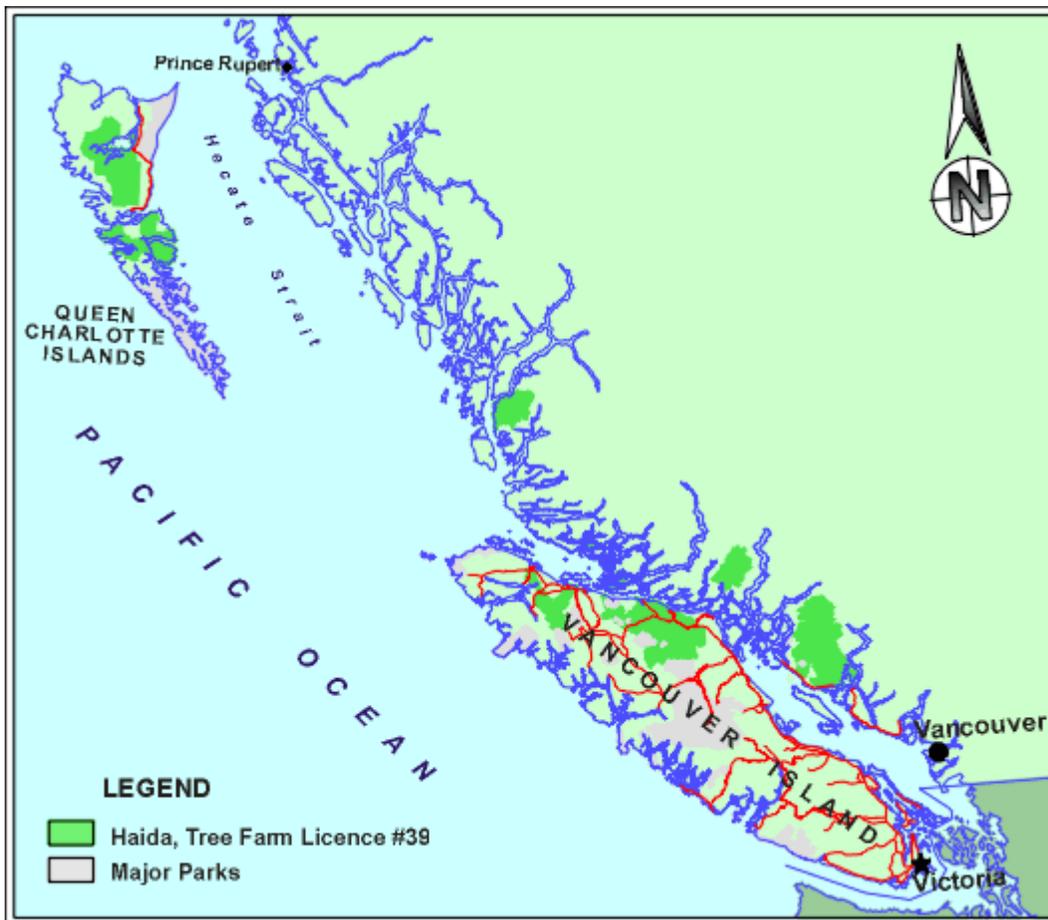
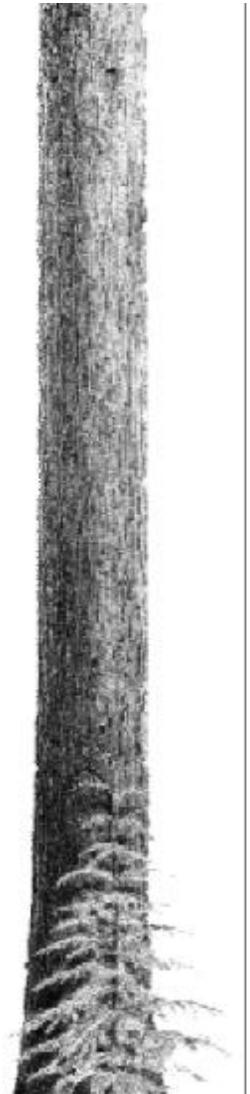


Welcome to the TFL 39 Management Plan #7

Making the Most of a Renewable Resource

- Management Plan # 7
- Appendix I – MB Philosophy, Woodlands Objectives, Policies and Procedures
- Appendix II – Statement of Management Objectives Option 2 Procedure
- Appendix III – Timber supply Analysis
- Appendix IV – Twenty Year Plan (1993 – 2012)
- Appendix V – Active Timber Sales and Schedule A Properties
- Appendix VI – Area and Volume summaries
- Appendix VII – Use of License Timber and Dependent Employment
- Appendix VIII – History of Management Achievements
- Comments from MB Stage #2 Open House



This is a test product, please contact Michael Hooper with any suggestions or comments:
Phone: (250) 755-3477
Email: mk.hooper@mb ltd.com

Please take the time to read the helpful hints offered for Acrobat, and remember, there is a full help system built into the program.

Acrobat Quick Reference

August 2, 1994

Ministry of Forests
Vancouver Forest Region
4595 Canada Way
Burnaby, B.C.
V5G 4L9

Attention: K.A. Collingwood, RPF, Region Manager

Dear Sir:

Re: TFL 39 Management Plan #7

Management Plan #7 is submitted herewith for approval. The Plan covers the period from January 1995 to December 1999.

Other copies of the Plan and this letter have been distributed according to the distribution list on Page v.

All requirements for public involvement were met. Arrangements for public viewing of the Plan are well in hand and are scheduled for mid September.

The Timber Supply Analysis was undertaken with full consultation and review with MoF specialists in Victoria. The recommended AAC of 3 740 000 m³, is inclusive of 40 000 m³ allocated to the harvest of deciduous stands. Exclusive of the deciduous stand component, this is 3% less than the previous AAC. We believe this AAC is justified given the large inventory of old growth timber, the good balance of age classes in the new forest, the sustainability of harvest schedules over time in all working circles, and the strong evidence that site indices in old growth and juvenile forests are underestimated and, thus, LRSY of the TFL is likely higher than currently estimated.

Yours truly,

MacMILLAN BLOEDEL LIMITED

Approved

MacMILLAN BLOEDEL LIMITED

W.J. Pearson, RPF
Region Forester
Coast Woodlands and Building Materials

W.A. Adams
Vice President
Coast Woodlands and Building Materials

encl.

cc: MP #7 Distribution List

August 2, 1994

Ministry of Forests
Vancouver Forest Region
4595 Canada Way
Burnaby, B.C.
V5G 4L9

Attention: K.A. Collingwood, RPF, Region Manager

Dear Sir:

Re: TFL 39 Management Plan #7

Management Plan (MP) #7 was submitted under covering letter of myself and approved by W.A. Adams, Vice President of Coast Woodlands and Building Materials.

As submitted, the Plan does not include Appendix IV, 20-Year Plan. Although the 20-Year Plan was earlier submitted to you with copies to District Managers, we have subsequently discovered what appears to be errors in the compilation report for the 20-Year Plan. We are currently checking these possible errors and will recompile the reports on a priority basis.

The corrected 20-Year Plan reports will be completed by August 12, 1994 and the corrected 20-Year Plan will be sent to all MP No. 7 recipients on that date for inclusion in their MP as Appendix IV.

The corrections will not affect the 20-Year Plan maps nor do we expect that the magnitude of the compilation corrections will have any substantive significance.

We apologize for this complication.

Yours truly,

MacMILLAN BLOEDEL LIMITED

W.J. Pearson, RPF
Region Forester
Coast Woodlands and Building Materials

encl.

cc: MP #7 Distribution List

Management Plan #7 Haida Tree Farm Licence 1995 to 1999

Embracing lands tributary to the communities of Powell River, Campbell River,
Sayward, Kelsey Bay, Port McNeill, Port Hardy, Sandspit, Queen Charlotte City,
Skidegate, Port Clements, Juskatla and Massett

D.L. Handley, RPF, Principal Author

W.J. Pearson, RPF, Supervising Forester

Signed and Sealed on August 2, 1994

D.L. Handley, RPF

W.J. Pearson, RPF



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COAST WOODLANDS AND BUILDING MATERIALS

MANAGEMENT PLAN #7

The Management Plan consists of two parts:

Part 1	Text with supporting appendices
Part II	Atlas

The Licence consists of seven blocks administered by five Divisions, as follows:

Block 1, Powell River	Stillwater Division
Block II, Adam River	Menzies, Kelsey Bay and Eve River Divisions
Block III, Coast Islands	Port McNeill Division
Block IV, Port Hardy	Port McNeill Division
Block V, Phillips River	Stillwater Division
Block VI, Queen Charlotte	Queen Charlotte Division
Block VII, Namu	Port McNeill Division

SUMMARY

Management Plan #7 conforms to the requirements of the Ministry of Forests in terms of content and commitment to fulfill the terms of the Licence Agreement and the Provincial Acts and Regulations which apply. It acknowledges the over-arching authority of the proposed Forest Practices Code and the implicit necessity to conserve all resources and societal values.

The plan also recognizes the harsh reality of economics and the necessity to satisfy the wishes of the public expressed through the provincial government and the need to ensure that the Company's operations remain economically viable. These are embodied in Chapter 1.0 dealing with corporate and resource management objectives.

Chapter 2.0 summarizes the complex process of timber supply analysis represented in Appendix III. Based on examination of the results of the options simulated, an allowable annual cut of 3 740 000 m³ is proposed. This includes 40 000 m³ specifically allocated to the harvest of deciduous stands to re-establish conifer production. Exclusive of the deciduous portion of the AAC, this represents a 3.1% reduction from the current AAC though a good case could be made on technical grounds for no reduction; the long run sustainable yield ranges from a low of 2 900 000 m³ to a high >4 100 000 m³. The SBFEP annual cut is 162 218 m³ and the proportion of the AAC to be harvested by contractors is 47.5%.

Chapter 3.0 explains the administration of the Licence and acknowledges the planning processes and procedures to be followed. A 20-year plan, included as Appendix IV, shows that the harvest schedule can be maintained while conforming to our interpretation of all the applicable constraints.

Chapter 4.0 highlights our commitments to the conservation and protection of the other resources and to the updating of recreation inventories and to the completion of a new recreation analysis and plan and a more formal assessment of landscape values and visual quality objectives.

Timber resource management is presented in Chapter 5.0. Clearcutting will continue to be the primary silvicultural system, but application of both shelterwood and Selection Systems on a limited scale is proposed in special circumstances.

MB's forest establishment and management targets emphasize high volume and high wood quality of largely naturally regenerated forests of mixed species. Planting, spacing and other treatments will be aggressively carried out where necessary to fulfill commitments, meet stocking targets and wood quality objectives.

A limited program of commercial thinning and re-conversion of alder stands to conifer is proposed. The extent of these programs will depend largely on market demand and wood values sufficient to break even.

The primary goals of the forest protection program are to prevent fire, but in the event of fire to attack aggressively. Ambrosia beetles are a continuing threat to product quality and MB will maintain efforts to reduce the volume of susceptible wood, to contain populations through good housekeeping and to trap female beetles using pheromone baits.

It is proposed that the annual reports, in conformance with the wish to keep the public informed, will be revised considerably in format and content to highlight progress in meeting resource management objectives and commitments and to report the results of silvicultural and environmental audits in lay language.

The appendices are integral components of the plan. Reference has already been made to the timber supply analysis and the 20-year plan. Appendix I– MB Policies and Procedures, Appendix VII– Use of the Licence Timber and Dependent Employment, and Appendix VIII– History and Management Achievements, provide interesting insights to past achievements, corporate philosophy and changing patterns in wood use and end product manufacture. Appendices V and VI provide statistics and details on the privately held land and timber rights and area and volume statistics for the Licence.

ACKNOWLEDGMENTS

The following persons contributed to this Management Plan:

- ⇒ M. de Bellefeuille, Divisional Forester, Eve River Division
- ⇒ R.A. Harder, Divisional Forester, Kelsey Bay Division
- ⇒ J.A. Loftus, Divisional Forester, Menzies Bay Division
- ⇒ S.C. Chambers, Divisional Forester, Port McNeill Division
- ⇒ S.R. Holmes, Divisional Forester, Queen Charlotte Division
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- ⇒ R.T. McLaughlin, Wildlife Biologist, Sustainable Forestry
- ⇒ I.G. Turner, Inventory Section, Woodlands Services Division

DISTRIBUTION LIST
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FOR TREE FARM LICENCE NO. 39

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Kelsey Bay	1	None
Eve River	1	None
Port McNeill	1	None
Stillwater	1	None
QCI	1	None
ALBERNI FORESTRY & BUILDING MATERIALS		
Regional Forester	1	None

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PART II– ATLAS

The maps for each Block are:

1	Block Boundary and Tenure
2	Broad Forest Cover and 20-Year Plan
3	Physical Features
4	Guiding and Trapping Licences
5	Landscape and Recreation
6	Sensitive Sites– Soils, Avalanche and Regeneration
7	Hydrological and Wildlife Data
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INTRODUCTION

This management plan is the continuation of a 31-year record of positive forest management. To a considerable extent it is based on the achievements over these years, the experience gained, and new knowledge— especially in fish and wildlife management, forest ecology, forest hydrology, soil and soil stability, and biodiversity.

It also embodies the evolution of public policy, especially with respect to recognition and conservation of other values associated with the forest— such as recreation, aesthetics, heritage and cultural sites, ecological reserves.

This said, it must also be recognized that the continuing pace of change and the expectations of the public is such that the plan is fraught with uncertainty. The need for and appropriateness of alternative silvicultural systems is but one example. There is essentially no experience base for application of different systems to old-growth coastal forests and the evidence supporting the ecological necessity is not conclusive. Nevertheless, the Plan provides for the increasing introduction of alternative silvicultural systems in special circumstances where traditional clearcuts may not be acceptable for silvical or social reasons.

In the first 31 years of management, 132 353 ha have been logged, and 6 927 ha have burned. 37 370 ha were classed as unstocked prior to the award of the TFL. 103 032 ha have restocked naturally to form mixed young forests of hemlock, cedar, cypress, amabilis fir, Douglas-fir and Sitka spruce depending on the seed source from the old-growth forest. These trees preserve the original gene pool.

In addition, 61 585 ha have been planted— 51 170 ha successfully— primarily with hemlock, cedar, Douglas-fir, Sitka spruce, cypress and amabilis fir. Follow-up surveys show that the vast majority of the plantations are now also mixed species forests because other species have seeded in. Of the remaining area, 8 437 ha are classed as non productive roads, swamp or islands of rock within the larger forest and 14 104 ha await reforestation.

In tending these young forests, 19 733 ha have been weeded, 20 223 ha have been spaced to reduce the number of competing trees, and 1 964 ha have been fertilized. 2 716 ha have been thinned and have yielded 490 000 m³ of sawlogs and pulpwood.

As of 1991, over 300 000 ha of old-growth forest remain which, on the basis of that portion eventually available for harvest, is the equivalent of over 40 years of harvesting. There is a good balance of age classes in the new forest (Appendix VI).

The conservation of non timber resources has become increasingly important over the years. Concern for fish, deer, and elk habitat arose in the late 1960s. This was followed by concern for soil stability on steep slopes, the need for landscape management to preserve aesthetics, and increasing recognition of the importance of forest based recreation. Most recently has been the call to preserve biodiversity and retain old-growth stands and stand characteristics and conserve grizzly bear and mountain goat habitats.

MB has a record of cooperative development of guidelines governing conservation of fish and wildlife habitat. To provide guidance in this area, specialists were added to the management team in 1974. Pioneering was done in ecosystem classification in the early 1970s and soil stability surveys and assessment in the 1980s.

Improvements in planning and implementation of resource conservation actions has been steady and continuous in response to new knowledge and the availability of successive improvements to the various guidelines.

As of 1994 the following reservations have been made to protect other resources:

- 35 000 ha of productive, operable forest are currently reserved from cutting because of soil sensitivity.
- 10 000 ha are reserved to protect fish habitat.
- 9 000 ha are reserved to protect wildlife.
- 249 000 ha are under logging constraints to protect visual quality.
- 6 000 ha are removed as recreation reserves.
- 280 ha are reserved as heritage sites.
- Small reserves are set aside to preserve examples of excellent quality old growth, the very rare golden spruce and golden hemlock and features of interest such as the Candlestick Cave, the Devil's Bath, and the Basaltic Pillars.

In addition, an extensive survey to locate likely archeological sites was made of the coastline of the islands in Block III. Results are recorded in booklet form for use in logging planning.

Examples of other conservation work include:

- A survey for Marbled Murrelets in 1990–91.
- A survey of birds, small mammals, amphibians and invertebrates on 20 sites ranging from clearcuts through a succession of age classes to old growth to document presence, abundance and apparent preferences.
- Surveys of bald eagle nests and development of guidelines for their protection.

Invisible, but equally important, has been the role each of these specialists have played as advisor and trouble-shooter in operational planning.

MB is cooperating with other researchers in testing different silvicultural systems on privately owned land (MF 19) at Menzies Bay. The results of this project will be useful in determining the economic and ecological practicability of extending these systems to the Licence area to achieve special objectives where special values justify the extra expense and possible loss of yield.

Advances have also been made in how the timber has been utilized. 42% of the sawn lumber is now re-manufactured into higher value products. Similarly in pulp and paper more product is going into value added specialty papers and high quality coated papers.

1.0 MANAGEMENT GOALS and OBJECTIVES

The following goals and objectives are paraphrased from the Statement of Management Objectives, Options and Procedures (Appendix II). In the case of the other resources, they have been expanded and made more explicit.

1.1 Corporate Goals

The MB goals are to:

- Remain a financially strong and economically viable corporation in order that the reasonable expectations of the people of B.C. for sustainable benefit from forest values, both timber and non-timber, can be integrated with the reasonable expectations of shareholders for sustained profitability in a competitive world market for forest products.
- Conserve and enhance the resources of its tenures as a legacy for future generations.
- Manage the forests to provide a sustainable resource base for the continued benefit of each local community now dependent on the forest harvest.
- Improve its historic record of forest management and gain public recognition of its commitment to and achievements in forest management and environmental stewardship.

1.2 Resource Management Objectives

The overall objective for this Management Plan (MP) is to sustain forest values through application of technical skill and experience derived from increased knowledge of resources on the Tree Farm Licence (TFL). Specific resource objectives are:

1.21 Silvicultural Management Objectives

- Harvest the approved allowable annual cut (AAC) for each of the six working circles and the TFL as a whole within the limits set by the Forest Act for annual and 5-year periods.
- Regenerate all productive, denuded forest land promptly with ecologically adapted tree species and apply appropriate silvicultural treatments to provide a high sustainable yield of high quality logs over an optimum range of log sizes.
- Based on many years of analysis of world and local trends in forest products market opportunities and prices and its own extensive growth and yield database, MB's strategy to grow wood of the quantity and quality it needs is to:

- apply management treatments to the new forests to achieve both a high sustainable mean annual increment (mai) per hectare and high quality sawlogs measured in terms of narrow ring widths, small branches and low taper,
- emphasize uniform distribution of seedlings and achieve crop tree densities in excess of 1,000 stems per productive hectare,
- carry out planting where natural regeneration is not likely to achieve reforestation objectives,
- space stands, where required, to comply with basic silviculture requirements and also where such treatment shows a positive return on investment using MB criteria for yield and log quality/size/value relationships as determined from world market data,
- commercially thin (lightly and frequently) when economically favourable, to favour growth of the most valued species adapted to the site, and to avoid a significant reduction to mai,
- vary the scale and intensity of silviculture treatments in accordance with:
 - opportunity for growth response (site productivity, etc.)
 - magnitude of impact on and importance of other resource values
 - need for sustension of yield
 - availability of funding and sound fiscal management.

1.22 Fish and Wildlife Management Objectives

In cooperation with appropriate federal and provincial agencies, identify and preserve wildlife habitat for the maintenance of realistic population levels, especially with regard to rare and endangered species.

1.23 Biodiversity Objectives

Maintain biodiversity throughout the TFL by:

- Conservation of essential wildlife habitats.
- Application of measures, including creation and management of forest ecosystem networks (FENs), for maintenance of biodiversity stated in applicable biodiversity guidelines which are expected to be approved under the Forest Practices Code.
- Management of riparian zones in accordance with riparian management area guidelines which are expected to be approved under the Forest Practice Code.

1.24 Forest Recreation Objectives

To provide a broad range of recreational opportunities appropriate to the diverse areas within the TFL through:

- Identification of Recreation Opportunity Spectrum (ROS) classes throughout the TFL.
- Identification of recreational features by means of recreation inventories carried out and periodically revised according to standards specified by the Ministry of Forests (MoF).
- Consideration of recreational values in the planning and conduct of timber management to ensure that timber and recreational values are integrated and coordinated for the greatest combined benefit. This will include the protection of some forest areas which have sufficiently high recreational values that are best managed solely for recreation.
- Completion of recreational use surveys and recreational analyses in accordance with prescribed procedures to assist in identifying need for recreational facilities.
- Recommendation of appropriate recreational facilities and, as approved and funded by the MoF, establishment of these facilities on the Licence.

1.25 Forest Landscape Management Objectives

Carry out forest landscape inventories in corridors frequented by the public to standards required by the MoF.

Manage forest harvesting and other forest operations within approved visual quality objectives (VQOs) for landscape units.

1.26 Heritage and Cultural Site Preservation Objectives

Identify historic and culturally significant sites prior to any development.

Protect those designated for preservation.

1.27 Conservation of Other Resources and Values

Conserve soil and water resources through proper assessment, planning and implementation of all forestry projects. In particular, protect water quality where the water supplies a community or is critical to fish.

1.28 Forest Protection Management Objectives

Limit losses from insect and disease epidemics and wildfires through careful assessment of hazard and risk and by early and appropriate control action.

1.29 Public Involvement Objectives

Grant the public adequate time and provide complete and easily understood information about planned activities to enable them to make informed comments and express concerns and ideas.

1.30 Aboriginal Involvement Objectives

Aboriginal bands, living in communities or reserves adjacent to MB operations or having traditional territorial claims on areas of MB operations, will be provided opportunity for forest management involvement and economic benefits through:

- Consultation in planning and in communication of forestry practices and planned activities.
- Employment opportunity as employees or contractors in a wide variety of forest management activities.
- Involvement in Small Business Forest Enterprise proposals. MB will assist with planning, training and joint venture use of equipment and facilities.

2.0 TIMBER SUPPLY ANALYSIS AND ALLOWABLE CUT

2.1 Timber Supply Analysis Summary

The procedure for determination of the AAC has developed from a simple arithmetic calculation requiring only a few hours to a process lasting up to two years for assembly of data, programming and loading of computers, months of analysis of options and testing of results, and reviews with MoF staff.

The following sections present and briefly explain the process. Details of the timber supply analysis (TSA) are given in Appendix III.

2.11 Forest Management Issues

The over-riding purpose of the TSA is to demonstrate harvest sustention over 200 years of computer simulated harvests, regeneration, tending and maturation of the new forests. Different management options may be analyzed to determine appropriate timber supply schedules for each option. The management options may be varied for such diverse reasons as:

- Landbase exclusions or inclusions.
- Set asides for alternative uses.
- Constraints on harvesting to achieve non timber management goals.
- Inventory and growth rate assumptions.
- Intensity of silviculture treatment.

Comparison of the resulting timber supply for each option enables conclusions to be made on the impact and timber supply schedules of decisions on land use or integrated resource management strategies.

2.12 Timber Supply Options

The following options were analyzed to determine what effect alternative discussions and/or assumptions would have on timber supply schedules.

- **Current Procedures: Option 2**

This option is based on the full landbase and forest inventory with currently applied reductions and/or constraints as specified by the MoF. It allows for integrated resource management, exclusion of currently uneconomic timber in accordance with MoF policy, current levels of silviculture and adjustments to MB yield forecasts to conform to those of the MoF.

The resulting timber supply schedule is the base against which the timber supply schedules of the other options are compared to understand the impacts of the constraints, strategies or technical issues on timber management.

- **Integrated Resource Management: Options 1, 3, 4, and 5**

OPTION 1 prioritizes timber management by excluding only sensitive soils which, of course, must be protected even where only timber management is of concern. Currently uneconomic timber is included on a 100-year schedule.

From this option one can infer the impact on potential timber supply schedules as a result of applying integrated resource management measures.

OPTIONS 3 and 4 include alternative assumptions for implementing visual quality guidelines. Option 3 applies a practical and realistic procedure for estimating actual effects of implementing current visual quality constraints in contrast to the procedure prescribed by the MoF for Timber Supply Analysis. MB deems that the MoF's procedure over-estimates actual effects of current operational guidelines. Option 4 applies a less constraining criterion (i.e., visual recovery at 3 m stand height instead of 5 m as specified in current guidelines).

In **OPTION 5**, in lieu of biodiversity guidelines which are not yet finalized for use in planning or analysis, a further reduction of 4% to the net operable old-growth timber was assumed to be equivalent to implementation of the biodiversity guidelines. This option was requested by the Provincial Chief Forester.

- **Economic Operability and Harvesting Methods: Options 6, 7, and 8**

These options were run to quantify the impact on timber supply schedules of inclusion or exclusion of timber stands on the basis of economic operability or harvest method.

OPTION 6 includes currently uneconomic timber over a 100-year period.

OPTION 7 excludes all timber classed as uneconomic and marginally uneconomic.

OPTION 8 excludes all timber harvestable only by nonconventional methods as well as uneconomic and marginally uneconomic timber.

- **Silviculture: Options 9 and 10**

Two options were run to quantify impacts on timber supply schedules resulting from increasing or decreasing intensity of silviculture management from current levels (Option 2).

OPTION 9 basic silviculture to MoF stocking targets; no incremental silviculture.

OPTION 10 higher than current stocking densities and levels of incremental treatments (spacing, alder conversion, etc.).

■ **Yield Assumptions: Option 11**

The yields forecasted by the model MB has developed, on the basis of growth and yield data from over 2,000 of its own forest growth plots, differ from the yields forecast by models used by the MoF. As well, the MoF uses more conservative operational adjustment factors than does MB to allow for natural inconsistencies in real life forests compared with theoretical projections.

OPTION 11 quantifies the impact on the timber supply schedule that would result from applying MB yield tables and operational adjustment factors. That is, the following MoF requested adjustments were not made:

- 10% reduction to Douglas-fir type yields
- 5% increase to hemlock type yields
- 5% further decrease to all yields as an additional operational adjustment factor.

■ **Site Productivity: Option 12**

Site index is the basis for all productivity estimates. It is derived from graphs of age and height of dominant trees. MB has shown that this method is unreliable in old growth, especially where the dominant species are hemlock, cedar, cypress or amabilis fir, and juvenile forests. MB has developed a biophysical approach to estimating site index in old-growth and juvenile forests which results in higher site indices than those of the current forest inventory.

OPTION 12 quantifies the result of the adjusted site indices.

■ **Landbase Removals: Options 13, 14, 15, 16, and 17**

Several areas of the TFL are currently under review for possible preservation or removal from the land lease available for timber harvesting. Options 13 to 17 quantify the impact of the following potential, landbase removals on timber harvest schedules.

OPTION 13 Yakoun Lake Basin.

OPTION 14 Yakoun River corridor, based on an arbitrary assumption that the land use plan for the Yakoun River corridor will result in the equivalent of a 100 m corridor on each side of the Yakoun River being excluded from timber management.

OPTION 15 Koeye River Watershed.

OPTION 16 Lower Tsitika River Watershed.

OPTION 17 Lower Tsitika River Watershed plus adjacent land area along Johnston Strait that is accessible only through the Tsitika Watershed.

2.13 Forest Estate Model and Analysis Variables

The model used to determine timber supply schedules for these different options was developed by MB. The Forest Estate Model (FEM) is an inventory projection simulation. It has been extensively tested and was first approved for use in the Timber Supply Analysis for TFL #44 in 1991.

The input variables start with the volume estimates and new forest descriptions for each TFL Block aggregated into six working circles, Blocks III and IV are combined.

Management zones are superimposed to account for visual landscapes, community watersheds, and avalanche run-out zones.

The individual forest stands are aggregated into 11 site index classes, 2 species associations, 20 to 30, five-year age classes for the new forest and 32 regeneration models (17 for Douglas-fir types and 15 for western hemlock types).

These regeneration model assignments depend on experience-based assumptions about whether the area will be planted or regenerate naturally, how many and how well distributed the new trees will be, and the likely impacts of brush. Each of these factors impacts the volume available for harvest and when it will be available. Growth on existing stands over 30 years of age are projected on the basic stand descriptions.

2.14 Netdowns to the Forest Landbase

The total area encompassed by the TFL boundaries is reduced, or netted down, to account for non forest areas and areas unsuitable for, or reserved from, timber management. Full details are contained in Pages 17, 37 and 40 of the Timber Supply Analysis Information Package included as part of Appendix III. The following table shows the netdowns rounded to the nearest 000s hectares.

TABLE 2.14. Area Netdowns to Derive Coniferous Forest Landbase
(hectares)

Gross Area of Licence	804 000
Non Forest	81 000
Non Productive Forest and Very Low Site	174 000
Physically Inoperable by Current Standards	25 000
Sensitive Soils and Ends of Avalanche Runs	36 000
Reserves for Fish Habitat Protection	10 000
Reserves for Wildlife	9 000
Reserves for Recreation	6 000
Miscellaneous	2 000
Deciduous Forest	6 000
Remaining Coniferous Forest Landbase	461 000

Note: Figures do not add due to overlap of some constraints, rounding and exclusion of 3 000 ha in the 30-Year Reserve.

2.15 Yield Tables, Assumptions and Adjustments

The primary yield tables used in the analysis are those for Douglas-fir and western hemlock developed by MB. They are based on more than 2 000 permanent sample plots on MB's own tenures. They were established and remeasured between 1953 and 1989.

Because of insufficient plots of species other than Douglas-fir and western hemlock, the growth of plots in which Sitka spruce, amabilis fir and cedar dominated were compared with Douglas-fir and hemlock yield tables. In each case, growth was more similar to hemlock and thus yields of these species are forecast as hemlock. Pine and cypress stands were arbitrarily assigned to the lower yielding Douglas-fir tables.

Numerous adjustments are made in application of the tables to account for variables which impact theoretically attainable yields. Adjustments are made for:

- Merchantability based on Close Utilization Standards.
- Delays in regeneration following logging.
- Growth loss due to competition from weeds.
- Growth gain from use of genetically improved seedlings.
- Harvesting losses due to decay, waste and breakage.
- Reduced yields for operational adjustment factors (gaps in stocking, disease losses, non mappable intrusion of nonproductive land, etc.).

2.16 Harvesting Constraints

A variety of constraints are applied which may impact the timber supply schedule and the long run sustainable yield (LRSY). They are:

- Harvest level may not fall more than 10% per decade, except in Blocks V and VII.
- Definition of maturity, i.e., when a stand may first be cut and minimum volume that is harvestable in the new forests.
- Harvest priority amongst new forest stands ready for harvest.
- Compliance with the commitment to protect other resources and values– specifically aesthetics, opening size and green-up, community watersheds, and avalanche areas.

Increasingly, application of harvest constraints on available timber to comply with visual requirements is becoming a critical, limiting factor in determining practicable harvest schedules. Deferral of harvesting to meet VQO requirements forces an earlier and greater rate of harvest in new forests. The consequence is a net loss of growth opportunity as actively growing new forests are harvested in place of the old growth forests where net annual growth in wood volume is at or near zero.

2.17 Results of Timber Supply Analysis

Twelve harvest simulations were run to test the impact of different management options, constraints, and technical issues as described in Section 2.12. These resulted in the following LRSYs:

Option	Emphasis	LRSY (km ³)
1	Timber priority with protection of sensitive soils	3 564
2	Current constraints applied for Integrated Resource Mgmt.	3 236
3	Reduced VQO deductions cf. Option 2	3 300
4	Reduced green-up height for visual recovery cf. Option 3	3 337
5	Option 2 – 4 % of net mature timber for biodiversity	3 185
6	Option 2 + currently uneconomic timber	3 289
7	Option 2 – marginally economic timber	3 160
8	Option 7 – nonconventional harvest areas	2 955
9	Option 2 with basic silviculture only	3 055
10	Option 2 with enhanced silviculture	3 441
11	Option 2 using unadjusted MB yields	3 302
12	Option 2 using adjusted site indices	3 856

These results show that under the most restricted and pessimistic of scenarios, (Option 8– full integrated resource management constraints as interpreted by the MoF for use in Timber Supply Analysis and based only on a landbase economically harvested by conventional methods), the LRSY is 2 955 000 m³. If a further allowance for biodiversity is allowed for as in Option 5, the LRSY would be reduced to about 2 900 000 m³ or a reduction of 24%.

On the other hand, the results show that there is considerable potential for a significant increase in LRSY over the present AAC as follows:

	Cumulative LRSY (000 m³)
■ Option 2– full integrated resource management, LRSY is	3 236
■ LRSY gain due to enhanced silvicultural (Option 10–Option 2)	<u>205</u>
CUMULATIVE LRSY	3441
■ LRSY gain due to relaxed and realistic VQO interpretation (Option 4– Option 2)	<u>101</u>
CUMULATIVE LRSY	3542
■ LRSY gain due to inclusion of currently uneconomic timber (Option 6– Option 2)	<u>53</u>
CUMULATIVE LRSY	3595
■ LRSY gain due to correction of site indices in old-growth and young second-growth inventory (Option 12–Option 2)	<u>620</u>
CUMULATIVE LRSY	4215
■ LRSY gain due to verification of MB yield models operational adjustment factors without need for further MoF adjustment	<u>66</u>
CUMULATIVE LRSY	4281

Other important factors in selecting the AAC are:

- The large volume of remaining old-growth timber that is eligible for eventual harvest (equivalent to over 40 years of harvest).
- The good distribution of ages in the new forest which allows a continuation of harvest without interruption in all working circles (at close to LRSY or higher levels) throughout the 200-year analysis period.
- The analysis shows that a gradual reduction in harvest levels to LRSY (on the basis of Option 2 assumptions) is feasible and would only require an overall harvest level reduction of less than 14% over a 75-year period.

Continuation of an AAC near the present level for the next 5 years is justified.

The remaining options determined the impacts of further removals of forest land:

- Removal of the Yakoun Lake Basin reduced LRSY by 24 000 m³ and removal of the Yakoun River corridor a further 9 000 m³.
- Removal of the Koeye River Watershed reduces LRSY by 36 000 m³.
- Removal of the lower Tsitika Watershed and adjacent wings reduces LRSY by 23 000 m³.

These figures are not large in themselves but, in total, would have measurable impacts on employment levels, the government and company income from the forest.

2.2 Recommended Allowable Annual Cut

Given the favourable results of the timber supply analysis and noting especially:

- The large volume of old-growth timber that is the equivalent of over 40 years of harvesting.
- The good distribution of age classes in the new forest.
- The favourable impact of correcting site index estimates.
- The opportunity to make adjustments in the future and still observe cut reduction rules if this proves necessary.
- Maintenance of employment and income streams.

the recommended AAC is 3 740 000 m³. This includes 40 000 m³ for timber to be harvested from alder stands as explained in Section 5.58. MB is currently engaged in trials to produce finished products from alder, as explained in Appendix VII, and is reasonably persuaded that it will prove practicable and profitable.

Based on the relative proportions of private (14%) and public (86%) productive, forest land in the TFL, the AAC from Crown lands is 3 216 400 m³.

2.3 Small Business Portion of AAC

The SBFEP share of the AAC is fixed at 162 218 m³ in the Licence Agreement.

2.4 Contractor Portion of the AAC

The TFL contract requires that 50% of the remainder of the AAC attributed to Crown lands, i.e. after SBFEP allowance, must be harvested by independent contractors. Proportionately this is:

$$\left(\frac{3\,216\,400 - 162\,218}{3\,740\,000 - 162\,218} \right) \text{ multiplied by } 50\% = 42.7\%$$

MB will ensure this proportion of the cut is harvested using both full and phase contractors.

As required by regulation, all work, unless of less than six months duration, is done under written contract.

3.0 TFL ADMINISTRATION AND PLANNING

3.1 Forest Administration

The TFL has been divided into six divisions for administrative purposes, as follows:

- Stillwater Blocks I & V
- Menzies Bay Part of Block II
- Kelsey Bay Part of Block II
- Eve River Part of Block II
- Port McNeill Blocks III, IV & VII
- Queen Charlotte Block VI

The location of the TFL and the divisional boundaries are shown on the key maps in Appendix IX and in Part II– Atlas.

Each division is fully responsible and accountable for all planning and management activities within their boundary. They are guided by the MB Policies and Procedures included as Appendix I.

3.2 TFL Management Planning Resources

Each division has access to many planning resources including:

- Inventories of forest cover, wildlife habitat, soils, fisheries, Forest Ecosystem Networks (FENs), and other sensitive sites (ESA).
- Digital forest cover and topographic maps.
- Aerial photography and satellite imagery.
- 3-dimensional perspective views for visual impact assessment.
- Models to examine growth and yield implications of silvicultural options.
- A Geographic Information System (GIS) for data reporting, analysis and map production. MB's GIS, based at Woodlands Services in Nanaimo, is currently undergoing major improvement and will, over the next two- to three-year period, enable a much more rapid response to questions related to management options for the forest landbase.

In addition to the MB policies, each Division is guided by official guidelines or handbooks issued by government agencies. Some examples of these include:

- Coastal Fish Forestry & Landscape Management Guidelines.
- Forest Landscape & Cave and Karst Management Handbooks.
- Cave Management Guidelines.
- Forest Road and Logging Trail Engineering Practices (1993).
- Recreation Manual.
- Biodiversity Guidelines (Draft).
- Fuel Management.
- Site Diagnosis and Species Selection Handbook.

The Regulations, Standards and Guidelines to be issued under the Forest Practice Code legislation will also be adhered to by MB Divisions.

Special technical advice and assistance is available from MB specialists, at Nanaimo, who are qualified in forest hydrology, soils and terrain stability, fish biology, wildlife biology, forest ecology, forest protection, soil and foliar analyses, forest growth and yield, and economic modeling and analysis.

3.3 Twenty-Year Plan

A 20-year plan is included as Appendix IV. Maps showing location of proposed harvest areas by 5-year periods in relation to forest cover, operability, ESAs and VQOs are included in Part II– Atlas. The plan was prepared in advance of recent government decisions related to the Commission on Resources and Environment (CORE), and proposed by the Vancouver Island Land Use Plan. These will be reflected in future 20-year plans. The plan shows that the proposed harvest schedule can be achieved in conformance to the operating constraints, such as green-up periods, adjacency, and wildlife habitat. The planned harvest blocks and their configuration and schedule represent one option of how harvesting may proceed. New strategies and new information may result in changes to harvest block locations, schedules, and configuration that are consistent with evolving practices.

Moratoriums currently in effect prevent development of the Koeve, Tlell, and part of the Tsitika River watersheds, and are reflected in the plan.

3.4 Five-Year Development Plans

These plans are updated annually by each division to meet the requirements specified in the Licence. Maps show areas planned for harvest by year and the text explains what is proposed and how pertinent guidelines are met, what other resources were identified and how they will be protected or managed.

It is in the 5-year plans that attempts are made to fulfill the harvest priorities set out in the TSA, but subject to conforming to the VQO and other constraints governing forest development.

These plans and associated Preharvest Silviculture Prescriptions (PHSPs) are advertised and presented annually for public review and response. The finalized plans are then presented for MoF approval.

3.5 Preharvest Silviculture Prescriptions (PHSPs)

A PHSP is completed for each area proposed for harvest. The PHSP describes the values and critical factors, identifies special values to be preserved or protected, and specifies the Silvicultural System, the harvesting and regeneration method and timing, and the desired species to meet MB objectives. Stocking targets and minimum levels will be specified which conform to MoF standards and procedures for measurement of stocking for audit purposes. However, where planting is required, MB will plant to higher actual densities to meet MB management goals for growth and yield, and log quality (ring width, branch size, etc.).

On problem sites, where stocking of the existing forest is lower than normal for reasons specific to the site, exemption from the restocking targets and free growing times will be sought if it is believed minimum stocking as defined by regulation cannot be attained.

The PHSP also prescribes other silvicultural treatments which are believed necessary to meet free growing guidelines.

3.6 Cutting Permits and Logging Plans

Cutting permits, based on approved 5-year development plans, accompanied by a proposed logging plan are submitted biennially for MoF approval and are the basis for stumpage determination.

Despite a commitment to engineer openings to reduce the chance of blown down timber, it is anticipated that the constraint of maximum 40 ha openings and long green-up periods will require submission of annual salvage permits to recover down timber. It is an MB objective to recover blown down timber on a priority basis before ambrosia beetle attack degrades the logs. If the incidence of windthrow is frequent, MB will work with the MoF to develop procedures to simplify and accelerate the approval process.

3.7 Local Resource Use Plans (LRUPs)

Special plans or LRUPs are prepared for designated areas on instruction of the MoF.

LRUPs, will be finalized for the following areas in 1995–96 provided agreement can be reached on outstanding issues with agencies and stakeholders:

- Yakoun Lake Basin
- Yakoun River Corridor

3.71 Tlell River LRUP

The MoF's District Manager is responsible for preparing an LRUP for the Tlell River watershed, part of which overlaps the TFL boundary. In the interim, MB will not propose harvesting on any Sitka spruce–devil's club forest types. MB will cooperate with the District Manager in preparation of the LRUP.

3.8 Other Resource Use Plans

3.81 Tsitika Watershed Integrated Resources Plan (TWIRP)

MB will continue to manage this watershed in accord with the currently approved plan as monitored by the Tsitika Follow-up Committee. Although no official AAC reduction has been proclaimed, for planning purposes a *de facto* harvest reduction of 22 000 m³ has been implemented for the duration of the moratorium on the Lower Tsitika watershed. This was done to avoid breaching the Plan principles elsewhere in the watershed.

3.82 Gray Bay - Cumshewa Head Integrated Resource Development Plan

This area will be managed in accordance with the approved plan.

3.9 Performance Audits

MB pioneered silviculture audits in 1980. MB staff audit environmental and silvicultural performance and fire management requirements against MB criteria, government regulations or guidelines, or commitments made in the MP, 5-year plans or the PHSPs.

As guidelines developed for the Forest Practices Code are implemented, these will also be used as a basis for MB audits.

On request, MB provides MoF audit staff with basic site information for the assistance of government auditors.

4.0 TOTAL RESOURCE MANAGEMENT STRATEGIES

The overall strategy is to identify and record the resource values in advance of development planning, to review with appropriate authorities those which may require reservation or protection and to "red flag" those requiring specialized care and protection.

Past achievements in managing or conserving other resources and values are summarized in Appendix VIII, Chapter 8.0.

4.1 Soil and Water Conservation Strategy

The MB strategy is to :

- Improve or verify terrain stability classification of areas which are in doubt.
- Clearly flag in the MB GIS and on field maps all critical or sensitive areas for more detailed field checking prior to any roading or harvesting.
- Have a professional engineer or geoscientist assess all Es1 and Es2 (Classes V/V' and IV) terrain before roading or harvesting starts to evaluate stability risk and recommend:
 - whether development proceed or not,
 - best road and cutting boundary locations or changes to proposed layout or alignment,
 - possible mitigative actions and criteria,
 - construction constraints or special road building or harvesting techniques,

to provide reasonable assurance of resource protection. In the case of Terrain Class IV, the emphasis for the professional assessment is on road construction. Class IV areas may be harvested without such assessment provided no road construction is planned within the Terrain Class IV areas. In the case of Terrain Class V, both road construction and harvest must be assessed.

- Where a watershed supplies water for community use or fish values are paramount, develop operating guidelines in consultation with appropriate local, provincial or federal authorities or follow the provisions of approved watershed development plans.
- Complete watershed development plans for Newcastle Creek. The need for a plan for Powell Lake is currently under review with the Water Management Division, MoELP.
- Locate, build and maintain roads, bridges and culverts so as to keep impacts on water quality and quantity as low as practicable and within acceptable limits.

- Carry out regular surveys of drainage ditches and culverts and take preventive measures to minimize risk of debris torrents and soil erosion. Deactivate or reclaim roads no longer needed for management access or protection purposes.

4.2 Fish and Wildlife Protection Strategy

The MB strategy is to:

- Be guided by the Coastal Fish/Forestry Guidelines in planning and implementing all forestry and road building activities. Where high values are identified, MB may consult with government fishery biologists to determine special precautions to be taken.
- Be guided by available guidelines, e.g., Marbled Murrelet and Wildlife Tree Guidelines, and MoELP staff in the protection of feeding, rearing, and other critical wildlife habitat and the need for any special, practicable management actions.

In consultation with MoELP seek specialist advice if rare or endangered species are present or suspected and reserve habitat or take other actions that conform with the overall MP.

During MP #7, MB will:

- Assess mature timber near Rainy Day Lake in Block I for its suitability as deer winter range. If habitat is suitable, a reserve will be set aside.
- Make a detailed study of grizzly bear and Rocky Mountain goat habitats in Block V to identify goat winter ranges and to map bear habitats in tributaries of the Philips River in 1995.
- Review the previously identified bear habitats in Block VII to confirm ranking and map selected additional areas.
- Continue to improve stream classification, especially identification and map register of Schedule A streams.

Specialist MB staff will continue to advise and assist the logging divisions in planning and implementing actions to protect riparian areas and mitigate any impacts. They will work cooperatively with fishery agencies toward the "no net loss" goals.

They also will assess marine and lake foreshore sites proposed for log handling, etc., and advise Divisional staff on suitability and environmental problems.

4.3 Biodiversity Strategy

Biological diversity, defined as the variety of life and all the processes that support it, is affected, both positively and negatively, by forestry practices, but the long-term

significance of altering biodiversity and its rate of recovery in our forest ecosystem is unknown. MB intends to conserve biodiversity on the forest lands it manages through:

- Reservation of critical wildlife habitats.
- Application of measures to conserve biodiversity in conformance with the Biodiversity Guidelines expected to be approved under the Forest Practices Code.
- Management of riparian zones in accordance with Riparian Area Guidelines which are expected to be approved under the Forest Practices Code.

In particular, during this Management Plan period, FENs will be identified, mapped, and accounted for in forest management planning and operations in accordance with the standards for FENs to be stated in the forthcoming Biodiversity Guidelines. Also, stand level actions to ensure greater structural diversity in and adjacent to new forest stands will be initiated.

MB will continue to conduct research into methods for monitoring for compliance with guidelines and modeling biodiversity in conjunction with a spatial harvest scheduling case study requirements. Two studies are currently being conducted in TFL 44 in the Klanawa and Nahmint watersheds. The methodology will eventually be useful to evaluate biodiversity provisions in TFL 39.

4.4 Forest Recreation Strategy

In accord with MoF Recreation Management Guidelines and Standards, the MB strategy is to:

- Protect and enhance established recreational sites as set out in MoF standards.
- Identify new, significant, recreational attractions in the course of inventory or developmental work and protect them.
- Develop recreational sites, over time, to meet demand, and as funding is provided through the MoF District recreation budgets.
- Cooperate with the MoF and authorized caving organizations, to protect cave entrances, underground cave features, and to assist in the management of public access.

During this Management Plan period, MB will:

- Update all recreation resource inventories including available information on cave/karst features by mid 1997.

- On the basis of updated resource inventories, identify all recreation ESAs (Er1 and Er2) and account for these in:
 - operational harvest plans
 - future timber supply analysis
- Complete a recreation analysis, in accord with MoF standards, in time for use with Management Plan No. 8.
- Identify cave/karst surface features on 5-Year Development Plans in Blocks II and IV and refer these to caving interest groups.

4.5 Forest Landscape Management Strategy

In accord with MoF Landscape Management Guidelines and standards, the MB strategy is to complete landscape inventories for all parts of the TFL which are visible by significant numbers of people from waterways, highways or Company roads used frequently for access to popular recreation destinations.

The inventories will include setting recommended visual quality objectives for landscapes having important visual qualities. The scheduling and spatial pattern of clearcut harvesting will be carried out in compliance with the constraints applicable to the individual landscapes and these will be declared in Preharvest Silviculture Prescriptions.

During this Management Plan, MB will:

- Complete, in coordination with the recreation resource inventories, all required landscape inventories and VQO recommendations by mid 1997.

5.0 TIMBER RESOURCE MANAGEMENT PLAN

5.1 Timber Inventory and Growth

5.11 Old-Growth Forest Inventory Improvement Plan

Further to the actions completed in 1993 and 1994 to adjust volumes in Block VI and checks of inventory accuracy in Blocks II and IV, the need for any further steps to verify or improve the accuracy of the old-growth timber inventory will be determined in conjunction with Inventory staff of the MoF. These discussions have already been initiated. All work will be scheduled for completion in time for use in the TSA for Management Plan No. 8.

5.12 New Forest Inventory Improvement Plan

The improvement plan is:

1. Continue the re-inventory of second-growth forest stands reaching pole size, the ("31+" re-inventory), at a target rate of 3 000 ha annually. The inventory confirms or revises species age, site index and stand boundaries, as recorded at free growing, and measures basal area as the basis for stocking and for use in timber supply analysis.
2. In Block I, Powell River, continue the 5-year program, started in 1994, to cruise approximately 46 000 ha of older second-growth forest not recruised since the original inventory. In addition, it is now apparent a significant proportion of the forest classed as non productive scrub in the original inventory is productive forest; this will also be cruised and the inventory adjusted accordingly.

5.13 Forest Inventory Maintenance Plan

The forest inventory database will be updated annually to reflect changes due to harvesting and forestry operations, property additions and deletions, TL reversions, etc. The updated database will provide the basis for annually distributing revised forest cover maps to the woodlands divisions.

5.14 Cutting Permit Cruising Plan

Cutting permit cruising, at operational cruise intensity, will be done as required.

5.15 Post Harvest, Residue Survey Plan

Residue will be measured by independent contractors each year for cut control and stumpage and royalty billing purposes.

5.16 Forest Growth and Yield Plan

Plans for the period are to:

- Remeasure 500 permanent sample plots (PSPs).

- Analyze the impacts of mortality due to *Phellinus* on forest level yields.
- Analyze the impact of commercial thinning intensity and frequency on stand yield.
- Provide information and data for habitat attribute modeling for a biodiversity model.
- Using the recently accepted biophysical approach to estimating site index, estimate a new site index for old-growth and juvenile stands.

MB is concerned that the MoF definition of competitor trees in stands being assessed for spacing is highly conservative. MB's own guidelines (Appendix I, Section 1.524) vary with height of dominant and codominant trees. If MB's guidelines are unacceptable, then MB will undertake a project to determine a biologically based measure of competition by measuring growth and mortality in juvenile stands of varying density and top heights.

5.2 Silviculture Systems

The clearcut silvicultural system has been the normal system used in the harvest of old-growth coastal harvests. It has, through decades of experience, proven to be an effective system for safely and economically harvesting the large old-growth timber on rough, coastal terrain. Improvements in implementing the clearcutting system have been made over the years to improve efficiency and to accommodate and protect other resource values. These include improvements in opening location and scheduling, and new methods which eliminate or reduce erosion risks.

There are perceived advantages and disadvantages to all silvicultural systems. It will be necessary to identify the disadvantages inherent in each system and complete operational trials under a variety of conditions before large scale introduction of alternate silvicultural systems can be rationally undertaken.

Some examples of the practical disadvantages of shelterwood or Selection Systems, or variations thereof, are increased windthrow— which may cause significant stream sedimentation and timber breakage and significant danger to fallers; perpetuation of diseases such as dwarf mistletoe where hemlock is the preferred species; and damage to the feeding roots of the remaining trees which tend to be concentrated in the organic layer of soil. However, in certain site specific situations, these disadvantages may be outweighed by improved regeneration, snow cover maintenance for water quality and quantity, meeting wildlife and biodiversity requirements of specific landscape units and in meeting visual quality objectives.

5.21 Clearcut System

The clearcut system will continue to be the predominant silvicultural system used throughout the TFL. However, we foresee a major increase in modification to this system by retaining, within the opening boundaries, individual trees or patches where these would serve to enhance or protect non timber values. Retention cutting blocks, as such areas might be termed, will be implemented with due consideration to worker safety as the

paramount concern. Clearcut openings will conform to the 40 ha maximum size constraints and will be scheduled to conform to adjacency limitations on the basis of "free-to-grow" status or green-up height on adjacent openings for various purposes– visual quality, wildlife habitat, etc.

Opening locations and adjacency scheduling will also be planned to accommodate the often contradictory requirements for:

- Visual quality.
- Fish and wildlife habitat.
- Heritage sites.
- Recreational use.
- Road efficiency and associated environmental impacts.
- Windfall considerations (wind speed and direction, tree rooting depths).
- Soil types and erodability.
- Fire hazard and risk.
- Silvical requirements of preferred replacement species.
- Biodiversity.
- Equipment limitations.

Greater consideration will be given in the planning of clearcut opening layouts to the identification of reserves either as single trees or as small patches where these would serve a function (e.g., greater diversity in the forest structure of the new forest within a landscape unit). In planning such reserves, worker safety will be paramount.

5.22 Shelterwood System

The Shelterwood System embraces a wide range of overstory removal and time intervals between one or more intermediate cuts and final removal. It is also possible to leave some trees as standards (green tree retention) for at least the next rotation. MB will make use of one or more variations of the Shelterwood System where it is necessary to protect other values or where amelioration of visual disturbance is required. The highly visible landscapes adjacent to Powell Lake and other lakes in Block I will be a likely starting location for this system.

As experience is gained and if the theoretical benefit of the shelterwood system is sustained, MB will extend its use more widely where other resource values or constraints justify this use.

5.23 Selection System

The Selection System is most applicable with tree species that are adapted or highly adapted to regenerating and growing in shade. Species poorly suited to the Selection System include Douglas-fir and pines. Moderately suited species are grand fir and Sitka spruce. Well suited species are the hemlocks, amabilis fir, cedar and cypress; these latter predominate on the TFL. These are thin barked and have high root density in the litter layers. Thus, stems and roots of leave trees are easily damaged during harvest. In the

case of hemlock, control of dwarf mistletoe is an important consideration to be accounted for in Selection System planning and implementation.

Steep slopes and sites with soils highly sensitive to erosion are where the Selection System is an appropriate choice environmentally and ecologically. MB is planning to make some limited trials to initiate a true Selection System in locations where stand conditions, species, safety considerations, logging chance, probability of silvicultural success and economics permit. In the life of this MP, only one cut would be made and no more than 15% of the merchantable volume removed from any areas designated for the Selection System.

5.3 Harvesting Systems and Procedures

There are essentially three approaches to harvesting: use of ground-based machines, yarding with cables from spars and yarding using helicopters or balloons. Harvest costs per cubic metre of wood generally tend to increase from ground-based machines, to cable yarders, to aerial systems. Conversely, the possibility for damage to the soil decreases with the same progression of systems.

The choice of harvesting system is dictated by soil, slope, season, importance of other resources, accessibility and road costs, future management considerations and the necessity to keep production costs within economic limits. The actual method to be used for each opening is prescribed in the PHSP and logging plans.

In recent years, the harvest systems have been classed as either conventional or nonconventional. Conventional systems comprise all systems except the true aerial and long line yarding systems. The old-growth forest inventory has been classified as to appropriate logging method as well as to economic operability class (uneconomic, marginally economic or economic).

MB will attempt to harvest the remaining old-growth forest in proportion to the profile of the component parts in the inventory, i.e., conventional and nonconventional harvest methods and economic operability class. However, meeting the profile of the forest harvest will be secondary to meeting other harvest constraints. As well, nonconventional harvesting will be scheduled in relation to the schedule for rational road development and not before. It is expected that in all operations a satisfactory trend towards harvesting to match the forest profile will be continued. Long line harvest systems are already available in a number of Vancouver Island operations and balloon and helicopter systems have been routinely used in Blocks I and V.

5.31 Conventional Harvesting Methods

Most settings will be logged using the conventional methods because logging with these methods can be done economically and efficiently and also meet constraints to protect other resources on the majority of sites. Low ground pressure tracked machines configured as hoe chucks or feller bunchers will be used on suitable ground wherever possible. These machines are proving to be quite adaptable to those variations of the

clearcutting system where a portion of the original stand is retained (e.g., green tree retention, seed tree, shelterwood). They offer greater worker safety in these operations as well as cause less breakage. Operators of these machines, in comparison to cable systems, are better able to identify non recoverable pieces and to leave these throughout the setting (a biodiversity advantage) and avoid concentrating them at roadside (a silvicultural disadvantage). When used on suitable sites, considering steepness and soil bearing capacity, any resulting site disturbance can normally be mitigated immediately.

5.32 Nonconventional Harvesting Methods

In keeping with new knowledge about soil stability and constraints to building roads and logging from them in special situations, an increasing portion of the current inventory and stands previously excluded from the inventory as inoperable will be logged using the nonconventional methods.

5.33 Green-up Definitions

Unless it is essential to salvage timber, permission to enlarge an opening will not be requested until the new forest has achieved the appropriate "free-to-grow" and/or height status for aesthetic, hydrologic, wildlife purposes, etc., for that particular area.

The time required to reach a given height as specified for the site specific management purpose will vary according to species, site productivity and other factors that vary from site to site. For example, if weeds (especially salal on low sites) are absent or sparse, more rapid early height growth will occur. To illustrate, Table 1.52A in Appendix 1 shows the age at which 5 m height is achieved according to MB data. Considerable variation may be expected from site to site.

5.4 Infrastructure and Access Development

General locations of new log handling facilities, roads, bridges and major culverts will be shown at the appropriate planning stage for the detail required, i.e., the 20-Year Plan, 5-Year Development Plan or annual road building plan.

5.41 Dryland Sorts and Log Dumps

Present installations will be maintained and will conform to environmental protection regulations. No new dryland sorts or log dumps will be built until an environmental and heritage site assessment has been made and the appropriate approvals, including any proposed ameliorative actions, received.

5.42 Road Building and Maintenance

The annual road building and maintenance plan will be reviewed with the respective District Managers as part of the 5-Year Development Plan process. All roads and bridges will meet or exceed MoF standards as set down in the MoF Forest Road and Logging Trail Engineering Practices (July 1993). All bridges and major stream crossings will be reviewed with and approved by fisheries officials.

To reduce the risk of slope failure and associated environmental damage, roads through Es1 and Es2 sites will be built in locations and to specifications approved by a professional engineer or geoscientist.

5.43 Site Restoration

Roads no longer needed for the active management of the TFL will be deactivated. A deactivation plan will be prepared and presented to the appropriate District Managers before April 1st annually.

Backspar trails, abandoned roads and, as necessary and appropriate, gravel pits and log landings will be restored by ripping, return of spoil, spreading of debris, construction of anti-erosion barriers and sowing of soil improving or soil holding species as is appropriate to each site and in accordance with government standards.

5.44 Commercial and Public Use of Roads and Facilities

When volume or other operating constraints permit, MB will enter into an agreement, including clearly stated charges and responsibilities, with other companies wishing to haul over MB roads or dump or sort logs using MB log dumps and sorting facilities.

When requested by the District Manager, MB will provide road use fees (\$/m³/km) based on current year maintenance costs for purposes of administering the SBFEP programme.

The general public has free right of access and use of MB roads on the TFL subject to local rules made originally under the authority of the Industrial Transportation Act (1960).

5.5 Establishing and Managing the New Forest

MB accepts the responsibility for establishing and managing the new forest as set down in law and in conformance with the TFL Agreement and the approved objectives of management contained in the SMOOP and this MP. MB will use forest renewal or other public funds for qualifying, silvicultural treatments in cooperation with local MoF staff. On request, MB will identify stands justifying treatment and ranked according to silvicultural and economic priority.

In keeping with the silvicultural management objectives, MB plans to regenerate the forest at above standard densities to ensure full site coverage and high yields of quality timber. MB will bear the silviculture costs for basic silviculture in compliance with the silviculture regulations. Other treatments on Crown land will only be undertaken at Crown expense. MB expects to receive a proportionate share of the forest renewal or other public funding in each Forest District. In the case of silvicultural projects, we anticipate receiving funds for projects prescribing the targets given in the MP. For example, spacing by MB to 1400 sph should receive equal priority for funding as spacing by other Licencees or the MoF to other standards.

Prior to 1987, all stand establishment to the free-to-grow stage on Crown lands was funded by the MoF. Subsequently, with a change to the Forest Act, stand establishment

(basic silviculture) became the financial responsibility of the Licencee. All basic silviculture on lands harvested prior to 1987 remains the funding responsibility of the MoF and is provided for in the annual silviculture budgets of the various Forest Districts. Such areas of pre 1987 harvesting where the MoF retain funding responsibility for basic silviculture are generally termed "industry outstanding" areas.

The area of industry outstanding and not yet free-growing on the TFL as at December 31, 1993 was:

Block 1, V (Stillwater Division)	3 516 ha
Block II (Menzies, Kelsey & Eve Divisions)	5 740 ha
Block III, IV (Port MacNeill Division)	3 334 ha
Block VI (Queen Charlotte Division)	9 161 ha

Estimated treatment and surveys planned for funding by the MoF under the industry outstanding funding category are shown in Table 5.5.

TABLE 5.5. Industry Outstanding Silviculture Projects

	1995		1996		1997		1998		1999		TOTAL	
	Area	Cost	Area	Cost								
SURVEYS												
Block I, V	700	7350	700	7650	705	7400	705	7400	706	7410	3516	37210
Block II	1068	10680	1089	10890	1079	10790	1253	12530	1293	12930	5782	57820
Block III, IV	400	4400	400	4400	400	4400	400	4400	400	4400	2000	22000
Block VI	2600	26000	2600	31200	1800	21600	1800	21600	1900	26600	10700	127000
TOTAL	4768	48430	4789	54140	3984	44190	4158	45930	4299	51340	21998	244030
SITE PREPARATION												
Block I, V												
Block II	70	4900	100	7000	100	7000					270	18900
Block III, IV	5	3500	5	3500	5	3500	5	3500	5	3500	25	17500
Block VI												
TOTAL	75	8400	105	10500	105	10500	5	3500	5	3500	295	36400
PLANTING												
Block I, V												
Block II	70	4900	100	7000	100	7000					270	18900
Block III, IV	5	3500	5	3500	5	3500	5	3500	5	3500	25	17500
Block VI												
TOTAL	75	8400	105	10500	105	10500	5	3500	5	3500	295	36400
WEEDING												
Block I, V	50	1250			50	1250					100	2500
Block II												
Block III, IV	100	70000	50	35000	30	21000	30	21000			210	147000
Block VI	100	100000	100	100000	100	110000	100	120000	250	300000	650	730000
TOTAL	250	171250	150	135000	180	132250	130	141000	250	300000	960	879500
SPACING												
Block I, V												
Block II												
Block III, IV	80	144000	60	108000	40	72000	40	72000	40	72000	260	468000
Block VI	100	160000	100	160000	100	170000	100	170000	400	700000	800	1360000
TOTAL	180	304000	160	268000	140	242000	140	242000	440	772000	1060	1828000

Note: The provision for site preparation and planting is for rehabilitation of off-site hemlock at Menzies Bay and stabilization and rehabilitation of slides (not road induced) at Port McNeill.

5.51 Silvicultural Surveys and Stocking Targets

The MB species value ranking table, stocking targets, regeneration delay allowances, and NSR standards are set out in Appendix I, Sections 1.14, 1.15 and 1.16.

MB usually makes at least three assessments of every site prior to claiming free growing status, as described below:

1. A post-logging survey confirms whether or not the treatments in the PHSP regarding– loading and disposal, site preparation, regeneration method and timing– still applies. If necessary a PHSP amendment is made.
2. A stocking survey is made two years prior to the end of the regeneration delay period where natural regeneration is prescribed. If it appears the target will not be met alternate actions, which may include one or more of scarification, weed control or planting, will be undertaken. If necessary, a further PHSP amendment is made.
3. A survival survey occurs one year after planting. If necessary, a fill plant or a replant is scheduled.
4. A performance survey is made of all natural or planted areas three to five years after germination or planting. If needed, fill planting or weed control is scheduled.
5. Between the fifth and tenth year a further assessment is made to ensure that a free growing stand has been or will be achieved as committed. Necessary weeding or spacing or a final free growing survey is scheduled.
6. If not free growing before age ten, a free growing survey is made before the latest permitted time to confirm the stand is free growing and to finalize the initial stand formula for recording in the forest inventory on which future TSAs are based.

At each survey a stand formula is completed or revised for inclusion in the forest inventory records. The MB procedures for the conduct of these surveys and the compilation methods are in Appendix I, Section 1.3.

5.511 Regeneration Delays

Each newly denuded site is assigned a regeneration delay based on consideration of site index, brush hazard, or special considerations, e.g., aesthetics or harvest scheduling, and whether the site will be planted or scheduled for natural regeneration. Regeneration delays specified in PHSPs are consistent with these. Details are contained in Appendix I, Section 1.16.

5.512 Species Selection and Planting Targets

MB bases species selection firstly on the silvical characteristics of the individual species and their adaptability to the particular site, including forest health considerations. The second criterion for selection is species value ranking. This is based on the company

vision of the wood qualities and species rarity and desirability which will fetch premium prices at harvest. Currently, cypress and cedar rank highest. For details see Appendix I, Section 1.14. Because of this ranking, MB is planting cypress on sites to which it is ecologically suited but is not included in the MoF listing of preferred or acceptable species for these particular site series.

The MB stocking targets (Appendix I, Section 1.15) recognize differences in silvical characteristics of each tree species (especially crown shape and shade tolerance and their impact on growth and yield at both tree and stand level) and site index class. The forester may set higher targets; for example, in the Hemlock Association higher levels are valid for amabilis fir, cedar and cypress on more fertile sites or sites which will be managed intensively. Conversely, on lowest quality sites, or those where physical obstacles obstruct, the stocking target may be reduced to the highest realistic number above the NSR level.

5.52 Site Preparation

Anticipated site preparation necessary to renew the forest is prescribed in the PHSP and confirmed in the post logging survey. Site preparation methods which may be prescribed include mechanical slash dispersal, broadcast or accumulation burns, and mechanical or chemical control of brush or unwanted seed trees.

Each method is considered in terms of economics, environment and government regulation– e.g., for smoke control, use of herbicides, or protection of fish habitat– before the optimal solution is prescribed.

Estimates of areas to be treated are shown in Table 5.59 below.

5.53 Forest Regeneration

5.531 Forest Tree Seed

MB attempts to maintain a 5-year supply of seed for the range of species and Biogeoclimatic variants managed. Normally seed will be from the MB seed orchards or the orchards of other Coastal Tree Improvement Cooperative members. Where seed orchard seed may be unavailable in sufficient quantity or there are no seed orchards, wild seed will be collected under supervision to ensure best quality.

Based on available research results or experience, MB may prescribe that seedlings from another seed zone be used; for example, if no seed orchard seed is available for the species and zone desired. If such a prescription conflicts with seed transfer rules, it will be reviewed with MoF, Research Branch.

5.532 Regeneration Methods

MB favours natural regeneration wherever practicable considering the conditions of the site, availability and suitability of seed source and other stewardship and legal requirements. Where natural regeneration has not reached at least the minimal acceptable level two years before the end of the regeneration delay period, fill planting will be prescribed with consideration of the likelihood of further natural stocking. Fill planting

may also be prescribed where natural regeneration has reached the minimum acceptable level to achieve the yield gains from higher stocking levels as specified in MB stocking targets.

Immediate planting is normally prescribed on all high sites, because of the likelihood of weed invasion, and where natural regeneration is judged unlikely to be successful or would be of an unacceptable species.

MB will not plant substandard nursery stock, even if this would mean that a commitment is not met. If any stock is found to be substandard, this will be reported in a letter to the District Manager requesting approval of an amended PHSP.

Natural regeneration and planting goals are shown in Table 5.59

5.533 Brush or Weed Control

Weed control will be carried out wherever the new tree crop is endangered or the free growing target at an acceptable level of stocking will not be achieved.

The method of weed control prescribed will depend on such variables as weed species growth habit, suitability and cost of mechanical or manual means, availability of a suitable herbicide, and ecological considerations including the Coastal Fish Forestry Guidelines.

Weed control by non herbicide methods will be favoured where results and costs are comparable.

Estimates of area to be treated annually are shown in Table 5.59.

5.54 Pre Commercial Thinning

Where the number of competing trees in a young stand will likely result in significant loss of merchantable volume and value and the loss in volume can be economically offset, overstocked stands will be spaced or pre-commercially thinned in accordance with silvicultural regulation and/or as government funding is available.

The results of MB analyses of volume impacts, piece size and value relationships at various levels of tree competition and intensities of spacing and the overall economics of spacing, favour higher crop tree densities than the MoF targets. The higher MB targets result in higher yields and trees with lighter branches and narrower rings (which generally translate to higher quality and thus price). The smaller stem diameter that may result from higher densities have, increasingly, less of an impact on log price and are more than offset by the increased value from higher yields, smaller branches and tighter rings. These conclusions differ from those of Forintek and the MoF, but are similar to those of the United States Forest Service and University of Washington, published in January 1992.

The following data, derived by the MB Y-XENO model, is indicative of the mean and range of diameters attained at culmination of mai of three hemlock stands starting at 6 000 sph and spaced at a stand height of 6 m to 1 500 sph.

TABLE 5.54a. Mean DBH and Stand Table of Spaced Hemlock Stands

1) Spaced to 1500 sph

SI (m)	Culm Age	Mean dbh(cm)	Numbers of Stems in each 5 cm Diameter Class								Total sph
			20+	25+	30+	35+	40+	45+	50+	55+	
24	80	37	23	45	130	310	214	11	-	-	733
30	70	41		35	70	146	156	196	-	-	603
36	50	43		15	36	77	136	204	36	-	504

2) Spaced to 1000 sph

24	90	40	15	31	72	180	263	93	-	-	655
30	80	49	-	-	13	43	65	103	146	73	444
36	50	49	-	-	13	9	56	169	178	35	459

It is current MB experience that, age for age, smaller diameter sawlogs from new forest stands with narrower rings and smaller knots fetch higher prices than largest diameter logs with wide rings and large knots.

The decision to space and the number of trees to leave must consider:

- The relative frequency and silvical characteristics of each tree species present and their growth rates.
- The number of significant competitors– defined for the present as trees exceeding 30% to 50%, increasing with age, of the height of the crop trees (see Appendix I, Section 1.524).
- The features (log diameter, ring width, and knot size) in the dominant species that most affect value and their interaction.
- The accessibility of the stand for future management.
- The likely harvesting age– considering landscape management or other reasons for extended rotations and harvesting costs.
- Other resource objectives and habitat needs.

Stands may be spaced to lower levels to achieve non timber yield objectives (wildlife strategies for forage production) or where lower densities are appropriate because thinning chance is very poor or extended rotations are probable.

If the decision is made to space it is then necessary to weigh the likelihood of commercial thinning. If thinning seems likely, species, timing, intensity and frequency of entry are considered when prescribing the number of trees to be left. If thinning is unlikely, a lesser number of trees will be left after spacing than if thinning were likely.

Because there is no need to advance cutting age to overcome age imbalances on the TFL, MB leaves much higher numbers of trees to achieve its management objectives than the MoF. Spacing prescriptions will state leave tree targets guided by the following table and the foresters assessment of the importance of the variables discussed above.

TABLE 5.54b. Range of stems per hectare after spacing
(sph)

Species	Range
Cedar or cypress	1900-2100
Amabilis fir	1700-1900
Hemlock.....	1100-1900
Grand fir	1300-1500
Douglas-fir	900-1300
Sitka or Egelmann spruce	1100-1300
Pines	1100

Note: The MB planting targets are generally lower than spacing targets. This is a compromise reflecting the much higher cost of planting to the stocking targets for spacing. It also recognizes that, in most cases, natural regeneration will augment planted stocking. Examples of spacing impacts may be seen by comparing data for planted, spaced, and unspaced stands in the yield tables, Appendix III, in the TSA Information Package.

Estimates of area to be spaced if direct costs are borne by government funds is shown in Table 5.59.

5.55 Forest Fertilization

MB is not planning large scale fertilization of the new forests at this time.

Research on northern Vancouver Island and the Queen Charlotte Islands has indicated favourable responses to N fertilizer application at the time of planting on the cedar-salal site types. Operational trials on these site types has shown significant height growth responses to seedlings individually fertilized with nitrogen in "tea bag" or "briquette" form. The response was especially noteworthy in redcedar seedlings; less so in hemlock; and there was only a minor response with Douglas-fir.

On cedar-salal site types, individual cedar seedling fertilization will be considered where there is a strategic value in doing so; such as to reduce the time for visual recovery in critical viewscapes and thus to reduce deferral periods of adjacent timber.

In the case of Douglas-fir, it is doubtful if fertilizing will increase recoverable volumes unless fertilized stands are thinned or harvested 10–15 years after treatment, i.e., after the growth response has taken place and before stagnation and/or mortality result in a loss of the earlier gains.

MB will participate in government-funded fertilization programmes to fertilize carefully selected stands likely to have a significant growth response and where the increased growth can be recovered through scheduled harvest at the sooner time. Priority would go to relatively young low site stands.

Estimates of areas to be fertilized using forest renewal funding are shown in Table 5.59.

5.56 Pruning

Pruning increases the volume of clear wood and hence log value. The economic return from pruning is uncertain considering the high costs per tree (much more than in New Zealand) and the much longer investment period in B.C. *cf.* New Zealand.

MB will participate in government funded pruning programmes. MB would emphasize pruning of species that are most likely to yield the highest values in clear wood when harvested 40 or more years in the future. Favoured species are cypress, cedar, and Sitka spruce growing on high sites, especially if stocking is low and branches large.

Tentative areas to be pruned are shown in Table 5.59.

5.57 Commercial Thinning

As documented in Appendix VIII, MB has a long history of thinning including research into thinning equipment, stand layout and crew training. Thinning has rarely been profitable in the past except in stands nearing culmination age. Then it has the least silvicultural value. Thinning when stands are much younger than culmination age is not normally profitable unless fairly large volumes (>35% of stand) are removed. This intensity of thinning results in significant yield and value loss over the rotation and does not meet the MB objectives of management. There is no advantage on this Licence to thin to accelerate individual tree growth to favour harvesting prior to culmination age.

MB will commence thinning operations in this Management Plan period in those Blocks where second growth forms a large proportion of the total forest inventory, i.e., Blocks I, III and IV. Criteria for thinning any given second-growth stand will be:

- The operation will yield a break even or better economic return.
- Projected thinning yields and final clearcut yield, in aggregate, are projected to be greater than the yield from a clearcut without a previous thinning.

Alternatively, thinnings may be carried out where there is a clear strategic advantage to obtain yield from areas that are otherwise constrained from harvest due to visual harvest constraints. Thinning in second-growth stands in such areas may permit continuity of operations that would otherwise have to be disrupted pending visual recovery of existing clearcut blocks. Thinning in this kind of operation need not result in an aggregate yield increase.

MB expects to increase the amount of thinning operational trials and experimentation over a variety of areas with differing stand and site conditions during the Plan period and for a variety of purposes. We will, in part, focus on studies to determine and define the

relationship between thinning criteria and aggregate yields, net final yields, anticipated mortality recover, etc.

Thinning will not be carried out where the risk of thinning induced windthrow is significant or where thinning would likely exacerbate an existing and significant disease problem (e.g., dwarf mistletoe).

Volumes removed in thinning will be considered to be attributable to the normal AAC unless the level of removal is estimated to equal, in whole or in part, to anticipated mortality prior to the next cut. In such cases, a request for additional AAC will be made on a site specific basis to cover that part of the proposed thinning that is equivalent to the anticipated mortality.

5.58 Conversion of Alder Stands

The inventory summary, Appendix VI, shows alder is the dominant species on over 11 000 ha. The majority of this area is on land which previously carried old-growth conifers. MB has a long standing objective of re-establishing conifers on these lands. Within the TFL, 392 ha have been converted since 1970, 225 ha since 1988. It is our intention to accelerate this program now that the bulk of the stands are at or beyond culmination of mai.

During the life of this plan, MB will assess all alder stands and develop a 20-year plan to restore the bulk of them to conifer. Some 2 000 ha are tentatively reserved as riparian forest; these will also play a role in maintenance of biodiversity. This area may be increased as further information is gained. Sites best suited to alder growth will be maintained and managed to yield primarily alder.

The bulk of the alder forest is in Block I and II. MB proposes to log and restock about 500 ha between 1995 and 1999. Wood yield is estimated at 200 000 m³. To account for this harvest, 40 000 m³ is added to the recommended AAC in Chapter 2.0, Section 2.12. The harvest attributed to the alder AAC will be all species harvested from stands classified as alder stands in the forest inventory. This portion of the AAC will be accounted for separately in cut control reports.

5.59 Planned Silvicultural Treatments

The following table shows the anticipated level of silvicultural treatments.

TABLE 5.59 Silvicultural Treatments Plan
(hectares)

	1995	1996	1997	1998	1999	TOTAL
Scarification	314	230	180	166	186	1075
Burning			40		40	80
Seed Tree Control	15	10	15	10	15	65
Natural Regeneration	2720	2750	2750	2680	2670	13570
Planting	2806	2710	2670	2600	2595	13380
Weeding- Mechanical	600	510	580	550	580	2820
Weeding- Chemical	150	145	100	97	114	606
Spacing	1230	1260	1240	1200	2690	7620
Pruning	100	110	110	110	110	540
Fertilizing	350	150	150	350	1150	2150

5.6 Forest Protection

5.61 Fire Prevention and Suppression

MB's primary objective is to prevent fires through good housekeeping, diligent equipment maintenance and strict control of operations as fire danger rises. When a fire occurs, we aim to contain it within 24 hours of detection.

Prevention and control are governed by operating policies and procedures and a series of plans. Fuel management plans are prepared for MoF approval and components of the plan are built into the development plans. Each division maintains and deploys its own fire suppression equipment. If needed, further equipment can be obtained from a central cache at the Forest Industries Flying Tankers (FIFT) base at Sproat Lake and, in event of a catastrophic fire, from other divisions or the MoF. All divisions may call out FIFT for water bombing. All divisions except Queen Charlotte Division may call out FIFT for patrols, recce, bird dog work, and crew transport.

Divisional presuppression plans are prepared each spring, one copy is provided to the appropriate District Office before April 1st. Divisional and Regional plans exist for fires not controlled within 24 hours.

Key roads are identified and maintained each spring to ensure quick access to all roaded parts of the TFL. Ground and aerial patrols are made at frequencies related to fire danger.

Each division is connected to the MoF Fire Weather Information Network. In addition, MB sets up strategically located fire weather stations to monitor weather in the various operating areas. Data from these stations are used to modify or cease operations according to hazard rating, risk, and fire danger.

When necessary to meet the fuel management or regeneration goals, slash is dispersed or burned in accordance with prevailing regulations.

In recent years, the great increase in deactivation of roads through water-barring, removal of culverts, etc., to ensure the hydrological integrity of inactive roads will also add to the difficulty in achieving rapid fire attack response with men and equipment. An increased use of aircraft for this purpose will be likely.

5.62 Forest Insect Control

In the event of an insect epidemic, MB will assess the danger to the forest with specialists, neighbouring Licencees and MoF and undertake recommended control measures in a timely manner.

Currently, white pine weevil incidence and damage in 3 000 ha of pole stage Sitka spruce stands in Block IV appears significant. Discussions will be held with MoF specialists to discuss damage appraisal and possible remedial measures.

5.63 Forest Disease Control

The only forest diseases expected to be of consequence during the term of MP #7 are *Phellinus weirii* in Douglas-fir in stands in Block I and hemlock mistletoe.

MB will survey all second-growth Douglas-fir stands planned for logging for incidence and severity of *Phellinus weirii*. Where necessary we will either reforest with suitable, alternative species or, if Douglas-fir is the best choice, carry out practicable control measures before regenerating the infested areas in accordance with FRDA Memo 108.

Sanitation felling of residual saplings and use of the clearcutting system reduces the risk of hemlock mistletoe in future stands markedly. Treatment of infected, immature stands will vary depending on severity of infestation. If sanitation by removing all infected trees is realistic without removing more than approximately 25% of the volume or creating major gaps and economics permit, thinning would be prescribed. If this is infeasible and growth rate and stem quality impairment from mistletoe bole attack is significant, the stand will be scheduled for early harvest and reforestation.

5.7 Forest Research

The overall company objective in forest research is to obtain the knowledge to improve forest management and conservation and protection of other resources and values.

The strategy is to:

- Identify and recommend basic and applied research needs to the organizations which have this mandate.
- Cooperate with these organizations in conducting basic and applied research.
- Test and develop practicable applications and uses of published basic research that are relevant to MB management goals and responsibilities.

5.71 Forest Ecology

The objectives of the forest ecology research program are to determine the effects of management activities on forest ecosystems, to improve our ability to predict ecosystem response and to develop biologically sound silviculture prescriptions.

The program includes these continuing studies:

- **Landslide Rehabilitation:** Study sites in the Queen Charlotte Islands and on western Vancouver Island examine various techniques and species for revegetation of landslides. Trials include hydroseeding grasses and legumes, and planted conifers, hardwoods and native shrubs. Soil disturbance and erosion are also monitored.
- **Vegetation Dynamics of Montane Forests:** This project is studying natural regeneration and vegetation succession under alternative silvicultural systems in

montane forests at the cooperative Montane Alternative Silvicultural Systems (MASS) study area in Menzies Bay Division.

5.72 Forest Renewal

The forest renewal research program focuses on providing seedling and planting solutions to the new silvicultural challenges our foresters face in the 1990s. Much of our conventional wisdom based on experience with clearcut harvest systems will need to be adjusted to adapt to silviculture under the new Forest Practices Code. The research program will continue to place priority on cost efficiency and forest renewal solutions which address high cost problems.

Projects to be undertaken include:

- **MASS Regeneration:** This cooperative project seeks to understand western hemlock and amabilis fir growth and development under four harvest systems– clearcutting, green tree retention, shelterwood and patch cutting.
- **Fall Planting:** This project records morphological and physiological condition of fall planting stock and tracks field performance over a range of sites, species, stocktypes and planting years.
- **Cw/Cy Comparison:** Plantation performance of western redcedar and yellow cypress are being compared among a common set of seedlots over a range of sites from 50 m to 750 m elevation.
- **Cy Seedling/Steckling Comparison:** Seedling and cuttings from similar source populations are being compared on a high and low elevation planting site.
- **Slow Release Fertilizer Trial:** A new, long term, slow release fertilizer (3 year) is being tested to determine if the fertilizer can be incorporated into container seedling media at the nursery and have the nutrients release following planting. Species being tested are Douglas-fir, western redcedar, and western hemlock.

5.73 Forest Tree Nutrition

The aim of the nutrition research is to maintain or enhance the nutritional status of seedlings and trees to ensure optimum growth rates.

Projects in which MB is active include:

- The cooperative Salal-Cedar-Hemlock Integrated Research Program (SCHIRP). The objective of this multi-agency project is to determine the processes causing poorly performing plantations on salal-dominated cedar-hemlock sites, and to develop silvicultural treatments. The project has study sites near Port McNeill. Recent field tours and a summary brochure communicated results to foresters. A final synthesis report by UBC researchers is planned for 1994.

- A study of organic matter decomposition and nitrogen mineralization under alternative silvicultural systems in montane forests. It is led by UBC researchers at the MASS study area.
- A study of soil nutrient leaching under alternative silvicultural systems in montane forests. It is led by UBC researchers at the MASS study area.

5.74 Alternative Silvicultural Systems

Concerns over high elevation regeneration performance, visual aesthetics, biological diversity and wildlife habitat prompted MB to consider new approaches for managing coastal montane forests. The forest industry needs to know where alternatives to clearcutting are feasible, economical and ecologically sound.

A cooperative research initiative called the Montane Alternative Silvicultural Systems (MASS) project is underway with the Canadian Forest Service, The Forest Resource Development Agreement (FRDA II), the Forest Engineering Research Institute of Canada (FERIC), Industry Canada, the University of British Columbia and the University of Victoria. The objective of this project is to study the biological and economic consequences of various silvicultural systems in higher elevation forests. It examines clearcutting, green tree retention (25 sph), shelterwood (30% retention) and patch cutting (1.5 ha) systems in old-growth western hemlock-amabilis fir forests at the Iron River operation of Menzies Bay Division.

Harvesting was completed in 1993. MB and other agency studies include: feasibility and economics, soil disturbance, natural and planted regeneration, seedling physiology and response to competition and nutrition, growth and yield, microclimate, vegetation succession, forest bird diversity, seedling physiology, decomposition and soil nutrition, disease and decay. Numerous tours, talks and articles have communicated the project goals and initial findings to a wide audience. Cost and productivity data will be summarized by FERIC.

6.0 MANAGED FOREST UNIT 21 "HAIDA TREE FARM"

The "Haida Tree Farm", which comprises all the land privately owned by MB included in the TFL, is managed as an integral part of the Licence and to the same standards. All properties included in the MFU are shown in the key maps, coloured dark green, and are listed in Appendix VI.

7.0 MANAGEMENT PLAN ADMINISTRATION

7.1 Revision to MP #7

The MP will be revised or updated to conform to any legal changes, or a notice received from the Chief Forester. In the event of changes in company objectives or management plans necessitated by the business climate or other factors identified by the company, MB will consult with the Chief Forester about revising the MP.

7.2 TFL Annual Report

An annual report will be submitted by April 1st each year in compliance with the Licence Agreement. It will record progress in the routine management as well as the progress towards meeting the commitments made or implied in the MP. One or more copies will be made available for public review.

Specific commitments which will be reported upon include:

1. Progress in harvest of the timber profile. The proportion of the area harvested annually from areas classified as loggable by conventional and nonconventional and from the three economic operability classifications (economic, marginally economic and uneconomic) will be compared to the equivalent proportion of these in the available inventory.
2. Progress towards completion of the Forest Landscape Inventory, the Recreation Inventory and Analysis, ESA Mapping, and biodiversity requirements (FENs)
3. Progress in verifying or modifying the old-growth forest inventory.

8.0 MANAGEMENT PLAN #8

In anticipation of compliance with Section 2.05 of the new Licence Agreement, (presently in draft form) preparations for Management Plan #8 will commence early in September 1997 and will culminate with submission of the proposed Management Plan prior to October 1, 1999.