
L. P. Atherton & Associates

Forestry and Environmental Consulting Services

Draft 3

**Incremental Silviculture Strategy
For British Columbia**

**Working Paper 1:
Project Information,
List of References**

PREPARED FOR

**Forest Practices Branch,
Ministry of Forests,
Province of British Columbia**

February 19, 1999

Incremental Silviculture Strategy For British Columbia

Draft 3

This document is one of seven working papers prepared as background to the preparation of an incremental silviculture strategy for British Columbia.

The working papers are individually subtitled as follows:

- *Working Paper 1: Project Information, References*
- *Working Paper 2: Concepts of Strategy and Planning, Proposed Planning Framework*
- *Working Paper 3: Government's Goals, Proposed Guiding Principles*
- *Working Paper 4: Proposed Log Quality Framework, Timber Supply and Demand*
- *Working Paper 5: Proposed Financial and Socio-economic Analysis Framework*
- *Working Paper 6: Summary of TSA Basic Data*
- *Working Paper 7: Review of TSA Issues and Planning Processes*

This working paper covers two topics:

Project Information

provides information on:

- the project terms of reference;
- project methodology; and
- the consultant's background and qualifications.

List of References

lists in one place the references used for all working papers.

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1 PROJECT INFORMATION

1.1 Project Objectives and Scope

Contract Terms of Reference

The terms of reference for this project, as expressed in a contract between the Ministry of Forests and the consultant, are:

1. Prepare an inventory of regional and management unit strategic silviculture planning processes currently in existence. Analyze these processes for common elements and approaches. Determine which of these may be appropriate for a provincial standard methodology.
2. Review relevant existing reports and documents and prepare a strategic background analysis and report. The report will contain strategic conclusions for BC and indicate where there are gaps in strategic information or knowledge.
3. Review other strategies previously approved by FRBC to determine the necessary elements for a silviculture strategy.
4. Prepare by July 31, 1997 a draft incremental and backlog silviculture strategy for discussion and review.

Subsequent contracts provided for revising and editing the working papers and the incremental silviculture strategy document.

Further Defining the Scope

Defining Incremental Silviculture

Defining the scope of the project requires further definition of incremental silviculture. Silviculture in British Columbia has three components; basic, incremental and backlog reforestation, described as follows.

<i>Basic Silviculture</i>	Basic silviculture includes all activities that are required by law under the <i>Forest Practices Code of British Columbia Act</i> (the “Code”). The Code ensures the reforestation of recently harvested areas or areas recently disturbed by fire or insects. Activities may include surveys, site preparation, planting, brushing, spacing, fertilization, pruning and forest health treatments. Basic silviculture concludes once an area has achieved the free growing standards specified in a silviculture prescription which, under the Code, must be developed prior to harvesting or following fire and pest damage. Basic silviculture on harvested areas is funded by the forest industry or the Ministry of Forests’ Small Business Forest Enterprise Program.
<i>Incremental Silviculture</i>	Incremental silviculture consists of treatments applied to free growing stands to maintain or increase their yield and value. Treatments may include surveys, spacing, fertilization, pruning and forest health activities. Incremental silviculture is largely funded by Forest Renewal BC, a Crown corporation established for the purpose of re-investing in the forests, forest workers and forest communities.
<i>Backlog Reforestation</i>	Backlog reforestation consists of reforesting certain sites harvested or denuded by fire or pests before basic silviculture became law in 1987 and which are not yet free growing. Backlog reforestation may include the same activities as basic silviculture and is largely funded by Forest Renewal BC.

These definitions, however, do not encompass silviculture activities on stands that are not yet free growing but which are not required by the Code. Therefore, to include these activities as well as to simplify matters, the following definition of incremental silviculture is used in this report:

Incremental silviculture is any silviculture which is in addition to mandatory silviculture required by law.

Under this definition, incremental silviculture extends beyond the traditional activities of spacing, pruning and fertilization. It also includes pre-free growing silviculture activities that are in excess of legal requirements, commercial thinning and backlog reforestation. Additionally, where necessary to create a context for an incremental silviculture strategy, the background research broadly assesses the full potential range of silviculture activities, including those required under law.

Focus on the Timber Resource

Following consultation, the ministry confirmed that the focus of this project is on the timber supply aspects of silviculture but that wildlife habitat management should also be a consideration. Planning for the management of other resources through incremental silviculture, such as management for water quality and quantity, etc., can be added to the process once a basic planning system is functioning.

Focus on Use of Available Funds

The strategy and planning framework developed under this project is primarily intended to guide the application of existing funds. Forest Renewal BC, the major funding source for incremental silviculture, has a planned expenditure of \$161 million in enhanced forestry and backlog silviculture programs in FY 1997/98 (FRBC, 1997a:26). Another \$102 million and \$103.5 million are planned for resource inventory and watershed restoration respectively, indicating scope for considerable expansion of the enhanced forestry program once these have been completed, or otherwise reach a (presumably lower) steady state level.

While ultimately an incremental silviculture strategy may have some role in developing budget proposals, this is not its intended use.

This project deals with the funding of incremental silviculture as a given, and does not contain a socio-economic analysis of incremental silviculture options.

Where Incremental Silviculture Strategies are Expected to Apply

The proposed incremental silviculture strategy is expected to apply to all Crown forest land under the jurisdiction of the Ministry of Forests. However, ministry planning activities for incremental silviculture will be focused primarily on timber supply areas. While individual strategies as presented in approved TFL management plans will continue to be recognized, it is anticipated that the ministry will encourage tree farm licensees to follow the general framework. Future changes to required management plan outlines may be considered where warranted.

At present, woodlot licences represent less than 1% of provincial AAC and are not specifically addressed in this project. Again, it is anticipated that the ministry will encourage woodlot licensees to apply the principles and provincial strategies in developing management plans for their units.

Fit With Other Strategies

Forest Renewal BC

Forest Renewal BC, the Crown corporation largely responsible for funding incremental silviculture, has a broader mandate than the Ministry of Forests. Table 1 compares the mandates of the two agencies. It shows that FRBC has other factors it must consider in establishing funding priorities and allocations.

Mandate Similarity	Forest Renewal BC	Ministry of Forests
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Mandate Similarity	Forest Renewal BC	Ministry of Forests
Similar	enhance the productive capacity and environmental value of forest lands (s 2)	encourage maximum productivity of the forest and range resources in the Province (s 4(a))
Dissimilar	create jobs, provide training for forest workers and strengthen communities (s 2) plan and implement a regionally equitable program of expenditures (s 4 (1)(a))	to manage, protect and conserve the forest and range resources of the Crown, having regard to the immediate and long term economic and social benefits they may confer on the Province (s 4 (b))

Sources: *Forest Renewal Act, Ministry of Forests Act*

Table 1. Comparison of FRBC and Ministry of Forests' Mandates

The proposed strategy and planning process in this report address only those matters that fall within the mandate of the Ministry of Forests. It is expected that FRBC will consider Ministry of Forests' strategies, but that other factors may result in different funding allocations and program levels, provided they do not conflict with the objectives of the ministry.

Ministry of Forests' Five-year Forest and Range Resource Program

Every year, in accordance with the *Ministry of Forests Act*, the Minister of Forests lays before the Legislative Assembly of British Columbia a *Five-year Forest and Range Resource Program*. This follows a presentation by the minister to the Lieutenant Governor in Council of alternatives "for increasing the productivity of forest and range land and for otherwise improving forest and range resources in the Province..." together with "a program recommended to be implemented by the ministry..."

The strategies and planning processes resulting from this project are expected to support the above process and aid in the development of alternatives and choice of a selected course of action.

Other Strategies to Increase Timber Supply

Incremental silviculture strategies form part of a suite of strategies which will together achieve the goal of maintaining current harvest levels. As the focus of this report is incremental silviculture, other strategies are not addressed here. *Working Paper 4: Proposed Log Quality Framework, Timber Supply and Demand*, gives an indication of what some of the other strategies may be. It is assumed that sufficient effort will be placed in these other areas that, together with the incremental silviculture strategies proposed in this report, the goals will be attained.

1.2 Methodology

In keeping with the project scope and objectives, the following steps were undertaken:

1. Each region was contacted to determine the status of strategic plans and planning processes within them. Documentation is contained in *Working Paper 7: Review of TSA Issues and Planning Processes*.¹
2. An in-depth review of the Timber Supply Review information for all timber supply areas was conducted.
3. A review of existing information relevant to past and present strategic planning for incremental silviculture within the province was conducted.
4. A review of existing information with respect to factors external to British Columbia which may be relevant to development of an incremental silviculture strategy was undertaken. This consisted largely of reviewing information on timber supply and demand.
5. A limited review of relevant literature on the subject of strategic planning itself was done.

Literature reviewed is noted in the “List of References”, page 7. Most of the literature is from the consultant’s own reference library. Additional papers and reports were supplied by the client. These sources were supplemented by searching a number of relevant internet web sites such as the United Nations Food and Agriculture Organization, Canadian Forest Service, US Forest Service, CINTRAFOR and the BC Ministry of Forests. A search of periodicals was not undertaken.

Following consideration of the above, the seven working papers listed under the cover page (page ii) were prepared. After client review, these papers were revised and edited as appropriate. In lieu of a summary paper, at the ministry’s request a draft strategy interim incremental silviculture strategy document was prepared. The strategy document is based on but not limited to the findings of the working papers.

1.3 About the Consultant

L. P. Atherton & Associates was established in 1991 and is owned and managed by Lawrence (Larry) P. Atherton, R.P.F. Its mission is to provide management consulting services to government, industry and other groups in the field of natural resource management, specializing in forestry and the environment. In addition to numerous other projects, the firm has undertaken many silviculture-related projects, a partial list of which includes:

- final evaluation of the *Canada-British Columbia Partnership Agreement on Forest Resource Development: FRDA II* (part of a team of consultants);
- comprehensive audit of the silviculture program of three forest districts;
- evaluation of the need for a revised *Silviculture Manual*;

¹ This working paper is not available. Some ministry regions and districts have taken portions of the work and developed them further, making publication of the report redundant.

- development of models for allocation of silviculture FTE's between the six forest regions and between forest districts in the Prince George Forest Region;
- evaluation of the need for a contractor performance system for silviculture contracts;
- evaluation of ministry of forests progress towards commitments made under the *National Forest Strategy*, development of action plans to meet unfulfilled commitments (in cooperation with FORUM Consulting Group);
- evaluation of the programs and activities of the habitat/silviculture/protection account (in cooperation with FORUM Consulting Group); and
- delivery of two-day silviculture strategy workshops for all Vancouver Forest Region and some Nelson Forest Region timber supply areas.

Prior to forming his own consulting firm, for two years Larry was Administration Manager, Brinkman & Associates Reforestation Ltd., at that time Canada's largest reforestation company. While there, he co-authored "Chapter 7 - Reforestation Planning" of the book, *Regenerating British Columbia's Forests*.

From 1974 to 1969, Larry held a variety of management positions with the British Columbia Ministry of Forests. He worked in district, regional and headquarters positions in a number of locations in the province. His last position with the ministry was Manager of Planning and Co-operative Programs in the Silviculture Branch (now part of the Forest Practices Branch). Notable activities include coordinating the delivery of the *Canada-British Columbia Forest Resource Development Agreement* (FRDA I), managing the preparation of the *Silviculture Steady State Plan* for basic silviculture, and coordinating the *Silviculture Review*.

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2 LIST OF REFERENCES

- Alexander, M.L., D.C. Bebb, and R.A. McIntosh. 1997. *The Potential Impacts of Enhanced Forestry on Forest Productivity and Yield in Three B.C. Timber Supply Areas*. Report prepared for the Forest Alliance of British Columbia. KPMG, Vancouver, British Columbia. 100p + appendices.
- Anonymous. 1992. "Overview." In *Rising to the Challenge*. FRDA Discussion Paper DP-OI-92.04, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 61p.
- _____. 1996. *Forest Soils Research Strategy*. Unpublished paper dated January 1996 prepared for the Forest Renewal British Columbia Research Program. Science Council of British Columbia. Burnaby, British Columbia. 20p.
- _____. 1998. "Forest Service Timber Program Losing Money." In *The Forestry Source*, January 1998, Vol. 3, No. 1. Society of American Foresters, Bethesda, MD.
- Barclay, Reg. 1998a. "Forestry in Scandinavia." In *Logging and Sawmilling Journal*, Dec. 1997/Jan 1998, p 38-42.
- Barclay, Reg. 1998b. "Sawmills in Scandinavia." In *Logging and Sawmilling Journal*, Feb 1998.
- Barker, John. 1997a. *Spacing and AAC Implications – TFL 24*. Unpublished report presented to the Silviculture Institute of British Columbia, Module III. Western Forest Products Ltd. Vancouver, British Columbia. 15p.
- _____. 1997b. *Fertilization of Young Hemlock and Sitka Spruce Stands in TFL 24 – An Economic Evaluation*. Unpublished report presented to the Silviculture Institute of British Columbia, Module III. Western Forest Products Ltd. Vancouver, British Columbia. 20p.
- Barwise, Patrick. 1997. "Strategic Investment Decisions and Emergent Strategy". In *Mastering Management* (Part 15:2-6). The Financial Post. Toronto, Ontario.
- Baskerville, G.L. 1998. *Opportunities for Using Forest Level Planning and Silviculture to Enhance Forestry in the Future*. Paper delivered at FRBC strategy conference, Kamloops, BC, March 25, 1998. 13p.
- Beverly, Jennifer and Tony Lempriere. 1996. *Assumptions about the Price Elasticity of Demand: Implications For Wood Substitution and Prices*. Economic Studies Research Note No. 45e, Canadian Forest Service, Natural Resource Canada. Ottawa, Ontario. 18p.
- Binkley, Clark S. 1996a. *Ecosystem Management and Intensive Plantation Forestry – New Directions for British Columbia*. Unpublished Paper, Faculty of Forestry, University of British Columbia, Vancouver, British Columbia. 30p.
- _____. 1996b. "Forestry in a Post-Modern World." In *Branch Lines*, Volume 7 No 3. Faculty of Forestry, University of British Columbia, Vancouver, British Columbia. 6p.
- _____. 1996c. "Forestry in a Post-Modern World, Part II." In *Branch Lines*, Volume 7 No 1. Faculty of Forestry, University of British Columbia, Vancouver, British Columbia. 6p.
- _____. 1997. "Forestry in a Post-Modern World, Part III." In *Branch Lines*, Volume 8 No 1. Faculty of Forestry, University of British Columbia, Vancouver, British Columbia. 6p.

- Bonnor, G. M., R. J. De Jong, P. Boudewyn and J. W. Flewelling. 1995. *A guide to the STIM growth model*. Information Report BC-X-353, Canadian Forest Service, Victoria, British Columbia. 38p.
- Brett-Davies. 1997. "Juvenile spacing benefit questioned." In *RPF FORUM*, Vol 4, Issue 4, page 9. Association of British Columbia Professional Foresters, Vancouver, British Columbia. 35p.
- British Columbia. 1992. *Social and Economic Impact Assessment of Forest Land Management Options in British Columbia - Interim Evaluation Guidelines*. Paper produced by the Integrated Resource Planning Committee Task Group, Province of British Columbia, Victoria, British Columbia. 42p.
- _____. 1994. *Working in Partnership – British Columbia's Forest Renewal Plan*. Queen's Printer. Victoria, British Columbia. 23p.
- _____. 1996a. "Forest Practices Code of British Columbia Act." In *Revised Statutes of British Columbia 1996* (Chapter 159). Internet website <http://www.legis.gov.bc.ca/>. Victoria, British Columbia.
- _____. 1996b. "Forest Renewal Act." In *Revised Statutes of British Columbia 1996* (Chapter 160). Internet website <http://www.legis.gov.bc.ca/>. Victoria, British Columbia.
- _____. 1996c. "Ministry of Forests Act." In *Revised Statutes of British Columbia 1996* (Chapter 300). Internet website <http://www.legis.gov.bc.ca/>. Victoria, British Columbia.
- _____. 1997. *Jobs and Timber Accord*. Queen' Printer. Victoria, British Columbia. 13p.
- BC Ministry of Environment, Lands and Parks et al. 1997. *New Regulation to Protect Key Public Environmental Values of Private Land Within Forest Land Reserve*. News release. Communications Branch. Victoria, British Columbia. 1p + attachment.
- B.C. Ministry of Forests. Undated. *Pruning for Value*. Pamphlet. Silviculture Branch, Victoria, British Columbia. 4p.
- _____. Various(a). *Silviculture Manual*. Forest Practices Branch. Victoria, British Columbia.
- _____. Various(b). *Annual Reports*. Queen's Printer. Victoria, British Columbia.
- _____. 1980a. *Forest and Range Resource Analysis and Five Year Program Summary*. Information Services Branch. Victoria, British Columbia. 21p.
- _____. 1980b. *Forest and Range Resource Analysis Technical Report*. Victoria, British Columbia. 802p + Appendices.
- _____. 1984. *Forest and Range Resource Analysis 1984*. Victoria, British Columbia. 380p.
- _____. 1990a. *Towards a Silviculture Strategy – A Discussion Paper on Growing and Managing British Columbia's Future Wood Supply*. Silviculture Branch, Victoria, British Columbia. 12p.
- _____. 1990b. *Benefits of Incremental Silviculture*. Silviculture Branch, Victoria, British Columbia. 33p.
- _____. 1991a. *Towards a Silviculture Strategy II – A Discussion Paper on Growing and Managing British Columbia's Future Wood Supply*. Silviculture Branch, Victoria, British Columbia. 13p.
- _____. 1991b. *Proposed Allocation of Incremental Silviculture Funds*. Unpublished report. Silviculture Branch, Victoria, British Columbia. 18p.
- _____. 1992. *British Columbia's Forests: Monocultures or Mixed Forests?* Silviculture Branch, Victoria, British Columbia. 44p.

- _____. 1992 to Present. *Rationale for Allowable Annual Cut (AAC) Determination* (various by TSA and TFL management unit). Victoria, British Columbia.
- _____. 1995. *Forest, Range & Recreation Resource Analysis, 1994*. Queen's Printer, Victoria, British Columbia. 308p.
- _____. 1996a. *Forest Management Issues identified Through the AAC Determination Process*. Timber Supply Branch, Victoria, British Columbia. 331p.
- _____. 1996b. *Draft Strategy for Silvicultural Systems Research and Development Program in British Columbia*. August 28, 1996. Prepared for Forest Renewal BC, Victoria, British Columbia. 16p.
- _____. 1996c. *Fraser TSA inventory audit*. Resources Inventory Branch, Victoria, British Columbia. Pamphlet. 6p.
- _____. 1997a. *Timber Supply Area (TSA) Mature Volume and Species Composition Agreement Summary (Draft 7/24/97)*. Resources Inventory Branch, Victoria, British Columbia. 1p.
- _____. 1997b. *Summary of Timber Supply Review Results 1992 to 1996*. Victoria, British Columbia. 20p.
- _____. 1997c. *Tree Farm Licence Summary (to February 13, 1997)*. Resource Tenures and Engineering Branch, Victoria, British Columbia. 1p.
- _____. 1997d. *Assumptions Included in Timber Supply Analyses: Timber Supply Areas & Tree Farm Licences*. Forest Practices Branch, Victoria, British Columbia. 115p.
- _____. 1997e. *Regional Long Term Harvest Level Projections and Associated Employment Opportunities*. Unpublished report of the Fibre Targets Task Group, Victoria, British Columbia. 33p.
- _____. 1997f. *Stand Density Management Guidebook*. Unpublished draft. Victoria, British Columbia. 118p + Appendices.
- _____. 1997g. *Minimum Stratum Size Guidelines*. Memorandum dated July 11, 1997. Forest Practices Branch, Victoria, British Columbia. 2p.
- _____. 1997h. *New Regulation to Protect Key Public Environmental Values on Private Land Within Forest Land Reserve*. News release dated July 31, 1997. Public Affairs Branch, Victoria, British Columbia. 1p + Attachment.
- _____. 1997i. *Bid Proposal Sales Pilot Project Extended*. News release dated July 16, 1997. Small Business Forest Enterprise Program, Victoria, British Columbia. 1p.
- _____. 1997j. *Innovative Forest Practices Agreement Reached With Interfor*. News release dated November 13, 1997. Communications Branch, Victoria, British Columbia. 2p.
- _____. 1997k. *Sweden's public and private silviculture accomplishments (ha) from 1985 to 1994*. Internet website <http://www.for.gov.bc.ca/hfp/forsite/jtfacts/swaccomp.htm> 1p.
- _____. 1997l. *Silviculture treatments on public and small private lands (ha) in Finland from 1980 to 1994*. Internet website <http://www.for.gov.bc.ca/hfp/forsite/jtfacts/fintreat.htm> 1p.
- _____. 1997m. *New Zealand silviculture accomplishments and investments*. Internet website <http://www.for.gov.bc.ca/hfp/forsite/jtfacts/nzinvst.htm> 1p.
- _____. 1997n. *An Overview of Stocking Gaps and OAF1 Estimates for TIPSy*. OAF1 Project Report 1. Victoria, British Columbia. 7p.

- _____. 1997o. *TIPSY Version 2.1d - Online Help*. Electronic copy distributed by Research Branch, Victoria, British Columbia.
- _____. 1997p. *1997 Summary of Backlog Not Satisfactorily Restocked Forest Land*. Victoria, British Columbia. 53p.
- _____. 1998a. *Committee Offers Initial Recommendations for Community Forest Tenure Models*. News release dated January 14, 1998. Corporate Policy and Planning Branch, Victoria, British Columbia. 2p + Attachment.
- Brown, Robert G. 1995. *Public Influence on Reforestation in British Columbia*. B. C. Ministry of Forests, Victoria, British Columbia. 9p.
- Brumelle, S.L. et al. 1991. "Evaluating silvicultural investments: a review in the Canadian context." In *Forestry Abstracts*. September, 1991 Vol 52 No. 9 pp803 - 856.
- Canada and British Columbia. Undated. *Tree Improvement in B.C.* Fold-out brochure. Joint publication of the Canadian Forest Service and the B. C. Ministry of Forests, Victoria, British Columbia. 6p.
- _____. 1980. *Canada-British Columbia Subsidiary Agreement on Intensive Forest Management*. Information Services Branch, Ministry of Forests, Victoria, British Columbia. 33p.
- _____. 1985. *Canada-British Columbia Forest Resource Development Agreement (1985-1990)*. Joint publication of the Canadian Forestry Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 32p.
- _____. 1991. *Canada-British Columbia Partnership Agreement on Forest Resource Development: FRDA II (1991-1995)*. Joint publication of Forestry Canada and the British Columbia Ministry of Forests, Victoria, British Columbia. 19p.
- Canadian Council of Forest Ministers. 1992. *Sustainable Forests – A Canadian Commitment*. (National Forest Strategy) Canadian Forest Service, Ottawa, Ontario. 47p.
- Canadian Council of Forest Ministers. 1998. *National Forest Strategy 1998 - 2003*. Canadian Forest Service, Ottawa, Ontario. 47p.
- Canadian Council of Forest Ministers. 1997. *Criteria and Indicators of sustainable forest management in Canada. 1997 Progress to date*. Hull, Quebec. 51p.
- Canadian Forest Service. 1995. *The State of Canada's Forests, 1994 – a balancing act*. Natural Resources Canada, Ottawa, Ontario. 112p.
- _____. 1996. *The State of Canada's Forests, 1995 - 1996 – sustaining forests at home and abroad*. Natural Resources Canada, Ottawa, Ontario. 112p.
- _____. 1997. *Figure 4. Allowable Annual Cut (AAC) and Harvest of Industrial Roundwood*. Natural Resources Canada, Ottawa, Ontario. Internet website http://nrcan.gc.ca/cfs/proj/iepb/nfdp/cp95/image_e/fig4e.htm 1p.
- Chancellor Partners. 1994. *The Economic Impact of the Forest Industry on British Columbia and Metropolitan Vancouver*. Report commissioned by the Forest Alliance of British Columbia, Vancouver, British Columbia. 70p
- Commission on Resources and Environment. "1994/95 Annual Report." In *The Electronic Library*, 1995 Edition (CD Rom). Victoria, British Columbia.
- Council of Forest Industries. 1997. *British Columbia Forest Industry Fact Book*. Vancouver, British Columbia. 69p + Appendices

- _____. 1988. *British Columbia Forest Industry Fact Book*. Vancouver, British Columbia. 21p + Appendices
- Cripps, Susan. 1997. "SAF Testifies on Craig Bill" In *The Forestry Source*, December, 1997, Vol2. No. 10. Society of American Foresters, Bethesda, MD.
- Curtis, Robert O. 1994. *Some Simulation Estimates of Mean Annual Increment of Douglas-Fir: Results, Limitation, and Implications for Management*. Research Paper PNW-RP-471. United States Department of Agriculture, Pacific Northwest Research Station. 27p.
- Davis, Kenneth P. 1966. *Forest Management: Regulation and Valuation, 2nd Edition*. McGraw Hill, New York. 519p.
- Eastin, Ivan et al. 1996. *An Assessment of the Market for Softwood Clearwood Lumber Products*. Cintrafor Working Paper 59. Abstract. Internet website <http://weber.u.washington.edu/~blippke/WP59.htm> 4p.
- Enviroics Research Group Limited. 1989. *1989 National Survey of Canadian Public Opinion on Forestry Issues*. Report prepared for Forestry Canada, Ottawa, Ontario.
- Feltham, S.G. and M. Messmer. 1996. *Sawnwood Values and Species Effects on Quality: an Historical Perspective for British Columbia*. Draft dated October, 1996. Silviculture Practices Branch, B.C. Ministry of Forests, Victoria, British Columbia. 26p.
- Field, Barry C., and Nancy D Olewiler. 1995. *Environmental Economics - First Canadian Edition*. McGraw-Hill Ryerson Limited, Toronto, Ontario. 511p.
- Forest Alliance of British Columbia. 1992. *Principles of Sustainable Forestry*. Internet website <http://www.forest.org/hp.html>. Vancouver, British Columbia.
- Forest Products Society. Undated. *Publication Information*. Booklet. Madison, Wisconsin. 9p.
- Fraser, G. A. 1984. *Benefit Cost Analysis and the Evaluation of Forest Revenue and Management Investment*. Pacific Forest Research Centre, Victoria, British Columbia.
- Forest Productivity Council of British Columbia. 1996. *Growth and Yield Strategy 1996 - 2001*. Unpublished draft v0.3, August 8, 1996. Science Council of British Columbia. Burnaby, British Columbia. 8p.
- Forest Renewal BC. 1997a. *Business Plan 1997/98*. Victoria, British Columbia. 82p.
- _____. 1997b. *1997/1998 Land-Based Handbook*. Victoria, British Columbia. 54p + Attachments.
- Forum Consulting Group. 1996. *Economic Evaluation of Stand Management Silviculture Treatments: Recommendations Regarding Data, Stand Growth, Modeling and Economic Analysis*. Unpublished report prepared for the Ministry of Forests, Silviculture Practices Branch, Victoria, British Columbia. 64p.
- Gilfillan, B.D. et al. 1990. *Report of a Forestry Mission to Scandinavia*. FRDA Report 156, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 60p.
- Gregory, G. Robinson. 1987. *Resource Economics for Foresters*. John Wiley and Sons, Inc., Toronto. 475p.
- Greenough, Julee A., Werner A. Kurz and Carol L. Murray. 1995. *The Environmental Impacts of Incremental Silviculture*. Report prepared for the Ministry of Forests, Silviculture Branch, Victoria, British Columbia. 55p + Appendices.

- Hammer, Michael. 1996. *Beyond Reengineering*. HarperCollins Publishers Inc., New York. 285p.
- H.A. Simons Strategic Services Division 1992. "The Wood Products Sector in British Columbia – The Next Twenty Years." In *Rising to the Challenge*. FRDA Discussion Paper DP-OI-92.04, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 61p.
- H.A. Simons Strategic Services Division and Cortex Consultants Inc. 1993. *Historical and Future Log, Lumber, and Chip Prices in British Columbia*. FRDA Report 207, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 70p.
- Hawe, Angela. 1996. *Review of Past Partial-Cutting Activities in the Nelson Forest Region (1988 - Present)*. Technical Report MIT-001, prepared for the B.C. Ministry of Forests, Nelson Forest Region, Nelson, B.C. 67p.
- Heaps, T. and B. Pratt. 1989. *The Social Discount Rate for Silvicultural Investments*. FRDA Report 071, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 37p.
- Hopwood, Doug. 1991. *Principles and Practices of New Forestry - A Guide for British Columbians*. Report commissioned by the Old-Growth Strategy Working Group. Ministry of Forests, Victoria, British Columbia. 95p.
- Jozsa, L. A. and G. R. Middleton. 1994. *A Discussion of Wood Quality Attributes and Their Practical Implications*. Forintek Canada Corp. Special Publication No SP-34. Vancouver, British Columbia. 42p.
- Jozsa, L. A., B. D. Munro and J. R. Gordon. 1998. *Basic Wood Properties of Second-Growth Western Hemlock*. Forintek Canada Corp. Special Publication No SP-38. Vancouver, British Columbia. 68p.
- Kovats, M. 1993. "A comparison of British, Swedish and British Columbian growth and yield predictions for lodgepole pine." In *The Forestry Chronicle*. Volume 69, No. 4, August 1993 pp 450-457. Canadian Institute of Forestry, Ottawa, Ontario.
- KPMG et al. 1997. *Financial State of the Forest Industry and Delivered Wood Cost Drivers*. Report prepared for the Economics and Trade Branch, B.C. Ministry of Forests, Victoria, British Columbia. 51p + Appendices.
- Lavender, D.P. et al. 1990. *Regenerating British Columbia's Forests*. University of British Columbia Press. Vancouver, British Columbia. 372p.
- Laing & McCulloch Forest Management Services & Nawitka Resource Consultants Ltd. 1993. *Background Report for the Development of Juvenile Spacing Guidelines in British Columbia*. Report prepared for the B.C. Ministry of Forests, Victoria, British Columbia. 96p.
- MacKinnon, A. and G. Still. 1996. *Tables of numbers supporting figures in the 1994 Forest Range and Recreation Resource Analysis*. Work. Pap. 21/1996. Research Branch, B.C. Ministry of Forests, Victoria, B.C. 84p.
- MacMillan Bloedel Limited. 1997. *Formation of Forest Management Policy: Economics and Biology Relating to Certain Operational Standards in Coastal British Columbia*. Unpublished submission to the Chief Forester, Ministry of Forests, dated July 28, 1997. Vancouver, British Columbia. 30p.

- Manning, Glen H. 1994. *Timber supply and nonindustrial private forests in British Columbia*. Canadian Forest Service Information Report BC-X-349. Pacific Forestry Centre, Victoria, British Columbia. 10p.
- Massie, M.R.C. 1995. *Economic Component of Stand Tending Benefits*. Unpublished report prepared for the Ministry of Forests, Silviculture Branch, Victoria, British Columbia. 39p + Appendices.
- Massie, M.R.C. 1996. "Hardwood Utilization and Supply in British Columbia." In *Ecology and Management of B.C. Hardwoods*. FRDA Report 255, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 246p.
- Massie, Michael and Paul Brett. 1993. *Priorization of Factors Influencing Silvicultural Investment Decisions*. FRDA Report WP-6-004. Canadian Forest Service, Victoria, B.C. 46p + appendices.
- Marshall, P.L. and V. M. LeMay. 1995. *Incorporating Partial Cutting into Growth and Yield and Forest Estate Models: A Review of the Literature*. Unpublished report prepared for the Ministry of Forests, Silviculture Branch, Victoria, British Columbia. 47p.
- McAuliffe, Peter. 1996. "Management and Culture of Poplars by Scott Paper Limited" In *Ecology and Management of B.C. Hardwoods*. FRDA Report 255, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 246p.
- McMahon, John. 1993. *The Growing Industrial Forest: Remarks to The First Global Conference on Paper and the Environment*. Brussels, Belgium. Internet website <http://www.weyerhaeuser.com/news/speeches/mcmahon.htm> 7p.
- McWilliams, Eleanor and Reid Carter. 1998. *Silviculture Investment Opportunities: A Methodology for Identifying Key Decision Variables*. Forest Renewal BC Number HQ96463-RE. Victoria, British Columbia. 102p.
- Messmer, Mark. 1995. *Timber Supply and Silvicultural Investment in an Economic Context for Coastal British Columbia*. Canadian Forest Service Information Report BC-X-355. Victoria British Columbia. 41p.
- Messmer, Mark and Dave E. White. 1998. *A Forest Estate Plan For The Invermere Enhanced Forest Management Pilot Area*. Ministry of Forests, Invermere, British Columbia. 44p.
- Middleton, G.R., L. A Josza, L. C. Palka, B. D Munro and P. Sen. 1994. *Lodgepole Pine Product Yields Related to Differences in Stand Density*. Forintek Canada Corp. Special Publication No SP-35. Vancouver, British Columbia. 65p + appendices.
- Minister of Forests. 1994. "Economic and Social Objectives of the Crown." In *Letter to the Chief Forester* (July 28, 1994.) Victoria, British Columbia.
- Mintzberg, Henry. 1994. *The Rise and Fall of Strategic Planning*. The Free Press, Toronto, Ontario. 458p.
- Mitchell, K.J. and S.E. Grout. 1995. *User's Guide for producing Managed Stand Yield Tables with WinTIPSY Version 1.3 under Microsoft Windows*. Research Branch, Ministry of Forests, Victoria, British Columbia. 174p.
- Nelson, Harry, Bill Wilson and Gregg Delcourt. 1977. *Pulp Fibre Availability in British Columbia: A Case Study of the 1995 Price Spike*. Working Paper 97.03, Canadian Forest Service, Victoria, British Columbia. 29p.

- Moore, J.I. 1992. *Writers on Strategy and Strategic Management: The Theory of Strategy and the Practice of Strategic Management at Enterprise, Corporate, Business and Functional Levels*. Penguin Books, London, England. 311p.
- New York Times News Service. 1997. "Weyerhaeuser Wins High-yield Wager." In *Forestry Chronicle*, vol. 72, no. 2, March/April 1997, p 191. Canadian Institute of Forestry, Ottawa, Ontario.
- New Zealand Forest Owners Association Inc. 1997. *New Zealand Facts and Figures '97*. Wellington, New Zealand. Brochure. 22p.
- NLK Consultants Inc. 1992. "The Pulp and Paper Sector in British Columbia – The Next Twenty Years." In *Rising to the Challenge*. FRDA Discussion Paper DP-OI-92.04, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 61p.
- Pearse, Peter H. 1976. *Timber Rights and Forest Policy in British Columbia – Report of the Royal Commission on Forest Resources*. Queen's Printer, Victoria, British Columbia. 395p + Appendices.
- Pedersen, Larry, 1997. *The Truth is Out There*. Address by the Chief Forester, Province of British Columbia, to the Annual Convention of the Northern Forest Products Association, Prince George, British Columbia. 17p.
- Petter, Andrew. 1995. *A 2020 Vision for the Forest Sector*. Speech delivered by the Honourable Andrew Petter, Minister of Forests, at Price Waterhouse Conference, Vancouver. B.C. Ministry of Forests, Victoria, British Columbia. 4p.
- Peter Woodbridge & Associates Ltd. and N.S. Mackenzie & Co. Ltd. 1992. *A Strategic Framework for Growth in British Columbia's Forest Sector*. FRDA Discussion Paper DP-OI-92.04, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 33p.
- Price, C. 1997. "A critical note on a long-running debate in forest economics." In *Forestry*, Vol 70, No 4, pp 389-397. Institute of Chartered Foresters, Great Britain.
- Price Waterhouse. 1987. *Ministry of Forests and Lands Silviculture Strategic Planning Framework*. Unpublished report prepared for the Ministry of Forests, Silviculture Branch, Victoria, British Columbia. 24p.
- _____. 1995. *Analysis of Recent British Columbia Government Forest Policy and Land Use Initiatives*. Report prepared for the Forest Alliance of British Columbia, Vancouver, British Columbia. 66p + Appendices.
- Reichenback, Gerald. 1996. *Effect of Silviculture Practices on Greenup Delay in the Nelson Forest Region*. Technical Report MIT-003, prepared for the B.C. Ministry of Forests, Nelson Forest Region, Nelson, B.C. 39p.
- Reid, Collins and Associates. 1993a. *Impact of Silvicultural Regimes on Future Timber Quality in the Vancouver Forest Region – Phase I: Assessing Current Quality Profiles*. Prepared for the B.C. Ministry of Forests, Vancouver Forest Region, Nanaimo, B.C. 27p.
- _____. 1993b. *Impact of Silvicultural Regimes on Future Timber Quality in the Vancouver Forest Region – Phase II: Price Projections*. Prepared for the B.C. Ministry of Forests, Vancouver Forest Region, Nanaimo, B.C. 24p.

- _____. 1993c. *Implications of Alternative Silvicultural Strategies on Timber Supply in the West Arm Demonstration Forest*. Prepared for the Silviculture Branch, Ministry of Forests, Victoria, B.C. 37p + Appendices.
- _____. 1994a. *Impact of Silvicultural Regimes on Future Timber Quality in the Vancouver Forest Region – Phase III: Quality Profiles from Basic Forestry*. Prepared for the B.C. Ministry of Forests, Vancouver Forest Region, Nanaimo, B.C. 24p.
- _____. 1994b. *Impact of Silvicultural Regimes on Future Timber Quality in the Vancouver Forest Region – Phase IV: Investigations into the Potential for Intensive Silviculture to Duplicate Historical Log Quality Profiles*. Prepared for the B.C. Ministry of Forests, Vancouver Forest Region, Nanaimo, B.C. 11p + appendices.
- _____. 1994c. *A World Review of Strategic Silvicultural Planning Processes that have Potential for Application to British Columbia*. FRDA Report 223, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 35p.
- Reveley, Hal. 1996. *Strategic Planning for Our Forest Resources*. Unpublished presentation to the Silviculture Institute of British Columbia. Ministry of Forests, Nanaimo, British Columbia. 41p.
- Robinson, Donald C.E. and Werner A. Kurz. 1996. *Exploring Partial Harvesting Options in the Nelson Forest Region Using PROGNOSIS*. Technical Report MIT-002, prepared for the B.C. Ministry of Forests, Nelson Forest Region, Nelson, B.C. 50p.
- Scientific Panel for Sustainable Forest Practices in Clayoquot Sound. 1995. *A Vision and Its Context: Global Context for Forest Practices in Clayoquot Sound*. Cortex Consultants Inc., Victoria, British Columbia. 40p.
- Savidge, Rod. 1997. "A Healthy Forest Is A Productive Forest - A Physiological Viewpoint. In *Forestry Chronicle*, vol 73, no 6, November/December, 1997, pp 749-780. Canadian Institute of Forestry, Ottawa, Ontario.
- Sedjo, Roger. 1997. *The Forest Sector: Important Innovations*. Discussion Paper 97-42. Resources for the Future, Washington, D.C. 49p.
- Sedjo, Roger and Kenneth Lyon. 1996. *Timber Supply Model 96: A Global Timber Supply Model with a Pulpwood Component*. Discussion Paper 96-15. Resources for the Future, Washington, D.C. 39p.
- Simons. 1992. *Wood Production Strategies and the Implications for Silviculture in B.C. – Executive Summary*. Prepared for the B.C. Forest Service. Victoria, British Columbia. 16p.
- Simons Strategic Services Division and Cortex Consultants. 1991. *Community Stability in Forest Sector Dependent Communities in British Columbia*. Prepared for the Old Growth Values Team of the Old Growth Strategy Project. Vancouver, British Columbia. 42p + appendices.
- Simons Strategic Services Division and Cortex Consultants. 1993. *Historical and Future Log, Lumber, and Chip Prices in British Columbia*. FRDA Report 207, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 70p.
- Sloan, Honourable Gordon McG. 1956. *Report of the Commissioner Relating to The Forest Resources of British Columbia*. Queen's Printer, Victoria, British Columbia. 888p.
- Sohngen, Brent, Robert Mendelsohn, Roger Sedjo and Kenneth Lyon. 1997. *An Analysis of Global Timber Markets*. Discussion Paper 97-37. Resources for the Future, Washington, D.C. 32p.
- Stanbury, W.T. 1991. *The Future of Our Forests: A Curate's Egg*. Working Paper, Faculty of Commerce and Business Administration, University of British Columbia. 42p.

- Stone, Michael. 1993. *An Economic Evaluation of Commercial Thinning Douglas-Fir in the Coastal Region of British Columbia*. FRDA Report WP-6-002. Economics and Trade Branch, British Columbia Ministry of Forests, Victoria, British Columbia. 146p.
- _____. 1996. *Commercial Thinning Lodgepole Pine: An Economic Analysis*. Economics and Trade Branch, British Columbia Ministry of Forests, Victoria, British Columbia. 153p.
- Teitenberg, Tom. 1994. *Environmental Economics and Policy*. HarperCollins College Publishers, New York. 432p.
- Tree Improvement Council of British Columbia. Undated. *Tree Improvement in British Columbia*. Fold-out brochure, Victoria, British Columbia. 6p.
- Tree Improvement Councils of British Columbia. 1996. *Research Plan for Tree Improvement Research in British Columbia*. Unpublished paper dated August 14, 1996. Science Council of British Columbia, Burnaby, British Columbia. 8p.
- Timberline Forest Inventory Consultants Ltd. 1997. *Forest Level Benefits to Commercial Thinning and Fertilization*. Prepared for the B.C. Ministry of Forests, Forest Practices Branch, Victoria, British Columbia. 64p.
- TimberWest. Undated (a). *The Role of Rotation Length Assumptions in Timber Supply*. Information Report No. 1 – Tree Farm Licence No 47. Management Plan No. 2. Vancouver, British Columbia. 3p.
- TimberWest. Undated (b). *Density Management: Assumptions in Timber Supply Analyses and Relationships to Future Product Opportunities*. Information Report No. 2 – Tree Farm Licence No 47. Management Plan No. 2. Vancouver, British Columbia. 3p.
- TimberWest. Undated (c). *Relationships between yield analysis assumptions, harvest strategies and stand management practices*. Information Report No. 3 – Tree Farm Licence No 47. Management Plan No. 2. Vancouver, British Columbia. 2p.
- U.S. Forest Service. Undated. *Economic and Social Analysis Handbook*. Internet website <http://www.fs.fed.us/im/directives/fsh/1909.17/1909.17,10.txt>
- _____. 1990. *Timber Management Manual - Chapter 2470 Silvicultural Practices*. Internet website <http://www.fs.fed.us/im/directives/fsm/2475-2479.04a.txt>
- Wear, David N. 1996. *Forest management and timber production in the U.S. South*. Southeastern Center for Forest Economics Research, Triangle Park, NC. SCFER Working Paper No. 82. 40p.
- Weetman, Gordon F. 1991. *Biological Uncertainty in Growth and Yield Benefits of Second-Growth Silviculture Actions and Old-growth Protection and Liquidation Strategies in British Columbia*. Forest Economics and Policy Analysis Research Unit - Working Paper 148. Department of Forest Science, University of British Columbia, Vancouver, British Columbia. 23p.
- _____. 1996. *Are European Silvicultural Systems and Precedents Useful for British Columbia Silviculture Prescriptions?* FRDA Report 239, a joint publication of the Canadian Forest Service and the British Columbia Ministry of Forests, Victoria, British Columbia. 31p.
- Weigand, James F., Richard W. Haynes, Judy L Mikowski, compilers. 1994. *Proceedings of the High Quality Forestry Workshop: The Idea of Long Rotations*. CINTRAFOR publication SP 15. College of Forest Resources, University of Washington, Seattle Washington. 225 p. (Abstract - 1p. Internet website <http://weber.u.washington.edu/~blippke/cintrafor.html>)
- Woodbridge, Reed and Associates. 1989. *Substitution: the Real Threat to BC's Wood Products Sector*. FRDA Report 068. Forestry Canada, Victoria, British Columbia. 30 p. + Appendices.

Wood Quality Council. 1996. *A Strategic Plan for Wood Quality Research in British Columbia*.
Unpublished paper prepared for Forest Renewal BC. Forintek Canada Corp. Vancouver, British
Columbia.

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