 cubic metres. This is the same harvest level attained under Scenario 1 during the period year 31 to 40, and maintained until year 149. Employment, employment income and government revenue impacts under Scenario 2 would therefore be identical to those experienced under Scenario 1 - the only difference being, they would occur 30 years later.
- Similar to Scenario 1, the harvest level increases (back) to the long-term harvest level in decade 16.

Table 6.2: Arrowsmith TSA - Economic Impacts Associated with Scenario 2

	Current		Scenario 2 - Harvest Forecast					
			Year 0 - 60		Year 61 - 150		Year 151+	
Harvest Level (000s m³) • % of the Current Level	417		385 92%		346 83%		385 92%	
	PYs	Income (\$millions)	PYs	Income (\$millions)	PYs	Income (\$millions)	PYs	Income (\$millions)
EMPLOYMENT & INCOME								
TSA								
Direct	363	\$12.4	335	\$11.5	301	\$10.3	335	\$11.5
Indirect & Induced	226	4.7	209	4.4	188	3.9	209	4.4
Total TSA ¹	589	\$17.1	544	\$15.9	489	\$14.2	544	\$15.9
• Cumulative Difference			(45)	(\$1.2)	(100)	(\$2.9)	(45)	(\$1.2)
Province								
Direct	560	\$19.6	517	\$18.1	465	\$16.3	517	\$18.1
Indirect & Induced	840	20.4	775	18.8	697	16.9	775	18.8
Total Province ¹	1 400	\$40.0	1 292	\$36.9	1 162	\$33.2	1 292	\$36.9
• Cumulative Difference			(108)	(\$3.1)	(238)	(\$6.8)	(108)	(\$3.1)
GOVERNMENT REVENUES								
Provincial		\$23.0		\$21.2		\$19.0		\$21.2
Federal		9.6		8.8		8.0		8.8
Total Government Revenues		\$32.6		\$30.0		\$27.0		\$30.0
• Cumulative Difference				(\$2.6)		(\$5.6)		(\$2.6)
¹ Excludes Forest Service employment. () represents a decrease								

7.0 Implications for Communities and First Nations

7.1 Community Implications

Although forestry-based economic activity and employment is a very significant component for numerous communities that lie within the TSA boundaries (Port Alberni, Cowichan Lake, Chemainus, etc.), the relatively small scale of the Arrowsmith TSA AAC, its dispersion throughout the region, and the relatively small changes being contemplated all suggest that a concentration of impacts in any one community is unlikely to arise. The one exception might be some smaller communities (e.g. Coombs, or Sooke) that are home to two or more small independent mills, operations that may be more vulnerable to any tightening, however incremental, in overall fibre supplies. This concern would arise only following the immediate reductions contemplated for Scenario 2, and not under the graduated reductions of Scenario 1.

For reasons relatively specific to each area, the following communities might have above average concerns regarding the prospect of a more immediate fibre reduction under Scenario 2:

- **Lake Cowichan:** The stability of the Cowichan Lake area is closely tied to the future outlook of TimberWest's sawmill at Youbou, which is designed to process the dwindling supply of large old growth timber from TimberWest's TFL 46. One rationale for the proposed Mount Bolduc Community Forest Licence (estimated AAC of 18 000 cubic metres) is to supplement the fibre supply for that mill (a decision is still pending on this licence). Clearly, the possible incremental impact of Scenario 2 in exacerbating the existing fibre supply situation in the Cowichan Lake area should be examined before any final AAC determination;
- **Chemainus/Duncan:** As referred to earlier, Doman Forest Products' Chemainus mill has come to depend more than the average on Small Business sales from the Arrowsmith TSA. Although other area mills also expressed concern, this Doman mill may be the one most exposed to any tightening of this fibre supply source (the mill experienced significant downtime in 1994 arising from general difficulties in acquiring fibre). Closure or downsizing of this mill would negatively impact the Chemainus area in particular, and is a consideration that should be explored before any final AAC determination;
- **Alberni Area:** Port Alberni and Ucluelet have up to ten small independent sawmills that lack a secure fibre supply, and that have an ongoing stake in the continuation of Small Business sales at current or higher levels. Although Small Business sales from the TSA are not the major source of regular fibre for any one of these operations, the incremental impact of a contraction of TSA Small Business sales on the general fibre supply situation facing these mills is still an important consideration.

7.2 First Nations Implications

There are 29 First Nations with reserves and/or traditional territories located within the boundaries of the Duncan and Port Alberni Forest Districts. With the exception of the Toquaht First Nation, which was awarded a Forest License in 1994, none of these First Nations have up to now had a direct collective stake in the TSA and its AAC (i.e. separate from the employment of individual Band members or sub-contract crews by non-native licensees). Based on agreements being negotiated or under consideration outside of the TSA however (e.g. involving the Dididaht, Hesquiaht, Ahousaht, and Cowichan First Nations, among others), there are clear indications that this situation may be about to change, and that many of these Bands (particularly in the western portions of the TSA) are moving toward a more active and managerial role in forestry activities. The higher initial harvest levels of Scenario One would appear to provide more room than those of Scenario Two to accommodating these First Nations interests. On the other hand, the view was also expressed that "culturally significant lands" would likely be less at risk under a lower rate of harvest scenario.

8.0 Environmental and Outdoor Recreation Implications

8.1 Environmental Implications

All timber harvest scenarios examined in the Arrowsmith TSA Timber Supply Analysis report embody a range of measures (i.e. cut-block adjacency standards, riparian buffers) aimed at the protecting the environment. The protective effect of these existing measures will be enhanced with implementation of the Forest Practices Code. The fact that the two harvest scenarios examined in this report share identical assumptions regarding environmental management clearly limits the conclusions that can be reached concerning the differences between each.

Additional limitations arise from the fact that over time, both scenarios move toward identical long-term harvest levels. Further, this report is concerned only with the Arrowsmith TSA land base, which as noted before, comprises a relatively small proportion of the overall southern Vancouver Island land base. The TSA land base is also taken as given, with varying harvest levels within that land base alone being considered. Finally, environmental impact analysis is limited by a lack of information concerning wildlife populations and ecosystem processes and relationships.

With those limitations in mind, the following is a brief discussion of some possibly relevant environmental implications:

- Natural forest stands are especially complex in early, and late (old growth) stages of succession - in contrast with the simpler structure and composition of stands managed intensively for wood fibre production. In general, existing forest management practices tend to eliminate or reduce the duration of these complex early, and late seral forest stages, possibly eliminating ecological processes and species that are dependent upon them. Under both harvest scenarios, a shift in the age class distribution to younger, second-growth forest will occur (under scenario 1, the majority of the mature forest stands, i.e. 250+ years, would be converted to younger stands within the first 50 years). Once converted, the majority of these forests will not redevelop to an old growth state as they will be harvested again, before this occurs. As a result, the loss of mature forest habitat may be detrimental to some species of management concern. However, the pattern of small dispersed operating areas within the Arrowsmith TSA makes it very difficult to be specific as to these effects. The essential difference between scenarios lies in the more rapidly reduced rate of harvest under Scenario 2. The relatively small overall difference, however, could well be offset by the effectiveness of the extensive and growing network of local protective measures now in effect for the entire area (i.e. Local Resource Use Plans, as well as, local biodiversity targets under the new Forest Practices Code).

- By far the largest habitat concentrations for wildlife groups of interest (such as deer, elk, Vancouver Island marmot, and birds) on Southern Vancouver Island lie outside of the TSA. As reviewed earlier in Section 3.3, this is also the case for the region's identified anadromous and freshwater fishery systems. In general, the most that can be said is that Scenario 2 appears to provide forest and wildlife managers the most time and flexibility to best accommodate habitat and special protection needs of species of interest (this is particularly the case within the eastern portion of southern Vancouver Island where biodiversity management is currently constrained by the high proportion of land that is privately owned). However, to the extent that developments such as the Clayoquot Sound Land Use Decision, the various local resource use plans, the new Forest Practices Code, or the new Protected or Low Intensity Areas designated by the Vancouver Island Land Use Plan effectively address these concerns, then any differences stemming from differential rates of harvest alone may be effectively overridden.
- Not everyone has total confidence in the adequacy of the new measures. For example, the Port Alberni-based Alberni Environmental Coalition (AEC) considers the provision for riparian zone buffers in the Forest Practices Code to be less than is required to safeguard areas of interest. They also submit that the risk of soils being depleted increases with rate of harvest. To the extent that the skepticism of groups such as the AEC is warranted, then the reduced rate of harvest provided for under Scenario 2 would be a more risk-free environmental choice.

8.2 Outdoor Recreation Implications

The fragmented pattern of the TSA, along with the identical long-term harvest levels, also limits what can be concluded with respect to the relative outdoor merits of Scenario 1 or 2. In the western parts of the TSA, major activity areas (e.g. Barkley Sound) are either already protected, or in the process of becoming protected/designated for special management. In this case, there is no generally higher risk to outdoor recreation activities that can be identified from the higher initial harvest levels allowed for under Scenario 1. A more pressing threat to the enjoyment of these activities in the western parts of the TSA appears to be that of crowding and over-use. In the more populated eastern portions of the TSA, the issues are somewhat different. Because of the scarcity of TSA/Crown lands in this area (most land is under private ownership or settlement), the retention of an accessible and pleasant recreational space is seen by many as a priority. Since a greater evidence of timber harvesting is more likely under Scenario 1, a concern exists that this local interest may not be as well protected as under Scenario 2. If this concern could be effectively addressed through area-specific safeguard measures, then that basis for preferring Scenario 2 over Scenario 1 would no longer apply.

9.0 Summary and Conclusions

Forestry is a significant part of the Southern Vancouver Island economy. The Arrowsmith TSA, however, with its relatively small and fragmented land base is a small contributor both to the region's timber harvest and forestry employment levels. The TSA accounted for approximately 8 percent of the total timber harvest on Southern Vancouver Island (1991-94). The TSA harvest supports approximately 363 direct full-time jobs and generates approximately \$12.4 million in after-tax income for south Island residents. Total TSA resident employment and after-tax income is 589 full-time jobs and \$17.1 million. Total forestry-based employment for this region is estimated to be upwards of 16 000 full-time (direct, indirect and induced) jobs. Provincially, the Arrowsmith TSA harvest supports an estimated 1 400 full-time (direct, indirect and induced) jobs, and generates approximately \$40.0 million in after-tax income (these figures include TSA-level employment) and \$23.0 million annually in provincial government revenues.

This report has examined the potential socio-economic and environmental impacts associated with two of the harvest scenarios in the *Arrowsmith TSA Timber Supply Analysis* report. Both scenarios involve a total drop in harvest levels of 32 000 cubic metres from the average annual harvest of 417 000 cubic metres, to a long-term harvest level of 385 000 cubic metres. The 417 000 cubic metres represents the average annual harvest level within the TSA over the last four years (1991-94). This level of harvest is approximately 87 percent below the timber supply AAC of 479 150 cubic metres. The average annual undercut of 62 150 cubic metres is primarily a function of underselling in the Small Business Forest Enterprise Program which was due, in large part, to changes in available land base.

The two scenarios considered in this report differ only in magnitude of initial harvest level changes. The timber supply analysis did not consider factors such as removals from the operable land base for new protected areas, or the impact of the resource management provisions of the new Forest Practices Code. Under Scenario 1 the initial harvest rate is set at 469 000 cubic metres, which represents close to 12 percent increase over the current harvest level (but 2 percent below the timber supply AAC). At the beginning of the second decade, the harvest drops back to 422 000 cubic metres, almost the level of the current harvest. It then continues to decline for the next two decades to annual harvest of 346 000 cubic metres, where it remains for another 12 decades, before rising to the long term harvest level of 385 000 cubic metres. Under Scenario 2, the initial harvest is decreased to the long term harvest level immediately. However, a reduction to 346 000 cubic metres is still required during decades 6 through 15 because of an insufficiency of mature second growth timber in the TSA during that period.

The analysis in this report assumes that the economic impacts would follow the trend in harvest level changes. Scenario 1, which provides a gradual step-down to the long term harvest level, defers employment and government revenue reductions until 2015, after which harvest levels begin to decline below the current harvest level. During this twenty year period, employment and government revenues have the potential to increase above current levels (this assumes that the current challenges being faced by the SBFEP can be successfully addressed). In contrast, under scenario 2 there would be immediate employment and government revenue declines relative to the

current situation. Within the TSA, direct and indirect/induced employment would fall by 45 PY's. At the provincial level, a total of 108 full-time jobs would be lost, and approximately \$1.8 million in government revenues foregone.

The relatively small scale of the Arrowsmith TSA harvest, its dispersion throughout the region, and the relatively small overall changes being contemplated all suggest that a concentration of impacts in any one community is unlikely to arise. The one exception might be some smaller communities (e.g. Coombs, or Sooke) that are home to two or more small independent mills whose operations may be more vulnerable to any tightening, however incremental, in overall fibre supplies. This concern would arise only under the immediate reductions contemplated under Scenario 2.

Although relatively small in the larger South Island fibre supply context, the Arrowsmith TSA Small Business component of approximately 200 000 cubic metres (Section 16) is important to a number of area mills and contract loggers as a valued source of incremental fibre. For these groups, the more immediate fall in harvest levels envisaged under Scenario 2 could pose some difficulties in maintaining existing levels of operations.

At present, the majority of the resident First Nations have not had a direct collective stake in the TSA and its harvest (with the exception of the Toquaht First Nation which was awarded a Forest Licence in December, 1994). Many First Nations, particularly those located on the West Coast, are moving towards a more active and managerial role in the forest sector. The higher initial harvest levels of Scenario 1 would appear to provide more room to accommodate these interests.

The main difference between the two scenarios from an environmental perspective results from the timing of harvest reductions. Harvesting of older age forest would proceed more rapidly under Scenario 1 than 2. The age class distribution of the forest would narrow and populations of species that depend on mature forests may decline. Moreover, biodiversity management within the eastern portion of South Vancouver Island is hampered by the high proportion of land that is privately owned, making it difficult for forest and wildlife managers to implement landscape level strategies. Scenario 2, with its immediate harvest reduction, provides forest and wildlife managers more flexibility to address habitat, fish and wildlife, and recreation requirements.

Glossary of Terms

Allowable Annual Cut (AAC)	The volume of timber which may be cut from a forest management unit (e.g., a TSA), set by the Chief Forester in accordance with Section 7.0 of the Forest Act.
AAC Apportionment	The allocation by the Minister of the AAC for a TSA among timber tenures in accordance with Section 8.0 of the Forest Act.
basic silviculture	A term used to refer to the silviculture treatments that are carried out to ensure the establishment of a free growing tree crop. This may include: surveying, site preparation, planting, direct seeding or brushing.
biodiversity	The diversity of plants, animals and other living organisms and their habitats measured by factors such as genetic variability, number of species and variation in species composition.
biogeoclimatic zones	Areas which are defined by similar biological, physical and atmospheric characteristics.
Bone-Dry Unit (BDU)	A bone-dry unit of pulp chips weighs 2 400 even dry pounds. The volume of solid wood in a BDU of chips varies with species density. A conversion factor of 2.8 m ³ /BDU would be roughly applicable for the fibre flows discussed in this report.
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 employment	Employment in the forestry sector (harvesting, milling, and silviculture).
ecosystem	Any complex of living organisms together with all the other biotic and abiotic (non-living) factors which affect them
Environmentally Sensitive Area (ESA)	An area with significant non-timber values, fragile or unstable soils, problems in establishing a new tree crop, or where timber harvesting may cause avalanches.
ecoprovince	An area of the earth's surface characterized by very broad ecological interactions between the four major environmental components of the ecosystem: air, water, land and biota.

forest cover requirements	These specify desired distributions of areas by age or size class groupings. These requirements can be used to reflect desired conditions for wildlife, watershed protection, visual quality and other integrated resource management objectives. General adjacency and green-up guidelines are also specified using forest cover requirements.
Forest Licence (FL)	This licence is the major forest-tenure in BC. It provides a replaceable AAC in a TSA to an operator who has an established or proposed processing facility.
green-up period	The time needed for a stand of trees to reach a desired condition (e.g. such as a certain minimum height) to ensure maintenance of water quality, wildlife habitat, soil stability, or aesthetics.
harvest forecast	The flow of potential timber harvests over time. A harvest forecast is usually a measure of the maximum timber supply that can be realised, over time, for a specified land base and set of management assumptions. It is a result of forest planning models and is affected by the size and productivity of the land base, the current growing stock, and management objectives, constraints and assumptions.
indirect employment	Employment in sectors which supply materials, equipment, and services to the forest sector.
induced employment	Employment supported by the local respending of the incomes of those employed in the direct (forestry) and indirect (service and supply) sectors.
inoperable areas	Areas defined as unavailable for harvest for terrain-related or economic reasons.
long term harvest level	Refers to timber harvesting levels whereby the volume of timber harvested in any given period can be replaced by a similar volume from regenerated stands within the same period.
management assumptions	Approximations of management objectives, priorities, constraints and other conditions needed to represent forest management actions in a forest planning model. These include, for example, the criteria for determining the timber harvesting land base, the specification of minimum cutting ages, utilization levels and standards, integrated resource guidelines and silviculture and pest management programs.
non-Crown areas	Areas not managed directly by the BC Forest Service (for example, private land, Indian Reserves, and provincial parks).

non-forest areas	Areas not occupied by productive forest cover (such as rock, swamp and alpine areas).
non-commercial cover areas	Areas occupied by non-commercial tree or brush species.
non-merchantable forest types	Areas occupied by timber stands that are accessible and otherwise available for timber harvesting but are assumed to be non-merchantable due to stand characteristics such as small size, incidence of decay and low stocking.
Person Year (PY)	A standard measure of employment that takes into account part-time and seasonal full-time work. For example, an employee working full-time for six months would represent 0.5 PY of employment. Using this measure allows different types of employment to be compared on a similar basis.
riparian zone	The stream bank and flood plain adjacent to streams or water bodies, with particular reference to the vegetation.
section management	A silvicultural system used to maintain or create areas containing a wide range of tree ages or sizes. The time interval between harvests in such areas is fairly short (usually less than 30 years) and during these harvests either single or scattered trees or small groups of trees are removed from across the entire area.
Small Business Forest Enterprise Program (SBFEP)	A program introduced in 1978 to provide opportunities for small businesses in the forest sector. Timber is sold to loggers, small sawmills, and re-manufacturers.
timber harvesting land base	The portion of the total land area of a management unit considered to contribute to, and be available for, long-term timber supply. The harvesting land base is defined by reducing the total land base according to specified management assumptions.
Timber Sale Licence (TSL)	Licences providing established operators with a ten year AAC over undefined areas of Crown land in a TSA. These licences are replaceable in their last year. Shorter term timber sale licences are also issued to small business loggers and to timber processors who qualify for registration under the Small Business Enterprise Program.
Timber Supply Area (TSA)	An integrated resource management unit established in accordance with Section 6 of the <i>Forest Act</i> .
unsalvaged losses	The volume of timber killed or damaged annually by natural causes (such as fire, wind, insects and disease) and not harvested.
Visual Quality Objective (VQO)	Defines a level of acceptable landscape alteration resulting from timber harvesting and other activities. A number of visual quality classes can be defined based on the maximum amount of alteration permitted.

watershed

An area drained by a particular stream or river. A large watershed may contain several smaller watersheds.

Woodlot Licence

A licence issued to an individual to manage a specific area of Crown Timber, plus any private woodlands the individual holds. Requires the holder to file a management plan and to harvest at a pre-determined rate.

Arrowsmith TSA: Incremental Economic Impacts

This appendix presents the incremental changes in employment, and employment income that would occur under Scenario One and Scenario Two. The incremental change shown for each time period represents the change from the previous period. For example, incremental changes shown for Year 20 are the changes from the "current" period.

Both TSA and provincial incremental impacts are presented. The provincial impacts include those at the TSA level.

Table B.1 TSA Level Incremental Employment and Income Impacts - Scenario 1

Year	Harvest (<i>'000 m³/year</i>)	Employment			Income		
		Direct (<i>PY</i>)	Indirect/ Induced (<i>PY</i>)	Total (<i>PY</i>)	Direct (<i>\$1994 mil.</i>)	Indirect/ Induced (<i>\$1994 mil.</i>)	Total (<i>\$1994 mil.</i>)
Current	417	363	226	589	\$12.4	\$4.7	\$17.1
0	52	45	28	73	\$1.6	\$0.6	\$2.2
10	(47)	(41)	(25)	(66)	(\$1.4)	(\$0.5)	(\$1.9)
20	(42)	(36)	(23)	(59)	(\$1.3)	(\$0.5)	(\$1.8)
30	(34)	(30)	(18)	(48)	(\$1.0)	(\$0.4)	(\$1.4)
40	0	0	0	0	\$0.0	\$0.0	\$0.0
50	0	0	0	0	\$0.0	\$0.0	\$0.0
60 - 140	0	0	0	0	\$0.0	\$0.0	\$0.0
150 - 200	39	34	21	55	\$1.2	\$0.5	\$1.7

Table B.2 TSA Level Incremental Employment and Income Impacts - Scenario 2

Year	Harvest (<i>'000 m³/year</i>)	Employment			Income		
		Direct (<i>PY</i>)	Indirect/ Induced (<i>PY</i>)	Total (<i>PY</i>)	Direct (<i>\$1994 mil.</i>)	Indirect/ Induced (<i>\$1994 mil.</i>)	Total (<i>\$1994 mil.</i>)
Current	417	363	226	589	\$12.4	\$4.7	\$17.1
0	(32)	(28)	(17)	(45)	(\$0.9)	(\$0.3)	(\$1.2)
10	0	0	0	0	\$0.0	\$0.0	\$0.0
20	0	0	0	0	\$0.0	\$0.0	\$0.0
30	0	0	0	0	\$0.0	\$0.0	\$0.0
40	0	0	0	0	\$0.0	\$0.0	\$0.0
50	0	0	0	0	\$0.0	\$0.0	\$0.0
60 - 140	(39)	(34)	(21)	(55)	(\$1.2)	(\$0.5)	(\$1.7)
150 - 200	39	34	21	55	\$1.2	\$0.5	\$1.7

Table B.3 Provincial Incremental Employment and Income Impacts - Scenario 1

Year	Harvest (<i>'000 m³/year</i>)	Employment			Income		
		Direct (<i>PY</i>)	Indirect/ Induced (<i>PY</i>)	Total (<i>PY</i>)	Direct (<i>\$1994 mil.</i>)	Indirect/ Induced (<i>\$1994 mil.</i>)	Total (<i>\$1994 mil.</i>)
Current	417	560	840	1,400	\$19.6	\$20.4	\$40.0
0	52	70	105	175	\$2.5	\$2.5	\$5.0
10	(47)	(63)	(95)	(158)	(\$2.2)	(\$2.3)	(\$4.5)
20	(42)	(56)	(85)	(141)	(\$2.0)	(\$2.0)	(\$4.0)
30	(34)	(46)	(68)	(114)	(\$1.6)	(\$1.7)	(\$3.3)
40	0	0	0	0	\$0.0	\$0.0	\$0.0
50	0	0	0	0	\$0.0	\$0.0	\$0.0
60 - 140	0	0	0	0	\$0.0	\$0.0	\$0.0
150 - 200	39	52	78	130	\$1.8	\$1.9	\$3.7

Table B.4 Provincial Incremental Employment and Income Impacts - Scenario 2

Year	Harvest (<i>'000 m³/year</i>)	Employment			Income		
		Direct (<i>PY</i>)	Indirect/ Induced (<i>PY</i>)	Total (<i>PY</i>)	Direct (<i>\$1994 mil.</i>)	Indirect/ Induced (<i>\$1994 mil.</i>)	Total (<i>\$1994 mil.</i>)
Current	417	560	840	1,400	\$19.6	\$20.4	\$40.0
0	(32)	(43)	(65)	(108)	(\$1.5)	(\$1.6)	(\$3.1)
10	0	0	0	0	\$0.0	\$0.0	\$0.0
20	0	0	0	0	\$0.0	\$0.0	\$0.0
30	0	0	0	0	\$0.0	\$0.0	\$0.0
40	0	0	0	0	\$0.0	\$0.0	\$0.0
50	0	0	0	0	\$0.0	\$0.0	\$0.0
60 - 140	(39)	(52)	(78)	(130)	(\$1.8)	(\$1.9)	(\$3.7)
150 - 200	39	52	78	130	\$1.8	\$1.9	\$3.7

Table B.5 Incremental Government Revenue Impacts - Scenario 1

Year	Harvest (000 m ³ /year)	BC Government Revenues				Federal Government Revenues		
		Stumpage & Rent Fees (\$1994 mil.)	Other Forestry Taxes (\$1994 mil.)	Personal Income Tax (\$1994 mil.)	BC Total (\$1994 mil.)	Personal Income Tax (\$1994 mil.)	Other Federal Taxes (\$1994 mil.)	Federal Total (\$1994 mil.)
Current	417	\$15.2	\$3.2	\$4.5	\$22.9	\$9.0	\$0.6	\$9.6
0	52	\$1.9	\$0.4	\$0.6	\$2.9	\$1.1	\$0.0	\$1.1
10	(47)	(\$1.7)	(\$0.4)	(\$0.5)	(\$2.6)	(\$1.0)	\$0.0	(\$1.0)
20	(42)	(\$1.6)	(\$0.3)	(\$0.5)	(\$2.4)	(\$0.9)	(\$0.1)	(\$1.0)
30	(34)	(\$1.2)	(\$0.3)	(\$0.4)	(\$1.9)	(\$0.7)	\$0.0	(\$0.7)
40	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
50	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
60	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
70	39	\$1.4	\$0.3	\$0.5	\$2.2	\$0.8	\$0.0	\$0.8

Table B.6 Incremental Government Revenue Impacts - Scenario 2

Year	Harvest (000 m ³ /year)	BC Government Revenues				Federal Government Revenues		
		Stumpage & Rent Fees (\$1994 mil.)	Other Forestry Taxes (\$1994 mil.)	Personal Income Tax (\$1994 mil.)	BC Total (\$1994 mil.)	Personal Income Tax (\$1994 mil.)	Other Federal Taxes (\$1994 mil.)	Federal Total (\$1994 mil.)
Current	417	\$15.2	\$3.2	\$4.5	\$22.9	\$9.0	\$0.6	\$9.6
0	(32)	(\$1.2)	(\$0.3)	(\$0.3)	(\$1.8)	(\$0.7)	(\$0.1)	(\$0.8)
10	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
20	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
30	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
40	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
50	0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
60 - 140	(39)	(\$1.4)	(\$0.3)	(\$0.5)	(\$2.2)	(\$0.8)	\$0.0	(\$0.8)
150 - 200	39	\$1.4	\$0.3	\$0.5	\$2.2	\$0.8	\$0.0	\$0.8

Economic Impact Methodology

This appendix provides a detailed explanation of the methods used to estimate the employment, employment income, and government revenue impacts associated with the Arrowsmith TSA AAC. Both TSA-level and province-wide impacts are discussed.

In simplified terms, the procedure for assessing economic impacts resulting from changes in harvest levels is as follows:

- *Determine direct forestry employment related to TSA harvest levels.* Major licensees and other sources provided data on employment and incomes attributed to current harvest levels. This information was used to derive direct employment coefficients and wage rates.
- *Determine indirect and induced impacts resulting from the direct forestry employment.* Employment multipliers provided by the Ministry of Finance and Corporate Relations and the Ministry of Forests were applied against the direct employment estimates derived from the survey of forest industry companies.
- *Determine government revenue impacts related to TSA harvest levels.* Government revenue rates provided by the Ministry of Forests (excluding provincial and federal personal income tax rates which were estimated using tax tables based on Revenue Canada income tax rates) were applied against the TSA harvest forecast profiles.

C.1 Direct Employment and Income Estimates

Estimates of forestry employment and employment income generated by the Arrowsmith TSA timber harvest are based on information collected from area forest products companies, area contractors, and the Forest Service offices in Port Alberni and Duncan, and relate to jobs attributable to the Arrowsmith TSA harvest volume and not to employment associated with non-TSA wood. The following employment estimates are based on the TSA AAC of 479 150 m³. This information was used to calculate employment coefficients, or measures of jobs per 1000 m³ of timber harvested. These coefficients were then used to estimate the employment impacts associated with different timber harvest levels, starting with the current actual harvest level of 417 000 m³ (average 1991-94), which is the base year for the tables presented in Section 6 of this report. This approach assumes that changes in harvest levels lead to directly proportional changes in forestry employment. A number of cautionary points related to the interpretation and use of employment coefficients are noted in Section 6. Coefficients for the different categories of direct employment are presented in Tables C.1, C.2, and C.3. The province-wide employment coefficients in Table C.3 are obtained by adding those for the Arrowsmith TSA and those for outside the TSA.

Incomes shown include cash benefits, such as vacation pay and overtime, but exclude non-cash benefits, such as employer contributions to pension and extended health plans. Before-tax incomes were generally reduced by approximately 20 percent to account for non-cash benefits (except for silviculture which was reduced by 15 percent). In addition, income impacts are

calculated and presented on an after-tax basis (government income tax revenues are discussed in Section C.3, below). Non-cash benefits and income taxes were removed in order to provide a measure of the disposable income which is available to circulate in the local economy and which is therefore consistent with the estimation of indirect and induced employment impacts using the multipliers discussed in Section C.2, below. Incomes are presented in \$1994, and have been rounded slightly.

Table C.1 Arrowsmith TSA Employment and Income (AAC 479 150 m³)

Sector	TSA Employment Coefficient (PYs/000 m ³)	TSA Employment (PYs)	TSA Average Income (before-tax \$)	Tax Rate	TSA Average Income (after-tax \$)
Harvesting	0.330	158	\$ 46 000	28%	\$ 33 100
Silviculture	0.015	7	\$ 32 000	22%	\$ 25 000
Marine Transp.	0.005	2	\$ 58 300	31%	\$ 40 200
Sawmill	0.310	149	\$ 46 300	28%	\$ 33 300
Pulp and Paper	0.210	101	\$ 54 000	30%	\$ 37 800
Total	0.870	417	\$ 47 900	28%	\$ 34 500

Table C.2 Outside Arrowsmith TSA Employment and Income (AAC 479 150 m³)

Sector	Non-TSA Employment Coefficient (PY/000 m ³)	Non-TSA Employment (PY)	Non-TSA Average Income (before-tax \$)	Tax Rate	Non-TSA Average Income (after-tax \$)
Harvesting	0.070	34	\$ 46 800	28%	\$ 33 700
Silviculture	0.016	8	\$ 32 000	22%	\$ 25 000
Marine Transp	0.008	4	\$ 58 300	31%	\$ 40 200
Sawmill	0.200	95	\$ 54 600	30%	\$ 38 200
Pulp and Paper	0.180	86	\$ 54 000	30%	\$ 37 800

Table C.3 Provincial Employment and Employment Income (AAC 479 150 m³)

Sector	Provincial Employment Coefficient (PY/000 m ³)	Provincial Employment (PY)	Provincial Average Income (before-tax \$)	Tax Rate	Provincial Average Income (after-tax \$)
Harvesting	0.400	192	\$ 46 100	28%	\$ 33 200
Silviculture	0.031	15	\$ 32 000	22%	\$ 25 000
Marine Transp	0.013	6	\$ 58 300	31%	\$ 40 200
Sawmill	0.510	244	\$ 49 500	29%	\$ 35 100
Pulp and Paper	0.390	187	\$ 54 000	30%	\$ 37 800
Total	1.344	644	\$ 49 500	29%	\$ 35 100

Harvesting

This includes logging, log transportation, and road building and maintenance. The figures presented are based on information provided by major licensees, and cover both company and contractor operations. Also included are the harvesting operations of independent loggers under the Small Business Forest Enterprise Program (SBFEP). TSA residents account for 82 percent of the total harvesting employment associated with the TSA harvest.

Harvesting employment income estimates are based on information provided by licensees, and in the case of Small Business contractors, on average IWA rates. The two wage rates were weighted according to their relative portions of the total TSA harvest. This yielded an average before-tax wage rate of \$46 000 within the TSA, and \$51 000 outside the TSA. The weighted provincial wage is \$46 800.

Silviculture

Information on silviculture spending was obtained from the Duncan and Port Alberni Forest District offices and from silviculture contractors. The Forest Service is responsible for funding silviculture for areas harvested under the SBFEP, while licensees are responsible for basic silviculture in their harvest areas. These activities include surveying, site preparation, planting, brushing, girdling, fertilization, and spacing. Most silviculture is seasonal, so actual employment totals would be higher than the PY estimates shown.

Based on a 1600 hour PY and an average wage of \$23 per hour, a silviculture PY would have an income of about \$37 000 before-tax and \$32 000 after the removal of non-cash benefits.

Sawmilling

The sawmilling sub-sector on Southern Vancouver Island is large. Local mills that process TSA fibre include: C. Mokko mill in Port Alberni (Coulson's SBFEP Sec. 16.1 sale); Doman's mill in Chemainus, the independent Coastland and CIPA mills in Nanaimo, the Pacific Forest Products mill Ladysmith, the MacMillan Bloedel Nanaimo and Chemainus mills, as well as numerous other small independent mills (SBFEP Sec. 16 sales); and, the small sawmilling facility on the Macoah reserve (Toquaht Forest Licence). Where possible, volume of fibre throughput, wage bill and total labour force information was obtained. In addition, a significant portion of the TSA fibre is transported to the Lower Mainland, and to a lesser extent Northern Vancouver Island for processing. Harvesting 1000 cubic metres of TSA timber is estimated to generate .31 PY's of employment within the TSA, and .51 PY's of employment at the provincial level.

The TSA before-tax wage rate of \$46 300 represents a weighted average of the Coulson, Toquaht Enterprises, and Small Business estimated employment wage bills. The non-TSA province-wide average gross annual income of \$54 600 is based on wage information associated with Intefor and other Lower Mainland processing. The provincial before-tax wage rate is \$49 500.

Pulp and Paper

An estimated 55 percent of the pulp fibre flow is assumed processed within the TSA, primarily at Crofton. A small portion, approximately 15 percent is processed by up Island mills. The

remainder (30 percent) is shipped to the lower mainland for processing. Pulp and Paper employment was estimated using direct coefficient of .39 PY's per 1000 cubic metres. This was based on 1994 data from six coastal pulp and paper mills (Economics and Trade Branch, Ministry of Forests, *Major Primary Timber Processing in B.C.*, 1994).

An average before-tax annual wage rate of \$54 000 was derived on the basis of Price Waterhouse sources.

Marine Transportation

Estimates regarding marine transportation were derived from information provided by licensees, and from interviews with representatives of Lower Mainland marine towing firms. The Arrowsmith TSA is estimated to generate .005 PY's of direct employment per 1000 cubic metres within the TSA, and .008 PY's per 1000 cubic metres outside of the TSA.

A before-tax annual wage rate was reported as approximately \$58 000. This represents a weighted average consisting of Masters, loading crews and deck hands.

BC Forest Service

There is additional forestry-related employment at the Port Alberni and Duncan Forest District offices of approximately 123 PY's, and a salary base of \$6.0 million (before-tax, including benefits), only a portion of which is TSA related. In addition, there are Forest Service employees who work at the Vancouver Region office and in branches located in Victoria, who undertake work related to the Arrowsmith TSA.

Forest Service employment was identified for profiling purposes only. Due to the broad stewardship role of the Forest Service, no direct relationship can reasonably be established with harvest levels. For example, the Forest Service has an increasing workload related to planning, the balancing of timber and non-timber resource values, and initiatives such as the Forest Renewal Plan. For this reason, Forest Service employment is not included in the impact analysis presented in the report.

C.2 Indirect and Induced Impacts

In addition to the direct forest sector employment associated with the Arrowsmith TSA harvest, there is also indirect and induced employment that was estimated using employment ratios, or multipliers. Indirect employment is generated by forest company spending on goods and services. Induced employment is generated through the spending of direct and indirect employment income, for example in local retail outlets. The estimation of indirect and induced employment in the Arrowsmith TSA, and in the province as a whole, is discussed below.

C.2.1 Arrowsmith TSA

For the Arrowsmith TSA, indirect and induced employment and income were calculated using employment ratios developed by the Ministry of Finance and Corporate Relations. These ratios are shown in Table C.4.

Table C.4 Arrowsmith TSA Employment Ratios

	No Migration	Migration
Logging and Silviculture	1.39	1.65
Pulp and Paper	1.50	1.79
Other Wood Processing	1.26	1.47

These ratios show the potential impact of the gain or loss of one job in local forestry sector. Two types of ratios were developed. In the *No Migration (With Safety Net)* case, when jobs are lost it is assumed that everyone who becomes unemployed stays in the area (that is, they do not migrate) and receives unemployment insurance benefits (the "safety net"). This is most appropriate for looking at immediate and short-term impacts, since unemployment insurance benefits can currently be claimed for a maximum of 50 weeks.

The ratios in the *Migration (No Safety Net)* case assume that all those who have lost their jobs leave the area, i.e. they migrate, and do not use the local safety net. It is reasonable to assume that as time goes by there would be a tendency for the cumulative effects of a drop in local employment to move towards the *Migration* case. However, long-run impacts could in fact be underestimated even under this scenario if public sector activity in the region is reduced due to emigration and reduced government revenue.

This analysis uses the *Migration (No Safety Net)* employment ratios because the impact analysis covers a period of decades. This will tend to overstate the impacts in the first two years following the loss of jobs, due to the availability of unemployment insurance and social assistance programs. These would provide some income to those who lose their jobs, as well as maintaining some level of re-spending and induced employment in the community. These employment ratios indicate, for example, that the loss of one direct logging (harvesting) job in the Arrowsmith TSA would also involve the loss of an estimated 0.65 local indirect/induced jobs.

The steps in arriving at TSA level indirect/induced employment and employment income associated with the AAC of 479 150 m³ are shown below.

Step 1 The information in the following table is the Arrowsmith TSA forest industry survey data collected for this study.

Sector	TSA Employment Coefficient (PYs/000 m³)	TSA Employment (PYs)	TSA Average Income (before-tax \$)	Tax Rate	TSA Average Income (after-tax \$)
Harvesting	0.330	158	\$ 46 000	28%	\$ 33 100
Silviculture	0.015	7	\$ 32 000	22%	\$ 25 000
Marine Transp.	0.005	2	\$ 58 300	31%	\$ 40 200
Sawmill	0.310	149	\$ 46 300	28%	\$ 33 300
Pulp and Paper	0.210	101	\$ 54 000	30%	\$ 37 800
Total	0.870	417	\$ 47 900	28%	\$ 34 500

Step 2 Use the *Migration (No Safety Net)* employment ratios to calculate indirect/induced employment.

Sector	Direct Employment (PY)	Indirect/Induced Employment Ratio	Indir/Induced Employment (PY)	Indir/Induced Income (before-tax \$)	Indir/Induced Income (after-tax \$)
Hvst'g, Silviculture & Marine Transp	167	0.65	109		
Pulp and Paper	101	0.79	80		
Sawmill	149	0.47	70		
Total	417	0.62	259	\$ 26 100	\$ 20 900

Step 3 Calculate after-tax employment income by multiplying the number of PYs in each category by the appropriate after-tax income level. For example, direct income for harvesting (\$5 229 800) is calculated by multiplying 158 PYs by the after-tax income level of \$33 100. The indirect/induced income levels are based on information provided by the Ministry of Finance and Corporate Relations.

Sector	Direct Income (after-tax \$)
Harvesting	\$ 5 229 800
Silviculture	\$ 175 000
Marine Transportation	\$ 80 400
Pulp and Paper	\$ 3 817 800
Sawmill	\$ 4 961 700
Direct Income	\$ 14 264 700
Indirect/Induced Income	\$ 5 413 100
Total Employment Income	\$ 19 677 800

Step 4 This employment and income information is then used to develop harvest-related coefficients for estimating employment and income levels associated with the Arrowsmith TSA timber harvest forecasts. These coefficients indicate employment and income levels per 1 000 m³ of timber harvested. For example, the direct employment coefficient (0.870 PY per 1 000 m³) is determined by dividing total direct employment (417 PYs) by the AAC (479 150 m³). The income coefficients shown below have been slightly rounded.

Information for calculating employment and income impacts for TSA harvest forecasts	
TSA direct employment coefficient (PY/000 m ³)	0.870
TSA indirect/induced employment coefficient (PY/000 m ³)	0.541
TSA direct after-tax income coefficient (\$/000 m ³)	\$ 29 800
TSA indirect/induced after-tax income coefficient (\$/000 m ³)	\$ 11 300

These coefficients were applied to the average annual harvest level of 417 000 m³ (1990 - 94), and to the Scenario 1 and Scenario 2 harvest forecasts to calculate the impacts shown in Section 6. It should be noted that these coefficients could be applied to a wider range of harvest scenarios, such as those presented in the Timber Supply Analysis report.

C.2.2 Provincial Impacts

The procedure for estimating provincial impacts is outlined below. These include impacts occurring in the TSA.

Step 1 The information in the following table is forest industry survey data collected for this study. The province-wide information is obtained by combining the information for the TSA and non-TSA areas.

Sector	Provincial Employment Coefficient (PY/000 m ³)	Provincial Employment (PY)	Provincial Average Income (before-tax \$)	Tax Rate	Provincial Average Income (after-tax \$)
Harvesting	0.400	192	\$ 46 100	28%	\$ 33 200
Silviculture	0.031	15	\$ 32 000	22%	\$ 25 000
Marine Transp	0.013	6	\$ 58 300	31%	\$ 40 200
Sawmill	0.510	244	\$ 49 500	29%	\$ 35 100
Pulp and Paper	0.390	187	\$ 54 000	30%	\$ 37 800
Total	1.344	644	\$ 49 500	29%	\$ 35 100

Step 2 Estimate total provincial employment and employment income. Determining indirect and induced impacts at the provincial level involves the application of a provincial employment multiplier of 2.5, which implies that each direct job in the forest sector is associated with 1.5 indirect and induced jobs. This multiplier is used by the Ministry of Forests and is based on a review of studies outlining the impacts of the forest sector on the BC economy. Indirect/induced employment at the provincial level is calculated by multiplying direct employment by 1.5, which is the indirect/induced component of the multiplier.

The indirect/induced before-tax income level of \$30 800 is an employment-weighted average of the \$26 100 used for the TSA and \$32 500 used for non-TSA indirect/induced employment. Provincial income is calculated by multiplying employment in each sector by the appropriate income level. For example, after-tax direct income (\$22 774 400) is estimated by multiplying direct employment (647 PY) by after-tax direct income (\$35 200).

Current After-Tax Incomes			
Sector	Income (before-tax \$)	Tax Rate	Income (after-tax \$)
Direct	\$ 49 500	0.29	\$ 35 100
Indirect/Induced	\$ 30 800	0.21	\$ 24 300

Employment (PY)	
Direct	644
Indirect/Induced	966
Total	1 610
Income (After-tax \$1994)	
Direct	\$ 22 604 400
Indirect/Induced	\$ 23 473 800
Total	\$ 46 078 200

Step 3 The figures presented above are the estimated provincial employment and income levels associated with the Arrowsmith TSA AAC (479 150 m³). This information is used to develop coefficients for estimating employment and income levels associated with the Arrowsmith TSA harvest forecasts. The coefficients indicate employment and income levels per 1000 m³ of timber harvested. For example, the direct employment coefficient (1.344 PY per 1000 m³) is determined by dividing direct employment (644 PY) by the AAC (479 150 m³).

Information for calculating provincial employment and income impacts for Arrowsmith TSA harvest forecasts	
Provincial direct employment coefficient (PYs/'000 m ³)	1.344
Provincial indirect/induced employment coefficient (PYs/'000 m ³)	2.016
Provincial direct after-tax income coefficient (\$/'000 m ³)	\$ 47 200
Provincial indirect/induced after-tax income coefficient (\$/'000 m ³)	\$ 49 000

Applying these coefficients to the average annual harvest level of 417 000 m³ (1990 - 94) and to the forecast timber harvest levels results in the estimates presented in Section 6 of the report. As at the TSA level, these coefficients could also be applied to a wider range of timber harvest forecasts than those examined in this report.

C.3 Government Forestry Revenues

Government revenues are divided into two categories, (1) provincial and (2) federal, and are comprised of stumpage, rent, personal income tax, scaling fees, residue and waste charges, and other taxes, e.g. corporate. Table C.5 provides a summary of current government revenue rates per 1 000 cubic metres.

Stumpage

Stumpage information for the Arrowsmith TSA has been provided by the Valuation Branch, Ministry of Forests. Due to significant changes in provincial stumpage rates during the past year, estimated stumpage rates are based on the 1994 Duncan and Port Alberni Forest District TSA billed volumes. The weighted average 1994 Arrowsmith TSA stumpage rate is \$36 570 per 1 000 cubic metres.

Rent

Rents are calculated on Forest Licences at a rate of \$.25 per cubic metre. Forest Licences within the Arrowsmith TSA comprise approximately 40% of the total AAC. It is assumed that the AAC apportionment will remain constant over the harvest forecast horizon. As such, the estimated rent rate is \$100 per 1 000 cubic metre.

Personal Income Tax

Provincial and federal income taxes were estimated using tax tables based on Revenue Canada income tax rates. A total income tax bill was determined for the direct, indirect and induced activity and was prorated 33% provincial, and 67% federal. The total direct, indirect and induced personal tax per 1 000 cubic metres is \$32 610. Total provincial income tax per 1 000 cubic metres is \$10 810; total federal income tax is \$21 620.

Corporate Taxes

At the provincial level, corporate taxes include logging, corporate income, corporate capital, sales, property and electricity taxes. At the federal level, they include corporate income, sales, excise and withholding taxes. Provincial and federal corporate tax rates are based on information from the Economics and Trade Branch, Ministry of Forests (five year average 1990 to 1994), and amount to \$7 570 and \$1 380 (\$1994), respectively.

Table C.5 Arrowsmith TSA - Government Revenues

	Government Revenue Rates per 1 000 cubic metres of Timber Harvested (\$1994)
Provincial	
Personal Income Tax	\$ 10 810
Stumpage	36 570
Rent	100
Corporate Taxes	<u>7 570</u>
Total Provincial Government Revenues	\$ 55 050
Federal	
Personal Income Tax	\$ 21 620
Corporate Taxes	<u>1 380</u>
Total Federal Government Revenues	\$ 23 000
Total Government Revenues	\$ 78 050

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Canadian Labour Congress, Duncan

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Southern Vancouver Island: Threatened and Endangered Species

The B.C. Ministry of Environment, Lands and Parks (MELP) has distinguished two groups of wildlife species that it considers "at risk" in British Columbia. Red list species are considered to be currently or potentially endangered or at risk of extirpation within the province. Blue list species are at less risk, but are still considered to be vulnerable. The following table identifies red and blue list wildlife species found within Southern Vancouver Island, and which are potentially affected by timber harvesting.

Note, while the species identified below are "at risk" provincially, from a global standpoint, all but the Vancouver Island marmot, and the Keen's Long-Eared Myotis are common, or frequent-to-common, i.e. demonstrably secure under present conditions.

Table E.1 Arrowsmith TSA Wildlife Species At-Risk (Affected by Timber Harvesting)

Red Listed Species (1994)	Birds Queen Charlotte Goshawk Mammal Vancouver Island Marmot Keen's Long-Eared Myotis Vancouver Island Water Shrew Reptile Sharptail Snake
Blue Listed Species (1994)	Birds Great Blue Heron Marbled Murrelet Bald Eagle Vancouver Island Pygmy Owl Western Screech Owl (Kennicotti) Island Pine Grosbeak Mammal Roosevelt Elk Vancouver Island Ermine Townsend's Big Eared Bat

Sources: Conservation Data Centre, MELP, Animal Tracking List, Duncan Forest District, 1994; Von Sacken and Tripp, Ministry of Forests, *Threatened and Endangered Species - Red and Blue Listed Species by Forest Region*, draft, August 1994.

In addition, MELP has identified 131 vascular plants (62 Red listed, and 69 Blue listed), and 51 plant communities (16 Red listed, and 16 Blue listed) within this region which it considers "at risk".