
Endnotes

Forest Management in British Columbia: An Overview

1. 1956, Public Inquiries Act – Report of the Commissioner relating to The Forest Resources of British Columbia / The Honorable Gordon McG. Sloan, Commissioner. pp. 398-399.

The following full quote of H.R. MacMillan appears in a section titled Future Trends Affecting Policies:

“Let us think how long is ninety years. What has happened to stable countries in the last ninety years?

“United States has ended its Civil War and engaged in two World Wars. Its population has grown from 35 million to 165 million.

“The population of California has grown from 470,000 to 13 million.

“Ninety years ago Canada extended only from the Strait of Belle Isle to the Lake of the Woods, and northerly to James Bay. Now it is a Confederation of 10 Provinces extending from the Island of Newfoundland in the Atlantic to the Queen Charlotte Islands in the Pacific, and from the Northern boundary of United States to the Northern boundary of Russia.

“The population of Canada has grown from 3 million to 15 million, and that of British Columbia from 30,000 to 1,500,000.

“Within 30 years our old political parties have virtually disappeared in important areas. Completely new political parties have arisen, grown and taken command of Canada’s three most Western Provinces.

“Income taxes have come to Canada.

“France has been three times invaded by the Germans. France has had 125 Governments.

“The Russian monarchy was assassinated and succeeded by a Communist Government.

“The British barely survived two world wars. They have departed from India, Burma, Ceylon and China, where they had dominated affairs for over a century.

“Albania, Bulgaria, Czechoslovakia, Estonia, Hungary, Latvia, Lithuania, Poland and Romania, nine sovereign countries, have disappeared behind the Iron Curtain.

“China has driven out the foreigner and gone Communist.

“Japan abandoned her age-long isolation, defeated China and Russia, established an Empire, which included Formosa, Korea, Manchuria, the Pacific Islands, became one of the four World Powers, took on one World War too many, and is crowded back on to her original Islands, facing an uncertain future.

“Spain and Holland have been expelled from and lost their Philippine and Indonesian Island Empires.

“Human habits have changed equally drastically. Wireless communication, the internal-combustion engine, the aeroplane, atomic fission and fusion, plastics and man-made fibres have been invented. Nickel and aluminum have been produced commercially. The *per capita use of lumber* has dropped by over 50 per cent. Who shall say what further changes will affect the value of the crop by the end of the rotation the Licensee is now starting?”

Indicator 1 – Ecosystem diversity

2. Several factors influence the accuracy of area, species and age data.

Area: The Coast/Interior boundary for 1957 is not the same as the one for 2000. The

total area considered Coast was 16.4 million ha in 1957 and 17.6 million ha in 2000, or 1.2 million ha greater in 2000. This was primarily a matter of where people chose to draw lines on a map with consideration of complex terrain and boundaries of administrative units such as tree farm licences. The forest area in the Coast was 6.953 million ha in 1957 and 9.757 million ha in 2000, or 2.8 million hectares greater in 2000. Only part of this change is explained by the change in land base. Much of the change is likely due to changes in inventory methods, especially photo-interpretation. Some marginal forests near mountain tops probably got counted in 2000 that did not get counted in the 1950s.

Species: Large shifts in the proportions of predominant species occur between the 1957 and 2000 inventories. These shifts are probably primarily due to changes in inventory methods, not changes in the forest. Species composition is largely based on photo-interpretation, and improvements in methods and experience between 1957 and 2000 suggest that fewer errors in species identification occurred in the 2000 inventory. Inventory audits in the 1990s showed that the inventory's species were reasonably accurate when summarized for a whole forest management unit (timber supply area or tree farm licence). For individual stands, species recorded in the inventory are not always reliable.

Age: After a century of harvesting older forests on the Coast, it is reasonable to expect a decrease in the proportion of old age classes and an increase in young age classes. The increase in young age classes is supported by the data: the 1–40 year age class increased from 12% to 14%, and the 41-80 year class from 7% to 10%. However, the 250+ year age class also increased, from 2.211 million ha to 4.150 million ha, or from 32% to 43%. This is explained by several factors: the changes in forest area, aging of forests, and the difficulties of estimating age. (1) Much of the 2.8 million ha increase in area of forests in the Coast is likely due to the inclusion of high elevation forests in the 2000 inventory, but not the 1957 inventory. Most of these high elevation forests can be expected to be older forests. (2) The age class of 161-250 year forests decreased from 26% to 12%. This reduction occurred when these forests were logged or grew older and moved up into the 250+ year class. As much as 0.6 million ha may have moved up from the 161-250 age class to the 250+ age class. (3) Estimation of age in older forests (over 120 years old) is difficult and therefore prone to misclassification. Trees that are estimated to be 200 years old may actually be 500 years old, and vice versa. Chances of estimating the wrong age class for an individual stand are considerable (perhaps 1 in 2), but many of the errors tend to cancel out at the forest level. Nonetheless, since personnel and estimation methods both change over time, it's hard to know whether a systematic bias may exist in one or both inventories. Conceivably, there are systematic biases in opposite directions in the two inventories. This could account for some of the shift between the 160-250 and 250+ year age classes.

Conclusion: Comparisons of area and species do not provide reliable trend information. Age class trends are reasonably reliable, but only on a proportional basis, due to the increase in forest area. The inventory audits done in the 1990s showed that the recent inventory data were fairly reliable across the province, with some biases apparent in a few management units. These audits were done in a statistically sound way, using random sampling. We can therefore be reasonably confident about the data for 2000.

Indicator 3 – Ecosystem dynamics

3. The mountain pine beetle epidemic is attributed to the combined effect of fire suppression that increased the beetle's food supply (mature lodgepole pine), and warm winters that increased survival of beetles to the next year. The warmer winters are part of ongoing climate change in B.C.

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4. Woods, A., D. Coates and A. Hamann. 2005. Is an unprecedented Dothistroma needle blight epidemic related to climate change? *BioScience*, Vol. 55, No. 9, pp. 761-769.
 5. The increase in biomass levels from 1950 to 2000 is likely overestimated due to the underestimate of the age of the forests in 1950, and to the underestimate of the area disturbed by fire and harvesting. If forests in 1950 are, on average, older, they will be accumulating less biomass over time, and any disturbances in these forests will cause a larger decrease in biomass. The model does not adequately represent changes in growth curves before or after a disturbance event. Thus, forests in 1950 that are disturbed prior to 2000 are assumed to be growing on a second-growth yield curve, even if they represent old growth forests. In addition, changes in species or regeneration delays after disturbances are not captured by the model.
 6. The oil and gas industry's increasing impacts on forests and the forest industry are a growing concern. Wells, roads, pipelines and seismic lines directly cover more than 130,000 ha of land, including over 26,000 ha of forest in the timber harvest land base (THLB), in the three timber supply areas in north-eastern British Columbia. These developments reduce the amount of timber available to the forest industry, reduce future timber productivity and fragment much larger areas of forest ecosystems.

For most oil and gas developments, the volume of timber removed and its value (stumpage payable to government) are estimated from the area that is cleared. Measuring the timber itself is not required on well sites and associated access, on seismic developments or on pipeline segments that remove less than 2000 m³, nor is it practical given the nature and density of these linear developments. The Ministry of Forests and Range receives final (as-built) plans delineating the area of oil and gas developments, and charges an area-based stumpage rate. The stumpage rate is based on the value of the district's productive forest averaged across the total land base, and includes a nominal silviculture levy for reforestation. It does not include a value for immature forest, so the potential value associated with immature, free-growing forests affected by developments is foregone. For a limited number of oil and gas development projects, timber volumes and stumpage revenues are appraised based on the timber harvested and hauled to a processing facility, rather than the area.

The Ministry of Forests encourages hauling timber to a mill, but does not require it for areas where the area-based stumpage is applied. Similarly, where there is no plan to use the timber, the ministry encourages, but does not require, hazard abatement by piling and burning to prevent wildfires and pest outbreaks. The volume of timber that is left unused can only be estimated from field inspections or the forest inventory.

Forest productivity is reduced by wells, roads and pipelines that are installed for 10-20 years or more, and the forest areas affected are permanently removed from the THLB considered in allowable annual cut determinations. Exploration activities (seismic lines) are less permanent and affected areas are not removed from the THLB. Seismic lines can vary from low impact (less than 1 metre wide) to caterpillar tractor swaths exceeding six metres, and there is no requirement to reforest them. Future timber productivity is reduced on these parts of the THLB, due to loss of immature trees and soil disturbance, but the magnitude of the loss is uncertain.

Fragmentation of forest ecosystems by oil and gas developments affects the habitats of many species over large areas. The information available is limited.

The Peace Forest District is the district with the largest area of oil and gas industry developments. It covers 7.7 million ha (8.1% of B.C.), consisting of the east slopes of the Rocky Mountains, foothills and boreal plains, and encompasses the cities of Dawson Creek, Chetwynd, and Fort St. John. In 2004 and 2005, the oil and gas industry removed trees from approximately 14,000 ha annually, exceeding the approximately 12,500 ha

harvested annually by the forest industry. Stumpage paid by the oil and gas industry in 2004 and 2005 was about \$5 million and \$6 million, compared with the forest industry's \$28 million and \$39 million. The higher rates paid by the forest industry are explained by the industry's targeting of more productive and more mature forests, and the certainty provided by measuring the actual timber harvested. The process for estimating stumpage for the oil and gas industry may be somewhat underestimating the actual timber volumes removed.

While the impacts of the oil and gas industry on forests and the forest industry are significant, this should be considered in the context of the substantial economic activity and government revenues generated by the oil and gas industry.

Indicator 4 – Species diversity

7. Species composition after harvest can be determined at two points: 1) the regeneration date, when a new stand is reported as established by natural regeneration or planting, and 2) the free growing date, when a stand is declared free growing and the reforestation obligation has therefore been met. The regeneration date is usually within five years after harvest. The free growing date is usually between 10 and 20 years after harvest, depending on a site's productivity, the size and quality of the planted trees, the quality of the planting effort and subsequent brushing where required.

Species composition at the regeneration date may not reflect the anticipated species composition of the future mature stand, since natural establishment of additional species may be expected to occur after the regeneration date. Species composition at the free growing date usually reflects the final composition more closely, and was therefore chosen for analysis in Indicator 4-4. Since the analysis is limited to stands for which species composition data were available for before harvest and at the free growing date after harvest, possible changes in species composition trends within the last 10-15 years are not reflected.

This shortcoming is partly addressed by a Forest Practices Board report based on harvests between 1995 and 2004. The report is based on species composition before harvest and at the regeneration date. It shows that planting practices in three forest districts with high mountain pine beetle impacts shifted in response to the mountain pine beetle epidemic. In these districts, the proportion of forests dominated by one species (lodgepole pine) increased after harvests before 2000 and was unchanged in areas harvested after 2000. In 18 other districts (with almost four times the area harvested) that are less affected by mountain pine beetle, proportions of forests dominated by one species (lodgepole pine) increased from 9% before harvest to 12% after harvest in areas harvested before 2000 and from 12% to 21% in areas harvested after 2000. For all Interior districts combined, the proportion of post-harvest areas dominated by lodgepole pine increased 6% relative to the pre-harvest proportion during the period 1995–2004. The widespread increase in forests dominated by one species after 1987, shown in the Indicator 4-4 analysis based on the free growing date, appears to be continuing in most of the Interior.

<http://www.fpb.gov.bc.ca/special/investigations/SIR15/SIR15.pdf>

Indicator 11 – Ownership and management

8. On public land where First Nations interests are identified, timber harvesting activities can be restricted through the creation of a designated area. This protects resource values during treaty negotiations. Current designated areas cover approximately 35,000 ha.

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9. Logs harvested from land owned by the province are also subject to a fee in lieu of manufacturing within the province and various restrictions on grades. For example, western redcedar logs and large old growth logs cannot be exported; only logs of various lower grades can be exported.
 10. The 1976 royal commission on forestry in B.C. reported that 59% of the committed allowable cut was held by the top 10 companies. The committed allowable cut represents the operationally feasible level of harvest at the time. This was considerably lower than the sum of AACs set by government, which were more theoretical, based on Hanzlik's formula. The top 10 companies held 43% of the sum of AACs. After 1980, new analytical techniques narrowed this gap between theoretical AAC determinations and operationally feasible harvest levels.
<http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Rc/Rc007/Rc007-2.pdf>
(Appendix B, Table B-9 on page B 7)
 11. Companies listed in MFR's timber apportionment reports that hold tenures with combined AACs totalling 100,000 m³ or more are deemed large operators in this report. An AAC of 100,000 m³ or more is sufficient to run a large sawmill. A few joint ventures and BCTS operators with commitments over 100,000 m³ are not included in the count.
 12. Individuals and companies holding tenures with AACs and non-AAC commitments totalling less than 100,000 m³ are deemed small operators in this report.

Indicator 13 – Timber harvest

13. Current timber supply forecasts may be underestimating mountain pine beetle impacts.
14. For the sum of all TSAs and TFLs, the timber supply for 2000 was 12% higher than the average harvest in the 1990s. This suggests that decreases of more than 12% by 2050 may result in localized economic impacts.

Indicator 14 – Silviculture

15. The nomenclature for clearcuts with reserves and variable retention is not yet applied consistently. In some cases, practices on the ground have not changed significantly.
16. Contiguous cutblocks may create openings that are larger than an individual cutblock. In 1989, guidelines to restrict contiguous cutblocks (overall opening size) varied across the province, and large openings consisting of many cutblocks were permitted in some areas. In 1995, the *Forest Practices Code Act* limited opening size to 40 ha in the three southern forest regions and 60 ha in the three northern forest regions. For an evaluation of the effect of this regulation, see:
<http://www.for.gov.bc.ca/hfp/frep/publications/reports.htm#rep03>
17. Even though natural regeneration could be expected to fulfil reforestation obligations in many situations, planting was increasingly chosen because it serves one or more additional purposes:
 - 1) Increasing growth rates. Planting, especially with seedlings grown from select seed, increases volume at harvest, typically in over 60 years on the Coast and 80 years in the Interior. This increase in future timber supply may permit changes in harvest schedules that justify short-term and mid-term increases in the allowable annual cut.
 - 2) Shortening the time required for "green-up" of the harvested area. This makes

adjacent areas available for harvest sooner, and can increase short-term and mid-term timber supply.

3) Reduction of liabilities for reforestation. The risk, and attendant costs, of failure to meet reforestation obligations with natural regeneration may be reduced by planting. If brush takes over a naturally regenerated site, treatments to remove the brush and plant trees can be very expensive.

Planting within a few years after harvest is called “current planting,” in contrast to later or overdue planting called “backlog planting.” Current planting has increased as a proportion of area harvested.

18. The 1979 Forest and Range Resource Analysis reported 1.1 million ha of NSR. The 1984 Forest and Range Resource Analysis reported 1.6 million ha of backlog (pre-1982) NSR on Crown land, of which 738, 000 ha were on good and medium sites, and considered economically treatable. The largest area of NSR was 2.1 million ha in 1990, reported in Table 6 of the Ministry of Forests annual report for 1990/91.

http://www.for.gov.bc.ca/hfd/pubs/docs/mr/annual/ar_1981-93/annual_1991.pdf

In 1987, the government created legal obligations to reforest areas denuded by harvesting, fire, insects and diseases, with the forest industry explicitly responsible for reforesting the areas it harvests. In 1995, the *Forest Practices Code of British Columbia Act* re-defined a backlog area as “an area from which the timber was harvested, damaged or destroyed before October 1, 1987; and, which in the district manager’s opinion, is insufficiently stocked with healthy, well-spaced trees of a commercially acceptable species.” This led to reporting of both pre-1982 and 1982–87 backlog NSR statistics for Crown land, with government responsible for funding reforestation of both. By 2002, extensive planting programs succeeded in reducing these backlog areas to 36 927 ha of treatable pre-1982 backlog NSR on good and medium sites, and 33 585 ha of treatable 1982–87 backlog NSR on good, medium and poor sites.

(Ministry of Forests. 2002. Summary of backlog NSR, impeded, and free growing forest land – 2002.)

<http://www.for.gov.bc.ca/hfp/publications/00066/2002BacklogNSR.pdf>

By 2002, the total NSR area had been reduced to 0.6 million ha, approximately equal to three years of timber harvesting. Most of this NSR was “current” – the time since it was created by recent logging or other disturbances had not exceeded the legal time limits for reforestation. The 1.5 million ha reduction from 2.1 million ha in 1990 to 0.6 million ha in 2002 was achieved through a combination of planting and natural regeneration. It also included about 0.4 million ha that were reclassified from NSR forest to non-productive lands because their initial classification as NSR was inappropriate.

19. In 2002, the obligation to reforest areas denuded by wildfire, insects and diseases was removed from legislation. Government considers reforestation of these areas an investment that is weighed against other options for use of available budgets.

The current mountain pine beetle epidemic has killed pine trees on over 8,000,000 ha, and the catastrophic wildfires of 2003 and 2004 disturbed 490,000 ha. With respect to NSR status, these areas fall into three categories:

1) Protected areas. Most areas in parks and some areas outside parks will be left as is for environmental reasons, and the NSR classification and reforestation obligations do not apply.

2) Salvage logging. Some areas have been or will be salvage logged. Thereupon they become surveyed NSR areas with a legal obligation to reforest. These areas are or will be included in the data for the graph for Indicator 14-2. Salvage logging of areas less than one hectare in size does not carry an obligation to reforest. This exception is significant, as the cumulative extent of these areas is considerable, and

policies to address this are under consideration.

3) Other. About 60,000 ha disturbed by wildfire, and probably over 1,000,000 ha with dead timber left standing after the beetle infestation, are outside parks and will not be salvage logged. Surveys of these areas are ongoing. Based on the surveys and analysis of expected returns from planting, decisions will be made for individual areas whether to invest in planting. The primary benefits expected from planting may be economic or environmental. These areas are or will be included in the data for the graph for Indicator 14-2. The Forests For Tomorrow program was established to reforest these areas.

<http://www.for.gov.bc.ca/hfp/fft/>

20. Private land falls into three main tenure categories with differing obligations for reforestation:

1) Private land within tree farm licences is subject to the same detailed regulations as public land.

2) Private land outside tree farm licences that is classified as “private managed forest land” under the *British Columbia Assessment Act* receives a beneficial tax status in return for commitments to manage the forest. The commitments include an obligation to reforest after harvest, but the requirements are less stringent than on public land.

3) Other private land is not subject to any reforestation obligations.

21. Disturbance and reforestation are reported in the Ministry of Forests and Range annual report table “Changes in the Not Satisfactorily Restocked (NSR) Crown Land.” The data are taken from the RESULTS database. Disturbance data are shown by category as “Additions in NSR due to: Harvesting; Fire; Pests; Other disturbances; Plantation failure; Natural regeneration failure.” Reforestation data, based on surveyed areas that have achieved free-growing status of commercially desirable tree species, are shown by category as “Reductions in NSR due to: Planting; Natural regeneration; Reclassification of NSR to non-productive land.” The data are further split into several categories of responsibility for reforestation.

22. The Ministry of Forests and Range recognizes that data capture has been incomplete in recent years and is directing resources to rectify this situation.

Disturbance areas (additions in NSR) in the RESULTS database are demonstrably incomplete if they are less than the area harvested (independently reported from another database for tenure administration). The area of disturbance in RESULTS should be greater than the area harvested, since it includes timber harvest and several other types of disturbance. From 1998/99 onward, this condition is not met (even though the area harvested is conservatively based on clearcutting and variable retention only; and does not include partial cutting silvicultural systems.) This shows that the disturbance data are incomplete, due to shortcomings in one or more of the following: 1) data entry by tenure holders, and 2) data entry by the ministry.

Reforestation areas (reductions in NSR) in the RESULTS database are demonstrably incomplete if the area of successful reforestation by planting falls far below the area planted 5-15 years earlier. The area planted in one year should result in a similar area successfully reforested 5-15 years later, with some reduction (less than 20%) due to plantation failures. In 2004/05, the reforestation area due to planting decreased by half from the preceding years, without an accompanying increase in plantation failures, and did not reflect area planted in earlier years. This shows that the reforestation data are incomplete, due to shortcomings in one or more of the following: 1) surveys of free-growing status, 2) data entry by tenure holders, and 3) data entry by the ministry. Although not as apparent as in 2004/05, reforestation data are likely also incomplete for other years (1998/99 onward).

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23. The risk and opportunity cost of tying up money in an investment is compounded over time. Since the time between an investment (e.g., planting) and its return (e.g., greater volume at timber harvest) is usually several decades in British Columbia, the financial return on investment and net present value of silvicultural treatments in B.C. are typically low. A financial analysis based on expected timber volume for an individual treatment area can be argued to be too simplistic, as it ignores forest-level effects on allowable harvests, increased ecological services and social benefits such as employment that may result from silvicultural investments. A more inclusive economic analysis that considers more aspects of sustainability should typically suggest higher returns than a simple financial analysis. Concern that reforestation investment decisions based on financial analysis alone would result in passing greatly diminished forests to future generations led to the 1987 legislation that made reforestation an obligation tied to current harvests.
24. The 6 million m³ gain from planting is based on about 150,000 ha planted annually and a gain of 40 m³ per ha at the time of harvest, relative to the alternative of natural regeneration of satisfactorily restocked forests. This modest gain applies in the context of legislation that requires successful reforestation by one or another means. In the absence of such legislation, the benefit from planting would likely be 300 m³ per ha or more for forests on the more productive, moist areas that tend to become covered by competing vegetation if not planted and brushed.
25. Cumulative volume gains were estimated for 65 years of growth using the following average annual rates per hectare:
- 0.50 m³ planting one to three years after logging (relative to satisfactory natural regeneration)
 - 2.93 m³ backlog planting (relative to a NSR site, overgrown by competing vegetation)
 - 0.40 m³ fertilizing
 - 0.25 m³ spacing (see below)
 - 0.41 m³ select seed (average gain in 2004/05, adjusted for lower and higher genetic quality in earlier and later years, respectively)

Site preparation before planting can improve planting success. No gain was calculated for site preparation before planting, as it is included in the gain from planting. Gains from site preparation to improve natural regeneration success were not estimated.

Similarly, brushing may be necessary on some sites to ensure successful reforestation. No gain was calculated for brushing after planting, as it is included in the gain from planting. Gains from brushing to maintain acceptable tree growth after natural regeneration were not estimated.

Spacing reduces competition among trees by reducing the number of trees per unit area and thereby provides more growing space, nutrients, water and light to the trees that are kept for future harvest. These crop trees often respond with increased diameter and merchantable volume growth. However, spacing directly reduces the standing total volume and total photosynthetic capacity (volume productivity) at the time of treatment, and research has shown that total (gross) volume per unit area at the time of harvest typically does not exceed that of an untreated area. On the other hand, spacing can cause crop trees to reach harvestable size (diameter) sooner, and permit greater merchantable volumes to be harvested by a given date than would be commercially feasible without spacing. The combined effects at the forest level, involving many areas treated and harvestable at different times, are complex and can vary from one forest to another depending on age class distribution and other factors.

Indicator 18 – Jobs and communities

26. Increased use of contractors reduces direct employment and increases indirect employment as a proportion of total forest-based employment. For example, accounting that was previously performed by staff of a forest company may now be contracted out to staff of an accounting firm. The previous employment was classified as being in the forest sector; the new employment in the accounting firm is classified as being in another sector that supports the forest sector.
27. Tourism businesses do not correspond to a standard industrial classification, so an employment record is not directly available. Special studies use published employment trends of related industries tracked by Statistics Canada. Employment in commercial nature-based tourism is for the base year 2001 with adjustments to persons (rather than full-time equivalents) and activities reliant on the forests (Characteristics of the Commercial Nature-Based Tourism Industry in British Columbia. Tourism British Columbia, January 2005). The sector is assumed to have a similar employment growth profile as the “R.V. Parks and Recreation Camps” industry category reported in the Labour Force Survey for subsequent years.
28. Employment in non-timber forest products (NTFPs) industries is not well documented. NTFPs are an important source of employment, but a reliable quantitative estimate comparable to the other forest-related industries is not currently available. Statistics Canada employment numbers for the industry “Forest Nurseries and Gathering of Forest Products” are suppressed, because there are fewer than 1,500 persons employed in the broader industry classification.

“The commercial harvest of NTFPs has been occurring for several decades and is believed to be expanding. One study (Wills and Lipsey, 1999) estimated that in 1997 the commercial harvest of wild mushrooms, floral greens and other products employed almost 32,000 people on a seasonal or full-time basis, which generated direct business revenues of \$280 million and overall provincial revenues in excess of \$680 million. However, there is a lack of recent economic data available for the industry in BC and what does exist is based on rough estimates.”

(Forest Practices Board, 2004. Integrating Non-Timber Forest Products into Forest Planning and Practices in British Columbia.)

<http://www.fpb.gov.bc.ca/special/reports/SR19/SR19.pdf>

NTFPs cover a wide range of products, the more commercially important being edible mushrooms and floral greens. Picking occurs for commercial and personal purposes in several regions of the province. The activity is not presently tenured by the Ministry of Forests, and participation in the industry is not well documented, although some research has been completed.

(Ministry of Forests. March 2000. Seeing the Forest Beneath the Trees: The Social and Economic Potential of Non-Timber Forest Products and Services in Queen Charlotte Islands/Haida Gwaii.)

http://www.for.gov.bc.ca/ftp/Het/external!/publish/web/non_timber_forest_products/qcismf~1.pdf

Royal Roads University, in Victoria, recently established a post-secondary education program to assist expansion of NTFPs industries.

<http://www.royalroads.ca/programs/faculties-schools-centres/non-timber-resources/ntfp/>

29. The gross domestic product (GDP) of timber-based industries averaged \$6.7 billion annually in the late 1980s (1987 to 1989 inclusive) and \$8.4 billion annually in the early 2000s (2000 to 2002 inclusive). The GDP of all industries increased from \$65.0 billion in the late 1980s to \$123.4 in the early 2000s. All figures in current dollars. Timber-based industries include Forestry and Logging, Wood Product Manufacturing and Pulp and

Paper Manufacturing as defined in the North American Industry Classification System (NAICS). See: BC Stats. The BC economic accounts: BC gross domestic product at basic prices, by industry – NAICS aggregations.
http://www.bcstats.gov.bc.ca/data/bus_stat/econ_acct.asp

30. Basic income is defined as income that flows into the community from the outside world, in the form of either employment income or non-employment income.

Basic employment income is earned in jobs that produce goods and services that are exported outside the community, jobs that produce tourism goods and services that outsiders pay for with money earned elsewhere, and public sector jobs paid for by senior governments and not directly by local residents. These include “direct employment” jobs in the forest sector (timber-based industries in this analysis), tourism, and eight other sectors, along with “indirect employment” jobs in businesses supplying goods and services to these 10 basic sectors.

Basic non-employment income includes transfer payments from senior governments, such as welfare payments and employment insurance benefits; and other types of income such as investment income, retirement pensions, and alimony.

In addition to jobs that provide basic income, communities also support jobs in the community that provide goods and services to individuals who live in the community. Examples include the retail trade, local financial services, taxis and hairdressers. Income from these jobs is called nonbasic income, nonbasic employment income or “induced employment” income, and is not included in calculations of community income dependency, because the nonbasic sector is dependent on a healthy basic sector. (Horne, Garry. 2004. *British Columbia's Heartland at the Dawn of the 21st Century: 2001 Economic Dependencies and Impact Ratios for 63 Local Areas*. BC Stats, Ministry of Labour & Citizens' Services.)
http://www.bcstats.gov.bc.ca/pubs/econ_dep.asp

31. The 63 local areas are based on aggregations of 527 census subdivisions used in the 2001 Census; of these 210 were Indian Reserves, many of which have small populations. (Horne, Garry. 2004. *British Columbia's Heartland at the Dawn of the 21st Century: 2001 Economic Dependencies and Impact Ratios for 63 Local Areas*. BC Stats, Ministry of Labour & Citizens' Services.)
http://www.bcstats.gov.bc.ca/pubs/econ_dep.asp

32. A community is likely to be vulnerable to potential downturns in the forest sector (specifically, timber-based industries) if its basic income dependence on the sector is high and its diversity of basic incomes is low. The vulnerability index indicates the vulnerability of each local area, relative to others in the province. A high value does not mean that the timber-processing industry in a local area is more likely to shut down. Rather, it means that if a downturn occurs in the forest sector, the area will likely experience greater economic difficulties than other areas would with a similar downturn.

The index is calculated by multiplying each local area's basic income dependence on the timber-based sector by (100 – its diversity index), and then normalizing the products for all local areas so that the highest vulnerability is assigned 100 and the lowest is 0. (Horne, Garry. 2004. *British Columbia's Heartland at the Dawn of the 21st Century: 2001 Economic Dependencies and Impact Ratios for 63 Local Areas*. BC Stats, Ministry of Labour & Citizens' Services.)
http://www.bcstats.gov.bc.ca/pubs/econ_dep.asp

Indicator 19 – First Nations involvement

33. The proportion of each joint venture held by First Nations was not available in 2005. Data for 2003 showed a share of 0.57 million m³, representing an average 32% share of the 1.8 million m³ in joint ventures. Assuming this 32% also holds for 2005, the First Nation share of the 2005 total of 2.2 million m³ in joint ventures would be about 0.71 million m³ or 0.9% of the provincial AAC.

Indicator 21 – Law

34. See annex “Related Publications.”

Indicator 24 – Certification

35. Canadian Standards Association (CSA). The CSA’s CAN/CSA-Z809-02 national standard for sustainable forest management certification sets public participation, system, and performance requirements for a defined forest area.
http://www.csa-international.org/product_areas/forest_products_marking/program_documents/
36. Forest Stewardship Council (FSC). The council, based in Mexico, administers a global certification process that involves an inspection of a forest management unit by an independent FSC-accredited certifier. FSC standards are based on ten principles for responsible forest management. FSC Canada coordinates the development of regional standards, including the British Columbia standard, which reflect local ecology and social circumstances.
<http://www.fsc-bc.org/BritishColumbia.htm>
37. Sustainable Forestry Initiative (SFI). Based in the United States of America, this program is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists, among others that combines the perpetual growing and harvesting of trees with the long-term protection of wildlife, plants, soil and water quality.
<http://www.sfiprogram.org/>
38. ISO 14001. The International Organization for Standardization (ISO) provides this standard for certification of environmental management systems that govern the environmental aspects of an organization’s processes, products and services. Its requirements may be internally audited for self-declaration, or certified by a third-party audit. To ensure credibility, forest operations in B.C. obtain third-party certification.
<http://www.iso.org/iso/en/prods-services/otherpubs/iso14000/index.html>
39. Programme for the Endorsement of Forest Certification (PEFC). PEFC is the world’s largest forest certification umbrella organisation with 32 independent national schemes in membership from all over the world. The PEFC Council (Programme for the Endorsement of Forest Certification schemes) is an independent, non-profit, non-governmental organisation, founded in Europe in 1999, which promotes sustainably managed forests through independent third party certification. The PEFC provides an assurance mechanism to purchasers of wood and paper products that they are promoting the sustainable management of forests.
http://www.pefc.org/internet/html/about_pefc.htm