PUBLIC INQUIRIES ACT

(BRITISH COLUMBIA)

LADNER DOWNS
Barristers & Solicitors
2100 Pacific Centre South
700 West Georgia Street
Vancouver, B.C. V7Y 1A8
Phone 687-5744

REPORT OF THE COMMISSIONER

Honourable Gordon McG. Sloan, Chief Justice of British Columbia

relating to

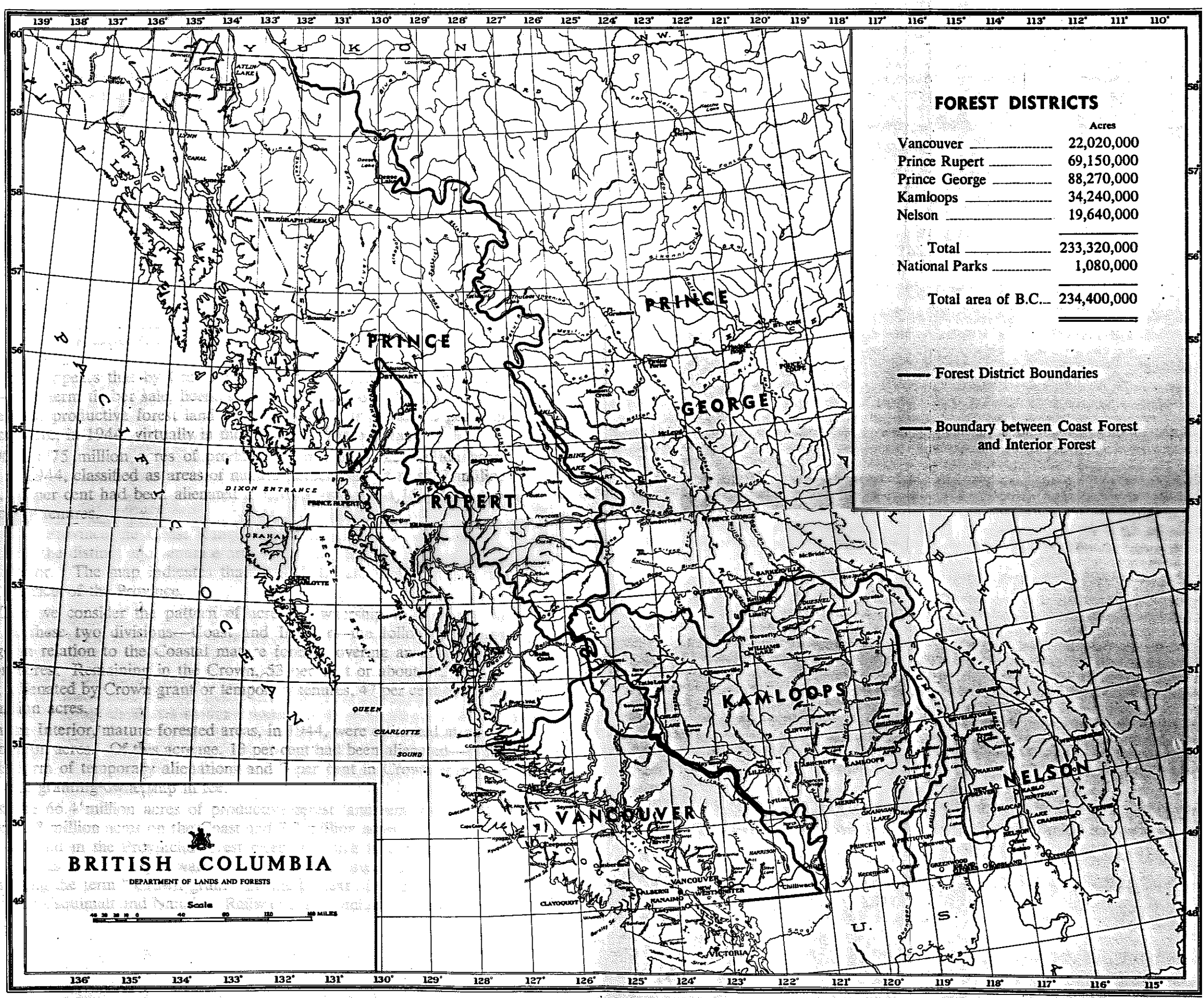
The Forest Resources of British Columbia

1956

VOLUME 1

LIBRARY

VICTORIA, B.C.
Printed by DON MCDIARMID, Printer to the Queen's Most Excellent Majesty
1957


FOREST DISTRICTS
Acres
Vancouver 22,020,000
Prince Rupert 69,150,000
Prince George 88,270,000
Kamloops 34,240,000
Nelson 19,640,000
Total 233,320,000
National Parks 1,080,000
Total area of B.C.... 234,400,000
Forest District Boundaries
Boundary between Coast Forest and Interior Forest
BRITISH COLUMBIA
DEPARTMENT OF LANDS AND FORESTS
Scale
PRINCE RUPERT
PRINCE GEORGE
KAMLOOPS
VANCOUVER
NELSON
YUKON
N.W.T.
ALBERTA
PACIFIC OCEAN
U.S.A.
DIXON ENTRANCE
HECATE STRAIT
QUEEN CHARLOTTE SOUND

To His Honour the Lieutenant-Governor in Council.

MAY IT PLEASE YOUR HONOUR:

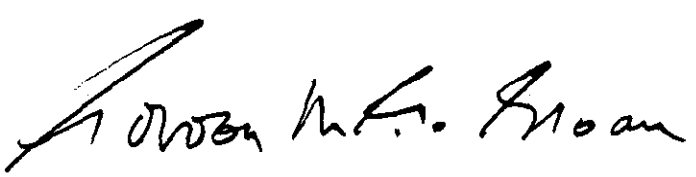
Pursuant to the powers contained in the "Public Inquiries Act," being chapter 162 of the "Revised Statutes of British Columbia, 1948," and in accordance with your Order in Council dated the 7th day of January, 1955, a Commission was issued under the Great Seal of the Province appointing me a sole Commissioner to inquire into and report upon the certain matters therein set out relating in general to the forest resources of British Columbia.

The Inquiry has been completed and I beg to submit my Report herewith.

I have the honour to be,

Sir,

Your obedient servant,



Commissioner.

Dated at Victoria, B.C., July, 1957.

CONTENTS

VOLUME 1

	Page
Terms of Commission	1
Growth of Industry during Last Decade	3
Economic Importance of Industry	9
Statement of Issues Involved	14
Historical Aspects of Forest Development	15
Tenures to 1945	19
Crown Grant	22
Timber Leases	24
Pulp Leases	26
Timber Berths	27
Timber Licences	27
Pulp Licences	31
Timber Sales	33
Pulpwood Timber Sales	33
Summary of 1944 Tenures	37
Recommendations of 1945 Commission	39
Tenures from 1945	45
Forest Management Licences	45
Public Working Circles	115
Tree-farms	139
Municipal Forests (Volume 2)	742
Farm Wood-lots (Volume 2)	752
Timber Sales	153
Forest Inventory	193
Sustained Yield	222
Allowable Cut	238
Forest Protection	245
Fire Protection	245
Forest Insects, Pests, and Diseases	269
Salvage	280
Regeneration	289
Industry	323
Sawmills	327
Shingle-mills	342
Pulp and Paper	345
Poles, Piling, Veneer, and Plywood	360
Utilization of Waste	366
Logging Residuals	366
Mill Residuals	378
Chips	390
Export of Chips	394
Future Trends Affecting Policies	398

VOLUME 2

	PAGE
Forest Finance	417
Assessment and Taxation	417
Stumpage	453
Forest Revenue	512
Forest Expenditures	519
Scaling	529
Coast	529
Interior	540
Administration	544
Forest Service Organization	545
Forest Commission	566
Advisory Boards	575
Provincial Advisory Council	579
Access Roads	599
Status of Roads and User	614
Research	625
By Federal Government	636
By Forest Service	640
By University of British Columbia	649
By Industry	651
Problems of the Interior	658
Tree-marking	658
Conflicts Arising out of Multiple Land Uses	681
Grazing	681
Mining	706
Watershed Management	721
Miscellaneous Subjects	724
Salmon-streams	724
Education and Public Relations	731
Municipal Forests	742
Farm Wood-lots	752
Parks Administration	760
E. & N. Belt	760
Conclusion	763
Appendices—	
Appendix A.—Forest Management Licence Sample Contract	767
Appendix B.—Forest Service Instructions for Preparing Working Plans	774
Appendix C.—List of Witnesses	778
Appendix D.—List of Counsel	782
Appendix E.—" Forest Act "	783
Index	865

Report of the Commissioner

INTRODUCTION

In December of 1945, as Royal Commissioner, I made a Report to the Government of British Columbia concerning many and varied phases of the forest resources and forest industries of this Province. In that Report I recommended as a prudential course of conduct (among other things) that another Royal Commission should be appointed ten years from then to take a look at what had transpired in the interval and to re-examine our forestry problems in the light of the knowledge and experience gained in that decade.

The Government accepted this suggestion, and on the 7th day of January, 1955, appointed me as a Royal Commissioner to examine into the present status of our forest resources.

The terms of my Commission read as follows:—

" WHEREAS it is desirable and in the public interest to cause to be re-examined all aspects of forestry in the light of developments during the last ten years and to cause an inquiry to be made into all phases and aspects of the forest resources of the Province and the legislation relating thereto:

"AND WHEREAS under section 3 of the ' Public Inquiries Act,' being chapter 162 of the ' Revised Statutes of British Columbia, 1948,' it is provided that whenever the Lieutenant-Governor in Council deems it expedient to cause inquiry to be made into and concerning any matter connected with the good government of the Province or the conduct of any part of the public business thereof, the Lieutenant-Governor in Council may, by Commission intituled in the matter of the said Act and issued under the Great Seal, appoint a sole Commissioner to inquire into such matter:

"AND WHEREAS His Honour the Lieutenant-Governor, by and with the advice of his Executive Council, hath deemed it expedient to appoint a sole Commissioner to re-examine all aspects of forestry in the light of developments during the last ten years, and to inquire into the following matters, namely:—

" The forest resources of the Province and all matters generally relating to or connected with the forest resources of the Province, including, but not limiting this reference to the following subjects:—

" 1. The extent, nature and value of the forest resources:

" 2. The conservation, management and protection of these resources:

" 3. The establishment of forest yield on a continuous production basis in perpetuity:

" 4. Forestation and research:

" 5. Forestry education and instruction:

"6. The utilization of the forest crop and its relationship to employment and social conditions:

"7. The use and management of forest and wild lands for parks, recreation, grazing and wild life in relation to forest administration:

"8. The relationship of the forest to soil conservation:

"9. The maintenance of an adequate forest cover with a view to the regulation of moisture run-off and the maintenance of the levels of lakes and streams:

"10. Forest finance and revenues to the Crown from forest resources:

"11. Acquisition of rights to forest lands and timber and the tenure of such rights, including existing rights and tenures, and the extent to which adequate and proper exercise of the rights thereunder is now made:

"12. Legislation and the amendment thereof:

"13. The relevant facts in relation to any matter that in the opinion of the Commissioner it is necessary to inquire into in order to carry out effectually the duties imposed upon him herein:

"NOW KNOW YE THEREFORE, that reposing every trust and confidence in your loyalty, integrity and ability, we do by these presents, under and by virtue of the powers contained in the said 'Public Inquiries Act' and in accordance with an Order of the Lieutenant-Governor in Council, dated the 7th day of January, A.D. 1955, appoint you, the Honourable Gordon McG. Sloan, Chief Justice of British Columbia, a sole Commissioner to inquire into the matters aforesaid."

The Commission opened its sessions at Victoria on the 21st day of February, 1955. Hearings were terminated at Victoria on the 23rd day of August, 1956. In the intervening months the Commission held sessions in Victoria, Vancouver, Nelson, Penticton, Kamloops, Prince George, Burns Lake, Quesnel, and Williams Lake. The evidence of 219 witnesses* was taken and is recorded in approximately 18,000 pages of transcript. The final summations by representatives of Industry and Commission Counsel occupied 3,500 pages of transcript. All told about 21,500 pages or about 6½ million words were included in the written transcripts now bound in forty-one volumes. This compilation does not take into account all the exhibits, totalling 440 in number—many of them long and detailed studies and reports upon various headings under review.

When I agreed to accept this present assignment, it was my impression that the inquiry would not be a lengthy one, neither would the issues be complex. I soon discovered the extent to which my uninformed expectations proved erroneous on both counts.

* For list of witnesses and appearances *see* Appendix C.

In 1944–45 the primary issue, while not easy of solution, could be stated simply enough: Were we to continue to follow a system of unrestrained and unregulated forest exploitation, regarding the forest as a mine to be exhausted of its wealth, or were we to move to a system based on the concept of sustained yield, wherein the forest was to be considered as a perpetually renewable asset like any other vegetable crop? The question when put in that form—as it was—supplied its own answer: We had to change our thinking and establish our forest resource on a more enlightened basis. Differences of opinion naturally arose as to how this could be accomplished, and it was my responsibility to weigh and determine the conflicts as best I could and report accordingly: which I did. What I reported and what has been accomplished will come later.

At the moment I propose to confine myself to the major changes occurring in the last decade resulting in the creation of new problems of challenging complexity. Before endeavouring, however, to frame the present problems in some crystallized form, it is, I think, necessary to fill in the economic background against which these problems find their measure and gravity. The growth during the last decade of the Forest Industries—and I use the term in its generic sense to include both the extractive and conversion processes—has been tremendous.

Later on in this Report, statistical material covering various phases of the Industry will be referred to in some detail, but at this juncture I limit my comments to some of the outstanding aspects of this enormous expansion.

The Provincial cut of all species in 1944 totalled 3,096,000,000 board-feet. In 1955 this had increased to 6,109,000,000 board-feet, an increase of about 100 per cent in volume of production.

The gross or sale value of production increased from $229,293,000 in 1944 to $896,963,000 in 1955, an increase of $640,670,000 or approximately 290 per cent.

Taking the year 1944 as representing an index figure of 100, the following table shows the relative growth of volume production of the products specified in the periods indicated between 1944 and 1955, inclusive. Attention is drawn to expansion of logging and lumber production in the Interior and the phenomenal increase in the volume of pulp-chip production, largely from Coast sawmills residuals. The output of plywood shows a very substantial increase as well. (The boundaries of the so-called Coast and Interior areas are shown on the map at page 35.)

TABLE 1

INDEX OF FOREST PRODUCTION IN BRITISH COLUMBIA, 1944, 1949, 1954, AND 1955

(1944=100.)

Products	1944		1949		1954		1955	
	Volume	Index	Volume	Index	Volume	Index	Volume	Index
Logging, primary products including pulpwood (M board-feet)	3,096,333	100.0	4,049,682	130.8	5,567,423	179.8	6,109,202	197.3
Coast	2,519,167	100.0	3,136,877	124.5	3,997,981	158.7	3,931,642	156.1
Interior	577,166	100.0	912,805	158.2	1,569,442	271.9	2,177,560	377.3
Lumber (M board-feet)	1,982,478	100.0	2,951,183	148.9	4,378,695	220.9	4,914,285	247.9
Coast	1,641,152	100.0	2,172,188	132.4	2,683,649	163.5	2,756,096	167.9
Interior	341,326	100.0	778,995	228.2	1,695,046	496.6	2,158,189	632.3
Pulp-chips produced at sawmills[1] ("units" of 200 cubic feet)	49,490	100.0	185,311	374.4	952,354	1,924.3	1,310,000	2,647.0[2]
Douglas fir plywood (thousand square feet, ¼-inch basis)	218,199	100.0	359,936	165.0	724,799	332.2	928,375	425.5
Apparent pulpwood production (cords)	630,916	100.0	763,631	121.0	1,362,109	215.9	1,279,000	202.7
Pulp production (tons)	489,690	100.0	666,542	136.1	1,277,082	260.8	1,364,092	278.6
Paper production (tons)	317,039	100.0	471,619	148.8	683,384	215.6	720,049	227.1

[1] Produced at Coast sawmills and mainly from so-called waste wood.
[2] Estimate.
Source: Bureau of Economics and Statistics, Department of Trade and Industry, Victoria, B.C.

Turning from volumes to values and using the same products and index for comparison, the following table shows the relative increases in gross values during those years.

TABLE 2

INDEX OF FOREST PRODUCTION IN BRITISH COLUMBIA, 1944, 1949, 1954, AND 1955
(GROSS VALUES)
(1944=100.)

Products	1944		1949		1954		1955	
	Value	Index	Value	Index	Value	Index	Value	Index
Logging, primary products including pulpwood	$59,906,045	100.0	$129,098,690	215.5	$219,448,210	366.3	$235,260,000	392.7
Coast	52,417,789	100.0	109,757,669	209.4	171,296,963	326.8	168,450,000	321.4
Interior	7,488,256	100.0	19,341,021	258.3	48,151,247	643.0	66,810,000	892.2
Lumber	70,080,622	100.0	177,708,047	253.6	293,429,444	418.7	337,000,000	480.9
Coast	59,579,134	100.0	142,141,480	238.6	198,277,115	332.8	211,100,000	354.3
Interior	10,501,488	100.0	35,566,567	338.7	95,152,329	906.1	125,900,000	1,198.9
Pulp-chips produced at sawmills	89,516	100.0	1,674,109	1,870.2	12,292,820	13,732.5	19,000,000	21,225.3
Douglas fir plywood	7,677,023	100.0	19,731,031	257.0	45,985,321	599.0	59,000,000	768.5
Apparent pulpwood production	9,274,946	100.0	18,051,217	194.6	33,175,299	357.7	31,100,000	335.3
Pulp production	19,739,476	100.0	36,737,722	186.1	99,629,620	504.7	107,067,325	542.2
Paper production	19,088,145	100.0	46,478,981	243.5	79,499,580	416.5	85,883,119	449.9

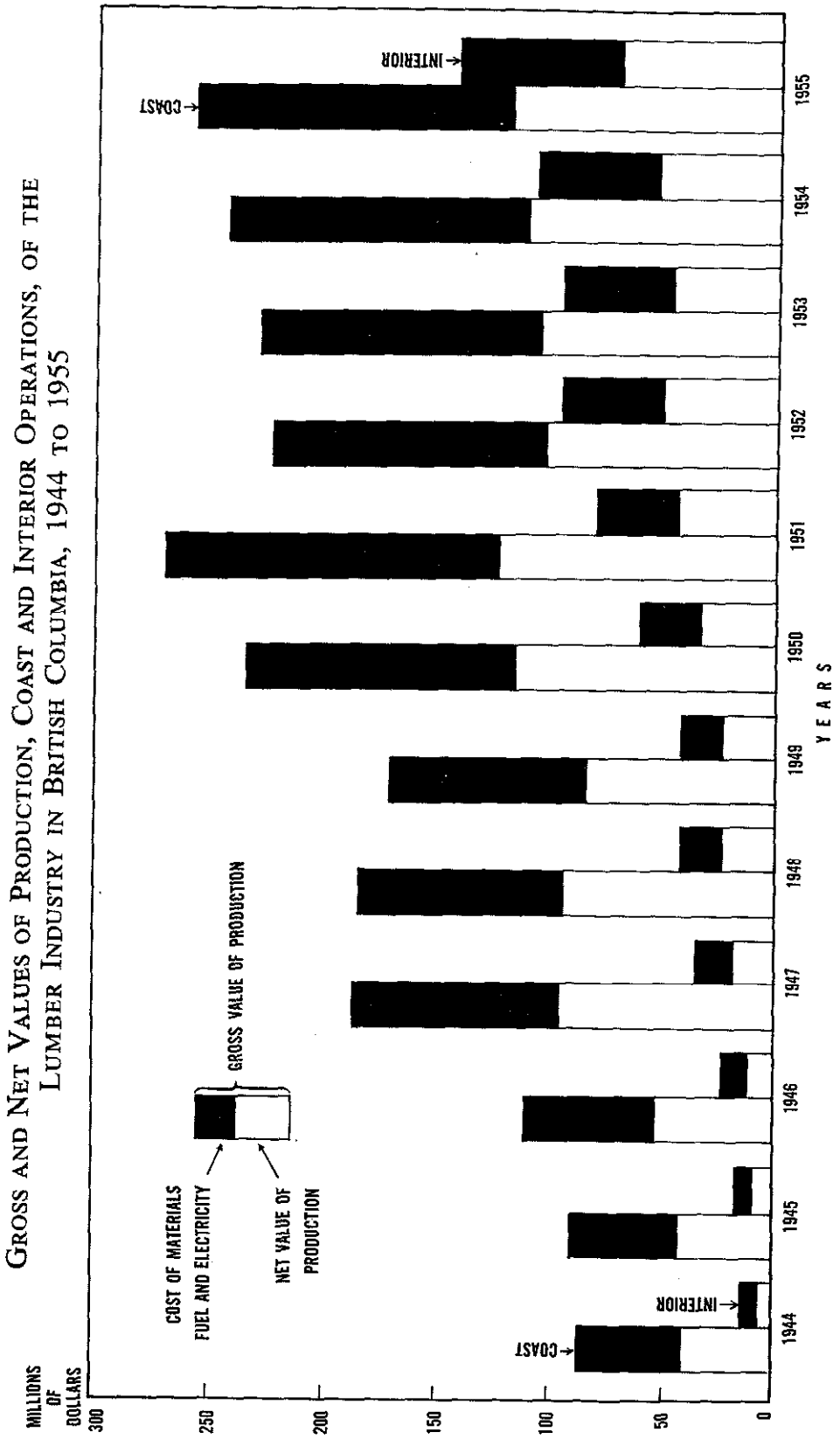
Source: Bureau of Economics and Statistics, Department of Trade and Industry, Victoria, B.C.

The increase in Interior productive values is notable. A 21,000-per-cent increase in value of chip production, from $89,000 in 1944 to $19,000,000 in 1955, is a most striking development.

The figures on Table 2 may be produced in graph form as follows:—

FIG. I

GROSS AND NET VALUES OF PRODUCTION, COAST AND INTERIOR OPERATIONS, OF THE LUMBER INDUSTRY IN BRITISH COLUMBIA, 1944 TO 1955



There is some discrepancy between the totals on Table 2 and the graphs on Fig. I. The explanation lies in the fact that the "lumber industry" represented on the graph includes not only those larger segments of the Forest Industries represented in Table II, but also extends to the production of shingles, laths, sawn ties, hardwood squares, box-shooks, staves, and headings, and the barking of pulpwood in plants other than pulp-mills.

I think it would be useful to break down the logging totals on Table I: wherein it is recorded that the total Provincial cut was 3,096,333,000 board-feet in 1944, 4,049,682,000 board-feet in 1949, 5,567,623,000 board-feet in 1954, and 6,109,202,000 board-feet in 1955. The result and comparison with 1944 as Index 100 is shown as follows:—

TABLE 3

INDEX OF TIMBER SCALED IN BRITISH COLUMBIA, 1944, 1949, 1954, AND 1955[1]

(1944=100.) (Volumes in thousand board-feet.)

Species	1944		1949		1954		1955	
	Volume	Index	Volume	Index	Volume	Index	Volume	Index
Douglas Fir—								
Coast	1,080,543	100.0	1,418,225	131.3	1,462,333	135.3	1,426,961	132.1
Interior	129,781	100.0	286,315	220.6	665,528	512.8	954,661	735.6
Total	1,210,324	100.0	1,704,540	140.8	2,127,861	175.8	2,381,622	196.8
Cedar—								
Coast	466,160	100.0	606,677	130.1	773,707	166.0	829,339	177.9
Interior	57,712	100.0	66,447	115.2	57,882	100.3	68,389	118.5
Total	523,872	100.0	673,124	128.5	831,589	158.7	897,728	171.4
Spruce—								
Coast	177,699	100.0	103,535	58.3	127,232	71.6	132,332	74.5
Interior	164,211	100.0	313,100	190.7	468,762	285.5	649,331	395.4
Total	341,910	100.0	416,635	121.9	595,994	174.3	781,663	228.6
Hemlock—								
Coast	597,469	100.0	787,767	131.9	1,235,065	206.7	1,145,694	191.8
Interior	24,983	100.0	20,513	82.1	59,192	236.9	81,514	326.3
Total	622,452	100.0	808,280	129.9	1,294,257	207.9	1,227,208	197.2
Balsam fir—								
Coast	143,670	100.0	179,621	125.0	347,996	242.2	334,026	232.5
Interior	4,948	100.0	9,430	190.6	38,439	776.9	47,336	956.7
Total	148,618	100.0	189,051	127.2	386,435	260.0	381,362	256.6
Total, all species—								
Coast	2,519,167	100.0	3,136,877	124.5	3,997,981	158.7	3,931,642	156.1
Interior	577,166	100.0	912,805	158.2	1,569,442	271.9	2,177,560	377.3
Total	3,096,333	100.0	4,049,682	130.8	5,567,423	179.8	6,109,202	197.3

[1] Annual Reports of British Columbia Forest Service.

Source: Annual Reports, British Columbia Forest Service.

Source: Bureau of Economics and Statistics, Department of Trade and Industry, Victoria, B.C.

It is apparently the habit of statisticians when determining in a relative way the economic relationship of one group of industries to another to use the net values of production as a comparative " yardstick."

The net value of production is defined " as that portion of the gross or sale value of production which has been added by the manufacturing process and is obtained by subtracting from the gross value the cost of materials and supplies, fuel and electricity."

Thus, when we compare the productive value of the Forest Industries with the Provincial total production of wealth, the net value principle is adopted, with the following result:—

TABLE 4

Year	Estimated Net Value of Primary and Secondary Forest Production in British Columbia	Estimated Net Value of Total Production in British Columbia	Per Cent of Forest Products of Total Production in British Columbia
1946	$174,493,309	$609,337,792	28.64
1947	279,371,678	784,630,095	35.61
1948	317,635,313	921,500,886	34.47
1949	292,104,291	884,820,749	33.01
1950	384,349,181	995,233,672	38.62
1951	486,478,692	1,240,224,661	39.23
1952	452,313,906	1,239,008,819	36.51
1953	477,191,638	1,319,826,559	36.16
1954	511,789,407	1,301,084,000	39.34
1955 (estimated)	567,700,000	1,459,000,000	38.91

Source: Bureau of Economics and Statistics, Department of Trade and Industry, Victoria, B.C.

The expansion of the Forest Industry and its contribution to the Provincial economy is again very apparent from these figures.

If we compare the estimated net values produced by the Forest Industries with the estimated net values derived from the other Provincial basic sources of our wealth, we get the following approximate results for 1955:—

Forestry	$600,000,000
Mining	175,000,000
Agriculture	130,000,000
Fisheries	70,000,000

It is generally agreed that the Forest Industries as a whole comprise the most important industrial group in the Province, accounting for about 40 per cent of the total Provincial net value of production. This 40-per-cent contribution is produced by various branches of the Industry in the approximate following proportions:—

	Per Cent
Lumber industry	14
Logging	13½
Pulp and paper	7½
Other wood- and paper-using industries	5
	40

It must also be borne in mind that the Forest Industries of British Columbia are playing a major role in the contribution they are making to the national economy.

Taking a look at lumber for a moment, we see that British Columbia's production in terms of comparative percentages of total Canadian volume increased from about 44 per cent thereof in 1944 to 60 per cent in 1954 and in terms of value from 48 to 63 per cent during that same period.

This Province is, in other words, producing well over one-half of all the lumber produced in the whole of Canada, not only in terms of volume, but of value as well.

Other details of interest may be discovered in the following table.

TABLE 5

SELECTED STATISTICS DEALING WITH THE FOREST INDUSTRIES OF BRITISH COLUMBIA AND CANADA, 1944, 1949, AND 1954

	Unit	1944			1949			1954		
		British Columbia	Canada	Per Cent	British Columbia	Canada	Per Cent	British Columbia	Canada	Per Cent
Logging										
Net value of production	$	46,947,472	236,336,547	19.9	102,767,911	446,907,281	23.0	177,602,325	628,270,706	28.3
Volume of production	M cu. ft.	503,852	2,508,046	20.1	694,928	3,140,137	22.1	1,002,814	3,661,963	27.4
Employment[1]	No.	9,111	118,503	7.7	11,280	126,120	8.9	12,261	135,051	9.1
Salary and wages[1]	$	21,705,809	195,000,000	9.9	36,028,431	321,000,000	11.2	56,195,020	471,467,305	11.9
Lumber										
Net value of production	$	46,251,574	96,528,955	47.9	104,089,164	186,120,981	55.9	166,672,420	263,629,457	63.2
Volume of production (lumber only)	M bd.-ft.	1,982,478	4,512,232	43.9	2,951,183	5,915,443	49.9	4,378,695	7,243,855	60.4
Employment	No.	15,274	43,516	35.1	24,027	55,032	43.7	29,342	57,010	51.5
Salaries and wages	$	27,110,882	51,516,085	52.6	56,527,596	97,449,091	58.0	92,479,036	139,571,531	66.3
Pulp and Paper										
Net value of production	$	18,131,055	174,492,103	10.4	42,881,670	423,375,527	10.1	90,056,949	641,410,070	14.0
Volume of production (wood pulp only)	Tons	489,690	5,271,137	9.3	666,542	7,852,998	8.5	1,277,082	9,673,016	13.2
Employment	No.	3,901	37,896	10.3	4,586	52,050	8.8	6,881	60,837	11.3
Salaries and wages	$	8,411,434	75,833,408	11.1	14,374,571	157,703,868	9.1	31,455,638	252,598,383	12.5
Forest Industries Total (Including Other Wood- and Paper-using Industries)										
Net value of production	$	130,392,962	668,408,213	19.5	292,104,291	1,373,124,675	21.3	509,436,407	1,996,737,762	25.5
Volume of production	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Employment[1]	No.	35,167	267,613	13.1	50,028	324,223	15.4	61,274	351,352	17.4
Salaries and wages[1]	$	67,504,997	412,601,401	16.4	128,936,857	754,251,265	17.1	218,953,774	1,126,145,545	19.4

[1] "Operations in the Woods" present statistics for employment, salaries, and wages for Canada, but not for the Provinces. Statistics for British Columbia are from the British Columbia Department of Labour and therefore are not comparable.

[2] Same as in "Logging."

Sources:—

Annual reports of the Dominion Bureau of Statistics, Ottawa:—

(1) Operations in the Woods.

(2) The Lumber Industry.

(3) The Pulp and Paper Industry.

Annual reports of the British Columbia Department of Labour, Victoria, B.C.

Bureau of Economics and Statistics, Department of Trade and Industry, Victoria, B.C.

The foregoing synoptic look at the figures of volume and value in 1954 and 1955 as compared with what they were in 1944 demonstrates clearly enough that my description of this past decade as one of " tremendous " growth and expansion was not an over-statement of the facts.

It will also be noted from the foregoing tables that, in 1944, 35,000 employees in the Forest Industries were paid 67.5 million dollars in wages and salaries and produced forest products to an approximate net value of $130 million dollars. Ten years later, in 1954, 61,000 employees were paid 219 million dollars in wages and salaries and produced forest products with a net value of about 500 million dollars.

The volume of wood and wood products flowing from our conversion plants of various kinds in a prodigious daily stream must find a buyer's market. The entire Forest Industry is really engaged in one basic process: the translation of wood, by various techniques, into money. It is a chain-process in which each link, from the tree in the woods to its manufacture and ultimate sale, must effectively fulfil its allotted function. The sum total of these functions is to produce a product at a cost low enough to supply a market willing to pay a price high enough to return to the producer his cost plus profit.

If there is no such available market, the elaborate structure of primary production becomes an exercise in futility.

This Province, with a domestic market limited by the needs of a relatively sparse consumer population, can absorb a comparatively small proportion of this tremendous daily output of forest products. The following table summarizes, in general, the markets presently buying these products in terms of dollar values:—

TABLE 6

Exports to—	1951		1952		1953		1954		1955	
	Value	%	Value	%	Value	%	Value	%	Value	%
Canadian Provinces	$84,564,000	21	$106,972,000	27	$96,537,000	22	$116,103,000	23	$134,501,000	21
Foreign countries	321,661,941	79	291,464,456	73	348,060,229	78	393,409,808	77	505,343,011	79
Totals	$406,225,941	100	$398,436,456	100	$444,597,229	100	$509,512,808	100	$639,844,011	100

Average annual export to Canadian Provinces	$107,735,400
Average annual export to foreign markets	$371,987,891
Percentage average export to Canadian Provinces	22%
Percentage average export to foreign markets	78%

The percentage of Provincial export of wood, wood products, and pulp and paper to total Canadian export of these materials is shown hereunder for the year 1954:—

	Per Cent	Value
Wood and wood products—		
Canadian export	100.0	$679,055,537
Originating in British Columbia	42.2	333,792,011
Pulp and paper—		
Canadian export	100.0	1,179,665,443
Originating in British Columbia	9.3	110,805,218

Sources: Estimates of the Bureau of Economics and Statistics, Department of Trade and Industry, Victoria, B.C.

When we realize that we sell about 78 per cent of our exported wood and wood products in foreign markets and must continue to do so in order to maintain a healthy economy, it does not need much imagination to appreciate how vulnerable we are to the impact of international and world conditions, to which we must respond, but over which we can exercise no control.

The adverse effect of a weakening market in the fall of 1956 (as this is written) due to international trade dislocations, a decline in housing and building construction because of credit restrictions and higher interest rates, the discount of the American dollar, a shortage in shipping tonnage with concomitant high railway freight rates, all these working in combination and allied with other export trade restrictions, due to varying causes, has darkened the immediate outlook and is illustrative of our dependence on foreign buyers.

From the studies and reports filed as exhibits or brought to my attention during the hearings of the Commission, it is, I think, reasonably clear that the world demand for wood and wood products is far from being satiated. The potential future demand for paper products, should it materialize, is beyond the capacity of presently existing mills to meet. The secular trend, despite periodic recessions, gives no indication that world demand for wood products in one form or another will diminish.

It is, however, equally clear, I think, that, in time, present centres of demand and supply will shift in accord with future economic currents even now taking form and substance and seeking new channels. Looking out of our windows at the world, we can see, in almost every direction, vast new areas of forested land growing into production and yielding ample supplies of low-cost raw materials for large modern conversion plants. These areas, until of recent years, looked to us for their supply of lumber, for their pulp and newsprint, and for the other wood products. They are becoming self-sufficient, and those that have achieved that objective because of expanded production or shrinkage in their own domestic demand are now exporters in competition with our mills in the markets of the world.*

We are entering a new business cycle. The days of the eager buyer standing hat-in-hand are drawing to a close. We must be competitive in world markets or reap a bleak future, not only in our Forest Industry, but in our entire Provincial economy.

* *See* section Future Trends Affecting Policy.

This brief look at the economic importance of the Forest Industry points out the imperative necessity of maintaining its relative position of prominence in the domestic, provincial, federal, and world scheme of things. It is manifest that the problems confronting this industry should, if possible, be resolved.

During the Inquiry many conflicting view-points were advanced by various groups of witnesses in relation thereto. The problems discussed lie, in part, in economic and social fields, and, while not peculiar to the Forest Industry, were brought into question and call for resolution because of the impelling importance to this Province of maintaining the continued prosperity of this industry, and the economic and social well-being of those engaged therein.

At this stage of this Report I am speaking in very general terms; definition will come later. In this context perhaps I may formulate as a question the primary economic and social problem emerging from the evidence in this Inquiry: Are we to seek the continued and full realization of our forest resource in a system wherein competition is completely free and unregulated or within a framework of rigid state control, or in a system wherein the free enterprise concept finds expression within a co-operative pattern between Government and Industry wide enough in scope to embrace both private and public interests?

Those who expressed opinions on these and related subjects were, I believe, in many instances, influenced to a marked degree by the time factor. Those with a pressing and urgent need for timber to-day or to-morrow are driven to think in contemporary terms limited by short-term policies—to-morrow's timber sale. Those with large investments and corporate continuity are more likely to think in terms of long-time tenures, sustained yield and forest management stretching into centuries.

Just as a map of an area contracts or expands in accordance with the scale used in its delineation, so do the problems of the Forest Industry differ when viewed in the short or long perspective. In general, the short-term view is that of the so-called " small man " who is vitally interested primarily in conducting a profitable operation within the span of his own expectancy; the long-term view is that held by the large integrated extraction and conversion operations made possible by the investment of hundreds of millions of dollars of shareholders' money and employing thousands of men. These corporations are, by the very nature of their operations, physical and financial, vitally interested in the long-term maintenance and security of their raw-material supply. Thus their management thinks in terms of tree-farms and of second- and third-crop rotations, and each rotation, on the Coast, may be presently estimated at ninety years.

To-day we stand at a momentous period in the economic and social development of this industry. We are in a stage of transition from a discarded policy of forest liquidation to one of sustained yield and forest

management. We are nearing the end of the era when virgin fir was the major producer of our forest wealth and are approaching an economy dominated by hemlock. We must evaluate and resolve the conflicts existing between those of the long and the short view of our future policies—a task of great complexity, not only because of the divergence of opinions between opposing interests, but by clashes of interest within groups seeking the achievement of similar objectives. These and other inexorable pressures are upon us now.

Our economy needs, and must plan for, the continued existence of the small man. We must also plan for the social and economic future of the large integrated operations. The problem, in essence, seems to resolve itself into a search for a policy which, while retaining and assuring the continuing benefits flowing from large integrated industrial units, does not in itself militate against those competitive forces operating in a free-enterprise society. In an endeavour to blue-print, even in broad outline, a future course to pursue our perspective must in consequence include, in proper focus, and with impartial detachment and objectivity, the long- and short-term concepts.

This design must be more than a mere forecast: it must fashion and mould the future. In that larger and creative sense, the paramount and guiding consideration must be the welfare of the people of this Province as a whole, an objective transcending in importance the future of individual industrial units, large or small. What we plan now is, in its larger and comprehensive aspects of principle, irrevocable to the extent the plan is carried into operation. In this extension into time of present planning there comes a point from, and at which, there can be no return and no rational departure from the principle of the plan unless accompanied by severe dislocations. In certain aspects we have already reached that point of no return, because our past planning has projected itself, in action, into the present. We cannot, for instance, return to the outmoded system of forest liquidation without catastrophic results to our whole Provincial economy. We have accepted and acted upon the principle of sustained-yield forest management. The question now, therefore, is whether or not in the execution of that broad principle due regard has been had, in the public interest, to the presently existing economic and social conflicts that have developed as a consequence of economic evolution and of the competitive conditions bred by the general buoyant economy of the industry.

There are those who strive to destroy the forest management licence system by claiming (*inter alia*) that this system and its implementation is directly responsible for timber being in short supply for them in certain Coastal areas. That premise cannot be supported. Conditions prevailing to-day in this Province are in the light of the known facts, the direct and inevitable results of patterns established as far back as 1907, or earlier, and are not of recent creation. Then, too, regional shortages must be inevitable

if the sustained-yield concept is maintained, no matter what techniques of management are applied.

Competition for timber where timber is no longer available in sufficient quantity to meet all demands has created pressures in those areas of short supply. In turn, the impact of those pressures has made manifest a condition that has been, for a long time, latent. If the present recession worsened and lasted any considerable time, that would in itself reduce the pressure and dissolve many of the present difficulties requiring adjustment. We cannot, however, fold our hands and wait for the occurrence of such an untoward event. It is, I think, as I have said, generally accepted that barring ineluctable contingencies the demand for wood volume in varying forms will not diminish but increase over at least the next decade. That being so, the difficulties of to-day are not going to diminish but increase during that decade, unless means are found to relieve those causative pressures which we have inherited from the past. Because of this inheritance it is essential to the understanding of the problems of to-day that the historical background of our forest policies be examined.

HISTORICAL

Nature has played, and will continue to play, an extremely important part in all our forest planning. A tree is a large plant. Some of them, like the plants in our gardens, will grow in the shade; others require more sunlight. In a mixed stand these species that are more tolerant of shade will reproduce themselves and grow at the expense of the more intolerant. In comparison with hemlock, balsam, spruce, or cedar, Douglas fir is a sun-loving plant. One school of thought holds that our magnificent stands of old-growth fir, of almost the same age-groups, resulted from holocaustic fires that swept away the then climactic forests of hemlock and cedar, thus allowing the sun to reach the forest floor.

In any event, and whatever the cause, the earliest explorers and pioneer settlers found in this Province vast and seemingly limitless forested areas, in great part composed of tall and lordly trees later to be designated as " Douglas fir." As far back as 1778, tall trees growing close to the shoreline in Nootka Sound were cut and fashioned for spars and masts by Captain Cook. The first reported commerce in timber was in 1788. In that year Captain John Meares loaded a vessel with furs and a deck-load of spars for the China trade. These and other early and historical events are interesting, but bear no real relationship to the conditions of to-day.

We can, therefore, disregard these early events and take up the narrative at a period of 1865, a year before the Mainland of British Columbia and Vancouver Island joined together to become the Crown Colony of British Columbia. Prior to that date, timber lands in the Colonies were regarded in the public estimation as of little or no value as such. They could be acquired by purchase and Crown grant in the same manner and

for the same price as any other Crown land. This public attitude continued until 1865, when the Land Ordinance of that year introduced for the first time in the Colony of British Columbia the system of granting the right to cut timber on Crown lands without alienation of the land itself. These leases or cutting rights were restricted to those " actually engaged " in the cutting of " spars, timber or lumber " as a measure, no doubt designed to encourage the then existing industry and to prevent speculation. It was at this juncture then that the important first step was taken toward the development of our present forest policy—the retention by the Crown of title to forest land, and the granting of cutting rights thereon by various forms of licence. (I use " licence " in this context in its wide sense.)

It might be well to pause here for a moment to reflect upon the conditions existing in the Crown Colony of British Columbia in, say, the year 1867, the date of Confederation. In 1866 the Mainland of British Columbia and Vancouver Island joined hands to create the Colony of British Columbia. This vast area, containing over 365,000 square miles, was virtually an unknown wilderness and was, except for fur brigades, untravelled. It was isolated from the Eastern Provinces by a similarly unknown stretch of wilderness, reaching 1,200 miles, from the Rocky Mountains to Ontario, broken by only one small settlement at Red River. Travellers to the East proceeded from here to San Francisco by ship and then by rail over American lines.

The population of this Colony at the time of its entry into the Confederation of Canadian Provinces in 1871 was estimated at about 40,000 people. Of these, 9,000 were white, 25,000 were Indians, and the balance chiefly Chinese. In 1865 or 1867 it is safe to assume the population of white people was less than the 9,000 estimate of 1871. The greater portion of the population was to be found on Vancouver Island.

These, the people of British Columbia, were at that stage the owners of millions of acres of rich forest land. The magnificent Coastal virgin forests, heavy with old-growth fir, growing in silent and untouched splendour for hundreds of years, stood waiting at their doorsteps—a free gift of nature. The vast and boundless forests of the Interior were largely unknown. Sawmills were few and scattered. At Hudson's Bay trading-posts sawing was by hand, and it was not until 1848, on the Mill Stream near Parson's Bridge at the head of Esquimalt Harbour, that the first machine-operated sawmill began operation. In relation to the then established industries, the abundant forest resources even close to hand must have seemed, to the few citizens of British Columbia, virtually inexhaustible.

It is a matter of considerable interest to remember that, under the circumstances prevailing in 1865, and to which I have made brief reference, the first sign-post was erected which pointed the way to our present system of retaining the Crown ownership of forest land.

This policy, however, took some further time to emerge from an embryonic stage. After the entry of British Columbia into Confederation in 1871, timber lands continued to be sold and Crown-granted and cutting rights leased under the Ordinance of 1865. These leases were issued without reservation of royalty, without restriction on export, and generally without limitation as to size, except perhaps that the area or volume was related to the productive capacity of an appurtenant mill.

In the following years, cutting rights took various forms and were subject to varied conditions. It was an uneven and somewhat complex development, motivated by conditions thought impelling at the time these various forms of tenure were devised. To conclude that the earlier settlers, who had a hand in framing the forest laws and policies of those days, were, in so doing, deliberately thinking in terms of generations ahead is, I think, with respect, to attribute to them an unwarranted prescience. Early administrations were, in my view, motivated by the immediate objectives important to the era in which they lived. They were confronted with the critical necessity of obtaining Crown revenue and of finding means to encourage the utilization of forest products. The developing pattern of Crown ownership was the consequential result and not the design of their pioneering policies. This opinion is, I believe, substantiated when the history of these tenures is examined with some particularity. At this juncture I feel I must consider this development in some detail.

FORMS OF FOREST TENURE

The historical background and development of various forms of tenure up to 1945 were discussed in considerable detail in the 1945 Report, and it is essential to reproduce here in substance the salient points of these systems designed to facilitate the right to possess and cut Crown timber. This review will, I believe, demonstrate that the present methods of alienation and tenures, including forest management licences, both as to concept and areas covered by these contracts, are the logical projections of earlier methods of disposing of Crown timber.

The ownership of forest land and the right to cut timber on Crown land without land-ownership are to-day held under a variety of tenures which have been developed during the last hundred years. The Royal Commission on Forestry of 1910 noted that " in the early days of the Province timber lands seem to have had little or no value in the public estimation. They could be acquired by purchase and Crown Grant from the Crown in the ordinary way and at the same rates as any other land. Crown Grants carried all the timber without any reservation of royalty, and valuable tracts of timber were acquired for what would now be considered nominal prices."

CROWN-GRANTED LAND OWNERSHIP

The earliest disposal of Crown lands in 1858 carried with it all the natural resources appurtenant thereto, and in case any doubt existed that timber was included in the grant, a proclamation of 1859 by the Governor of the Colony of British Columbia recited that " unless otherwise specially announced at the time of the sale, the conveyance of the land shall include all trees. . . ." Incidentally, the prevailing price for land, timbered or untimbered, was 10 shillings an acre. This was considered too high a valuation, and in 1861 the price was reduced to 4s. 2d. an acre. In 1870 the price remained the same, but the wording was changed to read " $1.00 per acre " in accordance with the Currency Ordinance of 1867.

In 1884 the price for purchase of land, including timber, was raised to $2.50 an acre but remained at $1 an acre for land acquired by pre-emption for farming, limited to 160 acres per individual pre-emptor.

In 1887 a royalty of 25 cents a thousand board-feet was applied to new applications to purchase or pre-empt and applicants were required to make a declaration that the land in question was " not chiefly valuable for timber." The land-owner had to obtain a licence to cut timber on these lands until 1903, when this requirement was revoked.

In 1888 the price of land suitable for cultivation or lumbering was still $2.50 an acre, other land $1 an acre. Individual sales were limited to 640 acres. The price of land acquired by pre-emption remained at $1 an acre. Royalty was raised to 50 cents a thousand board-feet.

The Land Act of 1891 provided that the land should be surveyed before purchase, and that the surveyor should classify lands that were suitable for cultivation or lumbering as *first-class lands,* to be sold at a fixed price of $5 per acre; lands suitable for agricultural development but not lumbering to be classified as *second-class lands,* sold at $2.50 per acre; mountainous and pasture lands, not suitable for agriculture or lumbering, as *third-class lands,* sold at $1 per acre. Land suitable for lumbering was defined as land containing milling-timber to the average extent of 5,000 feet per acre to each 160 acres. The limits to a sale were a maximum of 640 acres and a minimum of 160 acres.

In 1896 " timber land " was first defined to mean land containing 8,000 feet board-measure per acre on the Coast and 5,000 feet board-measure per acre in the Interior. The sale of such land was prohibited. However, as proper administrative measures were not introduced at that time, the Act was loosely enforced and it was still possible for " timber lands " to pass into private ownership.

The surveyors who classified the land were not foresters or lumbermen, and much of the first-class land sold under these Acts was chiefly of value for timber, until the practice was gradually checked by the requirement that applications should be examined by the Forest Branch, after its organization in 1912.

Thus it appears that the policy with regard to the sale of timber land was not on a very stable foundation. For four years, 1887 to 1891, sale of such land was refused, but the decision depended merely on the applicant's declaration. For five years, 1891 to 1896, sale of timber land was authorized at $5 per acre. From 1896 the sale of timber land was prohibited, but the prohibition was not strictly enforced until after 1912.

While the 1896 Act and its delayed enforcement were the first effective steps taken to establish the principle conceived in 1865 and formulated in 1887, that mature timber lands should be held by the Crown and not permanently alienated, logged-off and reforested lands, not coming within the statutory classification of " timber lands," could still be purchased. The sale of such forest land was not prohibited by the Legislature until 1947. " Forest land " is defined by the " Forest Act " as " land that in the opinion of the Minister will find its best economic use under forest crop."

In 1908 the price of $1 for third-class land was repealed, and no provision for the price of such land was made until 1937, when the rate of $1 per acre was re-established. The minimum prices for first and second class were raised in 1911 to $10 and $5 respectively, but were lowered again in 1919 to the former prices of $5 and $2.50 per acre.

While Crown land was, and is, sold in comparatively small parcels on individual application, large tracts were granted in aid of railway construction. In 1871 British Columbia entered Confederation and became part of the Dominion of Canada. By section 11 of the Terms of Union the Domin-

ion undertook to construct a railway to connect the seaboard of this Province with the railway system of Canada and in return this Province agreed to transfer to the Dominion certain public lands in aid of such railway construction. Difficulties arose which are not pertinent to this Inquiry, and in 1883 and 1884 these differences were finally resolved between the two Governments, as a result of which the Province conveyed to the Dominion a belt of land extending for 20 miles on each side of the main line of the Canadian Pacific Railway, totalling 17,000 square miles. Then, because some of this land was valueless for agriculture or other productive enterprises, the Province also conveyed to the Dominion as " lieu lands " a block containing 5,470 square miles in the Peace River District. In a separate transaction the Province conveyed to the Dominion 3,000 square miles of land on Vancouver Island, which the Dominion agreed to convey to a company, the Esquimalt and Nanaimo Railway Company, which was then formed to construct a railway from Esquimalt to Nanaimo. The Dominion granted this land to the Company on the 21st of April, 1887.

Large areas of this grant have since been sold by the Railway Company (now controlled by the Canadian Pacific Railway Company) to timber operators and settlers. It contained some of the finest stands of Douglas fir on the Pacific Coast, which have supported, and still support, some of the largest sawmills and plywood-mills in the Province. As in the case of other grants made during this period, no royalty was reserved on timber in this grant, but the land, after sale by the Company, was and is subject to the same annual taxation as other Crown-granted land in its class. In addition, a special tax of 25 per cent of assessed value is imposed, effective since 1946, on each sale when made by the Company.

The period between 1875 and 1899 was an era of railway speculation in British Columbia. A great number of railways were incorporated in the Kootenay District and in northern British Columbia, and other Crown grants were made to many of them in furtherance of railway construction. These are of minor consequence now. Much of the land reverted to, or was repurchased by, the Crown. A total of 8,203,400 acres were granted to various railways during this period; 4,065,076 acres were revested in the Crown in 1910 and 1912. The E. & N. land grant accounts for 2,057,000 acres of the remainder. Of the 470,000 acres still owned by this Railway Company, an unknown but appreciable percentage does not carry merchantable timber. Most of the remaining area has not been adequately cruised, but the Forest Service reported in 1952 that the Company still had an estimated 22 billion feet board-measure including 8,768 million feet of Douglas fir. Since that time the Company has sold 100,000 acres. During the ten-year period 1946 to 1955 it sold 226,100 acres.

STATUS OF CROWN GRANTS RELATIVE TO ROYALTY AND EXPORT

At present all Crown-granted lands, other than lands still owned by the Esquimalt and Nanaimo Railway Company within the E. & N. Land Grant, which are governed by special Acts, are subject to taxes in accordance with the provisions of the " Taxation Act " and to forest protection tax. Lands within the Grant after sale by the E. & N. Company are also subject to the same timber-land or other taxes as provided by the " Taxation Act."

In my 1945 Report I discussed in detail the exemption from royalty of timber cut from lands within the E. & N. Land Grant and the exemption from taxation of all land within the Grant while still in possession of the Railway Company. I concluded that it would not be unjust or inequitable to impose a special tax on purchasers of E. & N. timber. I recommended accordingly that steps be taken by the Crown to have determined by the Courts the competence of the Provincial Legislature to impose such a tax, and if the decision should be that the tax would be *intra vires* the Province, then it should, in the public interest, be imposed on future sales of Company timber. I recommended that the amount of the tax should approximate prevailing rates of royalty. The Privy Council gave a favourable verdict and, as a result, the " Esquimalt and Nanaimo Belt Land Tax Act " was enacted by the Legislature in 1950, making the lands within the Land Grant, as and when alienated from the Company, liable to taxation at the rate of 25 per cent of the actual assessed value at the date of alienation; the assessment to include the value of the timber.

The position in regard to the incidence of royalty and the right to export unmanufactured timber is complicated.

First, it is necessary to distinguish between " acquiring lands " and " Crown grants to land."

Land may be acquired by pre-emption record and entry, or by an application to purchase. In each case a Crown grant may thereafter be obtained, thus perfecting title.

As we have already seen, prior to April 7th, 1887, there was no reservation of timber royalty nor restriction on export. Clearly, therefore, timber cut from land actually Crown-granted prior to this date was free of royalty and exportable. This was felt to cause a hardship on persons who had acquired land prior to this date but had not perfected their title by obtaining a Crown grant. Consequently, it was enacted that persons who had acquired the lands in question prior to April 7th, 1887, and who afterwards obtained a Crown grant before the effective date of the " Timber Manufacture Act "—March 12th, 1906—should enjoy this same freedom from royalty and restriction on export.

Esquimalt and Nanaimo Railway lands are in this group by reason of the date on which the lands were acquired and Crown grant obtained by

the Dominion. Timber cut from Dominion " patented lands " had the same freedom from royalty and export control.

The passage of the " Timber Manufacture Act," effective March 12th, 1906, provided that timber cut from all Crown grants after that date should be non-exportable. Later the Lieutenant-Governor in Council was given power to approve such export in an unmanufactured state upon such terms and conditions as he sees fit.

Consequently, those persons who had acquired lands prior to April 7th, 1887, but did not obtain their Crown grants until after March 12th, 1906, still had freedom from royalty but cannot export timber cut from such lands in its unmanufactured state unless such export is approved by the Lieutenant-Governor in Council as aforesaid.

On and after April 7th, 1887, and on or before the effective date of the " Timber Manufacture Act "—March 12th, 1906—there was still no restriction on export in respect of timber cut from lands acquired by purchase or pre-emption. Royalty, however, was reserved. Thus timber cut from lands acquired and Crown-granted in this period are subject to royalty at the rates set forth in subsection (1) of section 54 and subsections (1) and (2) of section 57 of the " Forest Act," but can be exported in its unmanufactured state.

If, however, the Crown grant to such lands acquired on and after April 7th, 1887, was not obtained until after March 12th, 1906, but on or before March 1st, 1914, which last date is the effective date of the " Timber Royalty Act," then the timber cut therefrom is subject to the same royalties as are stated in the last paragraph, but is non-exportable in its unmanufactured state, save with the approval of the Lieutenant-Governor in Council.

If the Crown grants to lands acquired after April 7th, 1887, were not obtained until after March 1st, 1914, then the timber cut therefrom is under the same restriction as to export, but royalty became payable in accordance with the terms of the " Timber Royalty Act " of 1914. This royalty is found in sections 55 and 57 of the " Forest Act."

The various classes of Crown grants and the incidence thereof may be summarized for convenience as follows:—

Lands Acquired prior to April 7th, 1887, and Crown-granted on or before March 12th, 1906, E. & N. Lands and Dominion Patented Lands.—Exempt from royalty, and timber cut on such lands may be exported from the Province without permit.

Lands Acquired prior to April 7th, 1887, and Crown-granted after March 12th, 1906.—Exempt from royalty, and unmanufactured timber is non-exportable unless the export from the Province of such timber is approved by the Lieutenant-Governor in Council upon such terms and conditions as he sees fit.

Lands Acquired on and subsequent to April 7th, 1887, and Crown-granted on or before March 12th, 1906.—Royalty is payable in accordance with the provisions of subsection (1) of section 54 and in subsections (1) and (2) of section 57 of the " Forest Act," and timber cut on such lands may be exported from the Province without permit.

Lands Acquired on and subsequent to April 7th, 1887, and Crown-granted subsequent to March 12th, 1906, on or before March 1st, 1914.—Royalty is payable in accordance with the provision of subsection (1) of section 54 and subsections (1) and (2) of section 57 of the " Forest Act," and unmanufactured timber is non-exportable unless the export from the Province of such timber is approved by the Lieutenant-Governor in Council upon such terms and conditions as he sees fit.

Lands Acquired on and subsequent to April 7th, 1887, and Crown-granted subsequent to March 1st, 1914, or Lands Held under Pre-emption Entry and Record.—Royalty is payable in accordance with the provisions of sections 55 and 57 of the " Forest Act," and unmanufactured timber is non-exportable unless the export from the Province of such timber is approved by the Lieutenant-Governor in Council upon such terms and conditions as he sees fit.

Total area of Crown-granted forest lands, including Esquimalt and Nanaimo Grant, amounts to 5,480,049 acres, including 1,571,149 acres of mature and 2,758,134 acres of immature timber.

TEMPORARY TENURES

Co-incident with the disposal of forest land by Crown grant through sale to individual purchasers and grants for railway construction, alienations were made under a variety of conditions and terms by means of leases and licences.

Timber Leases

Seven years after the first sales of Crown lands in 1858, leases were authorized by the Land Ordinance of 1865 as follows: " Sec. 53. Leases of an extent of unoccupied Crown lands may be granted by the Governor to any person, persons or corporation duly authorized in that behalf for the purpose of cutting spars, timber or lumber, and actually engaged in those pursuits subject to such rent, terms and provisions as shall seem expedient to the Governor." While this was a precedent for other forms of leasing and licensing forest land for cutting timber without granting the land itself, it seems that the major objective was to obtain by this device more revenue from the forests than could be obtained by outright sale of the land. It will be recalled that demand was so weak during this period, even at the low price of 10 shillings an acre, that in 1861 the sale price was reduced

to 4s. 2d., later $1, an acre. Moreover, as no limit was set to the period of tenancy, the tenure was almost as secure as outright ownership.

There was a definite policy of discouraging investment in timber land without operating it, indicated by limiting the lease to those who were actually engaged in industry. This principle was maintained in later forms of leases and licences until December 24th, 1907, when the granting of timber land by lease or licence was discontinued.

In 1871 and 1888 enactments were passed having the effect of imposing a ground-rent of 5 to 10 cents per acre on all leases granted between 1871 and 1888. Those granted under the 1888 Land Act amendments were limited to a period of thirty years, subject to ground-rent of 10 cents per acre and a royalty of 50 cents per thousand board-feet. The Lieutenant-Governor in Council was empowered to allow, on the exportation of manufactured timber on which the royalty imposed by this Act had been paid, a drawback or rebate equal to one-half of the royalty.

Coincident with this aid to export of manufactured timber, each lessee was required to erect within the Province a mill with a capacity of not less than 1,000 board-feet per day for each 400 acres under lease. The apparent intention of this provision was to limit the miller's holdings to his actual requirements.

In 1891 a system of selling the leases by tender to the person paying the highest cash bonus was introduced. It was also enacted that all timber cut from lands held under leases be manufactured within the Province.

By amendments in the year 1892, the term of leases granted thereafter was reduced to a maximum of twenty-one years, and provision was made that the required mill be appurtenant to the lease. If the highest tenderer had no such mill, he was required to deposit 10 cents per acre to guarantee its erection within two years. Royalty and rentals remained the same.

In 1895 it was made possible for non-mill-owners to acquire leases upon payment of a substantially increased rental. The existing rentals of 10 and 15 cents per acre for mill-owners and non-mill-owners respectively were increased to 15 and 25 cents per acre. In 1899 amendments were passed to make it clear that mere ownership of a mill was not sufficient by providing that the mill must be actually kept in operation for six months each year, unless excused by the Lieutenant-Governor in Council for some reason such as bad weather or poor markets. Rental was made 15 cents per acre and royalty of 50 cents per thousand board-feet, with a minimum total of fees collected of 50 cents per acre.

In 1901 all existing leases were made renewable for consecutive and successive periods of twenty-one years, subject to royalties and rents in force at the time of renewal, and subject to surrender of existing leases within one year. The terms of the existing lease could be renewed to date of normal expiry, and thereafter for the remainder of the twenty-one years the lease was subject to royalty, rents, and conditions effective when the

normal term of the first lease expired. This renewal privilege was made in the public interest as the total of timber then held under lease and licence was far in excess of a twenty-year supply. This Act also required that all timber cut from timber leases or timber licences must be used or manufactured within the Province. Later the Lieutenant-Governor in Council was authorized to allow export on terms.

Under sections 35 and 36 of the "Forest Act," leases may be renewed for periods of twenty-one years, as above stated, subject to

> "the like terms, conditions, and royalties as under any Act of the Legislature and regulations made thereunder are from time to time in force in respect of timber held or cut under special timber licence in that portion of the Province wherein the lands covered by the lease are situate; and the lease shall also during that period and any renewal period be subject to the payment of ground-rent each year at a rate per acre calculated as the six-hundred-and-fortieth part of the annual renewal fee payable that year in that portion of the Province for a special timber licence covering six hundred and forty acres."

In 1910 the Royal Commission of Inquiry on Timber and Forestry reported* that there were 478,049 acres under lease with the obligation to operate sawmills and 140,976 acres under lease without such obligation, total 619,025 acres in 172 timber leases, with an average annual rental of 12.6 cents per acre, varying in size between 168 and 35,360 acres each.

In 1915 provision was made for conversion of leases into special timber licences. Since that date, when leases were renewed they became subject to full statutory royalty in force at the time of renewal in place of the rate of 50 cents per thousand board-feet, all species and grades, to which they had hitherto been subject. Annual rental was payable at the rate of $140 per square mile on the Coast and $100 per square mile in the Interior, approximately 21.9 cents and 15.6 cents per acre respectively.

In 1945 there were 152 timber leases with a total area of 197,900 acres. The 1945 cut was 209,542 M f.b.m. The average for the preceding ten years was 506,514 M f.b.m.

Pulp Leases

A form of lease, available between 1901† and 1903, was provided for owners of pulp-mills with a capacity of 1 ton of pulp per square mile of lease, with the provision that the mill be operated for at least six months a year unless excused. The pulp leases were for a term of twenty-one years, renewable. As they were intended to cover pulp-timber of a quality or size making it less valuable than saw-timber, the rental and royalties payable were at first less than those ordinary timber leases or timber licences.

* Pp. 23, 24, 108.
† 1901 Statutes, chap. 30, sec. 6.

If saw-timber were cut on these pulp leases, the following provision of the 1901 Act applied:—

> "All timber cut on Crown timber limits under such lease and not used for the manufacture of wood pulp or paper will be subject to the provision of the Land Act governing timber licences and leases in respect to royalties and returns."

This provision was not strictly enforced for several years. Later it was clarified so that, if saw-timber were cut, back rental, computed from 1914, became payable at the timber-licence rate, approximately 21.9 cents per acre, on the basis of 1 acre for each 15 M f.b.m. of timber cut.

Prior to 1944, royalty was at the rate of 25 cents per cord; it was then raised to 55 cents per cord or $1 per thousand board-feet.

The area alienated under pulp lease was 354,399 acres.* Apparently few, if any, reverted to the Crown; instead they have been held as reserves for future supply of the large pulp and paper mills operated by their owners, a basic requirement in management for continuing production where well-established immature age-classes are not available. Thirty-three pulp leases, with a total of 335,611 acres, were still in good standing in 1945. There was a cut of 39,088 M f.b.m. in 1945 from pulp leases.

Timber Berths

Within the Dominion Railway Belt of 20 miles wide on each side of the Canadian Pacific Railway main line through the Province, cutting rights were granted by the Dominion Government in so-called "timber berths," of which 178 are still in good standing with a total of 387,047 acres. The largest individual berth covers 25 square miles (16,000 acres). These are now under Provincial administration as a result of the transfer to the Province of the Railway Belt in 1930. Rental of 10 cents per acre is payable on berths lying south of the latitude of Yale and $10 per square mile on berths north of that line. Royalty of $1.50 per thousand board-feet, all species and grades, is payable on berths lying west of the Cascade Mountains and $1.25 per thousand east of the Cascades.

Timber Licences

This form of temporary alienation of timber is of later development than leases and was not established until 1884. The 1884 "Timber Act" makes it clear that its purpose was to derive revenue from the cutting of timber on Crown lands. The Act did not apply to hemlock.

The licences thus provided were for four years at an annual fee of $10. Unoccupied Crown lands, other than Indian reserves or lands exempted by the Lieutenant-Governor in Council on grounds of public policy, were available for licence. Each licence was limited to 1,000 acres and to one person.

* Report of Royal Commission, 1910, p. 50.

In 1887 a conflict between pre-emptors of land and licensees thereof was solved by insertion of a provision that any timber licence did not include the right to cut timber on pre-empted lands within the area of the licence. Timber dues at the rate of 20 cents per thousand board-feet, plus 15 cents per tree (excluding small trees used for skids), were imposed.

Prior to April 7th, 1887, no royalty was reserved on timber cut from lands sold by the Crown, and the sale price of such lands was only $2.50 per acre. There was no Act in effect setting any specific rate of royalty in respect of timber cut from leased lands; thus the licence system was more profitable to the Crown than any form of temporary or permanent alienation then in effect.

Generally speaking, leases were granted only to mill-owners. No such limitations were ever imposed in respect of timber licences.

In 1888 the licensing system was changed. The licences became "special timber licences" and were given for one year, renewable at the discretion of the Chief Commissioner of Lands, but were not transferable. The area was still limited to 1,000 acres, and each licensee could hold only one licence. The annual fee was increased to $50 and royalties were also increased.

Until 1901 there was no restriction on export in respect of timber cut from lands under licence. The 1901 legislation, in addition to prohibiting the export of timber cut from leases and licences, increased the licence fee to $100 and reduced the area to 640 acres. Each licensee was now allowed to take two licences which were still non-transferable. Conditions of renewal and royalty were not altered.

It will be noted that the principle behind the earlier forms of alienation of Crown timber was encouragement of manufacture within the Province. Up to 1895, leases were granted only to mill-owners. Licences, though not restricted to mill-owners, were for very short terms, for the most part one year, renewable at discretion. After 1895 the door was opened to investors in timber, though only partially. The leases available then to non-manufacturers required increased carrying costs. In 1903 the timber-licence term was lengthened to five years, renewable still "at discretion," and annual renewal fees were further increased, to $140 west of the Cascades and $115 east of the Cascades, the whole five-year fee being payable at date of application. Royalty was fixed at 50 cents per thousand board-feet and 25 cents per cord.

In comparison with this short-term licence, with only discretionary renewal and non-transferable, an annual fee of 22 cents an acre payable for five years in advance, subject to a fixed royalty of 50 cents when cut, the lease, at the same period in these parallel developments, was made renewable for consecutive and successive periods of twenty-one years, with a rental of from 10 to 15 cents per acre and royalty of 50 cents, but both rental and royalty rates subject to change at each renewal date, and the

lessee was required to own a mill. Of the two forms of tenure, the lease was the more secure but necessitated a greater investment on account of the mill requirement.

In 1905 an important change was made in the licensing system, which combined some of the features of both. Licences were made renewable annually for a period of twenty-one years and were transferable. In order to put the existing five-year licences on the same basis, they were made renewable for sixteen years after the expiry of their original five-year term. No limit was placed on the number of licences that an individual might acquire. The licences were subject to such royalty as might be in force at the time of cutting.

Official thinking at the time this policy was introduced is expressed in the words of the then Minister of Lands, Hon. W. R. Ross, on January 23rd, 1912, in the Legislature:—

> " In 1905 the administration realized that the leasing system was an extremely bad one, the timber being sold for twenty-one years ahead at the low prevailing rates. It was obvious that the public timber was being sold at a sacrifice price. It was decided to substitute a constructive forest policy which would revolutionize conditions in the province. This marked the beginning of the modern epoch in forest policy.
>
> " For years the province had been in a bad way. The public revenue was insufficient. Development was starved for want of money. The credit of the province was low and immigration had been reduced to a trickle. These conditions could not do more than retard the progress of the lumbering industry, but the cut was small. So also was the forest revenue, which was only $455,000 in 1904. There existed then the extraordinary situation that in a country of magnificent forest resources the revenue derived from them was only about one-seventh of the scant provincial revenue of $3,000,000. The forest wealth of the province was locked up, it was no help to the progress of the young community. The province was starving for capital and had no means of drawing upon its natural wealth. And yet the rest of the continent was even then beginning to realize that the timber supply was insufficient; in fact a shortage, a timber famine, was predicted in thirty years by those in a position to know.
>
> " Stumpage in consequence was being sought almost feverishly by investors. Here in British Columbia was the timber; here the crying need for public revenue to open up the province, for capital to invigorate our anæmic industries and there, throughout the older regions of the continent, was the capital we needed, capital which was seeking to invest itself in the fast diminishing western reserve of timber that in consequence of the exhaustion of the eastern forests was destined to control the lumber markets of America before another thirty years should pass.

" It was a moment of danger for the province. Modern history is full of sad examples of young countries determined to get capital at any price, at any ruinous sacrifice of their future.

" The administration of 1905 nailed its colours to the mast; its motto was ' public ownership of forests.' But it was essential to encourage one of the mainstays of the province, the lumbering industry; also it was essential to give a supply of timber for the future operations of existing mills; to encourage by the same means the building of new mills.

" What, then, did the Government do? The Government threw open all Crown timber lands, but it handed over merely the cutting rights. In return licensees were required to pay only annual interest on the value of the timber reserved for them, which was to be paid for when it should be cut. No tenure could be simpler and none more advantageous, since it made possible the holding of timber until a market should be favourable for its cutting. In this way 15,000 square miles were taken up, and no less than thirteen million dollars were yielded to the treasury in seven years. The Government's policy was to extract a steady even flow of annual revenue from the vast area of timber, the poor along with the good, which might, perchance, not be exploited for fifty years. Profit was extracted from the forest by holding the timber and also by cutting it. The forest policy of 1905 caused the world to realize something of this country's resources, it let loose the flood of prosperity which the province has enjoyed ever since.

" By the end of 1907 an annual revenue of two and a half million dollars had been secured. This being sufficient for the opening for settlement of central British Columbia and other new regions, the Government ceased to issue timber licences and placed the remaining timber lands under reserve until further sales should become necessary. The issuance of cutting rights over 9,500,000 acres placed the Government in a position of very heavy responsibility, both as trustee of the people's timber lands and in respect of its duty of fostering the lumbering industry and recognizing the just rights of licensees. In consequence, in 1909, it appointed a Royal Commission of investigation (Hon. F. J. Fulton, K.C., Chairman). This Commission collected an immense mass of evidence, visiting every important centre of the province. After a most painstaking inquiry for a year and a half the Commission reported in 1910. One of the first points referred to it was the question of time limit for cutting timber under the licences and the Commission had no hesitation in advising removal of the limit as the logical sequence of the forest policy, since it was not in the interest of true conservation to force cutting at any time by arbitrary regulations.

" British Columbia is in a strong position with regard to the future and there is the great and glorious fact that our forests are in public

ownership and that every citizen is thus a timber-owner. Two things are plain; one, that the value of standing timber in British Columbia is destined to rise to heights that general opinion would consider incredible today; the other, that under careful management heavy taxation need never fall upon the population of this province. The profits from a permanent Crown timber business should make British Columbia that phenomenon of statecraft and good fortune, a country of semi-independent means."

At the time when the Forest Service was established, forty-five years ago, the Government and Legislature made it plain that their policy was to retain control of timber lands and to bring the various classes of tenure on to an equitable basis. The Minister expressed this policy thus: "Uniformity of tenure is most desirable, so that no commercial handicaps shall be created between different classes of holders of Crown timber. For this reason all future sales will be of licences." And the Premier, Sir Richard McBride, at the same session: "Under the special licence plan Parliament retains the power to increase both rental and royalty charges, so that as the timber values grow, so does the interest in the timber retained by the Province increase. The people are guaranteed a fair share in the rise in values, the unearned increment."

Forty-five years later, uniformity of tenure has not been achieved; in fact, there are probably more varieties now than then. The new timber licences were a prototype of our forest management licences, and similar claims were made for them as are made for management licences now. The stumpage—i.e., royalty—was not to be appraised and paid until the time of logging, the licences were to be subject to regulations in force from time to time; they fell short of the present management licences in that sustained-yield management was not required. They have, through fifty years, as was planned, provided annual revenue from rentals when held as an investment, and from royalty when logged.

At the beginning of 1909, 15,109 licences were still in existence. During the next four years 907 lapsed, leaving 14,202 at the time the Forest Branch was established.* The 1914 cut from them was 211,191 M f.b.m. The annual cut from this tenure increased as their numbers decreased; in 1925 it was 530,864 M f.b.m. and in 1945 637,297 M f.b.m., by which time the numbers had dwindled to 2,850.

By 1924 it became obvious that the Royalty Act of 1914, which set royalty rates for forty years ahead, was no longer a practical instrument for this purpose. As a result, the Royalty Act was repealed and the rates applicable to each tenure, species, and grade were incorporated into the "Forest Act" and have been subject to amendment from time to time as conditions indicate without any attempt to follow a set formula or basis for the timing or amount of such amendments.

* 1912 Annual Report Forest Branch, p. 29; 1937 Annual Report Forest Branch, p. 35.

During the fifty years the rates of royalty on timber cut on timber licences have been increased from time to time. I have quoted the present rates on pulpwood and the definition of pulpwood for these reduced rates. Other products, from the largest old-growth logs down to pea-sticks, are subject to royalty when cut on timber licences and leases and also on certain classes of Crown-granted land to which I have referred. Present royalty rates have been in effect since May 1st, 1948, and will be referred to in more detail later in the section relating to Forest Finance.

Pulp Licences

This term was given to special timber licences which were converted between 1919 and 1921, under provisions of the "Forest Act," so that their owners could get somewhat similar advantages to those given to holders of pulp leases. These advantages included half the special timber licence rate of annual renewal fee and royalty of 40 cents per cord, up to 1945. Royalty on pulp leases during the same period was 25 cents per cord. If saw-timber were removed, the same upward adjustment of royalty and rental applied as for pulp leases. The licences were held as part of the timber reserves of large pulp and paper companies. Timber from them is not exportable. In 1944 there were 252 pulp licences, covering 155,730 acres. Production in 1945 was 78,854 M f.b.m.

Hand-loggers' Licences

This is a form of personal licence to cut Crown timber which is subject to disposition by the Crown. It is restricted to persons on the Provincial voters list or Indians and is valid for one year only. The area to be cut over must be inspected and approved by the Forest Service. No machinery operated by other than muscular power may be used. The fee for each licence is $25. Timber cut is subject to standard royalty.

These licences were first issued in 1886. The former annual fee of $10 was raised to the present $25 in 1908. Provision for these licences is still in the "Forest Act" (section 22); none were issued in 1954 and 1955; one only in 1956, in the Prince Rupert District. This form of tenure appears to have fallen into desuetude, although a few hand-logger licence logs still come to market, presumably delayed in transit. Numbers of licensees and volumes produced are shown below for selected years:—

TABLE 7

Year	No. of Licences	Volume Scaled, F.B.M.
1915	222	(1)
1920	261	(1)
1925	111	10,542,541
1930	63	5,413,150
1935	43	5,324,156
1940	15	1,520,297
1945	6	401,085
1950	4	352,623
1953	2	126,114
1954	.....	266,674
1955	.....	139,733
1956	1	.....

[1] Not reported.

The largest number of hand-loggers' licences reported in one year was 388 in 1917, and the greatest annual production reported was 31,745,500 f.b.m. in 1916, 2½ per cent of the total Provincial cut. It is, however, probable that much greater volumes were cut by hand-loggers during the earlier years of the logging industry when there was little, if any, administration to control the areas on which they cut, and logging methods.

These facts are included here in order to record, perhaps for the last time, the existence of a colourful segment of early forest industry in British Columbia, and one of some social significance, especially on the Lower Coast, during the years of its activity.

TIMBER SALES

After the embargo on the granting of timber licences in 1907, there was no legal provision for disposal of Crown timber, with the exception of hand-loggers' licences, until 1912. In that year the " Forest Act," which also created the Forest Branch, provided for sale by public competition of licences to cut Crown timber after cruising, surveying, appraising, and advertising by the Forest Branch. In order to distinguish them from the " special timber licence " and all former licences, these new licences were, and still are, commonly referred to as " timber sales."

In 1912, although millions of acres of timber had already been alienated under various forms of tenure, the annual cut was not more than a fraction of the volume which could be sustained without diminution of the growing capacity. Many licences and leases were being held in reserve for future supply of conversion plants or as investments. There were also accessible stands which had been passed over in the 1905 to 1907 wide-open staking of licences. Many of these stands were fragments which could most efficiently be logged together with adjacent private timber. In the Interior, where the acquisition of timber licences had not been so widespread as on the Coast, there was a necessity for making timber available for operators who had no other means of obtaining it. The timber sale met this demand.

In most cases the area to be sold was cruised and advertised by the Forest Service after application, although sometimes an area might be cruised in advance for sale when opportune. The price included standard royalty, stumpage not less than the appraised upset rates, cost of cruising, surveying and advertising, and annual rental at the same rates per acre as the special timber licences; i.e., 21.88 cents on the Coast and 15.62 cents in the Interior. In addition, forest-protection tax was payable and each sale was subject to the special conditions written into its licence contract.

In the case of very small sales the charges for cruising, advertising, forest-protection tax, and rental might be remitted and the sale could be made without advertising or public competition. Larger sales were made by sealed tender or occasionally at public auction to the highest accepted bidder. Sales were for short terms, usually one to three years.

The numbers and volumes sold increased through the years with expanding markets, the cutting of other tenures and the disclosure by new forest surveys of much greater accessible volumes than were previously estimated, because of the development of roads, new and more efficient logging methods, and higher values for forest products. The total annual cut from timber sales of all classes gradually became an important part of the Provincial production; in 1945 it was 778 million board-feet, 25 per cent of the Provincial total from all tenures.

Pulpwood Timber Sales

There was a special class of timber sale provided for in the 1912 Act, with some of the characteristics of the pulpwood leases which were granted between the date of the 1901 "Land Act" and the 1907 Order in Council. These pulpwood timber sales were subject to the general conditions relative to all timber sales but, in addition, the applicant had to prove that he had spent $350,000 in construction of a pulp-mill or post a bond of $50,000 to guarantee the erection of a mill within three years.

The contract was renewable from year to year during the period of the contract and was made appurtenant to the pulp-mill. The pulp licences held by the pulp-mill operator must not contain more than thirty years' supply of pulpwood at any one time.

In the 1912 Act, rentals were set at one-half those payable on ordinary timber sales, with a provision for full rental in the event of the pulp-mill not operating six months in one year, and a provision for full rentals and full royalties in respect of saw-timber cut in pulp area but not manufactured into wood-pulp or paper.

In 1944 there were nineteen pulp-timber sales with an average area of 4,176 acres.

These systems of alienation left us in 1944 in relation to the total area of productive forest land, then estimated to be 75 million acres, in this position:—

TABLE 8

Tenures	Number of Contracts	Acreage	Tenure Percentage	Percentage of Total Productive Acreage
Crown grants[1]	.....	5,175,500	57.1	6.90
Timber sales	3,721	978,000	10.8	1.31
Timber berths	205	424,671	4.7	0.57
Timber licences	2,850	1,795,817	19.8	2.39
Pulp licences	252	155,778	1.7	0.21
Timber leases	152	197,939	2.2	0.26
Pulp leases	33	335,611	3.7	0.44
Totals	7,213	9,063,316	100.0	12.08

[1] Including Indian reserves, E. & N. land, small wood-lots.

It thus appears that by Crown grants and temporary forms of alienation—short-term timber sale, licences, and such like—over 9 million acres of the total productive forest land of the Province, or about 12 per cent thereof, were, in 1944, virtually in the hands of private owners.

Of this 75 million acres of productive forest land, 22 million acres were, in 1944, classified as areas of mature timber, and of this 22 million acres, 10 per cent had been alienated in Crown grants and 15 per cent in temporary tenures.

In this Province the Coast Range is considered as the boundary-line separating the distinct and separate areas generally described as the Coast and Interior. The map indicates that line of demarcation and also the forest districts of the Province.

When we consider the pattern of acreage ownership as it existed in 1944 in these two divisions—Coast and Interior—the following figures emerge in relation to the Coastal mature forests covering an area of 7.9 million acres: Remaining in the Crown, 53 per cent or about 4.2 million acres; alienated by Crown grant or temporary tenures, 47 per cent or about 3.7 million acres.

In the Interior, mature forested areas, in 1944, were estimated at about 14.8 million acres. Of this acreage, 13 per cent had been alienated—6 per cent in form of temporary alienations and 7 per cent in Crown grants or other title granting ownership in fee.

Of the 66.4 million acres of productive forest land remaining in the Crown, 2.3 million acres on the Coast and 7.7 million acres in the Interior were included in the Provincial forest reserves, which had been surveyed since 1925 as the first step toward a sustained-yield objective.

In using the term " Crown grant " in this context of tenures, I include therein the Esquimalt and Nanaimo Railway grant, Indian reserves, munici-

pally owned watersheds, small wood-lots, and other small holdings in fee-simple.

When we turn to consider volume instead of acreage, the 1944 figures indicated that 61 per cent of the volume of merchantable timber on the Coast had been alienated in various forms of tenure, leaving 39 per cent thereof remaining in the Crown.

In the Interior, 14 per cent of the volume of merchantable timber had been alienated, leaving 86 per cent remaining in Crown ownership. These estimates were based on the 1937 inventory of 155 billion f.b.m. on the Coast and 100 billion f.b.m. in the Interior.

An analysis of the ownership of the various temporary tenures or cutting rights in 1944 demonstrated that fifty-eight individuals or companies, or 2 per cent of the total number of those licensed to cut, controlled 51.7 per cent of the total areas included in the various tenures. On the Coast, twenty-four out of 677 logging operators produced over 60 per cent of the volume of the cut. An examination of the log production from the various tenures, averaged over the ten-year period 1934–43, indicated the following:—

	Per Cent
Crown grants	40.3
Timber licences	26.8
Timber leases	16.4
Timber sales	14.5
Pre-emption and miscellaneous	1.4
Dominion lands	0.5
Hand-loggers	0.1
	100.0

Many, if not all, of these Crown grants, licences, and leases were of long standing. For example, of the 40.3 per cent average of the total cut from Crown-granted lands, 33.2 per cent of the total cut came from Crown grants issued up to 1887.

It is, I think, an established fact that the men who secured the earlier Crown grants and cutting tenures, which have endured and have been renewed from time to time down the years, exercised a sound and discerning judgment in their selection of the areas for which they applied. The rich areas of virgin and accessible timber—the lush valleys, the great sweeping acres of green timbered watersheds—fired the imagination of these pioneers, and led them to secure titles and cutting rights upon which the timber empires of yesterday and to-day were built. It has been said, and I believe it to be so, that by 1907, generally speaking, the best timbered areas had been alienated by the Crown in one form of tenure or another and that about 30 per cent of the remaining Crown timber in the Vancouver Forest District was growing at altitudes of 2,000 feet and higher. It was certainly apparent by 1944 that not only had the best timber been alienated, but also, spurred by the necessity of securing reserves of timber to maintain the continuing and expanding productive capacity of conversion plants and to remain competitive on world markets, the men

charged with that responsibility had the foresight and financial ability to accumulate in their hands these alienated lands, especially on the Coast, and more particularly in the Vancouver Forest District. These lands are now held in great part by their corporate successors as trustees for their thousands of shareholders and investors.

It is true, of course, that large acreages of unalienated forest land remained in the Crown, but, in general, the remaining areas of mature forests on the Coast lay on hillsides above the rich valleys, and were of poorer-quality timber. Some remaining areas carried stands of fine timber, but in instances difficult of access because of the strategic locations of alienated timber. Other areas were remote and without access by waterways or existing roads.

The system of temporary tenures, whereby timber lands reverted to the Crown when logged, did not offer any inducement to the operators to do other than cut off their mature timber (unless they could afford to hold it) and then move on to other areas, without regard to the productivity of the land and its capacity to produce a continuous crop of timber. Operators, in order to maintain production, simply " cut out and got out." They were transients, consuming the forest as they went along, without any permanent interest in the land they cut over and continually migrating to other sources of supply. The practice of private forestry was, unfortunately, neither contemplated nor encouraged by these forms of temporary tenures. Such a situation could only lead to ultimate disaster.

Responsible officers of the Forest Service were aware of the danger—so were the managers of large corporations with millions of dollars invested in conversion plants. It was in consequence of this apprehension that I was appointed in 1943 as a Royal Commissioner to investigate and report upon the forests and forest industry of the Province.

After lengthy hearings I reached certain conclusions, and in December of 1945, in consequence of these conclusions, I made a series of recommendations. As the 1945 Report is out of print, I reproduce, in part, some of the relevant observations in that Report:—

> "At present our forest resources might be visualized as a slowly descending spiral. That picture must be changed to an ascending spiral. Differently phrased, we must change over from the present system of unmanaged and unregulated liquidation of our forested areas to a planned and regulated policy of forest management, leading eventually to a programme ensuring a sustained yield from all our productive land area.
>
> " The expression ' sustained yield ' now requires explanation. Although professional foresters, when treating this subject, appear to have much the same mental concept, their definitions do not always agree. The disagreements, however, appear to me to be more of scope than of substance, and arise, for instance, from the endeavour to include within

the definition reference to silviculture requirements and multiple forest uses.

" Silviculture can, and will, increase the yield and the optimum yield would result from an intensive use of the productive capacity of the area. A sustained-yield policy has, as one objective, the maintenance of forest cover and growth, thus ensuring a perpetual supply of raw material for forest industries, with consequent stability of industrial communities and assurance of permanent pay-rolls.

"A no less important objective is the perpetuation of the forest-cover to assure the continuance of the many direct and indirect benefits which flow therefrom in addition to the mere growing of wood. In my view, however, none of these factors is a necessary or essential ingredient of the definition to be applied to the term ' sustained yield.'

" I would define ' sustained yield ' to mean a perpetual yield of wood of commercially usable quality from regional areas in yearly or periodic quantities of equal or increasing volume. That is my understanding of the concept expressed in its basic form.

" That, then, must be our objective: To so manage our forests that all our forest land is sustaining a perpetual yield of timber to the fullest extent of its productive capacity. When that is accomplished all benefits, direct and indirect, of a sustained-yield management policy will be realized; providing, of course, that the multiple purpose of our forests is recognized as an aim as important as balancing cut and increment.

" In my opening remarks I made mention of the main contributions our forest makes to our economic and social welfare. May I repeat here that a sustained-yield policy, perpetuating our forest stands, will not only provide a continuity of wood-supply essential to maintain our forest industries, primary and secondary, with consequent regional stability of employment, but will also ensure a continued forest-cover adequate to perform the invaluable functions of watershed protection, stream-flow and run-off control, the prevention of soil erosion, and of providing recreational and scenic areas, and a home for our wild bird and animal life.

" Our forest industries have been living on an expenditure of forest capital that has taken hundreds of years to accumulate at no cost to industry. The time has now come when we have to plan to live on forest interest and maintain our capital unimpaired. How are we to accomplish this purpose?

" I propose to deal with the subject under the various headings below, but the order in which they appear is not to be taken as an indication of the relative importance of each heading, but rather as indicative of the relative urgency needed in the implementation of each recommendation.

"(1) Fire-protection must be greatly increased.
"(2) The rate of planting denuded areas of productive forest land —especially on the Coast—must be greatly increased.
"(3) Logging methods must be regulated to prevent destructive exploitation and to ensure full regeneration of cut-over lands.
"(4) New systems of tenure and taxation need be formulated to encourage private forestry and to remove causes compelling liquidation.
"(5) Management plans for individual regional working circles should be formulated and implemented by regulation.
"(6) There must be a more intensified research in and practise of silvicultural methods.
"(7) Facilities and funds must be provided for extensive forestry research.

" It must not be thought that, as and when the objectives outlined above are reached, the forests of this Province will then be on a sustained-yield basis. That desired end cannot be reached until our mature timber on the Coast is cut and the area now covered by that old growth —which might just as well be in piles in a lumber-yard as in the forest, so far as increment is concerned—is growing a new forest. But unless we do plant our denuded areas and secure regeneration of our cut-over lands and protect our new growth from fire, we can never hope to save our forest wealth from inevitable extinction, much less succeed in attaining a sustained-yield forest production. There is much to be done and the start must be made at once before it is too late. The whole is the sum of its parts, and if we succeed in setting up working circles, region by region, the day will come, and it will not be long, when the people of this Province can, with pride of achievement, hand down to their sons, and their son's sons for all time to come, the wealth and benefits of our forest land in all its growing beauty.

" Under our present system of temporary alienations of timber lands that revert to the Crown when logged, operators who cut these lands to secure raw material for their own conversion units are offered no encouragement to treat these lands as permanent tree-farms producing continuous crops. They are, therefore, of necessity forced to move from one area to another to maintain production—' cutting out and getting out.' Responsible operators with large investments in sawmills and pulp and paper plants realize that this process cannot keep on indefinitely. They feel that the time has come when, in order to be assured of a continuous supply of raw material for their plants, a new industry must be created—the use of the productive capacity of the land for the growing of forest crops.

" The first step toward this objective would be a form of tenure permitting the operator to retain possession in perpetuity of the land now

held under temporary forms of alienation, upon condition that he maintain these lands continuously productive and regulate the cut therefrom on a sustained-yield basis.

" I think I can safely say, upon the evidence before me, no operator has a sufficient supply of timber in reserve to permit him to maintain an economic production of lumber from those areas under his control if he were compelled to cut on a sustained-yield basis either now or in the second crop rotation.

" It seems to me the only practical solution to this problem lies in the allocation of Crown timber."

The basic problem that we had to resolve in 1945 was how to bring about, in an orderly fashion, this concept of sustained yield and forest management, which was to replace the system of unmanaged liquidation of our forest resource.

As demonstrated by the historical review of past alienation, millions of acres of highly productive land on the Coast, in large part in strategic locations, were in private hands in various forms of tenure, permanent, as in Crown grants, or in temporary forms of alienation.

Unless and until these lands were brought under a sustained-yield programme, then the objectives outlined in the 1945 Report could not be achieved. It was this inherited pattern of ownership that loomed large in the path. In 1945 I said:—

". . . it seems to me an inescapable conclusion that the great part of the alienated timber resources of this Province are controlled by a comparatively few men. The success of any future forest policy designed to place our forests under a system of planned management must depend, to a degree, upon the extent to which these holders co-operate with the Crown in a mutual endeavour to reach that objective. . . ."

There were four courses open: One, to admit our inability to meet the challenge and to continue on a liquidation basis to probable economic disaster within the foreseeable future. Two, to cancel or refuse to renew all temporary tenures, which would mean a repudiation by the Government of existing contracts and renewal rights thereunder. Three, to devise a form of contract whereby the holder of private lands held by him in fee or on temporary tenures would agree to manage these lands on a sustained-yield basis and surrender his right to liquidate as he pleased, provided the Crown allocated to him contiguous and suitable areas of unalienated Crown timber so that the total combined areas, when on sustained yield, would provide a substantial proportion of the raw material required by him to maintain his production—title to the whole area to remain in the Crown, except acreage previously held in fee, and the management of the total area to be subject to Crown control. Or, four, to depart from a long continued policy and convert by outright sale the temporary tenures when cut over into

some form of permanent title, to which might be added Crown areas sold or alienated on some permanent basis to make up sustained-yield units.

It would have been unwise, in my opinion, to suggest the adoption of proposition one, two, or four. Public opinion would not, in 1945, in my belief, support a policy of continued liquidation, nor repudiation of existing contracts. Neither would a recommendation that Crown timber lands be permanently alienated have met with general public approval at that time.

That left the partnership concept as the only rational selection for a future forest policy wherein the Crown, in order to ensure the desired objectives, would retain full control and regulation of the areas included in the partnership contract. In consequence I felt impelled to make this recommendation, which in due course led to the formulation of the present forest management licence policy.

In one sense the heavy hand of the past pressed down upon the Forest Service in its effort to carry out the basic intent of the plan: the large and long-existing private ownership pattern determined the location of the contributory forest management areas. A forest management licence is primarily a device designed to enable and encourage the practice of sustained-yield forestry by private interests on those privately held tenures and, in addition, shifts from the Forest Service to industry the costly burden of forest management of the previously unalienated Crown forest land included in the licence area, the overriding control still, however, remaining in the Crown, as owner of the land. Sustained yield in this sense means that our forests will be a continuous and increasingly valuable asset, with long-term benefits to the economy of the Province. An assured continuity of supply of raw material results in the construction, maintenance, and uninterrupted operation of costly integrated conversion plants, ensuring the highest utilization return for the logs cut with attendant competitive advantages in world markets. This, in turn, should result in a maximum continuity of employment in all phases of the industry—logging, transportation, and conversion into the end product.

Continuity of employment has, as its sequel, stable, settled, and prosperous communities. Then, too, indirect benefits flowing from a sustained-yield policy are of great consequence and are felt in almost every branch of our Provincial economy.

The forest management licence system was devised as a vehicle of policy to effectuate this concept of sustained yield with all these and other consequential benefits.

The forest management licence, while securing to the licensee an assurance of the continuity of supply of a percentage of his wood requirements measured in terms of productive capacity, compels him, in consideration thereof, to assume burdens not imposed upon him by any other form of tenure.

Contrary to the views expressed by those opposing the system of forest management licences as a " give away " of our resources, it is not a one-way street. I shall, however, return to this aspect and others later when discussing in detail forest management licences and the objections thereto voiced during the Inquiry.

Having set up a system to provide for a sustained-yield programme on privately held lands and included unalienated Crown lands, there remained the problem of extending this principle to the still remaining unalienated Crown lands.

To this end and upon consideration of the evidence adduced, I recommended, in the 1945 Report, the creation of public working circles. These public working circles had their historic origin and legislative sanction in the Provincial forest reserves established under provisions of the " Forest Act " of 1912, of which preliminary working-plan surveys had been made since 1925. This recommendation could thus be implemented through administrative action by the Forest Service without further specific statutory provisions relating thereto.

An important segment of the forest industry is composed of sawmills and other small conversion units, which have no reserve of timber-supplies of their own. There is, in addition, an independent group of loggers who do not wish to manage timbered areas, and who have no conversion units of their own. The public working circles were areas to be managed on a sustained-yield basis by the Forest Service, wherein the independent logger could buy timber and produce logs for this class of sawmill. On the Coast an open log market was the link joining these two groups together. Of recent years, the open log market and position of the independent market logger have, to a degree, undergone some alterations or modifications—subjects to be dealt with at a later stage of this Report. It is also apparent that holders of forest management licences, and especially those who have increased their mill capacity, are now looking to the public working circles to supply that portion of their requirements not provided for by the allowable cut in the licensed areas.

However that may be the underlying reason for setting up public working circles was the necessity of bringing unalienated Crown lands within the sustained-yield programme of management under the Forest Service and at the public expense.

FOREST MANAGEMENT LICENCES

In my 1945 Report I stated* that, upon the evidence before me, no operator had a sufficient supply of timber in reserve to permit him to maintain an economic production from those areas under his control if he were compelled to cut on a sustained-yield basis. As it is undoubtedly in the public interest that industries should be stabilized and forests managed on a sustained-yield basis, I recommended the allocation or reserve of Crown timber for units of industry in order that they might, from the combination of Crown and private timber, be able to maintain economic production from their conversion plants during the period necessary for reforestation on their logged lands to mature. I anticipated further that the amount of Crown timber allocated to each operator should be such that it would enable him to manage the combined areas in a manner that would, in the next rotation, assure him enough timber to maintain his plant on a sustained-yield basis in perpetuity.

I also recommended that, in order to encourage private forestry, the owners of revertible tenures should be permitted to retain these lands after logging, when classified as best suited for the purpose of tree-farming, at a nominal annual licence fee of 1 cent per acre, plus the forest-protection tax, and subject to a yield tax at 12½ per cent of prevailing stumpage values, payable when the final crop or any interim cutting thereof is harvested. Until the existing mature timber on temporary tenures had been logged, I recommended that existing conditions of tenure and prevailing carrying charges payable to the Crown should remain unchanged, except as might be necessary to ensure reforestation.†

The Government accepted these recommendations in principle, and implemented them in part by amendments to the "Forest Act" in 1947 providing for the establishment of forest management licences. The enabling clause, subsection (2) of section 33 of the Act, reads as follows:—

> "The Minister may enter into an agreement, to be described as a forest management licence, with any person for the management of Crown lands specified in the agreement and reserved to the sole use of the licensee for the purpose of growing continuously and perpetually successive crops of forest products to be harvested in approximately equal annual or periodic cuts adjusted to the sustained-yield capacity of the lands in the area covered by the licence, or may enter into an agreement, to be known as a forest management licence, with the owner of other tenures to combine such other tenures and Crown forest lands into a single unit reserved by mutual consent and contract to the sole use of the licensee for the like purpose."

* 1945 Report, p. 144.
† 1945 Report, pp. 145–146.

The evidence in 1944 disclosed that three-quarters of the merchantable timber in private hands was held under various forms of temporary tenure* which reverted to Crown ownership when logged. The operators who cut these lands to secure raw material for their own conversion units were offered no encouragement to treat them as permanent tree-farms producing continuous crops.†

This subject was thoroughly canvassed before the 1944–45 Commission, and various suggestions were discussed with regard to changes in form and period of tenure. The Canadian Institute of Forestry, then known as the Canadian Society of Forest Engineers, recommended two forms of private tenure of forest land, subject to special conditions:—

"(1) For municipal or community forests and small 'farmer' forests; a Crown grant, containing provisions that the land be maintained in continuous production of wood under professional forest management, prohibiting devastation of mature forest and cutting of immature forest except in such a way as will improve its growth:

"(2) For companies owning wood processing mills; a perpetual lease stipulating professional forestry management on a sustained yield basis and subject to cancellation for infraction of provisions.

"Suitable vacant Crown lands, which have been classified as forest land, should be made available by sale or lease for the practice of forestry by private enterprise, subject to the above restrictions, at a price so assessed as to place the purchaser, as near as possible, in an equally favourable position with the present owners of private forest land in the neighbourhood. Such lands should be subject to the nominal annual tax or licence fee and yield tax for the zone in which they are situated."‡

The Society, under cross-examination, strongly maintained its position in this regard, including therein the principle of "perpetuity" in interest.§

A recommendation for permanent tenure was also made in 1945 by the pulp and paper industry in its unanimous brief presented to the Commission, as follows:—

"There should be no attempt to abrogate existing contracts; but provision should be made in the statutes to permit, by mutual agreement in connection with working circles, the amendment of existing tenure conditions of forest land and provide permanent tenure at nominal fees, in order to stimulate private forest management and reforestation."‖

In 1945 all sections of the industry on the Coast—logging, sawmills, and pulp and paper mills—were able to combine in a brief presented to

* 1945 Report, p. 79.
† 1945 Report, p. 143.
‡ Transcript, 1944, p. 2385.
§ Transcript, 1944, p. 2449.
‖ Transcript, 1945, p. 4225.

that Royal Commission. They recommended that both Crown and private working circles be established and supported the principle that Crown forest reserves should be used for the purpose of balancing sustained-yield requirements in the administration of private forests.* While no definite proposals were made by them in connection with allocation of Crown timber as a part of private working circles, subsequent events proved that part at least of the industry was bending an attentive ear to the discussions on this subject before the Commission. Several applications were received by the Government before the forest management licence legislation was introduced, and even before the Royal Commission had reported, for reserve of Crown timber to be acquired if some new form of tenure should be made available as a result of my Report.

Such was the weight of experienced and professional evidence at the hearings of that Commission, and on it I based the recommendations to which I have referred. In contradistinction, before the present Inquiry, it was evident that the implementation by the Legislature of these recommendations in the form of forest management licences has created divisions of opinion between sections of the forest industry, between units of the same section, and between the forest industry and other interests using the forest lands.

It is necessary, therefore, to examine the nature of these licences; the consequences of their introduction into the fabric of forest ownership and operation; the degree to which they have, so far, succeeded or failed in the objective of sustained-yield management by private enterprise, which was the justification for their establishment; whether the basis for the criticisms that have been made lies in policy or administration; whether and to what extent the objections are justified and can be overcome by amendments, statutory or otherwise; or whether they are expressions of objection to conditions in the forest industries which have changed, and must change, in accord with local or world-wide economic and social influences.

My second recommendation, to which I have referred, has not been implemented. No provision has been made for the retention of revertible tenures after logging, except in so far as their owners are successful in obtaining a forest management licence and including their temporary tenures therein. No applications have been made for management licence status to be applied to such tenures alone, without addition of Crown lands. This is understandable. Sustained-yield management cannot be applied to logged-off lands alone, and the owners could not reasonably be expected to restrict their cutting to sustained-yield proportions, thus extending by many years the period of high carrying costs while their competitors, having obtained Crown timber in management licences, are able to continue their former rate of production.

* Transcript, 1945, pp. 10364, 10382.

The procedure whereby a forest management licence may be acquired and held is meticulously defined in the " Forest Act."*

" Section 33. (3) An application for a management licence shall be in writing, signed by the applicant, in a form prescribed by the Minister, and shall contain a description of the lands desired, together with such other details as the Minister may require.

"(4) (*a*) If the lands applied for appear to be available for management licence purposes, the Minister shall instruct the applicant to publish in one issue of the Gazette, and in specified newspapers, in a form to be approved by the Minister, a notice of the application, with a description of the area applied for.

"(*b*) Not less than sixty days after publication of notice of application the Minister may place the lands applied for under reserve to enable preparation by the applicant of a management and working plan, and direct the applicant to prepare and submit a management and working plan for the proposed licence area designed to maintain perpetual yield and operation.

"(5) The management and working plan prepared under the provisions of subsection (4) shall be submitted for the approval of the Chief Forester, and no management licence shall be issued until the management and working plan has been approved.

"(6) Every application for a management licence under this section shall include an offer on behalf of the applicant to pay to the Crown:—

"(*a*) The cost incurred by the Forest Service in cruising, surveying, and investigating the lands applied for, and their productive capacity and the management and working plan:

"(*b*) A cash deposit or security approved by the Minister in such sum as the Minister shall determine, to be held by the Forest Service for such time and under such conditions as the Minister may determine:

"(*c*) A deposit in such sum per unit of wood harvested from the management licence lands to such total sum, and to be held for such time and under such conditions as the Minister may determine:

"(*d*) A cash deposit or security approved by the Minister in such sum as the Minister requires, but not to exceed five hundred dollars per million feet, board measure, of the estimated annual-yield capacity of the proposed licence area, which deposit shall be repayable to the applicant when, in the opinion of the Minister, the working-plan is being implemented and an appurtenant manufacturing plant is in operation.

* *See* Appendix for latest form of forest management licence and Forest Service instructions for preparing working plans.

Deposits under this subsection shall be for the purpose of ensuring compliance on the part of the licensee with the terms of this Act, the regulations, the licence, and the management and working plan, and shall be subject to such payments to the Crown as this Act, the regulations, or the licence provides.

"(7) An application for a management licence under this section shall be accompanied by a statement of other tenures owned by the applicant, together with any information relating thereto that the Minister may require.

"(8) A management licence shall have included therein, as an integral part of the licence area, all lands of other tenure owned by the applicant that are located within any watershed or drainage-basin or part thereof as defined in the management licence on which the licence area encroaches.

"(9) If a licensee acquires any additional forest land subsequent to the issuance of a management licence, he shall, within thirty days of acquisition, advise the Minister that he has acquired such lands, and such lands, if they are located within the boundaries of the licence area, or within any watershed or drainage-basin or part thereof as defined in the management licence on which the management licence encroaches, shall forthwith be included in the licence area and shall be subject to the management licence.

"(10) Other tenures incorporated in a management licence shall be subject to the like terms, conditions, taxes, rental, royalties, and stumpage as under any Act of the Legislature and regulations made thereunder, or the 'Dominion Lands Act' and regulations made thereunder, or the contract by which the tenure is established, except as provided under subsection (26).*

"(11) Other tenures included in a management licence shall not be sold, transferred, or otherwise disposed of except as provided in this section.

"(12) (*a*) After a management licence has been awarded and for such time as the Crown lands within the licence area remain subject to such licence, such lands shall be withdrawn from sale and settlement under the 'Land Act' and 'Taxation Act.'

"(*b*) In respect to the use and occupancy of the Crown lands in the licence area under the provisions of any other Act, such use and occupancy shall be subject to the provisions of this Act and the regulations and shall be in accordance with the principles of sustained-yield forest management.

"(13) Land held under other tenure (other than Crown-granted land) included within a licence area, when logged off, shall revert to

* Subsection (26) provides that timber cut from a management licence area, regardless of tenure, is subject to the provisions of Part X of the Act, which makes manufacture within the Province obligatory unless permit to export is granted by the Lieutenant-Governor in Council.

the Crown but shall continue to constitute a part of the licence area and shall be operated in accordance with the provisions of the management and working plan. Crown-granted land included in the licence area that has been logged off shall, subject to the provisions hereinafter provided, continue to be a part of the licence area and subject to all the terms and conditions of the management and working plan. At any time during the continuance of the licence after the Crown-granted land has been logged off the licensee may elect that such land shall revert to the Crown and on written notice of such election served on the Minister it shall so revert subject to the reservation to the licensee of the coal or mineral rights of the licensee in such land, if any, and the land shall continue to constitute a part of the licence area and shall be operated in accordance with the provisions of the management licence.

"(14) The Minister may, subject to the terms of the management licence, add lands to the licence area, or may reduce the area thereof, but any such increase or decrease shall be made in accordance with the principles of sustained-yield management of the forest and the estimated yield capacity as set forth in the management and working plan.

"(15) The licensee shall manage the licence area in accordance with the provisions of this section and of the regulations and of the management and working plan for the purpose of growing continuously and perpetually successive crops of forest products to be harvested in approximately equal annual or periodic cuts adjusted to the sustained-yield capacity of the licence area."

Subsections (16), (17), and (18) provide that the services of one or more foresters registered under the "British Columbia Foresters Act" must be retained by the licensee.

Payments to be made for the Crown land and timber included in the licence are specified in subsections (19) and (20).* The original Act of 1947 provided only for stumpage as required by subsection 20 (*a*) and (*b*). The alternative method of payment, 20 (*c*), was introduced by amendment in 1949. The "other timber" of subsection 20 (*b*) has particular reference to stands immature at the date of the licence contract. In this connection the Department interprets "immature" to mean less than half the age at which the timber is subsequently cut in accordance with the working plan.

"(19) A rental of one cent per acre per year shall be due and payable to the Crown on all Crown land in a licence area that is not held under another tenure or subject to provisional reserve under subsection (25).

"(20) (*a*) Except as provided in subsection (21), there shall be due and payable to the Crown on all timber on Crown lands in the licence area not held under other tenure which is deemed to be merchant-

* *See* section on Forest Finance.

able at the time the management licence is issued and is so described in the management licence, stumpage, inclusive of royalty, as and when the timber is cut, and in such sum per unit of measurement as shall be appraised and assessed by the Forest Service. The method of appraisal shall be the method of appraisals currently in use by the Forest Service at the time the appraisal is made.

"(*b*) On all other timber cut on Crown lands in the management licence area not held under other tenure, there shall be due and payable to the Crown, stumpage, inclusive of royalty, in the sum of sixteen per centum of the stumpage value as appraised by the Forest Service by methods currently in use by the Forest Service at the time the appraisal is made.

"(*c*) Alternatively to clauses (*a*) and (*b*) and except as provided in subsection (21) there shall be due and payable to the Crown on all timber on all Crown lands in the licence area not held under other tenure, stumpage, inclusive of royalty, as and when the timber is cut, in such sum per unit of measurement as is appraised and assessed by the Forest Service; and the appraisal shall allow as a cost of logging such costs of management, protection, and silvicultural treatment of the licence area as the Minister deems to be just and proper charges, but in other respects the method of appraisal shall be the method currently in use by the Forest Service at the time the appraisal is made.

"(*d*) A licensee shall elect at the time the licence is issued whether clauses (*a*) and (*b*) or clause (*c*) shall apply to his licence, and thereafter the method of appraisal shall not be changed except with the permission of the Minister, and permission shall not be granted unless compensation is paid to the Crown for any advantages previously enjoyed by reason of the method of appraisal first selected, and the compensation shall be in such sum as the Forest Service determines.

"(*e*) In the case of a licence issued and in effect at the time when this clause is enacted, the licensee, within twelve months after the date of such enactment, may elect to use the method of appraisal provided in clause (*c*); and if he does not make an election within the said period of twelve months, his management licence shall continue to be governed by clauses (*a*) and (*b*), subject to the further right of election conferred by clause (*d*).

"(*f*) The provisions of clauses (*a*), (*b*), and (*c*) shall not apply to a forest management licence of which a municipality is the licensee, but there shall be due and payable to the Crown on all timber cut on Crown lands in the area covered by such forest management licence, royalty as provided by this Act."

The next subsections, (21) and (22), were designed to be of financial assistance to the holder of private timber, either Crown-granted or temporary tenure, which he had planned to liquidate earlier than would be possible

on a sustained-yield basis in a forest management licence. It enables him to plan his management with less regard for the immediate financial position relating to the timber of varying tenures in his management licence.

"(21) Subject to the provisions of subsection (13), in the case of timber cut on Crown lands in a licence area not held under other tenure, the licensee shall have the privilege of electing that timber cut on such Crown land within the licence area shall be deemed to have been cut, and shall be treated as if it had been cut, on land of other tenure owned or controlled by the licensee within the licence area; and such election having been made, that Crown timber as cut shall be charged and paid for at the appropriate rates applying to the land from which it was deemed to have been cut. For the purposes of this section, every parcel of land of other tenure included in the licence area shall be listed and shall be credited with a quantity of merchantable timber as shall be agreed upon, or with an average stand per acre as shall be agreed upon. When the timber cut from Crown lands not held under other tenure and charged under this section to a parcel of land of other tenure equals the timber agreed to be on the parcel of land of other tenure then in good standing, then that other tenure shall be extinguished and the lands held under the other tenure shall revert to the Crown, but shall continue to constitute a part of the licence area.

"(22) On the cancellation of a management licence, if timber has been cut and charged to lands of other tenure as provided for in subsection (21) but not in sufficient quantity to extinguish that other tenure, then on the timber so cut and charged to lands in respect of which the tenure has not been extinguished there shall be due and payable to the Crown the difference between the amount that has been paid on such timber and the amount that would have been payable thereon if a licence had been purchased under the provisions of section 17."*

The effect of such an exchange of timber is that the forest management licensee may obtain and cut an immediate volume of Crown timber without paying stumpage, but only the royalty, if any, that would have been payable on the timber from his timber lease or licence or Crown-granted land, which is the subject of the exchange. He is also exempted from further payments of annual fees, rentals, taxes, or other charges in respect of these private tenures, with the exception of the 1-cent-per-acre rental applicable to all Crown land in the forest management licence. On the other hand, when the time comes for the formerly private timber to be cut in accordance with his plans, he will pay the full stumpage value of it as appraised by the Forest Service at the time of cutting.

This is one instance in which the Department is, in effect, willing to dispose of timber on a cruised volume. Whether the trade in any particular case is of more advantage to the forest management licensee or the Crown

* Section 17—ordinary timber-sale provisions.

depends on the accuracy of the cruise and the relative qualities of the two bodies of timber which are exchanged. The immediate financial advantage is, of course, to the management licensee.

The exchange of Crown timber for timber held under timber licence or lease, in order to improve organization for sustained-yield management, is not a new concept. This and the exchange of Crown logged-off land for Crown-granted land within a forest reserve have been authorized for many years by the "Forest Act." Section 31 reads:—

> "31. The Lieutenant-Governor in Council may, with the consent of the owner of the land, exchange for any land enclosed in whole or in part by the boundaries of any forest reserve, the title to which is not vested in the Crown in right of the Province, available Crown lands situate without the reserve, other than timber lands; and may, with the consent of the holder of the timber leasehold or timber limit, exchange for any timber leasehold or timber limit enclosed in whole or in part by the boundaries of any forest reserve available Crown timber on corresponding areas of Crown lands situate without the reserve, and when necessary may make compensation upon the exchange; and a copy of every Order in Council authorizing such an exchange shall be laid before the Legislature during the first fifteen days of the next ensuing session thereof."

This section was part of the provision made to implement management of forest reserves for "maintaining the growth of continuous crops of timber," provided for in sections 30 to 32 of the "Forest Act." The section has not often been used, no doubt because sustained-yield management of the public forest reserves was itself neglected for more than thirty years. Subsections (21) and (22), which I am discussing, make exchange possible as an implement in sustained-yield management of private forests. The irregular pattern of ownership, either inside or outside sustained-yield units, public or private, has long been recognized as a handicap in good management; exchange is available as an instrument toward the removal of this handicap within management licences.

This privilege of exchange is of little importance in the Interior, where few management licensees have private timber to exchange. On the Coast it is unlikely that the holder of Crown-granted timber will wish to take advantage of the opportunity to exchange his land for timber only and thereby lose Crown-grant title to the second and succeeding crops of timber on the land exchanged. The privilege of exchange is of particular advantage to the owners of temporary tenures in a forest management licence, which, for reasons of quality, accessibility, or species, might have to be held for many years before logging could be undertaken to best advantage relative to their production plans.

I am informed that, to date, this privilege of exchange of timber within forest management licence boundaries has been exercised in one instance only.

The provision for exchange of private land and timber within a Provincial forest for Crown land outside, to which I have referred, was to simplify management of the forest by obtaining a uniform Crown ownership within the forest's boundaries. For the same purpose, exchange of land or timber not owned by the licensee, within a forest management licence, might be exchanged for similar land or timber outside; but it is not necessary to have any legislative enactment to accomplish this. The Crown land within a management licence boundaries is presumably included in the licence area. Land held by owners other than the licensee can be exchanged by mutual consent or purchased. Timber under temporary tenure owned by others can similarly be exchanged, or, if impossible to obtain consent, the land on which it stands will automatically become part of the licence after logging by its owner. It does not seem to be necessary or desirable to obtain such exchanges by force of law.

The exchange provided for in subsections (21) and (22) is not of this nature. Both parcels in the contemplated exchange are already within the management licence. The purpose is, by this circuitous method, to relieve the licensee of the cost of accumulated carrying charges on his private timber reserved, according to plan, for future cutting, while providing him with an equivalent volume of Crown timber at less than its value. It is therefore a subsidy, to encourage sustained-yield management, related to a basic principle of forest management licence policy in a similar way to that of "forestry cost" allowances in cutting permits, or any other concession or exemption given relative to Crown lands, whether leased, licensed, or otherwise unencumbered, which are to be managed for sustained yield.

The acquisition of a reserve of Crown timber at a nominal carrying cost of 1 cent per acre per annum enables the licensee to continue operations in his private holdings at what would otherwise be a liquidation rate. The accumulation of rentals, fees, and taxes on the private tenures is part of the consideration for which they were originally acquired. The sum of this accumulation relative to private timber in management licences in each case will depend upon the relation between the Crown and private contributions of timber in the individual management licence and to their relative locations and suitability for prompt logging. It would be impracticable to ascertain the precise number of extra years (if any) of carrying charges payable on each holding in each forest management licence which could be attributed to sustained-yield management. The conditions under which such an exchange might be sought will vary from licence to licence. It might give, in fact it seems designed to give, an advantage to some management licensees, to whom such an exchange might be possible and profitable, over those who are not so situated. It is difficult also to disregard the possibility of inequitable exchange to the disadvantage of the Crown. I am in some doubt as to whether or not subsections (21) and (22) should be retained in the Act. The matter for exchange in these circumstances

was not dealt with with any particularity during the Inquiry, and in my view this is a subject upon which the advice of the Provincial Advisory Council* might well be sought by the Minister.

Assistance in the development of a management licence area as a permanent operation, and especially in connection with the construction of roads on a higher standard, and in advance of requirements for current logging from year to year, is given by subsection (23), which follows:—

> "(23) Such improvements on a licence area as are designed to facilitate the management and operation of, and the growing and harvesting of wood on, any lands in the licence area shall be exempt from taxes under the 'Taxation Act.'"

In the appraisal of Crown stumpage for cutting permits in forest management licences the cost of roads built for logging is included in logging costs as in the appraisal of timber-sale stumpage. However, the problems which arise in timber sales, when the operator of the first sale opening up a body of timber has to build a road which may later serve his competitors in future sales, do not affect the management licensee who is secure in his control of all timber in the unit. The cost of roads built in excess of current logging requirements, for purposes of fire protection, planting, insect-control, or other approved forestry practices, is also allowed in stumpage appraisals in forest management licences in the same manner as the cost of logging-roads, but only to the extent that such improvements are on Crown land. No "forestry costs" are shared by the Government for expenditures on private lands of any tenure in a management licence. Such improvements are, however, exempt from taxation under the "Taxation Act" by the above subsection (23). I shall refer again to the Forest Service's interpretation of "forestry costs" and the allowances made for them.

The Department's policy in approval of management licence applications has been that it is not necessary that the applicant own any timber, nor that he own any mill prior to his application, but that "first consideration in issuing licences will be given to existing industry."† To make certain that the yield from a management licence actually does go to maintain an existing or prospective mill as intended, subsection (24) provides:—

> "(24) Where a forest management licence is given for the maintenance of an existing or proposed mill or manufacturing plant, the Minister may make the licence appurtenant to the mill or manufacturing plant, and any such licence shall not be sold or transferred separately from the mill or plant during the continuance of the licence; and any other forest management licence shall not be transferable except on written consent of the Minister."

However, in four cases only have completed contracts been made appurtenant to a plant definitely located: Licence No. 1, at Watson Island

* *See* section on Administration for explanation of "Provincial Advisory Council."

† "Forest Management Licences," Department bulletin, p. 2.

(Prince Rupert); No. 2, at Duncan Bay; No. 6, at Quatsino; No. 23, to be built at Castlegar. While these are all large pulp or paper mills, other management licences awarded for the support of similar conversion plants, existing or to be built, have not been made appurtenant by contract to any particular mill. Six licences were made appurtenant to plants not precisely located: No. 3, "Slocan vicinity"; No. 5, "Quesnel vicinity"; No. 7, "Vancouver Forest District"; No. 8, "Kettle Valley"; No. 9, "Okanagan Lake"; No. 22, "Vancouver Island." The majority of licences are unrestricted in disposal of products. The effect of this differentiation is that some licensees may in future move their conversion plants to some other locality, or close down their own mills and supply others, if it should prove more profitable so to do, regardless of the dependence of existing communities upon their present plants, whereas other licensees do not have this privilege, although the dependence of communities upon them may be no greater. (*See* Tables 9 to 15, pp. 102 *et seq.*)

In three only of the contracts is the annual yield restricted to a specified maximum volume, being the estimated consumption of a certain plant, rather than to the sustained-yield capacity of the land as approved in working plans. These are three of the early contracts, and the obvious inconsistency, since the basic requirement of all forest management licences is that the whole area be managed for an annual production "adjusted to the sustained-yield capacity" of the licence area, apparently caused the Department to eliminate this type of restriction from all later contracts.

With regard to these and other differences between individual contracts, as well as to the Department's policy in selection of successful applicants, to which I shall refer later, there was no unanimity. The Deputy Minister (Dr. Orchard) explained that it is not necessary, in his opinion, to have a uniform policy for all licences. With regard to the provision in some contracts, and not in others, that the licence area may be reduced by unilateral action of the Minister at any time if it should be found to be capable of producing an annual volume greater than some fixed amount specified in the contract, his evidence was:—*

> "Q.—I understand from examination of the licence that there was a change in policy or in approach of the Forest Service, part way through the issuing of the series of management licenees to date, from what I would call a volume allotment to an area allotment. Could you explain the reasoning behind the change and what safeguards you now hold? A.—The very first licences that were issued set down the fact that this licence is intended to produce 'X' cubic feet of wood. That wasn't included in very many because it was just too hampering to permit, in the future, to the administration, decisions in the best public interest, so we felt. So now most of them say for the production of enough timber to support a certain plant, and various other things,

* Transcript, p. 15629.

The estimated productive capacity of a licence could change every few years practically on the basis, it could be, on the basis of better management, closer utilization, better information data on your growing stock, all that sort of thing.

"Q.—I can't recall at the moment any particular licence to which this applies, but there are some licences which have been issued which are not appurtenant to any conversion plant particularly, and which simply grant an area. You have no authority retained by yourself on those types of licence to cut the licence back for any reason beyond the half or 1 per cent, whatever the small percentage is, that the Minister retains in himself to withdraw for higher economic use? A.—Yes. Right now I don't think we have any rule. We would enter conditions in there that seemed to best meet the circumstances of the individual licence.

"Q.—That would seem to strike me that you have, at the present minute, no uniform policy. Some you can cut back, some you can't, to a greater or less extent. A.—That's right and whether you can or whether you can't is dependent on the circumstances at the time the licence was written."

As to whether these contract differences were drawn with consent of the licensees and whether they should be ironed out, Dr. Orchard's evidence was:—*

"Q.—It occurs to me, I don't hold a forest management licence, as you know, but it occurs to me that if I did, that some concern would exist in my mind in putting up, say, up to a million dollars into one of these with the thought that I reached, from what I have heard to date, that the Minister may come along at any time and abrogate this contract? A.—After you've got your contract?

"Q.—Yes. A.—I don't know where they get that.

"Q.—You have stated that the Minister can come along any time and abrogate it? A.—What do you mean by 'abrogate'? Cancel the contract?

"Q.—Well, let's say vary it; take portions of your area away from you. A.—Oh, yes, but there are safeguards to the licensee in there.

"Q.—Yes, fortunately he can go to the Courts of the land? A.—There are other safeguards in there. It is well worth while reading that contract, you know.

"Q.—You, in business, have you heard of the expression 'one-sided contracts'? A.—I dare say I have.

"Q.—Does the lawyer for the applicant have anything to do with amending the contract, or is that the contract? The one in this Exhibit 36?† A.—By and large, that's the contract.

* Transcript, p. 1862.

† Sample form of standard forest management licence contract in Appendix.

"Q.—He signs that or else? A.—Any special clauses are subject to discussion, and——

"Q.—Arbitration? A.—But the more of these that are used, you can't give one kind of contract to 'A' and another to 'B' and get progressively more lenient and so on. Once that pattern is set by signing two or three of them, it is only fair that they should continue to be much the same type.

"Q.—I would suggest that it would be very difficult to have variation or change to the form of contract in Exhibit 36? A.—If it were important, I think it should be extended to all contracts.

"Q.—In other words, the main theme of the contract is to take care of the public? A.—I think with equal concern about the operator.

"Q.—Have the licensees in these cases expressed their satisfaction with the contract, generally? A.—Well, they have signed them."

Nevertheless, these discrepancies between licence contracts with regard to restrictions on production and disposal of product still exist, and there is no evidence that any attempt has been made to remove them by mutual consent. This should be done in my opinion.

Although the Act does not require it, most licences that have been awarded to date have been given to owners of manufacturing plants in support of their existing mills, or of proposed expansion in conversion facilities for the same type of product, or of new construction to improve integration by manufacture of another product. One licence only was awarded to a licensee not hitherto owning or operating a mill in the Province; this was contingent upon construction of a pulp plant of a certain capacity to utilize the yield of an underdeveloped area in the North. The mill was built on schedule and is in operation on timber from developed areas while the project of opening up the more remote forest is evolved. Three licences have been awarded to logging companies which do not supply the open market but were already, or shortly became, owned by, affiliated with, or contractors for manufacturing companies.

My 1945 recommendation contemplated private working circles in which the combination of private and public timber would "supply the needs of some one or more particular conversion units in perpetuity."* As I have explained, most of the licences which have been issued are of this type in a general way. I also recommended "the merger of the holdings of private owners with no conversion plants of their own but who desire to practise sustained-yield forestry. Log production in this instance should flow to the open log market."† No such licences have yet been awarded, nor, to my knowledge, applied for, nor was any evidence presented to indicate that any attempt has been made to restrict licences awarded to timber-owners or logging companies without any conversion plant to production

* 1945 Report, p. 146.
† 1945 Report, p. 147.

for the open market, thus providing a source of supply for mills without any timber of their own.

Statutory clauses of especial interest in cases where a proposed forest management licence conflicts with the normal source of supply from Crown timber of other existing mills or industries are subsections (25), (32), (33), and (34):—

"(25) At the time a management licence is issued, the Minister may place under provisional reserve any part of the licence area not otherwise alienated. The timber on any area under provisional reserve shall be subject to disposition by the Crown under this Part, and following such disposition any area logged shall be withdrawn from the provisional reserve and become an unencumbered part of the licence area.

"(32) Where, at the time a forest management licence is issued, a sawmill or other forest industry is already established and is depending in whole or in part for its wood-supply on some of the lands included within the licence area, the provisions of subsection (33) shall apply.

"(33) (*a*) Notwithstanding anything contained in this Act, the Minister may, at his discretion from time to time and in such quantities and for such period as is provided in the licence, give to the owner of such sawmill or other forest industry a licence to cut Crown timber within the licence area, at an appraised stumpage price and without public competition.

"(*b*) Every offer to purchase Crown timber under this subsection shall include an offer to pay to the Crown in addition to stumpage the cost incurred by the Forest Service in cruising and surveying the timber limit and an annual rental as provided under section 17.*

"(34) Where a licence to cut timber is given under this section, the forest management licensee shall be exempted from the obligation to pay rent in respect of the area covered by the licence given under this section so long as such licence remains in force."

These arrangements to hold back or deduct certain volumes from the yield of a forest management licence in order to supply other industries are applied at discretion and are subject to varying conditions. The Department bulletin explains the " provisional reserve " of subsection (25) thus: " Where a licence area carries an excessive amount of mature timber, some of this timber may be held out for immediate disposal to other industries, under what the Act calls a ' provisional reserve '; but any such reserve will be made subsidiary to the requirements of the licensee and will not be permitted to jeopardize the sustained yield management intent of the licence." No explanation is given of the term " excessive." This provision and that of subsections (32) and (33) appear to overlap, with the exception that disposal of timber from the provisional reserve is not limited to mills existing at the time the management licence is issued.

* Section 17—regular timber-sale procedure.

These subsections have been applied in the case of F.M.L. No. 1, by reserving an unstated annual volume for sale to other industries during a period of twenty years, up to a total of 15,000,000 board-feet of cedar, 5,000,000 feet of spruce, and 10,000,000 feet of cedar poles. In the case of F.M.L. No. 2, all the Crown timber in the management licence was reserved for sale to others during a period of thirty-five years. In No. 6 a volume of 5,000,000 board-feet yearly was reserved for sale to small operators, without a time-limit. A similar deduction of 5,000,000 board-feet yearly is made from the allowable cut of No. 7, without a time-limit, the timber to be within 1 mile of the licence boundaries. From No. 23 timber sales may be made by the Forest Service to operators who were logging within the licence area during a period of seven years prior to approval of the management licence. No other awarded licences are subject to these reserves.

In my opinion these varied and, to some extent, unpredictable demands on the production of a managed sustained-yield unit are not, as administered, in the best interests of good forest management nor of over-all forest policy. It seems to me that these reserves of timber within a forest management licence, to be allocated by the Minister to selected persons, with or without competition, should be co-ordinated with, and included in, the sustained-yield working plans of the licensee. In order that this may be efficiently done, the timber sales should be planned and located in the same manner as for a public working circle. They should be treated either as the allowable cut of an individual circle, if the area and volume involved are large enough, or as a cutting section of one of the licensee's own working circles. The licensee is made responsible for the condition and management of these sales after they have been logged; it is illogical that sales should be located and made on the demand of irresponsible operators which may cause undue interference in the licensee's arrangement of age-classes for the next rotation. The licensee, therefore, should be consulted before any sale is made or advertised within his licence area, so that his views may be given proper consideration before any individual commitment is made. This is of particular importance where the areas or volumes involved are large relative to the allowable cut of the whole licence.

In those cases where no time-limit has been set for the sale of timber to other operators, a suitable limit should be established after consultation with the licensee and included as an amendment to the contract by mutual consent.

Responsibility for administration, management, and protection of these " provisional reserves," and the timber sales made in them, must, on the principle of *cui bono,* lie with the Forest Service, which collects the whole stumpage value. Therefore, the cost of reforestation and protection, including the whole cost of suppression of fires and insect epidemics originating in these areas, should be borne by the Forest Service until such time as they

are satisfactorily reforested and become an unencumbered part of the forest management licence.

Other statutory provisions affecting forest management licences are concerned with administrative procedure relative to fire protection, control of default by stoppage of operations, and appeal to the Lieutenant-Governor in Council and the Courts. The final subsection provides that an appeal to the Lieutenant-Governor in Council from a decision of the Minister must be brought within thirty days after the exercise of the power or direction complained of.

I have quoted above, with some comments, the legislation relating to forest management licences in its present amended form. The Act gives great power to the Minister and his Department in the award of Crown timber and also in the control of management in these licensed forests after award. But it expresses no general policy, and gives little guidance as to the vital questions of what qualifications justify the award of a licence to an applicant: what kind of conversion plant should be supported, or indeed whether an existing industry, no matter how long established, should have any preference at all.

No reference is made to the total area and volume of forest land and timber owned by an applicant, nor is there any indication that this should be related in any way to the amount of Crown timber which may be awarded. There is no legal limit to this amount: it may be only enough for one small sustained-yield unit to be economically managed, or it may be extensive enough for several working circles in one large licence. It is true that the applicant's private lands must be included, to the extent that they are " located within any watershed or drainage-basin " which is to be put under management in the licence, but this presumably is required for technical efficiency of sustained-yield organization. This omission of any limit, either relative or absolute, is of particular interest on the Coast, which has been established already as a single economic unit, in broad terms, for the supply of wood to almost any conversion plant on tidewater. Thus there is no economic limit, and there is no legal limit, to the size and number of management licences that may be held by the same licensee on the Coast.

These features provide an interesting comparison with policies of the past and especially the " special timber licences " of fifty years ago, whose history I have recorded in some detail, which were designed as a progressive measure, encouraging private enterprise while safeguarding the public interest and Government control. Those licences were available to any applicant who staked, recorded, paid the fees, and later surveyed them. They also were made in effect perpetual, being renewable yearly, subject to stated conditions. The privilege of licensing was withdrawn when the Government considered that ample timber had by this means been made available for any anticipated expansion of industry during many years ahead, and when it considered that the licences granted would provide sufficient revenue

for its needs. I am not suggesting that the policies of a pioneer people fifty years ago could be applied in conditions of to-day, but in comparison with the straightforward method of disposal of the 1905 timber licences our management licence policy has been lacking in clarity, and, as a natural consequence, this vagueness has been reflected in administration.

In other sections of my Report I have described and analysed the conditions in the forest industries and the forest resources, and the warning-signs which pointed the way to establishment of our sustained-yield policy. There is no longer any disagreement with sustained yield as an over-all Government policy, but there were many and varied differences of opinion among many classes of witnesses as to the best methods for its application. Strong and determined opposition and equally strong and determined support were expressed relative to the forest management licence policy and its administration. The evidence, ranging from established facts and logical reasoning to misinterpretations and prejudice, presented both by informed persons of long and important experience in the industries and also by some without direct interest or experience, made it plain that many corporate and personal businesses and fortunes have been greatly influenced by the impact which this new form of forest tenure has made on long-established customs and opportunities.

Among the influences which induced witnesses to prepare and present their opinions before the Commission, the forest management licence was the most important. Individuals, corporations, industrial and other Associations appeared directly or employed counsel to represent them. The volume, diversity, and, to an extent, inconsistency of available evidence made a happy hunting-ground for any who sought to substantiate their views. It also created a thicket, almost impenetrable, for the definition of any clear and undeviating path to sustained-yield management.

The basic cleavage of opinion on forest management licence policy lies between those who believe that the ownership and management of forest lands is an enterprise most suitable, measured by efficiency and satisfaction of social responsibilities, for the private citizen and private company, subject to general Government control, and, on the other hand, those who believe that their interests would be better served under a system in which ownership and management of forest lands would be a Crown monopoly; that, briefly, the Crown should grow the trees and sell them at maturity to the highest bidder in open competition among manufacturers and loggers alike, with no attempt to allocate or give preference of supply to any one of them.

Those who support private forest management, in varying degrees, directed their criticism at the system, or lack of it, in selection of applicants for approval, and at the unpredictable working of the merit system, at the arbitrary nature of the licence contract, and unnecessary interference with private management.

There was, as I have indicated, great range of evidence relative to the principle underlying the issuance of forest management licences. In the realm of principle, the theories of John Stuart Mill, John Ruskin, and Blackstone's Commentaries were quoted by Mr. J. D. Gilmour, representing operators' Associations in the Prince George District, to the effect that land differs from all other forms of property and must always be in public ownership. Mr. Gilmour was (he has died since he gave his evidence) a prominent forest consultant, a former District Forester in the British Columbia Forest Service, and formerly chief forester for the H. R. MacMillan Export Company. He said:—

> " The allocation of any natural resource, forest or other, to a particular person or company, is wrong; justice demands equal opportunity, which means in this case free competition."*

Asked to explain this statement, under cross-examination, he said:—

> " I think the reason is under our British heritage of land laws, where the title to all resources rests in the Crown, that there was a very good reason why that should be so, and the reason was that the monarch represented all the people. Now I think that if we consider that feature, ' the monarch represents all the people,' that every person must have an equal right to a natural resource. That's why I say allocation to a particular person or company is wrong. By private deals which seem good deals, like the Quebec deals, $400 a square mile and now it's $800, I think, they might be good deals and still the principle is wrong."†

In spite of this belief in principle, however, Mr. Gilmour considered private management in practice better than Government management. But he stipulated that allocation should be competitive and temporary even though long-term.

> " None of this means that land should not be privately owned, or that a private individual should not have a lease from the State giving him the right to use the land. In truth, all the social advantages which some theorists claim for land nationalization can be attained by the public collection of rent based on the annual value of the land for use, without bureaucracy and its attendant evils and expense, and without disturbing private titles in any way. We believe that, under these conditions, private operations upon land, with security of tenure, will produce more than the State can do."‡

Reasons for objection to the management licence policy were stated more concisely by Mr. Cornelius Swanson, a logging contractor of many years' experience and president of the Western Forest Management Asso-

* Transcript, p. 7722.
† Transcript, p. 7819.
‡ Transcript, p. 7696.

ciation. Mr. Swanson said that all Crown timber should be sold at public auction to the highest bidder.

> "We are opposed to the system because it discriminates against many and favours a few. That form of allocation leads to mistrust and very poor public relations."

In his opinion, also, it tends to be a monopoly, and "we have no right at this stage to be granting anything to anybody for ever." As for efficiency of management:—

> "We don't think that private enterprise can manage forests any better than a Forestry Board, or a Forest Service, if they have the money to do it. If the public working circles are managed properly, they could practise good utilization, just as well as the large company could."*

Forest Service evidence, however, does not support the latter opinion. Although public working circles are described as being under regulation for sustained yield, it appears that management plans of the standard required for forest management licences have not yet been drawn up for the public areas. Mr. J. R. Stokes, Forester in Charge of the Management Division of the Forest Service, questioned on this point, replied:—

> "No, I guess we have not a formal working plan to that intensity. We have several interim working plans for some of these working circles. It is something that you have to build up over the years."†

The Forest Service does not consider that forest management is, or could be, as good in public forests as in private management licences. This is not only a matter of funds and staff. Dr. Orchard said in answer to cross-examination:—

> "Q.—I take it that you would not agree that, given sufficient finances, the Forest Service couldn't do as good a job as the private individual? A.—No, my answer is identically the same for reasons that I have already indicated.
>
> "Q.—In other words, you say that if you had all the funds that you would require——? A.—All we wanted.
>
> "Q.—All you wanted, the Forest Service still wouldn't do as good a job in managing our forests as private individuals? A.—We would not get as good forestry practice on public working circles as we would on management licences."‡

The chief reason for this is the relative efficiency of control over the application of forestry requirements, for example:—

> "Q.—Now, stabilization and perpetuation of industry in communities. I take it that that is one of your aims with public working circles? A.—Yes.

* Transcript, pp. 14407–14408.
† Transcript, p. 3234.
‡ Transcript, p. 2189.

"Q.—So the same thing applies, then, in public working circles as with management licences? A.—To a lesser extent.

"Q.—Why to a lesser extent? A.—Because we have no control over the operator in a public working circle. They can all quit, all move out. The industry that is established, let's say, for example, in Powell River isn't very likely to move away from Powell River."*

A comparison of the supervision required in public and private working circles was made by Dr. Orchard:—

"Q.—Is there more work for the Forest Service in public working circles? A.—Yes, certainly there is. We are managing the public working circles. In the management licence all we do is sit as an overseer and let the licensee's foresters manage it.

"Q.—Aren't you doing the same thing in public working circles, sitting as overseers? A.—I don't think I can make it any more clear. In the public working circle we are doing the managing. We have to supply the ranger and the forest protection, and the foresters, and make the working plans, and oversee them and see that the working plan is complied with on the ground. In the management licence that responsibility rests right on the licensee."†

Forest reserves, of course, have been created by Proclamation, surveyed, and their capacity estimated during the last thirty years or more, as I have mentioned elsewhere, to a total of 25,691,900 acres (*see* Table 42), but actual management of the forest was not in force. Dr. Orchard explained that actual regulation of the public working circles began in 1952 with the setting-up of cutting ledgers in some public circles prescribing the volumes which could be sold and cut annually in accord with sustained-yield principles.

The volume of technical work involved in management of public forests, the added difficulty of control of many operators in one working circle, the increasing costs, the demand created for the work of foresters in both industry and public service in inventory, research and silviculture through the great expansion of the forest industries during recent years, and the consequent difficulty in obtaining competent staff explain in some degree why the management of the public forests, after thirty years, lags behind that of private forests in management licences and tree-farms. These facts also provide a strong argument for increasing the area of forest land under private management, subject to reasonable control. Dr. Orchard admits that it is more difficult and expensive to control a large number of timber-sale operators in a public forest than one licensee of a forest management licence, leaving the details to him. It follows that best forest management must be sacrificed to some extent in order to provide opportunities in public working circles for loggers and mills which do not wish to undertake the

* Transcript, p. 2176.
† Transcript, p. 1904.

responsibility for their own forestry. This sacrifice, however, should not be taken for granted, and its extent must be carefully balanced against the social benefits obtained in each case where decision must be made between the creation of a management licence or a public working circle.

Dr. Orchard is driven by the facts to the following conclusion:—

"Q.—So you think there may be some force in what is suggested, that companies with bona fide merit and intention to do what's right and live up to the terms of their contract are going to give more intensive management than the Forest Service is able to do with the anticipated lack of staff which has bedevilled your organization for so many years? A.—Yes, they can do a better job than we can.

"Q.—Well now, if that is so, would the next step then be, in the public interest, to have greater areas under private management than public management? A.—It is my firm belief that, if you're thinking of nothing else whatever, no consideration whatever except the public interest over a long term of years, we ought to have every square foot of forest land in B.C. under management licence. I don't advocate that by any manner of means. We have other attendant circumstances that we can't ignore, but if you're just thinking nothing whatever except good forest management and the best results and the general public interest, forgetting every individual, and the biggest benefit in the long run, put the whole thing under private management.

"Q.—Is it a corollary of that, then, that the Crown should gradually release more of its Crown-owned lands, say, by form of outright sale and Crown grants to companies who are prepared to take over a sustained-yield management? A.—Once again a purely personal opinion, I think perhaps it would be in the public interest if 50 per cent of our lands belonged to private owners.

"Q.—It would appear from what you say that the policy that has been enunciated here since about 1909—I believe it was, somewhere around there—has discharged its function for which it was designed and we may be approaching a new concept in forest ownership and pattern in British Columbia. A.—I'm inclined to think so. I'm inclined to think that some of those Statutes and policies that were adopted fifty years ago were wise beyond their day; they were extremely wise, valuable. I think that at our present stage of development one-half of our lands in private ownership would be a wise step. I don't think we can do it. I don't think we ever will. We've got ourselves involved; we've sold the idea of Government ownership so thoroughly, we have such a strong minority element of socialism, I don't think the people would ever let us sell the land. But all those things aside, if we were just looking for the greatest benefit for the most people over the longest period of time, I think that we should dispose of one-half of our land

in private ownership, and the rest of it, if it were possible, into forest management licences."*

Opposition to both policy and administration of the forest management licence legislation was expressed by Mr. J. Gordon Gibson, a former M.L.A., who has had a lifetime experience in logging and sawmilling, largely on the west coast of Vancouver Island. Mr. Gibson's objections were based on his contentions that monopolies were being created in perpetuity, with the consequent destruction of opportunity for independent individuals to buy timber, sell logs on a competitive open market, or manufacture lumber in competition with other independent loggers and mill-owners. He also contended that undue proportions of the remaining timber are being locked up in both public and private working circles because of underestimated inventories with consequent loss of increment.

"On our acknowledged inventory of 800 billion feet, we should be cutting now, at the rate of 1 per cent a year, 8 billion feet a year. This total cut would, of course, have to be distributed over the entire Province and the most encouragement given to those operating in remote areas.

"Proper forestry is not being practised if we are not cutting off our mature timber at the rate it can replace itself, and if we continue to cut at 5 billion a year, we will be for ever wasting an annual potential of between 3 and 7 billion feet."†

Mr. Gibson also gave evidence to the effect that in his view the Government reserves set aside to be managed for the benefit of the smaller logging operators, especially on Vancouver Island, are of low quality or are being cancelled in favour of forest management licence awards to large companies. With reference to a Forest Service statement in 1948 that it was the intention to reserve timber, especially areas easily accessible to tidewater, for the benefit of small operators, he was asked:—

"Q.—In your experience with public working circles in British Columbia, can you advise the Commission whether the statement there has been carried out? A.—The statement has not been carried out at all. The best has been given in every instance to the forest management licence applicant or holder, and the poorest has been reserved or set aside, the crumbs have been set aside for the small man and the A-frame shows; about the best A-frame show left in British Columbia was our Clayoquot Working Circle, which has now been changed, so that now I must say that I can't agree in any part that that has been done."‡

Mr. Gibson strongly criticized the system by which forest management licences are awarded, and recommended that this should be the responsibility of an independent Forestry Commission. He said:—

* Transcript, pp. 15574–15576.
† Transcript, p. 4233.
‡ Transcript, p. 4268.

"As the system now stands, it is the responsibility of the Minister to decide arbitrarily who shall be allocated these resources—resources which are sometimes measurable in many millions of dollars. But how in fact is the Minister to decide? I would like to point out that in every other type of dealing between an individual or a corporation and the Government there is the check and balance of public bidding or a system of administration by an independent commission.

"But in forest management licences, it boils down to the fact that the Minister finally has to make a decision between one man and another. By this decision he may be putting one man out of business and giving the other the right to a profitable operation from Crown resources for many years to come. . . . We would indeed be simple-minded if we did not concede that where arbitrary powers of economic life and death are concentrated in a political office that it creates a system which is patently open to abuse."*

The problem of allocation was also commented upon in the brief of the Canadian Institute of Forestry. The foresters consider, as in 1944, that this could be solved or modified by giving responsibility for decision to a Forest Commission:—

" Forest management licences resulted from the enactment of section 33 of the ' Forest Act ' and were apparently designed to implement recommendations of the Royal Commission. The Institute endorses this form of tenure in principle and is in favour of its continuation. A major problem in the development and extension of this form of tenure, however, lies in the difficulty of reaching a decision, under the present administrative structure, as to which of two or more competing applicants should be awarded the licence. To date, such a decision is usually made behind closed doors and leaves room for doubt regarding the fairness of the decision. Appeals from such decisions can be made only to the Provincial Cabinet, whose members have often played definite parts in the making of the decision. If the 1945 Royal Commission recommendation for the appointment of a Forest Commission had been implemented, and such decisions made by the Commission, much of the misunderstanding and controversy would have been avoided."†

The Truck Loggers' Association represents an important section of the logging companies, partnerships, and individual logging contractors of the Coast, with a membership of 145. Their aggregate annual production is approximately 600 million board-feet. They were represented before the Commission by their president, Mr. John E. Fletcher.‡ They contended that the policies and promises of the Government, as expressed at the time when forest management licences were first instituted, have not been ful-

* Transcript, p. 4244.
† Transcript, p. 11371.
‡ Mr. L. S. Eckardt appeared as counsel for this Association throughout the Inquiry.

filled. After reciting the list of new pulp and paper mills constructed as a condition for award of a forest management licence, Mr. Fletcher said:—

> " The Truck Loggers Association is by no means opposed to pulp and paper companies, but it is felt that, in the administration of the private management licence scheme to date, ' existing industry ' has been placed in a very secondary spot and that new industry has been placed in a very preferred position when being allocated mature Crown timber. Admittedly there is a most violent competition taking place among independent operators to-day to obtain timber to stay in business. We would like to emphasize that the majority of these independent operators were ' existing industry ' when the present forest management licence legislation was passed.
>
> " One cannot help but reach the conclusion that the allocation of Crown timber, especially in the Coastal area, should have been deferred for several years, or until such time as the whole forest situation on the Coast could have been carefully assessed, and then direct allocations made only on the basis that it was necessary to keep a particular plant in operation until the second crop of timber was ready to harvest. If new industry wanted to come into the Province, there were ample areas available in the yet undeveloped regions of British Columbia to accommodate them. Indeed, this was the expressed policy of the Government, as publicly stated by the then Minister of Lands and Forests, the Honourable E. T. Kenney."*

The Association also contended that the areas reserved for Government management as public working circles were inadequate and that the continued granting of management licences would lead to monopolies and the end of free enterprise in the industry.

> " We are afraid that a continuance of the present policy will result in the establishing of forest monopolies. The size of such monopolies doesn't matter. History has shown us that competition is the prime factor of successful industrial progress. The Coastal region possesses the topography for free competition, and it is not desirable to protect or subsidize one company or one group of companies. Nor is it advisable to continue on a programme that will ultimately stifle individual initiative and free enterprise in the forest industry."†

Mr. Fletcher said that the best and most accessible timber has already been allocated in management licences on the Coast and that many more public working circles are necessary to provide for independent operators. He added that even those that had been established were indefinite and impermanent: " They are undefined areas with no definite commitment by the Government, which can and indeed have been entirely wiped out for no apparent reason."‡

* Transcript, p. 3551.
† Transcript, p. 3556.
‡ Transcript, p. 3557.

The Association's main remedy for conditions which they consider unsatisfactory would be a "non-political Forest Commission." In their opinion, "failure of successive Governments to implement this important recommendation (in the 1945 Report) in 'Forest Act' revisions has naturally resulted in charges of favouritism in the granting of forest management licences. Furthermore, persistent failure of successive Governments to enlarge the scope of public working circles has added further to charges of shortcomings of the Forest Branch in its administration."*

On cross-examination, however, Mr. Fletcher admitted that his members' chief difficulties were caused by competition for timber, and that causes other than forest management licence policy were responsible for the competition. The increase in total cut on the Coast, the incursion of many new operators, and the gradually diminishing volumes of Crown old-growth timber available for purchase made the position of an independent operator, dependent upon Government timber sales, more difficult. Although some operators would rather log for themselves than work for someone else, this practice of open-market logging has been decreasing in favour of the greater security offered by contract and "first refusal" logging.† He considered that an improvement would be to require that a contractor cutting timber for a forest management licensee, and having no other market than the licensee's plant, should receive the full market price of the logs.

> "My own idea, Mr. Commissioner, would be, if one is going to assume that the purpose of a management licence, where you are going to give one conversion plant the control of a large territory, is for one purpose only, to guarantee him a supply of raw products. And I don't think he should be entitled to have advantage over a similar plant that is required to buy in the open market. In that way a contractor, if you want to use that word, should be entitled to what could be considered the market price of the logs, less the fixed costs. Those fixed costs would apply to anybody.
>
> "Q.—That is a matter of detail. Let's think about principle. I predicated my comment by saying that assume that a contract could be drawn which was both reasonable and equitable to both the forest management licensee and the smaller operator, as we have defined him here to-day. Now, assuming that as a premise, do you think that may be one solution toward alleviating the difficulty in which the smaller man finds himself? A.—It might be, sir."‡

Mr. Fletcher agreed that the pattern of ownership of Coast timber, with the logging of individual timber licences or small groups of licences, such as were previously available, by purchase or contract, for independent

* Transcript, p. 3562.
† Transcript, p. 3594.
‡ Transcript, p. 3627.

loggers, and the acquisition by large industrial corporations of such licences as remained, has given considerable "strategic control" to these companies and has often left only "fringe" Crown timber beyond open to the independent. This Crown timber, though theoretically available and accessible, is seldom economically a field for the independent. In such cases the granting of a forest management licence to include both private and Crown timber makes no difference to the logger.

It was also established by Mr. Fletcher that the great companies with their large conversion plants are essential to the market upon which his members rely.

"Q.—It is true, is it not, that all the large companies do sell on the open log market? A.—I believe so.

"Q.—And buy on the open log market the same way. And, in fact, that is what creates the market, is it not? A.—That is right.

"Q.—It is a free market affected by the prices the large companies are willing to buy and sell for? A.—Yes.

"Q.—And without the support of the purchases and sales made by the larger companies, there would be no open log market of the kind which we know to-day? A.—I believe that is correct."*

There appeared to be misunderstanding as to the nature of management licence contracts in the minds of some who thought they were injured by them. On cross-examination, such witnesses sometimes admitted that the licences complained of had not, in fact, done them any injury; for example, the fact that no Crown timber was included in F.M.L. No. 2 and that the Forest Service was making public timber sales in the licence area as before. Fear was expressed that there would be less timber in the future for loggers by reason of the establishment of management licences, but Mr. Fletcher recognized the necessity for sustained-yield management to support large industries.

"Q.—It is fair to say that the truck loggers need the establishment of large conversion plants for their own continuance in business? A.—They do.

"Q.—And as we look forward into the future, Mr. Fletcher, with increased utilization, there will be likely more and more wood put into pulp? A.—It would appear that the trend is that way.

"Q.—And are you familiar with the fact that many of the larger companies with conversion plants are buying cut-over lands in large acreages? A.—Yes.

"Q.—Those, of course, will be ready to provide a cut for pulp purposes before they get to sawlog stage? A.—Yes.

"Q.—And with an increased intensity of use of wood products for pulp, there is every likelihood that there will be, as time goes on, an

* Transcript, p. 3646.

increasing need for someone to log those areas and produce the timber for conversion? A.—That is right."*

Companies owning important manufacturing plants which have been unsuccessful applicants for forest management licences through several years commented on the apparent lack of guiding principles or "rules" governing the award of licences. The Powell River Company, making suggestions designed to clarify the conditions which should justify an award, said:—

"What we were trying to do was find some acceptable formula that might get through this dilemma that everyone is in as to a future policy if management licences are to be continued.

"Q.—In other words, make some rule known to everybody? A.—Known to everybody.

"Q.—And clear-cut? A.—Yes.

"Q.—So that everyone would know whether they would be entitled, as a matter of right, to a forest management licence? A.—Yes."†

For example, it was suggested that licences should be granted only to existing conversion plants except in undeveloped regions; also that the contributions of public and private timber or forest land to a management licence should be related on a basis of 50–50, or some other proportion defining the minimum of private contributions which would qualify. Dr. Orchard admitted that there are no such rules and did not think that any could be established. He maintained this position under repeated examination throughout the hearings.

"There are so many circumstances that enter into decisions as to whether this man should have or should not have a forest management licence that every one just has to be considered on its merits. The fact that a man is already located in that area under review for a management licence certainly has a bearing.‡

"Q.—What are the principles applied by your Department in determining who gets a forest management licenee if there is competition? A.—There is no set list of principles. It is a matter of circumstances.

"Q.—You mean each one has to stand on its own feet? A.—Yes, every one is a problem in itself, and is decided on its merits."§

He was unable to define what constituted merits or demerits, but made a distinction between competitors for a management licence and objectors who had no desire to obtain the licence themselves.

---

* Transcript, p. 3654.
† Mr. H. S. Foley, transcript, p. 16119.
‡ Transcript, p. 1629.
§ Transcript, p. 2157.

" There has been a great deal of one applying and the others objecting just more or less on principle. There has been a lot of objection in cases where loggers said, ' That is where I propose to get my timber five, ten, fifteen, twenty years from now. I have been looking forward to that for a long time.' "*

Dr. Orchard said also that the ownership of the more desirable and accessible timber, developed through fifty years by all forms of alienation, created a " pattern of land tenure that has had a profound effect on the current problems of forest land management."

" The net effect of this ownership pattern is that, in instance after instance, the Crown timber in a watershed, while it may represent a most significant volume, is almost exclusively fringe timber and accessible only through an extensive stand of privately held timber. The only economic way to remove these Crown holdings is in conjunction with the logging of the private timber."†

However, there is evidence that this situation does not always assure the award of a management licence to the owner of the private holdings. In reference to competition between two large companies for an area on Vancouver Island, Canadian Forest Products Limited, the loser, gave the following evidence:—

" Canadian Forest Products made prior application for the disputed area.

" Canadian Forest Products was the largest private timber-holder in the Upper Gold River drainage. While we owned 67 per cent of the private timber in the Upper Gold River drainage, only 11 per cent of the Crown timber in the area would be allotted to our proposed management licence.

" Our company owned 45.2 per cent of the timber in its proposed management licence area, as compared with only 18.8 per cent (estimated) private ownership held by the competing company in its management licence area. It is our belief that management licence applications which are backed by strong private commitments should be given priority."‡

This company also urged establishment of rules to guide the award of management licences.

Evidence relevant to the influence of priority of application was inconclusive. The Department's publication dealing with forest management licence procedure, to which reference has been made, says, " The submission of a formal application does not establish any priority or claim to the use of the vacant Crown lands involved and is not considered to restrict the Government in any way in making other disposition of those lands to

* Transcript, p. 2159.
† Transcript, pp. 15397–15398.
‡ Transcript, pp. 9972–9973.

any person or for any purpose whatsoever." This formal application is not a mere letter; it includes reports on the applicant's business and financial status, consumption of his mill, classification of the forest-cover included, his own and the Crown area applied for, volumes of timber by ownership and species, and an estimate of the sustained-yield capacity. A later application for the same area may be given preference, as I have shown, even where a smaller private contribution of timber is involved.

In the case of competition between an established local mill and a newcomer to the district, preference is given to the local applicant. Dr. Orchard gives as an example:—

> "A man with an established operation applies for a management licence up in Rock Creek valley. Somebody else comes in who has never been in there and applies for a licence over Rock Creek valley. It might be taken, from what I have said, that now you have got two applications and nobody is going to get it, but in that case the established mill in Rock Creek valley might very well be given the licence in spite of this other application. The second application has no established rights, no vested interest whatsoever."*

On the other hand, the Forest Service declines the responsibility for choice between applicants.

> "If you're going to give things without competition, then you've got to be very careful about who you give it to and when and where. And, in spite of evidence that has been given to the Commission, we have been very careful about who and where we give it. We have any number of applications turned down. If you've got two applications for the same area, up to this point, by and large, both have been ruled out. We just will not choose between 'A' and 'B.' If there is an application where there has been a long-established small industry, the rule in the past has been, 'We won't talk to you about a management licence, there are too many people who are interested in there; we'll make that a public working circle.' "†

Dr. Orchard considered that it is not the function of Government to take the initiative in seeking to secure the permanency of any particular industry; to say, "Would you like a management licence? We approve your industry."‡ But the reward for foresight should not be denied.

> "When 'A' comes in and asks for timber; I will admit that perhaps at that time 'B' needed it just as badly as 'A,' but 'A' came and asked for it and 'B' didn't. Now, that is just everyday competition. 'A' is more far-sighted than 'B,' and in the long run 'A' is going to succeed and 'B' is going to go out of business, but he isn't going to go out of business because of Government allocation."§

* Transcript, p. 15773A.
† Transcript, p. 15536.
‡ Transcript, p. 17359.
§ Transcript, p. 17361.

On the other hand, in his opinion, competition might be aroused by auction of forest management licence opportunities in certain circumstances:—

"Q.—If forest management licences are to continue in the future, and they are to be granted in remote areas, should they be granted on the basis of open competition or should they not? A.—In a remote area where there is no established industry, or where there is ample timber for the established industry plus a lot more——

"THE COMMISSIONER: And where, I understand it, to use the factor we have been using before in this discussion, the person who applies doesn't have any timber of his own to contribute.

A.—Yes. Then, I don't see any reason in the world why it shouldn't be put up for public auction."*

But in areas where there is "any established pattern of important private ownership" public auction would not be practical. The private-timber owner "either gets his management licence or else nobody gets it; it wouldn't be practical for anybody else."

This alternative of offering a management licence at competitive sale was rejected for other reasons explained by Dr. Orchard:—

"The only way you can dispose of it by competitive bid is in the form of a bonus, and we propose to take all that is legitimately coming to revenue out of stumpage. Therefore, what you get at competitive bid is a bonus, pure and simple. It's money that has got to come out of what we believe are legitimate profits of operation. . . . I think it's an unjustified impost on industry."†

When the analogy with competitive bidding at Crown timber sales was pointed out in cross-examination, Dr. Orchard did not extend the same reasoning and concern for the purchaser's profits, although the upset prices for timber sales are appraised by the same methods as those for management licence cutting permits. He explained the difference in attitude thus, for management licences:—

"I believe the most practical way to get your revenue is to charge for the timber what it's worth when it's taken out of the woods. Now, if you're going to charge all that the—if you like to put it that way—traffic will bear, all that it is really worth when you dispose of the timber when it is actually cut, where is the money going to come from for this bonus? Isn't that an unfair impost on industry?"

With reference to competitors at timber-sale auctions: "Well, they penalize themselves. There's no compulsion there." And the blunt statement that management licences are "not for sale."‡

* Transcript, pp. 17365–17366.
† Transcript, p. 15534.
‡ Transcript, pp. 15543–15544.

The competitive system for disposal of Crown timber licences and leases has long been used in Eastern Canada. The methods adopted were explained in detail by Dr. J. Miles Gibson, Dean of Forestry at the University of New Brunswick, and Professor L. R. Seheult, of the same University, who presented a brief before this Royal Commission on behalf of a committee sponsored by the Vancouver Foundation. Following are extracts from the brief. In introducing the subject the authors of this brief stated that "the principles of stability of tenure and responsibility for sustained yield remain the cardinal points in any system of forest management," and that "economics must be as fully appreciated as silviculture and markets are just as essential as reforestation."

QUEBEC*

"After the Union of 1841 the timber question was one of the first to be dealt with and regulations were made at the first session of the United Parliament which limited the period of a licence, re-allocated licences improperly worked and stipulated sale by auction with a 'bonus bid' over the regular dues where there were two or more applicants for a berth. This was the first use of the auction principle in timber disposal in Canada. . . . The system of annually renewable licences, still in use in Quebec, originated at this time.

"It is indeed of interest that some of the points raised in this enquiry should have been pertinent and provided for by legislation over 100 years ago. The principle of auction, the question of preference in the renewal of licences, the exaction of ground rent, a penalty to encourage continuous operation and the increased export charges to encourage home manufacture, illustrate the measures adopted to cope with the problems of the day. From 1841 to 1867 Quebec and Ontario constituted one province and regulations, with some exceptions to meet local needs, were the same. The plan of selling the rights to cut timber under licence with the land remaining in Crown ownership was accepted as a continuing policy.

TIMBER LICENCES IN QUEBEC

Year	Square Miles	Per Cent of 1954 Licensed Area
1879	42,631	52.5
1880	47,125	58.3
1890	44,201	54.7
1900	51,194	63.4
1903	62,730	77.5
1954	80,749	100.0

"The forests of Quebec are administered by the Minister of Lands and Forests. Licences may be granted by him 'at such rates and subject to such conditions, regulations and restrictions as may, from time to time, be established by the Lieutenant-Governor in Council,

* Exhibit 144.

and of which notice shall be given in the Quebec Official Gazette.' It is significant that the period of tenure is one year but automatically renewable if the regulations are complied with and all dues and fees paid.

"Section 98 states that 'all timber limits within the unoccupied territory of the Crown belonging to the Province shall be sold at public auction.' However, the next section permits the Minister to issue without public auction special permits for a period of twelve months to cut on vacant Crown lands up to a limit of 150,000 cu. ft. per permit, subject to all dues in force. This quantity may be increased to 300,000 cu. ft. where the timber is to be sawn and the operation of the mill is an economic necessity for a neighbouring locality.

"However, owing to the fact that certain industries were in danger of running short of wood an Act was passed in 1946 entitled 'An Act to Provide for a Rational Exploitation of Certain Forest Lands.' The most important provisions of the Act are:—

"Section 1. 'The Lieutenant-Governor in Council may authorize the Minister of Lands and Forests to grant to the industries mentioned in the present section renewable cutting licences on Crown lands, for a price not inferior to $500 per sq. mile and subject to all conditions which he may deem equitable and advantageous for the Province and which he may determine.' This section goes on to enumerate the companies concerned and the area of timberland granted to each. Under this Act and amendments to it a total of 4,125 sq. miles have been granted to fifteen lumber and pulp and paper companies. The last amendment extends the time for these authorizations to December 31, 1956.

"The Act (section 7) provided that the grants of timber limits so made 'shall have the same effect as if they resulted from a sale at auction made in accordance with section 98 of the Lands and Forests Act.' These are therefore subject to all the terms and conditions of the ordinary licenses.

"Section 2 of this Act uses another principle which evidently was found necessary for carrying out the purposes of the Act. It reads: 'The Lieutenant-Governor in Council may also authorize the Minister of Lands and Forests to make, upon such conditions as he may determine, exchanges with owners of forest lands or with holders of timber limits, or to withdraw from such timber limits any portion thereof and grant in exchange for territories thus withdrawn renewable cutting licenses on Crown lands.'

"In 1948 another Act was passed which made possible, in certain limited cases, the granting of limits otherwise than by auction. The Act is entitled 'An Act to Stabilize Small Industry.' It enables the Lieutenant-Governor in Council to authorize the Minister 'to concede

to small industrialists, for their forest exploitation, wooded lands of the Crown domain, at a minimum price of $500 per sq. mile and subject to the conditions he may deem expedient to determine.'

"The area so conceded shall not exceed 600 sq. miles *in toto* nor 50 sq. miles to any one limit holder. These limits are subject to the usual terms and conditions and have the same effect as if they resulted from a sale by auction.

"The license of a limit holder is a negotiable security and can be transferred with the authorization of the Minister and upon payment of a transfer fee of $65 per sq. mile and the Lands and Forests Act provides for the registration of such transfers. The licensing system presents somewhat of a paradox, being at once very temporary and yet secure. On this basis the large pulp and paper industry with its heavy capital investment gets 65 per cent of its wood.

"The following is a list showing the areas held by corporations controlling over 1,000 sq. miles, taken from the 1954 report of the Department:—

Limit Holder	Area
1. Canadian International Paper Co.	17,436 sq. miles
2. Consolidated Paper Corp. Ltd.	13,757 „ „
3. Price Brothers & Co. Ltd.	7,755 „ „
4. Quebec North Shore Paper Co.	5,977 „ „
5. St. Lawrence Corporation Ltd.	5,201 „ „
6. Anglo Can. Pulp & Paper Mills Ltd.	3,150 „ „
7. Brown Corporation (now C.I.P.)	2,580 „ „
8. MacLaren Company Ltd., The James	2,578 „ „
9. Eddy Company, The E. B.	2,389 „ „
10. Eddy Company Ltd., The E. B.	1,541 „ „
11. Donnacona Paper Company Ltd.	1,372 „ „
12. Booth Lumber Ltd.	1,161 „ „
13. Gillies Brothers & Co. Ltd.	1,145 „ „
14. Gaspesia Sulphite Company Ltd.	1,136 „ „
15. New Brunswick Int'l Paper Co.	1,134 „ „
16. Cascapedia Mfg. & Trading Co.	1,061 „ „

"Only one of these is exclusively a sawmilling company, the others being pulp and paper companies, a few of which operate sawmills. Some of these companies own freehold lands in Quebec and also freehold land and timber limits in other provinces.

"Quebec was the first province to make regulations for the bringing about of sustained-yield (1923). Article 12 in the regulations promulgated under the Lands and Forests Act—'Each licensee must furnish to the Department, in addition to a working plan for the whole area which he holds under license, a special working plan for the sector to be operated during the first decade.' A copy of the outline for the management plan is presented as an exhibit as well as a license form (O/C 1099, April 28, 1948). The latter bears the notation, 'The licensee must exploit the forest within this limit according to a working plan and each year before starting cutting operations, he must secure from the Minister of Lands and Forests, the authorization to carry them out.'

" The quantity of wood to be cut in the course of each decade of the plan must not exceed the allowable cut for the decade ' except where it shall be judged opportune to regularize the forest stock.' There is a joint responsibility on the licensee and the Forest Service to examine the areas to be cut and ' to choose from the silvicultural treatments prescribed in the working plan, the one which should preferably be applied in each case.' This work must be carried out by a ' forest engineer ' (as defined by statute) who shall carry out the program. The names of the persons assisting him in the carrying out of this work must be submitted to the Department of Lands and Forests.

" The areas under management plans, 1954, are as follows:—

117 limits over 20 sq. miles each	69,759.0 sq. miles
15 limits of 20 sq. miles or less	172.7 „ „
	69,931.7 „ „

" Areas not subject to or not administered under management plan are as follows:—

47 limits over 20 sq. miles each	10,296.6	
75 limits of 20 sq. miles or less	521.2	
		10,817.8 sq. miles
Special forest reserves (forest syndicates)		986.0 „ „
Township forest reserves (farmers and settlers)		2,915.0 „ „
Total of all ' occupied ' Crown forest lands		84,650.5 „ „

" There is estimated to be about 80,000 sq. miles of Crown forest land in addition to the above. Most of this is in relatively remote areas. They contribute little to the annual cut of wood (about 7 per cent in 1954) and would require heavy capital expense to bring into production. In general, they are not of as good a quality as the forests now under management.

" It is thus evident that sustained-yield management is in the first few decades of the first rotation in Quebec. The first step taken has been to stabilize the existing industries. This is being brought about by some exchanges and by the granting of additional limits. In some cases the annual cut has been reduced, leaving it to the limit holder to secure additional supplics by purchase.

" Forest Areas, Inventory, Annual Cut, Working Plans, Province of Quebec

" Areas

Total Forest Area	345,000 sq. miles
Accessible, Productive Forest Area	191,000 „ „
Total ' Occupied ' Crown Forest Lands	84,650 „ „
Total Freehold Forest Lands	25,062 „ „

" Inventory

" There is no recently completed inventory for the whole province. Inventories made for working plans cover 70,000 sq. miles and during

the last 8 years, an inventory has been made of 11,000 sq. miles of unoccupied forests. The reported general inventory is as follows:

All species 10" D.B.H. and over	10,450	million cu. ft.
All species 4" to 9" D.B.H.	53,000	„ „ „
Provincial Total	63,450	„ „ „

" Softwoods make up 78 per cent of this total and in fact spruce and balsam comprise 62 per cent of the same total.

"Annual Cut

Total Cut Crown Lands (1953–54)	482	million cu. ft.
Total Cut Freehold Lands (1953–54)	436	„ „ „

" The Freehold cut includes 151 million cu. ft. of fuel wood.

" The Lands and Forests Act (Section 5) states that a reduction in stumpage may be allowed for approved silvicultural work. This however has not been used to any extent and any such work carried out has been at the licensee's expense. The Department of Lands and Forests does provide assistance in reforestation by providing planting stock free of charge or by payment of a planting bonus."

ONTARIO

" The early history of lumbering and the development of a licensing system was very similar to that in Quebec. Licences were granted after 1892 in which only particular species were included, so that the same area might be under licence to a pulp company for spruce and balsam and to a lumber company for all pine species.

"Another departure from Quebec practice came into being with the inception of the pulp and paper industry in the early years of the century. This was the allocation of limits by negotiated agreement on condition that a mill be built and operated. (Later this was extended to pulpwood export companies.) The agreements were for a 21 year term and have been renewed on expiry.

" Ontario also developed its own system of Crown charges for timber. When an area was put up for auction, besides the regular or ' Crown dues ' there frequently was set an upset price or ' bonus ' and with competitive bidding, a ' bid ' above the bonus. All charges are on a unit volume basis.

" Rights to cut timber fell into four categories:—

" 1. *Licenses* granted as the result of sale by auction. They were renewable annually on compliance with the conditions set forth.

" 2. *Agreements* as described above. The areas were usually large. Ground rent, protection charges, Crown dues, ' bonus ' and duration were specified.

" 3. *Permissions*. Special cases where an agreement or license is not in effect, generally covering an interim period before signing of an agreement.
" 4. *Permits* issued by the district offices for quantities of timber where the stumpage value did not exceed $500.

" PRESENT LEGISLATION IN ONTARIO

" The legislation dealing with forest administration and management developed over a long period of years in a rather piecemeal and perplexing manner. The 1947 Royal Commission recommended ' a thorough revision of this whole body of Statutory law and Regulations.' This was done and in 1952 the new ' Crown Timber Act 1952 ' was passed. At the same time the following were repealed:

" 1. The Crown Timber Act.
" 2. The Cullers Act.
" 3. The Forest Management Act.
" 4. The Forest Resources Regulation Act.
" 5. The Forestry Act.
" 6. The Mills Licensing Act.
" 7. The Provincial Forest Act.
" 8. The Pulpwood Conservation Act.

" The new Act is a simple framework setting out the various ways in which the Minister or his agents may grant licenses to cut timber and laying down the requirements of the management plan and the powers of the Minister to enforce measures to ensure continued productivity and stabilization of the forest industry.

" It simplifies and makes uniform the application of all regulations by defining *License* (Section Ie) to be ' any document heretofore and hereafter granted that authorizes the cutting of Crown timber ' and by Section 51 (2) which states: ' This Act and the regulations apply to every license heretofore or hereafter granted and where there is any conflict between this Act or the regulations and any license, this Act and the regulations govern.'

" The new Act maintains the three main methods of timber disposal and there are thus three different kinds of licenses.

" (i) The Minister (Section 2) may offer timber for sale by tender either to the public generally or to a restricted group ' as a source of supply of raw materials for mills in existence.' The period and terms are at the discretion of the Minister within the limits of consistency with the regulations.
" (ii) Notwithstanding the above the Minister may grant licenses to cut timber ' at such rates and subject to such terms and conditions as he may deem proper, if the Crown charges payable for such timber do not exceed $1,000 ' (subsection 6).

"(This legislation takes care of licenses equivalent to British Columbia timber sales and current small sales.)

"(iii) Section 3 states: 'The Minister, with the approval of the Lieutenant-Governor in Council, may grant licenses to cut Crown timber for such periods, subject to such terms and conditions as the Minister may deem proper and that are not inconsistent with the regulations.'

"This section enables the Government to make agreements as in the past for the establishment of new industries or to adjust the supply of raw material for existing ones. In the case of pulp and paper companies these agreements usually have been for terms of 21 years with renewals for further like periods. In the case of lumber companies the term is 9 years likewise renewable.

"Section 4 of the Act gives the Minister very wide discretionary powers to permit or direct the salvage of killed or damaged timber or such other timber which, in the interest of economic forest utilization, should be cut at the same time.

"In the year ending March 1, 1954, the following licenses were issued:—

23 sales disposed of by tender	70.4 sq. miles
18 areas disposed of by Order-in-Council	832.8 „ „
5 timber salvage sales	11.9 „ „
Total	915.1 „ „

"The area under license in Ontario March 31, 1954, was as follows:—

730 licenses and renewals issued 1953–54	10,943.1 sq. miles
33 licenses in suspense	349.0 „ „
763	11,292.1 „ „
Area under pulpwood and timber agreement	87,007.0 „ „
Total area under license	98,299.1 „ „

"There is a residuum of about 15,000 sq. miles of accessible vacant Crown lands.

"The new Act continues the practice of naming the species which may be cut under a license so that two licenses may be issued for different species on the same area. It is noteworthy also that because of the precarious situation of supplies of sawtimber in the hands of lumber companies, the Minister may (Section 24), 'having regard to reasonable business requirements of the licensee . . . determine the species and quantities of Crown timber that may be cut by any licensee for the manufacture of lumber, pulp, paper or other products.'

"Section 8 states that 'a license shall not confer on the licensee any right to the soil or freehold of the licensed area or to the exclusive possession thereof except as may in the opinion of the Minister be necessary for the cutting and removal of the timber thereon and the management of the licensed area and operations incidental thereto.'

"Section 12 provides that no licensee may commence cutting until the Minister has approved in writing the area designated for that particular year's cut. Section 14 sets out the conditions under which a license may be assigned, pledged or charged, and transfer fees are fixed by the regulations.

"The Act provides that the Minister by instrument in writing may authorize the Deputy Minister or any officer or agent to exercise such of the powers conferred by this Act on him as may in his opinion properly be exercised by the Deputy Minister or officer or agent. Everything done by the Minister under the authority of this Act shall be deemed to be of an administrative and not of a legislative nature.

"This exercise of authority has been formally set down and an exhibit is presented showing what powers have been delegated to the Deputy Minister, the Chief of Forest Management, the District Foresters and the Departmental Solicitor.

"POLICY REGARDING THE OFFERING OF CROWN TIMBER FOR SALE

"In 1953 the Minister approved a policy to be followed in the sale of timber. The declared objective of this policy is to stabilize industry within the limits of the public interest by the development of sustained-yield and to discourage casual enterprise with little prospect of a continuing supply of raw material.

"For the setting up of a system of priorities three groups of operators are recognized and three conditions of timber supply within the management units into which the whole province has been divided.

"*Group 1—Agreement Holders* (Licensees by Order-in-Council) whose timber has either in whole or part been obtained by negotiation.

"*Group 2—Ordinary Licensees* whose timber supply has been obtained entirely by public tender.

"*Group 3—Non-Licensees* deriving their timber supply by local permit or from private holdings or operators wishing to start a new business venture.

"The management units are classified as 'overcut,' 'balanced' and 'undercut' depending on whether the drain from current operations exceeds, equals or is less than the allowable cut within a working margin of 10 per cent.

"The priorities recommended are as follows:—

"1. An agreement holder and an ordinary licensee may obtain additional timber—

"(*a*) *In an Overcut Unit,* only by tender on a sale limited to others in the same group, but only if his present holdings are inadequate for current needs of an established plant.

"(*b*) *In a Balanced Unit,* by tender as in (*a*) provided his holdings do not exceed current requirements of his plant and on the understanding that the new supply will serve first to assure his current requirements and secondly to boost his output provided the expansion is approved by the Minister.

"(*c*) *In an Undercut Unit,* by negotiation or by tender in an offering to any of the three groups on the understanding that any industrial expansion dependent on the new supply has the approval of the Minister.

"2. A non-licensee may obtain timber only from an Undercut Unit by negotiation or tender provided his proposal fits into the plan for development of the unit. Before offering timber to a non-licensee, the need of the other two groups in adjacent management units would be considered.

"It is evident that the aim throughout is to assure the raw material for established industry and to chart an orderly use of surplus material.

"Freehold Lands in Ontario

"There are no regulations regarding the management of freehold forest lands. In one agreement with the Abitibi Power and Paper Company the government required that inventories and master plan include private holdings. The new Crown Timber Act does not specify that private lands be included in working plans but it is the practice of the department to request the licensee to list his annual supplies from other sources.

"In general the larger holdings are managed on a par with Crown lands but the smaller holdings, as elsewhere in eastern Canada, have been severely overcut. This also parallels European experience.

"Private lands have been yielding a more than proportionate amount of the annual cut but it is thought that lowering of growing stock and quality will result in lower yields in the future.

"Forest Areas, Inventory, Annual Cut, Working Plans, Province of Ontario

"*Areas*

Accessible, Productive Forest Land	132,000 sq. miles
Crown Land under Timber Licence	98,300 „ „
Total Freehold Forest Lands	19,055 „ „

"Of the freehold forest lands 6,000 sq. miles are in farm woodlots.

"*Inventory*

"Ontario has almost concluded its inventory program made with the assistance of the Federal Government under the Canada Forestry Act.

The area photographed to date	249,959 sq. miles
The area mapped to date	196,639 „ „
The area field sampled to date	195,249 „ „

" The general inventory is as follows:

All species 10" D.B.H. and over	15,297 million cu. ft.
All species 4" to 9" D.B.H.	58,853 „ „ „
Total	74,150 „ „ „

" Spruce and balsam form about 57 per cent of this total and the softwood comprise 73 per cent of the same total.

"Annual Cut

1953–54 Crown Lands	374,096,000 cu. ft.

" This is equivalent to 5.9 cu. ft. per acre on the area under licence and is over 90 per cent softwoods. The cut in 1952–53 was larger and amounted to 7.2 cu. ft. per acre. No information is available regarding the cut on private lands. The allowable cut on Crown lands is estimated to be 542,000,000 cu. ft. for softwoods. There is a very large surplus of hardwoods of a size not suitable for sawlogs. The allowable cut for hardwoods is estimated to be over 500 million cu. ft. per year against the present cut of 25 to 30 million cu. ft. Red and white pine are being seriously overcut.

" Working Plans

" The whole province is divided into 123 management units. Thirty-six of these are company management units and 87 departmental management units. Up to March, 1954, management plans had been prepared for 22 company units and 36 departmental units.

" Cutting plan must be approved annually and compliance with the management plan is checked periodically by District Forester's staff.

" No allowance has been made for special forestry costs which might be incurred by the licensee."

NEW BRUNSWICK

" New Brunswick became a separate province in 1784. For almost a century after that, grants of land were made for agriculture and for lumbering. Disposal of land by sale was also the policy at that time in the sister province of Nova Scotia and the neighbouring New England States. In 1883 this policy was reversed and no further sales of forest lands were made. About half of the total forested area of 14 million acres remains in Crown ownership today.

" During the time these lands were being sold a licensing system also grew up. In 1837 the management of Crown lands came under provincial control and licenses to cut timber were sold at auction. The fees were nominal and at first were payable on the manufactured product. In 1843 the leasing system had its origin; viz., timberlands were

leased for the period of one year on the basis of area, again on an auction bid.

"This system led to waste and overcutting and in 1851 the upset ground rent was raised and the term of lease raised to three years. During this period the province derived very little revenue from its timber, about 5 cents per M F.B.M. at a time when privately owned stumpage was selling at 20 to 40 times this figure. It was not until 1874 that a stumpage of 60 to 80 cents per M was introduced in addition to the ground rent.

"Probably no other Province has experimented so much with the duration of its licenses. The period was extended in 1877 to 5 years and in 1883 to 10 years. Nine years later a Royal Commission was appointed to make a full inquiry into the condition of the lumber trade and into the best policy to be adopted in administering the Crown timberlands. The Commission was so strongly impressed with the desirability of giving the lumberman a permanent tenure of his holdings that it recommended the leasing of the lands in perpetuity. This, however, was going further than public opinion was prepared to sanction and a compromise was made, the period being set at 25 years.

"Since that time further changes were made and at present the duration is 50 years for pulpwood licenses, 30 years for sawmill licenses and 10 years for licenses which are not directly associated with an industrial plant. Even now the matter has not been finally settled. Several licenses come up for renewal in 1963 and the terms and conditions of renewal is one of the matters before the New Brunswick Forest Development Commission now sitting (1955).

"The situation today is as follows:—

No.	Licenses	Area
5	50 year expiring 1978–1983	5,558.5 sq. miles
1	30 year+20 year extension expiring 1963	108.5 „ „
46	30 year expiring 1963	3,209.0 „ „
218	10 year expiring 1963	1,421.5 „ „
	Total area under license	10,297.5 „ „
	Crown land in reserve (cut over)	271.0 „ „
		10,568.5 „ „

"One of the present difficulties in New Brunswick is that some of these licenses are not being operated near their maximum productive capacity, even though the forests are all completely accessible. Although legislation imposes a minimum cut, this minimum is so low as to be ineffective in many cases. Records of the Forest Service show the amount cut in recent years expressed as a percentage of the estimated allowable cut, to be:—

1948–49	57%	1951–52	73%
1949–50	48%	1952–53	54%
1950–51	51%		

"About 70 per cent of the timber cut on Crown lands is pulpwood. The lumber industry finds itself in very much the same position as in Ontario, that is, without adequate reserves of raw material. Historically this was brought about largely because some of the largest lumber interests switched over to the manufacture of pulp and paper but it is also true that some other lumber interests sold out their holdings to the pulp and paper manufacturers.

" Small licenses are sometimes surrendered by their holders and may be disposed of by auction if applied for again. Permits may be issued to allow cutting of small amounts on vacant Crown lands and permits may also be granted to other parties to cut on licenses if the licensee fails to cut the minimum volume required under the regulations.

" Private Lands

" There are no regulations regarding the management of freehold timberlands. In general these lands are being cut 2.8 times as heavily as Crown lands (25 cu. ft. per acre compared to 9 cu. ft. per acre).

"As in other provinces the larger holdings are managed on a par with Crown lands. The smaller holdings have been severely overcut in recent years.

" Forest Areas, Inventory, Annual Cut, Working Plans, Province of New Brunswick

" Areas

Total Productive Forest Area	21,708 sq. miles
Freehold Forest Land	11,140 „ „
Crown Forest Land	10,568 „ „
Area under Licence	10,297 „ „

" Inventory

" Inventory based on aerial photographs now covers 75 per cent of the province. Recent inventories are available for 80 per cent of the Crown lands.

Total of all species 10" and up D.B.H.	1,300 million cu. ft.
Total of all species 4"–9" D.B.H.	7,650 „ „ „
Provincial total	8,950 „ „ „

" Softwoods form almost 70 per cent of the total and spruce and balsam comprise 59 per cent of the same total.

" Annual Cut

"Average annual cut in the period 1948–1952 (incl.) on Crown Lands, 62.7 million cu. ft. This is equivalent to 9.0 cu. ft. per acre of the area under licence and represents about 56 per cent of the allowable cut. The average annual cut on private lands in the same period

was 181 million cu. ft., representing a drain of about 25 cu. ft. per acre.

"Working Plans

" Management plans have been prepared for about 9,000 sq. miles. In general there is little difficulty securing regeneration of spruce and balsam. No cost allowance is made by the Crown for any special forestry work. Rotation age is 80–100 years for sawlogs and 40–60 years for pulpwood."

NOVA SCOTIA

" Shipbuilding and sawmilling developed at an early date in Nova Scotia. In 1785 ninety sawmills were operating. The policy of disposal of Crown lands by sale was carried further than in New Brunswick and it was not until 1899 that legislation was introduced to permit the leasing of timberland. By 1903 less than 1½ million acres of land of any description remained under Crown ownership and only 5 per cent of this was timbered.

" The picture has changed somewhat since 1925 with the organization of a Forest Service. Through resurvey it was discovered that the ownership of the Crown was greater than shown on the records and since then nearly half a million acres of cut-over land has been purchased, making a total of 2½ million acres. There are nearly 7 million acres of freehold forest lands.

" Much of the Crown land is covered with young age classes and is being held in reserve.

" The original leases were for a term of 20 years, renewable. The lessee paid 40 to 80 cents per acre to secure his rights and no stumpage. No leases have been issued for several years and the present policy is for use of short-term timber sales at competitive bids. The upset price is set high enough to take care of the write-off of any roads constructed by the Department. Ninety-eight of these cutting licenses were sold in 1953–54. Only 5 per cent of the annual cut is at present from Crown lands.

" Forest Areas, Inventory, Annual Cut, Working Plans, Province of Nova Scotia

"Areas

Total Productive Forest Area	11,555 sq. miles
Crown Forest Lands	3,090 „ „
Freehold Forest Lands	8,465 „ „
Area of Crown Land under Lease	744 „ „

"Inventory

" New inventory commenced in 1953 and will cover the entire province (under Canada Forestry Act).

General inventory—	
All species 10" and up D.B.H.	1,222 million cu. ft.
All species 4"–9" D.B.H.	2,425 „ „ „
Provincial Total	3,647 „ „ „

" Softwoods make up over 80 per cent of this total and spruce and balsam comprise 71 per cent of the same total.

"Working Plans

" No working plans. Crown lands under direct management of Provincial forest service (except on leases). Cutting on private land governed by the ' Small Tree Act.' Legislation enables the Minister to require a working plan on private lands but this legislation has never been acted upon."

I have recorded at some length conditions relevant to the disposal of Crown timber in these Eastern Provinces for purposes of comparison with management licences in British Columbia and for examples of procedures which have been suggested for application here. The disposal of licences by auction on the " bonus " system has been in effect in Quebec and Ontario for many years, and concurrently other Crown timber has been allocated to mill-owners without competition, particularly in cases where the operation of a mill is a local economic necessity. Licences in Quebec are for a term of twelve months only, but are automatically renewable, subject to payment of dues and compliance with the regulations. On this security great pulp and paper industries have developed. In Ontario there are annual licences and also, to encourage the construction of new mills, licences for twenty-one years, renewable subject to the regulations.

The timber-sale priority system in use in Ontario is also of interest in relation to the disposal of the allowable cut in managed units (public working circles) of Crown forest reserves in this Province. The question of priority was introduced by many witnesses and is dealt with in this Report under the appropriate heading.

The basic criticism of the management licence policy, that it creates monopolies in which Crown timber is sold to the licensee without competition, fails to distinguish, or greatly undervalues, the contribution which this policy should make to the permanent, sustained, and increasing production of manufactured commodities, upon which the critics themselves largely depend. The truck loggers, for example, agreed that the large manufacturing plants of the licensees are essential markets for their own industry. The manufacturers, for their part, agreed that the contract loggers or independent loggers are a vital part of this composite forest industry. Reducing the matter to its simplest terms, it would seem that the conflict arises through the desire of each of the classes of which the industry is composed to expand outside its field. The logger, not content with the profit to be

made in a logging operation, wishes to make a profit also on the stumpage value of timber without taking the responsibility for management of the forest in which it grows. The mill men, and this is particularly the case in the Interior, not content with the profit to be made by manufacture of logs bought in an open market, seek also a profit through buying an assured supply of Crown timber at non-competitive prices and doing their own logging. The timber-owners, the largest of whom are timber-owners of necessity in order to protect their great investments in integrated conversion plants, show increasing willingness to undertake the responsibility for permanent forestry on their own lands, provided the Government will allot them sufficient Crown timber to assure them a non-competitive supply for all, or a very large percentage of, their mill capacity; but they also seek the profit from stumpage values above the appraised price and the profits from their own logging divisions. Finally, the Government, unable to achieve the standard of forest management which it would like on all forest lands, is willing to delegate some of this responsibility to private enterprise, but finds it difficult to decide to what extent and to whom it should be delegated, difficult to cut the apron-strings of detailed control, and difficult to renounce the temptation to charge all the traffic will bear in the sale of its timber and of the timber grown by private enterprise on Crown land, even to the extent of including in its appraisals some of the profit of manufacturing which it does not undertake.

A major cause of these phenomena, in addition to increasing competition in an expanding industry, is a tendency toward integration of growing, logging, manufacturing, and sale under single control. Such integration, if economic and efficient, can be regarded as undesirable, in my opinion, only if the social effects are unacceptable to our people. The weight of evidence and argument of the loggers and small-mill operators are concentrated in placing the blame for their difficulties, not always logically, on the allocation of Crown timber to forest management licensees. It was held to be a way of life, an intrinsic right, that each generation of British Columbians should find public timber available for them to acquire as their foundation for independent economic ventures. The validity of this independent concept was admitted by most of the large companies. Provision for it has long been made by the Government in the establishment of forest reserves and new public working circles from which the allowable cut is sold in small parcels to the highest bidder, and in forest management licences from which a percentage of the logging must be offered by the licensee to contract loggers. It is, I consider, in the public interest that an adequate field for an independent logging industry be maintained and protected.

When valuable natural resources, in this case the use of land, are to be awarded by selection rather than by competitive bidding, selection should be based upon clearly expressed Government policy. In my opinion not

sufficient distinction has been made, in the award of management licences, between those whose services to their community have justified their selection for a preferred position of security above their competitors and those who are merely shrewd enough to seize an opportunity. There has been no clear principle to guide this selection, no "set of rules" whereby a prospective licensee could assess his own qualifications and know that these qualifications would be recognized by the Government and required of him and other licensees on an equal basis. Each application is treated "on its merits," but a consistent estimate of "merit" is not apparent. Nor have the particular merits which justified each award been made public at the time or since.

There is no adequate provision for competitors and opposing interests to present their views. The very fact that an applicant is required to submit his case in considerable detail and to obtain the Department's permission before he advertises his intention implies a certain *ex parte* approval, even though no definite commitment is made. This is not in the public interest. In my opinion not only should a preliminary notice of intention be advertised, in newspapers circulating in the district, in which notice counter-proposals would be invited before any negotiations with the Department are commenced, but the Department should be responsible to see that knowledge and nature of the proposed licence and its boundaries be transmitted to all forest-land holders whose property and interests may be directly affected by the proposed licence.

Apart from the allocation of timber in undeveloped regions to encourage development of a new industry, the two basic reasons for granting a licence are support of a mill of proved value to the community and inducement for private forest-land owners to place their lands under good forest management. In 1945 I contemplated the allocation of Crown lands to owners of conversion plants who already possessed forest lands of their own but not enough to support their plants. The Act provides that the Department may grant, and the Department has granted, forest management licences to persons with no land of their own, even to some with neither land nor plant. This is particularly the case in the Interior, where the average proportion of Crown contribution of productive land to the forest management licences awarded to date, as will be seen on Table 13, is 99+ per cent.

The average Coast management licence includes 13 per cent Crown-granted forest land, 25 per cent Crown lands held under temporary tenures which have been made permanent by their inclusion in the management licence, and 62 per cent previously unalienated Crown land. These percentages may be weighted in relation to the proportions of all forest land under the three headings mentioned. Of all Coast forest lands, 16 per cent are Crown-granted, 14 per cent are Crown lands held under temporary tenure, and 70 per cent are unalienated, including for this purpose

lands allocated to forest management licences. Of the Interior forest lands, 4 per cent are Crown-granted, 1 per cent are held under temporary tenure, and 95 per cent are unalienated, disregarding management licences.

It appears, therefore, that the amount of Crown forest land committed as inducement for the dedication of private lands to permanent forestry on the Coast is more closely geared to the proportion of Crown land which exists and may be acquired than to the area of private lands dedicated. It also appears that the system has greatest attraction for the owners of temporary tenures, which are thereby made permanent if the owner is able to include them in a forest management licence. In the Interior the area of private land which has been brought under forest management by the management licence policy is insignificant; this objective seems to have been lost in the development of licences to support selected mill-owners who are completely dependent on Crown timber.

It is now reasonably possible to dissect the fibres which both constitute and control the growth of the forest policy which is manifesting itself in the development of public and private forests, and in particular the development of forest management licences.

The objective of this policy has commonly been defined as sustained-yield management, and it is worth repeating that no opposition to this objective has appeared from any quarter. It is important to realize, however, that sustained yield is not an end in itself; more properly it should be regarded as an instrument by which the real purpose of our forest policy may be achieved. This purpose is social and economic rather than technical; it is the use of British Columbia forest for the maintenance of maximum and stable employment and profitable production of manufactured commodities for sale in the markets of the world. To achieve this purpose, sustained-yield management is an essential tool.

The forests of commercial quality are so important a part of British Columbia's natural resources that their use to supply the wood-manufacturing industries must be regarded as their chief function and other uses as subsidiary. These subsidiary uses may, however, regionally assume enough importance to require modification of the sustained-yield principle. For example, in some part of the Province, notably the Okanagan drainage-basin, forest management for water conservation may demand a higher priority than for maximum production of sawlogs. These considerations apply not only regionally, but also to individual units of the region, including forest management licences.

The allocation of use priorities, integrated or exclusive, may create local problems more complicated than those involved in the allocation of a forest unit to one mill or another. It is fortunate that for the most part these conflicts can be adjusted and the same forest managed so as to serve more than one use. Conflicts have, however, already appeared both on the Coast and in the Interior. The interests of mining, cattle-grazing and

farming, commercial fishing, recreation, hunting and sport fishing, ski-ing, summer homes and camp-sites were all represented before the Commission by those who thought these interests were being, or might be, adversely affected by forest management policy, particularly in forest management licences. I propose to deal in other sections of this Report with the representations concerning mining, grazing, and other multiple forest uses. With regard to the uses generally classed as recreational, the evidence is chiefly concentrated on access and use of roads built by management licensees for forestry purposes. This subject is also to be treated under a separate heading.

At this stage, however, I am dealing with the administration and management of forest management licences as the source of commercial wood-supply. For this purpose, as I have shown, sustained-yield management is an essential tool, but it must not be taken for granted that sustained yield of any particular species, size, quality, or for any particular product or manufacturing process, even though it may happen to be presently in existence, must be applied indiscriminately, immediately, or for ever. The hands of progress and invention must not be tied by contracts narrowly concentrated on the present.

In deciding whether or not a forest management licence should be awarded in an area, or to which applicant where more than one applies, first consideration should be given to the relative importance of the individual proposals in fulfilling the function of a permanent forest toward the pre-eminent social and economic objectives I have described. Secondly, consideration should be given to the contribution of timber and productive forest land which the applicant is himself prepared to make to the licence. Evidence indicates that these two features have not always been given first consideration in the award of licences to date; yet they are the basic reasons for the award of any licence; first, to repeat, stability of employment in dependent communities, and, second, establishment of permanent forestry on private lands.

It will be noticed that I have not recommended that "existing industry" should *ipso facto* be entitled to priority. The meaning of this term relative to the forest management licence policy is in some doubt. The loggers' Associations consider that the independent logger, moving from place to place to log timber bought from the Crown or private owner, selling his logs to mills by contract or on the open market, should be regarded as an "existing industry." His security should be provided, they contend, not by award of a forest management licence, which he does not want, but by reserve of Crown forests to be managed by the Government in public working circles. It is doubtless true that the term "industry" can include logging—an interpretation apparently acceptable in one sense to the Service—but it is an incomplete or intermediate industry of a similar nature to the transport "industry" whether it uses rail, truck, raft, barge, or

tanker. No one has suggested that forests should be set aside to support the tug companies. They all do their share of the work in attaining the social and economic objectives. Arguments as to their relative importance are reminiscent of the old fable of the body and its parts.

The first of my two criteria for examination of the relative merits of management licence applications implies that industry, for this purpose, must be regarded as almost synonymous with manufacture, since it is the perpetuation of export trade, which is the ultimate objective of British Columbia forest policy. The manufacturer employs not only his own mill crews, but also, indirectly, the loggers and the foresters upon whom he relies for his supply of timber, whether they are "independent" or not. But it does not follow that the manufacturer must do his own logging to the exclusion of the subsidiary industry.

In award of management licences, first priority must be given therefore, in my opinion, to the pulp and paper industries and other large conversion units, especially the great integrated organizations, because of their relative stability, the enormous investment required for their establishment, their continuous prosecution of research and development of new and better uses for wood, their ability to offer continuous, profitable employment, the support of communities, and their direct and indirect contributions to the Provincial taxation structure. On the premise stated, it is implicit in my recommendation that the position of existing industry, meaning in this context companies with mills already producing and integrated expansion already provided for, with existing communities dependent upon their continuous operation, must be carefully examined before any further awards of Crown timber are made to encourage new companies to invest in this field, except in the presently remote and undeveloped areas of the Province. This is of particular importance on the Coast.

After the contracts are signed for the licences which have already, in effect, been awarded subject to approval of working plans (*see* list in Table 18), it is my opinion no more applications should be encouraged until satisfactory surveys, as I have recommended, have been completed by all licensees, permanent licence boundary adjustments and surveys, as I shall describe, have been completed, and more reliable yield capacity and allowable cut estimates have been prepared for each licence. As I have recommended a maximum period of five years for that purpose, this may be taken as a general indication that no new forest management licences should be awarded during the same period, with certain exceptions, unless special circumstances can be shown which would justify the grant in the public interest, and after opportunity has been given, with publication of all relevant facts, for expression of opinion by organized industry in the forest district concerned.

It would, I think, be desirable that the opinion of the Provincial Advisory Council be sought as to whether or not the special circumstances

of the applicant are sufficient to justify the award of the licence, but I do not go so far as to say that the approval of the Council must be regarded as a condition precedent to the award. Its approval or disapproval, while not determinative, should, however, be a weighty factor.

One exception I have in mind is in relation to the award of licences in underdeveloped areas and with especial reference to the Interior, I believe encouragement should be given to the establishment of integrated organizations, where economic conditions will permit, and utilization of surplus forest growing capacity can provide new industries and support of existing or new communities on a permanent basis through the award of forest management licences subject to my previous comments concerning publication of notice of intention to apply and with an opportunity afforded for all interested parties to submit counter-proposals.

Another exception is my view in regard to the present relative positions of the major integrated industries on the Coast. Among applications that have not yet been approved, except for advertising, are some of the earlier ones, including those of the operators of large and efficient pulp and paper and other manufacturing plants at Powell River, Ocean Falls, and New Westminster. These companies' applications, to the extent they are prepared to contribute their private holdings to management licences on an equitable basis relative to the Crown contribution, should, in my opinion, be regarded as exceptional and awarded on similar terms to those which have been granted their competitors among the major industrial organizations before consideration is given to additional applications from the present holders of management licences of this class.

On the Coast also, because of the demand for timber by independent loggers to satisfy the open log market and the requirements of log-buying mills with no timber of their own, a further exception should also be made in favour of other applicants who have mature volumes of their own but not enough for a sustained-yield operation and who are willing to allocate enough private timber to satisfy the allowable cut of the licence on a sustained-yield basis by the addition of Crown logged-off and immature areas but with the inclusion of little or no mature Crown timber. This form of licence is exceptionally advantageous to the Crown in that it allows the Forest Service to sell the merchantable Crown timber in the licence area by public timber sales while responsibilities of management of these areas, after logging, is undertaken by the licensee, who will obtain his return only after the second growth matures. An example of this concept is found in F.M.L. No. 2.

Generally speaking, and whenever management licences are granted, priority in award of a licence in an area suitable for management as a sustained-yield unit should be given to the major owner of private timber within the area. This priority should, I think, be absolute if the major owner contributes a volume of timber equal to one-half or more of the

volume of Crown timber within the proposed licence area. If there is no owner with this proportion of timber within the sustained-yield unit area and more than one with 10 per cent of the Crown volume, no licence should be awarded except by consent of such private-timber owners in the licence area.

Unless an applicant is prepared to contribute not less than 25 per cent of either the merchantable timber or the productive forest land within the proposed licence area, no licence should be awarded without provision for public competition. This competition could be expressed either in the form of a lump-sum payment as a bonus or in the form of a percentage addition to the unit rates of stumpage, which will be appraised by the Forest Service each year as at present.

All licence contracts should require that a percentage of the annual cut, regardless of tenure, not less than the original percentage of Crown timber in the licence, must be manufactured in the licensee's own conversion plants. If the licensee has no conversion plant, the contract should require that this percentage be sold in the open log market.

Perpetuity.—I have explained why the management of a forest on a sustained-yield basis is a continuous operation requiring a continuous cost of maintenance in addition to the initial investment. No specific term of years can be allotted to this investment, at the end of which it may be considered to be liquidated as if it were merely a certain volume of timber the value of which might be recovered by the time the last tree is cut. In consequence the award of a management licence has been made " perpetual " both by Statute and contract. This feature was a major reason for opposition to the present policy on the ground that it destroyed or weakened control by Government over large tracts of public timber. On the other hand, the detailed control, which I have described and which is, in my opinion, necessary and sufficient to ensure performance of the obligations undertaken by the licensee and, with certain modifications which I recommend, to secure a proper return to the public treasury, was criticized by some licensees as excessive and detrimental to good forest management.

In order to make Government control more evident to the public, I recommend that in future contracts the " perpetual " term be eliminated and the licence be made subject to payment of dues and fulfilment of all obligations specified in the contract, for a term of either twenty-one years or the time when the sum of the actual annual cuts from the licence area, regardless of tenure, has reached a volume not less than the volume of private timber contributed to the licence by the licensee. At the end of this period or of twenty-one years, whichever is the greater, the licence shall be renewable, subject to renegotiation of terms and conditions in accordance with provisions of the " Forest Act " at that time.

I have mentioned, under the heading of " Sustained Yield," that the evidence indicates that some management licences may be overstocked and capable of producing a greater annual yield than was estimated at the time of their award. This situation is not in the public interest and is one of the reasons for my recommendation of prompt and accurate surveys of the capacity of each licence. If a licence is found to be overstocked, I recommend that the licensee be given a reasonable time to provide manufacturing capacity to utilize the extra volume, or, failing that, the surplus volume, in selected areas related to the current working plan, be advertised for competitive sale each year by the Forest Service until the licensee is able to make proper use of the whole annual yield. It would not be in the public interest to destroy or damage the efficiency of a management licence under sustained-yield management by arbitrary reduction of area to suit an arbitrary production volume. This recommendation is consistent with the present thinking of the Department as disclosed in answer to a specific question as to whether a management licence, which had been designed by the Forest Service to supply a conversion plant with a certain annual yield, should be reduced in size because later it is found capable of producing a greater yield. Dr. Orchard replied:—

> " You have got into management details. Let's say, just for the sake of argument, that the licensee, the mill, can use 100 million and the licence was designed to produce 100 million, and we find that, in fact, it will produce 200 million. It doesn't follow absolutely that it would be wise to take it away from them. Maybe they are the best people to utilize it."*

In that instance and until plant capacity is sufficient to absorb the productive volume of the licence, it seems to me that public sale by the Forest Service of timber seriously undercut by any management licensee, relative to consumption, should be made in lieu of the present payment of penalty stumpage which does nothing to bring the growing stock and yield into balance.

For overcutting over a period of ten years, in addition to the present financial penalty, there should be a rigid restriction of all logging operations in the licence area until the capacity and production can again be balanced.

Boundaries.—Following completion of survey on a standard adequate for sustained-yield management, the boundaries of each management licence should be permanently decided and defined on the ground. The controlling principle in location of these boundaries should be efficiency of management, as I have mentioned under " Sustained Yield " in connection with the organization of the licence area. This is especially important in order to forestall future conflict where two management licences or a licence and a public working circle are immediately adjacent. Examination of maps and descriptions of present boundaries indicate that this principle was not suffici-

* Transcript, p. 17376.

ently recognized in the original allocation of areas to management licences. When changes appear to be desirable, they should be negotiated with the licensee, or between the two licensees, where there is a common boundary, rather than decided unilaterally by the Forest Service.

Should the survey disclose a greater capacity for annual production than was originally planned for a licence, it would be a mistake in all such instances to reduce the area to the detriment of good management, as I have already explained. The important thing is to get the land under management; this necessitates careful and detailed planning, which in turn requires stability. A management licence area is, in fact, a tree-farm; who owns it, who manages it, now or in future, is of secondary importance, provided it is managed with ability, interest, and imagination. Col. W. B. Greeley, an early Chief Forester of the United States, writes:—*

> " First and last, a tree farm stands for awakened interest in the land that grew the timber. It has started a new kind of timber cruising. Many foresters have been employed to inventory cut-over and second-growth lands. They are mapping the growing quality of the soil, its present stocking with young trees, the areas in need of planting. They are locating snag patches and other fire hazards. They are tallying growth rates. The industry is appraising its long-neglected asset—the growing power of the soil. It is setting up the records and employing the techniques of long-range forest management. It is learning the first precept of forestry: *Know your own land and what it will grow.* Study it as a good farmer studies his fields. That is where forest management begins."

Such ingenuous, persistent, and efficient personal interest can only be expected of an owner who knows that his boundaries are secure and his ownership invulnerable.

Definition of these permanent boundaries on the ground opens a new field for land surveyors. The old-fashioned wooden posts and tree blazes belong to a past age when man's interest in forest land disappeared, together with the posts and blazes, after the timber was cut. The following comments† by British Columbia's Surveyor-General, Col. G. S. Andrews, are relevant:—

> " In the allocation of territory, the problems of delimitation and demarkation should be anticipated with a view to avoiding complications. The negotiators responsible for both allocation of territory and delimitation of boundaries seldom have the benefit of personal observation of the ground. They depend mainly on documentary evidence in reports and maps. In these as well as in so many other aspects of forest management licences the need and value of good maps and air photographs cannot be over-emphasized.

* " Forests and Men," p. 168. Doubleday & Co., 1951.
† Memorandum, December 31st, 1956.

" Cadastral boundaries pertaining to District Lots and certain inferior categories of tenure have been convenient for incorporating into forest management licence boundaries. It should be appreciated that the neat appearance of these on official records, maps and plans does not ensure that they are correctly located or that they are recoverable on the ground.

" In the worst category from the above point of view are so-called T.L.s and S.T.L.s. These are not accepted as official surveys under the Land Act, and it has been departmental policy to cancel them as soon as reversion to the Crown affords the opportunity. . . . The majority were ' surveyed ' by compass and none is under 35 years of age. Their corners were marked by wooden posts—most of which have disintegrated through the ravages of decay or fire. In the case of groups only the outside perimeters were run, often with gross closing errors. In such cases the interior lines exist only on paper."

When it is realized that these ancient, obliterated timber licence boundaries have been frequently used to define the limits of great forest tracts allocated to private ownership for perpetual management in the forest management licences of the Coast, and that they are not accepted as legal surveys, it becomes evident that an improved method of defining ownership and responsibility is past due. Investigation and experiment should be made in the use of aircraft and air photography for marking and mapping monuments on watersheds and other topographic features where these are suitable for permanent boundaries of forest management licences. Colonel Andrews agrees with this, and also:—

" There is a need for experiment in the matter of artificial boundary marking of the line between monuments. Little can be said here beyond indication of some requirements and a few suggestions for experiment. A primary need is easy recognition both on the ground and from the air, visually and photographically. Permanence is another requirement. Renewal should not be necessary within periods of 50 years."

Thirty per Cent Clause.—As the award of management licences progressed, representations were made to the Government by independent loggers who complained that the traditional areas in which they had been accustomed to operate on competitive Government timber sales, or in which they had anticipated working in the future, were being closed to them in some degree by inclusion of these areas within management licence boundaries. In the later contracts, beginning with No. 14, in 1953, the Government, in apparent recognition of these complaints, required the inclusion in the licences of a contract clause reading as follows:—

> " In the process of harvesting the crop from the licence area, the Licensee shall provide the opportunity for contractors other than the Licensee's own employees or shareholders who own more than one per cent interest to harvest a minimum of thirty per cent* of the allowable cut on Crown lands not held under other tenure as set forth in each succeeding management working plan, but where the Minister is satisfied that such contract operation is not feasible, either by reason of lack of operators or for other good and sufficient reason, the Minister may relieve the Licensee in whole or in part from this responsibility."

As this provision applies only to Crown timber, it would be possible for all logging in any year to be done in private timber in a licence, with none available to contract loggers under this clause. In my opinion, the provision should apply to all timber in the licence regardless of tenure, but the annual volume should not exceed the percentage of Crown mature timber allocated to the licence. (On the Coast this averages out at 62 per cent.) I have reached this conclusion upon the basis that this volume of Crown timber before being included in the licence might possibly have been considered as open to small loggers to purchase on future timber-sale contracts and that the granting of the licence deprives him of that opportunity. On the other hand, the licensee is entitled to the timber on the licensed area. If the smaller loggers are allowed the opportunity of logging the volume of which they were possibly deprived and the licensee gets the production, I do not see any real objection to extending the contract clause as I have suggested. Selection of locations for contract logging and of the contractors should be made by the licensee, and the price, either on a stumpage basis or on a piece-work or service basis, should be determined by negotiation.

I would retain in the licence contract the present provision vesting in the Minister the right to relieve the licensee from full compliance with this obligation as it relates to the volume of timber to be offered to contract loggers.

Should a dispute arise between the licensee and contractor as to price and terms that cannot be settled by negotiation, then I would think the matter in issue should be determined by a Board of three to be appointed by the Chairman of the Provincial Advisory Council. Each disputant should have the privilege of recommending an appointee, but the Chairman of the Board should be selected and appointed by the Chairman of the Council. This tribunal should function as an Arbitration Board and its decisions be final and binding.

Proposals were made that timber to be cut under this clause should be offered at competitive sale by the Forest Service subject to payment of approved " forestry costs " to the licensee and first refusal of the logs at

* In F.M.L. No. 22 the contract increased the 30 per cent to 65 per cent in respect to the area in this licence which was formerly within the Clayoquot Public Working Circle.

current market prices (on the Coast) offered the licensee. I have given much thought to this proposal and have reached the conclusion that such an arrangement, if included in every licence contract, would be in general an impracticable interference with the licensee's management obligations.

In a final word on this subject, it is my view that the present so-called " 30 per cent clause " should be drafted for inclusion in future licences so as to leave no doubt of its intent to provide the fullest opportunity to contract loggers to log on a reasonable price basis the percentage of the volume of timber contributed by the Crown to the licence whether that volume is currently logged from Crown or previously privately held timber, subject to the right of the Minister to relieve the licensee from this obligation to the extent he may, according to the circumstances, deem it impracticable for the licensee to fulfil.

It is my considered opinion that forest management licensees should not be permitted to acquire, either directly or indirectly, additional timber from public working circles or unalienated Crown lands unless the licence contains the provision for contract logging to the extent I have recommended. Licensees holding licences up to No. 14 and those with the present contracting-out clauses inserted therein should, at their request, be entitled as of right to have their licences amended to include the recommended provision for contract logging, which would thus qualify them to continue to acquire timber from public working circles and unalienated Crown land.

During the writing of this section of the Report I decided not to break the text by the insertion of tables. In consequence, these are now together in one place on the following pages. The information contained therein was compiled as a result of a careful analysis of all licences issued to date by the late Mr. F. D. Mulholland. They are, I think, self-explanatory.

TABLE 9

LICENCES AWARDED

F.M.L. No.	Name	Original Licensee	Present Licensee	Affiliation
	Vancouver District			
2	Duncan Bay	Canadian Western	Elk Falls	Crown Zellerbach.
4	Blind Channel	M. C. Carroll	D. A. Morrison	
6	Quatsino	B.C. Pulp & Paper	Alaska Pine	Rayonier Inc.
7	Salmon River	Salmon River Logging	Salmon River Logging	Powell River Co.
10	Toba	Timberland Development	Timberland Development	Canadian Collieries.
12	Hardwicke	Bendickson Logging	Bendickson Logging	Alaska Pine.
17	Knight Inlet	Evans Products	Evans Products	
19	Tahsis	Tahsis Lumber Co.	Tahsis Lumber Co.	East Asiatic.
20	Tofino	MacMillan & Bloedel	MacMillan & Bloedel	
21	Alberni	MacMillan & Bloedel	MacMillan & Bloedel	
22	Maquinna	B.C. Forest Products	B.C. Forest Products	Scott Paper.
	Prince Rupert District			
1	Port Edward	Columbia Cellulose	Columbia Cellulose	Celanese Corporation.
	Prince George District			
5	Mackenzie-Cariboo	Western Plywood	Western Plywood	
	Kamloops District			
9	Okanagan West	S. M. Simpson Ltd.	S. M. Simpson Ltd.	
15	Inkaneep	Oliver Sawmills	Oliver Sawmills	
16	Monte Lake	Pondosa Pine Lumber	Pondosa Pine Lumber	
18	Clearwater	Clearwater Timber Products	Clearwater Timber Products	Swanson Lumber, Alberta.
	Nelson District			
3	Little Slocan	Passmore Lumber Co.	Passmore Lumber Co.	
8	Boundary Creek	Boundary Sawmills	Boundary Sawmills	
11	Carmi	Olinger Lumber Co.	Olinger Lumber Co.	
13	Bull River	Galloway Lumber Co.	Galloway Lumber Co.	
14	Spillimacheen	Cranbrook Sawmills	Cranbrook Sawmills	
23	Arrow Lakes	Celgar Development	Celgar Development	Celanese Corporation.

TABLE 10

F.M.L. No.	Appurtenant to—	Yield Restriction	Transfer
Vancouver District			
2	100,000-ton pulp at Duncan Bay	15,000,000 cu. ft.	No restriction.
4	No restriction	None	With consent.
6	15,000 M cu. ft. plant at Quatsino	20,000,000 cu. ft.	Tied to plant.
7	10,000 M cu. ft. plant in Vancouver Forest District	80 per cent to plant	Consent with plant.
10	No restriction	None	With consent.
12	No restriction	None	After ten years.
17	No restriction	None	After ten years.
19	No restriction	None	After ten years.
20	No restriction	None	After ten years.
21	No restriction	None	After ten years.
22	Plants, including 80,000-ton pulp-mill on Vancouver Island	80 per cent to plants	After ten years.
Prince Rupert District			
1	80,000-ton pulp at Watson Island	80,000-ton mill	No restriction.
Prince George District			
5	1,500 M cu. ft. plant, Quesnel vicinity	80 per cent to plant	With consent.
Kamloops District			
9	Plant on Okanagan Lake	80 per cent to plant	Tied to plant.
15	No restriction	None	After ten years.
16	No restriction	None	After ten years.
18	No restriction	None	After ten years.
Nelson District			
3	1,800 M cu. ft. plant, Slocan vicinity	80 per cent to plant	With consent.
8	1,500 M cu. ft. plant in Kettle Valley	80 per cent to plant	Consent with plant.
11	No restriction	None	Consent after 10 years.
13	No restriction	None	After ten years.
14	No restriction	None	After ten years.
23	24,000 M cu. ft. plants, including pulp-mill at Castlegar	None	After ten years.

TABLE 11

RELATIVE DATES

F.M.L. No.	Intent	Application	Contract	Protests	Public Hearings	Appeal to Cabinet
Vancouver District						
2	28-10-46	7-3-47	24-1-49	45 and T.L.A.[1]	None	12-3-48
4	21-3-48	17-9-48	15-5-50	1	None	None
6	8-12-47	6-2-48	26-10-50	3	None	None
7	8-5-47	26-6-48	15-12-50	7 and T.L.A.	None	None
10	25-1-47	6-12-47	7-11-51	4	None	7-1-54 (Ext.)
12	?-2-48	28-4-49	25-2-52	None	None	None
17	9-5-47	26-8-47 15-10-51	29-7-54	67 and T.L.A.	3-8-48	23-7-48 6-1-54
19	30-9-46	14-10-53	23-12-54	2	None	10-5-54
20	29-11-44	30-7-47	24-1-55	7 and W.C.S.O.[2]	None	None
21	13-10-44	4-12-47	19-3-55	4 and W.C.S.O.	None	None
22	8-8-46	25-6-51	18-5-55	11 and W.C.S.O.	None	18-4-55
Prince Rupert District						
1	20-7-46	19-6-47	4-5-48	16	None	None
Prince George District						
5	19-6-47	19-8-47	15-5-50	25	10-5-48	None
Kamloops District						
9	22-2-47	16-7-49	16-8-51	10	None	None
15	6-8-47	22-12-50	22-4-54	None	None	None
16	29-8-50	24-11-50	22-4-54	3 and I.L.S.O.[3]	None	None
18	———	5-4-47	2-11-54	None	None	None
Nelson District						
3	———	19-4-48	1-2-50	None	None	None
8	———	23-7-48	26-1-51	4	None	None
11	———	23-8-48	14-1-52	4	None	None
13	———	2-3-50	17-6-52	2	None	None
14	25-9-50	21-11-50	23-12-53	36	None	None
23	14-10-47	9-7-51	20-7-55	Many	21-4-52	24-10-52

[1] Truck Logging Association.
[2] West Coast Small Operators.
[3] Independent Loggers and Small Loggers' Association.

TABLE 12

F.M.L. No.	Total Area in Licence (Acres)					Percentage	
	Vacant Crown Land	Timber Licence	Total Crown	Crown Grant	Total	Crown	Private
Vancouver District							
2	244,625	5,314	249,939	128,500	378,439	66	34
4	4,353	.....	4,353	.....	4,353	100	....
6	291,303	131,042	422,345	3,655	426,000	99	1
7	120,782	38,972	159,754	358	160,112	100	....
10	138,970	545	139,515	.....	139,515	100	....
12	18,851	4,417	23,268	.....	23,268	100	....
17	272,419	.....	272,419	1,230	273,649	100	....
19	367,291	26,390	393,681	2,271	395,952	99	1
20	278,574	55,300	333,874	90,250	424,124	79	21
21	360,269	244,800	605,069	30,400	635,469	95	5
22	311,165	55,500	366,665	24,370	391,035	94	6
Totals	2,408,602	562,280	2,970,882	281,034	3,251,916	91	9
Prince Rupert District							
1 (C.)	240,615	5,272	245,887	.....	245,887	100	....
Totals, Coast	2,649,217	567,552	3,216,769	281,034	3,497,803	92	8
Prince Rupert District							
1 (I.)	1,811,061	.....	1,811,061	.....	1,811,061	100	....
Prince George District							
5	83,745	.....	83,745	215	83,960	100	....
Kamloops District							
9	194,433	.....	194,433	1,102	195,535	99	1
15	134,757	.....	134,757	.....	134,757	100	....
16	137,195	.....	137,195	.....	137,195	100	....
18	177,575	.....	177,575	.....	177,575	100	....
Totals	643,960	.....	643,960	1,102	645,062	100	....
Nelson District							
3	196,625	.....	196,625	.....	196,625	100	....
8	111,010	.....	111,010	.....	111,010	100	....
11	80,815	.....	80,815	.....	80,815	100	....
13	57,280	.....	57,280	.....	57,280	100	....
14	232,570	4,410	236,980	.....	236,980	100	....
23	2,502,568	30,100	2,532,668	.....	2,532,668	100	....
Totals	3,180,868	34,510	3,215,378	.....	3,215,378	100	....
Totals, Interior	5,719,634	34,510	5,754,144	1,317	5,755,461	100	....
Grand totals	8,368,851	602,062	8,970,913	282,351	9,253,264	97	3

TABLE 13

F.M.L. No.	Productive Land (Acres)					Percentage	
	Vacant Crown Land	Timber Licence	Total Crown	Crown Grant	Total	Crown	Private
Vancouver District							
2	163,612	2,644	166,256	114,370	280,626	59	41
4	3,881	.....	3,881	.....	3,881	100	....
6	188,967	103,626	292,593	3,617	296,210	99	1
7	83,697	34,001	117,698	358	118,056	100	....
10	48,742	545	49,287	.....	49,287	100	....
12	12,702	3,219	15,921	.....	15,921	100	1
17	45,794	.....	45,794	685	46,479	99	1
19	165,431	23,208	188,639	2,271	190,910	99	1
20	132,008	47,945	179,953	81,200	261,153	69	31
21	205,202	226,704	431,906	28,271	460,177	94	6
22	200,399	53,700	254,099	22,550	276,649	92	8
Totals	1,250,435	495,592	1,746,027	253,322	1,999,349	87	13
Prince Rupert District							
1 (C.)	73,297	5,090	78,387	.....	78,387	100	....
Totals, Coast	1,323,732	500,682	1,824,414	253,322	2,077,736	88	12
Prince Rupert District							
1 (I.)	716,881	.....	716,881	.....	716,881	100	....
Prince George District							
5	81,215	.....	81,215	195	81,410	100	....
Kamloops District							
9	169,631	.....	169,631	1,102	170,733	99	1
15	90,837	.....	90,837	.....	90,837	100	....
16	115,570	.....	115,570	.....	115,570	100	....
18	155,500	.....	155,500	.....	155,500	100	....
Totals	531,538	.....	531,538	1,102	532,640	100	1
Nelson District							
3	100,085	.....	100,085	.....	100,085	100	....
8	89,530	.....	89,530	.....	89,530	100	....
11	64,787	.....	64,787	.....	64,787	100	....
13	37,880	.....	37,880	.....	37,880	100	....
14	83,265	3,715	86,980	.....	86,980	100	....
23	861,820	27,540	889,360	.....	889,360	100	....
Totals	1,237,367	31,255	1,268,622	.....	1,268,622	100	....
Totals, Interior	2,567,001	31,255	2,598,256	1,297	2,599,553	100	1
Grand totals	3,890,733	531,937	4,422,670	254,619	4,677,289	95	5

[1] These percentages are slightly less than 100 per cent, but the difference is negligible.

TABLE 14

F.M.L. No.	Total Holdings (Acres)		Total Holdings (M Cu. Ft.)			
	Crown Grant	Timber Licence	Crown Grant	Timber Licence	Total	Percentage Included
Vancouver District						
2	128,500	5,314	.....	.....	375,000[1]	100
4	.....	.....	.....	.....	.....	.....
6	54,555	314,148	74,184	853,285	927,469	53
7	1,340	38,972	1,170	161,320	162,490	100
10	.....	545	.....	2,630	2,630	100
12	.....	4,417	.....	10,256	10,256	100
17	1,230	.....	503	.....	503	100
19	2,271	70,773	2,006	372,994	375,000	38
20	370,464	493,450	645,672	1,719,037	2,364,709	66
21						
22	72,700	126,700	135,000	470,000	605,000	47
Totals	631,060	1,054,319	858,535	3,589,522	4,823,057	.....
Prince Rupert District						
1	.....	5,272	.....	26,583	26,583	100
Prince George District						
5	.....	.....	.....	.....	.....	.....
Kamloops District						
9	1,102	.....	1,180	.....	1,180	100
15	.....	.....	.....	.....	.....	.....
16	.....	.....	.....	.....	.....	.....
18	.....	.....	.....	.....	.....	.....
Totals	1,102	.....	1,180	.....	1,180	.....
Nelson District						
3	.....	.....	.....	.....	.....	.....
8	.....	.....	.....	.....	.....	.....
11	.....	.....	.....	.....	.....	.....
13	.....	.....	.....	.....	.....	.....
14	.....	4,410	.....	8,870	8,870	100
23	.....	31,163	.....	64,946	64,946	59
Totals	.....	35,573	.....	73,816	73,816	.....
Grand totals	632,162	1,095,164	859,715	3,689,921	4,924,636	.....

[1] Timber on these lands is not controlled by licensee except to the extent necessary to provide 15 MM cubic feet per annum for twenty-five years.

TABLE 15

F.M.L. No.	Mature Timber (M Cu. Ft.)					Percentage	
	Crown	Private			Total	Crown	Private
		Timber Licence	Crown Grant	Total			
Vancouver District							
2	.....	.....	375,000[1]	375,000	375,000	.....	100
4	6,399	.....	.....	.....	6,399	100	.....
6	735,002	482,031	9,467	491,498	1,226,500	60	40
7	278,140	161,320	.....	161,320	439,460	63	37
10	153,357	2,630	.....	2,630	155,987	98	2
12	18,760	10,256	.....	10,256	29,016	65	35
17	145,032	.....	503	503	145,535	100	.....
19	696,418	140,005	2,006	142,011	838,429	83	17
20	606,360	1,334,636	229,378	1,564,014[2]	3,037,304	49	51
21	866,930						
22	1,065,757	234,400	51,200	285,600	1,351,357	79	21
Totals	4,572,155	2,365,278	667,554	3,032,832	7,604,987	60	40
Prince Rupert District							
1 (C.)	362,938	26,583	.....	26,583	389,521	93	7
Totals, Coast	4,935,093	2,391,861	667,554	3,059,415	7,994,508	62	38
Prince Rupert District							
1 (I.)	2,685,618	.....	.....	.....	2,685,618	100	.....
Prince George District							
5	136,100	.....	172	172	136,272	100	.....
Kamloops District							
9	96,800	.....	1,180	1,180	97,980	99	1
15	21,276	.....	.....	.....	21,276	100	.....
16	18,945	.....	.....	.....	18,945	100	.....
18	136,086	.....	.....	.....	136,086	100	.....
Totals	273,107	.....	1,180	1,180	274,287	100	.....
Nelson District							
3	80,524	.....	.....	.....	80,524	100	.....
8	80,430	.....	.....	.....	80,430	100	.....
11	24,903	.....	.....	.....	24,903	100	.....
13	17,140	.....	.....	.....	17,140	100	.....
14	58,590	8,870	.....	8,870	67,460	87	13
23	1,584,497	38,356	.....	38,356	1,622,853	98	2
Totals	1,846,084	47,226	.....	47,226	1,893,310	98	2
Totals, Interior	4,940,909	47,226	1,352	48,578	4,989,487	99	1
Grand totals	9,876,002	2,439,087	668,906	3,107,993	12,983,995	76	24

[1] F.M.L. No. 2 is required to provide the 15,000,000 feet annual production from its private timber for twenty-five years.

[2] Reported by MacMillan & Bloedel Limited, not segregated between licences.

TABLE 16

F.M.L. No.	Average Site	Rotation Years	M.A.I. (Cu. Ft.)	Annual Production (M Cu. Ft.)			Actual Cut from F.M.L., 1955
				S.Y. Cap.	Second R.	Approved	
Vancouver District							
2	125	70	97	15,000	.....	15,000	.....
4	140	85	108	208	.....	208	151
6	110	90	90	18,000	.....	18,000	17,468
7	130	80	98	10,800	.....	10,800	9,851
10	.....	90	50	2,250	.....	1,900	993
12	.....	110	.....	830	900	1,330	980
17	100	120	46	1,500	2,380	1,500	1,583
19	110	100	54	9,700	10,400	10,000	9,497
20	.....	90	45	14,000	.....	15,196	.....
21	.....	90	58	25,500	26,800	25,500	.....
22	.....	90	50	16,122	.....	16,100	.....
Totals	119	92	70	113,910	.....	115,534	40,523
Prince Rupert District							
1	77	133	40	21,000	50,000	22,000	14,478
Totals, Coast	113	96	67	134,910	.....	137,534	55,001
Prince George District							
5	102	130	36	2,500	8,000	2,500	2,381
Kamloops District							
9	.....	130	.....	1,550	3,060	1,680	1,952
15	.....	150	20	538	1,800	538	489
16	.....	130	25	1,000	2,500	1,000	856
18	.....	130	40	2,700	6,220	2,500	1,613
Totals	.....	135	28	5,788	13,580	5,718	4,920
Nelson District							
3	90	110	28	3,100	.....	2,000	2,804
8	80	120	27	1,370	.....	1,260	1,502
11	.....	120	15	965	.....	800	677
13	.....	110	30	357	640	655	826
14	.....	120	30	2,190	.....	2,400	1,614
23	.....	100	34	22,000	31,000	13,400	.....
Totals	85	113	27	29,982	.....	20,515	7,423
Totals, Interior	90	123	28	38,270	.....	28,733	14,724
Grand totals	.....	.....	.....	173,180	.....	166,267	69,725

TABLE 17

F.M.L. No.	1955 Stumpage per C Cu. Ft., Net	Forestry Allowance	District Timber Sale		Government Contribution $			
			Bid	Received	Stumpage	1% Tax[1]	Total	Per C Cu. Ft.
Vancouver District								
2	No cut	*Nil*	.....	.....	*Nil*	*Nil*	*Nil*	*Nil*
4	$4.71	$0.50	.....	.....	$376	*Nil*	$376	$0.18
6	3.07	.15	.....	.....	3,359	$53,871	57,230	.32
7	3.22	.25	.....	.....	3,581	21,294	24,875	.23
10	3.29	.30	.....	.....	1,430	347	1,777	.09
12	4.02	.20	.....	.....	276	1,354	1,630	.12
17	2.99	.25	.....	.....	468	*Nil*	468	.03
19	7.88	.30	.....	.....	516	46,145	46,661	.47
20	No cut	*Nil*	.....	.....	*Nil*	50,232	50,232	.48
21	No cut	*Nil*	.....	.....	*Nil*	265,515	265,515	1.06
22	No cut	*Nil*	.....	.....	*Nil*	38,830	38,830	.19
Average	3.36	.....	$6.14	$4.57	.....	.....	.....	.....
Prince Rupert District								
1 (C.)	3.06	.77	3.72	3.03	8,146	2,073	10,219	.30
1 (I.)	1.99	.77	3.66	2.86	33,866	*Nil*	33,866	.33
Prince George District								
5	2.18	.49	3.83	2.81	6,097	*Nil*	6,097	.24
Kamloops District								
9	2.30	1.88	.....	.....	17,522	*Nil*	17,522	1.04
15	2.71	.50	.....	.....	1,201	*Nil*	1,201	.22
16	2.00	1.00	.....	.....	3,087	*Nil*	3,087	.31
18	3.44	.10	.....	.....	350	*Nil*	350	.01
Average	2.52	.....	5.93	3.95	.....	.....	.....	.....
Nelson District								
3	5.84	.40	.....	.....	5,012	*Nil*	5,012	.25
8	2.30	1.15	.....	.....	8,458	*Nil*	8,458	.67
11	2.87	.65	.....	.....	2,197	*Nil*	2,197	.27
13	2.73	.80	.....	.....	2,900	*Nil*	2,900	.44
14	2.52	.75	.....	.....	750	1,197	1,947	.08
23	6.41	.60	.....	.....	555	4,026	4,581	.04
Average	4.10	.....	5.18	3.73	.....	.....	.....	.....

[1] "1 per Cent Tax" column includes all 1 per cent tax remission and refund in 1955.

Last column gives rate per hundred cubic feet of approved cut, all tenures in forest management licence.

At the risk of being considered unnecessarily repetitive, I would again state that a major objective of the new tenure recommended in the 1945 Report was to enable private owners to maintain sustained-yield management on their own land by adding sufficient Crown land to make economic units; results of the management licence policy are shown on Table 13, which in summary discloses that 3,890,733 acres of formerly unalienated Crown productive forest land have been contributed by the Crown, perpetual cutting rights have been granted on 531,937 acres of temporary tenures, and 254,619 acres have been contributed by private owners (223,841 of these by two companies), to make the 4,677,289 acres of productive forest land now in management licences. Of the 5½ million acres of Crown-granted forest land in the Province, 95 per cent thereof is still outside the scheme. This total, however, includes E. & N. lands, Indian reserves, and small wood-lots.

If and when the management licences awarded, subject to the approval of working plans, are finally granted, and if licences are awarded to other large companies whose applications have been approved for advertising, this percentage will be reduced by the degree their privately held forest lands are included in the licence areas.

In addition to the twenty-three forest management licences already issued, there are eighteen approved and awaiting the submission of satisfactory working plans before being finally awarded.

Particulars of these are found in the following table:—

TABLE 18

FOREST MANAGEMENT LICENCES AWARDED SUBJECT TO APPROVAL OF WORKING PLANS

(Acres.)

Applicant	Vacant Crown Land	Timber Licence	Crown Grant	Productive		Non-productive		Total Area		Total, All Area	Mature Volume (M Cu. Ft.)		Total Volume (M Cu. Ft.)	Allowable Annual Cut (M Cu. Ft.)
				Crown	Private	Crown	Private	Crown	Private		Crown	Private		
Coast														
Alaska Pine (Q.C.I.)	255,467	23,761	.....	112,718	21,219	142,749	2,542	255,467	23,761	279,228	497,345	97,259	594,604	8,000
Alaska Pine (Prince Rupert)	713,548	82,485	.....	80,207	26,294	633,341	56,191	713,548	282,485	796,033	253,010	254,463	507,473	11,336
Alaska Pine (Vancouver)	263,548	45,400	36,281	119,807	72,513	143,741	9,168	263,548	81,681	345,229	260,918	91,200	352,118	3,064
Allison Logging (Prince Rupert)	65,120	.....	.....	16,460	.....	48,660	.....	65,120	.....	65,120	78,982	.....	78,982	518
F. & R. Logging (Vancouver)	23,570	.....	.....	9,360	.....	14,210	.....	23,570	.....	23,570	17,000	.....	17,000	333
Kitimat P. & P. (Prince Rupert)	1,626,650	34,702	.....	306,340	26,389	1,320,310	8,313	1,626,650	34,702	1,661,352	1,474,428	108,210	1,582,635	13,220
Mission Corporation (Vancouver)	15,110	.....	2,750	13,449	2,664	1,661	86	15,110	2,750	17,860	16,013	1,050	17,063	425
Moore-Whittington (Vancouver)	30,859	3,504	432	26,151	3,923	4,708	13	30,859	3,936	34,795	185,124	21,329	206,453	2,465
Totals, Coast	2,993,872	189,852	39,463	684,492	153,002	2,309,380	76,313	2,993,872	229,315	3,223,187	2,782,810	573,511	2,898,853	39,361
Interior														
B.C. Interior Sawmills	96,147	.....	.....	94,557	.....	1,590	.....	96,147	.....	96,147	23,030	.....	23,030	890
Church Sawmill	53,858	.....	.....	42,071	.....	11,787	.....	53,858	.....	53,858	105,552	.....	105,552	880
Eagle Lake Sawmill	120,251	.....	1,240	105,608	1,080	14,643	160	120,251	1,240	121,491	349,764	3,730	353,494	3,066
Galloway Sawmills	43,000	.....	.....	39,220	.....	3,780	.....	43,000	.....	43,000	13,855	.....	13,855	360
Penny Spruce Mills	121,675	.....	.....	46,340	.....	75,335	.....	121,675	.....	121,675	259,400	.....	259,400	2,180
Shelly Development	90,220	.....	.....	85,673	.....	4,547	.....	90,220	.....	90,220	174,206	.....	174,206	2,805
Shuswap Timbers Ltd.	18,295	.....	.....	14,490	.....	3,805	.....	18,295	.....	18,295	28,188	.....	28,188	385
Sinclair Spruce Lumber	77,198	.....	.....	68,540	.....	8,658	.....	77,198	.....	77,198	213,940	.....	213,940	2,129
Upper Fraser Spruce Mills	44,969	.....	230	42,372	230	2,597	.....	44,969	230	45,199	117,992	.....	117,992	1,258
Vernon Box & Pine Lumber	32,721	.....	.....	31,324	.....	1,397	.....	32,721	.....	32,721	21,311	.....	21,311	450
Totals, Interior	698,334	.....	1,470	570,195	1,310	128,139	160	698,334	1,470	699,804	1,307,238	3,730	1,310,968	14,403
Grand Totals	3,692,206	189,852	40,933	1,254,687	154,312	2,437,519	76,473	3,692,206	230,785	3,922,991	4,090,048	577,241	4,667,299	53,764

At an earlier stage of processing are twenty-eight applications approved for advertising only.

Previous mention has been made of applications in this classification from two large companies, namely, Powell River Company on the Coast and Canadian Forest Products in the Interior. Particulars of these applications are as follows:—

TABLE 19

Applicant	Productive		Non-productive		Total Area		Total, All Area
	Crown	Private	Crown	Private	Crown	Private	
Powell River Co.	220,861	268,720	.....	.....	200,861	268,720	489,581
Canadian Forest Products	89,700	9,345	311,115	.....	400,815	9,345	410,160

Applicant	Mature Volume			Allowable Annual Cut (M Cu. Ft.)
	Crown	Private	Total	
Powell River Co.	387,701	916,058	1,303,759	28,350
Canadian Forest Products	19,600	83,333	102,933	3,300

None of the areas applied for in these two categories of applications (either approved subject to submission of working plans or merely for advertising) conflict with existing public working circles. It is Dr. Orchard's clearly expressed opinion that, so far as he is concerned, he is "thoroughly opposed to awarding a licence over an existing (public) working circle."* This opinion is subject to his reservation that "in a small area" it might be necessary to "readjust the boundaries" in order to exclude a "piece of land that just isn't tributary to the main working circle."* This, to my view, is not an unreasonable reservation if kept within that framework.

The disappearance of the Clayoquot Public Working Circle by its inclusion within the boundaries of the British Columbia Forest Products management licence (No. 22) by a decision of the then Minister (subsequently upheld on appeal to the Cabinet) was apparently an action by the Government without prior consultation with Dr. Orchard. As he stated in his evidence, his opinion either "approving or disapproving" this action was not sought by the Minister nor the Government.†

As of December, 1956, there were on file with the Forest Service 123 applications for forest management licences in addition to those I have mentioned. Formal applications have been filed for ninety-three of these, and thirty are included in "letters of intent." Many of these, if granted, would conflict with and include areas now reserved for public working circles. I do

* Transcript, pp. 17554–17555.
† Transcript, p. 1881.

not think that any real purpose would be served by an analysis of these applications. I have already outlined my views in a general way concerning the granting of further management licences, and the relevant principles I have enumerated, if acceptable to the Government, would apply thereto.

According to the evidence, seventy-three forest management licence applications have been considered and rejected. Of these, thirty-one were in the Vancouver Forest District, eight in the Prince George Forest District, twenty-one in the Kamloops Forest District, six in the Nelson Forest District, and seven in the Prince Rupert Forest District.

PUBLIC WORKING CIRCLES

In the section of this Report dealing with tenures generally I said: ". . . However that may be the underlying reason for setting up public working circles was the necessity of bringing unalienated Crown lands within the sustained-yield programme of management under the Forest Service and at the public expense." I repeat that comment in this context because it became apparent during the Inquiry that many witnesses thought the primary reason for the creation of the public working circles was to establish managed areas from which the smaller operator, without a forest management licence, could be supplied in perpetuity with timber. That might be the effect of setting up these sustained-yield units, to the extent to which the allowable cut is available, but, as I have said, that was not the underlying reason.

The public working circles are, in part, the direct lineal descendants of the forest reserves which were established by the Dominion Government in those land areas conveyed by grant from the Province to the Dominion by way of consideration for Canada's undertaking to secure the construction of a trans-Canada railway. This so-called Railway Belt consisted of a strip of land 40 miles wide on the Mainland. Later on the so-called E. and N. Belt on Vancouver Island—a strip 20 miles wide on each side of the projected line—was also transferred to the Dominion in order to subsidize the construction of a railway between Esquimalt and Nanaimo.

In 1911 the Federal Government, pursuant to the provisions of the "Dominion Forest Reserves and Parks Act" (S.C. 1911, chapter 10) established in British Columbia, in the Railway Belt, the following forest reserves:—

(1) The Long Lake Forest Reserve.
(2) The Monte Hills Forest Reserve.
(3) The Martin Mountain Forest Reserve.
(4) The Niskonlith Forest Reserve.
(5) The Tranquille Forest Reserve.
(6) The Hat Creek Forest Reserve.
(7) The Larch Hills Forest Reserve.

By an amendment to the Act the Federal Government, in 1913, set up the following additional forest reserves:—

The Nicola Forest Reserve.
The Fly Hill Forest Reserve.
The Arrowstone Forest Reserve.

By a further amendment in 1919 (S.C., chapter 49) the legal description of the boundaries of eight of these Dominion forest reserves were changed.

In 1930, consequent upon the recommendations contained in a Report of a Royal Commission, the Dominion Government reconveyed to the Prov-

ince the areas remaining unalienated in the Railway Belt and the Peace River Block (the " lieu lands "). The conveyance was by Statute (S.C. 1930, chapter 37).

The Dominion, in addition to setting up forest reserves in the Railway Belt, created parks therein, but these and the E. and N. Belt on Vancouver Island were not reconveyed to the Province, the latter area having been conveyed by the Dominion to the Railway Company.

In passing I might mention that these National parks set up by the Dominion in lands formerly belonging to the Province are as follows:—

(1) Mount Revelstoke National Park.
(2) Glacier National Park.
(3) Yoho National Park.
(4) Kootenay National Park.

Paralleling the establishment of forest reserves by the Dominion, the Province, by enactment of the " Forest Act " of 1912, was empowered to set aside areas of Crown forest land as Provincial forest reserves. The 1912 legislation (S.B.C. 1912, chapter 17), in so far as relevant, read as follows:—

" 12. (1) The Minister shall cause an examination of Crown lands to be made by the Department for the purpose of delimitating areas of such lands that it is desirable to reserve for the perpetual growing of timber, and as a result of such examination the Lieutenant-Governor in Council may, by Proclamation, constitute any such area a permanent forest reserve; and upon such proclamation all land included within the boundaries of any such area shall be withdrawn from sale, settlement, and occupancy under the provisions of the ' Land Act ' and in respect of the ' Mineral Act ' and ' Placer-mining Act ' and ' Coal-mines Act ' shall be subject to such conditions as the Lieutenant-Governor in Council may impose. After such proclamation no Crown land within the boundaries of such forest reserve so constituted shall be sold, leased, or otherwise disposed of or be located or settled upon, and no person shall use or occupy any part of the land included in said reserve except under the provisions of this Act or of regulations made thereunder.

"(2) Forest reserves constituted in the manner provided in this section shall be under the control and management of the Minister for the maintenance of the timber growing or which may hereafter grow thereon, for the protection of the water-supply, and for the prevention of trespass thereon.

"(3) The Lieutenant-Governor in Council may exchange for any land within any such reserve, the title to which is not vested in the Crown in right of the Province of British Columbia, available Crown lands other than timber lands situated outside the boundaries of such reserves, and for any timber limits or leaseholds or portions thereof included within such reserves corresponding areas of Crown timber land

situated outside the boundaries of such reserves, and when necessary may make compensation upon such exchange; and a copy of every Order in Council authorizing such an exchange shall be laid before the Legislature during the first fifteen days of the next ensuing session thereof.

"(4) Land comprised in any timber, pulp, or tan-bark lease or special licence shall be held under reserve upon expiry of the lease or licence until examined and reported on by the Department.

"(5) Any forest reserve may from time to time be cancelled in whole or in part by Order in Council."

There was no special fund provided for management of Provincial forest reserves, and in 1925 the "Forest Act" was amended to meet this situation. In explaining the necessity for such expenditures, the late Honourable T. D. Pattullo, then Minister of Lands, said in part:—

". . . the setting aside of forest reserves is the foundation of sound forest policy and the primary object of their creation is to ensure a continuous production of timber."

The 1925 legislation read as follows:—

"30A. (1) For the purpose of meeting the cost of the development and protection of forest reserves, and the planting of denuded areas and maintaining the growth of continuous crops of timber in forest reserves, there shall be established in the Treasury an account to be known as the 'Forest Reserve Account.'

"(2) Before closing the books of the Treasury at the end of each fiscal year there shall be paid into the Forest Reserve Account from the Consolidated Revenue Fund an amount equal to three per centum of the gross receipts for that year from timber royalty or tax and stumpage.

"(3) The Minister of Finance shall make payments out of the Forest Reserve Account for the purpose of subsection (1) upon vouchers certified by the Minister of Lands."

Subsection (4) (following) was added in the 1926–27 Session (chapter 23):—

"(4) Expenses incurred in any experimental or demonstration cutting or removal of trees, timber, forest products, brush, or debris in forest reserves shall be payable out of the Forest Reserve Fund, and all moneys received by the Crown from the sale of such trees, timber, or forest products shall be placed to the credit of the Forest Reserve Fund."

By an amendment in 1947 (S.B.C., chapter 38) the Forest Reserve Fund became the Forest Reserve Account.

In the 1936 revision, section 30A, quoted above, was renumbered as section 32 and in 1954 (S.B.C., chapter 11) section 32 was repealed and re-enacted to read as follows:—

" 32. For the purpose of meeting the cost of the examination of Crown lands required under section 30 and the cost of the development and protection of forest reserves and the planting of denuded areas and maintaining the growth of continuous crops of timber in forest reserves, there shall be made available for expenditure a sum which, inclusive of any appropriation of the Legislature, will be not less than three per centum of the gross receipts from timber royalty or tax and stumpage in the last preceding year, and in the absence of any appropriation of the Legislature there shall be made available for the purpose an amount equal to three per centum of the gross receipts from timber royalty or tax and stumpage in the last preceding year."

This amendment had the effect of abolishing the Forest Reserve Account as such while retaining the 3-per-cent contribution provided for in the 1925 legislation.

I have mentioned the comment of the then Minister of Lands, when introducing the 1925 legislation, concerning the nature of the forest reserves, and I would also like to record, in part, what was said on this subject by the late F. D. Mulholland in his classic report of 1937 on the forest resources of British Columbia (at page 138 *et seq.*). He said, after mentioning that a total of thirty-nine forest reserves had been established up to that time:—

"All the fifteen Coast Forests and fifteen of the twenty-four Interior Forests were established by the Provincial Government; the remaining nine* were transferred to the Province by the Dominion in 1930 when the Railway Lands were returned to Provincial administration.

"All the Coast Forests are in the Vancouver Forest District; of the Interior Forests, eighteen are in the Kamloops District, four in the Nelson District, and two in the Prince Rupert District.

" Surveys have been made of these Forests in order to ascertain the nature of their resources and their economic value, and as a preliminary to their management on a sustained-yield basis. Working-plans designed to regulate forests which have been in utilization for many years, where many industries, small and large, have been established, and where there is considerable private equity in the timber, cannot be put into effect overnight. They must be introduced gradually, and with as little disturbance to industry as possible. Yet they must be introduced, because without working-plans, with their regulated budgets and records, the successful practice of permanent forestry is impossible.

" When a forest, or a combination of forests, economically suitable for management as a unit, is being cut on a scale exceeding or even comparable with its capacity for sustained yield, then it is time to regulate its yield; every year of overcutting makes regulation more difficult,

* The Federal Act sets up ten Forest Reserves and I have not taken the time to trace the history of each one as the discrepancy is not of much consequence in the broad objective I have in view.

the ultimate disturbance of industry more severe, rehabilitation of the forest more expensive, and the effect on the general public interest more harmful.

"As these Provincial Forests have been set aside for the purpose of producing timber in perpetuity, they are the logical place for the commencement of planned forestry. Not that every Forest should be regarded as a unit in itself, but suitable groups of Forests may be managed to provide permanently the raw material necessary for established industries and communities already dependent upon them. Many of the Provincial Forests are already overcut, particularly on the Coast.

"With many surveys and preliminary outlines for working-plans already made, the Forest Service is seeking the co-operation of timber-owners, the forest industries, and the public in its attempts to introduce forest regulation where it is needed.

"Beside the permanent production of commercial timber, the Provincial Forests have many secondary uses. In some cases, as in the Okanagan watershed, they are of great importance for the regulation of irrigation-water in a rich farming district entirely dependent upon it. Some of them include considerable grazing areas for cattle at the lower levels and summer range for sheep at the higher elevations. Many of them help to maintain the stock of game, fish, and fur-bearing animals and most of them have a value for hunting, camping, and general recreation. All these uses will have to be co-ordinated in the public interest; that cannot be done effectively without technical knowledge and economic planning."

In 1945 the number of reserved forested areas had increased from thirty-nine to forty-six. I said then concerning these forests:—*

"These forest areas are not open for sale for agricultural or other pursuits and, while timber alienation thereon has been through the medium of timber-sale contracts or other forms of tenure into which the forest administration could write any terms it chose to impose, the evidence is clear that no proper programme of forest management has been enforced in these forest reserves. Thus, for example, loggers operating in these reserves have not been obliged to leave the cut-over land with sufficient seed-trees to ensure regeneration.

"No real attempt has been made to limit the cut on alienated areas to the sustained-yield capacity of the area, although recently increasing attention is being given to silvicultural practices in the Interior forest reserves areas—i.e., marking of selected trees for cutting is now in the experimental stage.

"To express the conclusion compendiously, it is manifest that very little, if anything, has been done during the past twenty years to bring

* 1945 Report, pp. 85–86.

to fruition the ideal objective contained in the speech of the Minister of Lands in 1925.

"The reason is simply lack of an adequate staff to conduct the necessary research work, which condition in turn, stems from lack of sufficient funds—a sombre thread which runs through all aspects of forest administration in this Province.

"The forest reserves on the Coast contain a great part of the 39 per cent of the volume of merchantable timber remaining in Crown ownership, and therefore are destined to play an important role in any future planning."

Since 1944 the total number of forests placed under reserve increased by eleven, from forty-six to fifty-seven.

Having traced the legislative history of the forest reserves, both Dominion and Provincial, and considered in a broad way the basic reason for their creation, we can now turn to look at these reserves in a little more detail.

The following table is a compilation of the present fifty-seven forest reserves—twenty-six on the Coast and thirty-one in the Interior:—

TABLE 20

PROVINCIAL FORESTS IN BRITISH COLUMBIA, 1956

Name	Locality	Area (Acres)	Area (Square Miles)	Date Originally Created
Coast Forests				
Broughton	Islands between Vancouver Island and Mainland	43,100	67	1934
Gilford		111,940	175	1934
Harbledown		69,573	109	1934
Hardwicke		18,020	28	1925
Sonora		39,320	61	1926
West Thurlow		19,780	31	1925
East Thurlow		25,950	41	1927
Redonda		42,620	67	1928
Chilliwack	Chilliwack Drainage	169,920	266	1949
Clayoquot	West Coast of Vancouver Island	1,046,421	1,635	1949
Douglas	Harrison Lake	443,498	693	1933
Juan de Fuca	West Coast of Vancouver Island	658,870	1,029	1949
Kingcome	Kingcome Inlet	454,660	710	1938
Kyuquot	West Coast of Vancouver Island	1,193,590	1,865	1950
Loughborough	Loughborough Inlet	597,470	933	1934
Moresby	Queen Charlotte Islands	851,890	1,331	1940
Nimpkish	North Vancouver Island	886,988	1,386	1936
Powell River	Powell River	434,660	679	1934
Quatsino	Northerly portion of Vancouver Island	572,323	894	1949
Sayward	North of Campbell River	394,406	616	1929
Sechelt	Sechelt and Jervis Inlet	764,914	1,195	1934
Seymour	Seymour Inlet	580,870	908	1938
Skagit	Hope	195,840	306	1951
Toba	Toba Inlet	763,910	1,194	1936
Graham	Queen Charlotte Islands	821,272	1,283	1942
Vancouver Island plantations		94,409	148	1944
Totals, Coast (26)		11,297,214	17,660	.....

TABLE 20—*Continued*

Name	Locality	Area (Acres)	Area (Square Miles)	Date Originally Created
Interior Forests				
Stuart Lake	Stuart Lake	1,371,952	2,144	1954
Arrow, Lower	Lower Arrow Lake	480,236	750	1938
Arrow, Upper	Upper Arrow Lake	1,193,480	1,865	1938
Aberdeen Mountain	Vernon	53,720	83	1922
Babine	C.N.R., Fraser Lake-Telkwa	1,299,475	2,030	1926
Barriere	North Thompson River	340,370	532	1933
Cottonwood	Upper Fraser	492,020	769	1951
Crooked River	Prince George	639,960	1,000	1949
Elk	Fernie	1,551,589	2,424	1914
Flathead	Flathead River	340,440	532	1933
Fly Hill	Salmon Arm	162,890	254	1913
Grizzly Hill	Vernon	379,630	593	1922
Inkaneep	South Okanagan	205,260	321	1923
Kettle	Kettle River	808,190	1,263	1924
Little White Mountain	Kelowna	186,137	291	1922
Larch Hills	Salmon Arm	32,600	51	1911
Mount Ida	Salmon Arm	33,150	52	1913
Martin Mountain	Westwold	56,350	88	1911
Momich	Adams Lake	1,001,920	1,566	1933
Monte Hills	Westwold	222,920	348	1911
Morice	Morice River	579,880	907	1928
Naver	Upper Fraser	204,563	319	1951
Nehalliston	North Thompson River	707,300	1,105	1924
Nicola	Nicola River	217,400	339	1913
Niskonlith	South Thompson River	286,100	447	1911
Okanagan	West Okanagan	628,638	982	1922
Shuswap	Shuswap Lake	230,900	361	1926
Slocan	Slocan Lake	768,050	1,200	1948
Spallumcheen	Shuswap River	479,894	749	1927
Tranquille	Tranquille	188,800	295	1911
Yahk	Cranbrook	624,254	975	1924
Totals, Interior (31)		14,394,668	22,490	.....
Totals, Coast and Interior		25,691,882	40,150	.....

It is interesting to note that the original concept of creating forest reserves for sustained-yield management has, and I presume with some logic, been implemented to a degree by including parts of these reserves within twenty-two forest management licences. I am not advised of the acreage distribution.

The disposition of these fifty-seven forest reserves up to October of 1956 is shown on the following table:—

TABLE 21

STATUS OF PROVINCIAL FORESTS, OCTOBER, 1956

Coast Forests

Broughton—Public Working Circle.
Gilford—Public Working Circle.
Harbledown—Public Working Circle.
Hardwicke—Forest Management Licence No. 12.
Sonora—Forest Management Licence No. 2.
West Thurlow—Forest Management Licences Nos. 4 and 2.
East Thurlow—Forest Management Licence No. 2.
Redonda—Public Working Circle.
Chilliwack—Public Working Circle.
Clayoquot—Forest Management Licences Nos. 20, 21, and 22, Barkley Public Working Circle.
Douglas—Unencumbered.
Juan de Fuca—Forest Management Licences Nos. 21, 22, Moore-Whittington (F.M.L. reserve), Alaska Pine (F.M.L. reserve).
Kingcome—Broughton Public Working Circle.
Kyuquot—Forest Management Licence No. 19, Kyuquot Public Working Circle.
Loughborough—Alaska Pine (F.M.L. reserve), rest unencumbered.
Moresby—Alaska Pine (F.M.L. reserve), rest unencumbered.
Nimpkish—Alaska Pine (F.M.L. reserve), mostly unencumbered.
Powell River—Unencumbered.
Quatsino—Forest Management Licence No. 6, Alaska Pine (F.M.L. reserve), Cape Scott Public Working Circle.
Sayward—Forest Management Licence No. 7 (West), Sayward Public Working Circle (East).
Sechelt—Sechelt Public Working Circle.
Seymour—South-east corner in Broughton Public Working Circle, rest unencumbered..
Skagit—Fraser Canyon Public Working Circle (South), rest unencumbered.
Toba—Forest Management Licence No. 10 (North), Redonda Public Working Circle (South).
Graham—Unencumbered.
Vancouver Island Plantations—Unencumbered (S.Y.U.).

TABLE 21—*Continued*

Interior Forests

Stuart Lake—Stuart Lake Public Working Circle.
Arrow, Lower—Forest Management Licence No. 23.
Arrow, Upper—Forest Management Licence No. 23, Arrowhead and Nakusp Public Working Circles.
Aberdeen Mountain—Spallumcheen Public Working Circle (East), rest unencumbered.
Babine—Babine Public Working Circle.
Barriere—Barriere Public Working Circle.
Cottonwood—Cottonwood Public Working Circle.
Crooked River—Crooked River Public Working Circle.
Elk—Unencumbered.
Flathead—Unencumbered.
Fly Hills—Salmon Arm Public Working Circle (North), Vernon Box and Pine (F.M.L. reserve).
Grizzly Hill—Spallumcheen Public Working Circle.
Inkaneep—Forest Management Licence No. 15 (South), rest unencumbered.
Kettle—Forest Management Licence No. 11, Kettle Public Working Circle.
Little White Mountain—Unencumbered.
Larch Hills—Salmon Arm Public Working Circle.
Mount Ida—Salmon Arm Public Working Circle (North), rest unencumbered.
Martin Mountain—Unencumbered.
Momich—Unencumbered.
Monte Hills—Forest Management Licence No. 16.
Morice—Morice Sustained Yield Unit.
Naver—Naver Public Working Circle.
Nehalliston—Forest Management Licence No. 18 (North), rest Nehalliston Sustained Yield Unit.
Nicola—Nicola Sustained Yield Unit, Big Bar Sustained Yield Unit.
Niskonlith—Niskonlith Public Working Circle.
Okanagan—Forest Management Licence No. 9, rest unencumbered.
Shuswap—Unencumbered.
Slocan—Forest Management Licence No. 3, Slocan Public Working Circle.
Spallumcheen—Spallumcheen Public Working Circle.
Tranquille—B.C. Interior Sawmills (F.M.L. reserve), rest unencumbered.
Yahk—Creston Sustained Yield Unit (South-west), rest unencumbered.

Turning from forest reserves as such to public working circles, it is of interest to note that Dr. Orchard stated on several occasions during his testimony that it was the ambition of the Forest Service "to have eventually one-half of the Crown lands included in forest management licences and one-half in public working circles."

In furtherance of this objective and consequent upon the recommendations of the 1945 Report, the Forest Service embarked upon the arduous and tedious task of setting up the public working circles. In a memorandum to all District Foresters, Dr. Orchard outlined the various steps to be taken to effectuate this purpose. It reads in part as follows:—*

> ". . . a certain amount of confusion exists in the routine to follow in placing a Public Working Circle under management.
>
> "The first step in initiating management of an area is to assemble the best information available as to forest inventory, operations now established in the area, average annual requirements of that industry,

* Exhibit 36, p. 26 *et seq.*

and forecast of future demand. Then, on the basis of this knowledge and in keeping with the topography of the region, delineate boundaries for the proposed Working Circle.

" The second step should be to recommend approval of the Chief Forester establishing the Working Circle and, having secured approval, proceed to draught the management working plan. In the event of a management plan being draughted, this should be submitted to the Working Plans Division for approval; and if approved, the allowable cut proposed under this plan will be that established for the Working Circle, and you will be so notified. If adequate inventory data is not available it may be necessary to postpone submission of the working plan, in which case the procedure should be to make an estimate of allowable annual cut based on such information as is at hand. This estimate should be submitted to the Working Plans Division for review, and if satisfactory, that Division will approve an interim allowable cut that is subject to revision in the light of future surveys and a working plan.

" Having secured approval from Working Plans Division of an allowable annual cut for a given Circle, the fourth step should be an analysis of the situation in the Working Circle relative to the balance between requirements and the ability of the land to produce, and submit to the Management Division your proposals for initiating regulation of cut. In the cases where we get started early enough and have a surplus over and above current requirements, the problem of regulation is straight forward and approval of the allowable cut will be tantamount to approval to set up control ledgers. On the other hand, where current requirements exceed the approved allowable cut, the situation must be analyzed carefully and recommendations for procedure in initiating regulation submitted to Management Division for approval."

The first public working circles were approved in the Vancouver District in 1949 and 1950, when work was initiated on the Sechelt, Chilliwack, and a portion of the Sayward Provincial Forests. Ledgers for timber-sale record-keeping and control of the annual cut were first established for these areas in 1951.

Working-circle activities in 1950 and 1951 were largely confined to reconnaissance surveys by two small field crews working under the direction of the Forester in Charge of Management. These surveys covered the Sechelt, Chilliwack, and Sayward " Circles " in the Vancouver District and the Niskonlith, Salmon Arm, and Spallumcheen " Circles " in the Kamloops District. About the same time, work had begun on the Crooked River and Naver " Circles " in the Prince George District.

The information collected by these field crews was needed to supplement existing inventory data and to determine the pathological condition of mature stands for use in future cutting plans. Progress in sustained-yield

planning was retarded by the lack of satisfactory forest-resource information.

As time went on, however, further information was gained by forest surveys, and more public working circles were established both within and without the old forest reserves.

As of December, 1956, ten public working circles were established on the Coast and twenty-three in the Interior. Particulars are shown on the following table:—

TABLE 22

AREA CLASSIFICATION OF PUBLIC WORKING CIRCLES[1] (CROWN LAND ONLY)

Name	Mature Volume (M Cu. Ft.)	Mature (Acres)	Immature (Acres)	N.S.R.[2] and N.C.C.[3] (Acres)	Total Productive Area (Acres)	Total Non-productive Area (Acres)	Total Area (Acres)	Allowable Annual Cut (M Cu. Ft.)	Actual Cut, 1956 (M Cu. Ft.)	Total Commitments (M Cu. Ft.)	
										1957	1958
Coast											
Barclay	224,963	45,335	1,900	430	47,665	63,435	110,100	2,500	1,962	2,530	1,840
Broughton	1,206,599	333,968	68,231	2,150	404,349	320,280	724,629	13,000	15,335	13,070	9,260
Cape Scott	190,154	64,530	1,645	3,975	70,150	186,271	256,421	2,250	3,462	2,160	1,790
Chilliwack	127,450	30,950	14,700	11,980	57,630	109,780	167,410	2,330	1,095	2,350	2,130
Fraser Canyon	258,325	87,292	78,435	26,917	192,644	82,356	275,000	6,000	1,810	2,260	2,230
Kyuquot	1,608,877	326,375	23,480	12,780	362,635	328,935	691,570	19,650	4,554	19,610	17,590
Redonda	1,232,344	156,112	171,968	47,905	375,985	99,015	475,000	17,000	17,173	15,880	10,760
Rivers Inlet	595,647	165,190	3,770	8,600	177,560	1,522,440	1,700,000	6,330	894	6,280	5,290
Sayward	85,629	29,300	54,710	30,850	114,860	37,270	152,130	2,500	1,604	2,520	2,250
Sechelt	984,885	143,390	134,530	19,160	297,080	502,920	800,000	15,000	14,510	15,100	11,480
Totals, Coast	6,514,873	1,382,442	553,369	164,747	2,100,558	3,252,702	8,352,260	86,560	62,399	81,760	64,620
Interior											
Arrowhead	99,321	39,080	38,405	2,490	79,975	341,550	421,525	2,000	1,712	1,490	1,020
Babine	1,283,685	459,558	340,709	214,400	1,014,667	114,508	1,129,175	6,900	3,188	6,910	5,400
Barriere	160,314	53,664	67,522	19,275	140,461	28,164	168,625	1,800	1,055	1,800	1,230
Cottonwood	360,000	215,000	164,000	.....	379,000	54,000	433,000	5,000	3,277	4,960	4,580
Crooked River	888,493	348,393	232,732	23,106	604,231	53,800	658,031	6,030	5,111	6,050	5,290
Edgewood	36,000	21,210	75,580	55,030	151,820	120,640	272,460	2,800	3,146	2,700	2,410
Kettle	220,146	199,060	427,162	87,059	713,281	34,925	748,206	4,400	5,707	4,260	3,550
Nakusp	59,000	36,130	39,520	18,810	94,460	188,770	283,230	2,200	826	2,210	2,210
Narcosli	70,988	43,126	128,629	64,978	236,733	57,132	293,865	3,000	703	2,990	2,610
Naver	542,178	165,578	125,664	20,286	311,528	18,138	329,666	7,880	4,713	6,740	4,610
Niskonlith	121,440	85,420	104,960	29,320	219,700	13,270	232,970	2,350	1,496	2,200	1,400
Purden Lake	195,976	100,704	36,431	17,427	154,562	7,988	162,550	2,500	.....	2,000	2,000
Quesnel Lake	622,803	284,466	428,573	13,028	726,067	58,454	784,521	5,760	4,749	5,500	4,530
Salmon Arm	31,592	24,400	49,560	4,290	78,250	3,820	82,070	1,760	1,562	960	600
Similkameen	183,000	67,331	195,465	.....	262,796	17,204	280,000	3,000	842	1,220	970

Slocan	33,850	33,850	106,730	11,870	152,450	295,910	448,360	2,500	1,523	1,830	1,160
Smithers	203,460	105,460	149,811	251,539	506,810	657,020	1,163,830	4,500	5,493	4,500	3,300
Spallumcheen	223,874	223,874	299,006	28,747	551,627	195,221	746,848	9,700	7,369	9,340	7,690
Stuart Lake	371,180	185,590	296,223	.....	481,813	10,187	492,000	6,500	5,418	6,330	5,220
Upper Kootenay	366,797	134,165	152,690	.....	286,855	548,145	835,000	4,700	2,557	2,530	2,240
Westlake	40,000	18,000	182,000	.....	200,000	88,640	288,640	3,700	3,444	3,760	3,290
Williams Lake	628,756	248,816	331,663	43,960	624,439	32,560	656,999	6,300	14,581[4]	5,620	3,890
Willow River	516,255	146,754	84,014	28,678	259,446	12,202	271,668	7,000	3,270	6,360	5,670
Totals, Interior	7,259,108	3,239,629	4,057,049	934,293	8,230,971	2,934,110	11,183,239	102,280	81,742	92,260	74,870
Provincial totals	13,773,981	4,622,071	4,610,418	1,099,040	10,331,529	6,186,812	19,535,499	188,840	144,141	174,020	139,490

[1] Including volume and annual cut information.
[2] Not satisfactorily stocked.
[3] Non-commercial cover.
[4] This figure includes cut from timber sales awarded prior to January 1st, 1955. These sales are not charged against the annual budget.

During 1955–56 no new public working circles were established as such, but in order to continue with management planning, fourteen areas in the Interior were set up as " sustained yield units " and an annual allowable cut was approved for each of these.

Upon reflection it seems to me that the name " sustained yield units " is more descriptive of the true character of these managed areas than " public working circles," and I suggest that this nomenclature be applied in the future to these areas. Particulars of the sustained yield units are shown on the following table:—

TABLE 23

1956 AREA CLASSIFICATION OF SUSTAINED YIELD UNITS[1] (CROWN LAND ONLY)

Name	Mature Volume (M Cu. Ft.)	Mature (Acres)	Immature (Acres)	N.S.R.[2] and N.C.C.[3] (Acres)	Total Productive Area (Acres)	Total Non-productive Area (Acres)	Total Area (Acres)	Allowable Annual Cut (M Cu. Ft.)	Actual Cut, 1956 (M Cu. Ft.)	Total Commitments (M Cu. Ft.)	
										1957	1958
Interior											
Big Bar	408,741	273,880	1,052,642	161,789	1,488,311	188,127	1,676,438	12,000	7,595	11,800	8,940
Big Valley	952,407	289,271	58,380	5,528	353,179	25,422	378,601	6,000	165	2,960	2,440
Botanie Creek	226,309	123,441	278,400	61,011	462,852	390,647	853,499	4,600	678	4,440	3,860
Bowron	777,977	241,536	116,323	18,388	376,247	194,845	571,092	8,000	200	2,420	2,420
Carp Lake	914,688	356,772	833,304	47,309	1,237,385	129,409	1,366,794	6,100	2,505	4,400	3,880
Creston	201,767	97,699	367,471	102,848	568,018	44,382	612,400	6,000	4,727	6,000	4,700
Lac la Hache	389,843	263,954	1,050,734	98,550	1,413,238	180,741	1,593,979	12,000	18,726[4]	5,510	5,370
Longworth	232,248	112,540	24,193	13,095	149,828	23,030	172,858	2,000	671	1,570	1,450
Nicola Lake	273,880	13,474	269,316	41,173	323,963	126,246	450,209	3,900	2,746	3,390	2,510
Parsnip	317,615	342,112	555,984	136,237	1,034,333	511,865	1,546,198	3,500	290	1,460	940
Stum Lake	80,531	164,179	666,691	163,560	994,430	484,875	1,479,305	3,000	2,299	3,170	2,760
Taseko	161,369	239,050	1,290,958	476,877	2,006,885	1,045,924	3,052,809	4,200	.....	4,180	4,180
Windermere	150,449	106,399	362,100	34,574	503,073	549,778	1,052,851	4,500	3,620	4,490	3,510
Yalakom	184,972	103,297	308,095	14,123	425,515	370,326	795,841	3,000	92	540	520
Totals	5,272,796	2,727,604	7,234,591	1,375,062	11,337,257	4,265,617	15,602,874	78,800	44,314	56,330	47,480

[1] Including volume and annual cut information.
[2] Not satisfactorily stocked.
[3] Non-commercial cover.
[4] This figure includes cut from timber sales awarded prior to January 1st, 1956. These sales are not charged against the annual budget.

In order to round out the picture of the presently established areas managed by the Forest Service, it is necessary to combine these two tables with the following resulting totals in relation to productive acreages, mature volumes, allowable, actual, and committed cut as indicated:—

TABLE 24

	Total Productive Area (Acres)	Mature Volume (M Cu. Ft.)	Allowable Annual Cut (M Cu. Ft.)	Actual Cut, 1956 (M Cu. Ft.)	Total Commitments (M Cu. Ft.)	
					1957	1958
Coast	2,100,558	6,514,873	86,560	62,399	81,760	64,620
Interior	19,568,228	12,531,904	181,080	126,056	148,590	122,350
Totals	21,668,786	19,046,777	267,640	188,455	230,350	186,970

The 50–50 objective envisaged by Dr. Orchard is a long-term programme, and I would think that many years will pass before it is brought to fruition and the 90 million acres of productive forest land in this Province are included in forest management licences or public working circles. As I had occasion to mention in another section of this Report, the alienation of some proportion of Crown lands to permit management thereof by private enterprise would assist in great measure to bring public lands under management much earlier than would be possible under the present system of Crown ownership of these vast areas.

At the moment it is only fair to say that the Service has made a very creditable effort indeed during the past decade to move toward the desired objective. It is a truly prodigious task, and the Service is deserving of praise for what has been accomplished in spite of suffering a severe handicap from lack of sufficient and experienced personnel.

The following table shows that, excluding tree-farms and farmers' woodlots, close to 27 million acres of productive forest land are now under some form of management either included within forest management licences or within areas wherein the cut is controlled by the Forest Service. These 27 million acres represent about 30 per cent of the Provincial total of 90 million acres and contain about 32 million cubic feet of mature timber, which represents around 25 per cent of the Provincial total, estimated at 133 million cubic feet.

These areas under management produced in 1956 a combined cut of over 310 million cubic feet, which was approximately 30 per cent of the Provincial total cut of around 1,069 million cubic feet in that year.

TABLE 25

	Productive Forest Land (Acres)		Volume of Mature Timber (M Cu. Ft.)		Volume of Approved Cut, 1956 (M Cu. Ft.)		Volume of Actual Cut, 1956 (M Cu. Ft.)	
	F.M.L.	P.W.C. and S.Y.U.	F.M.L.	P.W.C. and S.Y.U.	F.M.L.	P.W.C. and S.Y.U.	F.M.L.	P.W.C. and S.Y.U.
Coast	2,077,736	2,100,558	7,994,508	6,514,873	137,534	86,560	102,325	62,399
Interior	2,599,553	19,568,228	4,989,487	12,531,904	28,733	181,080	19,545	126,056
Totals	4,677,289	21,668,786	12,983,995	19,046,777	166,267	267,640	121,870	188,455
	21,668,816		19,046,777		267,640		188,455	
Combined totals, F.M.L., P.W.C., and S.Y.U.	26,346,105		32,030,772		433,907		310,325	

See map showing distribution of tenures in this table in pocket at end of Volume 2.

CRITICISMS RELATING TO PUBLIC WORKING CIRCLES

In keeping with the general trend of discussion throughout the Inquiry, evidence relating to public working circles was controversial and ran the gamut. Some witnesses recommended their eventual absorption into forest management licences; others thought that no more management licences on the congested areas on the Coast should be granted, but instead all unalienated Crown forest land and all present forms of temporary tenures should, on reversion to the Crown, be incorporated within public working circles. Between those who sought their extinction and those who wished for their extension, others offered criticism of the administration of these areas by the the Forest Service.

I do not see much point in discussing the possible inclusion of all public working circles within forest management licences. Public working circles are an essential part of our forest planning to achieve a sustained-yield programme in spite of the tremendous task of management their creation placed upon the shoulders of the Forest Service.

The establishment of more public working circles on the Coast, except in the more remote areas, is by no means an easy task, and the Service objective of a 50–50 division is most difficult, if not impossible, of attainment on the Coast because of the long-established pattern of private ownership with its concomitant and stategic control of unalienated Crown lands. The situation on the Coast seems in reasonable balance at present, so far as area is concerned, with about 2 million acres in forest management licences and public working circles respectively.

Mature-timber volumes on these respective areas are not so very far apart. That equilibrium will in the future tend to a state of regional imbalance if and when the approved and advertised management licences are awarded on the Coast. I can see no escape from that development, and in the section of this Report dealing with forest management licences generally I had occasion to express my opinion as to the necessity for the continuation and

expansion of this method of forest management by private enterprise assisted by reserves of Crown timber with, however, wider opportunities being provided for contract logging.

That leaves, for the establishment of additional public working circles, chiefly the northern section of the Coast and the Interior.

With the abolition of appraisal zones, readjustment of minimum stumpage, and the recognition of stumpage as an instrument of policy (all of which are to be dealt with in a later section of this Report under Forest Finance), the northern areas on the Coast should become attractive as public working circles from which logs will move to Coastal conversion plants. It is my considered view, however, that it is in the vast areas of the Interior the expanding Industry must find its future.

Dr. Orchard expressed his thought on this anticipated and presently developing migration as follows:—*

> " Q.—It seems to me, from the evidence that we have been canvassing, that the larger number of public working circles are going to be in the Interior, and that is going to be where the larger number of operators are. Is that part of any particular design, or thought in planning, or is it something which has just arisen? A.—No, that was the thought of the Creator of the Province. There is some ten times as much area in the Interior of the Province than on the Coast. I am not trying to be funny or anything, but is that the answer to what you are asking? Obviously, you see, you have got—I forget my figures, but, oh, let's say for our present purposes that one-fifth of the area of the Province is on the Coast and four-fifths in the Interior. The Interior has been neglected by the Industry in the past. It started out with the bulk of your Industry up in the Interior. Then it shifted rapidly to the Coast. Now it is gradually shifting back into the Interior, or rather, with the Coast pretty fully occupied, Industry is seeking outlets in the Interior because that is where the opportunities exist. And I can forsee the Interior Industry growing more than anything that we would have predicted ten years ago, growing fabulously. It has, within the past ten years. Certainly Industry is going to move into the Interior, and it is going to develop there. That is where the timber is. That is where the acres are."

This observation of the Chief Forester is supported by the tremendous increase in Interior production, which expanded from a cut of 577 million f.b.m. in 1944 to 2 billion 177 million f.b.m. in 1955, an increase of 377.3 per cent over the last decade.

As I pointed out before, in order to ensure that some measure of control could be exercised over the areas from which this enormous cut is being taken, the Forest Service has now established Interior public working circles or sustained yield units over approximately 20 million acres of productive forest land containing a mature volume of about 100 billion f.b.m.

* Transcript, p. 1672.

Lack of Management.—It was repeatedly stressed that the degree of management by the Forest Service over areas contained in public working circles was limited to containing the cut within approved limits and to the inclusion of restrictive covenants concerning logging methods in timber-sale contracts. It was also said that inventories and surveys were inadequate for management purposes. I have dealt with this subject before, but I think it might be of value at this juncture to let Dr. Orchard speak for himself on this subject. He was asked if the Service had cutting plans similar to that required from a forest management licence. He said:—*

"A.—I will admit that it would be very nice to take these thirty-odd public working circles and to put engineers into every one of them and have a beautiful book of plans such as was entered by our licensees as an exhibit. If we do that, we have just got to stop doing other things. We do first things first, we just haven't the staff to make that kind of plan.

" Q.—In your public working circles, speaking generally, have you got a cutting plan, let us say, in some reasonably formal document in which you indicate for the next three or five years, whatever the term is, how and where you are going to have to cut your timber? A.—No. We have made one or two attempts at that, and we get the most violent protests from the Industry. So that the actual spot, the actual place to cut, and exactly what area we are going to cut at the present time, we decide more or less after we get the application. Now, then, we get the application for a certain piece of timber. I trust that we have a main access road in. The applicant proposes to build a road from the access road to the timber he has applied for, and then we go and examine that and we award it or not, according to the circumstances and conditions that we find on the ground. Quite often those sales are turned down. Here you have a working circle of a million acres. Really it doesn't matter whether you cut an acre here, or here, or here, this year. After you have cut from one of those places this year, it is a little more important where you cut next year, and it gets progressively so as the years go on. But we can draw up a beautiful plan for the cutting of this area and our road comes across here and here is our branches and so on, and we will sell this piece of timber first, and then we will sell this one, and then we will sell this one. But just as sure as you are living, there is going to come along an operator who wants to cut here. There is no good reason why he shouldn't, and why should we say, ' No, we say you have got to cut there or you don't cut at all? ' So we can't make that kind of plan. But we can decide, after we get the application, whether it is wise to let him cut here or whether we can let him cut here or not, and still keep within the over-all intentions of the management of this million acres.

* Transcript, p. 1697 *et seq.*

" Q.—How do you handle the problem of cutting overmature timber if you have, so to speak, no over-all working plan? A.—We offer people favourable rates. We induce them to go and take it. You have got overmature timber wherever you go, you get some of it cut in any event, and we absolutely refuse to sell the young growth. So that he has either got to take the overmature and old stuff, or at least mature timber. In administering the forests of this Province for the public, you can't go out with a bull stick and start prodding loggers in the backside and tell them where they are going to go and what they are going to do. It just can't be done. We have a limitation there that must be recognized. Therefore, that is one of the principal reasons why there are not very carefully written up and compiled working plans for these working circles.

" Q.—I understand from the evidence that there is needed inside a management area some kind of local growth and yield table indicating your annual increment? A.—Yes.

" Q.—Have you got those tables for the public working circles of the Province? A.—They are being compiled, growth data is being taken on all our surveys.

" Q.—Is there any public working circle in the Province, at the present time, for which you feel that you have appropriate growth and yield data, at the present time, to assist you in establishing your management plans? A.—Satisfactory, no, that will be the accumulation of years and years. You see, we are only about seven years old in this stuff, and on a job that is going to take 100 years to get what a critical forester, a fussy forester, would say is reasonably good.

" Q.—What about a reforestation plan? Is the reforestation plan of the public working circle worked out as an integral unit of the working circle unit itself or is it a part of a larger plan that you may have for the Province? A.—It is a larger plan. Apart from the experimental work which is going on in the East Kootenay, we have no reforestation plan for the Interior, and the planting programme on the Coast is not related specifically to public working circles, although the biggest part of our planting has been done in one public working circle."

The basic reason, in my view, that the Forest Service does not have sufficient data for adequate management of public working circles is the overwhelming immensity of the task with which it was confronted in organizing the Crown forests on a managed basis within an administrative framework not adequately staffed to cope with this very heavy burden imposed upon it. The astonishing fact is that so few men have, so far, accomplished so much. In truth, much remains to be done, but the first important steps have been taken in the regulation of the allowable cut and methods of logging to ensure regeneration. If past Governments had supplied the Service

with money and staff sufficient to permit proper surveys of the forest reserve areas, many of to-day's problems would have been nearer solution.

It seems to me that the existing method of putting up timber sales in public working circles upon the request of an applicant should be reconsidered by the Service with a view to its modification at least to the extent, at present, of Service selection of cutting areas a year prior to the time these areas would be open for bidding. Publication of these selected areas by circulation of particulars thereof to operators interested therein and posting of this information in the offices of District Foresters would be a consequent requirement should this change in the present method be adopted. I have in mind the United States system of disposing of public timber in making this suggestion, but do not feel sufficiently confident of the practicability of its extension to this Province to make a firm recommendation in relation thereto. As time goes on, however, some way of more extensive regulation in this regard must be formulated than presently exists.

Access Roads.—The allowable cut on a public working circle does not take into strict account the factor of accessibility, and the lack of access roads, especially into Coast circles, was in consequence a matter of much concern to a number of witnesses. I propose to deal with this problem under a separate heading.

Boundaries.—Because of the disappearance of the Clayoquot Public Working Circle, and other reasons, a number of witnesses expressed the view that the boundaries of public working circles be given more permanence than at present. Dr. Orchard gave his views on this subject at some length, and the following excerpts are from his evidence:—*

> "A.—When we set up a public working circle, we outline the boundaries of that public working circle on our Forest Service working atlas, so that if any application comes up for a timber sale, let us say, or an application for a management licence, or purchase, or lease, we are immediately aware of the fact that it is in conflict with this public working circle.
>
> " Q.—Are the other departments of the Government not notified of the fact that the area which you have designated in your Forest Service record is constituted as an established public working circle? A.—No.
>
> " Q.—Why don't you do this? A.—It is of no interest to them.
>
> " Q.—Are the boundaries of these public working circles flexible? A—Yes.
>
> " Q.—Why are they not treated with the particularity and the definiteness that the boundaries of the forest management licence are? A.—

* Transcript, p. 1764 *et seq.*

For one thing it is all within the family, as it were. There is no outside interests involved in the fixing of property interests or anything like that, outside interests in the boundaries, and in the course of time there may be 10,001 reasons why the boundaries should be adjusted one way or the other. You can't foresee what the developments are. The same provision is written into the management licence. If lands within a management licence are required for any higher use, and what higher use actually is to be interpreted by the Minister, then the lands may, without the consent of the licensee, be withdrawn from the management licence. We believe that over a long term of years the same latitude is necessary in the public working circle.

" Q.—What definiteness is there to the boundaries of these public working circles? A.—I don't know just how far you intend to go with definiteness. There are absolutely definite boundaries. They are drawn and set out on our working atlases in the Department, and there is no application or proposal to use lands that are within forest areas that don't come to the Forest Service for checking, and they are on our maps, and any time that there is any business that develops on lands that are within one of those working circles, the question is immediately raised, and decided by the Department or perhaps eventually by the Minister, depending on its importance. Now, that seems to be definite enough for the present. But I don't think that any Government could afford to take any piece of land and draw a line around it and say, ' Now, that is for this particular use for all time to come. That boundary must not be changed for any purpose whatsoever.' If that is what you mean by definiteness, there is nothing, there is none.

" Q.—You have given, it seems to me, a certain degree of definiteness to the boundaries of your forest management licence, it is definite subject only to a discretionary change? A.—Yes.

" Q.—Why don't you do the same for a public working circle? A.—We have done the same, as far as I can see. It doesn't seem to be necessary for us to describe by metes and bounds those boundaries when the thing is entirely within our own hands, our own office, our own family. I can't see any object to be attained by writing down for our own information those things that we positively know without writing it down.

" Q.—Looking at the map of British Columbia, there, you have a great many awards of forest management licences, or the Government has seen fit to award the licences, and it is envisaged eventually that there will be some kind of partnership or equal divisions, with modification, between private licensees and operators in public working circles, and you have delineated with a good deal of particularity the forest management licence areas, subject only to change by ministerial discretion. Now, what similar guarantee or limit is there for the reassurance of the public that the public working circles, which appear to be lines

on your maps in the Forest Service, won't be changed, or haven't the public got an interest in it? A.—There is no guarantee at all. You have elected a Government. It is completely beyond my sphere of influence. You have elected a Government, and from time to time renew it, to administer the affairs of the Province. And they will administer them, I suppose, as they deem to be best in the public interest, and some of these areas they have allotted to outside interests, other interests under management licence. Now, when you are dealing with another party, you want that all very particularly set down and described.

" Q.—Are the boundaries of the public working circles subject to change at any time? A.—Subject to change at the discretion of the Government, yes."

It seems to me this situation, explained by Dr. Orchard, is not in the public interest and is causing apprehension, whether or not well founded at present. I recommend that the boundaries of the existing public working circles and sustained yield units be established and published in The British Columbia Gazette, and that no change be made therein except by Order in Council, and only after due notice of the proposed change, and the reason therefor, be published in a newspaper circulated in the district affected so that all interested parties may have an opportunity of presenting to the Government any objections they may legitimately have to the proposed boundary amendments. Any proposed alteration of a major character in boundaries should, I think, be also referred to the Provincial Advisory Council for its consideration.

No Assurance of Supply.—Some witnesses were critical of the administration of public working circles because of the method of disposing of timber included therein. Mr. Walter Koerner expressed this thought as follows:—*

" The public working circle shows these main characteristics:—

"(*a*) Public ownership of the timber is preserved.

"(*b*) Conservation and protection of the forest are achieved by regulation as to volume and method of cut.

"(*c*) The forest may be utilized continuously, so long as log market prices are high enough to induce operation.

"(*d*) The logging operator has no assurance of a continuous market for his logs.

"(*e*) The conversion plant using logs from a public working circle has no assurance of a continuous supply of raw materials. Therefore, the tendency for plants dependent upon such logs must be to limit their investment.

"(*f*) Conversion plants with a limited assured supply of wood, and a low capital investment, do not, in general, produce a high

* Exhibit 252, pp. 29–30.

priced or readily marketable product. They cannot afford research for new developments and better wood utilization. In addition, neither they nor the logging operations are under any compulsion to operate continuously in times of poor markets. They can more readily afford to shut down as their depreciation and overhead are low.

" Thus, the public working circle may achieve the technical forestry objective. By its very nature, however, because of the short term incentives offered, the public working circle does not contribute to the principal objective of ensuring that the maximum contribution is made by the forests towards improving the general economic and social level of the Province.

" In actual fact the so-called public working circle is in no way different from all other areas of public forests outside of management licences and the foregoing characteristics therefore apply to such other lands. In the areas reserved for public working circles, the only apparent difference is that the Government has restricted the number of timber sales."

Mr. Koerner then suggested that a system of allocation of timber be established—a subject for later discussion. At this point, however, I would, with deference, once more draw attention to the fact that the primary reason for creating sustained yield units in public forest lands was to ensure a form of management in those areas—a " technical forestry objective."

The Canadian Institute of Forestry, in recognition of this aspect of forest management, stated through Mr. Gormely:—*

" The introduction of public working circles since the last Royal Commission, as recommended in the Institute's brief of 1944, is commended since such units permit more specific and economic organization of forest land for sustained yield management, and should also assist in stabilizing communities."

It is the policy of the Service to establish public working circles as near to settled communities as circumstances permit.

* Transcript, p. 11376.

TREE-FARMS

What is, in effect, a new form of forest-land tenure was created in 1951 by amendments to the "Taxation Act." This is the classification known as "tree-farm land," with provision for special taxation of Crown-granted forest lands, intended to encourage the dedication of suitable private land to permanent forestry.

Such lands are either timber-lands or wild lands, which are otherwise subject, in addition to school tax, to an annual tax of 1½ and 3 per cent respectively of their assessed value. The "Taxation Act" defines the land which may qualify for the less onerous tree-farm taxation as follows:—

"'Tree-farm land' means any land which will find its best economic use under forest crop on which:—

"(*a*) There is a stock of young growth in numbers of trees per acre not less than the minimum standards established by the Forest Service; or

"(*b*) An approved working-plan provides a reforestation programme which is designed to establish a growing stock in numbers of trees per acre not less than the minimum standards established by the Forest Service; or

"(*c*) There is a stock of mature timber which, according to an approved working-plan, will be harvested on a sustained-yield basis; or

"(*d*) There is any combination of the foregoing."

Application for tree-farm classification by a Crown-granted land-owner is made to the Forest Service, which is authorized to decide whether the application meets tree-farm requirements. If certified by the Forest Service, the assessed valuation is completed by the Timber-land Appraisal staff of the Taxation Branch. The "Taxation Act" provides that "the assessed value of tree-farm land, exclusive of any improvements thereon, shall be ascertained only by giving consideration to the present use, revenue, or rental value of the land from the sustained annual growth and annual or periodic cut of the forest trees." The value is based on anticipated annual or periodic income, less anticipated costs of operation, and the resulting net income is capitalized at the rate of 12 per cent. This rate is intended to include:—

(*a*) Four per cent for a return on a safe investment, such as Government bonds:

(*b*) Six per cent for additional risk factor in the forest industry:

(*c*) Two per cent to cover annual property taxes.

Forest-protection tax is treated as a cost of operation in determining the net income. On the valuation determined in the above manner the tax rate is 1 per cent, to which is added the school rate of the district in which the tree-farm is situated. At present this averages from 1¼ to 1½ per cent, making a tax of 2¼ to 2½ per cent on the land and improvements of the tree-farm.

TABLE 26

CERTIFIED TREE-FARM LAND

(Revised to May 4th, 1956.)

Tree-farm No. and Owner	Acreage	1956 Assessed Value as Tree-farm Land	Area of Immature Timber	Area of Mature Timber	Volume of Mature Timber	Present Annual Allowable Cut	Estimated 1956 Tax[1] (Based on First Rotation)			Estimated Annual Cut, Second Rotation
							Per M of Cut	Per Acre	Percentage of Stumpage[2]	
			Acres	Acres	M F.B.M.	M F.B.M.				M F.B.M.
1. T. G. Wright	323	$5,142	263	*Nil*	*Nil*	210	$0.52	34¢	10.2	210
2. H. R. Nickson	181	2,625	150	*Nil*	*Nil*	43	1.30	31¢	14.4	80
3. MacMillan & Bloedel Ltd.	25,038	278,816	18,584	4,087	75,167	5,262	1.12	24¢	14.7	8,770
4. Powell River Co. Ltd.	9,719	96,498	8,541	128	2,661	1,740	1.18	21¢	12.3	2,580
5. Western Forest Industries Ltd.	8,538	33,650	8,268	140	4,500	*Nil*	*Nil*	8¢	*Nil*	4,000
6. G. E. Bernard	3,502	31,006	1,579	558	12,890	750	.88	18.8¢	8.3	750
7. Sooke Lake Lumber Co. Ltd.	8,542	180,291	(3)	(3)	(3)	(3)	2.54	45¢	16.0	(3)
8. R. J. Filberg	7,586	44,050	4,548	236	6,234	600	.50	12.3¢	6.8	1,850
9. Elk Falls Co. Ltd.	68,879	151,745	40,098	1,097	14,480	*Nil*	*Nil*	4.7¢	*Nil*	18,530
10. F. D. Mulholland	570	3,345	385	*Nil*	*Nil*	90	.78	12¢	9.9	117
11. Canadian Forest Products Ltd.	2,561	12,317	2,184	113	1,788	180	.77	10¢	11.0	340
12. Evans Products Ltd.	1,230	9,000	29	51	809	127	1.50	15.5¢	15.0	127
13. MacMillan & Bloedel Ltd.	91,840	1,942,258	34,876	34,934	1,150,893	24,688	1.67	45¢	15.8	24,688
14. MacMillan & Bloedel Ltd.	30,591	509,200	16,460	10,515	225,374	8,068	1.34	35¢	15.4	8,068
15. W. J. Robertson	163	3,517	(3)	(3)	(3)	(3)	*Nil*	46¢	*Nil*	(3)
Totals	259,263	$3,303,520	141,031	54,993	1,569,826	43,258	.....	27¢ av.	.....	71,710

[1] Estimated on basis of 1 per cent tree-farm tax and 1.2 per cent school tax on present annual allowable cut.

[2] Stumpage is defined for purposes of this submission as gross price of the standing tree (net of any royalties or other Crown equity). The tax per thousand of cut is expressed as a percentage of that stumpage.

[3] Not available. Two of the assessed owners have not agreed to make this information public.

Since the previous table was compiled, four more tree-farms have been certified. Particulars relating to them are listed below, also the total acreages and allowable cut as of March 1st, 1957. However, the figures of May, 1956, have been used in the text, which was written before these revised figures were available.

TABLE 27

CERTIFIED TREE-FARM LAND

(Additional, as of March 1st, 1957.)

Tree-farm No. and Owner	Acreage	1957 Assessed Value as Tree-farm Land	Area of Immature Timber	Area of Mature Timber	Volume of Mature Timber	Present Annual Allowable Cut	Estimated 1957 Tax[1]		
							Per M of Cut	Per Acre	Percentage of Stumpage[2]
			Acres	Acres	M F.B.M.	M F.B.M.			
16. B.C. Forest Products Co. Ltd.	24,620	$573,458	6,908	7,881	270,210	6,756	$1.86	49.0¢	15.1
17. C.W. Logging Co.	4,945	24,267	3,526	39	1,490	215	2.39[3]	10.4¢	16.0
18. C. & G. Timberland Management Ltd.	731	4,015	596	41	385	112	0.76[4]	11.6¢	5.0
19. MacMillan & Bloedel Ltd.	246,037	11,383,038	72,678	100,701	2,718,638	101,500	1.30	102.0¢	8.7
Totals, additional	276,333	$11,984,778	83,708	108,662	2,990,723	108,583	.....	.....	.....
Totals to date	535,596	.....	224,739	163,655	4,560,549	151,841			

[1] Estimated on basis of 1 per cent tree-farm tax and 1.2 per cent school tax on present annual allowable cut.

[2] Stumpage is defined for purposes of this submission as gross price of the standing tree (net of any royalties or other Crown equity). The tax per thousand of cut is expressed as a percentage of that stumpage.

[3] Tax per M of present cut.

[4] Based on cut for four-year period, then no allowable cut for twenty-four years.

Assuming that it is desirable to encourage the practice of forestry on land owned in fee-simple, and in my view it is eminently so, the problems involved concern, first, methods for increasing the 259,263 acres of Crown-granted land of productive forest quality which is in this category, and, second, whether additional forest land (excluding statutory timber land) should be sold for this purpose.

Present legislation is having the effect of inducing large companies to place Crown-granted forest lands, especially logged-off and second-growth lands, in forest management licences without relinquishing their title. In order to escape the onerous and perhaps confiscatory annual " wild land " tax of about 4½ per cent (3 per cent plus school tax) on the assessed value of these lands during the long period while they are being reforested and growing another crop of timber but producing no present income, there is no alternative other than tree-farm certification. If a company possesses, or can acquire by means of forest management licence, enough mature timber to support its conversion plants on a sustained-yield basis, it is greatly to its advantage to obtain tree-farm certification also of its Crown-granted old growth, by which means both assessed value and rate of taxation are reduced, as explained. Whether mature, immature, or logged off, the Crown-grant title is maintained when the lands are placed in a management licence. There is no evidence that any forest management licensee has been willing to relinquish his Crown-grant title in exchange for licence tenure and face the possibility of complete loss of ownership in the event that his forest management licence should be cancelled or surrendered.

Once included within a forest management licence boundaries, these Crown-granted lands must be managed on a sustained-yield basis together with the lands of other tenure within the forest management licence. The tree-farm legislation, as it now stands, is, in effect, an attempt to compel other owners of forest land, even small parcels, to manage their properties on a sustained-yield basis, under equally rigid Government control, in the same manner as forest management licensees. These owners, especially small owners, may not be able to get, or may not want, a forest management licence including an allotment of Crown forest land and timber. Their lands may not be extensive enough, nor in suitable condition, for sustained-yield management, as I have explained elsewhere in this Report. Nevertheless, they are forest lands and owners may be willing, and should be allowed, to maintain them under forest-cover as an investment for the future and for such limited production meanwhile as good silviculture may allow. Tree-farm legislation should provide reasonable taxation for such smaller properties. Public policy should, in my opinion, regard such forestry as more closely related to farming than to industry engaged in development of natural resources and virgin timber.

To achieve this purpose, present tree-farm legislation is, in my opinion, unsuitable and its detailed requirements unnecessary. Both this Commis-

sion and that of 1944–45 were informed by competent witnesses that in Scandinavian countries such owners are required merely to maintain their forests in continuous growth, without any restriction or regulation of cutting on a sustained-yield basis, but prohibiting devastation of mature forest and cutting of immature forest except in such a way as will improve its condition.

The Canadian Institute of Forestry, representing professional foresters, recommended similar conditions for tree-farm classification in British Columbia before me in 1944 and again in 1955, when they requested that the " Taxation Act " be amended to define tree-farm land as " any land which is used for the continuous production of trees of commercial value and on which the owner undertakes to provide reforestation of understocked land, to cut no immature timber except in such a manner as will effect silvicultural improvement, and to maintain a definite programme of forest protection."

The Institute also recommended that " the Assessor shall approve an application by an owner to have his land classified as ' tree-farm land ' upon receipt of a certificate from a British Columbia registered forester to the effect that the lands fulfil the requirements of the Act." Also that a similar statement be submitted annually. The Institute expressed the opinion that the assessment of tree-farms " should be regarded as a capital assessment similar to other farm lands and be subject to the farm tax rate," and that reassessment should only be made " in accordance with changes in general economic conditions affecting all farm land assessment and taxation."

It seems evident that the requirements for certification and assessment need revision and simplification if improved forest management on privately owned forest lands outside management licences is to be encouraged. Before making recommendations, I wish to compliment the Provincial Assessment Branch for the evident care and consideration which it has applied in this part of its responsibilities. The difficulties of assessment under the present legislation were frankly recognized, particularly in connection with assessment of the sustained annual yield of tree-farm land from which there could be no production for a generation and of which the site quality could not be accurately ascertained. Although other witnesses made various recommendations for changes in this legislation, none made any specific complaints of the Department's administration of it.

In place of the definition of " tree-farm land " in section 2 (which I have quoted) I would suggest " any land which (*a*) has been included in a forest management licence, or (*b*) is being used by the owner for the continuous growth of trees of commercial value." It seems to me, with deference, that the proposal of the Institute to include requirements for prompt reforestation and protection of immature trees are silvicultural details which are implicit in the simpler definitions I propose.

Section 33A (1), which gives the Assessor's requirements for certification, could then be simplified to "(*a*) a certificate from the Minister of Lands and Forests to the effect that the lands are included in a forest management licence, or (*b*) a statement by the applicant that he is using the lands for the continuous growth of trees of commercial value, accompanied by a plan and report by a forester registered under the 'British Columbia Foresters Act' showing the forest condition of the lands, the present annual production, if any, and the estimated site quality of each forest type."

In the case of an owner of Crown-granted forest land for which tree-farm classification is sought and from which the production supports his own conversion plant, in whole or in part, it should be an additional requirement for tree-farm classification that such lands be managed on a sustained-yield basis.* If the owner is also a forest management licensee, but the lands are so located that they are not subject to section 33, subsections (8) and (9), of the "Forest Act" (requiring their inclusion in his forest management licence), then, as a condition of tree-farm classification, he should be required to include under sustained-yield management (as defined in the "Forest Act" for forest management licences) all Crown-granted forest lands owned by him within the same general economic district or area from which he supplies his conversion plant or plants.*

Section 33A (2) deals with the annual return required by the Assessor. I am unable to see what useful purpose is served by the amount of time and expense involved in this return by a small tree-farmer. In the case of the large owner with Crown-granted lands in a management licence, it is merely duplication of the management licence records. One witness,† who said he had a tree-farm of 600 acres registered under the Canadian Forestry Association scheme, had not applied for certification under the "Taxation Act" because "I am not sure that I would obtain sufficient advantage to recompense me for the extra trouble and expense of the necessary paper work. That's my sole trouble, I don't want to stop and do the necessary work and so on." I consider that the annual return should be limited to a statement certified by a registered forester that the tree-farm is being maintained in accordance with the provisions of the Act and should include the Government scale of timber cut during the year.

I have mentioned, above, certification of tree-farms by the Canadian Forestry Association. This is a purely voluntary movement, introduced by the Association to encourage owners of private land to practise forestry. The Association's definition of a tree-farm is "an area of privately owned forest land devoted to the continuous growth of merchantable forest products under good management." The owner is required to harvest his timber-crops in a manner that will ensure future crops in perpetuity, and

* Unless the report on the condition of the land by a registered forester establishes to the satisfaction of the Forest Service that this is not economically feasible.

† Mr. E. A. Anderson, p. 10188.

to provide reasonable protection from destructive agencies. The Association reports that 411,662 acres of tree-farms have been certified in Canada, including 195,563 acres in British Columbia.

This development is similar to that of the very successful voluntary tree-farm organizations in the United States, which are supported by the largest timber and pulp corporations as well as the smallest forest-land owners. A tree-farm may include the land of several owners, in which case an " allowable cut " is planned for the tree-farm as a whole rather than for each owner. Resident owners are responsible for the management of their own land. In a composite tree-farm of this nature, an acreage assessment is made yearly for fire protection, including maintenance of roads, trails, lookout towers, and patrol. As in the Canadian movement, requirements are prompt reforestation after logging and proper treatment of second growth; there is no attempt to restrict the cut to a hypothetical " sustained yield " where the growing stock is not in condition for such management. Certification as a tree-farm has no direct effect on taxation, but if classified under the reforestation law of the State, the land is subject to a nominal annual tax and a yield tax on actual production.

The second problem I mentioned is whether suitable Crown land should be made available by sale to tree-farmers. This was recommended by witnesses, including the Canadian Institute of Forestry, at both Commissions, 1944 and 1955. Under appropriate conditions and control, reasons for adoption of such a policy are as follows:—

The interest of small-land owners in even elementary practice of forestry is of very recent origin in British Columbia. It is not difficult to find reasons. The tax rate on logged and reforested land, which is included in the " wild land " taxation class, is not calculated to encourage owners to invest in such property for profit through the management of the growth of young trees already on the lands; it prohibits any possibility of profit from reforestation of denuded lands. The " wild land " tax rate was 5 per cent from 1917 to 1929 and 3 per cent from 1930 to the present time. In addition, this land is subject to school tax, which may bring the total rate to 4½ per cent. Apparently this, the highest Provincial rate of taxation of any property, was deliberately intended to recover Crown ownership, a form of confiscation, or, alternatively, to force owners to develop logged-off lands for agriculture or other purposes, ignoring the fact that little of this land was suitable for anything but growing trees and that, if reverted to Crown ownership, it would be unlikely to produce any revenue for a generation. The first reason, therefore, for permitting the sale of forest lands is to share the responsibility for their management with private citizens and to put them on the tax roll on terms commensurate with their real value.

The second reason why there has not been any great demand for ownership has been the lack of market for the product, usually small logs, which might come from second-growth forests. This situation is changing.

The expansion in construction of pulp and paper mills is providing a market. MacMillan & Bloedel Limited, Crown Zellerbach Canada Limited, and British Columbia Forest Products Limited have announced their interest in buying "farmer" wood.* The Elk Falls Company informed the Commission that "another source of wood supply for the Duncan Bay mill, which is of growing local importance, is the logs and wood purchased from farmers and small-land owners in the vicinity of Campbell River. Increasing numbers of people are adding to their incomes by taking advantage of the facilities at Duncan Bay for disposal of small amounts of wood." A small-mill operator recommended that "small loggers and operators should be encouraged to develop tree-farms in available areas" and thought that "small isolated and neglected areas should be made available" to such operators.

There are social implications in small-forest ownership. As Mr. H. S. Foley, of Powell River Company, put it: If an interested man could "get 100 or 160 acres of land and own it, and grow trees and sell them, he becomes a better citizen, he becomes interested in forestry, he is an owner; in my judgment it would be the most wonderful thing that could happen to British Columbia. That is a tree-farm. And as this country opens up, more and more of that type of ownership would develop." In answer to the suggestion that small tree-farms would soon be bought up by large industrial corporations, Mr. Foley said: "No, I think any company would rather see 100 small producers producing either logs or wood suitable for use in the pulp-mill. Those 100 men then become interested in forestry. They become interested in taxation problems. They are interested in everything that is for the good of a tree from the time it starts to grow until it becomes paper or pulp . . . so far as our Company is concerned, I would much rather see the ownership dispersed."

Mr. Frederiksen, president of Tahsis Company, expressed a similar point of view: "We are of the opinion that, as time goes on, tree-farms could become an important factor in encouraging smaller operators to practise forestry on a long-term basis with economic advantages to themselves and to the general good of the public." He suggested that sales should be kept to a maximum of 1,000 acres. "These farms should always be owned by individuals, and legislation should be enacted to prevent conversion plants from acquiring such tenures."

Another reason for sale of comparatively small parcels of Crown land for the purpose of tree-farming is indicated by the patchwork pattern of ownership of non-agricultural lands exemplified, for example, in the eastern part of Vancouver Island. Lands acquired for timber have been held after logging, attempts have been made in some cases to farm unsuitable soils, some properties have reverted to the Crown through non-payment of the high wild-land tax. In disposal of such lands, efficiency of forest management should be given first consideration. For example, the owner of a

* *See* section on Farm Wood-lots.

management licence or tree-farm should be given the opportunity to acquire a Crown lot which is surrounded by, or adjacent to, his managed property if it can be efficiently combined with it. In case of competition for these scattered parcels of forest land, preference should be given to the small tree-farm owner. The relationship of length of boundary to area included is important in forest management of small properties, especially those which have been logged. It is possible for the cost of making an official land survey to exceed the value of such property, and the cost of permanent maintenance of such a boundary should not be ignored.

The general consensus of the opinions expressed during the hearings was favourable to the judicious extension of the tree-farm principle, and I have no hesitation in recommending to the Government that appropriate measures be adopted to encourage and implement this programme.

I do consider, however, that present methods of assessment and taxation of tree-farms should be modified.

I had intended to deal with these headings when considering taxation generally, but as tree-farms are in a special category it might be appropriate to venture into those subjects at this juncture.

Assessment and Taxation of Tree-farms

With regard to recently logged lands, and even lands with well-established reforestation, the Department expresses the opinion that " tree-farm land from which no cut is anticipated for thirty or more years is not a realistic investment based on reasonably anticipated income for private capital." The Department does not, however, adopt the logical conclusion of this point of view, which is that forest land, apart from trees on it, has no assessable value. It assigns a " nominal site productivity value " in cases where there is no possibility of income for thirty or more years. For such cases it has worked out a table of " bare land " values according to site quality and accessibility, and applies these values in assessment of forest land whether in tree-farm classification or not (*see* following table). In addition, a value is assigned to immature stands over 5 years of age varying from 10 cents per acre up to 10 years to $55 per acre for 41 to 50 years old on best sites. These values have been assigned to immature forests on private lands not classified as tree-farms (second table). Immature forests on tree-farm land are assessed at half the values in this table in cases where assessment cannot be made on the basis of capitalized productive capacity because of the length of time that must elapse before actual production can be realized.

TABLE 28

SITE LAND VALUES FOR LANDS DEVOTED TO FOREST CROP IN COASTAL AREA OF BRITISH COLUMBIA

Land Quality	Accessibility and Topography	Assessed Value of Land (per Acre)
Good (140+)	Favourable	$5.00
	Average	4.00
	Difficult	3.00
	Very difficult	2.00
Average (110)	Favourable	4.00
	Average	3.00
	Difficult	2.00
	Very difficult	1.00
Poor (80)	Favourable	3.00
	Average	2.00
	Difficult	1.00
	Very difficult	.50

The above values are applied to all logged-over lands devoted to forest crop not classed as tree-farm land and to tree-farms from which no cut is anticipated for thirty years or more because of immaturity of the growing stock.

TABLE 29

ASSESSED VALUES OF IMMATURE SECOND GROWTH IN COASTAL BRITISH COLUMBIA

All species; trees generally under 12 inches d.b.h. Assessment value in dollars per acre for 100 per cent stocking.)

Site-class	Age (Years)								
	0–5	6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–50
	Risk Allowance								
	100%	88%	77%	64%	54%	43%	40%	40%	40%
80 and under	*Nil*	$0.10	$0.30	$1.40	$4.40	$9.40	$14.00	$18.00	$25.25
110	*Nil*	0.10	0.60	2.25	6.60	13.60	20.75	27.00	37.00
140–170	*Nil*	0.10	1.00	3.60	9.60	20.50	31.50	40.50	55.00

Assessed values of tree-farm land from which no cut is anticipated for thirty or more years because of immaturity of the growing stock are assessed at half the above rates which are applied to second growth not in tree-farm classification.

The Finance Department comments as follows:—

"Ascertainment of reasonable assessed values on tree-farm land under section 33B of the 'Taxation Act' is difficult. Adequate data on income and operational costs is not readily determined because even large tree-farm operators, apparently, cannot furnish authentic statements. Such a situation is not unexpected in the initial stages of any

relatively new land use in this Province such as tree-farming. It is possible that a request for considerable detail on tree-farm costs has meant some inconvenience to tree-farm operators. This request was based on the premise that without such adequate data no equitable tree-farm land-valuation approach can be developed.

" The Finance Department is interested in any new ideas dealing with tree-farm valuation which are appropriate within the framework of the legislation. Assessed valuations are not likely to be authoritative until:—

"(*a*) At least ten years' experience in actual costs and income from typical tree-farms is available:

"(*b*) More up-to-date and authentic site productivity tables, both on the Coast and in the Interior, are available. Further research by the Forestry Service on site productivity tables would be appreciated."

In view of the Finance Department's difficulty in obtaining detailed information for the purpose of assessment of tree-farms, it is instructive to quote the actual requirements of the " Taxation Act " (section 33A). The applicant must obtain a certificate from the Minister of Lands and Forests to the effect that his land fulfils the definition of tree-farm land quoted above, and that the plan submitted with his application " is designed to ensure that the lands will be maintained in a state of continuous productivity." It must include " a return for each parcel or area owned or occupied, setting out in detail:—

"(*a*) The legal or other well-defined description of each parcel or area and the acreage thereof:

"(*b*) A plan, being a standard forest-cover map, showing the uniform subdivision of each parcel or area into forty-acre areas of twenty chains square. Such plan shall show:—

"(i) The area of mature timber, together with an estimate in board-feet measure by species on each forty-acre area thereof:

"(ii) The area of cut-over land and the young trees thereon, together with an estimate of the age, height, and average number of trees per acre by species:

"(iii) The area of productive cut-over land containing less than normal stocking per acre of young trees:

"(iv) The area of non-productive land:

"(*c*) The estimated annual or periodic sustained yield:

"(*d*) A plan of operation to show:—

"(i) The silvicultural method used to maintain continuous forest production on the land:

"(ii) The programme for reforesting the cut-over land containing less than normal stock of young trees per acre:

"(iii) The protection programme used to guard the forest as a whole:

"(*e*) The proposed over-all annual or periodic rate of cut. Where such annual or periodic cut exceeds the estimated annual or periodic sustained yield, the programme for decreasing the annual or periodic cut to equal the yield shall be stated.

"(2) Any owner of tree-farm land shall make an annual return to the Assessor for each parcel or area of land used for tree-farming on or before the twenty-first day of October in each year for the twelve-month period ending on the thirtieth day of September in that year. The return shall show in detail:—

"(*a*) The legal or other well-defined description of each parcel or area logged, together with a plan of each parcel or area indicating the exact acreage and description of each forty-acre area or portion thereof from which the timber has been cut and removed:

"(*b*) The official Government scale of timber removed from each parcel or area:

"(*c*) The reforestation programme completed:

"(*d*) The protection programme completed."

These statutory requirements, for the management of land owned in fee-simple, in order that it may be equitably taxed, are more meticulous and onerous than those required by the "Forest Act" for the approval of the inclusion of Crown land in a management licence. In the case of the tree-farm, the work involved in satisfying these requirements is demanded before the application can be approved; in that of the management licence these matters of regulation and silviculture are included in a working plan designed to introduce sustained yield in successive steps, and the detailed information, required initially of a tree-farmer, is provided gradually by a management licensee in a series of revised working plans at intervals of five or more years.

In my 1945 Report I wrote:—

> "In my opinion, with deference, the complicated system of taxation recommended by some of the witnesses before me, while no doubt sound in theory, would, in practice, tend to discourage rather than encourage large and long-time investment in tree-farms. The essential aim of any tax structure should be simplicity in methods of assessment and collection."

This statement appears to have been borne out by results of the tree-farm taxation. In the six years since its enactment, 259,263 acres, less than 5 per cent of the 5,480,000 acres of privately owned forest land in the Province, have been certified as tree-farms. Of the total, 192,540 acres have been certified because they were already included in forest manage-

ment licences and, therefore, presumably being managed for sustained yield and entitled to tree-farm classification for taxation purposes.

The opinion of the Canadian Institute of Forestry was expressed as follows: " The Institute endorses the 1951 tree-farm amendments to the 'Taxation Act' as being a progressive step in forest management which recognizes the principle that private land owners should be encouraged to hold and grow timber as a crop." But it recommended that " the assessment procedure of tree-farm land tenures be reviewed and simplified as far as possible. As the present assessment system appears to be cumbersome, complicated, and confusing, it should be determined whether the method used is in accordance with the intentions of the 'Taxation Act'."

This seems to criticize the assessment procedure rather than the legislation, whereas the fact is that the procedure is defined in great detail in the Act. The Institute continues, however, with recommendations to redefine " tree-farm land," and its assessment, by amendments to the Act, to which I have referred.

The brief presented to the Commission by the Provincial Department of Finance compares the tax rate on tree-farms to royalty and quotes examples in which the tax works out to " the equivalent of a royalty " of from 12 to 20 per cent of sale value of the timber cut. With respect, I do not consider this a proper comparison. At the time of acquisition of timber leases and licences and certain classes of Crown grant, royalty was reserved to the Crown on the timber standing on the land at that time, and payable when it was cut. Whatever may be the historical basis for the reservation of royalty to the Crown and the ancient meaning of this term, to-day it has become in practice and in effect a deferred purchase price. On the other hand, tree-farm classification is available only for land which has already been Crown-granted, and the tax thereon is a property tax and not, in any sense, a purchase price of timber grown on a tree-farm by its private owner.

The Department estimates that the average tree-farm tax, including school tax, will be approximately the equivalent of a royalty of 13 to 14 per cent of the stumpage value of the allowable yield on a sustained-yield operation, whether actually cut or not. There will, however, be considerable variation in these percentages between tree-farms, caused by uneven distribution of age-classes at time of certification; by varying costs of necessary forestry work in development of each tree-farm; by differences in district school tax rates; and by the varying rates of royalty to which timber cut on some classes of Crown-granted land in tree-farms is subject. In any case it is difficult to justify a tax rate on land owned in fee-simple, approximating the 16 per cent of stumpage value, which will be payable to the Crown as the *purchase price* of second-growth timber grown by forest management licensees on Crown land in their licences. It is relevant to note (*see* Table 26) that on the fifteen tree-farms certified up to January, 1956, (259,263 acres) the tax averages 27 cents per acre per

annum although less than 25 per cent of the area carries mature timber. The annual licence fee on Crown land in management licences is only 1 cent per acre. Forestry obligations are approximately the same on both tenures under present legislation.

While it is doubtless true that, under the present system of assessment of privately owned land being used for tree-farming, the remark of the Department that " without such adequate data no equitable tree-farm land valuation approach can be developed," the present system is, in my opinion, premature in relation to the stage of development of forestry in the Province either on Crown or licensed lands. I recommend instead an annual tax equivalent to 1 cent per acre of the total area of the tree-farm and a form of yield tax of 10 per cent of the prevailing stumpage value in the district on timber actually cut during the past year. Half of the total to be allocated as school tax. In time, as tree-farms become more profitable and numerous, and as reliable information on the qualities of forest sites becomes available, it may be possible to increase and vary the annual rate of 1 cent per acre according to site quality, but the greater part of the tax should be in the form of a yield tax, which automatically reflects the volume of production and therefore the quality of managed forests.

I have mentioned the position of the owner of a small tract of forest land relative to that of the large owner, in particular the owner of a forest management licence in which is included Crown-granted land. There appears to be a basic difference between the two, which might appropriately be reflected in assessment and taxation. Of the tree-farms certified to date, those owned by individuals average 2,054 acres; timber or pulp companies own an average of 35,277 acres each. This is in addition to the company holdings under other tenures.

I consider therefore that small tree-farms should be classed with other farm land for taxation purposes and that the definition of " farm land " in section 2 of the " Taxation Act " should be amended to read: " Farm land " means any area of land of two or more acres and, in the case of land used for tree-farming, not exceeding 2,000 acres in one ownership, classified as such by the Assessor.

Appropriate amendments should be made in section 2 (*a*), section 24 (*e*), and wherever necessary in the Act.

My suggested revised definition of " tree-farm land " as a taxation class would then relate to (*a*) Crown-granted land in a forest management licence and (*b*) other Crown-granted forest land, over 2,000 acres in one ownership, dedicated to forestry as I have defined it.

TIMBER SALES

As I pointed out earlier in this Report, after the embargo on the granting of timber licences in 1912 there was no statutory provision for disposal of Crown timber, with the exception of hand-logger licences, until the " Forest Act " was enacted in 1912, containing provisions permitting the sale by public competition of licences to cut Crown timber after cruising, appraising, and advertising by the Forest Service. In order to distinguish this type of temporary tenure from all former classes of licences, this new method of timber alienation was, and still is, referred to as a " timber sale."

The number of contracts and volumes sold have greatly increased over the last decade with the cutting of other tenures and the extension of forest surveys disclosing much greater accessible volumes than previously estimated because of the development of roads, new and more efficient logging methods, and higher values for forest products. The annual cut from timber sales is now the most important single source of Provincial production, and in 1956 amounted to almost 50 per cent of the total Provincial cut.

The following tables are illustrative of this development:—

TABLE 30

TIMBER-SALE RECORD

Year	Sales Made[1]	Sales Closed	Total Sales Existing	Total Area (Acres)	Total 10% Deposits
1947	2,469	1,417	6,195	1,522,827	$1,524,339.54
1948	2,612	1,838	6,521	1,602,914	2,111,899.89
1949	2,562	2,304	6,226	1,548,063	2,267,581.48
1950	2,591	2,122	6,264	1,543,319	2,796,773.32
1951	2,962	1,904	7,009	1,774,963	4,627,876.89
1952	2,594	2,168	7,143	1,932,878	6,068,335.29
1953	2,881	2,456	7,287	2,094,280	6,682,253.35
1954	3,010	2,456	7,617	2,300,490	8,094,125.33
1955	3,372	2,376	8,371	2,789,657	10,760,505,55
1956	2,859	2,253	8,738	3,218,820	14,008,994.00
Ten-year average	2,791	2,129	7,137	2,032,821	$5,894,268.46

[1] Inclusive of cash sales averaging 342 of such sales per annum (the 1956 total of 2,859 sales made included 239 cash sales and four long-term timber sales).

TABLE 31

TIMBER SALES AWARDED BY FOREST DISTRICTS, 1956

Forest District	Number of Sales	Acreage	Cu. Ft.	Poles and Piling (Lin. Ft.)	Number of Posts	Number of Cords	Number of Ties	Saw-timber (F.B.M.)[1]	Number of Christmas Trees	Number of Hop-poles	Number of Car-stakes	Number of Blasting-sticks	Number of Bean-poles	Number of Cedar Shakes	Number of Fence-rails	Estimated Revenue
Vancouver	728	131,184	249,676,200	239,080	2,000	4,548	620							71,360		$19,871,394.50
Prince Rupert	467	86,259	85,315,020	3,123,025		3,657	32,625				2,600					4,087,992.93
Prince George	729	193,000	204,446,800	297,355	168,125	2,335	107,686									10,325,063.77
Kamloops	661	315,134	183,029,500	7,264,630	214,732	825	2,000									14,958,690.09
Nelson	274	144,592	79,957,910	2,676,510	414,570	849	650				600					6,700,616.37
Totals, 1956	2,859	870,169	802,425,430	13,600,600	799,427	12,214	143,581				3,200			71,360		$55,943,757.66
Totals, 1955	3,378	923,230	764,812,540	10,765,982	757,890	22,590	156,077	8,356,000[2]	300		1,000	45,000		110,400	1,951	40,507,422.12
Totals, 1954	3,009	693,153	530,817,905	10,210,460	1,017,098	655,670	67,275		300		7,600	15,500		95,400	235	18,938,049.76
Totals, 1953	2,881	605,450	461,100,000	22,090,812	795,235	22,580	196,144	446,200			6,810	12,000	500	9,100		17,322,931.29
Totals, 1952	2,594	534,409	57,729,795	14,148,539	1,005,485	20,546	218,433	2,221,589,000	300		700			174,700		23,584,741.49
Totals, 1951	2,962	605,511	5,000	12,812,383	615,153	25,783	296,932	2,806,195,000			2,150			313,250		24,621,254.79
Totals, 1950	2,591	372,237		12,451,507	793,976	31,785	144,592	1,628,166,500	300		1,700			113,720		9,152,791.81
Totals, 1949	2,525	375,717		10,298,466	1,601,707	57,557	200,300	1,238,155,000			2,650			542,000		5,669,035.70
Totals, 1948	2,611	440,198		12,052,076	966,267	65,599	235,583	1,824,615,000				117,000		1,247,800		8,544,121.84
Totals, 1947	2,469	375,781		27,185,542	1,291,482	64,576	236,851	1,469,890,000		3,000	1,800			636,385		7,097,435.12
Ten-year average, 1947–56	2,788	579,586		14,561,637	964,372	97,890								331,412		21,138,154.16

[1] Sales since 1952 on cubic-foot scale only.
[2] Special resale on f.b.m. basis.

In order to evaluate the tremendous expansion of the cut from timber sales during the last decade, the following table is included. It will be noted that the cut from this class of tenure in 1944 amounted to 23 per cent of the total cut from all tenures and 37 per cent of the total cut from Crown lands. In 1956 these percentages had increased to 48 and 65 per cent respectively.

In direct comparison the cut from timber sales increased from about 713 million board-feet in 1944 to over 3 billion board-feet in 1956—an increase of approximately 425 per cent.

TABLE 32

TOTAL SCALE OF ALL PRODUCTS, IN F.B.M., BY LAND STATUS AND FOREST DISTRICTS, 1944 AND 1956[1]

Land Status	Vancouver		Prince Rupert (Coast)		Prince Rupert (Interior)		Prince George		Kamloops		Nelson		Totals	
	1944	1956	1944	1956	1944	1956	1944	1956	1944	1956	1944	1956	1944	1956
Timber licences	567,310,718	645,771,101	82,009,573	4,003,305	1,511,374	250,339	4,298,784	7,349,768	8,932,111	5,209,278	17,249,247	35,857,945	681,311,807	698,441,736
Timber berths	129,600,204	61,485,291							12,080,706	15,647,776	7,119,579	5,590,982	148,800,489	82,724,049
Timber leases	184,735,030	142,099,403									5,462,681	148,582	190,197,711	142,247,985
Pulp leases	26,903,568	20,471,346	108,755	26,108,291									27,012,323	46,579,637
Pulp licences	25,826,269	8,740,280	71,960,743	45,703,818									97,787,012	54,444,098
Hand-loggers' licences	32,495	48,976	747,644	104,198									780,139	153,174
Farm wood-lots		355,232								42,529		113,539		511,300
Timber sales	299,095,312	1,102,357,920	62,674,589	125,714,228	34,090,469	143,820,774	89,484,355	594,379,966	101,443,744	759,513,863	126,278,534	314,057,172	713,067,003	3,039,843,923
Pulp-timber sales	2,257,093		4,190,609	85,305,251									6,447,702	85,305,251
No mark visible		125,460,791												125,460,791
Management licences		113,203,692		39,353,682		69,621,174		14,055,697		23,916,101		53,963,494		314,113,840
Miscellaneous	24,828,762	11,897,000	3,062,715	27,309,586	1,580,344	3,566,020	15,501,522	11,055,683	3,631,829	14,733,617	14,056,817	3,627,061	62,661,989	72,188,967
Sub-totals, Crown lands	1,260,589,451	2,231,891,032	224,754,628	353,602,359	37,182,187	217,258,307	109,284,661	626,841,114	126,088,390	819,063,164	170,166,858	413,358,775	1,928,066,175	4,662,014,751
Federal lands	15,264,523	39,677,539	1,766,530	4,960,160		5,772,946			1,624,982	23,357,564	6,012,560	1,387,425	24,668,595	75,155,634
Crown grants—														
To 1887	888,706,132	966,816,498	2,360,464	95,683				1,578,371	13,504,458	44,459,678	49,195	2,117,830	904,620,249	1,015,068,060
1887–1906	57,376,441	101,220,117	1,612,187	3,222,071	298,210	201,678	92,388	122,939	6,617,624	14,499,345	38,018,518	48,726,837	104,019,368	167,992,987
1906–1914	35,986,865	40,271,384	3,738,638	13,107,195	2,551,937	7,350,765	2,385,520	7,009,416	9,876,042	27,648,065	10,754,882	12,238,907	65,293,884	107,625,732
1914 to date	26,543,865	122,713,935	468,184	12,854,179	3,110,298	5,339,667	15,502,991	39,777,086	15,663,414	75,521,924	8,376,514	23,254,669	69,665,266	279,461,460
Totals	2,284,467,277	3,502,590,505	234,700,631	387,841,647	43,142,632	235,923,363	127,269,560	675,328,926	173,374,910	1,004,549,740	233,378,527	501,084,443	3,096,333,537	6,307,318,624

[1] Source: Reports of the Forest Service.

There are three general classes of timber sales: (*a*) Sales of otherwise unalienated and unmanaged Crown timber, (*b*) sales of timber in public working circles, and (*c*) sales of Crown timber in forest management licence areas.

Dealing with (*c*): Sales are made by the Service of mature Crown timber in certain forest management licences when reserved for that purpose and each cutting permit is in reality a sale of Crown timber included therein. I have dealt with these aspects of the subject in the Management Licence section of this Report.

I propose at this point to limit my observations to sales within the (*a*) and (*b*) classifications, although it may be that, when relevant, my comments may be taken to extend to some phases of timber disposal under (*c*).

Some witnesses were seemingly under the impression that timber sales under (*a*) and (*b*) are primarily, if not solely, for independent loggers, with the ultimate purpose of perpetuating an open log market from which the conversion plants without appurtenant management licences could secure a continuity of supply of logs.

Whatever the situation may have been in the past, it is, I think, made abundantly clear in the evidence that in the last decade the number of large and small free and independent loggers has been steadily declining.

At one time on the Coast there were, in addition to the relatively small independent loggers, a number of very large companies which were engaged, either wholly or in most part, in extensive woods operations cutting for the open market. They no longer exist. Logging is now, to a major degree, a subsidiary function of integrated companies and other conversion units, using their own crews or contractors to cut private timber, timber sales, and forest management licences.*

Exact figures are difficult to ascertain because the status of loggers does not remain a constant, but changes according to the particular category in which the individual may, at any one time, be placed. That is to say, he may be an independent logger on one show and a contractor on the next.

The best I can do from the evidence adduced is to estimate that on the Coast there are not more than about 300 independent loggers engaged as such at any one time, and this total includes a number of casual operators cutting a few poles and piles or generally operating very small outfits. Their entire production amounts to between 5 and 10 per cent of the total Coast cut or somewhere in the neighbourhood of between 200 or 300 million f.b.m. per annum. This cut is chiefly of hemlock and cedar. "Free" fir is almost non-existent, and what comes on the open market for processing in the Province is small in quantity and inferior in quality.

So far as the evidence discloses, there are only about thirty-one loggers operating in the Prince Rupert District (Coast), and I understand they are all contract loggers.

In addition to the independent loggers, there are approximately 1,000 loggers on the Coast financed by conversion plants, with first-refusal-at-market contracts or some other form of tied arrangement.

* It is estimated that there are between 20,000 and 25,000 men employed on a wage basis in logging operations by conversion plants—from 10,000 to 15,000 on the Coast and approximately 10,000 in the Interior.

This type of logger produces about 25 per cent of the Coast cut. In the Interior there are very few, if any, independent loggers.

Excluding the independent and contract loggers, cutting in combination somewhere around 30 to 35 per cent of the total Coast log production, the balance of the cut is thus made up from timber logged on private tenures, timber sales, and forest management licences by companies owning conversion plants and using their own logging crews.

The increase in the number of the contract type of logger results, in part, from the disappearance of the big logging companies on the Coast who were able to carry on large woods operations without financial assistance. Older men in industry will recall such vanished companies as Merrill & Ring and Bloedel, Stewart & Welch. When they ceased operating, for reasons now only historical, conversion plants not able or not wishing to organize logging divisions of their own found it desirable to finance smaller loggers to secure their supply of logs.* Many loggers finding it difficult to finance independent operations of their own were willing to co-operate on this basis. In consequence it has come about that the independent and free logger has been gradually replaced by the contract logger with a resultant and undesirable, although inevitable, diminishing open log market. I say " undesirable " advisedly because it is my view that the continuation of a competitive open log market is in the public interest; for one reason it is an important factor in Coast stumpage appraisals.

For another and more cogent reason it should be a continuing source of supply, for large as well as smaller conversion plants.†

As illustrative of this, I would refer to the sources from which one very large conversion plant, with a small forest management licence, draws its supply. Its annual consumption averages approximately 300 million board-feet and it employs the services of about eleven contract and twenty-one tied loggers.

Particulars are as follows:—

PROPORTION OF CUT BY LAND TENURES FOR THE YEARS INDICATED

Management licence—	1952 (Per Cent)	1953 (Per Cent)	1954 (Per Cent)	1955 (Per Cent)
Crown timber	5.6	4.5	7.2	1.7
Company timber	7.1	10.2	10.5	10.2
	12.7	14.7	17.7	11.9
Temporary tenures	33.5	36.6	32.7	33.2
Company timber sales	28.3	27.9	38.2	45.1
Timber sales inside public working circle (cut by tied loggers)	10.6	6.1	5.4	3.0
Timber sales outside public working circle (cut by tied loggers)	3.3	2.3	1.8	2.3
Crown grants	11.6	12.4	4.2	4.5
	100.0	100.0	100.0	100.0

* *See* section on Sawmills.

† Producing mines on the Coast also depend in great part on the open log market for their timber requirements. *See* section on Mining.

This 100-per-cent cut from these various classes of tenures supplies about 93 per cent of the company's annual consumption. The remainder, or about 7 per cent, is made up by purchases in the open log market.

Much discussion revolved around the plight of the small logger. I would make two comments upon this: first, the word " small " is used in this context in a purely relative sense. Even the " small " logger requires from $50,000 to $100,000 to set himself up in business. As a rule of thumb, it has been said that for every million feet of log production an investment of from $20,000 to $30,000 is required. Heavy logging equipment, now that easily accessible timber is no longer available, is expensive to buy and all items of cost have increased considerably over the past years.

A medium-sized logger is usually regarded as one having an investment of between $400,000 to $1,000,000, and a large operator is defined in general terms as having an investment in excess of $1,000,000.

My second observation is that while the comparatively few independent loggers are complaining of lack of available timber and are vocal in that regard, the real crux of the problem, it seems to me, is not the result of their demand for timber, but stems basically from the difficult situation facing the many smaller sawmills, without timber reserves of their own, that are endeavouring to secure a continuity of supply of raw material from timber sales in public working circles and unalienated Crown lands, and what is available to them on the open log market in competition with others in the same situation, complicated by the fact that large companies are looking to these same sources to supplement their own supply.

I have recorded these facts briefly as a background for a discussion of timber-sale administration and the criticisms that have been directed thereto.

In dealing with these criticisms I think the approach thereto would be simplified by commenting upon each successive step by which such sales are awarded.

Origination of Sales.—It was submitted by a number of witnesses that the present system of " putting up " timber sales by an applicant desirous of purchasing the timber thereon was a haphazard proceeding not conducive to good forest management. On the other hand, organized Associations and other witnesses strenuously opposed any alteration in the present method. As I have already said, as time goes on it seems to me some more orderly system of disposing of Crown timber in public working circles will have to be devised. At the moment it does not appear to be an urgent problem on Crown land outside public working circles, nor in the Interior generally, but on the more congested public working circles on the Coast a selection by the Forest Service of areas for priority cutting would appear an inevitable development in the not too distant future.

Delay.—Some witnesses complained of the time lapse between the application for the sale and the date the sale was held. A cruise by the Forest Service is an essential step in order to ascertain timber volumes and other

relevant data. Although procedures have been stepped up in the past year, it seems to me that, when necessary to expedite the work of the Service in this regard, a cruise by an independent registered forester employed by the applicant for this purpose could be accepted as a satisfactory basis for stumpage appraisals. Dr. Orchard is opposed to this. He said in effect that the vendor of goods is entitled to measure the article he is selling, whether it be boots or sugar or timber. I do not find fault with that philosophy, but the Crown is paid for the timber on the scale when cut and the Service cruise is considered adequate for stumpage appraisal if within a 40-per-cent margin of error—that is, 20 per cent either too high or too low.

Dr. Orchard said in this regard:—*

> " Q.—Now, at the present time, do you have an accurate cruise when a timber sale is put up? A.—Certainly not good enough for a lump-sum sale. We don't need anything like the accuracy for our system that you would for a lump-sum sale.
>
> " Q.—Why not? A.—Because we're going to get paid for what comes off whether our cruise is good, bad, or indifferent.
>
> " Q. — How close are you coming to-day, going back over what they've actually logged from an area and then examining your own cruises? You've been doing that, I presume, Doctor. A.—Yes, we do that constantly. I don't know that we've ever made a detailed study and set all of those figures down to examine them, but my guess would be that at the present time we would be coming, oh, say, average within 20 per cent.
>
> " Q.—I'm not quite sure what you mean by an average of 20 per cent. Does that mean 10 per cent above and 10 per cent below? A.—Plus or minus 20 per cent were overcruised or undercruised, and the tendency is undercruised.
>
> " Q.—I see. I didn't know whether that was 10 both ways or 20 both ways. It's 20 both ways. A.—Twenty both ways."

It is difficult for me to believe that a registered forester making an honest cruise could exceed this margin of allowable error. The generally accepted cruise is, as I understand it, not expected to be any closer than 10 per cent both ways. I rule out of consideration the possibilities of a deliberately fraudulent cruise. The chance of such an occurrence is, to my mind, when considered in the light of the penalties to be exacted, if discovered, negligible.

In this connection I would also draw attention to the method of scaling in force in the Interior—a subject considered later.

The present system of reference to the Victoria office for approval of details of a proposed sale, with the consequential delay occasioned thereby, should be alleviated to some extent if my recommendation, in a later section of the Report, is accepted that District Foresters be permitted to process

* Transcript, p. 17288 *et seq.*

and complete sales to an amount of $7,000 instead of being limited, as at present, to a $4,000 ceiling.* More and smaller ranger districts would also expedite Service cruising.

Stumpage Appraisals.—This subject was controversial, and I propose to deal with its many aspects under a separate heading.

Competition.—A sale having been " put up " by an applicant and having been cruised, appraised, and advertised by the Service is then sold at public auction either at the upset, or appraised price, or at a higher price bid by others seeking to secure the timber "put up" by the original applicant.

It is at this stage of the proceedings that competitive forces come into play. In an endeavour to maintain some semblance of perspective in approaching this problem, I have, in my opening observations at the beginning of this section, made a brief reference to the relatively minor degree the completely independent logger, now comparatively few in number, can influence the bidding. The real battles, when they do occur in the auction room, are joined between operators of bigger calibre, although perhaps represented in some instances by contract or tied loggers.

Then, too, the ubiquitous speculator taking full advantage of a free enterprise system is ready, able, and indeed willing to bid up a sale, not with the expectation of working it, but with the hope, in an expanding market, of turning it over at a profit. With appraised prices reflecting (in the past few years in any event) a buoyant market and a shortage of free logs, the chances of a quick capital appreciation to the speculator bidding up a sale are decidedly narrowed. However that may be, the independent logger, when unfortunate enough to be caught in a cross-fire of competitive bidding at a sale he has put up, is unable to meet the challenge and loses out. This sort of occurrence creates a particular hardship on an operator who has pioneered an area and built his roads and constructed other facilities with the expectation that he will be able to secure a block of contiguous timber at the upset price when he needs it for the continuance of his operations, and then when he requests the Forest Service to put it up for sale, a stranger bids the price up beyond his means or even at times beyond the limit at which the timber can be logged at a profit.

A number of suggestions designed to preserve the position of the existing operators from invasion was offered as possible solutions to this vexing problem. I have given considerable thought to what has been submitted by many witnesses, including systems of priority allocation of timber to existing operators at upset stumpage, the Alberta system† whereby a Board of Arbitration may award the sale to the unsuccessful tenderer at the highest bid price, restrictions on bidding in overcut areas as in Ontario,‡ licensing of conversion units as a condition precedent to the acquisition of timber

* *See* section on Administration.

† Alberta Forestry Act, 1952, chapter 34, section 19 *et seq.*

‡ *See* section on Management Licences for extended reference to Ontario system of licensing bidders.

sales, prohibiting holders of forest management licences from acquiring timber in public working circles, and a host of other suggestions, all directed to the preservation of existing operators, whether loggers or millers. The crux of the problem is simply that there is not enough easily accessible timber to supply the immediate demand. We live in a free enterprise economy, and my recommendation of all or any of the submitted suggestions would, if implemented by the Government, impose on Industry generally the obligatory acceptance of a regimented and controlled system of timber disposal by the Crown with the inevitable concomitant direction of its ultimate end use. I do not think that such a programme is consonant with a system of free enterprise, nor is it one that the Forest Service is designed or competent to implement and carry into execution.

I do not mean to imply by these observations that nothing can be done to assist the deserving operator who pioneers an area from unfair competition especially from speculators.

That is a practice which should be definitely discouraged, and ways and means should be sought to minimize its impact on timber-sale prices. I think that, for instance, timber-sale contracts should contain a performance requirement compelling any buyer who did not "put up" the sale to commence cutting operations within a specified time under penalty of forfeiture of the contract if he failed to do so, unless relieved from his obligation by the Minister upon good cause being shown. Transfer of the timber sale by such a buyer should be prohibited, unless by consent of the Minister. I also think that consideration should be given to adding a provision to the advertisement of the sale to the effect that if the sale is bid up and acquired by a person other than the applicant for it, the deposit required from him would be substantially higher than that demanded from the original applicant. Just what percentage to fix in this instance is not easy to determine. It should perhaps bear some relationship to the difference between the appraised and bid price. For instance, if the bid price was 10 per cent over the upset price, the deposit required from the outside bidder could be fixed at the normal rate of deposit plus 10 per cent with no maximum. This is really merely a suggestion for consideration, but it is, I believe, one worthy of experiment.

The question of road costs is an important element in this area of conflict of interest. I consider that some consideration should be given to the man on the ground for road costs already incurred by him when bidding for a contiguous sale. I propose to develop this more extensively when considering road costs generally as a factor in stumpage appraisals.

(Many of these subjects fall into several categories, and it is difficult to contain each of them within separate compartments.)

While it is undoubtedly true that competition for timber sales is causing grave concern to those in short supply, this problem must not be given an exaggerated importance in the wider aspects of timber-sale administration embracing the entire Province. In other words, the problem is more regional than general.

Another factor not always taken into account by complainants is that by the Forest Service method of appraisal, stumpage value is determined to approximate one-half of the gross spread between the cost of the operation and the price received for the product. The purchaser acquiring a timber sale can in consequence pay an amount up to double the upset price without risking the danger of an actual operating loss. It is only when the bid purchase price exceeds twice the upset price that the purchaser faces a really serious situation. With these factors in mind, the following table is of interest and demonstrates that in 1956, out of a total of 2,303 sales of sawlogs in the Province, 88 per cent thereof in number went without any competition. In terms of volume, 76 per cent were not bid beyond the upset price. Nine per cent in number and 17 per cent in volume were bid in at prices less than twice the upset price, whereas only 3 per cent in number and 7 per cent in volume were bid up to a price at which the bidder might find himself in trouble—that is, more than twice the appraised price.

TABLE 33

COMPETITION FOR TIMBER SALES AWARDED[1]

Year	By Number of Sales						By Volume, Sawlogs Only (M Cu. Ft.)					
	No Competition		Bid less than 2× the Upset Stumpage		Bid More than 2× the Upset Stumpage		No Competition		Bid less than 2× the Upset Stumpage		Bid More than 2× the Upset Stumpage	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent
1952	2,181	92	136	7	22	1						
1953	2,407	93	156	6	37	1	433,352	94	21,596	5	6,184	1
1954	2,540	91	180	6	65	3	460,467	87	51,013	9	19,438	4
1955	2,735	87	267	9	128	4	560,997	73	144,814	19	59,033	8
1956	2,303	88	248	9	69	3	605,031	76	139,594	17	57,827	7

[1] Exclusive of small cash sales.

Breaking these Provincial figures down into districts indicates that the pattern throughout is closely parallel, as appears from the following tables, except that in the Kamloops and Nelson Districts the percentages of the bids over the upset price shows some intensification of competition in these two districts wherein it is to be noted the independent logger is not a factor.

TABLE 34

COMPETITION FOR TIMBER SALES AWARDED, BY DISTRICTS

Vancouver Forest District

Year	By Number of Sales						By Volume, Sawlogs Only (M Cu. Ft.)					
	No Competition		Bid less than 2× the Upset Stumpage		Bid More than 2× the Upset Stumpage		No Competition		Bid less than 2× the Upset Stumpage		Bid More than 2× the Upset Stumpage	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent
1952	613	90	60	9	9	1	.....	...	.....	...	.....	...
1953	663	92	40	6	14	2	141,200	98	2,716	2	419	...
1954	750	90	68	8	20	2	148,740	80	31,076	17	6,917	3
1955	601	85	81	11	27	4	139,150	63	63,416	28	19,635	9
1956	627	86	77	11	23	3	174,102	70	62,499	25	13,074	5

Prince Rupert Forest District

1952	370	98	6	2	2	...	.....	...	.....	...	.....	...
1953	464	99	4	1	...	...	52,852	100	181	...	.....	...
1954	431	96	12	3	6	1	39,223	93	1,255	3	1,589	4
1955	524	95	29	5	1	...	69,925	90	5,655	7	2,615	3
1956	425	94	21	5	5	1	77,205	90	8,122	10	.....	...

Prince George Forest District

1952	463	97	15	3	...	...	.....	...	.....	...	.....	...
1953	467	94	24	5	6	1	69,299	92	6,058	8	434	1
1954	447	93	22	5	9	2	72,987	89	4,933	6	3,950	5
1955	610	92	25	4	27	4	131,957	90	3,776	3	10,830	7
1956	557	89	62	10	4	1	189,134	92	13,948	7	1,381	1

Kamloops Forest District

1952	449	90	40	8	9	2	.....	...	.....	...	.....	...
1953	552	88	61	10	14	2	101,632	89	8,251	7	4,645	4
1954	613	90	47	7	23	3	118,658	88	9,367	7	6,775	5
1955	666	83	90	11	52	6	142,507	74	29,309	15	19,932	11
1956	509	86	54	9	27	5	122,731	67	30,650	17	29,648	16

Nelson Forest District

1952	252	93	16	6	2	1	.....	...	.....	...	.....	...
1953	260	90	27	10	4	...	43,536	92	3,837	7	252	1
1954	324	88	35	10	10	2	70,670	93	3,822	5	1,405	2
1955	334	84	42	11	21	5	77,458	61	42,658	34	6,021	5
1956	185	81	34	15	10	4	41,859	52	24,375	31	13,724	17

An analysis of sales made in 1954 in five selected public working circles—Babine, Crooked River, Sechelt, Niskonlith, and Kettle River—disclosed that they fell within the general range indicated in the district totals. Sales without competition averaged 87 per cent. For example, in the Sechelt Working Circle on the Coast, 89 per cent of the sales in number were made without competition, 8 per cent were bid in at less than twice the upset price, and 3 per cent at more than twice the upset price. The number of sales without competition in the Niskonlith and Kettle Valley Public Working Circles were, however, considerably below the general average, although the volumes sold above the upset price were relatively small.

"Blackmail."—In answer to these percentages, witnesses, some of whom, I am inclined to believe, were somewhat nonplussed thereby, countered by saying that a number of sales recorded as made without competition reflected a system of blackmail prevalent in the Industry. It was said that an applicant for a sale would be approached by an individual before the auction commenced and be threatened that unless the applicant would agree to sell to him a certain portion of the logs from the sale at a discounted price he would bid the sale up to the detriment of the applicant for it.

There is no doubt such a practice exists. A witness of the calibre of Mr. H. R. MacMillan said in this connection:—*

> "It is repeatedly reported, and in some quarters it is apparently common knowledge, that collusion sometimes accompanied by blackmail shows up with mounting frequency in timber sales. Under a threat of being forced to bid far above real values or lose out, a logger whose operations may be dependent upon getting a certain tract of timber is induced to buy off the threat by such methods as paying cash or selling millions of feet of logs to the blackmailer at several dollars per thousand feet below the ready market price.
>
> "The easy profits from such a bootlegging type of activity are encouraging imitators of the original invention. These blackmail deals are dishonest; they prevent the genuine bidding which protects public revenue; they exploit the necessities of loggers who depend upon getting a tract of timber; they create an erroneous idea of stumpage values; they allow evil to flourish they bring into disrepute the administration of timber sales.
>
> "It is possible that this fungus growth could be discouraged or prevented by the efforts of the legal advisers of Government."

I am somewhat skeptical of the submission that this practice is so prevalent on a Province-wide basis that the recorded percentages of sales made at non-competitive prices are not to be accepted. An examination of the tables discloses a reasonably close relationship in each district of sales in this category, and I am unable to understand how the evil complained of

* Transcript, pp. 8869–8870.

could flourish in the Interior where, as far as I am advised, the speculator has little encouragement for an exercise of this nature.

In the Vancouver Forest District, 627 or 86 per cent of the sales in 1956 were non-competitive, and even allowing for some reduction due to pre-auction deals, I doubt very much if this figure could be reduced to 80 per cent, which would still leave only one-fifth of the sales subject to competitive bidding in this District, from which about 60 per cent of the total Provincial cut is taken. Witnesses who described the competitive situation as " ruinous," " cut-throat," and " dog eat dog " are no doubt representative of those who suffered an unpleasant personal experience at an auction and lost the sale. I doubt very much if any of the buyers who put up over 2,000 sales in 1956 and bid them in without competition felt aggrieved at the present method of disposing of Crown timber, except perhaps some small over-all percentage of those who ran foul of the blackmailer.

At this juncture I should say that I am using the term " blackmailer " in the broad sense ascribed to the word by Mr. MacMillan. I am not using it in a technical or legal sense. Whether the practice outlined by the complaining witnesses is blackmail in the strict legal definition of the word is a matter upon which I must refrain from expressing any opinion in my present capacity.

While I am inclined, upon the evidence, to believe that, in the general picture, this sort of business, by whatever name it is called, does not materially alter the figures in the relevant tables nor the conclusions to be drawn therefrom, I am nevertheless in full accord with the submission that this intimidation ought to be stamped out. Just how this is to be accomplished is another matter.

In the Provincial legislative field the Province has plenary powers in matters relating to property and civil rights, and I do not doubt that the Attorney-General, as the legal adviser of the Government, could find constitutional ways and means of framing legislation designed to obviate this so-called blackmail.

It would seem that some sort of situation similar to that under discussion led to the inclusion of a section in the Alberta Forestry Act (S.A. 1952, chapter 34, section 94 (1)), reading as follows:—

> " 92. (1) If, before or at the time of a public sale of a berth on public lands, any person by intimidation, combination or unfair management, hinders or prevents, or attempts to hinder or prevent, any person from bidding upon or purchasing any berth offered for sale, the offender and his or their aiders and abettors shall, for every such offence, be guilty of an offence, and liable on summary conviction to a penalty not exceeding four hundred dollars, and in default of payment, to imprisonment for a term not exceeding two years."

The wording is not quite apposite, but the apparent intention is to discourage unfair pre-auction intimidation.

Dr. Orchard said he had had a few complaints made to him concerning this practice.

If persons subjected to coercive demands would report these incidents to the Chief Forester, he could establish a " black list " of individuals making the threats and prohibit them from acquiring public timber either directly or indirectly. The mere existence of such a list might act as a deterrent. Then, too, the provisions designed to prevent purely speculative bidding, as recommended in that context, should discourage reckless bidding on the part of the " blackmailer."

The fundamental reason for the existence of such practices is the regional demand for timber in areas wherein the cut is restricted and committed, and the real cure lies in opening up new areas of supply.

Size and Duration of Sales.—A considerable amount of evidence was adduced concerning the size of timber sales. The volume of timber included in each timber sale over the past five years, 1952 to 1956, inclusive, does not exceed on the average 2 million f.b.m.

The small logger finds himself impaled on the horns of a dilemma. On a small sale he has no security for a future operation on its expiry. The timber ahead is likely to be bid out from under him. For that reason he is fearful of extending himself financially, and his degree of utilization is not as high as it might be if he was able to spend more time and money on his sale. He is also less concerned with his methods of logging.

When he has the opportunity of putting up a sale of considerable size, he is faced with the possibility of stiff competition from bigger operators to whom such a sale is attractive.

On the other hand, if he is successful in getting the sale, he is faced with the necessity of raising capital for a larger deposit, more extensive logging equipment, camp construction, booming-grounds, and so on. The bigger the sale, the more pressure he is under to seek financial assistance from conversion plants and thus becomes a financed or tied operator. The logger who wants to run his own show and take his chance of making a profit or going broke is thus facing a difficult situation. It is equally difficult to find ways and means, in a free enterprise economy, of assuring any particular individual a certainty of supply from small sales unless he is willing to seek his fortunes in the less congested and less competitive areas of the Province. It is for this reason that I have recommended the adoption of methods designed to offer him inducements to encourage his migration from the more congested areas on the Coast.

Some of the smaller loggers complained that when they requested the Service to put up a small sale, they were, in answer thereto, confronted with a sale much larger in area and volume than they were prepared to bid on.

The policy of the Forest Service in this regard is set out in its Management Manual (section 2149). It concerns applications for timber sales

which include only a portion of a natural topographic unit, and reads as follows:—*

" Where only the more accessible timber of the best quality or favorite species is included in an application, the application must be disallowed or amended to reasonably include the entire merchantable volume in the logging chance. Timber of comparatively low quality but nevertheless merchantable and accessible, if considered part of the unit, must be included. Should an area under application or examination be found to contain a preponderance of low quality timber, or an undesirable species in comparison with the total merchantable volume, it may be desirable to disallow the application pending a more favorable demand or market.

" In order to keep within the allowable cut of areas under regulation such as in public working circles, it may in such cases be advisable to depart from this policy and proceed with the sale over part of the logging unit. Where the boundaries of a logging unit are difficult to define topographically due to the nature of the topography, no sales shall be made until a reconnaissance has been undertaken of the general area. In this way, sales may be laid out in an orderly manner and thereby a situation is avoided which would, first, give any one operator a strategic control of a large body of Crown timber; two, split a logging unit in such a manner as to depreciate the value and attractiveness of the remaining timber."

Dr. Orchard when questioned on this said:—†

" Q.—Do you try throughout all the public working circles of the Province to keep a balance between small sales and large sales? A.—To date that is what we have been trying to do, yes.

" Q.—It would also appear to me that the size of the unit put up could pretty well determine who does and who does not stay in business in that immediate area, could it not? If you put up a very large sale in front of a small man, he is not going to be able to buy it? A.—That is possibly true, yes.

" Q.—Now, who decides on the ground how big a sale shall be put up, and whether it shall be a large or a small unit, in the Forest Service? A.—Well, first you have the recommendation of the Ranger, and then it is discussed in the district office, and it may come to the Victoria office, and we might even question that particular point. In other words, we try to get everybody's opinion. One of the main factors that is considered is the economics of the case. You may have in this unit a fairly tough, we will say, road-building problem. To put up part of the area, that just wouldn't pay for the road, there may not be enough timber. Maybe you need the whole unit in order to pay for

* Transcript, pp. 3253–3254.
† Transcript, pp. 3255–3256, 3258–3259.

the building of the road, and that is one thing we look into very closely is the economics of logging the particular area.

" Q.—Primarily you rely on the judgment of your Rangers? A.—Yes. It is a combination, the Ranger and our district office. Any of these bigger and larger sales, they are usually inspected by the district staff. They may go out and give the Ranger a hand, and so on.

" Q.—Am I to take it that in the case of the larger sales which may provide opportunity for difference of opinion that it is your invariable practice to have a senior officer from the district to look at this to determine if it has been properly assessed by the Ranger? A.—That is what we attempt to do. Sometimes under pressure of work it not always can be done, but that is certainly what we attempt to do.

" Q.—Can you assure me that in the large majority of cases it is done, or is the reverse the case? A.—I would say in the large majority of cases it is done.

" Q.—Do you ever split a unit which might be one natural unit for the specific purpose of allowing small operators in? A.—I believe we have done that, yes.

" Q.—Is it a matter of common practice to do so? A.—It depends on what area you are talking about. In the Interior, for instance, these topographic units in the Interior are sometimes very difficult to define. In those places we have sort of split these units up for the smaller operators. On the Coast there has been a certain amount of it. Actually this policy, from time to time, has got away from us a bit, the policy of including the whole unit. I will be frank and admit that it has got away from us occasionally.

" Q.—You mean you have split it up into more pieces than you would think desirable? A.—That is right."

This concept of selling timber by logging or topographical units as an instrument of management will, it seems to me, undoubtedly lead to a future increase in the size of timber sales. This is foreshadowed by the introduction in 1950 by the Forest Service of the long-term timber sale.

The policy of the Service in this regard is also set out in the Manual (section 55), which reads as follows:—

" The long term timber sale is designed to include the total volume of merchantable timber contained in an entire watershed or whole valley in contrast to the usual practise of breaking down a valley area into its several components logging units and making individual sales over each unit as applied for. Including all the timber in the entire watershed ensures complete utilization and permits an economical logging operation of the less accessible with the more accessible stands and the lower quality timber with the higher quality. It forestalls high grading and at the same time offers the advantage of permitting the licensee to switch from a summer to a winter operation at will, or from one species

to another in order to take advantage of changing market conditions. It makes available a large volume of timber, thereby reducing road costs and other overhead charges per unit of timber removed. The essential features of the long term timber sale are:

"(*a*) Includes in a single timber sale contract all available Crown timber in a watershed.

"(*b*) Timber is cruised, appraised, and the sale advertised in the usual manner.

"(*c*) Security deposit is 10 per cent of the first $150,000 value plus 5 per cent of the value over $150,000 with a maximum deposit of $25,000.

"(*d*) Up to 20 years removal period depending on the volume of timber with 15 years considered the most desirable removal period.

"(*e*) Stumpage adjustment up and down in accordance with the sliding scale formula is obligatory.

"(*f*) The licensee is required to complete the construction of all primary haul roads prior to the commencement of logging unless otherwise authorized by the Chief Forester. The said roads are to be constructed and maintained by the licensee to the standards and specifications supplied by the licensor with each set of particulars. All roads are the property of the Crown and the licensee shall have the right of use of the roads for the purpose of the contract only.

" The carrying out of these road constructions will require a considerable amount of financing before any returns from logging are forthcoming. In order to assist the small or medium-sized operator, the Department may assist in the financing if so desired by the licensee, under authority of section 164 of the Forest Act. This is not a part of the timber sale contract, but the procedure is to deal with it under a separate contract after the timber sale has been awarded. Notices are, however, sent to all intending bidders with each set of particulars that consideration will be given to an application under section 164 in order to assist in financing the cost of road construction of the primary haul roads up to a maximum of two-thirds of the cost or a stated figure per mile, whichever proves to be the less.

" The assistance in financing will be by means of reimbursement as and when credits have been accumulated. Where assistance in financing is rendered by means of the Forest Development Fund, the amount of assistance so rendered is to be repaid to the fund at a rate per unit of measurement of timber cut and removed by means of an addi-

tional charge added to the stumpage rate. In reaching a decision to offer assistance in financing road construction costs, from the Forest Development Fund, there are several factors which must be considered:

" 1. Is there sufficient volume of timber which will permit liquidation of the road building costs over a reasonable period at a reasonable charge per unit of measurement?

" 2. By rendering assistance, will it lead to better, more orderly utilization and more economical harvesting of the timber?

" 3. By rendering assistance, will it be possible to relate the cut from the proposed sale to the allowable cut from a large sustained yield unit of which it may form a part?

" The Engineering Division staff undertake to examine and determine and describe the position and cost of the most suitable road location, and at the same time draw up the specifications.

"(*g*) Cutting is controlled by cutting permits issued by the licensor subsequent to completion of the primary haul road construction. The authority for issuing cutting permits is provided by substituting for the printed condition 3 (*f*) in the contract document form F.S. 99 the following clause: 'No cutting operations shall be made on any lands within the timber sale area without first obtaining from the licensor a cutting permit. The licensor may issue a cutting permit in 30 days notice by the licensee, subject to the conditions as hereinafter provided.'

" In this way specific conditions may be set out in each permit as issued suitable to meet conditions found on the individual permit area, and avoid the necessity of making long-range decisions where the conditions are made a part of the contract itself. In addition, by means of cutting permits the logging can be controlled to ensure maximum forest protection, natural regeneration and more intensive utilization.

"(*h*) In order to discourage speculation in Crown timber and to ensure bona fide operations, it is considered necessary to insert a special clause for this purpose as follows: 'At any time after the lapse of five years from the date of this contract, the licensor may cancel the contract if the aggregate cut proves to be less than 70 per cent of the estimated total stand multiplied by the number of elapsed years divided by the years in the contract.' Where the cut from a long term

timber sale is part of a total allowable cut in a sustained yield unit, it may become necessary to restrict the annual cut accordingly by insertion of special clause and condition 3 (*l*) of the contract."

Mr. Stokes, in his evidence, gave the explanation for this type of sale as follows:—*

"In reviewing past timber sales and in reviewing the situation, we had found that in many of these self-contained valleys timber sales had been issued in the front of these valleys. They were issuing timber sales over the front of the valley and, as a result, we were removing the higher-value species. Particularly on the Coast, you will find that your fir grows at a lower elevation, and then as you get back into the valley you get into the hemlock, balsam types. So, it was decided to alleviate that situation to put up the entire unit so that the high-valued species could be taken out with the low-valued species, and in that way you get a balanced operation. That was more or less the basis on which these long-term sales were started."

To date only four of these long-term timber sales have been awarded. Particulars are as follows:—

Applicant: B.C. Forest Products Limited, applied for December 29th, 1949.

Date of Award: March 27th, 1951, to B.C. Forest Products. No competition.

Volume, Upset and Bid Prices

Upset Price per M	Species	Volume (F.B.M.)	Bid Price per M
$7.00	Fir	55,305,000	$7.00
13.50	Cedar	11,645,000	13.50
3.50	Hemlock	68,005,000	3.50
3.50	Balsam	5,020,000	3.50
3.50	Spruce	445,000	3.50
10.50	White pine	1,065,000	10.50
	Total volume	141,485,000	

Acreage: 3,471 acres.

Locality: Three Arm Creek and Camp Creek, Renfrew District, on Vancouver Island.

Term: Fifteen years with cancellation clause if a specified volume is not cut after five years.

The area of this sale is now included in the forest management licence awarded to B.C. Forest Products.

* Transcript, p. 1124.

Applicant: Western Plywood Company Limited, applied for February 23rd, 1950.
Date of Award: October 15th, 1951, bid in by Olson Logging Company Limited after eighty-five bids.

Volume, Upset and Bid Prices

Upset Price per M	Species	Volume (F.B.M.)	Bid Price per M
$10.00	Fir	16,460,000	$29.50
10.00	Cedar	38,116,000	21.00
3.50	Hemlock	47,260,000	14.00
4.00	Balsam	24,250,000	14.50
14.25	White pine	60,000	14.25
3.50	Cypress	10,000	3.50
3.50	Other species	1,000	3.50
	Total volume	126,157,000	

Acreage: 5,408 acres.
Locality: Tamahi Creek, Chilliwack District.
Term: Thirty years with cancellation clause if a specified volume has not been cut after five years. This area is in the Chilliwack Public Working Circle.

Applicant: MacMillan Export Company Limited, applied for July 18th, 1950.
Date of Award: June 1st, 1953, MacMillan & Bloedel Limited. No competition.

Volume, Upset and Bid Prices

Upset Price per C Cu. Ft.	Species	Volume (Cu. Ft.)	Bid Price per C Cu. Ft.
$4.90	Fir	8,185,000	$4.90
2.70	Cedar	2,860,000	2.70
2.50	Hemlock	5,830,000	2.50
2.20	Balsam	1,600,000	2.20
2.30	Cypress	990,000	2.30
4.30	White pine	190,000	4.30
2.50	Spruce	15,000	2.50
2.50	Other species	100	2.50
	Total volume	19,670,100	

Acreage: 5,630 acres.
Locality: St. Vincent Bay, Jervis Inlet.
Term: Fifteen years with cancellation clause if specified volume is not cut after five years.
This area is near the Sechelt Public Working Circle.

Applicant: E. C. Letcher Lumber Company Limited and Knight Lumber Company Limited, applied for October 12th, 1951.

Date of Award: September 27th, 1954, E. C. Letcher Lumber Company Limited and Knight Lumber Company Limited. No competition.

Volume, Upset and Bid Prices

Upset Price per C Cu. Ft.	Species	Volume (Cu. Ft.)	Bid Price per C Cu. Ft.
$2.50	Spruce	8,799,000	$2.50
2.70	Larch	3,907,000	2.70
2.70	Balsam	811,000	2.70
2.70	Fir	601,000	2.70
2.50	Cedar	430,000	2.50
2.70	Lodgepole pine	308,000	2.70
2.70	Hemlock	17,000	2.70
2.70	Other species	4,000	2.70
	Total volume	14,877,000	

Acreage: 18,500 acres.

Locality: Caven and Bloom Creeks, Kootenay District.

Term: Fifteen years.

In unalienated Crown land.

These long-term sales are not on a sustained-yield basis as the total volumes are not enough to permit this restriction, although silvicultural and forest-management requirements are provided by the terms of annual or periodic cutting permits.

It seems to me the general trend of the evidence indicates that the Forest Service will in future tend to increase the size and duration of timber-sale contracts, although up to the present the majority of sales are considerably less than 2 million f.b.m. If I am right in thus interpreting the evidence of Forest Service witnesses, considered in the light of developments in the Industry at large, and the necessity for more extensive management in public working circles, it would appear that the Forest Service must open up more areas suitable for smaller sales to independent loggers by expediting the building of main access roads to such areas.

The building of branch roads by such loggers should, I think, be financed to a greater degree than now by a more extensive use of the Forest Reserve Fund. This matter of access roads is one calling for immediate attention as a means of assisting in the dispersal of the smaller-type logger and assuring him areas in which to secure timber sales within his financial ability to operate. Once established on a sale, he usually has the priority in putting up a contiguous block of timber which, if the averages run true, he has almost a 90-per-cent chance of bidding in without competition. Apart from some form of allowance for his road-construction costs already incurred, I can see no way of assuring for him a continuing source of supply should he be faced with a competitor for any succeeding sale he may desire to acquire.

Deposits.—The successful bidder at a timber-sale auction is required to deposit at the time of the sale a cheque or government bonds for an amount equal to 10 per cent of the bid price up to a maximum amount of $25,000. This is to guarantee the performance of the terms of the sales contract and is retained in full until the sale is closed out or is forfeited to the Crown for breach of the contract or if the sale is surrendered.

There were submissions made that 10 per cent was too high to exact as a deposit. This view-point is illustrated in the evidence of the late Mr. J. D. Gilmour, who testified on this matter as follows:—*

> "The 10-per-cent deposit which the purchaser must make is excessive, and there is discrimination between those who purchase a short-term as compared with a long-term sale, because in the case of the long-term the money is tied up longer. It is a penalty on those who wish to start a new business, although the entry of new producers should be encouraged. The deposits require the tying-up of savings (which might otherwise be used as capital in the production of new wealth) in a manner which is most unproductive. If bonds of the grade demanded by the Government are deposited, the interest on them is very low, a fraction only of what the man who saved the money might earn in his own business. This is bad enough in the case of an operator so small that he is not subject to the logging profits tax, nor the corporation income tax. In the case of larger operators, subject to both of these taxes, it is a still greater imposition. Not only is the money tied up, but the return left to the investors after logging profits tax, corporation tax, and the personal income taxes on dividends which may be paid becomes a microscopic rate of interest. It will be said that such people can afford to pay, but this thinking is based on injustice; it is the prime duty of Government to seek to bring about justice among all of the people.
>
> "On large construction contracts, including those given out by Governments, the deposit required is usually 5 per cent of the estimated cost of the work. This percentage might be adopted for timber-sale contracts. Or, if the 10-per-cent rate of deposit is retained, it should be applied to accounts as they come due to the Government, until it is exhausted down to 20 or even 10 per cent of the original deposit. The Government, in this large business, should adopt commercial business methods and bear some of the risks inherent in such business."

There were others who thought the 10-per-cent deposit should not be reduced. Mr. E. E. Gregg, a forester now with the Western Plywood Company and formerly of twenty years' employment in the Forest Service, may be selected for expression of this opinion. He said:—†

* Transcript, p. 7733 *et seq.*
† Transcript, p. 10915.

> " No reduction of the 10-per-cent deposit should be accepted even on the large sales. As the timber is cut, the deposit could be refunded in part, always retaining sufficient to guarantee fulfilment of contract conditions. To accept a small deposit is to invite the gambler and the blackmailer."

I gather from his comment that the 10-per-cent deposit should be accepted on the larger sales as implying that the maximum of $25,000 should be discontinued.

Both of these witnesses seemed in accord in suggesting that the deposit be returned as the timber was being progressively cut, either by way of allocation to stumpage payments or by direct refund, so that the proportion of the deposit retained would equal 10 per cent of the remaining value of the uncut timber.

I do not know whether this last suggestion is practicable or not. In view of the fact that in 1956 about 14 million dollars was on deposit from cumulative timber sales, it would seem *ex facie* that consideration should be given to some proportionate refund of the amount of the deposit as cutting progresses, especially on the larger sales. This would be in line with road and other project contracts. There is this distinction, however: the Forest Service does not, except in rare instances, exact penalties for breach of timber-sale contract provisions beyond forfeiting the amount of the deposit, and it is conceivable that considerable damage might be done the forest resource in logging the last 100 acres of sale; thus, in order to provide for such a contingency, the full amount of the deposit should be retained until the sale is finally closed out.

While the sum of 14 million dollars is a very impressive amount in the aggregate, when we divide the number of existing sales in 1956 (8,738) into the total sum on deposit in that year, it discloses that the deposit on each individual sale averages out at not more than about $1,600.

The real pinch comes when the same individual holds more than one timber sale. Let us assume that a logger acquires five sales each for $5,000. He is required to deposit 10 per cent of the value of each sale. Thus his deposits total $2,500. It seems to me that perhaps it might be possible to put a ceiling on the amount of the total sum of the deposits when a number of sales, large or small, are held by one individual. The public interest would, I think, be protected if the total sum of the deposits equals or exceeds in amount five times the amount of the deposit required on any one particular additional sale. Let us consider these five sales to illustrate my thought. Let us assume that another additional sale is acquired by the same man again for $5,000. The deposit now required would be an additional $500, but he has already on deposit $2,500, which is five times the amount of the required deposit on the additional sale. He is, in consequence, not required to make any deposit on this particular sale. If, however, this sixth sale is bid in at $6,000, he would be required to

deposit the difference to maintain his ceiling; that is, in this instance, 10 per cent on $1,000. That would bring his total deposit up to $2,600 and would permit the purchase of a seventh sale at $5,200 without an additional deposit. The total sum of the deposits should be subject to forfeiture for failure to observe the contract provisions of any one of the sales held by the same individual.

I advance this suggestion for consideration only. Apart from this endeavour to alleviate the heavy burden of multiple deposits on several sales held by one individual and to bring this situation into conformity with the present policy of fixing a maximum deposit on any one sale, I do not feel justified in making any firm recommendations in relation to the amount of the deposit required, nor whether any part of it should be refunded as cutting progresses. The matter of deposits could well be made the subject of study by the Provincial Advisory Council to ascertain if some formula acceptable to both the Forest Service and Industry might be worked out.

Forfeitures.—The number of instances in which deposits were forfeited in whole or in part is shown by districts on the following table for the years indicated:—

TABLE 35

AMOUNTS FORFEITED BY DISTRICTS

	1951		1952		1953	
	Number of Sales	Deposits Forfeited	Number of Sales	Deposits Forfeited	Number of Sales	Deposits Forfeited
Vancouver	59	$16,734.22	95	$66,997.42	147	$163,018.93
Prince Rupert	71	6,073.58	78	8,660.19	96	16,912.56
Prince George	61	9,874.30	65	12,486.50	72	14,164.40
Kamloops	134	12,760.59	135	16,456.98	127	24,905.41
Nelson	93	8,207.40	80	9,555.46	92	25,660.16
Totals	418	$53,650.09	453	$114,156.55	534	$244,661.46

	1954		1955	
	Number of Sales	Deposits Forfeited	Number of Sales	Deposits Forfeited
Vancouver	135	$110,254.30	85	$48,448.19
Prince Rupert	115	18,656.41	107	23,666.78
Prince George	89	19,860.84	72	18,417.44
Kamloops	105	45,737.58	76	21,455.26
Nelson	62	9,127.27	63	13,016.77
Totals	506	$203,636.40	403	$125,004.44

It is, I think, necessary to take a look at the number of sales closed out during the years 1951 to 1955 in order to evaluate properly the extent to

which the deposits have been forfeited when such sales were cut out. These figures are shown on the following table:—

TABLE 36

TIMBER-SALE CLOSURES BY DISTRICTS

	1951		1952		1953	
	Number of Sales	Deposits Refunded	Number of Sales	Deposits Refunded	Number of Sales	Deposits Refunded
Vancouver	420	$151,815.00	582	$290,747.22	616	$395,030.55
Prince Rupert	218	27,981.64	254	39,170.90	271	56,255.24
Prince George	279	85,035.71	303	113,600.93	395	177,019.60
Kamloops	350	48,815.83	340	79,901.32	388	120,002.38
Nelson	219	37,803.06	236	56,582.21	252	77,183.03
Totals	1,486	$351,451.24	1,715	$580,002.58	1,922	$825,490.80

	1954		1955	
	Number of Sales	Deposits Refunded	Number of Sales	Deposits Refunded
Vancouver	617	$430,208.20	583	$411,995.35
Prince Rupert	327	81,255.35	299	85,755.80
Prince George	367	243,265.35	374	247,994.52
Kamloops	420	167,490.37	443	200,997.01
Nelson	219	94,488.95	274	123,210.28
Totals	1,950	$1,016,708.22	1,973	$1,069,952.96

If we take 1955 as an example, we see that 1,973 sales were closed out and deposits in the sum of $1,069,952 refunded. In that same year, 403 of these sales, or about one-fifth, which is about the general average, were penalized to some degree by the retention of $125,000 or less than one-tenth of the amount of the deposits refunded.

From a sample of 100 penalized sales selected at random on which deposits of $1,000 or more had been required, it appeared that of these about 63 per cent thereof were penalized when the sale was closed out because of wasteful logging methods, such as trees left standing, fringe pockets uncut, and such like, about 25 per cent were penalized and the deposits forfeited because no logging had been conducted on the sale, about 5 per cent were surrendered by the licensee with a view to acquiring this same area on a resale, with consequential loss of the deposit, and the remaining 7 per cent suffered penalties in varying degrees for failure to dispose of logging slash or mill waste, or both, during the term of the contract. The evidence does not disclose any instance where a sale was cancelled during its currency for breach of covenants, although thirty to forty contracts a year are suspended from operation for that reason, but the suspen-

sions have been lifted when the operators fulfilled their contractural obligations—for example, disposal of slash.

The 1956 figures furnished me, but not broken down into districts, disclose that of the number of sales closed out in that year, totalling 2,253, 355 of them were penalized for one reason or another, resulting in deposits totalling $97,720 being forfeited to the Crown.

This is considerably higher in numbers than the general run of the figures for the years shown on the table, but even at that serves to demonstrate, together with the other quoted figures, that the suggested " 5 times formula " I threw out for consideration should be ample to protect the public interest because the amounts forfeited for all reasons in that year did not exceed, on the average, $300 per sale, which, I may add, is just about the over-all average of sums forfeited during the preceding five years.

Cash Sales.—Timber-sale statistics usually include in total sales made a number of cash sales. From 1947 to 1956 these ranged from a high in 1949 of 553 to a low in 1956 of 239. The average over those years is about 342 sales. This type of sale may be described as the antithesis of the long-term timber sale. There is no cruise, no advertising, no public auction, and no deposit on a sale of this character. These are usually over-the-counter sales of small quantities of cordwood or of a very few trees the lumber from which a farmer may need for his own use after having the logs sawn in a custom mill. The local Ranger is empowered to close these sales without reference to the District Forester up to an amount of $100. This limit of his discretion was fixed some years ago. After consideration of all the relevant circumstances, it is my opinion that this amount ought to be increased to $500, and I so recommend.

Lump-sum Sales.—The method of disposing of Crown timber on a lump-sum or cruise basis was supported by a number of witnesses and opposed by others including the Forest Service. Mr. H. S. Irwin, a forester of long experience and now assistant land agent for the Esquimalt and Nanaimo Railway Company, testified that this Company disposed of forest land in the E. & N. Belt by selling the land and the timber therein on a lump-sum basis. His evidence is in part as follows:—*

> " Q.—There has been a conflict of evidence in the Commission as to whether the sale by such a method encourages the utilization of timber in the sale or whether it makes little or no difference at all. Now from your experience with timber sales sold on an ordinary basis in British Columbia timber sales, and the sales the way you make them, what can you tell the Commission about any difference you may or may not have observed?
>
> "A.—Well, I like the lump-sum sale whereby the purchaser can suit himself what he takes off. In theory, on a timber sale, everything has to be taken off and paid for as it is scaled or as it is taken off, to the

* Transcript, p. 16490 *et seq.*

satisfaction of the Forest Service. Well, it might be that they are hard to satisfy or easy to satisfy. The operator couldn't tell when he started in on the timber sale, and I have had to do with a great many of them, couldn't tell just what the final effect was going to be, whether his 10 per cent deposit would be estreated or confiscated or whether he would get it back for having done a good job. When you make the lump-sum purchase, the purchaser suits himself, he has to comply with Government regulations on fire protection, slash-removal, and so forth, but as far as actual footage recovered, that is his business, and as a rule you could figure he would skin the claim off pretty close in order to get his lump sum back plus some profit.

" If you feel you have a reliable estimate of the timber, I think the lump-sum sale is much to be preferred. It gets away with all the problem of keeping your logs separate, marking them separately, having them scaled separately, paying separate accounts. You are through with it. If you have reasonable confidence in your cruise, your estimate, the lump-sum sale would certainly be preferable.

" When we get through laying out the area there is a chance that part of the area that we insist he takes can't be logged immediately, economic conditions wouldn't warrant it. He still owns it, and he can go back and take that. I think that he is encouraged to take everything he possibly can because he owns it. It is all his. If he scratches around and gets an extra 10 per cent of the cruise, above the cruise, there is no extra to pay, no extra stumpage on that. It is his. Whereas with the timber sale, by scratching around and getting a little more than the estimated amount, he still is paying the required amount per thousand foot as it is scaled."

Witnesses disagreeing with Mr. Irwin said that in some instances lump-sum sales encouraged high grading, such as logging valuable peeler logs and leaving the less desirable grades or species uncut.

Dr. Orchard's view-point is as follows:—*

" Q.—Has consideration been given to the sale of Crown timber by lump-sum sales? A.—Oh, yes. It must of necessity have been considered when they first drew up the ' Forest Act.' It hasn't been seriously considered since that time.

" Q.—Do you see any advantages to the Province or to industry or to all concerned in making sales of Crown timber by lump sum? A.—I can see a possible very substantial advantage to the buyer. Cruises are usually reasonably conservative, and if you buy in the lump sum, you make by whatever additional that you manage to take out. I would like to ask the proposer here, ' What objection have you got to paying for what you get? '

* Transcript, p. 15684 *et seq.*

" Q.—The reason I have heard expressed in the evidence is that lump-sum sales will do two things: First of all, they will free the Department of, if not exactly responsibility, it will free the department of things like scaling after the sale is made; and, secondly, it will encourage utilization to the extent that having paid his money, the man will extract every stick of timber he can from the sale. Those are the two points that are made. A.—That's just bunk."

When his attention was drawn to the lump-sum method of timber disposal adopted by the Esquimalt and Nanaimo Railway Company, he said in part:—*

"A.—One very obvious (reason) in the E. & N. (Belt) is that they profit by the freight, and that's very substantial you know. If I owned the C.P.R. railway and had timber out here on Vancouver Island, and it were a condition of the sale that my buyer would ship on my railway, I'm going to get a dollar a hundredweight to take it to market, maybe I could afford to give that timber away. I don't know. But that has quite an important bearing on that particular case. They have right from the start, and still do, sell in a lump-sum basis.

" Q.—Yes, but in your experience and observations, there's no better utilization there (in the E. & N. Belt) than there is on timber sales. A.—That's my opinion.

" Q.—Address yourself, if you would Dr. Orchard, to Mr. Irwin's comments, such as ' It is all his. If he scratches around and gets an extra 10 per cent of the cruise, above the cruise, there is no extra to pay, no extra stumpage on that.' Therefore, he is encouraged to take everything he possibly can because he owns it. A.—It is a very rational and plausible argument. That's what I would expect if I were starting from scratch without experience, but all I am saying is that we are unable to observe any measurable difference."†

Dr. Orchard also advanced as an additional factor in support of his opposition to lump-sum sales of Crown timber that the Forest Service cruises were not accurate enough to protect the Crown revenue on a sale of that character.

Dr. Orchard's opinion was echoed by a number of witnesses. As an example, I quote from the submission of Mr. John Liersch. He said in part:—‡

" The other objections brought forward by Dr. Orchard regarding the accuracy of cruise and the lack of staff at the present time to carry such work out, I believe, are quite valid. On the present basis of selling stumpage, on scale, it is not too serious if the Forest Service is 15 or 20 per cent out in their original cruise one way or the other, because

* Transcript, pp. 15688, 17207H.
† Transcript, pp. 17270H, 17270I.
‡ Transcript, p. 19221.

the man pays for what he actually takes out. On the lump-sum basis, if something like that happened, he could lose a lot or he could gain a lot to which he wouldn't be entitled. And from the standpoint of utilization, I can't see where you are going to increase your utilization through lump-sum sales. I just don't think it will work that way."

It seems to me that for the present at least the method of selling on a lump-sum basis cannot be introduced in substitution for sales on scale. I do think, however, that the lump-sum sale method should be given immediate serious consideration when the Forest Service is offering decadent or fire-killed timber for sale on a salvage basis. In these instances the return of revenue to the Crown is of relatively minor consequence when compared with the advantages to be obtained by recovering productive acreage for future regeneration. It follows that a precise or closely accurate cruise need not, on sales of this kind, be regarded as essential.

Scaling.—I propose to consider the subject of scaling both on the Coast and in the Interior under a separate heading.

Marking Sales.—This subject is of particular concern to operators in the Interior and will be dealt with in conjunction with other problems relating to that area of the Province.

Bidding by Forest Management Licensees in Public Working Circles.—A number of witnesses who were dependent in whole or great part upon timber sales for their supply of logs contended that the holders of forest management licences should not be permitted to compete for additional timber in public working circles.

This submission would be a weighty one if the allowable cut from forest management licence areas was sufficient to supply the normal production needs of the licensee's conversion plants. The Celgar licence is the only one that at present is in that position as far as I am aware, and I believe that licensee will not need any additional timber from outside sources. The general policy of the Forest Service is not to award a management licence with an allowable cut sufficient to meet the plant capacity of the licensee. Dr. Orchard gave the reasons for this policy. He said:—*

"A.—Let's say that here is a company that cuts 10 million feet a year, we are not inclined to give him a management licence that will cut 10 million feet a year for various reasons. We give him a licence that will cut 8 million feet a year. If he cuts his mill productive capacity (consumption?) down to the 8 million, then he has a licence for everything he requires, and our object in cutting down the allowable cut that we would permit is defeated. Then there is this aspect: The fact that that man has got a management licence to cut 8 million feet a year, which isn't big, is he thereafter to be forbidden for all time to cut 9 million feet? And if he can't go out somewhere else and buy it, how can he get more than the eight? It seems to me that if we put an

* Transcript, p. 1154 *et seq.*

absolute limit on the operator, on his business, if the operator's business is absolutely limited by the capacity of the management licence, then we forbid him for all time to ever get any bigger, to exercise his business acumen.

" Q.—I understood you to say the policy was, in granting a management licence, to limit the cut to a point below the normal productive requirements of the conversion plant. Is that your policy? A.—That was a well-defined policy when we first started with these licences, and we haven't discarded it entirely yet. The object was to give some inducement to the licensee to actually practise forestry and improve the condition of his licence and increase the cut, thinking in our wisdom and as psychologists in human nature that if you give the man everything he wants there is no incentive to do anything. Take this man with the 10 million and for the moment, for the sake of argument, he doesn't want to expand, he doesn't want any more than that, and you give him his 10 million. There is no incentive whatever to improve his management licence, which in fact is capable, in the second rotation and progressively, to cut, let's say, as much as 20 million feet."

It is worthy of note that the cut from the majority of management licences is not as large as is generally supposed. In fact, the allowable cut from fourteen of the twenty-three licences awarded does not exceed in any appreciable degree 15 million board-feet per annum.

As long as the Forest Service maintains its present policy of encouraging incentive by limiting the area of the licence and the allowable cut therefrom to a point below the licensee's plant consumption, and until such future time as the allowable cut from the licence, as the result of intensive management, close utilization, and a more intensive inventory survey, is sufficient for his plant requirements at that time, I do not think any of the reasons advanced for denying him the privilege, in the immediate future, of obtaining timber sufficient for his needs from public working circles should be accepted as valid, provided he applies to have his licence amended to include therein the extended provisions relating to contract logging I previously referred to when considering the so-called " 30 per cent clause."

One of the reasons advanced for barring forest management licensees from public working circles was that as the licensee was privileged in getting an assured supply of at least a measure of his requirements at non-competitive prices from the licensed area, he was thus enabled to bid up a timber sale beyond its upset price and by averaging his timber costs would have, in consequence, a distinct advantage over the man without this opportunity.

This submission appears *ex facie* to be one of considerable weight, but in my opinion excludes from consideration several important factors. In the first place, at least over 80 per cent of the sales on public working circles go at the upset price. Secondly, the stumpage of Crown timber on a

forest management licence is appraised on exactly the same basis as that of other Crown timber. Thirdly, the appraisal in each instance takes into account all relevant costs imposed upon the operator of the sale. The forest management licensee has to bear the costs of growing, managing, and protecting Crown timber, none of which costs is chargeable against stumpage values on public working circle sales. In addition to these items, heavy expenditures for road construction must be financed. All these cost items are reflected in stumpage appraisals on management licences; thus, while it is true a differential exists and it may be asserted stumpage rates on Crown timber within management licences are lower than on public working circles, the licensee does not derive any direct financial benefit therefrom. In fact, he may very well end up with less realizable relative profit than the man who pays a higher stumpage for Crown timber outside a management licence.

A weighted average of the differentials existing on a unit of 100 cubic feet is set out hereunder for the year 1954:—

COAST

	Management Licences	Sechelt Working Circle (Upset Prices)	Difference
Fir	$4.57	$6.50	$1.93
Cedar	2.30	2.49	.19
Hemlock	2.20	2.94	.74
Balsam	1.90	2.47	.57

INTERIOR

	Management Licences	Four Public Working Circles[1] (Upset Prices)	Difference
Fir	$2.51	$2.98	$0.47
Cedar	2.26	2.56	.30
Hemlock	2.65	2.90	.25
Spruce	3.04	3.10	.06
Balsam	2.27	2.36	.09
White pine	17.77	14.97	2.80
Lodgepole	2.25	2.63	.38
Yellow pine	2.42	2.85	.43
Larch	2.65	2.75	.10

[1] Babine, Crooked River, Niskonlith, and Kettle River Public Working Circles.

The Sechelt Public Working Circle contains, in most part, the best and most accessible stumpage in Crown ownership on the lower Coast.

These price differentials are said to be considerably less than the costs of the management imposed on the licensee under the terms of the licence contract. Under the present system of stumpage appraisals however, approximately one-half of these management costs are ultimately borne by the Crown. I will have occasion in a later section of this Report to con-

sider the subject of allowable forestry costs when dealing with forest finance generally.

At this point, and as a corollary to the subject under discussion, I would also mention that it was alleged stumpage rates payable by management licensees not only operated to the detriment of the competitive position of others seeking Crown timber in public working circles, but also resulted in loss of income to the Treasury.

In this regard I quote the evidence of Dr. Orchard. He said:—*

> "All these comparisons complacently overlook the fact that this ' loss of revenue in stumpage ' is the cost of growing timber, as opposed to liquidating timber. Henceforth, and in ever-increasing degree, we will have to grow the timber we cut. That is going to cost money, and we must of necessity accept a smaller net return. Another point the critics overlook is that, of the sums collected at the higher rates from competitive sales, a proportion, about equal to that ' allowed ' on management licences, will have to be put back into the business of growing forests, over and above the sums traditionally provided for forest administration. It is not net revenue.
>
> " The Forest Service has been receiving substantial sums on this score for some years.
>
> " For example, the whole of the Forest Reserve Account has been spent on exactly those kind of activities. From 1926 to 1956 we have had under the Forest Reserve Account $3,840,890. Added to that from the Dominion, $1,409,278. The Silvicultural Fund, all of which has been used for that business, added expense of growing timber, ten years, 1946 to 1956, $5,275,201. And those two items alone over $10,525,369. There are other very considerable items. For instance, the Forest Protection money that we've been providing ever since there was a Forest Service, ever since 1912, is legitimately a charge against the cost of growing timber, and at the present time we're spending in the neighbourhood of $4,000,000 a year on that one subject, on that one activity.
>
> " Now, add that for the last ten years to this $10,500,000 and you've got over $50,000,000. It's a very substantial sum. In the case of the forest management licence, the licensee is spending it. In the case of the public working circle, the extra stumpage is not net gain, it has got to go back into growing forests. It all works back to the fact that you just can't grow forests for nothing."

I am in general agreement with this statement of Dr. Orchard.

Allocation of Timber Sales.—As the Inquiry progressed it became increasingly evident that many of the questions in issue involved not only matters relating to pure forestry, but complex problems lying in wider

* Transcript, p. 15469 *et seq.*

fields, embracing far-reaching social and economic implications. Many of these issues brought into focus a conflict between those who favoured a controlled economy and others who desired a continuation of a free enterprise system. The allocation by the Forest Service of available timber to selected conversion plants from public working circles was a matter of contention in this field.

Mr. Walter Koerner, of the Alaska Pine and Cellulose Company, said in this connection, in part:—*

> " I suggest that public working circles could be made to serve the public interest more effectively and help us to achieve our principal objective if desirable conversion plants were given a first refusal to purchase the logs produced from certain areas in public working circles. The stability of supply assured by such a first refusal would permit and encourage more investments in building, maintaining, and improving efficient manufacturing plants which would operate continuously, providing stable employment and producing valuable products. Also such a course will give the independent logger an assured market because the plant will rely on the allocated quantity in its planning. Here, too, the principle of allocation has to be applied if we are to achieve the desired results. The first refusal should also be subject to cancellation by the Lieutenant-Governor in Council in the same manner and for the same reasons as I have previously outlined for management licences. In order to make this plan effective, the plant having the first refusal on the logs will also have to have assurance that the logs are produced. If that is not done, the advantages flowing to the economy through the assurance of supply of raw material will not materialize. Consequently, I recommend that if any of the areas to be logged under the working plan are not bid in at the auction, those not sold should be offered again within one month at upset prices 25 per cent less than the original figures. It must be presumed, if no one has bid the upset price, that the Government has set it above the competitive market price."

Mr. Koerner's comment that " the first refusal should also be subject to cancellation by the Lieutenant-Governor in Council in the same manner and for the same reasons I have previously outlined for management licences " relates to his submission in that regard, reading in part as follows:—†

> " . . . we should give formal recognition to our principal objective, which is to obtain the highest dollar return and maximum stability of employment from our forest lands. If the holder of a management licence does not make an appropriate contribution to this principal objective in relation to comparable operations, it should be within the power of the Lieutenant-Governor in Council to instruct the licensee to

* Transcript, p. 12256 *et seq.*
† Transcript, p. 12235.

improve the efficiency of his operations within a fixed period of time, say up to five years, so as to improve or change the product of the plant to meet changing competitive conditions and also ensure reasonably stable employment.

" If, in the opinion of the Lieutenant-Governor in Council, the situation has not been improved at the end of the period, the licence should be subject to revocation or appropriate modification."

These suggestions, if implemented, would subject each conversion unit, and its management, to direct supervision and overriding control by the Crown or a Crown agency.

Dr. Orchard, when questioned concerning Mr. Koerner's suggestions, expressed himself in forthright terms as follows:—*

" Q.—Dr. Orchard, what do you think of the practicability, or otherwise, of the Alaska Pine Company's suggestion? A.—The first nine-tenths of it is just another case of appeal for a forest management licence, somebody else paying the costs, and the licensee accepting no responsibility whatever, assured supply allotted to him from a public working circle, first refusal just dressed up in another little bit of form. As for the 25 per cent, that's just too easy. Even now, 90 per cent of our timber sales go without competition. Now I ask you, who is going to pay the upset price when, by waiting for one month, he can get it for 25 per cent less?

" Q.—Except this, it seems to me that it is envisaged here that the Government is going to manage and is going to put up the sale under a working plan. A.—You're darn right the Government is going to do all the work, put up the sales, but Mr. Koerner is going to have the refusal of the timber, nobody else. I shouldn't say Mr. Koerner—these selected mills. By Mr. Koerner's plan the selected mill is going to have the refusal of the timber. They don't have to find a logger. They don't have to do anything. They have no management responsibility, no protection responsibility, nothing. If disaster hits, they don't lose anything, but they have got the refusal of the timber, which is to say the product of the licence. I don't think they should get it on those terms. Then the 25 per cent, there will be cases where people are so hard pressed for timber that they will compete, yes, but over all there is only about 10 per cent of our sales for which there is any competition. The other 90 per cent go at upset price. All you have got to do is wait thirty days and get it for 25 per cent less."

While I am of the opinion that Mr. Koerner's thoughtful submission cannot be brushed aside in such a cavalier manner as that manifested by Dr. Orchard, nevertheless his evidence demonstrates the depth of disagreement that exists between those of opposing views and points up the diffi-

* Transcript, p. 15886 *et seq.*

culties facing anyone who is charged with the responsibility of endeavouring to reconcile these conflicts.

Mr. H. R. MacMillan expressed his views on the subject of free competition as follows:—*

> "A lot of effort has been spent and time taken up during the sittings of this Commission in an effort to persuade you, Mr. Commissioner, to a conclusion that public timber should be parcelled out to the selected few, selected on one basis or another, but all with the sole objective that the few should survive and the many struggle for their existence until they can struggle no more and cease to trouble. To this we are unalterably opposed.
>
> " The public forests are public property, and one citizen has just as much right as another to bring it into productivity and make money doing so if he can. The principle is as old as the French Revolution—there is nothing novel about it—there is no God-given right in any man to say who shall and who shall not enjoy the benefits of public property. Our mines are not parcelled out in that fashion—anybody can buy a free miner's certificate and go hunting for minerals if he wants to. Our fish are not managed on any such principle. Any man can get himself a fishing licence and go and catch fish where he can catch them. Why should there be some closed circle applied to the public forests in a district where the demand for wood is already greater than the supply? It does not make sense and no argument will make it sensible.
>
> " Timber sales should be open to anyone. The Powell River Company endorsed this principle.
>
> " This position that timber sales should be open and free to everyone is supported by Mr. Flavelle.
>
> " Mr. Liersch endorsed the open bidding basis even on timber contiguous to private holdings. There is nothing peculiar about this. It is a Canadian concept on which this country has been built and run ever since we took it from the Indians, and I for one see no good reason why we should at this late date cast aside our heritage for the mid-European concept of the managed state."

It is, however, I think, well established in the evidence that even now when timber sales are open to everyone a greater part of the cut from public working circles and unmanaged Crown land is in fact allocated to various conversion units through the medium of tied loggers operating thereon. Mr. Koerner's company, for one, has some form of first refusal or other arrangement with twenty-one such tied logging outfits (apart from twenty contract loggers operating on this Company's own timber).

* Transcript, p. 18994 *et seq.*

The MacMillan & Bloedel Company submitted to me a statement concerning the number of tied loggers with which it had some form of arrangement, but did so under the seal of confidence.*

I have already outlined the reasons for this development on the Coast.

In four of the Interior public working circles a unique system of allocation of timber has been evolved by the owners of conversion plants drawing their supply from these areas. This objective is attained through voluntary Associations controlling practically the entire distribution of the allowable cut in the Crooked River, Westlake, Willow River Public Working Circles, and southern portion of the Naver Public Working Circle (Ahbau Association).

Mr. L. A. De Grace, a consultant forester who presented the submission on behalf of the Ahbau Association, said:—†

> " In the past development of local lumber industries has followed a general pattern. An interested company has located a body of timber and set up a sawmill, logging operation, and possibly a planer-mill to utilize a body of timber. The investment has been based on funds available and the requirements of the area in which the company is operating. Any timber security has been based on the foresight of the company concerned in choosing their location with regard to timber, transportation, and other facilities.
>
> " With the advent of the working circle policy, an immediate restriction of allowable cut has come into effect. A company which hitherto intended to utilize the timber of any given area now has an additional limit placed upon them. Where two or three to a dozen or more industries are located within a public working circle, they can proceed to use the timber only up to the allowable cut. If six companies are operating on an allowable cut of 24,000,000 f.b.m. per year, then each on the average may expect to use 4,000,000 feet. If two or three additional mills enter the area, the allowable cut is then on the average reduced by at least a million feet. It immediately became apparent to companies within a working circle that some apportionment of the allowable cut must be made if all were to exist. In this Association the allowable cut was apportioned according to a mutual agreement between the mills as to the quota each, presumably, should have in perpetuity. Under the present operation a complete set of records of timber sales, applications for timber sale, and scale returns are kept. Twice a year the membership receive statements of their relative timber and cutting positions within the working circle. The Association thus acts to regulate the cutting of member mills.

* This Company states: " We have not in the past bid, or had our contractors bid, for Crown timber in a public working circle." Exhibit 206H.

† Exhibit 163, p. 2 *et seq.*

" From the point of view of security the Association also acts to prevent a reduction of cut to member mills by the entrance of other mills into the area. This function has been one of persuasion. If it comes to the knowledge of members that another mill is interested the company is approached by members or by the Association and the timber situation is pointed out. To date the system has worked satisfactorily and non-member companies have made no serious effort to upset the regulation of the working circle."

This Association, although in favour of the Forest Service selecting areas for priority cutting, was strongly opposed to the Service originating timber sales. Mr. De Grace said in part:—*

" By setting up a large enough block the Forest Service can encourage large companies, hitherto not operating in the area, to bid on timber. Companies of such a size can think in terms of investment period beyond those of the companies which make up the membership of this Association. By setting up such a situation the Forest Service can virtually eliminate any operation in favour of a larger. This aspect the Association protests strongly.

" If the Forest Service has a good inventory of an area or working circle, and if they also have the priority cutting areas laid out, why should it be necessary to choose the time, size and location of timber sales? There should be no serious objection to allowing each operation to set its own pace within the priority areas and within the allowable cut as set up by the Forest Service. This is common sense."

The Associations set up in the other three public working circles are organized and operate on much the same basis as the Ahbau Association.

It seems to me that to the extent to which these Associations are successful in discouraging outside competition from non-association members and continue to allocate the allowable cut among their own members solely, they are in effect translating public working circles into forest management licences without assuming the concomitant responsibilities of management and management costs usually attached thereto.

Just where this concept will lead to is at least an interesting speculation. I do not pause to consider the possible legalistic aspects that may be involved.

Returning once more to the submission that the Forest Service should allocate timber from timber sales to selected conversion units, there was one school of thought which argued that as the sale of timber was virtually a Crown monopoly " the landlord should have the right to select his own tenant." In a general sense that is true, but a system of licensing some selected sawmills or other conversion plants to the exclusion of all others would confront the Service and the Government with intractable problems.

* Exhibit 163, p. 4 *et seq.*

Those who are familiar with my 1945 Report will probably remind me that I said at that time:—*

"The Interior Lumber Manufacturers Association has recommended for the Interior that 'all existing operations should be brought under licence and no new operation should be licensed until the availability of timber in the area affected, sufficient to guarantee the maintenance of that operation on a sustained-yield basis in perpetuity, has been determined.'

"In my opinion this recommendation should be implemented. It is a much better policy to plan and manage any Interior working circle so that one mill may be assured of continuity of supply and permanent operation than to allow the productive capacity of an area to be divided between four or five mills with the result that none of them has a sufficient supply to ensure an economic production, thus leading to the ultimate disappearance of them all.

"Ghost towns in the Interior bear distressing and silent witness to the past policy of too many mills cutting out areas that could have supported in perpetuity, on a system of planned management, the potential capacity of probably half of them."

I repeat now what I said then that a licensing policy would be advantageous, but I considered then that such a policy would be carried into execution through the medium of a powerful Forest Commission "free from trammelling influences—political or otherwise." I did not expect that the Government itself or the Forest Service should be faced with such harsh and politically distasteful decisions. In this respect, and in the absence of a Forest Commission, I presently share Dr. Orchard's views, which he expressed as follows to Mr. Eckardt:—†

"Q.—Do you recall last week at Victoria there was some discussion concerning the advisability of licensing sawmills? A.—Yes.

"Q.—I would like your opinion; it seemed to me that applying that to the question of increasing competitive bidding, would you say there would be any merit, in attempting to eliminate this cut-throat bidding in public working circles, that a system of licensing operators in a public working circle be adopted? And then limit the bidding of timber sales in that public working circle to the licensees? A.—Well, from the forester's standpoint, it would be a delightful thing to do. From a public administration standpoint, I don't believe it can be done, under our political set-up, which we all like and think is the best in the world.

"Q.—Otherwise you think it would be a practical solution? A.—I don't think what I have said would describe it as a practical solution. I think it is completely impractical in our political and economic set-up.

* 1945 Report, pp. 147–148.
† Transcript, pp. 1987–1988.

"Q.—But not from a forestry set-up? A.—As far as plain, unqualified forestry is concerned, raising a crop and harvesting it, why, it would be delightful, yes."

In my opinion, to repeat, the answer to this problem of demand exceeding supply, regionally, must be found in the adoption of policies designed to open up additional areas of supply on attractive terms. This involves many more access roads and a change in the present methods of appraising stumpage values—subjects dealt with under their appropriate headings.

If after a fair trial the recommendations later made in relation to these subjects fail to alleviate the competition in the readily accessible areas on the Coast and in the Interior, then perhaps thought could be given to the introduction of the licensing system operating in Ontario, to which reference was made when I was dealing with forest management licences generally. In this regard, and if the need arises, the views of the Provincial Advisory Council should be of value.

Before leaving this subject of allocation, there is yet another aspect to be considered. I have in mind the system of marketing area allocation in force in Oregon for a number of years and now repealed. It seems to me this might be a matter worthy of experimentation by the Service, selecting as a control area for observation, for a few years, Crown timber sales supplying the sawmills in the vicinity of Hope. This would not involve a system of licensing mills nor an allocation of timber to any individual plant, but could be attained by inserting a provision in timber-sale contracts providing that any timber cut within the prescribed marketing area would have to be processed in that area, leaving the mills there now, or any others that wished to enter that field, to compete among themselves for the available timber-supply. If this proves successful, it would tend, if judiciously extended after careful study of all relevant factors, to stabilize the existence of small communities dependent upon the continuance of small local mills. I have reached this conclusion notwithstanding the opposition thereto of the operators of large mills at New Westminster and other localities on the Fraser River now reaching into the Hope area for timber and who said that such a programme would "subsidize inefficiency." Sometimes even an inefficient mill can perform a valuable social service in a small community, and an inefficient mill, if given a chance to survive, may be encouraged thereby to increase its efficiency by the expenditure of money justified by some assurance of supply free from powerful competition of wealthy operators with mills outside the designated marketing area.

Efficiency in this sense is relative and would be forced on the smaller mills in a marketing area by competitors of like size and comparable financial means.

The pattern of forest-land ownership in Oregon, which I understand led primarily to the discontinuance of marketing area allocations in that State, does not apply to this Province in any comparable degree.

THE FOREST INVENTORY

Reasons for making a forest inventory, and the kind of inventory that is made, vary with ownership, condition of the forest, primary and secondary functions which the forest is expected to perform, value of its products and their relative importance in the owner's economy. A private owner may want merely a stock-taking of his merchantable timber. The Government, which controls public and, to a degree, private forests, must maintain a complete and reasonably accurate and up-to-date inventory in all its phases as a foundation for its forest policy.

A reasonably accurate knowledge of the extent of our forest resources is a primary essential in order to evaluate forest policy and administration relating to conditions of tenure, incidence of taxation, protection from fire, insects and disease, improved standards of utilization and forest management in general, designed to assure a continuity of production and sustained yield. An inventory is designed to provide information on merchantable volumes, classification of forest areas, types, site qualities, ages and condition of the growing stock together with rates of growth so that the production which may be obtained by sustained-yield management can be calculated with reasonable certainty. It should be broken down into administrative and topographic units so as to assist in the location of unsatisfactory conditions and their improvement, and to indicate areas of local variation where blanket rules and regulations may not be appropriate.

The latest inventory available to the 1944 Commission was compiled between the years 1927 and 1936 and published by the Forest Service in 1937. The basic figures in that publication were the foundation-stones upon which the 1945 Report was built. Some adjustments and revisions were made necessary by reason of the further information gathered and knowledge gained by the Forest Service between 1937 and 1944. In essence, however, the 1944–45 inventory was the 1937 inventory as amended. The present inventory was published in the 1954 Forest Service Annual Report and was presented in more detail to the Commission in a brief by the Forest Surveys Division of the Service. It is the result of work done by that Division during the intervening years. It may be of interest to note that the surveys and compilations for the 1937 inventory were handicapped by the depressed economic conditions of the thirties, and the Second World War interfered with surveys for the 1954 inventory. However, in recent years the work has been expedited by important financial help from the Federal Government and is again organized on a continuing basis.

On the presentation of a new inventory the natural reaction is to compare it with the former one and seek to account for the apparent differences between them. Such a comparison will be made in this Report, but first it is, I think, desirable to make some general observations on the purposes,

nature, and interpretation of forest inventories and to trace briefly their development in this Province.

Trees supply many of the material needs of man: he is, in truth, surrounded by and utilizes wood and wood products from the cradle to the grave. The fact that the forest is a renewable resource was, however, seldom recognized by those who pioneered, less than a century ago, the settlement and early industrial development of this richly forested, wild and sparsely inhabited land. The forests were truly inexhaustible by the requirements of those who lived in or near them, and in those early years no one knew or cared what area they covered, or what volume of wood they contained; there was no reason why they should. To many early settlers the forest was, indeed, an undesirable encumbrance to be removed by burning.

But there were those in other parts of the continent whose timber-supply was dwindling and who were already engaged in a struggle of increasing intensity to locate and possess other areas of supply. British Columbia's comparative inaccessibility protected its stored-up forest capital from too early and too rapid exploitation, even after transcontinental railways and the Panama Canal made its products available to the world.

This retarded exploitation (deplored by early Governments), as well as natural reforestation on the Coast after liquidation of comparatively small parts of the virgin forests logged in early attempts to build an industry, has been most fortunate for present and future generations. The over-all capacity of our forest to supply permanent industrial development has been diminished only locally. The very real danger of exhausting our forest resource by unregulated liquidation without thought for the future has passed. The sustained-yield principle of forest management recommended in the 1945 Report has been introduced during the last ten years, and is being actively pursued by Government and Industry. There are no tenures of forest land in the Province which cannot be saved from destructive liquidation by owners and operators acting in co-operation with the Government under the general provisions of the forest, land, and taxation legislation already in effect, complicated though it may be. Improved capacity, sustained and increasing production, and the enrolment of all sections of the industry in support of these basic objectives in the public interest can only be achieved, however, in an atmosphere of fair and equitable consideration for all interests, large and small. A shared and disseminated knowledge of the forests, their condition, capabilities, ownership, and management, is essential to a mutuality of purpose designed to effectuate these objectives and to stimulate public support and concurrence in this programme. The attainment of these objectives could be greatly hindered by public ignorance of the nature of the forest resources and the type of management most suitable for them and most profitable for the public. Through any vicissitudes of economic or political fortune which may come upon us, it is to me unthinkable that the informed people of this Province would be content to

abandon the concept of continuous yield from its forests and turn the clock back to an era of unregulated liquidation. Knowledge of our forest inventory in all its implications is indispensable to the formation of an informed public opinion concerning the present position of our forest industry and future policy.

A forest is a living organism, and since an inventory of so large an area as British Columbia takes years to make, it becomes obsolete as soon as completed. It should therefore be a continuing process and provide adjusted and corrected information at short intervals, even where the forests are left uncut. In a heavily cut area, such, for example, as the Vancouver Forest District, the effects of logging and fires, and other agents of depletion in conjunction with the changes caused by growth of young stands and decay in overmature ones, make constant stock-taking especially necessary. The introduction of definite areas under sustained-yield management is gradually relieving the Forest Service, to a marked degree, of the heavy responsibility for this task. Future Provincial inventories will increasingly draw upon the more careful and detailed surveys, maps, compilations, and working plans required for the management of sustained-yield units, both public and private. Provincial inventories, periodically published, should still serve to collect and co-ordinate information for large administrative units and become an essential link between the regulation of local forests and the direction and improvement of high-level forest policy.

At this point it might be useful to consider the historical background of the current forest inventory. It should be remembered that even so recently as the turn of the century there was no such thing as an inventory of forest resources. Industrial development was in its infancy and volumes of timber consumed were negligible. A guide book published in Victoria in 1882 " Containing New and Valuable Information concerning this comparatively unknown Region "* reported that " The Timber Resources of the Province are very extensive, embracing many hundred thousand acres of Douglas fir lying in the West Cascade region, the choicest bodies being upon Burrard and Jervis Inlets, Mud Bay, Howe Sound, and the east coast of Vancouver Island. It attains an enormous growth, and being straight and exceedingly tough and durable is in great demand the world over for ship spars and timbers. Over thirty million feet are manufactured into lumber annually, chiefly for exportation to Asiatic, Australian and South American ports. The pine and spruce of the Interior, though much inferior in size and quality to the fir of the Coast, is sufficient in both and also in quantity for all local purposes."

The industry, except for a few very small mills serving local needs, was concentrated in two large mills on Burrard Inlet: the Moodyville mill, producing 20 to 25 million feet a year, and the Hastings mill, 15 million annually adjoining " the pleasant village of Granville which had strong

* Newton H. Chittenden, Victoria, 1882.

expectations of securing the prize (terminus of the C.P.R.) which has fallen to Port Moody." That was the situation in 1882 before the birth of the City of Vancouver.

Quoting the late R. H. Alexander, manager of the B.C. Mills Timber and Trading Company (Hastings mill), the Federal Commission of Conservation (1918 Report) said: "In 1885, when the Canadian Pacific Railway reached Vancouver, the output of the Coast mills of British Columbia did not exceed 75,000,000 feet, and this year (1906), including shingles, it will reach 525,000,000 feet. In that year, 1885, the revenue arising from the forest was only $3,768, while last year (1905) it amounted to $578,748. In making this comparison, however, a large share has to be credited to the growth of the lumbering business in the interior of the province." It is notable that the new licensing policy which the Government introduced at that time within three years (1908) brought the forest revenue up to $2,785,807. Fifteen thousand licences had been issued, and this evident demand for timber, although strengthening the Treasury, gave the Government considerable concern, leading to the termination in December of 1907 of all forms of alienation of Crown timber.

In 1909 a Royal Commission on Forestry was appointed under the chairmanship of the Honourable F. J. Fulton, K.C. The Report, issued in 1910, included the first attempt at a forest inventory, although it was frank to say that little was known of the forest resources. It was stated: "For years a legend passed from writer to writer that the Province of British Columbia had 182 million acres of forest. This was replaced in 1908 by Dr. Fernow's conjecture that the true figure was somewhere between 30 and 50 million acres, as far as 'merchantable forest' was concerned." Dr. Fernow's "conjecture" included an estimate of 300 billion board-feet. The Commission noted the serious effect on forestry problems due to the lack of a reliable inventory: "Inflated estimates of the present supply of timber cause people to be careless of the waste of it; distorted theories of annual destruction, by fire and by lumbering, enable alarmists to harm the common-sense campaign for conservation by their exaggerations; uncertainty is created in business conditions; and in general, from every point of view, the task of governments that are labouring to construct sound forest policies is made extremely difficult." The Commission's estimate of merchantable timber land was:—

	Acres	Million Board-feet
Crown-grant timber on Vancouver Island	318,000	11,130
Crown-grant timber on Mainland	552,000	5,520
E. & N. Railway Co.	375,000	5,380
Timber leases	619,000	12,380
Mill timber on pulp leases	387,000	4,640
Timber licences	9,000,000	108,000
Reserved, unalienated	3,750,000	45,000
Dominion control	1,280,000	48,000
Totals	16,281,000	240,000

Pulp-timber was ignored in this inventory. The Commission made no attempt to estimate the immature, non-commercial, or not restocked forest land, nor the rate of growth, but it concluded: " The bulk of this timber is Crown property; most of it is under Government control; and the rate of growth upon the Pacific Coast is twice the average for the United States. . . . Two things are therefore plain; one, that the value of standing timber in British Columbia is destined to rise to heights that general opinion would consider incredible today; the other, that under careful management heavy taxation need never fall upon the population of the Province."

While the Commission's inventory of merchantable volume has proved to be much too low, it should be remembered that it was based on the type of logging and degree of utilization practised in 1910 or earlier.

One of the Commission's twenty-one recommendations was the creation of a full Department of Forests. This was implemented, in part, in 1912, by the establishment of a Forest Service as a branch of the Lands Department. The responsible Minister announced that the new Service would, among its first duties, " ascertain with exactitude what timber there is within the Province." Survey parties were sent out, whose chief purpose was to estimate the extent and volume of merchantable timber. This work was slowed to a standstill during the First World War.

In his report on the first year's work of the new Forest Service, the Chief Forester, Mr. H. R. MacMillan, wrote* (January, 1913) that his organization had made a good beginning upon the forest surveys and that " the most urgent need for them is to supply information needed as a basis for efficient work in the creation of forest reserves, the construction of permanent improvements, and the distribution of the field force. While satisfying these needs, these forest surveys will yield at the same time detailed information regarding the stand of commercial timber in the different regions, its size and quality, and its availability for successful lumbering operations, which will be of great practical value to lumbermen and other forest-users, as well as in the development of a progressive public timber-sale policy." A year later he reported:† " Until recently the forest exploration of British Columbia depended upon private individuals, and there has not been available any definite information of the forest resources of the Province beyond the knowledge that 11,000,000 acres of merchantable timber has been taken up under grant, lease, or licence, and that a considerable portion of the remainder of the Province is forested." That was only forty-two years ago.

It was the intention in 1912 that all the work in a district should be under the direction of the District Forester, including forest surveys and land classification; also that more forest districts would be created as qualified men became available. This policy, however, was later rejected for one of greater centralization. In 1912 there were eleven District Foresters; be-

* Annual Report (1913), p. 43.
† Annual Report (1914), p. 75.

ginning in 1916 the number was gradually reduced to eight in 1920, six in 1926, five in 1932 and at the present time. The inventory maps and volume estimates are used by district officers and Rangers, but these officials have not since 1950 directly assisted in their construction, and the estimates are not now readily related to district boundaries.

In 1918 a more comprehensive report on the forests of British Columbia was issued by the Federal Commission of Conservation, written by two prominent foresters, H. N. Whitford and R. D. Craig, after three years' work. This included estimates of timber by species and classification of forest lands by regions. It dealt also with geographic, physiographic, climatic, and soil relations, forest policy, administration, and utilization. A summary of their inventory follows:—

MERCHANTABLE TIMBER IN BRITISH COLUMBIA, 1917
(Million board-feet.)

Species	Coast		Interior		Total	
	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent
Red cedar	59,949	28	18,019	13	77,968	22
Douglas fir	63,400	30	12,573	9	75,973	22
Spruce	14,165	7	58,899	43	73,064	21
Hemlock	51,948	24	12,164	9	64,112	18
White fir (balsam)	19,115	9	13,838	10	32,953	9
Lodgepole pine	68	——	11,793	9	11,861	3
Yellow pine	——	——	4,208	3	4,208	1
Cypress	4,056	2	——	——	4,056	1
Larch	——	——	3,152	2	3,152	1
White pine	1,083	——	1,617	1	2,700	1
Cottonwood	516	——	272	——	788	——
Totals	214,300	——	136,535	——	350,835	——
Pulpwood, poles, etc.	15,465	——	——	——	15,465	——
Totals	229,765	——	136,535	——	366,300	——

Of the above, 61,016 million feet were on the east coast of Vancouver Island and 55,897 million feet were on the west coast of Vancouver Island.

Of this 366 billion board-feet of timber, 260 billion had been alienated in various tenures, as follows:—

ALIENATED TIMBER, 1917

	Million Board-feet
Timber licences	161,300
Timber leases	22,000
Pulp leases	9,600
Timber sales	316
Dominion licences	17,400
Crown-granted	50,000
Total	260,616

CLASSIFICATION OF FOREST LAND, 1917

Class	Coast		Interior		Total	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Timber, over 30 M b.m.	2,457,600	16	1,758,720	2	9,030,400	10
Timber, 10–30 M b.m.	4,814,080	32				
Timber, 5–10 M b.m.			9,027,200	11	9,027,200	9
Timber, 1–5 M b.m.			15,229,440	19	15,229,440	16
Total timber land	7,271,680	48	26,015,360	32	33,287,040	35
Productive, mostly reproduction	7,734,400	52	54,558,720	68	62,293,120	65
Totals	15,006,080	100	80,574,080	100	95,580,160	100

The area logged prior to 1917 was estimated as 1,280,000 acres, from which 30 billion f.b.m. had been taken. The remainder of the productive area, or approximately 61 million acres without mature timber, had been burned.

These estimates were not the result of a new field survey. For the Coast estimates, cruises were obtained from private owners which covered 65 per cent of the timber; for the rest and especially for the Interior, where information was not available in Forest Service records, volume estimates were made by applying best available averages obtained from all informed sources to forest types mapped topographically below the estimated upper limits of merchantable timber growth. No air photographs were available in 1917, and this was the best that could be done. Figures were reported by large drainage-basins. As far as possible, volume figures were based on a minimum stump diameter of 10 inches, which was considerably closer utilization than the current practice at that time.

No information concerning the rate of growth was available, but the Commission's foresters (Whitford and Craig) made a rough calculation of the sustained-yield capacity as follows:* "During the last five years the total cut in the province has averaged only 1,250 million board feet. With a stand of 350,000 million board feet of timber of commercial size, and with over 64,000,000 acres of land on which young forests are established and which, if protected, should produce from 5,000 million to 7,000 million board feet per annum, it will be seen that the forest resources of British Columbia can, under conservative exploitation, supply at least five times the present cut without seriously depleting the capital stock."

Their estimate of 64 million acres of immature forest, if anywhere near the truth at that time, indicates that *ex facie* there has been a tremendous loss of young forest since 1917. The present (1955) forest inventory reports only 38,303,000 acres of immature forest in the Province. The explanation may, in all likelihood, be found in the fact that there have been great losses by fire since 1917, and, too, some of the older age-classes of the 1917

* Report of Federal Commission of Conservation (1918), p. 9.

young forests are now mature, but it is also possible that the immature areas were overestimated at that time.

The 1918 Commission's calculation of the sustained-yield capacity of the Province is of interest because it is within range of the more conservative of present estimates. It is probable that it, and much of the information in that Commission's report, was gleaned from the Forest Service. Five years earlier, Mr. H. R. MacMillan wrote, as Chief Forester:* "The investigations of the Forest Branch have gone far enough to show that British Columbia contains not less than one hundred million acres of forest land, and that the total stand of commercial timber is certainly not less than three hundred billion feet, and probably much more. At present the lumber output of British Columbia is about a billion and a quarter feet a year. At the present rate of cutting, making no allowance at all for annual growth, it would take the lumber industry of British Columbia nearly 250 years to use up merely the mature timber now standing. The annual growth of the forests of British Columbia is even now, before they are either adequately protected from fire or from waste, certainly not less than five times the present annual lumber cut." He concluded that "it is not merely advisable to encourage the growth of our lumber industry until it equals the production of our forests—it is our clear duty to do so, in order that timber which otherwise will soon rot on the ground may furnish the basis for industry." Notwithstanding its continuous extension over the years, it was not possible for industry even to approach this objective until its great and relatively recent expansion, particularly in the production of pulp and paper.

The Commission's 1918 report was the chief authority for information concerning British Columbia forests and forestry for nearly twenty years. It indicated that standing timber was in a buyer's market, that stumpage and carrying costs must be kept low, and it satisfied Government, industry, and even foresters that, provided protection from fire was brought to adequate standards, the idea of managing our forests on a sustained-yield basis was many years ahead and not then an impending necessity by any means.

After the war, survey and reconnaissance of the forest resources were resumed, and by 1925 a programme leading to the creation and management of forest reserves was activated. These forest reserves were established by Proclamation for the perpetual growing of timber by authority of the "Forest Act" of 1912. A statutory fund for their development and management was established in 1925. In consequence, there was included in the survey of these areas an examination of age-classes of immature stands, rates of growth, rotation periods, and capacity for sustained yield, so that preliminary plans for management could be made.

This development made it possible to include more reliable and specific information in the general inventory and, in addition to publishing the

* Annual Report (1913), p. 5.

surveys as they were made of individual forest reserves, by this time called "Provincial Forests," a general inventory for each administrative forest district was published in Forest Service Annual Reports as information became available. Thus publication of the forest inventory of the Vancouver District was made in 1931, Prince Rupert in 1932, the Interior districts in 1933–35. Revisions and adjustments were made in 1936, and a complete Provincial forest inventory, including information on tenure, depletion by logging, fires, and other causes, calculation of growth and sustained-yield capacity, and description of forest practices, was issued in 1937. The above information was also given for each of the five forest districts individually, and it is this inventory that, as I stated above, provided the basic material for the 1944–45 Report.

This publication was entitled "Forest Resources of British Columbia," and concerning its worth and merit I said in 1945: "This excellent compilation is the result of many years effort by the Forest Branch to bring together relevant forestry facts and figures. The author, F. D. Mulholland, welded together the statistical and other data into a valuable contribution."

For comparison with previous and subsequent inventories, a summary of the 1937 volumes by species and classification of forest lands is given in the following tables:—

TABLE 37

MERCHANTABLE TIMBER IN BRITISH COLUMBIA, 1937

(Million board-feet.)

Species	Coast		Interior		Total	
	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent
Hemlock	46,135	30	10,527	11	56,662	22
Spruce	9,949	6	40,273	40	50,222	20
Douglas fir	37,115	24	12,154	12	49,269	19
Red cedar	40,553	26	8,451	9	49,004	19
White fir	17,580	11	13,904	14	31,484	12
Lodgepole pine	127	—	9,655	10	9,782	4
Yellow cedar	3,019	2	—	—	3,019	1
Larch	—	—	2,122	2	2,122	1
White pine	651	1	901	1	1,552	1
Yellow pine	—	—	1,383	1	1,383	1
Totals	155,129	100	99,370	100	254,499	100

East coast of Vancouver Island, 37,510; west coast of Vancouver Island, 51,876.

TABLE 38

TENURE OF TIMBER, 1937

(Million board-feet.)

	Coast		Interior		Total	
	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent
Timber licences and leases	73,215	47	8,812	9	82,027	32
Crown-granted and Indian	21,940	14	5,072	5	27,012	11
Crown unalienated	59,974	39	85,486	86	145,460	57
Totals	155,129	100	99,370	100	254,499	100

TABLE 39

CLASSIFICATION OF FOREST LAND, 1937

(Thousand acres.)

	Coast		Interior		Total	
	Area	Per Cent	Area	Per Cent	Area	Per Cent
Mature timber	7,880	78.4	14,776	22.7	22,656	30.2
Immature—						
Over 25 feet	380	3.8	22,734	35.0	23,114	30.9
Under 25 feet	873	8.7	8,328	12.8	9,201	12.2
Total immature	1,253	12.5	31,062	47.8	32,315	43.1
Logged	360	3.6	323	0.5	683	0.9
Logged and burned	330	3.3	241	0.4	571	0.8
Burned only	228	2.2	18,570	28.6	18,798	25.1
Total not reforested	918	9.1	19,134	29.5	20,052	26.8
Total productive	10,051	100.0	64,972	100.0	75,023	100.0
Barren	16,902	55.4	48,844	39.3	65,746	42.5
Scrub	12,515	40.8	69,766	56.3	82,281	53.2
Swamp and water	1,196	3.8	5,455	4.4	6,651	4.3
Total non-productive	30,613	100.0	124,065	100.0	154,678	100.0
Cultivated	432	87.3	679	16.2	1,111	23.6
Open grass	63	12.7	3,528	83.8	3,591	76.4
Agricultural	495	100.0	4,207	100.0	4,702	100.0
Total area of B.C.	41,159		193,244		234,403	

By 1936 the forest-reserve surveys had covered more than 15 million acres, including 25 per cent of the productive forest of the Vancouver District, so that it was possible to go a step further than previous inventories in relating the growing stock to production. The 1937 (Mulholland) Report explains (p. 153): "By applying the results of the preliminary working-plan surveys of the 'Provincial Forests' to the unsurveyed areas which have been mapped and resources estimated on a more extensive basis, approximate estimates of increment in immature stands and capacity for sustained annual yield for each district have been calculated. For these

surveys some 17,000 miles of examination strips have been run on the ground and 3,000 miles of aerial photography stereoscopically plotted; on the strips age, diameters, heights and volume have been recorded, so that by applying the resultant rate of growth estimates, type by type, to the gross area of each type and district, preliminary estimates of increment and yield for the whole Province have been made with sufficient accuracy for present needs." For uniformity a manual of instructions for forest surveys was printed and mechanical tabulation of forest classification and volumes was introduced. It was intended that field re-examination, with air photography, should be made at ten-year intervals.

This inventory was made during the depression of the thirties, and its assessment of the qualifications "merchantable" and "accessible" was coloured by the atmosphere of poor markets and low profits. It is difficult for those of us who are without personal experience of those days in this field to realize the difference between what could be logged then and now. Average timber-sale stumpage was $1.16 for fir, 73 cents for hemlock. Production dropped to the lowest since 1916 during the First World War, and forest revenue was only 2 million dollars (now over 28 million dollars). Many stands which were correctly mapped and compiled at that time as inaccessible (under the economic conditions of those years) or as worthless scrub have since been logged. The sustained-yield capacity of the organized districts was estimated at 5,180 million feet, while the Provincial cut in 1936 was 3,021 million. Based on sawlog rotations of 100 to 120 years and the low utilization standards of the period, it was considered that the Vancouver District, with a ten-year average cut of 2,065 million feet (2,544 million in 1936), was at the limit of its sustained-yield capacity "unless it can be increased by closer utilization in logging, more successful reforestation, protection of the immature stands and replanting of areas denuded in the past."

The standard forest surveys of areas believed to be suitable for forest reserves were continued until 1942, after which they had to be suspended on account of the war, but revision of the forest-inventory maps was maintained and statistical recording of inventory data continued.* At the time of the 1944–45 Commission, forty-five Provincial forest reserves had been created, following survey, for sustained-yield management. However, little had been done to implement the preliminary plans.† These forests covered 19,661,000 acres. An additional reserve of 94,700 acres, containing the Vancouver Island plantations, was made at that time.

While the inventory work was kept alive during the war in the above manner, it was not possible for the Forest Service to compile a revised inventory for the Province by 1945, so that it was necessary for me in that year to make such adjustments to the 1937 figures, as the evidence indi-

* Forest Branch Annual Report (1942), p. 16.
† 1945 Commission Report, pp. 84–85.

cated, to bring them into conformity with the improved knowledge and experience gained in the interim. That Commission was told that the total Provincial volume estimate of 254,500 million board-feet was too low; in fact, I was informed by Mr. Mulholland that if standards of utilization such as those in Sweden, for example, were economically possible, that estimate would have been doubled. It also appeared that the volume of "accessible" should be revised upward. After hearing considerable evidence from informed witnesses, I found the facts supported following revised inventory for the Coast.

TABLE 40

MERCHANTABLE TIMBER, COAST, 1945

(Million board-feet.)

	Total	Accessible
Douglas fir	47,837	43,053
Red cedar	52,268	47,041
Western hemlock	59,463	53,517
Spruce	12,823	11,541
White fir (balsam)	22,659	20,393
White pine	840	755
Other species	4,056	3,650
Totals	199,946	179,950

It was estimated that in the Interior increment by growth at that time exceeded depletion from all causes by one-half billion feet a year, and that there was little chance of an over-all shortage of timber during the next ten years, except for larch, white and yellow pine. There might, however, be local shortages, and the question of transportation was an important one. There was not sufficient evidence to estimate what proportion of the volumes considered inaccessible in 1937 would become accessible. The 1937 estimate, though admittedly conservative, was therefore accepted by me with the addition of 4,000 million feet net increment by growth to the total and 1,600 million to the accessible estimate, with the following result:—

TABLE 41

MERCHANTABLE TIMBER, INTERIOR, 1945

(Million board-feet.)

	Total	Accessible
Douglas fir	12,640	7,620
Western hemlock	10,950	2,400
Red cedar	8,800	4,310
Spruce	41,880	12,000
White fir (balsam)	14,460	2,370
Lodgepole pine	10,040	2,760
Larch	2,210	1,960
White pine	940	610
Yellow pine	1,440	1,270
Totals	103,360	35,300

Estimates made by witnesses before the 1945 Commission and conclusions based upon them were, like those included in previous inventories, in

part conjectural. I said in my Report " that in ten years' time exact information concerning our forest resources not now available ought to be known and forest policy should then be reviewed in the light of known facts and be guided by the interim developments that have taken place in methods of utilization, marketing, and other relevant factors affecting our forest economy." Meanwhile, I recommended that the Coast cut should not exceed 35 billion board-feet during the next ten years as a basis for forest regulation and policy during that decade. The average Coast cut at that time was 2¾ billion board-feet and, although no restrictions have been imposed by Government action, the total Coast cut for the ten years following the 1945 Commission recommendation amounted to 34 billion board-feet.

TABLE 42

FOREST SURVEYS SINCE 1945

Year	Federal Grant	Acres Surveyed	Forest Reserves Created (Acres)
1945	.....	674,000	
1946	.....	1,018,090	
1947	.....	2,118,910	
1948	.....	3,593,428	Slocan, 768,000
1949	.....	4,188,337	Quatsino, Clayoquot, Juan de Fuca, Chilliwack, Crooked River, 3,569,900
1950	.....	4,346,280	Kyuquot, 1,193,600
1951	$203,000	8,710,200	Skagit, Cottonwood, Naver, 892,400
1952	420,692	38,045,000	
1953	477,882	21,987,000	
1954	461,617	25,570,000	Stuart Lake, 1,371,950
1955	412,439	22,457,200	
Totals	$1,975,630	132,708,445	Total, 25,691,900

The earlier forest inventories in this Province were made for current use, based on the standards of utilization of the times when they were made, or a little ahead, and with an intensity and accuracy of field examination, mapping, and compiling controlled more by the money available than by what was desirable. The statutory Forest Reserve Fund, provided by 1925 legislation, made possible the unit surveys with the object of establishing forest reserves dedicated to sustained yield, as previously mentioned; these were not primarily intended for the purpose of constructing a forest inventory, but their results were added to, and improved, the general forest-inventory work which was being conducted concurrently on an extensive basis from information provided by each Forest Ranger for his own district, under the direction and with the assistance of reconnaissance officers from headquarters. The forest atlas maintained in this way has gradually been replaced by the forest-inventory surveys, and this type of work has, to a large extent, been outmoded by the new inventory organization.

The present inventory, for the first time, is designed to record the whole wood content of forests from a stump 1 foot high to a 4-inch-diameter top.

For practical use, adjustments must be made to obtain volumes on whatever standard of utilization is contemplated. The gross volume mentioned has not been compiled; the figures published and presented to this Commission do not include the small trees below the 10-inch-diameter class.

This advance in forest stock-taking was brought about by several contemporary and possible related factors:—

(1) The rapid expansion of forest industry, particularly the manufacture of pulp and paper, which has created greater demand and competition for wood:
(2) The economic possibility of utilizing smaller logs recovered by pre-logging, main logging, or re-logging operations for pulp-mills:
(3) The improved prosperity of the Province, which enabled funds for this purpose to be provided:
(4) Federal financial assistance, which is contingent upon adherence to high standards specified by contract between the two Governments.

An inventory designed, within practicable limits of cost and time, to provide information, Province or region wide, will give reasonably satisfactory results for that purpose, but it will be less accurate as a basis for actual management of smaller areas. In the absence of a better yardstick, the " standard " forest surveys are being used for this purpose as preliminary estimates for forest management licences and Provincial forests under management, although they are acknowledged to be inadequate for this purpose. Gradual improvement will come from more intensive surveys before each successive working plan is made.

An outline of the procedure followed in the standard forest survey was given by Mr. H. M. Pogue* as follows:—

"(1) Vertical air photography is obtained. The Province has developed an efficient Air Survey Division, and owns the aircraft and other facilities to do this work.

"(2) The Air Survey Division prepares a base map and prints of the air photographs for the use of the Forest Service. These maps are planimetric; that is to say, they show the map features with horizontal control, but no vertical control.

"(3) The Forest Survey Division compiles the area and type classifications of the schedule. This requires field observation and stereoscopic study of the air photographs to determine the nature and extent of each class. The air photograph itself becomes the map and the type lines are drawn upon it, with cross references to the field notes.

"(4) The details from the air photographs are transferred to the maps. With modern equipment this operation can be done quickly and accurately.

* Forester in Charge of Forest Surveys and Inventory Division of the Forest Service, transcript, pp. 485, 494, 497.

"(5) From the results of the foregoing steps, a sampling work plan is drawn up which, by scientific methods, ensures that sufficient samples will be obtained to meet the accuracy specifications of the cruise.

"(6) Once the samples are obtained the data are integrated with the map and other descriptive information. The area of each type is measured from the map, and the type summary obtained. The objective of the current summary is to inventory all the wood, and for the purpose of interim results, compartment maps and summaries of the classifications within each compartment are based on existing zonal averages. No stated accuracy can be attached to the compartment volume summaries individually, but the aggregate totals by zones are within the required 10 per cent, or are approaching this accuracy in proportion to the extent that the work has been completed in each zone. In preparing these interim compartment summaries no attempt has been made to assess the local economics of merchantability with respect to tree sizes and tree species, or the local economics of accessibility.

" These interim results include volumes classified into eleven forest type groups, five age groups, four height groups, and three stocking classes within each zone.

" Mechanical tabulation of samples, classification, and related map data provides for computations, sorting the derived data, and filing preparatory to report requirements. Statements summarizing the results are produced by the business machines on master sheets, which can be run through a duplicating machine to provide copies for distribution. The time saving is enormous, in fact it would be an impossible task to do this work by hand methods. These machines will enable us to keep our heads above the flood of data and processing work which will inevitably be necessitated by the demands for ever-increasing quantities of more intensive, detailed surveys."

The Agreement of December 4th, 1951, between Canada and British Columbia provided that Canada would reimburse the Province half the cost of the forest inventory in each fiscal year, provided that the inventory is in conformity with the specifications laid down in the Agreement. The initial inventory was to be completed within five years, after which Canada agrees to pay half the cost of maintaining the inventory, subject to similar conditions. The Province also undertakes to promote the general practice of sustained-yield management as rapidly as circumstances permit. Discussions with regard to a new agreement to take effect at the end of the five-year period are, at this writing, in progress. Schedule A of the Agreement contains specifications of the nature of inventory which will be approved; it is as follows:—

" SCHEDULE A

" Part 1: General Principles to Govern Federal Participation in Provincial Inventory Projects

" 1. Three broad classes of forest inventory surveys are recognized as follows:

"(*a*) Reconnaissance surveys, intended to determine locations of the areas of productive forests;

"(*b*) National or provincial surveys, intended to determine the areas of different classes of forest and to provide estimates of timber volumes for large areas;

"(*c*) Working plan surveys, which provide detailed estimates of volumes and other characteristics for relatively small areas.

" 2. Costs per acre of forest surveys are governed chiefly by the size of unit areas for which independent estimates of volume are to be made.

" 3. High cost estimates are justified only when detailed information is to be put to immediate use in the formulation of working plans. Cheaper surveys are capable of yielding data sufficiently detailed for broad purposes of administration and for compiling provincial and national inventory statements. Federal assistance in provincial inventory programs will be limited to costs relating to ' reconnaissance,' and ' provincial ' surveys, and will not extend to the preparation of ' working plan ' surveys.

" 4. The direct federal interest in forest inventory statistics is limited to the securing of accurate statements, by provinces, relating to broad forest characteristics which can be combined into national totals. On the other hand, provincial administrators require separate estimates for administrative districts or other relatively large unit areas. Federal assistance shall be extended to the preparation of such estimates for individual districts.

" 5. The situation with respect to the present status of forest inventory information differs from province to province. Such differences must be recognized when considering plans for future work.

" Part 2: The Following Classes of Information Shall Be Obtained in All Federally Supported Inventory Programs

" 1. Areas of productive and non-productive forest shall be determined.

" 2. All productive forest shall be classified into three main types—softwood, mixedwood, and hardwood. These areas shall be further subdivided into merchantable and young growth classes. Accessible and inacessible areas should be estimated separately.

" 3. Area estimates for accessible productive forest should be further subdivided according to the following classes of tenure—occupied Crown forest, unoccupied Crown forest, and other forest.

" 4. Estimates of timber volumes should be prepared for accessible productive forest only. Separate estimates of volume should be made for trees of 10 inches diameter at breast height. Volume estimates should be made for each of the principal tree species.

" 5. Plans for preparation of preliminary information regarding annual growth should be formulated. The proposed minimum requirement would rely upon comparison of volume and ages of stands actually sampled. Other methods may be considered.

" Part 3: General Specifications for Forest Inventory Surveys

" 1. If the proportion of the total area of a province occupied by forests is small, reconnaissance surveys based on photography on a scale of 1:40,000 (1 inch=3,333 feet) should be undertaken. Forest areas to be outlined on planimetric maps on a scale of 1:63,360 (1 inch=5,280 feet). Forested areas to be rephotographed at 1:15,840 (1 inch=1,320 feet) and mapped at a scale not smaller than 1:63,360 or larger than 1:15,840.

" 2. If proportion of forest areas is large, original photography to be at 1:15,840, and mapping at a scale not smaller than 1:63,360 or larger than 1:15,840.

" 3. Federal assistance may be extended to share in the cost of photolithographed forest maps at a scale not larger than 1:63,360, provided such maps follow an approved system of forest classification, legend, etc.

" 4. Ground sampling to be based upon distribution of different forest classes as determined from aerial photos.

" 5. Stratified random sampling procedures should be followed where conditions of accessibility permit. Wherever random sampling cannot be used because of excessive cost and technical difficulties, some pattern of selective sampling should be adopted. Sampling procedures should be designed to give gross volume estimates of a probable error of plus or minus 10 per cent. In the smaller provinces, independent estimates may be made for areas of about 500,000 acres of forested land; in the larger provinces for unit areas of about 1,000,000 acres."

It ought to be manifest that the preparation of a forest inventory is a formidable undertaking. Interpretation of a forest inventory is also a complicated subject. A survey which includes all timber from a 1-foot stump height to a 4-inch top diameter requires adjustment when an estimate of volumes for current logging is required. The inventory is compiled in cubic feet; for those who have been accustomed to think in terms of board-foot log-scale, a further adjustment is necessary. Blanket con-

version factors are used for large regions—6 to 1 for the Coast, 5.5 or 5.75 to 1 for the Interior—but the accuracy of these factors for smaller tracts will depend upon the size of the trees.

Interim volume tables have been prepared which give, in cubic feet, volumes of the entire peeled stem by 2-inch diameter classes and 10-foot height classes. Factors have been worked out for application to these tables in order to estimate the gross volumes which will be produced by three standards of utilization—close, intermediate, and rough. Preliminary air-photo volume tables have been constructed for some regions; by using photo plots in conjunction with ground plots in a double-sampling plan, accuracy in estimates of stand volumes is greatly improved at minimum cost. Other factors have been compiled from the tree measurements taken in preparation of the volume tables. These factors indicate the losses by species, to be expected in logging due to (1) decayed wood, (2) waste of sound wood by culling logs more than 66 per cent defective and trees more than 50 per cent defective, and (3) felling breakage. These factors have been worked out for zones comprising groups of regions of the inventory system. Cull for decay was made in compilations for the general inventory as published, but allowance was not made for the other two losses.

Turning back to Table 42, we find a very rapid increase in areas surveyed each year, indicating the expansion in organization that has been necessary. Mr. Pogue, upon whose shoulders this work has fallen, is to be congratulated upon the progress he has made in an undertaking of such magnitude. In presenting the forest inventory, a summary of which is given herein, it is emphasized that it is an interim inventory; the Province has not yet all been surveyed to the same degree of accuracy; and that expert interpretation of the figures is required; the question as to how much timber there is in the Province, or on the Coast, or in any particular large district cannot be answered without qualifications. Mr. Pogue's evidence* on this subject in answer to cross-examination was:—

> " Q.—Do you know what we have in the timber ' bank ' to-day? A.—The different classifications of trees which we recognize . . . include various sizes which might not be considered merchantable to-day. They also include certain descriptive tree classes which might not be considered merchantable to-day. . . . It will be possible, by analysing this data, to provide those answers and . . . having covered the Province and found out what classifications we have by the different factors involved in the classification, then we will indeed be able to produce the most marvellous economic analysis.
>
> " Q.—But to-day, do we know what we have in the timber bank? A.—It is obvious that we don't.

* Transcript, p. 2547 *et seq.*

"Q.—And, save for a complete analysis, based on a ground cruise, of the whole Province, is there any possible way in which we could find out what we have in the timber bank to-day? A.—We are doing a Provincial survey as fast as we can. It is a sort of 5 cents an acre coverage basis. Now, possibly the type of answer which is being hoped for won't come out at anything less than a $2 an acre survey. If there are a hundred million acres of productive forest land, even if we are able to concentrate on them, that is quite a tall order.

"Q.—Do I put it fairly when I say this: We will never know what we have in the timber bank until we make a complete ground survey of all the productive forest areas in the Province? A.—The industry, through the forest management licence programme and the Forest Service through the public working circle programme, are accomplishing that objective."

In answer to the question as to why the programme was set up that way, Mr. Pogue replied, "We are attempting to look forward at least as far as the first rotation and possibly further," and that it would be easy to assess the information economically for local use.

As the forest-inventory survey continues, increased accuracy in estimates for areas previously recorded by reconnaissance only will affect the provincial and regional totals. It will be appreciated that these changes, added to the effects of logging, fires, insects, and decay, on the one hand, and of increment in growth of existing timber and the achievement of maturity by immature classes, on the other hand, will make the accuracy of any summary subject to a time-limit, perhaps very short. This may be illustrated by tabulating the reported timber inventories through the years (in million board-feet). (Conversion factors from cubic—6 for Coast, 5.5 for Interior.)

Year	Province	Coast
1910	240,000	———
1917	366,300	229,700
1937	254,500	155,100
1945	303,300	200,000
1951	431,500	254,100
1952	662,800	(1)
1953	757,000	(1)
1955	760,050	330,200

[1] Not segregated.

The areas which have been covered by the standard forest survey and those for which information is dependent on reconnaissance by air and on the ground, including all past surveys and cruises by the Province and private owners, where these were judged to be still useful, are shown below:—

TABLE 43

BASIS OF 1955 INVENTORY

Whole Province

Covered by—	Mature Timber	Productive Area	Total
	Acres	Acres	Acres
Aerial reconnaissance	21,381,651	50,609,581	166,414,132
Standard survey	19,148,304	40,087,486	67,989,068
Totals	40,529,955	90,697,067	234,403,200

Coast

Aerial reconnaissance	2,880,019	3,200,775	14,650,158
Standard survey	7,550,727	11,427,001	27,187,213
Totals	10,430,746	14,627,776	41,837,371

Interior

Aerial reconnaissance	18,501,632	47,408,806	151,763,974
Standard survey	11,597,577	28,660,485	40,801,855
Totals	30,099,209	76,069,291	192,565,829

Although the standard surveys have covered only 29 per cent of the whole area of British Columbia, it is estimated that they have included 44 per cent of the forest land of productive quality and 47 per cent of the mature timber area. On the Coast, standard surveys have covered 78 per cent of the productive area, 72 per cent of the mature-timber area with 89 per cent of the timber volumes.

TABLE 44

BASIS OF VOLUMES, 1955 INVENTORY

Whole Province

Species	Aerial Reconnaissance	Standard Survey	Totals, M C.F.
Douglas fir	3,006,803	11,359,605	14,366,408
Red cedar	3,846,722	13,871,466	17,718,188
Hemlock	8,867,269	21,967,041	30,834,310
Spruce	15,564,203	17,822,768	33,386,971
Balsam	6,661,500	14,610,039	21,271,539
Lodgepole pine	3,628,268	6,508,188	10,136,456
Yellow pine	111,621	354,906	466,527
White pine	227,612	354,546	582,158
Cypress	162,979	1,414,844	1,577,823
Larch	340,519	180,618	521,137
Cottonwood	633,866	486,050	1,119,916
Other deciduous	146,017	1,058,860	1,204,877
Totals	43,197,379	89,988,931	133,186,310
	32.4%	67.6%	100%

Coast

Douglas fir	754,440	6,485,516	7,239,956
Red cedar	1,477,809	11,324,275	12,802,084
Hemlock	1,700,612	19,175,643	20,876,255
Spruce	924,006	2,507,502	3,431,508
Balsam	809,114	7,440,357	8,249,471
Lodgepole pine	23,502	74,787	98,289
White pine	16,958	260,110	277,068
Cypress	162,979	1,397,144	1,560,123
Cottonwood	17,803	131,627	149,430
Other deciduous	4,388	344,778	349,166
Totals	5,891,611	49,141,739	55,033,350
	10.7%	89.3%	100%

Interior

Douglas fir	2,252,363	4,874,089	7,126,452
Red cedar	2,368,913	2,547,191	4,916,104
Hemlock	7,166,657	2,791,398	9,958,055
Spruce	14,640,197	15,315,266	29,955,463
Balsam	5,852,386	7,169,682	13,022,068
Lodgepole pine	3,604,766	6,433,401	10,038,167
Yellow pine	111,621	354,906	466,527
White pine	210,654	94,436	305,090
Cypress		17,700	17,700
Larch	340,519	180,618	521,137
Cottonwood	616,063	354,423	970,486
Other deciduous	141,629	714,082	855,711
Totals	37,305,768	40,847,192	78,152,960
	48%	52%	100%

Having examined the methods used to measure the extent of our forest resource in terms of acreage and volume, we can now read the result in the following tables, which I think are self-explanatory.

TABLE 45

FOREST LAND CLASSIFICATION, 1955

Coast

Classification	Province		Canada		Timber Licences and Leases		Crown-granted		Total
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	
Mature timber	7,874,882	75.5	63,733	0.6	1,527,408	14.6	964,723	9.3	10,430,746
Immature, 1–20	355,268	.....	6,753	.....	49,940	.....	275,061	.....	687,022
Immature, 21–60	768,727	.....	16,994	.....	93,087	.....	456,268	.....	1,335,076
Immature, 61+	318,239	.....	3,984	.....	39,800	.....	89,741	.....	451,764
Immature total	1,442,234	58.3	27,731	1.1	182,827	7.4	821,070	33.2	2,473,862
N.S.R.	896,994	52.1	29,445	1.7	309,290	17.9	487,439	28.3	1,723,168
Total productive	10,214,110	69.9	120,909	0.8	2,019,525	13.8	2,273,232	15.5	14,627,776

Interior

Mature timber	29,035,814	96.5	218,536	0.7	238,433	0.8	606,426	2.0	30,099,209
Immature, 1–20	4,044,808	.....	12,564	.....	17,198	.....	127,177	.....	4,201,747
Immature, 21–60	18,358,699	.....	159,280	.....	59,926	.....	1,042,618	.....	19,620,523
Immature, 61+	11,101,506	.....	97,460	.....	40,626	.....	767,269	.....	12,006,861
Immature total	33,505,013	93.5	269,304	0.8	117,750	0.3	1,937,064	5.4	35,829,131
N.S.R.	9,405,377	92.8	42,284	0.4	29,963	0.3	663,327	6.5	10,140,951
Total productive	71,946,204	94.6	530,124	0.7	386,146	0.5	3,206,817	4.2	76,069,291

Whole Province

Mature timber	36,910,696	91.0	282,269	0.7	1,765,841	4.4	1,571,149	3.9	40,529,955
Immature, 1–20	4,400,076	.....	19,317	.....	67,138	.....	402,238	.....	4,888,769
Immature, 21–60	19,127,426	.....	176,274	.....	153,013	.....	1,498,886	.....	20,955,599
Immature, 61+	11,419,745	.....	101,444	.....	80,426	.....	857,010	.....	12,458,625
Immature total	34,947,247	91.2	297,035	0.8	300,577	0.8	2,758,134	7.2	38,302,993
N.S.R.	10,302,371	86.9	71,729	0.6	339,253	2.8	1,150,766	9.7	11,864,119
Total productive	82,160,314	90.6	651,033	0.7	2,405,671	2.7	5,480,049	6.0	90,697,067

NOTE.—Forest management licence areas are included under appropriate tenures.
Total area of Province, 234,403,200 acres.
" Province "—unalienated Crown lands of the Province.
" Canada "—controlled by Government of Canada.
Land classifications in diagrammatic form in pocket at end of Volume 2.

Turning from acreage to volume, the following tables indicate volumes of mature timber:—

TABLE 46

MATURE TIMBER, 1955

(Thousand cubic feet.)

Whole Province

Species	Province		Canada		Timber Licences and Leases		Crown-granted		Total
	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent	
Douglas fir	9,403,024	65.4	124,546	0.9	945,694	6.6	3,893,144	27.1	14,366,408
Red cedar	13,902,215	78.5	63,341	0.4	2,556,297	14.4	1,196,335	6.7	17,718,188
Western hemlock	24,225,320	78.7	87,138	0.3	3,725,013	12.0	2,796,839	9.0	30,834,310
Spruce	32,212,465	96.6	112,213	0.3	785,417	2.3	276,876	0.8	33,386,971
White fir (balsam)	18,852,405	88.7	41,593	0.2	1,530,900	7.2	846,641	3.9	21,271,539
White pine	405,491	69.6	607	0.1	58,915	10.1	117,145	20.2	582,158
Yellow pine	390,856	83.8	22,571	4.8	4,180	0.9	48,920	10.5	466,527
Lodgepole pine	9,946,511	98.1	63,968	0.6	24,129	0.3	101,848	1.0	10,136,456
Yellow cedar	1,176,514	74.6	9,427	0.6	235,295	14.9	156,586	9.9	1,577,822
Larch	470,506	90.3	17,776	3.4	3,273	0.6	29,582	5.7	521,137
Cottonwood	1,067,355	95.3	8,681	0.8	27,796	2.5	16,084	1.4	1,119,916
Other deciduous	1,103,933	91.7	6,156	0.5	69,060	5.7	25,728	2.1	1,204,877
Totals	113,156,595	85.0	558,017	0.4	9,965,969	7.5	9,505,728	7.1	133,186,309

Coast

Douglas fir	2,984,752	41.3	33,786	0.5	867,434	11.9	3,353,984	46.3	7,239,956
Red cedar	9,294,822	72.7	52,207	0.4	2,372,600	18.5	1,082,455	8.4	12,802,084
Western hemlock	14,546,898	69.7	66,026	0.3	3,604,924	17.3	2,658,407	12.7	20,876,255
Spruce	2,808,653	81.8	20,034	0.6	551,416	16.1	51,405	1.5	3,431,508
White fir (balsam)	6,020,085	73.0	26,671	0.3	1,447,055	17.5	755,660	9.2	8,249,471
White pine	127,844	46.1	558	0.2	44,884	16.2	103,782	37.5	277,068
Lodgepole pine	76,266	77.6	1,207	1.2	6,949	7.1	13,867	14.1	98,289
Yellow cedar	1,159,835	74.3	9,336	0.6	235,165	15.1	155,787	10.0	1,560,123
Cottonwood	112,311	75.2	7,608	5.1	24,951	16.7	4,560	3.0	149,430
Other deciduous	263,876	75.5	5,360	1.5	64,626	18.6	15,304	4.4	349,166
Totals	37,395,342	68.0	222,793	0.5	9,220,004	16.7	8,195,211	14.8	55,033,350

Table continued overleaf.

TABLE 47

MATURE TIMBER, 1955—*Continued*

(Thousand cubic feet.)

Interior

Species	Province		Canada		Timber Licences and Leases		Crown-granted		Total
	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent	Volume	Per Cent	
Douglas fir	6,418,272	90.1	90,760	1.3	78,260	1.1	539,160	7.5	7,126,452
Red cedar	4,607,393	93.8	11,134	0.2	183,697	3.7	113,880	2.3	4,916,104
Western hemlock	9,678,422	97.2	21,112	0.2	120,089	1.2	138,432	1.4	9,958,055
Spruce	29,403,812	98.2	92,179	0.3	234,001	0.8	225,471	0.7	29,955,463
White fir (balsam)	12,832,320	98.6	14,922	0.1	83,845	0.6	90,981	0.7	13,022,068
White pine	277,647	99.1	49	------	14,031	0.5	13,363	0.4	305,090
Yellow pine	390,856	83.8	22,571	4.8	4,180	0.9	48,920	10.5	466,527
Lodgepole pine	9,870,245	98.3	62,761	0.6	17,180	0.2	87,981	0.9	10,038,167
Yellow cedar	16,679	94.3	91	0.5	130	0.7	799	4.5	17,699
Larch	470,506	90.3	17,776	3.4	3,273	0.6	29,582	5.7	521,137
Cottonwood	955,044	98.4	1,073	0.1	2,845	0.3	11,524	1.2	970,486
Other deciduous	840,057	98.2	796	0.1	4,434	0.5	10,424	1.2	855,711
Totals	75,761,253	96.9	335,224	0.4	745,965	1.0	1,310,517	1.7	78,152,959

The large area of productive land—11,864,119 acres—which is not satisfactorily restocked, was reported without subdivision as to cause and condition. However, sample "regions" representative of the Vancouver Forest District and of the Prince Rupert Forest District were selected by the Forest Service, in which the N.S.R. is made up as follows:—

TABLE 48

NOT SATISFACTORILY RESTOCKED

(Acres.)

Regions of Inventory	Logged	Other	N.C. Young	N.C. Grown	Total
Vancouver District—12, 26, 30, 31, 50, 51, 52	61,591	63,052	84,548	227,744	436,935
	14%	15%	19%	52%	100%
Prince Rupert—53, 64	3,403	2,115	22,160	35,227	62,905
	6%	3%	35%	56%	100%
Totals	64,994	65,167	106,708	262,971	499,840
	13%	13%	21%	53%	100%

NOTE.—"Other" includes chiefly burned areas, not logged, with blow-down and some minor types.

"N.C. Young" is non-commercial stands of young deciduous, chiefly alder, or young conifers damaged by logging residual mature trees, or sparse conifer regeneration overcrowded by brush, shrubs, debris.

"N.C. Grown" is overmature, decadent forest, values so low as to be not capable of production, with second growth still a minor element; damaged residuals after logging in unsatisfactory reforestation development; low-grade branchy trees suitable only for fuel.

On the basis of these samples, the Vancouver Forest District and the Prince Rupert Coast District include N.S.R. areas of potentially productive forest land classified as follows:—

TABLE 49

District	Logged	Other	N.C. Young	N.C. Grown	Total
Vancouver	207,500	222,300	281,600	770,700	1,482,100
Prince Rupert	14,470	7,230	84,400	135,000	241,100
Whole Coast	221,970	229,530	366,000	905,700	1,723,200
Per cent	13%	13%	21%	53%	100%

The Prince Rupert figures include only the area west of the Coast Mountains; there are an additional 287,000 acres N.S.R. in the area tributary to Coast industry.

Most of the "logged" and "other" classifications, 451,500 acres, may be expected to be reforested by nature or man, but apparently nothing is being done to rehabilitate the 1,271,700 acres (74 per cent of the whole) which have been taken over by growth of no commercial value; it is estimated that the cost of clearing and reforesting would be too great. However, this involves an annual loss of 87,700,000 cubic feet in potential

increment at the average rates of 75 cubic feet and 40 cubic feet per acre estimated by the Forest Service for the Vancouver and Prince Rupert Districts respectively.*

Tenures of the unsatisfactorily stocked areas are:—

TABLE 50

Tenure	Coast		Interior		Total	
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent
Province	896,990	52	9,405,380	93	10,302,370	87
Canada	29,440	2	42,280	.....	71,720	.....
Timber licences and leases	309,290	18	29,960	.....	339,250	3
Crown-granted	487,440	28	663,330	7	1,150,770	10
Totals	1,723,160	100	10,140,950	100	11,864,110	100

No information is available as to the nature of the growth on the 10 million acres which have been devastated by fire and other agencies in the Interior. No reliable calculation can be made of the annual increment which is being lost thereby.

Attempts have been made to compare directly the inventories of 1945 and 1955. Comparison of inventories ten years apart for all or any part of the area covered cannot usefully be made without adjustments to bring the forest-cover classifications and anticipated utilization of timber to the same standards. As an example, the Peace River drainage below Finlay Forks in British Columbia was reported in 1945 and 1955 as follows (in the absence of later information no changes could be made in 1945 from the figures for this region estimated in 1937):—

ACRES

	1945	1955
Mature timber	1,039,400	1,341,829
Immature	3,152,000	3,080,188
Not satisfactorily stocked	3,764,300	3,216,884
Total productive	7,955,700	7,638,901
Total area	15,806,400	15,098,100

MERCHANTABLE TIMBER (M B.M.)

	1945	1955
Spruce	6,040,800	12,036,941
Balsam	704,200	888,916
Lodgepole pine	1,546,700	3,225,934
Deciduous	.....	770,937
Totals	8,291,700	16,922,728

The average volumes per acre—8 M b.m. in 1945 and 12.6 M b.m. in 1955—reflect the higher standard of utilization in 1955, and the 30-per-cent increase in mature area in 1955 may be partly due to maturing stands (1,275,000 acres are now over sixty years) and partly because

* *See* section on Regeneration.

marginal or scrub timber of the earlier inventory is now regarded as merchantable. In 1945 there was little expectation that any significant volume from these forests would be used for many years; however, the annual production is now around 50 million board-feet.

The differences caused by improved survey facilities and more optimistic views after ten years is even more marked in the 1955 estimates for the vast area south of the Yukon boundary, drained by the Liard on the east and the Stikine on the west. This region was unorganized in 1945, and its forest resources almost unknown. Based on extensive reconnaissance a very rough estimate had been made in 1937, and the Commission had no evidence in 1945 on which to revise it. Comparisons follow:—

ACRES

	1945	1955
Mature	469,000	2,649,433
Immature	5,573,000	262,261
Not satisfactorily stocked	5,113,000	218,706
Total productive	11,155,000	3,130,400
Total area	67,990,000	65,095,979

MATURE TIMBER (M B.M.)

	1945	1955
Spruce	1,172,500	21,798,000
Balsam	229,900	979,500
Lodgepole pine	92,000	2,735,000
Hemlock	804,700	3,440,000
Poplar	.....	2,646,500
Totals	2,299,100	31,599,000

With aerial photography and access by the Alaska Highway it was possible in 1955 to make improvements in classification; apparently half of the 4 million acres of the more-advanced second growth which was included in the earlier inventory is now reported to be mature timber, with a consequent great increase in volume, apart from the increase in average volume per acre from 5 M b.m. to 11.9 M b.m. On the other hand, the later survey finds the not-restocked areas and most of the remaining second growth to be permanently incapable of producing merchantable timber. The whole region is regarded as accessible for local use only unless new and cheap forms of transportation can be developed.

A comparison of more immediate interest is made between the 1945 and 1955 inventories of the Coast region in the following tables:—

TABLE 51

MATURE TIMBER, COAST REGION (SPECIES)

(Million board-feet.)

Species	1945		1955		Per Cent Increase (+) or Decrease (−)
	Volume	Per Cent	Volume	Per Cent	
Douglas fir	47,837	23.9	43,440	13.3	−9
Red cedar	52,268	26.2	76,812	23.5	+47
Western hemlock	59,463	29.8	125,257	38.3	+111
Spruce	12,823	6.4	20,589	6.3	+60
White fir (balsam)	22,659	11.3	49,497	15.1	+118
White pine	840	0.4	1,662	0.5	+99
Other species	4,056	2.0	9,950	3.0	+146
Totals	199,946	100.0	327,207	100.0	+64

NOTE.—Deciduous species not included.

It will be noticed that Douglas fir is the only species which shows a reduction in volume, and its rank has been lowered from 23.9 to 13.3 per cent. The importance of hemlock, 38.3 per cent, is now unquestionable. The figures for 1955 are the gross volumes reported by the Forest Inventory Division. According to the Working Plans Division, the Coast total should be reduced from 327,207 million board-feet to 280,620 million (46,770 million cubic feet) to allow for breakage, waste, and other logging losses in current practice. I shall discuss this contention later under the heading of "Sustained Yield."

TABLE 52

FOREST CLASSIFICATION, COAST REGION (ACRES)

	1945 (Acres)	1955 (Acres)
Mature timber	7,880,000	10,430,746
Immature	1,253,000	2,473,862
Not satisfactorily stocked	918,000	1,723,168
Total productive	10,051,000	14,627,776

The 32-per-cent increase in mature acreage and 63-per-cent increase in volume (or 40 per cent using the Forest Service net estimate) do not represent growth increment in Coast forests during the ten-year interval. The increases are accounted for by the greater average volume per acre estimated for the 1955 inventory, reflecting higher utilization standards, and by the inclusion of areas formerly classified as scrub. I have already described the different factors affecting the compilation of the two inventories.

I think it can be said that the great increase in volume in the Interior (100 billion to 450 billion board-feet), the reclassification of large areas of scrub as timber of commercial value, together with the continuing annual

increment in merchantable volume by growth, considerably in excess of depletion from all causes, continues to offer a challenge to industry to open up these undeveloped areas in the Interior of the Province.

The still unfinished and changing condition of the inventory both regarding volumes and classification of areas, the paucity of reliable information on site qualities and rates of growth, the necessity for the application of experienced judgment in deciding how, and to what extent, the many qualifying factors mentioned should be used, evaluation of the relation between mature volumes and present utilization standards, of the different relation between mature volumes and expected standards of the distant future, these variables make estimates of the sustained-yield capacities of the forests very difficult. A number of industrial foresters, as well as the Forest Service, have made estimates of the allowable cut for the Coast and the Vancouver Forest District; these will be included in a general discussion of sustained yield.

SUSTAINED YIELD AND ALLOWABLE CUT

The meaning of the term " sustained yield " and the techniques whereby an unregulated forest may be converted into and maintained as a managed one are not generally understood. It is therefore desirable to deal with this matter at some length so that the implications of British Columbia's sustained-yield policy, the prospects ahead and the progress that has been made, may be more intelligible to the reader who is without training in forestry.

The term itself was defined in my 1945 Report as " a perpetual yield of wood of commercially usable quality from regional areas in yearly or periodic quantities of equal or increasing volume." There appears to be no reason to change this as a definition of the basic concept. It should be recognized, however, that the words " regional " and " periodic " have definite limits of meaning when used in this context. Some witnesses erroneously assumed as a hypothesis that any area of any size could be " put on sustained yield," regardless of the present condition and age of its growing stock. A whole nation might be said to administer its forests on a sustained-yield basis if it could be shown that its growing stock is, in the aggregate, maintained in condition to supply an approximately equal annual volume for its industries, but it would be technically impractical in an economic and social sense to attempt to manage the forests of a whole country as a sustained-yield unit, with the consequential result that in all probability regional areas would be seriously overcut.

In practice, sustained yield is obtained by detailed planning for smaller areas or regions, not merely in the initial stages of dedicating a forest area to produce an equal annual volume of wood, but also in providing for the continuous management necessary to maintain the forest in a condition to satisfy this objective indefinitely. The " regional area " of my definition is therefore a sustained-yield unit capable of being managed under the provisions of one and the same working plan. It should not be so large that objectives having social implications cannot be achieved, nor so small that it does not include the necessary range of growing stock to provide an annual yield large enough for profitable operation. It may, or may not, coincide with an administrative forest unit. It may include more than one type of forest and be managed to supply more than one type of conversion plant, but to satisfy the essential criteria of a sustained-yield unit, it must be organized regionally to produce a sustained annual yield under a single working plan.

The use of the word " periodic " as an alternative to a strictly determined and inflexible annual yield is simply a recognition of relevant economic factors. A number of causes, from natural phenomena to international markets, may interfere with the steady flow of wood into, and manufactured products out of, a mill. Nevertheless, it is the object of

sustained-yield management to bring irregularities into balance over relatively short periods, so as to minimize interference with the establishment of a regular series of age-classes in the next rotation. This principle and the need for some flexibility have been recognized in forest management licence contracts which provide a ten-year period in which a balance is to be struck between actual cut and allowable cut.

It is, in my opinion, a negation of the principle of sustained yield, and the social aspects implicit therein, to manage a forest intentionally in order to harvest large areas of it at infrequent intervals, even up to a whole rotation, with long periods intervening without any production. It must be understood, however, that such a system may, if governed by silvicultural considerations, produce a greater yield and be better forestry for a forest that is not in a normal condition with properly grouped age classifications, or is too small for profitable management on a sustained-yield basis, provided the owner is satisfied with intermittent returns. The following discussion is predicated upon the imperious demand of our Provincial economy for sustained yield from large Crown and Crown-assisted units.

It is usual to start the organization of a sustained-yield unit by dividing the selected area into compartments. These are permanent units of operation; their boundaries cannot be hurriedly chosen nor casually changed. Once selected they control all forest activities and record. Construction of roads, location of logging operations, reforestation, forest-protection developments are all related to compartments. If possible each should be accessible for logging operations without hauling logs through another. Boundaries usually follow topographic features and must be permanently marked to obviate the necessity for repeated surveys. Here is a field for the use of air photography that (as far as I am aware) has not yet been cultivated.

Unless the sustained-yield unit is quite uniform in forest type and site quality—a somewhat unusual occurrence—it is necessary to group a number of compartments of like nature for management under the same silvicultural system and rotation. These grouped compartments form a production unit or working circle, with as complete a series of age-classes as possible. If these age-classes are not present, as is not uncommonly the case in an unregulated forest, it will be the object of management to produce them gradually with a minimum loss of increment. To illustrate: A sustained-yield unit in the Coast fir-hemlock range may be required to produce Douglas fir for lumber and plywood, and hemlock for pulp. Site quality of the predominantly fir areas may indicate that maximum production of suitable-quality fir for lumber can be obtained when the trees are 100 years old, whereas the predominantly hemlock areas may give greatest average yield of pulpwood at 60 years. Theoretically this difficulty might be resolved by managing the whole area as an uneven-aged mixed forest with selective logging; however, if logging costs and silvicultural difficulties prevent this, the solution might involve organization and management of

two working circles comprising the fir sites on a 100-year rotation and the hemlock on a 60-year rotation. Both would be operated under the same working plan and compartment boundaries would not be affected.

Thus the working circle may be one of several being operated under a master working plan, or it may, in a uniform forest, be identical with the sustained-yield unit or the administrative unit of the forest. It is not appropriate to use the technical term " working circle " as the title of a large administrative unit, even during the conversion period, because it will probably become necessary to divide the unit into a number of working circles as the area's capabilities are better known and demand for maximum production justifies the cost of more intensive management.

The word " circle " is an appropriate expression of the concept of continuity which is the principle of this unit of sustained-yield management.* At all times in an ideal working circle there is a complete gradation of age-classes; after each harvest the age relationships and the usable value of the growing stock is relatively the same as it was after the previous harvest. There is an end of a rotation for an individual tree or acre when it is cut, but for a working circle the rotation has no beginning nor end; growth and production are continuously balanced. Forest management on a sustained-yield basis cannot be a temporary treatment nor a self-liquidating investment; it is perpetual.

Sustained-yield forestry as such, and as an industry in its own right, has not yet attracted private investment in British Columbia. It has not been necessary for those who are interested only in logging, nor for owners of smaller conversion plants planned for liquidation over a period of years, to grow their own timber so long as they could be reasonably sure of purchasing their wood-supply from private or Government sales during their period of operation. In a different category are the great mills planned for continuous improvement and periodic replacement of obsolete units. Upon their production depend thousands of employees and the communities in which they live. It is an essential of our economy that these plants be assured of their raw-material supply indefinitely. If it is necessary for them to maintain large areas of overmature timber for long periods because of a shortage of thrifty immature forest and because no other source of supply is available to them, then the resultant reduced cut and loss of increment must be absorbed as part of their capital investment in forestry until their privately owned, leased, or licensed old growth can be converted into a sustained-yield forest. My recommendation, in 1945, of a co-operative relationship was intended to obviate this disadvantage by the allocation to them of areas of contiguous public forest, to be managed by them, with their own, on a sustained-yield basis.

There is no such thing as one definite all-inclusive sustained-yield system that is capable of being distilled into a formula by the application of which

* While the word " circle " has its proper connotation in this sense, the descriptive adjective " public " has led to some misunderstanding. For this reason I suggested in an earlier section that the name " sustained-yield units " might be substituted for " public working circles."

growth is maintained, reforestation assured, and continuous production of timber secured. Various silvicultural systems have been developed by foresters in Europe for centuries to suit the forest conditions, environment, and biological peculiarities of the species or mixtures of species concerned. Naturally there are many systems designed to meet the exigencies of the relevant existing and prevailing circumstances, but having recognized the diversity and degrees of application of silviculture, one thread runs through them all: they can all be regarded as modifications of two main types of harvesting the forest, i.e., by clear cutting or selective cutting.

Clear cutting is the universal practice on the Coast; it is modified, however, by recognition of the fact that too large an area of cutting in one place reduces the chance of adequate natural regeneration and creates an unnecessary fire-hazard. Profitable logging in smaller patches or strips, which lessens these disadvantages, has become more widely practised through the development of tractor logging and truck hauling, replacing high-lead, skidder, and logging-railways. Under most conditions, leaving scattered seed-trees in large felled areas has not proved satisfactory; they either blow down and are wasted or, if extracted later, cause flagrant destruction in established second growth.

A form of selective cutting is practised in some of the Interior forests by which the selected trees are marked and removed in periodic fellings, leaving the rest to add increment for later cutting. The trees removed are those which have reached their optimum growth and size, those in crowded groups that are interfering with the development of others, and those which are deformed or sickly and unlikely to improve for the next periodic cutting. For best results, technical forestry skill in selection of trees is required. This system is operated in, or creates, an uneven-aged forest. It was introduced into the Okanagan forests before the war and more recently in the Prince George spruce-balsam forest, with attendant difficulties mentioned elsewhere in this Report.

For calculation of anticipated yield and regulation of the cut, numerous formulæ, associated with the various silvicultural systems, have been devised through the centuries. Any particular formula is not necessarily suitable for any system. Considerable errors may result through application of an unsuitable formula to a forest condition or silvicultural system for which it was not designed.

Use of these formulæ requires knowledge of the volume of mature merchantable wood, area, site quality, age-classes, and rates of growth of the immature stands, and the age at which each of them will reach the most desirable size or quality of the trees for the intended manufacturing process. In the application of any formula to a particular forest it is customary to forecast its effect through a rotation as a check and, if necessary, modifications are made in the indicated yield to suit the actual conditions of that particular forest.

The cultivation of forests through successive rotations is an ancient art. N. V. Brasnett, of the Imperial Forestry Institute, Oxford, recalls that the earliest written record of forest management for wood production is contained in Pliny's 17th Book (*circa* 50 A.D.), wherein he wrote that in the southern wine-growing districts of ancient Gaul, Spanish chestnut was cultivated on a three- to five-year rotation for vine-stakes. He also stated that in localities where people had to go a long way for fuel, oak was coppiced on an eleven-year rotation. The systems on which the forests of Europe are now managed had their origins at least 600 years ago in France and the principalities which later became Germany. There were many proposals, experiments, and disagreements, sometimes violent. It is nothing new that there was a decided lack of unanimity regarding rotations and yields in representations to this Commission.

Study of these historic silvicultural systems and their results is included in most University forestry courses, and it is probable that, through the work of professional foresters, they will continue, with modifications, to influence beneficially our present methods of forest management. Among the lessons taught by experience through the centuries are that every forest has its own individuality, each is different from all others in one or more of the many factors which made it what it is—elevation, aspect, soil, climate, rainfall, mixture of species, density, effects of disease, insects, fire; that it is important to maintain an adequate healthy growing stock, enough and no more than is necessary to yield a continuous stream of the products desired, to the extent to which each forest can provide them; that the application of siliviculture by trained men in each forest is more successful than rules for regulation from a distant office; and that it is dangerous to be influenced unduly by preconceived ideas, perfect solutions, and ideals impossible of fulfilment.

The forests of British Columbia are far from being in a well-balanced state; 82 per cent of the Coast productive area is producing little or no increment. The evidence discloses that both private management of forest management licences and public management of Provincial forest reserves will be able to achieve only a semblance of sustained-yield conditions within the limits of a single rotation at a great sacrifice of potential increment. It is a paradox that no irregularly stocked forest can be organized for sustained yield without sacrifice of immediate yield. The great background of public forests, not yet under any form of management, are still in a state of nature as they were ten years ago, with the one exception of improved protection from fire. Only a small percentage of private tenures is yet organized for sustained yield. But, as a result of accelerated inventory work, we do know more about forest conditions now than we did ten years ago, and are presently in a position to apply management and silviculture progressively, step by step.

This is not the place for a detailed technical discussion of the various formulæ for yield regulation, but I will briefly mention those generally used in the Province as described in the different working plans made available to the Commission. The simplest and oldest formulæ provide for regulation of the cut by volume or area, or a combination of the two. If a million feet of timber is to be logged once in 100 years, giving the logged areas 100 years to reproduce mature timber, then 10,000 feet will be cut each year, and ignoring all other factors (which cannot be done in practice) theoretically there will be an even distribution of ages at the end of the 100 years; it will be a " normal " forest (*see* Fig. III). A similar result will be obtained by cutting over 1,000 acres of mature forest at the rate of 10 acres a year, or by planting 1,000 acres of denuded land at a rate of 10 acres a year.

But there are other complicating factors; we have to deal with forests in which many combinations of mature and immature stands exist. Also many different site qualities produce different volumes per acre at maturity over varying periods of years. In a proper management plan all these factors will have been carefully ascertained and each given due weight in estimating the capacity of the limited area to which it applies.

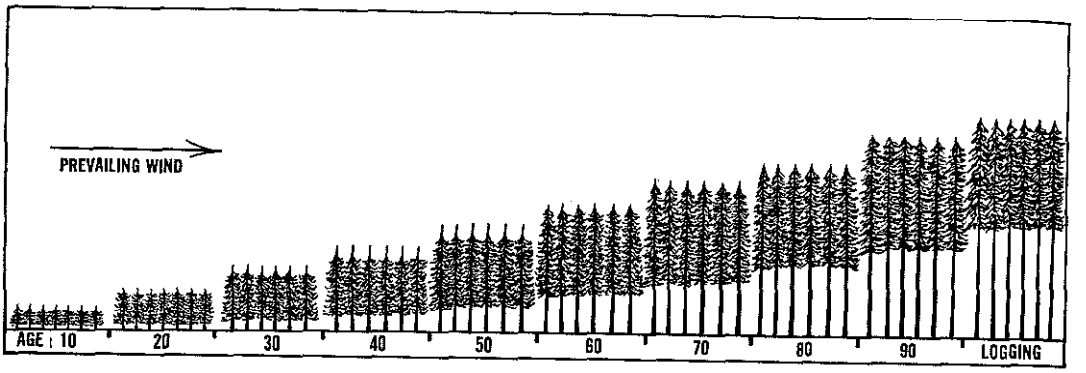
In this Province, surveys on the intensive scale necessary for such good forest management are beginning to take form. As mentioned elsewhere, preliminary plans have been based upon the " standard " forest inventory both for the Crown forest reserves under management as public working circles and for forest management licences. This inventory is admittedly inadequate for regional sustained-yield management. From the evidence presented, it appears that licensees have done varying amounts of more intensive surveys since obtaining their licences; actual operative management in the licences is further advanced than in the public forests. For most of the latter the Provincial forest inventory is used as basis for an estimate of the allowable cut of an area within tentative boundaries, and timber-sale applications are accepted up to the estimated productive capacity, but not beyond it. This constitutes the first forward step in organization, and, although lacking in precision, should be improved in time, as in the management licences, by periodic working plans based on more intensive surveys.

These surveys and the resulting variation in value may affect not only local industry, but our district and Provincial economy. One coast company* with a large management licence reported that site qualities, increment, and yield for all its logged and reforested lands have been ascertained by surveys extending over six years. The Company is fortunate in having on its lands all age-groups from seedlings to maturity in stands predominantly hemlock, so that empirical rates of growth and actual volumes at all ages could be measured with considerable accuracy. It plans to regulate

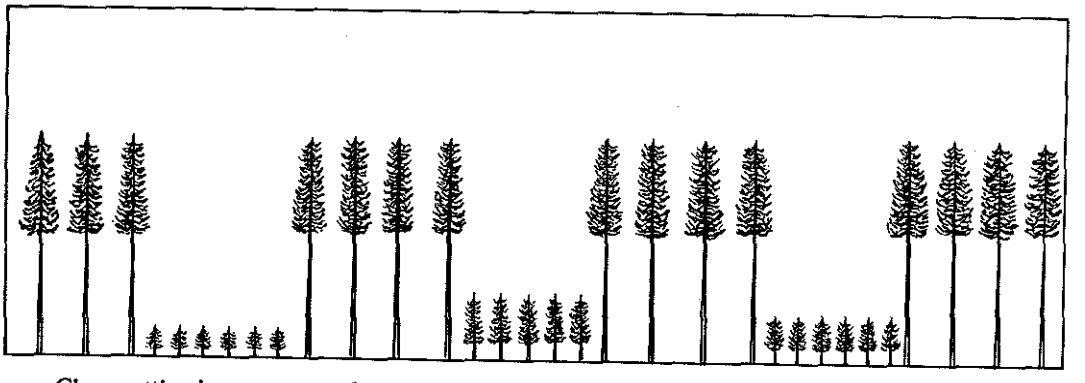
* Elk Falls Company Limited.

FIG. III

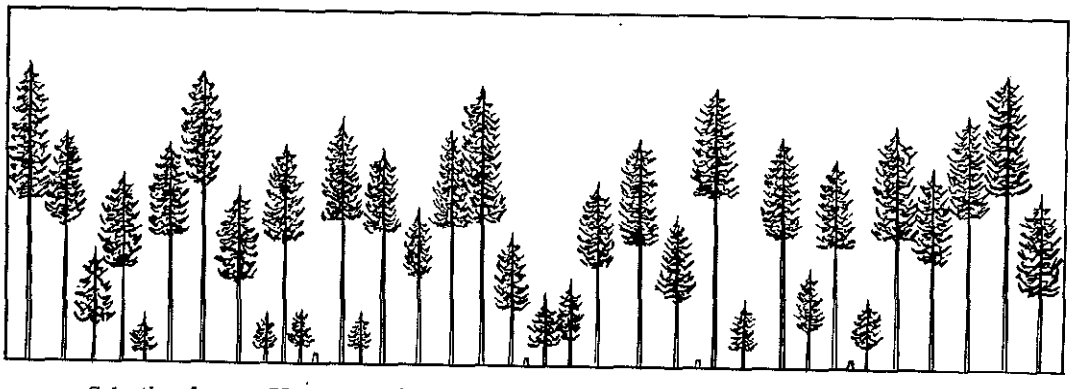
SILVICULTURAL SYSTEMS



Normal series of age-classes: Uniform shelter wood; clear-cutting followed by natural or artificial reforestation.



Clear-cutting in groups, patches, or strips; natural regeneration from adjoining mature trees.



Selection forest: Uneven aged, with all age-classes present but not necessarily throughout. Each block or compartment logged at intervals of several years to harvest mature trees and improve the stand.

its cutting programme on four rotations according to site quality, from a maximum of seventy-five years on the poorer sites to a minimum of fifty-five years on a comparatively small area of best quality. The Company anticipates that improved management implicit in these plans will result in a greater proportion of smaller operations than in the original logging, and thus enlarge the areas suitable for operations by independent loggers.

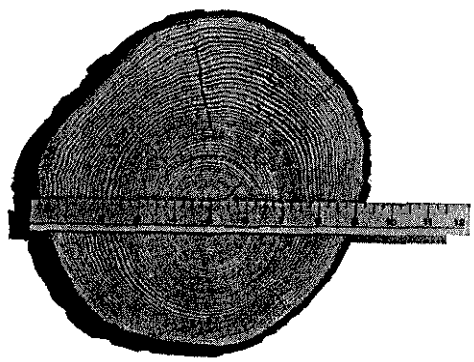
A strict limit—I suggest five years—should be placed on the requirement for management licensees to survey, map, and compile all immature and unstocked areas in their licences; this should include reliable information on site qualities, constitution of the stand by species, stocking, age yield, and estimated rotation. Modern survey methods should also be used to revise the estimates of old-growth timber in management licences whether Crown or privately owned. All this information should be accessible to the public, who are partners in every management licence. Similar requirements should be met by the Forest Service with respect to the Provincial forest reserves—public working circles—under management as sustained-yield units for public competitive supply.

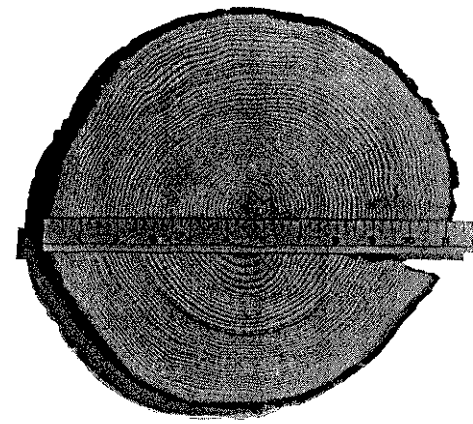
The importance of precise knowledge of site qualities in estimating the annual allowable cut is demonstrated clearly by the following photographs of sections of hemlock-trees felled at the rotation age providing best volume per acre. It will be noted that while the ages of each tree are closely related, the difference in size and in consequent volume is entirely due to the growing environment or site quality. For example, on site 80 trees seventy years old produce in volume 4,300 cubic feet per acre, whereas on site 170 trees only fifty-five years old produce 10,325 cubic feet per acre or an increase of over 6,000 cubic feet per acre from trees fifteen years younger. To put it another way, trees on site-quality acreage defined as 80 produce about 61 cubic feet per acre per year, whereas site quality 170 produces 188 cubic feet per acre per year, or three times as much.

In most cases, because of the lack of reliable detailed information, it has been necessary to make use of general over-all averages of site, increment, and yield based on very limited sampling, and to use these averages to determine sustained-yield capacity by the application of simple formulæ. Most forest management licence owners have in their working plans applied the Hanzlik formula, previously used by the Forest Service in preliminary calculations of yield for forest reserves. This estimates the sustained-yield capacity by dividing the volume of mature timber by the average rotation age selected and adding the mean annual increment from established immature stands. It is suitable for even-aged forests with a preponderance of mature timber to be harvested by clear cutting, which is the general situation in this Province. The better the distribution of age-classes in the immature forest the more satisfactory are the results; if there is bad distribution with a deficiency or surplus of older age-classes, the formula result requires modification.

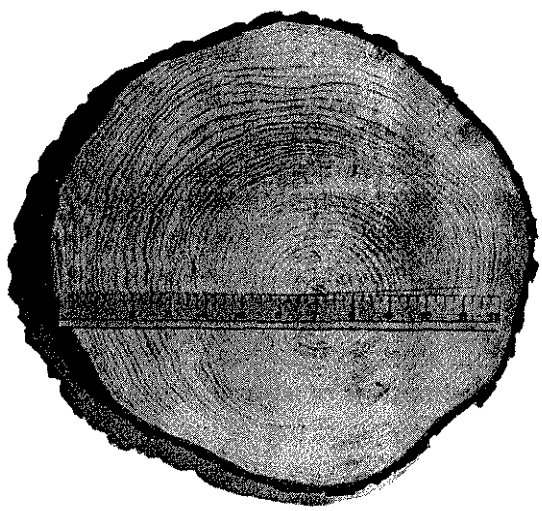
FIG. IV

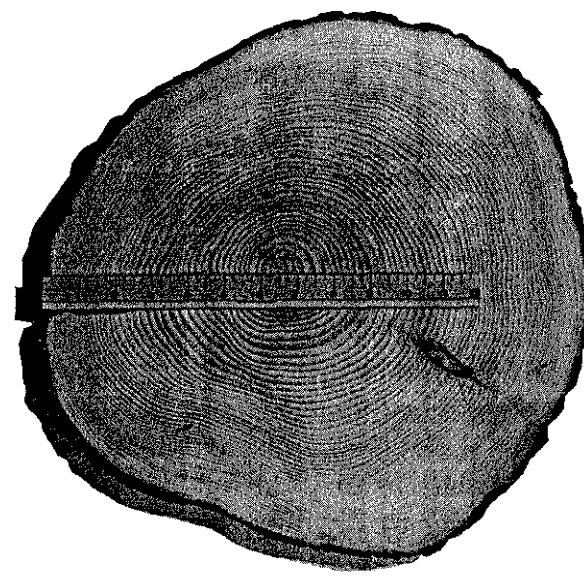
SECTIONS AT BREAST HEIGHT OF TYPICAL HEMLOCK AT ROTATION CUTTING AGE FOR EACH SITE QUALITY





Site 80, Age-class 70		*Site 110, Age-class 65*
65	Height of tree, feet.	85
8.2	Diameter breast height, inches.	10.9
325	Merchantable trees per acre.	313
13.2	Cubic feet per tree length.	20.8
4,300	Cubic feet volume per acre.	6,500





Site 140, Age-class 60		*Site 170, Age-class 55*
102	Height of tree, feet.	116
13.3	Diameter breast height, inches.	15.8
300	Merchantable trees per acre.	310
27.3	Cubic feet per tree length.	33.3
8,200	Cubic feet volume per acre.	10,325

Some management licensees of uneven-aged forests in the Interior suitable for selective logging have used in their working plans another formula associated with the silvicultural system known as the French method of 1883. This method requires enumeration of the trees into three groups; those over two-thirds of the diameter decided upon as merchantable, those between one-third and two-thirds, and those with diameters under one-third. The annual yield is calculated by dividing the volume of the large group by one-third of the rotation, adding half the annual increment of the large group, and a fraction, up to one-third, of the annual increment of the medium group according to the condition and stocking of the forest. Periodic stock-taking is required to ascertain whether the forest is becoming over- or under-stocked, in which case adjustments can be made in selection of merchantable diameter, increment fractions, or otherwise.

It is not economically possible to cut over the whole of these uneven-aged forests under the selection system every year; instead, the area is divided into logging sections, each of which is cut at an interval, or felling cycle, of a number of years. In the yellow pine-fir-larch Interior forests a fifty-year cycle has been found suitable where the average age of maximum mean annual increment is 150 years. In the selection system of silviculture, rotation has little meaning in practice.

This and all theoretical methods of calculating the allowable cut for sustained yield are subject to considerable modification by an experienced forester to suit the individual characteristics of the forest in his charge. No schematic uniformity can be imposed by law or regulation.

It may be thought that I have dealt in unnecessary detail with technical methods of silviculture and sustained-yield organization and management. Foresters, however, will recognize that I have presented merely a skeleton of a subject which, if fully covered, would fill a book of considerable size. The reasons for such detail as I have given will appear in my remarks on the question of overcutting, which follow.

OVERCUTTING

There was considerable discussion and little agreement as to whether logging has reached a volume which is endangering the future supply of wood for the industries of the Province, or regions of it, and in particular the Vancouver Forest District. The Interior, with a mature inventory of 78 billion cubic feet and a cut of only 378 million, is obviously not being overcut, nor likely to be in the near future. Keen competition for timber sales in localized areas may indicate pressures leading to local overcutting; this is being taken care of by the organization of forest management licences and working circles in public forests. Likewise, the Prince Rupert Coast District, with a mature inventory of 26 billion cubic feet and a cut of 56 million, is being very much undercut. The Forest Service estimates that

the annual production of that district could safely be increased to 231 million cubic feet.

The question of whether or not the Vancouver Forest District was being overcut caused considerable controversy. The Forest Service estimates that the allowable annual cut for this District is 540 million cubic feet. In 1955 the cut was approximately 600 million cubic feet, and the average for the past five years was 561 million. The District, on this evidence, is being overcut by 10 per cent. This conclusion, and the accuracy of the calculation, was strongly challenged by prominent industrial foresters. The Forest Service position may, I think, be expressed by the following syllogism:—

(1) In a sustained-yield unit, with a normal growing stock, the annual cut is balanced by annual increment:
(2) Annual cut and increment in the Vancouver District are not in balance:
(3) Therefore, the Vancouver District is being overcut.

Truth of the major premise is conceded by all; therefore, the validity of the conclusion depends upon the truth and relevancy of the minor premise.

I will put aside, for later examination, the assumption that the Vancouver District is, or should be, a sustained-yield unit. It is not disputed that it does not possess a normal series of age-classes. Two questions, therefore, require an answer: (*a*) Which of the calculations of the allowable cut is most accurate, reasonable, and appropriate for this particular District; and (*b*) is it imperative, or even desirable, that cut and increment should balance, in a forest in a state of imbalance, during the period of conversion to sustained-yield management.

The Hanzlik formula was used by the Forest Service and also by the foresters who challenged the Forest Service result. The controlling factors are the volume of mature timber, the increment in the immature forest, and the average age at which the latter will produce a maximum mean annual increment, i.e., the rotation.

It is necessary to understand the meaning of these technical terms, particularly the difference between annual " increment " and annual " yield." In forestry, " increment " is the increase in wood volume added each year to a tree, an acre, or a forest by natural growth; it may or may not, according to the size of the trees, have any immediate merchantable value. " Current increment " is the volume added by growth during the present year, or, for simpler calculation, the average of a short period, five to ten years. " Mean annual increment " is the average per annum through the life of the tree or stand. Current increment rises rapidly during the vigorous early years of growth, reaches a maximum, then falls gradually to zero when the tree dies. Applied to a stand of trees, it falls to zero long before all the trees die because the diminishing increment in the trees that live is equalled, or surpassed, by the death of other trees. That is the condition

of many, if not most, of our old virgin forests. The mean annual increment reaches its maximum at the precise moment when it is equal to the current annual increment. That is the time for logging when the object of management is the greatest production of volume. The age at the time of logging, with the addition, if necessary, of a few years to allow for reforestation, is the "rotation."

"Yield" is synonymous with production for use. The difference between yield and increment may be illustrated by contrasting the annual yield from a forest with a complete range or "normal" series of age-classes, an equal volume maturing and being harvested annually, with the increment in a forest completely immature, at a stage of rapid growth with an enormous volume of wood being added each year, but not an acre capable of yield or production for use until the rotation age is reached, except perhaps that volume which may be recovered by silvicultural treatment, e.g., thinnings.

In the Vancouver Forest District the Forest Service estimates 29,627 million cubic feet of mature timber, 10,170,000 acres of land capable of producing commercial timber (called "productive area" for brevity), and 2,520,000 acres of immature stands adding increment at various rates according to their age and the quality of the land on which they grow. The Forest Service estimates the mean annual increment, realizable only when they, *seriatim*, reach their rotation ages, will average 75 cubic feet per acre; the average rotation ninety years. The Hanzlik formula becomes $^{29627}/_{90}+2.52\times75=518$ million cubic feet. The favourable range of age-classes of the immature growing stock enables this to be increased to 540 million feet per annum.

The foresters who presented different results also based their estimates on the forest-inventory figures of mature volume and areas of immature stands. The differences arose through use of different rotations and increment and through interpretations and adjustments made in mature volumes, based on each man's experience and judgment. Dr. Orchard, when first quoting his figure for the allowable cut of the Coast forests, admitted that an accurate estimate is not possible and that "any forester anywhere with any knowledge of British Columbia conditions can throw serious doubts on it." However, he later considered it "ridiculous" for anyone to dispute the accuracy of the results of "fifteen hundred man years of work" and an expenditure of 10 million dollars which went into the Forest Service figures. The industrial foresters' position was explained by Mr. T. G. Wright, who said that their estimates were based on the identical material used by the Forest Service. "It is all public information and we've used the same information, except that we have supplemented the Forest Service estimates with our many years of practical experience in cruising and in logging, and particularly we have taken an interest in volumes per acre recovered in logging."

His and other estimates are gathered together in the following table:—

TABLE 53

ESTIMATES BY PROFESSIONAL FORESTERS OF THE SUSTAINED CAPACITY OF VANCOUVER FOREST DISTRICT

Affiliation	Mature, MM C.F.	M.A.I. Immature	Rotation	Allowable Cut, MM C.F.
Alaska Pine & Cellulose	32,500	75	70	720
B.C. Forest Products	38,000	58	90	572
Canadian Forest Products	45,800	90	90	825
Crown Zellerbach	32,800	83	81	656
MacMillan & Bloedel	32,500	75	90	548
Powell River Co.	39,200	-----	-----	-----
Tahsis Co.	38,300	67	90	600
Average	37,000	75	85	654
Forest Service	29,627	75	90	540
Actual cut, average 1951–55	-----	-----	-----	561

Alaska Pine & Cellulose Company estimated there will be a mean annual increment of 38 cubic feet per acre in the "not satisfactorily stocked" areas; other Companies also anticipated that there would be some production from partly stocked areas, none of which has been included in the sustained-yield calculations by the Forest Service.

The Provincial inventory volume of old-growth timber in the Vancouver Forest District is 39,922 million cubic feet, including sound wood in trees of the 10-inch-diameter class and larger. This includes timber within Park boundaries. It cannot be estimated how much, if any, of this Park timber will actually be logged, and the Forest Service excluded it all from their calculations. The total was thus reduced to 38,519 million cubic feet. The surveys and cruises which are the source of the mature-timber estimates are of varying ages and reliability; in addition to the cull for decay already made in compilation, the Service considered that certain deductions should be made from the inventory figures for breakage and waste. These deductions were made in accordance with percentages found by a study of a limited number of sample logged areas. Deductions for waste in accordance with these samples vary from 11 per cent in fir to 19 per cent in hemlock and 25 per cent in cedar. For felling breakage a flat 5 per cent for all species was deducted. These deductions were not applied generally, but to estimates for certain regions where considered appropriate. A further general deduction of 15 per cent was made for other anticipated losses. As a result of all these, the above figure of 38,519 billion cubic feet of mature timber was reduced to an estimate of 29,627 billion cubic feet realizable volume. This is a reduction of 23 per cent, exclusive of cull in cruising. The industrial foresters considered this too great a safety factor, as indicated in the table.

The above 29,627 billion cubic feet occupies 5,872,000 acres, an average volume of 5,045 cubic feet or 30,270 board-feet per acre. The following table shows that the actual recovery per acre in the Vancouver Forest District during the last five years has been 42,900 board-feet per acre, increasing from 40,300 f.b.m. per acre during the five years 1941–45. This result is in part explained by closer utilization in logging. It does not, in my view, support the Forest Service contention that, on the average, logging operations are gradually entering timber stands of lower volume in the Vancouver Forest District and that average recovery per acre from logging in the old-growth timber will decrease by 30 per cent.

TABLE 54

VANCOUVER FOREST DISTRICT LOGGING

Year	Acres	Volume, M B.M.	Per Acre
1936	(1)	2,544,447	.....
1937	(1)	2,693,167	.....
1938	(1)	2,304,440	.....
1939	(1)	2,922,201	.....
1940	(1)	3,107,647	.....
Five-year total	(1)	13,571,902	.....
Average	(1)	2,714,380	.....
1941	76,000	3,053,574	40.3
1942	63,868	2,528,148	39.6
1943	53,540	2,302,157	43.0
1944	56,885	2,284,467	40.1
1945	59,699	2,292,502	38.4
Five-year totals	309,992	12,460,848	.....
Averages	61,998	2,492,170	40.3
1946	58,502	2,394,826	41.2
1947	76,313	3,098,866	40.5
1948	76,667	3,091,276	40.2
1949	70,414	2,962,078	42.0
1950	75,503	3,314,537	43.9
Five-year totals	357,399	14,861,583	.....
Averages	71,480	2,972,317	41.6
1951	71,751	3,090,659	43.0
1952	75,291	3,102,784	41.2
1953	79,198	3,380,185	42.7
1954	81,833	3,674,156	44.9
1955	84,484	3,595,749	42.6
Five-year totals	392,557	16,843,533	.....
Averages	78,511	3,368,707	42.9
Twenty-year total	.....	57,737,866	.....
Averages	70,663[2]	2,886,893	40.8

[1] Not recorded.
[2] Average acres for fifteen years only.

Two other important factors affecting the allowable cut of the Vancouver District are the rotation and rate of increment. I have already explained why application of a single rotation to so great a region is

unrealistic. The selection of a single figure depends on the selector's judgment of the future nature of the forest industries. If major production is to be for lumber and plywood, then rotations of ninety years and upward will be necessary. But if most of the timber goes to pulp and paper mills, shorter periods will be adequate for growing it.

There were conflicting views on the importance of the rotation in calculating the sustained-yield capacity of forests with a large surplus of mature timber as on the Coast of British Columbia. Mr. H. R. MacMillan expressed the opinion that ninety years are necessary to grow timber for sawmills, but that "the rotation doesn't come into effect for so long a time into the future that . . . whether you adopt the eighty-year rotation or the ninety-year rotation isn't going to make any difference right now." The Forest Service opinion is: "In view of past trends it is logical that some allowance should be made for continued improvement in the utilization of small logs for both pulp and saw-timber. Average rotations for the Coast as low as seventy years have been proposed on this basis. Generally speaking, we have assumed a rotation age of ninety years for stands now classed as immature. Under present-day conditions we are still a long way from a complete forest industry economy based on timber ninety years old. In selecting this figure as an average, considerable allowance has therefore been made for the trends toward a more intensive utilization and the use of small-diameter logs. The argument has been presented that the better sites produce their greatest mean annual increment at approximately fifty years, but it should be emphasized that this applies to the better sites only and that the fifty-year rotation will produce a large number of small-diameter (less than 12 inches d.b.h.) trees. In any event, the reduction in mean annual increment resulting from carrying stands an additional thirty to forty years is insignificant and will be offset by such advantages as improved quality increment, larger-size trees, and less volume loss resulting from more frequent regeneration periods."

I understand Mr. MacMillan's opinion to mean that the question, a half-century or more hence, as to whether timber then sixty years old should be cut or left to grow for another thirty years will be a problem for the men of that time to resolve; it is not for us to make the decision now for them. I believe this is a reasonable view. There is a moral obligation on this generation to leave the forests in a productive state, by which I mean not merely that they have been reforested after logging, but that the growing stock is capable of sustaining an annual yield of commercial quality. It does not seem necessary that industry of this generation should be sacrificed beyond that point in order to reproduce the kind of big-tree forest we value now, when even now industry is beginning to find profitable use for smaller trees. Between the extremes of a legacy of devasted forest land and an inheritance of big trees such as those that industry is now utilizing, we must provide a *tertium quid* which will be an adequate growing stock for

continuous production. The adaptation of that growing stock to the uses of that period can safely be left to the ingenuity of future operators in the confident expectation that they will not miss the old-age trees of large growth they have never known.

As an argument to support a longer rotation, the opinion that carrying immature stands an additional thirty to forty years causes an insignificant loss in mean annual increment while producing a higher quality appears to overlook the chief function that the selected rotation performs in these estimates of allowable cut for the Vancouver District—that is, its use as divisor of the present mature timber; selection of a sixty-year rotation for the immature stands in place of ninety years would increase by 50 per cent the annual rate at which the mature timber could be cut. The shorter rotation will also increase by the same percentage the rate at which the stagnant overmature acres are logged, reforested, and made increment-productive. The fact that 82 per cent of the potentially productive forest lands of the Coast and 75 per cent in the Vancouver Forest District are, for one reason or another, growing very little, if any, increment should be regarded as an impelling factor in the choice of an average rotation age.

To the second question as to whether the annual cut in the Vancouver District should be restricted to the volume of annual increment during the period of conversion to sustained-yield management, the answer is simple: it cannot. The proportion of the productive land which is actually producing increment (25 per cent) is so small that a paramount consideration in management must be to increase this area as rapidly as possible. The full increment possible for the district can only be obtained after a proper arrangement of age-classes has been established.

In the absence of reliable knowledge of site qualities and even of the forest types and species mixtures which may be expected after the virgin forests have been cut out, any estimate of what the productive capacity of the District may be would be little more than a guess. The Forest Service has not attempted to make such an estimate. Annual yields of 700 to 900 million cubic feet were suggested by industry witnesses. Such estimates are interesting, but unfortunately of no value in regulation of the annual cut at the present time.

It is clear that the productive capacity of the forest land in the Vancouver District has little relevance to the volume which can be harvested now. The main objects should be to establish full increment on all the forest lands and to arrange a proper gradation of age-classes. The Forest Service estimate of allowable cut provides for fifty-five years of production from the old-growth timber, and as there are approximately 6 million acres of this timber, an average annual cut of 100,000 acres should be a satisfactory estimate and a guide to forest policies for the next ten years. After that the area can be increased if stock-taking justifies it. The productive area of the Vancouver District is comprised of mature, immature,

and not restocked, in the percentages of approximately 60, 25, and 15 respectively. Therefore, an average annual cut of 100,000 acres would have the effect of establishing a series of age-classes of approximately equal area over 85 per cent of the District forest, providing for a rotation of eighty-five years, disregarding any possible production from the not-restocked areas. It will be for industry to prove by good utilization that the 100,000 acres of yearly logging will produce the 654 million cubic feet it estimates. This calculation is predicated upon more adequate attention to silviculture in this District. It is disappointing to find that there is approximately double the area of unsatisfactorily stocked land as was reported in 1944.

An estimate of the allowable cut of so great an area as the Vancouver District is of value only to the extent that it might be of use as an aid in the framing of policies and in administrative regulation. While I do not concur with the Forest Service opinion that this District as a whole is being overcut, nevertheless there are local areas where this condition may be said to exist, and in any event it seems evident that the increasing cut is approaching a limit of safety, assuming continuance of present demand and present standards of utilization. Nevertheless no recommendations were made to me as to methods of restricting the volume of the District as one administrative unit. I do, in fact, consider that question largely academic. The policy of establishing sustained-yield units, managed by private industry in forest management licences and by the Crown in public working circles, is well under way; when this policy has been carried to a successful conclusion, the whole District will, as a consequential result, be organized on a sustained-yield basis and the allowable cut in terms of volume established. In this interim period of transition the suggested allowable area cut of 100,000 acres per year would serve as a governing check.

The following table shows the present stage in the development of public and private sustained-yield units in the Vancouver District. By comparing forest conditions and yields of the areas which are ostensibly being managed as sustained-yield units with conditions in the area as yet unorganized, the question of allowable cut in the District as a whole may be examined *de novo* as a check on the estimates to which I have referred. The figures for forest management licences include eleven licences awarded and four approved and reserved pending completion of final details. As figures for the unorganized part of the District are not directly available, they have been obtained by subtraction of the organized-area figures from the district totals. District totals used in the table are Forest Service net recoverable volume and net area with Parks excluded. Annual yield for the District is the Forest Service estimate of 540 million cubic feet.

TABLE 55

SUSTAINED YIELD IN VANCOUVER FOREST DISTRICT—COMPARISON OF ORGANIZED AND UNORGANIZED FOREST AREAS

(In thousand acres and million cubic feet.)

	Forest Management Licence		Public Working Circle		Total Organized		Unorganized		District Total
	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	
Mature area	1,487	25.4	1,217	20.6	2,704	46.0	3,168	54.0	5,872
Immature area	578	23.0	550	21.8	1,128	44.8	1,392	55.2	2,520
N.S.R. and N.C.C.	182	11.8	156	10.0	338	21.8	1,218	78.2	1,556
Total productive acres	2,247	22.5	1,923	19.2	4,170	41.7	5,778	58.3	9,948
Mature-timber volume (MM C.F.)	8,353	28.2	5,920	20.0	14,273	48.2	15,354	51.8	29,627
Cubic feet per acre	5,620	.....	4,860	.....	5,280	.....	4,850	.....	5,045
Allowable cut (MM C.F.)	130.1	24.1	80.2	14.8	210.3	38.9	329.7	61.1	540
Cutting period (years)	64	.....	74	.....	68	.....	46	.....	55
Cubic feet yield per productive acre	57.9	.....	41.7	.....	50.4	.....	57.1	.....	54.3

Basis: Forest Service records and estimates.

This table requires very careful analysis. According to the evidence, the resources and yield capacity of the public and private management units have been more carefully surveyed and estimated than those of the unorganized areas. The District totals and estimate of allowable cut were presented in a special Forest Service brief* which sought to substantiate them in detail. The results are surprising.

The opinion of many witnesses that the organized forests, especially the forest management licences, include the cream of the District forests was not seriously challenged; nevertheless, these forests, with 41.7 per cent of the productive forest area and 48.2 per cent of the mature-timber volume, are being managed to produce only 38.9 per cent of the allowable cut of the Vancouver District. The forest management licences alone, containing 22.5 per cent of the productive area and 28.2 per cent of the timber volume, are restricted by contract to produce 24.1 per cent of the District yield.

The cutting period during which the old timber of the whole District should be harvested was estimated by the Forest Service to be fifty-five years, after which the present immature stands will be ready to take over the burden of production. This old timber is planned to last for sixty-four years in the forest-management areas and seventy-four years in public working circles. As a result, the remaining 51.8 per cent of the District timber volume in areas still unorganized, and including both public and private ownership, will have to be cut off in forty-six years in order to main-

* Exhibit No. 310.

tain the District allowable cut. I am driven to conclude that the caution which was admitted in calculating the District's sustained-yield capacity has been exercised to an extreme degree in the preparation and approval of working plans for areas within sustained-yield units, public and private.

The average net recoverable volume per acre for the whole District is estimated by the Forest Service to be 5,045 cubic feet, or approximately 30,200 f.b.m. The average for areas within management licences is 5,620 cubic feet or 33,700 f.b.m. In comparison with the actual recovery of 42,900 f.b.m. per acre in 1955 from all tenures and site qualities, this estimate seems to be something more than conservative, especially as working plans are made for short periods, five to ten years, only.

The mean annual net rate of increment used by the Forest Service for the Vancouver District is 75 cubic feet per acre; this figure is also the average of the industrial foresters' estimates. This is the volume that will be produced from the immature stands when they reach harvest-time. They will, at this average rate of increment, produce a net 5,250 cubic feet per acre at age seventy. The old virgin timber should produce as much or more; in fact, it is doing so now with an average production of 7,150 cubic feet per acre. The Forest Service considers this will drop to an average of 5,045 cubic feet. At the former figure the old growth could maintain a production equivalent to ninety-five years of increment at 75 cubic feet; on the Forest Service estimate, sixty-seven years.

Meanwhile, governed by the present working plans and estimates, the forest management licences are producing 57.9 cubic feet per productive acre, the public working circles 41.7 cubic feet, and the District overall 54.3 cubic feet per productive acre, if restricted to the Forest Service estimate of a 540 million cubic feet allowable annual cut. The difference between these figures and the accepted capacity of 75 cubic feet per acre is in great part the inevitable loss caused by the necessity of maintaining reserves of timber long past commercial maturity, due to the present and past imbalance between our mature and growing stock. At present this difference amounts to 200 million cubic feet a year in the Vancouver Forest District, and could be alleviated in the future to a considerable degree if the 1,500,000 acres classified as "N.C.C." and "N.S.R." were brought back into production.

It seems that the full and complete information necessary for construction of accurate sustained-yield working plans is simply not yet available. This has had the effect of inducing overcaution. This in turn, as the table shows, results in apparent undercutting in the public and private management units, which, if continued, will tend to build up an excess growing stock in those units at the expense of production from outside areas until these are themselves organized. After that time it will be at the expense of industry at large until better surveys and estimates prove that a greater yield can be obtained.

Consideration of the discrepancies mentioned leads to the stated conclusion that excessive safety factors have been applied to the inventory volumes when used for management plans. It is unlikely that important errors have been made in area because the boundaries of forest types were mapped or checked from recent vertical air photographs, on which they are usually distinguishable by men experienced in modern forest mapping. Standard surveys, with ground sampling designed to obtain volume estimates with an accuracy of 10 per cent over or under, have covered 72 per cent of the Coast mature timber area with 89 per cent of the estimated volume (*see* Table 43). No criticism was made of these inventory volumes; in fact, several industrial witnesses complimented the Forest Service on the good work done on the Federal-Provincial co-operative survey. Differences arise from interpretation.

Interpretation was made in accord with each man's experience and judgment. In my opinion the judgment of senior industrial foresters, most of whom have had experience in the service of both Government and industry, cannot be ignored.

The rate of cutting in the old-growth timber should be related to two objectives: First, it should be designed to produce an evenly gradated series of age-classes in the reforested lands; second, it should remove the old timber soon enough to prevent disastrous losses by insects and fungi, even greater than those referred to elsewhere in this Report, to add to the loss of increment. That there will be a satisfactory production from the maturing second growth by the time the last of the old has been disposed of is a corollary of the first objective.

In basing the choice of rotation age for the immature stands on the size and quality of the product at that age, it should be remembered that this product will be a very minor factor in industrial economy for at least fifty years, during which period wood-supply will continue to come from old-growth timber. If, as experienced witnesses stated, sixty years on an average site will produce a maximum mean annual increment of pulpwood of a size already commercially useful, there should be no hesitation in adopting a sixty-year rotation for a working circle to be managed chiefly for pulpwood production. Moreover, the rotation, whether sixty years or longer, used in these calculations is merely an estimated average. As adequate surveys are made, it will be found that there will be a variety of site qualities requiring management on rotations of different lengths.

The question whether the Vancouver Forest District is or should be one sustained-yield unit can be answered shortly in the negative. Plans for such management of so great a territory have never been devised, nor was any evidence presented to me as to how they could be. In fact, I rejected the idea ten years ago as impracticable, and my recommendation that the method of organizing the production of the District, the Coast, and the whole Province, by establishing many working circles in many

public and private sustained-yield units, was adopted. This policy, in my opinion, ought not to be reversed.

The fact that neither the Vancouver Forest District nor the whole Coast can be managed as one sustained-yield unit does not mean that all the units of which these regions will ultimately be composed will be in separate economic compartments. The evidence indicates that the whole Coast is already an economic forest unit. A representative of one of the large Coast companies* expressed this point of view as follows, in opposition to any action to create artificial barriers to the movement of logs anywhere on the Coast; his opinion was supported by other large companies:—

> " While the Vancouver Forest District is not being overcut at present, it is an area in which conversion plants have demonstrated their ability to compete effectively in world markets. Given stable and economic supplies of raw materials, these plants can be expanded and new ones can be introduced. With few exceptions the Prince Rupert District has not supported such plants. Further, conversion plants in the Lower Coast area have been able to utilize logs from the coastal portion of the Prince Rupert Forest District successfully for many years. At present great areas in this District are not being cut, and we estimate that the coastal part of the Prince Rupert District is being undercut by at least 800 million board feet per year and that the Coast as a whole is being undercut by at least 1.4 billion feet per year. This constitutes an enormous waste. At present there is no increment on these forests, and in some decay is exceeding growth. Therefore if we cut now, even at lower stumpages, we are creating new economic wealth and not now prejudicing the use of such forest for future industries in the North and West Coast areas. If we assume that industries will be built in the North and West Coast areas in twenty years which can pay higher stumpages than those necessary to induce cutting there now, any policy which prevents such present cutting and transportation of logs to the Lower Coast conversion plants prevents the logging and conversion of about 28 billion feet of timber over that twenty-year period.
>
> " Perhaps some estimate should be made of the economic waste involved. If we assume that a thousand feet of logs is eventually converted to products having an average selling price of $80, this means that $2,200,000,000 which would have flowed into the economy of British Columbia will have been lost. Each year that we do not put these forests to use means the British Columbia economy receives about $112,000,000 less gross income than it should. The indirect return in taxes to the Government is infinitely greater than the reduction in stumpage necessary to assist this expansion. The alleged and so-called ' waste ' involved in towing logs from such areas would yield an eco-

* Mr. G. L. Draeske, Alaska Pine & Cellulose Company, p. 12901.

nomic return of 1,300 per cent each year, based on an average towing differential of $6 per thousand.

"We consider the Coast to be an economic unit, and that the creation of artificial barriers to the free movement of logs will cause economic waste and serious consequences to the industry."

The disadvantages of undercutting to which I have referred apply, with perhaps especial force, to management licences. The losses involved in holding reserves of overmature timber longer than absolutely necessary should not be underestimated in the desire to get immediate regulation through ultraconservative planning. Regulation of the cut should not be allowed to put silviculture in a strait-jacket. In any case, inflexible control for an unvarying annual production will probably be impossible. There may again be more difficulty in selling than in finding timber to manufacture. Coast production through the years shows many fluctuations, none of which was caused by shortage of timber. If over-caution in working plans should lead to overstocking in management licences and in turn to restriction of the cut available to competitive industry, untoward results not difficult to imagine may be far more damaging to the cause of forestry than temporary diminutions of production. They might hinder or even wreck the orderly introduction of the general sustained-yield policy of the Province. I have pointed out that this policy can only be fulfilled over a long period of time. Each individual forest must go through a period of conversion, and the length of this period unavoidably depends upon economics, industrial, mercantile, and political considerations, as well as upon the condition of the forests which nature has given us, their silviculture, and the uncertain calculations and unprovable forecasts of technical forestry.

Mr. H. R. MacMillan's arguments against action which "may lead to Government pricing us out of the market" support also the possibility that there will be times in the future when timber which might have been manufactured and sold, had this not been prevented by too narrow an estimate of yield, may be adding to the dead storage in management licences.

The dilemma which faces forest management in the choice between regulation and silviculture, or the weight to be given to each, is apparent in the development of Coast management licences. These are, with one exception, overstocked with mature timber, like the regional forests of which they are part. In some cases actual sustained-yield management is being postponed, with temporary overcutting of the estimated yield capacity; in others immediate regulation is given preference, with consequent limited production now and loss of increment for the future. The choice is, and must be, affected by the requirements of the owner, his existing mills and his control of or access to other sources of supply.

If it should appear that the average production of any district, not yet organized in sustained-yield units, is approaching the limit that can be maintained continuously, or even is likely to do so, the general policy

should be to seek first to improve the supply by better silviculture, thinnings, prompt reforestation, reduction of " left-overs," development of less accessible and " scrub " areas—in brief, to grow more wood for the future rather than hoard the present deteriorating stock for anticipated lean years ahead. If Joseph had been able to dam the Nile and grow more wheat in the drought years, he would have made a greater reputation than he did by locking up the surplus of seven good harvests.

The following quotation from the Finland Year Book, dealing with forestry in that country during the early part of the nineteenth century, is of interest: " The idea that had taken root in the mind of the public regarding the danger of the forests being destroyed became so strong in the course of time that the Government raised all kinds of obstacles to the development of the sawmilling industry. For instance, the right of felling was restricted and the use of steam in the sawmills was forbidden." This naturally prevented the industry from taking full advantage of the British free-trade policy and would have prevented the establishment of the pulp and paper industry in the 1860's, but in 1861 the restrictions were removed after the forest's possibilities were better understood. In 1860 Finland's lumber export was 120 million board-feet; by 1925, less than a rotation later, it reached 2,000 million.

FOREST PROTECTION

The one indispensable requisite of a sustained-yield policy is the continuance of large areas of forest land remaining actually productive and with growing stock thereon composed of a reasonable age-class distribution. Four major factors operate with deleterious effect to complicate an endeavour to reach this not only desirable, but necessary objective. These four are fire, insect pests, diseases, and the failure of cut-over land to regenerate.

FIRE PROTECTION

In addition to rendering a policy of sustained yield difficult, if not impossible, of fulfilment, inadequate fire protection and the widespread fire damage consequent upon such a short-sighted policy are reflected in other fields or our Provincial economy.

In the 1945 Report I said this:—

"It seems to me that many persons, outside the industry and the Forest Service, appear to regard fire losses in mature timber as the most serious aspect of our fire problem. Such is not the case. The older the forest is, the greater is its resistance to fire. Fire is the great destroyer of the young forest-growth, especially up to 20 years of age. To say that a fire burned over logged-off land and therefore caused no damage is tantamount to saying that a school burned down and although all the young children perished no lives were lost. Unless we protect our young forests from destruction there is no hope that this Province can continue to produce timber in the future. As one highly qualified witness expressed it, '. . . fire-protection is 80 per cent of reforestation' (Col. William B. Greeley).

"Another aspect of forest fire damage is also likely to be overlooked. I refer to the destruction of watersheds with consequent detriment to stream-flow, irrigation systems, and salmon-spawning grounds. Destruction by fire of our forest cover also destroys our wild life, leads to wind and water erosion, and a blackened desolation that, from the æsthetic point of view, remains an eyesore due to the fact that natural regeneration is retarded for many years. In some areas the soil is so robbed of its fertility that centuries must elapse before nature can be persuaded to make them green again with growing trees.

"These are the intangible losses that never appear in the statistics—nevertheless, the indirect results of forest fires are of greater ultimate importance than the fire damage that can be calculated in terms of money value. They must be kept in mind when deciding the extent of the expenditure to be made on fire-protection."*

After consideration of the evidence in 1945, I reached and recorded this conclusion at that time: "Fire-protection in relation to both personnel

* Report of Forestry Commission, 1945, p. 130.

and equipment is grossly inadequate. The reason is the usual one: lack of sufficient funds."

It is gratifying to learn that, now, ten years later, there has been in that interval a very marked improvement in fire protection. Much yet, however, remains to be accomplished. Fire protection is not yet adequate and for the same reason as that expressed in 1945: lack of sufficient funds.

"Adequacy of protection" is, in a sense, a relative term. There are "good" fire years in which fire occurrence and severity are below the long-term averages; there are "bad" fire years in which the number of fires and their severity exceed the average. It seems to me that fire protection should be geared to contend successfully with fire dangers and fires that are encountered not only in good years, but in those years when conditions of hazard in combination result in peak demands upon the Service.

In the fiscal year 1944–45, funds for fire protection inclusive of fire suppression amounted to $784,512. For the fiscal year 1956–57 the Estimates indicate a vote amounting to $2,705,000 for fire protection and suppression. Since 1952 the permanent-staff salaries and expenses, totalling about $1,100,000, have been transferred from the Protection Vote to the Salary and Expense Vote. For the purposes of comparison, this should be taken into account, making therefore a total voted expenditure for the fiscal year 1956–57 in the sum of $3,805,000, compared with $784,512 for the fiscal year 1944–45. This is an increase of over 400 per cent. When, however, the degree to which increased cost of employing men to fight fires (25 cents an hour in 1944 as compared with 75 cents an hour in 1955), to fall snags and carry out other necessary fire protection and suppression activities, and the present costs for material (shovels, hoses, pumps, trucks, and such like), all exceeding the 1944 level, is taken into account, the 400+ per cent shrinks to probably one-half of that in actual purchasing value of services and supplies.

The Forest Service records disclose that in the twenty-five-year period 1930 to 1954 a little over 7,000,000 acres, exclusive of grazing and non-productive land, were burned over by forest fires, averaging about 287,000 acres a year. Of this total, 6,426,475 acres were in the Interior and 737,692 acres on the Coast, an average of about 257,000 acres a year in the Interior and 29,500 acres a year on the Coast. Assuming the productive area of the Province to be on a sustained-yield basis and a rotation of 100 years, we are suffering a fire loss equal to 20.5 per cent of this productive area in each rotation. These appalling figures, representing an incalculable loss in actual and potential timber values (including site deterioration and increased insect-pest populations with consequent depredations) do not include holocaustic and unfought fires which raged from time to time over the 68 million acres in northern areas of the Province in unoccupied territory—a great majority, if not all, caused by lightning. (It is of interest

to note that these vast northern areas have now been added to the Prince George Forest District.)

The burned-acreage figures for the past six years (exclusive of non-productive and grazing land) are a little more encouraging and are as follows:—

TABLE 56

Year	Coast Acreage	Interior Acreage	Total Acreage
1950	4,611	546,136	550,747
1951	95,599	239,709	335,308
1952	21,964	100,124	122,088
1953	824	15,083	15,907
1954	1,575	6,189	7,764
1955	514	31,283	31,797
Totals	125,087	938,524	1,063,611

Source: Annual Reports, Forest Service.

This indicates a combined yearly average for this period of about 177,268 acres. The Coast averages out at about 20,800 acres, and at 156,000 acres in the Interior.

A properly functioning system of fire protection depends upon the adequacy of methods used to prevent, as far as is humanly possible, the occurrence of fires, and when a fire does occur, to detect it and have a crew upon the location before the fire has spread and grown to serious proportions.

Fire causes can be divided into two main categories: those resulting from lightning-strikes and those caused by some human agency. The following tables are illustrative:—

TABLE 57

Causes	Ten-year Average, 1944–54	Per Cent
Lightning	419	28.1
Campers	207	13.9
Railways operating	233	15.6
Smokers	263	17.7
Brush-burning (not railway-clearing)	79	5.3
Road and power- and telephone-line construction	14	0.9
Industrial operations	74	5.0
Incendiarism	17	1.1
Miscellaneous (known causes)	152	10.2
Unknown causes	33	2.2
Total number of fires	1,491	100.0

Source: Annual Report, Forest Service, 1954.

The 1955 figures broken down into forest districts are as follows:—

TABLE 58

NUMBER AND CAUSES OF FOREST FIRES, 1955

Forest District	Lightning	Campers	Railways Operating	Smokers	Brush-burning (Not Railway-clearing)	Road, Power- and Telephone-line Construction	Industrial Operation	Incendiarism	Miscellaneous (Known Causes)	Unknown Causes	Total	Per Cent of Total Fires in Province
Vancouver	9	15	143	57	18	6	20	2	47	2	319	23.05
Prince Rupert	6	14	7	14	7	4	8	.....	8	6	74	5.35
Prince George	30	44	13	6	9	6	17	.....	11	22	158	11.42
Kamloops	208	99	35	83	8	1	32	8	45	14	533	38.51
Nelson	165	23	8	46	5	7	12	5	23	6	300	21.67
Totals	418	195	206	206	47	24	89	15	134	50	1,384	100.00
Per cent	30.20	14.09	14.89	14.89	3.40	1.73	6.43	1.08	9.68	3.61	100.00	.....
Ten-year averages, 1946–55	407	208	211	248	77	16	80	15	150	34	1,446	.....
Per cent	28.15	14.38	14.59	17.15	5.33	1.11	5.53	1.04	10.37	2.35	100.00	.....

Source: Annual Report, Forest Service, 1955.

It will be seen that the majority of the lightning-fires, causing about one-quarter of the total fires during the past decade, are in the Kamloops and Nelson Forest Districts, and, as far as I am aware, science has not yet devised any method of eliminating this continuing cause of destruction.

In the case of man-caused fires, the method of prevention seems to be twofold—regulation and education.

Regulation consists of, for example, laws governing forest closures, slash-burning, requiring permits before setting fires, safety appliances on engines, and other such-like provisions. I doubt, however, the effectiveness of any regulatory provisions of this nature in the absence of a police agency to see to their enforcement. It is, of course, impracticable, if not impossible, to police vast forested areas.

I am not thinking in terms of responsible operators in making this observation. A glance at the tables of fire occurrences will illustrate my meaning. Industrial operations were, on the average, responsible for 5 per cent of fires during the ten-year period 1944–54. Campers caused about 14 per cent and smokers about 18 per cent of the fires during that same period, totalling between them in ten years 5,700 fires. In 1955 these two agencies alone—campers and smokers—caused 400 fires, accounting for 29 per cent of the fire-fighting costs of that year and burning over an area of 14,000 acres.

For the last ten years, fire losses from campers and smokers and other human causes have in an absolute sense remained fairly constant; but it must be borne in mind that during that period the number of campers, hunters, hikers, and others using the forested areas for recreational purposes

has greatly increased, so in relative proportion measured in terms of potential risk the number of fires caused by these two categories must have decreased. The present educational programme designed to "Keep B.C. Green" has doubtless made a significant contribution to this result. It is also, I believe, a reflection of the increasing "forest conscious" attitude of the general public of this Province, who are becoming to realize more and more the enormous extent the forests contribute directly and indirectly to our economy and to their own pocket-books.

It is an evident conclusion that the present programme of public education concerning the necessity of protecting our forests from fire be continued and expanded.

The penalties for breach of regulatory provisions designed to protect our forests should be rigorous enough to act as a deterrent to those heedless of educational and persuasive campaigns. A fine should not be a licence fee for carrying out unauthorized and dangerous practices, but a sharp reminder that defiance of the law results in a decidedly unprofitable and unpleasant experience.

All forest-protection planning must be predicated upon the inescapable fact that fires are going to occur every year, but varying in numbers, severity, and locations. Only a limited control can be effectively exercised by the Forest Service over the numbers and locations of our anticipated fires.

They can, and do, perform a very useful and necessary function in controlling their severity or spread. A desirable degree of efficiency in fire suppression can only be achieved if a fire is detected in its incipience and crews are on its location in time to contain, control, and subdue it within a narrow area.

Detection requires, among other things, the building, equipping, and manning of lookout towers. The productive area of the Vancouver Forest District is 16,800 square miles approximately. The area covered by one lookout is 79 square miles when they are established 10 miles apart, with no overlap. Since this intensity of coverage is not required on the west coast of Vancouver Island or parts of the northern end of the Vancouver Forest District, it is assumed that the area to be covered can be reduced by one-third. Therefore, 142 lookouts are required in this District, of which thirty-three are now established.

The productive area of the rest of the Province is 125,000 square miles approximately. The area covered by one lookout is 315 square miles when they are established 20 miles apart, with no overlap. Since there are large areas in the northern part of the Province which do not require this intensity of coverage, it is assumed that this area can also be reduced by one-third.

Based upon assumed requirements, in relation to the areas involved, the following table is indicative of the needs of the Forest Service in order to have an adequate system of lookouts:—

TABLE 59

District	Presently Operated	Additional Requirements	Totals
Vancouver District	33	109	142
Kamloops District	29	49	78
Prince George District	19	44	63
Nelson District	40	34	74
Prince Rupert District	19	30	49
Totals	140	266	406

These projected lookouts will become a part of the Forest Service radio system so that the nearest available suppression crews may be advised of the spotted fire. (In passing, it may be of interest to record that in 1944 there were only sixty-four lookouts in the entire Province.) There are sixteen suppression crews distributed through three forest districts: Vancouver with six, Nelson four, and Kamloops six. These crews, located in areas of high risk, are organized expressly for fire-fighting. They average ten men per crew, each crew working under a specially selected and experienced foreman. Crew men and foreman are hired on a monthly basis for an average period of 100 days of continuous service. Crews are housed in specially established suppression-crew camps, are in radio or telephone communication with lookouts and Ranger's headquarters, and are fully equipped with truck transportation and a full complement of tools, pumps, and hose. During hazardous weather they are on fire stand-by in the camp, much like a city fire brigade, and are away to a fire within minutes, or even seconds, after receiving a fire call. During low hazard periods they are engaged in useful work, such as trail maintenance and training in fire-fighting techniques, but even during such periods are in immediate touch with the Ranger office by radio or field telephone. The valuable results of their fire-suppression activities are shown on the following table:—

TABLE 60

SUPPRESSION-CREW ACTIVITIES

Year	Number of Crews	Number of Fires and Size when Attacked						Average Spread between Time Attacked and Extinguished					
		Up to ¼ Acre	¼ to 1 Acre	1 to 5 Acres	5 to 50 Acres	Over 50 Acres	Total	Up to ¼ Acre	¼ to 1 Acre	1 to 5 Acres	5 to 50 Acres	Over 50 Acres	Total
1944	16	57	28	19	12	2	118	---- ----	----	----	----	----	----
1945	16	62	24	23	11	2	122	---- ----	----	----	----	----	----
1946	16	54	14	18	7	2	95	64	13	5	7	6	95
1947	13	68	17	14	6	1	106	81	10	10	3	2	106
1948	13	30	3	----	1	----	34	28	3	1	1	1	34
1949	13	99	23	25	12	3	162	86	28	26	12	10	162
1950	13	90	20	23	6	7	146	81	20	30	7	8	146
1951	13	123	28	29	6	3	189	104	29	34	9	13	189
1952	15	130	23	26	10	3	192	150	16	12	7	7	192
1953	16	135	18	21	4	----	178	137	21	16	3	1	178
1954	16	63	10	6	4	----	83	70	6	3	3	1	83
1955	16	107	25	20	3	3	158	130	12	6	3	2	158
Totals	176	1,018	233	224	82	26	1,583	936	158	143	55	51	1,343
Eleven-year averages	15	85	19	19	7	2	132	94	16	14	5	5	134

Source: Annual Reports, Forest Service.

It will be seen from this table that suppression crews were on the location of the great majority of the fires attacked when they were burning in areas not exceeding one-quarter acre in extent. The crews were also successful on a ten-year average in extinguishing 92 per cent of fires attacked before they had exceeded a spread of 5 acres. This figure increased to 97 per cent in 1955. It is an excellent illustration of what can be accomplished when fires are detected and fought at an early stage. If any of those fires had spread over an appreciable acreage, the cost of fighting even one of them could very easily have reached $50,000 or more. The cost of maintaining efficient fire-suppression crews is, in consequence, money well spent as insurance against heavier fire-fighting costs, loss of valuable timber, together with other indirect and damaging consequences. In 1955 there were 1,384 fires in the Province. Suppression crews were able to attack only 158 of them. The reason: lack of access roads and trails.

The Forest Service is, of course, fully aware of the necessity of constructing and maintaining an adequate system of fire access roads and trails. Some years ago it was estimated that an additional 2,134 miles of access roads and an additional 2,252 miles of protection trails should be built in extension of the then, as now, inadequate road and trail system in order to provide a *minimum* of protection.

Since 1949, 827 miles of new roads and 776 miles of new trails have been constructed. We are still required to build 1,307 miles of new roads and 1,476 miles of new trails. In 1955 presently existing roads and trails totalled about 2,000 miles. When these new roads and trails are constructed, we shall have, therefore, a total of about 5,000 miles of access roads and fire trails, provided, of course, present roads and trails are maintained. These 5,000 miles of arteries when completed will be largely constructed on areas outside forest management licences, and may be considered the minimum requirement as an access system for fire-protection purposes, still short of permitting suppression crews to reach every reported fire within twenty-four hours.

The desirable and ultimate objective of the Forest Service is not only to reach, but to control every fire within twenty-four hours.

As an aid to the attainment of this objective, an intensive study was made by the Forest Service on the Spallumcheen Public Working Circle in the Lumby area—an area of average hazard. A protection plan was drawn up which incorporated a twenty-four-hour attack time. One feature of interest is the construction of ridge roads. These roads, as nearly as possible, cut the contours at right angles to reach and then follow the ridges. They are built as cheaply as possible, with maximum gradient of 35 per cent for dry-weather use. Maintenance costs are low. They permit fire crews to approach a fire from above. The entire cost of this project for lookouts, roads, personnel, and so on works out at 4.58 cents per acre

per year on a total area of 1,080,000 acres, or a yearly total of $49,434. It is anticipated that from the experience gained in the Spallumcheen study, generally similar plans will be adapted to and executed in other public working circles.

As far as management licences are concerned, the protection plans submitted by the licensees are scrutinized and, if necessary, suggestions are made to bring them into conformity with what is considered essential to the area and a hazard.

It takes time to survey and build access roads and trails, and even after their construction to the extent indicated, I doubt if the twenty-four-hour objective of the Forest Service could be achieved by the use of roads and trails alone. British Columbia is a vast, rugged, mountainous country. Because of its topography I said this in 1945:—

> "Access roads are, however, only a partial solution. For one reason it would take years to build the mileage required for effective coverage and even then I do not doubt fires will start on the other side of the mountain at which the nearest road ends. Coverage by aeroplanes from strategically located air strips is needed in a Province such as this, with its great distances and difficult terrain. These planes, preferably helicopters, when available, could carry a crew of fire-fighters equipped with parachutes—' smoke jumpers '—to a fire spotted at its inception. These men, with the aid of equipment, also dropped by parachute, could be combating a blaze within minutes of its occurrence.
>
> " Men and equipment should not be difficult to secure and it is my view that the end accomplishment would fully justify whatever expenditure might be found reasonably necessary."*

Perhaps I was overly optimistic ten years ago about dropping smoke jumpers from conventional aircraft into areas inaccessible by road or trail. There is the difficulty of recovering these men and their equipment—valued at about $700 per man—but I am still firmly of the opinion that helicopters can, and will, play an increasingly valuable part in fire suppression. I think in future developments the emphasis will be more on the use of helicopters, which are capable not only of taking men into, but also out of, inaccessible areas, and correspondingly less on access roads and trails.

Conventional aircraft play an important part in detection, and the Forest Service has made good use of aeroplanes for this purpose, for air photography, and other relevant aid. The following table is of interest and relates solely to " protection flying ":—

* Report of Forestry Commission, 1945, p. 139.

TABLE 61

PROTECTION FLYING BY AIRCRAFT UNDER CONTRACT

Year	Number of Hours Flown per District					
	Vancouver	Prince Rupert	Prince George	Kamloops	Nelson	Total
1944	---- ----	----------	----------	----------	----------	----------
1945[1]	---- ----	----------	----------	---- ----	----------	210
1946[1]	---- ----	----------	----------	---- ----	----------	336
1947[1]	---- ----	---- . .	---- ----	---- ----	----------	391
1948	----------	25	147	164	156	492
1949	---- .	35	231	348	325	939
1950	66	41	350	629	310	1,396
1951	91[2]	51	222	693	433	1,490
1952	394	281	476	645	524	2,320
1953	446	300	333	572	569	2,220
1954	321	376	279	730	472	2,178
1955	344	428	388	611	509	2,280
Totals	1,662	1,537	2,426	4,392	3,298	14,252

[1] Hours not assigned to a particular district.
[2] Victoria.
Source: Annual Reports, Forest Service.

Fire protection costs money. As I pointed out above, the vote for 1956–57 for protection and suppression, exclusive of an amount of $1,100,000 for permanent-staff salaries and expenses included in the General Salary and Expense Vote, comes to $2,705,000. To this amount must be added the fire-protection tax, estimated at $450,000, making a total expenditure by the Forest Service estimated at $3,155,000 for the fiscal year 1956–57. The money contributed by the Crown is a charge on general revenue. The money chargeable against the owners of timber land, either in permanent or temporary tenures not included in a forest management licence or tree-farms in excess of 640 acres, is at the rate of 6 cents per acre. Areas in forest management licences and tree-farms over 640 acres in extent are taxed at the rate of 9 cents for each thousand feet board-measure (or 5 cents for each 100 cubic feet) of "the approved annual productive capacity" of the licence or tree-farm.

Taking into consideration the evidence adduced concerning the urgent necessity of strengthening the fire protection and suppression agencies of the Forest Service, and weighing all the relevant factors, as best I can, it is my conclusion that the Crown ought to increase its contribution from the present level to $4,000,000 a year in such yearly increased amounts as the Forest Service considers it may wisely and necessarily expend.

I do not consider that the fire-protection tax should be increased. Industry is now spending considerably more on fire prevention and protection than its tax of $450,000.

The approximate expenditures on fire protection by industry in 1955 in addition to the fire-protection tax are reported as follows:—

TABLE 62

REPORTED APPROXIMATE EXPENDITURE IN FOREST PROTECTION BY OTHER AGENCIES, 1955

Forest District	Patrols and Fire Prevention	Tools and Equipment	Improvements	Total
Vancouver	$203,963.00	$200,374.00	$39,881.00	$444,218.00
Prince Rupert	30,003.00	33,285.00	7,800.00	71,088.00
Prince George	16,000.00	8,720.00	4,000.00	28,720.00
Kamloops	2,285.00	43,360.00	6,559.00	52,204.00
Nelson	9,050.00	42,068.00	29,700.00	80,818.00
Totals	$261,301.00	$327,807.00	$87,940.00	$677,048.00
Ten-year averages, 1946–55	$193,482.28	$285,024.09	$53,478.80	$531,985.17

Source: Annual Report, Forest Service, 1955.

In addition to these prevention and protection costs, industry has spent on the average over the last ten years (1946–55) $256,416 a year fighting fires. Total cost to the Forest Service for fire-fighting during the same period average $282,791 a year.

There are various reasons that can be advanced to justify this recommended increased allotment by the Crown. The following table shows the relationship that the Crown contributions to fire protection bear to total forest revenues and total forestry expenditures during the years indicated:—

TABLE 63

(1) Year	(2) Total Forestry Expenditure	(3) Contributions to F.P.	(4) Percentage of (3) to (2)	(5) Revenue	(6) Percentage of (3) to (5)
1943–44	$1,186,093	$500,000	42.15	$3,907,160	12.7
1953–54	7,724,876	2,089,521	27.1	19,054,607	10.9
1954–55	7,847,532	2,000,000	25.5	21,150,833	9.5
1955–56	8,672,898	2,348,291	27.1	23,867,705	9.8
1956–57 (estimate)	13,078,468	2,705,000	20.1	29,563,000	9.1

Source: Annual Reports, Forest Service.

It will be seen from these figures that Crown contributions to the Fire Protection Fund, while increasing in amount, have decreased substantially in relative proportion to forest revenues and expenditures. I extract the following figures from the foregoing table to indicate the percentage increases in revenues, expenditures, and Crown contributions for the years selected:—

Year	Total Forest Revenue	Total Expenditure	Contribution to Fire Protection
1953–54	$19,054,607	$7,724,876	$2,089,521
1956–57 (estimate)	29,563,000	13,078,468	2,705,000
Increase	$10,508,393 (65%)	$5,353,592 (70%)	$615,479 (30%)

Fire protection must not only extend to productive forest land, but to non-productive land as well. These areas include roads, bridges, the Pacific Great Eastern Railway, farms, villages, watersheds, irrigation, and power-works and dams.

When the varied Crown interests are taken into account, the present Crown contributions are relatively small in comparison with the enormous values involved—present and potential—both to the Province and to the National economy.

In 1945 I said (in part), after reviewing the benefits accruing to the nation and to the Federal treasury from the products of our forests:—

> "It seems to me because of the benefits accruing to the people of Canada from the forests of this Province that the Dominion Government should shoulder some of the financial responsibility for the protection and conservation of this national asset."*

It is encouraging to note that in 1956, after a lapse of eleven years, the Dominion Government agreed to make the following grants in aid of fire protection:—

1957–58	$74,840.00
1958–59	114,865.00
1959–60	194,915.00
1960–61	194,915.00
1961–62	194,915.00
Total	$774,450.00

Total Federal revenue receipts from the forest industries of this Province in 1954–55 amounted to an estimated $112,800,000. Total Federal expenditures on forestry in British Columbia during this same year amounted to $1,133,000. The Dominion Government has expended on forestry conservation, surveys, and research in this Province less than 1 per cent of the yearly direct revenue it receives from our forest industries. The additional grants in aid of fire protection will not appreciably affect this percentage, providing our forest industries do not slip into an extended period of diminishing profits with a corresponding drop in Federal tax receipts.

* Report of Forestry Commission, 1945, p. 134.

FOREST CLOSURES

Forest closures operating either in part or in totality are a valuable means of reducing fire occurrences. In 1944, closures, when ordered, were general in scope, and industry was not in agreement with this policy. I said in the 1945 Report:—

> " One way to keep the spark out of the powder during these periods of high hazard is to keep people out of the woods. The instrument by which this means is accomplished is the power of closure vested in the Minister. The closures ordered from time to time have been general in scope and because of the varied conditions of temperature and humidity in various areas within the operation of the order this system has been subject to critical comment by spokesmen for the industry. Logging camps, it is suggested, have been forced to close when local conditions rendered it quite safe for men to stay in the woods at work. The Deputy Minister agrees that the general closure is not altogether satisfactory in operation and he is quite prepared to set up an organization of more flexibility than at present to meet this criticism. His proposed method of dealing with the closure question is by a series of steps depending upon the exigencies of the situation. These steps may be summarized as follows:—
>
> "(1) The organization of a widely distributed system of stations reporting the essential weather data daily, or twice daily during periods of extreme danger, to a central office:
>
> "(2) This information to be plotted immediately it is received, in much the same way as the Dominion Weather Bureau plots its weather data. An experienced fire-control officer should examine this plotted data critically every day to watch trends and ' build up ':
>
> "(3) First action on an indicated dangerous ' build up ' would be in the form of warnings:
>
> "(4) Second action would be restrictive orders such as ' early shift ' or discontinuing work of the most hazardous description:
>
> "(5) Third action as risk increases, partial closures and closure to public travel in the woods:
>
> "(6) Fourth action would be complete closure in the most hazardous zones:
>
> "(7) Total closure."*

These seven steps have now been adopted as Forest Service policy. Industry, while recording the fact that closures are costly to employers and employees, is apparently in general agreement with this revised method of ordering closures and with the manner in which, from time to time, it has been administered. One complaint, however, has been forthcoming that in

*Report of Forestry Commission, 1945, p. 138.

my opinion is deserving of recognition. It is that quick closures at times are essential and that the authority vested in the Minister ought to be delegated in part to District Foresters or to Rangers where circumstances dictate the necessity for such action. This authority could, and, in my opinion, should, be delegated to be exercised in limited areas, subject to continuation by Ministerial confirmation within a stated time. To illustrate: Let us assume that in local Area A a high hazard develops and Company X voluntarily withdraws its crews from the woods. Company Y, probably a smaller outfit, a few miles away continues, in the absence of a closure order, to log. If the Ranger is of opinion that continued logging by Company Y is creating a risk potential endangering the area, it seems reasonable to me that he should be empowered to order Company Y to discontinue its operations for a period of from, say, twelve to forty-eight hours, depending upon the exigencies of the situation. Within that time the Minister should be advised of this action and could either confirm it by ordering a complete or partial closure in this hazardous zone, or alternatively dissolve or modify the Ranger's order. In the absence of any Ministerial direction the Ranger's order would, of course, expire by the effluxion of time. Similar jurisdiction could be exercised by the District Forester in larger areas and subject to the same overriding authority of the Minister.

This procedure would, I believe, add a desirable flexibility and dispatch to the present methods by authorizing the Forest Officers on the ground, and familiar with local conditions, to order closures in limited areas for short periods.

I added this comment to the 1945 suggestions of the Deputy Minister:—

> " I would add to the seven successive steps of the Deputy Minister another to this effect: that notwithstanding the fact that no closure order—either partial or complete—had been issued any logging operation at which the humidity dropped to a reading of 30 should cease work immediately and take the men out of the woods. It should be compulsory for the operator to maintain, in the area where the logging is being conducted, one or more hygrometers with automatic devices recording the relative humidity readings."

This was not made mandatory, but Industry is now maintaining fire-weather instruments for its own benefit on all the bigger operations. On many of these operations, crews are withdrawn from the woods when readings indicate conditions of high hazard in that particular area. In addition, these readings are transmitted to the Forest Service to assist in assessing the fire-hazard " build-up index."

As illustrative of the extent of these voluntary closures, one company in one of its logging operations on Vancouver Island has, during the past six years, on its own volition shut down in dangerous fire weather for an average of 10 partial days and 6.7 full days per year. Compulsory closures dur-

ing this same period averaged 5.3 days per year. The voluntary closures were, of course, in addition to the closures ordered by the Forest Service.

SLASH-BURNING

In 1944 the burning of slash on the Coast as a protective measure was compulsory by virtue of the relevant sections of the then "Forest Act" (sections 113A *et seq.*). Notwithstanding the fact the Service did not insist upon a rigorous compliance therewith, 79 per cent of the area logged in the Vancouver Forest District in that year was "broadcast burned." Considerable hostility to this compulsory feature of the Act was evidenced in the last Inquiry, and the 1945 Report contained my comment covering slash-burning:—

> "This subject disclosed very many divergent opinions. Considerable evidence was adduced on whether it is better to burn or not to burn logging debris. Slash-disposal by burning as a method of abating a fire-hazard has many exponents as well as many opponents. The effect of burning on regeneration was also the subject of much debate. I have reached the conclusion, after consideration of the many and varied points of view, that it is impossible to formulate any policy of general application in relation to slash-burning. This is so because each individual operation presents a specific problem in relation to slash-disposal and its effects upon the residual stands, forest soil, the establishment of seedlings by natural regeneration, and probable reduction of hazardous conditions on the area under review.*
>
> ". . . I would recommend that the Act be amended to provide that slash-burning be not compulsory on the Coast except where so directed by the Deputy Minister."*

This recommendation was adopted and the legislation amended accordingly. The relevant section (113 (4) and (5)) reads in part as follows:—

> "(4) Where any slash, including in that expression brush or debris, is occasioned or accumulated, the person carrying on the operation shall dispose of the slash by burning as and when instructed so to do by the Deputy Minister or any officer of the Forest Service authorized by the Deputy Minister to give such instructions.
>
> "(5) The Deputy Minister or officer of the Forest Service in his instructions may require any part of the slash to be left on the ground, and may require any measures to be taken by the operator to safeguard forest soil, seedlings, young trees, standing timber, or other property from damage likely to result from disposal measures, and may prohibit the burning of slash where in his opinion excessive damage is likely to result from burning."†

---

* Report of Forestry Commission, 1945, pp. 135–136.
† "Forest Act," section 113 (4) and (5).

Since this amendment in 1948 the attitude of the Forest Service toward slash-burning has undergone a considerable revision. This has resulted from various factors, including altered logging methods such as changing from clear cutting in very large continuous blocks to patch logging, closer utilization, thus leaving less debris, and improved access due to increased truck logging with its network of logging-roads. Then, too, the logging industry has demonstrated a growing degree of "fire consciousness," reflected in a self-protective improvement in logging methods such as I have mentioned and generally in exercising an increasing care in the woods and around the camps.

In comparison with the broadcast burning of about 78 per cent of the acreage logged in the Vancouver District in 1945, the following figures are illustrative of the change in policy during the last six years and appear to indicate a trend toward spot burning (for example burning accumulations at landings and along haul-roads) as distinct from broadcast burning.

TABLE 64

VANCOUVER FOREST DISTRICT

Year	Acres Logged	Broadcast Burning		Spot Burning		Percentage of Total Acres Burned to Acres Logged
		Acres	Per Cent	Acres	Per Cent	
1950	75,503	30,917	40.9	16,892	22.4	63.3
1951	71,751	18,170	25.3	17,827	24.8	50.1
1952	75,291	32,100	42.6	23,493	31.2	73.8
1953	79,198	23,004	29.0	20,936	26.4	55.4
1954	81,833	26,025	31.8	18,316	22.4	54.2
1955	84,484	6,651	7.9	31,835	37.7	45.6

Source: Annual Reports, Forest Service.

Slash-burning is a subject that is, to a degree, still contentious. I see no reason, however, to suggest any change in the present policy of discretionary burning. The decision to burn or not to burn is the result of a field examination by a slash-disposal officer. In my evaluation of the evidence it is, I think, manifest that the Service requires more of these inspectors, who should be qualified by experience and a more extensive training in evaluating the silvicultural factors necessarily involved in the discharge of their duties.

The Canadian Institute of Forestry, in speaking of fire protection on the Coast, said in part:—

> "Much remains to be learned about the factors influencing the start, the spread, and the damage likely to result from forest fires. Fire danger is an extremely local matter that must be rated at every Ranger Station and at every active operation. Many factors other than rela-

tive humidity and fuel moisture influence fire danger. . . . Unfortunately, there is still a lot to be learned in the application of available systems of rating fire danger."

This comment is supported by an interesting study prepared by Mr. G. A. Patterson, entitled " Some New Guides to Slash Burning." It is my view, based on this and other evidence, that further research is indicated as essential in relation to rating fire danger and behaviour.

CO-OPERATION

Industry as a whole is manifesting a genuine desire to co-operate fully with the Forest Service in matters of fire protection. A number of the larger companies (which have the most to lose and the money to spend) have assumed obligations in that behalf in instances in excess of requirements imposed by the Forest Service, both in relation to personnel and equipment.

As an instance, one company, which pays an annual fire-protection tax in excess of $11,000, has over $300,000 worth of equipment, such as hose, pumps, and tank-trucks, and spent, in addition to the tax, in 1954, $167,000 on protection.

In another sense, co-operation is manifest in the formation of informal committees, composed of those financially interested in fire protection. Ideas are exchanged and some protection efforts of the Service and industry are thus correlated. Fire is a common enemy, and a close co-ordination of all fire protection and fire-fighting agencies would undoubtedly be of mutual advantage to each.

FIRE WARDENS

In addition to the present system of appointing Honorary Fire Wardens, who perform a valuable function, it was stressed by many witnesses that logging operations should be required to employ one or more Fire Wardens who hold a certicate of competence indicating their graduation from a school teaching fire-prevention methods and techniques of fire suppression. The compulsory employment of men competent to administer first aid and the increase in accident-prevention personnel may be regarded as developments foreshadowing this suggestion.

Providing the necessary schools are established by either the Forest Service or industry, or both, acting together in some form of co-operative enterprise, or perhaps by the extension of accident-prevention training, to include these more or less related subjects, it seems to me that the idea is a good one and its effective execution would be of very real future value.

It is my recommendation, therefore, that serious thought be given to the possibility of the training and the compulsory employment by industry of certified Fire Wardens in selected hazardous areas—regardless of tenure

—where logging is conducted on a scale large enough to justify the added cost.

FIRE-FIGHTING

So far I have been discussing fire protection. Fire-fighting by suppression crews is essentially a factor in protection. There comes a time—unfortunately not infrequent—when a fire gets away and must be fought vigorously. These big conflagrations are generally in areas of comparative inaccessibility, and the fire-fighting in consequence is a difficult and costly business.

The years 1951 and 1952 are remembered as two bad fire years. In 1951, 7.7 per cent of the fires accounted for 87 per cent of the Forest Service fire-fighting bill, and the same figures for 1952 were 5.7 and 84 per cent respectively. With few exceptions these costly fires were in inaccessible areas.

It is, I think, an indisputable fact that a niggardly policy in relation to fire protection will, in the long run, prove more costly in terms of money finally spent on fire-fighting than a timely and generous allocation of funds for protective purposes. Neither the Forest Service nor past Governments have ever begrudged spending money without stint in fighting fires which became widespread and dangerous conflagrations. The cost to the Forest Service of fighting forest fires, averaged over the ten-year period 1946 to 1955, works out at a little over $280,000 a year. This figures does not include fire-fighting costs borne and paid by Industry, without recompense from the Crown.

Industry has, over the past ten years, 1946 to 1955, spent on an average about $250,000 a year in fighting fires. The obligation to carry out this fire-fighting function is imposed by the relevant sections of the "Forest Act" (sections 118 *et seq.*). In general the Act charges the person conducting an industrial operation on any land with the statutory duty to fight fires upon that land " no matter how, where or by whom the fire may have been set." This same obligation extends to any person " occupying " the land upon which the fire originated or to which it spread.

In order to discharge this duty satisfactorily, the person conducting the operation or the " occupier " of the land on which the fire is burning is required to " employ the services of as many of the men employed by him, up to the total of such men and any of his equipment suitable for fire-fighting as may be necessary " and he " shall himself pay for the services of the men and equipment so employed."

Subject to certain provisos, such as the payment of the fire protection tax, the fact that the fire did not originate on or spread from land occupied by him, and the diligent discharge of his fire-fighting duties, the Crown reimburses him for the total amount expended by him in controlling and extinguishing the fire " except that the amounts allowed for wages paid for

the services of the men so employed shall not exceed the rate prescribed for the Forest Service for such work."

This last exception is undoubtedly an important one and oft-times results in a heavy financial burden for fighting fires being borne by those who were neither directly nor indirectly responsible for their start or their spread.

On a small operation the impact of the provision is not so severe, but when an operator employing perhaps 1,000 men is compelled to divert them from their normal duties to fight a fire at their going rates of pay, the cost quickly amounts to a very substantial amount. The Forest Service rate of recompense pay at 75 cents an hour is a minor contribution to the total wage bill, to say nothing of lost production, which is absorbed by the operator.

Industry generally is not complaining of the present relevant legislative provisions except in one particular: that is in relation to a Forest Service interpretation of the word " occupier " as it affects forest management licences. The ruling in question is that " the area of occupation is deemed to be all lands within the boundaries of the forest management licence."

It is argued that " an area of occupation " within the statutory intent of section 118 of the " Forest Act " has, as an essential ingredient, some form of physical occupation by, for instance, a working crew or camp and cannot be extended to include areas in a forest management licence not being worked and perhaps remote from any immediate woods activity of the licensee.

In interpreting " occupation " in relation to other tenures—Crown grant or temporary—the Forest Service has adopted the principle of this submission. In relation to forest management licences—another form of tenure—it has refused to do so.

An examination of two hypothetical cases will illustrate the consequences flowing from these two varying concepts of " occupation." Company A has a title by Crown grant to timbered land in contiguous holdings and is paying the 6-cents-per-acre fire-protection tax. It has closed down logging in one area and moved its setting and crew to another area several miles away. A fire later originates in the closed-down area, caused probably by a camper. The Forest Service fights the fire on this land at no cost to Company A upon the basis that the land while owned by Company A is not at the time of the fire occupied by it.

The situation would be treated in the same manner if Company A held the two areas under a timber licence or other form of temporary tenure except a forest management licence. Let us now assume Company B has a forest management licence consisting of several blocks, X and Y, perhaps 100 miles apart. Let us assume then that Block X is at the north end of Vancouver Island and Block Y near Duncan. No logging is being done on Block X and no crews are there, but 1,000 men are employed on Block Y. A fire originates on Block X. According to the Forest Service interpreta-

tion previously quoted, Company B is " occupying " Block X and must send its 1,000 men (or as many of them as may be necessary), together with adequate equipment, from Duncan to Block X, 100 miles away, to combat the blaze. In actual practice I presume the Forest Service would recruit its own fire-fighting crews in the locality of Block X, but in any event Company B is billed for the actual cost of hiring these men up to the total number of men employed by Company B on Block Y, together with such other expense items that are incurred by the Forest Service in fighting this fire.

I am unable to appreciate the reason for this discrimination between the classes of tenure and I can find none in the evidence. It may be considered doubtful whether or not the language of the Act could be so construed to support this apparent distinction in treatment. I do not, however, consider it within my province as Commissioner to render judgment in matters of legal controversy, and thus refrain from an expression of opinion on this aspect of the matter.

The explanation may lie in the fact that the fire-protection tax chargeable against forest management licences is rated on " the approved annual productive capacity of the licence " and not on an acreage basis as on other tenures, resulting perhaps in slightly lower payments for this class of tenure.

This, in turn, may have influenced the Forest Service to conclude that forest management licensees should shoulder a much higher potential obligation for the cost of fighting fires than other licensees or Crown grantees.

Then again it may be that the Forest Service in exposing this category of licensee to the threat of paying the cost of fighting fires for which they are not responsible on " all the lands within the boundaries of the forest management licence " was using this as an indirect device to force the licensee to expend considerable sums of money on fire protection. They have this jurisdiction now when assessing the adequacy of fire-protection measures contemplated in the working plans submitted for approval. Indirection in this instance seems a superfluous exercise of power and may, in consequence, be reasonably excluded as a speculative assumption.

The fact remains, however, that, for whatever reasons may be assigned, the present policy of the Forest Service in this respect operates to the detriment of the forest management licensee. I see no reason why this discrimination should exist, and in consequence recommend that the fire-fighting obligations and the financial responsibility therefor should be imposed without distinction upon all classes of tenure.

In fairness to the Forest Service I should add that it may have reasons thought good and sufficient to warrant the discrimination I recommend be discontinued, and which were not disclosed to me. If the Forest Service can discharge the heavy onus of justifying to the Government the continuance of a policy of discrimination in this regard, then my recommendation will, of course, be thus nullified.

PEACE RIVER AREA

The Peace River District, now a part of the Prince George Forest District, includes that portion of British Columbia east of the height of the land on the east side of the Rocky Mountain Trench plus the watersheds of the Ketchika and Dease Rivers. This area covers 52,000,000 acres, of which 9,200,000 acres are classed as productive forest land.

The opening of the Alaska Highway and the booming timber market have, over the past few years, resulted in a substantial increase in the cut of this area. From 1945 to 1956, inclusive, the cut has totalled about 465 million f.b.m., from which the Crown has received $2,112,000 in revenue. Fire-fighting costs in this area have during this same period totalled $154,606.

After the Dominion Government had relinquished its administration in 1930, persons in an area equal to about 50 per cent of the Peace River Block and encompassing the more-settled portions were, by an Order in Council dated April 13th, 1931, exempted from the necessity of requiring permits to burn. The reason for this was that the Forest Service could not afford the expense of keeping more than one Ranger in this vast area.

The inevitable result was that farmers clearing land in the spring started fires which caused deplorable losses of timber. Fires 150 miles wide occurred.

In considering this situation in 1945, I said:—

> ". . . total lack of fire-protection has resulted in the denudation of many thousands of acres of productive forest land in the Peace River area.
>
> "A survey in 1931 indicated a timber stand in the Peace River Block of 3,850,800,000 board-feet. Since that time fires have destroyed about 3,350,000,000 feet of this stand, leaving remaining one-half billion feet. This is a serious loss to the Province with far-reaching economic consequences. How much of this timber would have been saved with a proper fire-protection organization it is difficult to say. . . ."*

The present inventory indicates that there is approximately 17 billion board-feet of timber and over 7,600,000 acres of productive forest land requiring protection in the Peace River drainage area in British Columbia.

The Forest Service has, since 1931, increased its staff from one to two Rangers. There are in addition seven Assistant Rangers, two lookoutmen, and two dispatchers. This gives a coverage for each Ranger of 26,000,000 acres, or, taking the entire strength of thirteen, one man to each 4,000,000 acres.

* Report of Forestry Commission, 1945, p. 132.

All fire statistics relative to this portion of the Province are only approximate. The area is huge; the detection facilities, meagre. Over a large proportion of the area, information comes from the R.C.A.F. and other sources, which merely tell of huge fires in areas so remote it is not feasible to dispatch fire-fighting crews. Again, in the "No Permit" area, it is a matter of opinion when a settler's legitimate burning without permit becomes a forest fire. The present rough rule is that it is not a forest fire until forest values are involved.

The present fire-fighting policy may be briefly described as follows:—

(1) Major fires will only be fought when merchantable timber values are involved; and even where such values are involved, major fires in remote areas where costs would be prohibitive will not be fought.

(2) In the "No Permit" area, fighting fires is the exception and only carried on when timber values are involved. The farming population is responsible for its own protection. The Forest Service does not feel justified in spending money on the protection of private property, and does not consider itself a rural fire brigade, although assistance is given.

(3) Elsewhere, in the enormous areas north of latitude 57°, as a general rule, fires are fought only when they can be controlled by a ten-man crew.

The area north of the 57th parallel, which is considered to be the southern boundary of the "perma-frost" zone, contains only approximately one-sixth of the total productive forest area but about two-thirds of the total area. The area south of the 57th parallel, containing five-sixths of the productive forest area, is primarily agricultural land which is being developed rapidly. The timber is usually confined to valleys or river-bottoms, with vast areas of non-productive land in between.

It is manifest that the Peace River area does not justify the same treatment nor the same intensity of coverage as the less-remote sections of the Province.

The present coverage is, however, not in keeping with the necessities of the situation. More Rangers and other assistants are required. To bring the present staff to one-quarter of the normal staff requirements in other areas of the Province, an additional fifty-two men are needed, bringing the total strength to sixty-five, made up as follows:—

	Present	Additional	Total
Rangers	2	4	6
Assistant Rangers	7	34	41
Lookout-men	2	10	12
Dispatchers	2	4	6
Totals	13	52	65

This gives a coverage of one man to each 800,000 acres as against 4,000,000 acres at present.

Difficulty of access emerges from the evidence. Mr. R. G. McKee, Assistant Chief Forester, presented the fire-protection brief prepared on behalf of the Forest Service by him and Mr. Ian Cameron, Forester in Charge of the Forest Protection Division. On examination by Commission Counsel he said:—

> " . . . you can't quarrel with the idea of raising agricultural crops on agricultural land, but the trouble is that in burning off the agricultural land, they also take out the forests in there unless we get in there with more protection. But there's no use us thinking of protecting the Peace River country in the spring of the year, without helicopters, because you can't get around, they don't build roads fast enough, and you wouldn't have enough staff with what we even have here to be able to get out and control this horrible spring burning that goes on. You can't get your men over those gumbo roads fast enough to do any good without some kind of extra protection."*

As I mentioned before, a helicopter would seem to be an essential piece of fire-protection equipment in these remote areas.

Continuing:—

> " Q.—These spring fires you speak of are presumably clearing fires for agricultural purposes? A.—Yes.
>
> " Q.—Haven't you any control of them? A.—As I say, we have a token force in the Peace River.
>
> " Q.—No, I am talking about your jurisdiction at the moment, not the exercise of it. Have you the jurisdiction to compel these farmers who are clearing for agricultural purposes to apply to your Department for a fire permit before they start these blazes? A.—Yes, we have except for that one area of the Peace River Block which was deliberately cut out from the responsibilities of asking for a permit in the first place. There is such an area of farm land in the Peace River where permits are not required to set a fire.
>
> " Q.—Is that contiguous to forest areas? A.—Yes, it's the heart of the Peace River Block where the farming goes on, and it is surrounded by forest areas on the outside."*

It seems to me that the 1931 policy of exempting " the heart of the Peace River Block " surrounded by forested areas from the necessity of acquiring permits to burn in fire seasons should be reviewed and, if the staff is available, revoked.

Excluding equipment costs and Ranger salaries, the additional salary requirements for the suggested increase in staff—most of whom are, of course, seasonal employees—would not amount to any large outlay.

* Transcript, pp. 1314–1315.

INSURANCE

The evidence before me pointed to the desirability of the Government initiating studies in order to determine the feasibility of designing a Government operated or assisted insurance undertaking covering fire losses in mature and young-growth forests. I am unable to contribute anything of value to this discussion, except to record the desire of industry that this be done, and to add that the request seems, in the light of all the circumstances, a reasonable one. This could be a matter for study and subsequent recommendations by the Provincial Advisory Council.

HUNTERS

Considerable evidence was advanced concerning the seasonal influx of hunters into wooded areas and their use of access roads as a factor in assessing fire risks. I propose to deal with this subject when considering access roads generally.

INSECT PESTS AND DISEASES

Forest fires can be awe-inspiring spectacles and the public is in a general sense aware of the devastation and the direct and indirect loss in values attributable thereto. The public is, I think, less informed and consequently less interested in the more extensive losses caused by the steady and increasing erosion of timber values by insects and diseases. These agencies of nature wage a cold and unspectacular but nevertheless disastrous warfare killing and maiming old and young trees alike.

In old-growth stands the killing of decadent trees by insects and diseases may be nature's method of preparing the ground for new and virile young forests—no doubt a valuable function of these agencies if limited to that type of destruction. Nature, however, is not in the business of forest management in the same sense as man, and probably plans in terms of æons rather than in rotations. Just as a statistical percentage of the various age-classes of humans succumb in any one year to diseases of various kinds, the normal forest mortality due to endemic insect infestations and diseases discloses, in a statistical sense, much the same pattern.

Then, too, periodical insect epidemics occur that spread over large areas killing tremendous volumes of timber. Human experience has its parallel in epidemics costly to human life.

Just as man has learned and is learning to lessen the impact of endemic and epidemic diseases upon the human population, so have the forest pathologists, biologists, and zoologists learned and are learning to control, if not eradicate, those agencies of nature destructive of our tree " population " and to find ways to minimize consequential losses.

LOSSES

I am greatly indebted to Science Service of the Dominion Department of Agriculture for presenting to the Commission through Dr. M. L. Prebble, Chief of the Forest Biology Division; Mr. H. A. Richmond, in charge of Forest Zoology Investigations; and Dr. R. E. Foster, in charge of Forest Pathology Investigations, their extensive studies relative to insect pests and diseases. Many of the following passages will be recognized as observations selected from their evidence, with some variation in form but not in content.

Before turning to examine the extent of the estimated losses due to the depredations of insects and the incidence of decay caused by diseases, it must be emphasized that accurate and meaningful estimates of annual or periodic losses due to insects and diseases are very difficult to compile. The huge forested area of the Province virtually makes accurate appraisal impossible. Then, no one unit of measurement can accommodate such diverse elements as the volume of merchantable timber killed outright; the

effect of progressively accumulated decay volume in mature and overmature stands; the mortality of young trees of unmerchantable size; the loss of increment and hence the postponement of merchantable maturity from repeated non-fatal defoliation or infection; and quality depreciation of living trees resulting from top-killing and stem cankers, or of logs resulting from ambrosia beetles, stains, and sap rots. Destructive outbreaks also reduce æsthetic values and recreational use in resort areas and increase the probability of costly forest fires.

Accessibility has a profound influence on the economic significance of insect and disease damage. Temporary depletion in inaccessible and currently unmerchantable stands might have no economic significance, especially if the depletion were repaired through renewal of the forest before it could in any case be opened up for economic production. Significant economic damage is that which lowers current increment, or reduces the volume or value of merchantable stands held in reserve for operation in the near future, or diminishes the yield of accessible young stands. Direct value losses in logs after felling and bucking also fall in this category.

Keeping in mind the difficulties inherent in any endeavour to represent, to any precise degree, insect losses, the following table does at least direct attention to the severity of the damage suffered by our forests from this cause:—

TABLE 65

ESTIMATED TIMBER LOSSES CAUSED BY INSECTS IN BRITISH COLUMBIA, 1944–54[1]

Timber Species	Insect Species	Locality	Acreage	Mortality (M F.B.M.)
Douglas fir	Douglas fir beetle	Vancouver Island	?	100,000
		Kamloops District	?	?
Engelmann spruce	Spruce beetle	Yahk Forest (Nelson District)	?	70,000
		Bolean Lake (Kamloops District)	150	?
White spruce	Spruce beetle	Nass River Valley (Prince Rupert District)	190,000	?
Lodgepole pine	Mountain pine beetle	Windermere Valley (Nelson District)	3,000	30,000
		White River Valley (Nelson District)	?	3,000
Hemlock, etc.	Hemlock looper	South-west Vancouver Island	50,000	500,000
		Rainy River (Vancouver District)	240	2,500
	Black-headed budworm	North-east Vancouver Island	11,000	90,000

[1] Source: Brief of Forest Biology Division, Science Service, Department of Agriculture, Canada.

The estimates of losses in this table represent specific infestations, and while totalling about 800 million board-feet, the figures are incomplete and do not include losses in those areas followed by a question mark. Neither does the table include losses of increment following non-fatal defoliation nor for losses in value in beetle-infested sawlogs and peeler-logs.

The losses in the Kamloops District, not estimated in the table, are known to be very extensive. An area heavily infested by Douglas fir bark-beetles extends all the way from Kamloops Lake north and west to Quesnel.

In the 1945 Report the 1944 average annual depletion from insect attack was estimated to be 401 million board-feet. This was calculated on the basis of an estimated loss in the Interior averaging 400 million board-feet a year, and in the absence of any records of value a token figure of 1 million board-feet per year insect loss was chargeable against Coast depletion.

Notwithstanding the relative paucity of the loss estimates, the table indicates some changes in pattern. During the period under review, timber mortality was considerably heavier in the Coastal area than in the Interior, owing primarily to the influence of the hemlock looper and the black-headed budworm; the Douglas fir beetle has recently caused much more serious mortality than was hitherto recorded, especially in the Coastal area. The extensive beetle killing of white spruce in the Nass River valley is also worthy of note. Although no estimate of the volume of timber killed in this valley is available, dead, dominant, and codominant trees occurred in 1949 over an area of about 300 square miles. The serious mortality of Engelmann spruce due to beetle attack appears to have been recorded for the first time in British Columbia in recent years.

The losses attributed to the black-headed budworm on Vancouver Island as shown in Table 65 are much too conservative. At last report (1956) this infestation has reached epidemic proportions, extending over hundreds of square miles and threatening the destruction of vast timber volumes.

Major logging companies are co-operating with the Forest Service and the Dominion Science Service in an extensive campaign designed to meet this threat.

DISEASES

In the 1945 Report, losses from decay-causing diseases were estimated on the average at 414 million board-feet. Much more extensive information on decay losses is now available as a result of field studies in the intervening years. The 1944 estimate of cull in the annual cut of Douglas fir, western red cedar, hemlock, and spruce—414 million board-feet—should be revised upward to about 494 million board-feet. The increase is due in part to larger annual production, and in part to more reliable information on the prevalence of decay.

The following tables are indicative of the average annual decay loss in terms of annual production of the species named therein and the estimated accumulated decay in mature and overmature stands of these same four species. Table 66 refers only to the volumes of defect that are in the logs actually cut and removed from the woods for ultimate utilization. The volume of a defective tree or culled log left in the woods is not included.

If these volumes were included, the figures in Table 66 would have to be increased by about 50 per cent, except for Douglas fir figures, which would require an increase of about 10 per cent.

On the other hand, Table 67 does reflect the total amount of defect in the stand, including defective trees and cull logs left in the woods. Cull factors in both tables are equivalent in general because of the different basis of computation: Table 66 computed in board-feet and Table 67 in cubic feet.

TABLE 66

ESTIMATED AVERAGE ANNUAL DECAY LOSS IN DOUGLAS FIR, CEDAR, HEMLOCK, AND SPRUCE, BASED ON ANNUAL PRODUCTION OF THESE SPECIES IN BRITISH COLUMBIA.[1]

Species	Average Sawlog Scale[2] (M F.B.M.)	Percentage Cull[3]	Amount of Cull (M F.B.M.)
Douglas fir—			
Coast	1,308,559	5	65,428
Interior	333,887	10	33,389
Cedar—			
Coast	629,819	20	125,964
Interior	70,226	30	21,068
Hemlock—			
Coast	794,262	20	158,852
Interior	34,166	40	13,666
Spruce—			
Coast	122,135	20	24,427
Interior	339,950	15	50,992
Totals—			
Coast	2,854,775	....	374,671
Interior	778,229	....	119,115
Grand totals	3,633,004	....	493,786

[1] Source: Brief of Forest Biology Division, Science Service, Department of Agriculture, Canada.
[2] Ten-year average derived from Reports of the Forest Service, 1944 to 1953.
[3] Estimated through pathological sampling.

TABLE 67

ESTIMATED ACCUMULATED VOLUME OF DECAY IN MATURE AND OVER-MATURE STANDS OF DOUGLAS FIR, CEDAR, HEMLOCK, AND SPRUCE IN BRITISH COLUMBIA.[1]

(Volumes in millions of cubic feet.)

Species	Net Volume[2]	Total Stand Defect[3] (per Cent)	Decay Volume
Douglas fir—			
Coast	7,239	5	381
Interior	7,127	10	792
Cedar—			
Coast	12,802	20	3,200
Interior	4,916	30	2,107
Hemlock—			
Coast	20,876	20	5,219
Interior	9,958	40	6,639
Spruce—			
Coast	3,431	20	858
Interior	29,956	15	5,286
Totals	96,305	—	24,482

[1] Source: Brief of Forest Biology Division, Science Service, Department of Agriculture, Canada.
[2] Data provided by Surveys Division, British Columbia Forest Service.
[3] Determined by pathological sampling.

The estimated accumulated volume of decay totalling 24 billion cubic feet, or about 140 billion board-feet, and an average annual decay loss of 493 million board-feet are very substantial figures. It seems to me, however, that they may be regarded as conservative when examined in the light of decadence studies made in the Kitimat, Upper Columbia, and Bolean Lake regions. Every tree on selected typical sample plots was, prior to its cutting, classified as "residual," "suspect," or "dead." That a tree was dead was obvious from the characteristics of its foliage or lack of it. The living trees in the stand were divided into two groups. Those that contained abnormalities, thought to be significant, were called "suspect." Those abnormalities included such things as open scars, frost crack, conks or sporophores, or broken tops. The residual trees were what were left over. They were the apparently healthy living trees in the stand.

The following table shows the results of these studies. The first section relates to occurrences of disease and the second to the volume affected.

TABLE 68

BASIC DATA PERTAINING TO THE R-S-D TREE DECADENCE CLASSIFICATION IN BRITISH COLUMBIA[1]

Decadence Classification	Kitimat Region		Upper Columbia Region	Bolean Lake	
	Western Hemlock (Basis, 95 Trees)	Amabilis Fir (Basis, 102 Trees)	Western Hemlock (Basis, 833 Trees)	Alpine Fir (Basis, 78 Trees)	Engelmann Spruce (Basis, 78 Trees)
	Percentage of Trees in Class Containing Disease Defect (Occurrence)				
Residual	46.0	28.0	60.5	55.0	31.8
Suspect	65.0	63.0	95.9	58.6	45.7
Dead	100.0	100.0	100.0	100.0	100.0
	Average Percentage of Volume Destroyed by Disease[2] (Volume)				
Residual	5.3	13.1	11.6	11.3	6.4
Suspect	38.4	37.7	55.1	22.2	15.4
Dead	84.9	100.0	95.2	50.5	50.6

[1] Source: Brief of Forest Biology Division, Science Service, Department of Agriculture, Canada.
[2] Preliminary values, cubic feet.

The percentage averages of decay volume in western hemlock in the Upper Columbia region have been estimated, when combined, to be 74 per cent in terms of board-foot measurement.

Turning back to Table 67 we see that this 74 per cent volume loss in hemlock has been scaled down to an over-all 40 per cent. Other comparisons could be made to support my conclusion that the estimated amounts of accumulated decay and yearly losses due to the incidence of diseases are not extravagant but conservative.

The amount of accumulated decay volume, if not defective, would have been sufficient to maintain forest industries in British Columbia at their present rate of cutting for some twenty-five years. It is a presumably unmerchantable volume which is occupying otherwise productive forest land. In addition, it represents a charge to production as it must be avoided or rejected in logging or milling, and must be destroyed in most cases prior to the establishment of the new crop. Finally, I presume it is taken into account in cruise estimates and is therefore not included in the net volume summaries of the Provincial inventory, yet it nevertheless has reference to a loss volume that might be reduced, at least in part, through more intensive forest utilization, silvicultural and management, in the future.

Losses due to diseases also occur in nurseries and young stands. For instance, an outbreak of top blight in 1947 destroyed about 3 million 1-year-old Douglas fir seedlings—approximately one-half the stock of the Duncan nurseries. The pole blight of western white pine is an example of

disease loss in young stands. Decline of a young stand at Silverton, in the Nelson District, characteristic of many of the young stands in the Interior, is shown in the following synopsis:—

Condition	Percentage Distribution by Condition Classes			
	1951	1952	1953	1954
Apparently healthy	38	20	12	11
Diseased	58	73	76	73
Dead	4	7	12	16

Source: Brief of Forest Biology Division, Science Service, Department of Agriculture, Canada.

White pine blister-rust and *Poria* root-rot of Douglas fir are additional examples of diseases causing appreciable losses in young stands. The spores of the white pine blister-rust coming from the host bushes infect and enter the twigs or needles of the tree, and from there the fungus-growth spreads to the main stem and girdles it, killing the tree. Mortality is more rapid in young stands because of the shorter distance the fungus has to travel to the main stem than in trees of larger growth.

It is of interest, I think, to record that in Idaho from 1922 to 1946 approximately $18,000,000 was spent in attempting to eradicate blister-rust by destroying the host bushes by hand—currant and gooseberries (*Ribes*). At one time (in 1934) actually 11,000 men were engaged in this work—a labour force equal to one and a half times the total number of persons employed in the logging and lumbering industries of that State in that year. The programme of eradication is still being pursued vigorously in Idaho, Western Washington, and Montana, but with the emphasis, I believe, shifted to the use of sprays to destroy the host bushes.

From an analysis of the available data, *Poria* root-rot is believed to spread from tree to tree through superficial contact of roots as small as 1 centimetre in diameter. The disease apparently spreads with greater rapidity in pure stands of fir than in mixed stands of fir and cedar. This mortality in nurseries and young stands cannot be assessed in terms of present volume losses, and the future potential values lost are incapable of conversion except perhaps in most speculative terms. These unpleasant events do, however, focus attention on the fact that diseases extract a heavy toll from the very youngest to the oldest age-classes. Sometimes the remedial measures are not difficult of application. For instance, the losses of nursery stock at Duncan were reduced to about 10 per cent by a soil amendment and a sand covering over the seed-beds. In contrast with this experience, the cause of the pole blight cruelly attacking western white pine has yet to be determined, and in consequence the remedy is not known. Trees affected, usually in stands of intermediate age, go into decline, indi-

cated by a progressive reduction in growth and loss of vigour, eventually dying in from three to nine years following the appearance of the first symptoms.

The deleterious effects of the two diseases — blister-rust and pole blight — upon this species, resulting as they do in a high percentage of stand fatalities, foretells, with our present knowledge, an almost hopeless outlook for the continuation of western white pine in this Province in any quantity, unless the long-continued effort on the part of the Federal Division of Forest Biology to produce a race of white pine immune to these diseases meets with ultimate success. It is heartening to know that in Scotland cross-breeding of larch produced the Dirkeld hybrid larch, resistant to canker.

While it seems evident that insects and diseases are no respecters of either youth or old age, the areas of damage are not distributed at random, but tend to be concentrated according to ecological principles. Concentrations of the host tree, predominance of mature and overmature stands, and predisposing factors, such as the site and climatic trends, influence the time, place, and degree of damage. This has several consequences: (*a*) the concept of static reserves of mature and overmature timber for use in the distant future is not altogether free from the vagaries of chance; (*b*) knowledge of site and stand factors, causing a predisposition to continued damage by endemic insects and diseases, can be utilized to reduce losses through modification of rotation ages, establishment of cutting priorities, salvage-cutting operations, and such like practices; (*c*) control measures can usually be localized, and based on an analysis of anticipated results and costs for a particular forest property.

Direct control of forest diseases may be carried out by removal of diseased trees or alternate hosts, by cutting out of affected parts, or by application of chemicals. These procedures would not generally be economically or practically feasible in extensive forests, but they might be expedient as an emergency measure to protect valuable stands from newly established foreign diseases.

There are really no hard and fast rules for the application of control measures. Inaccessibility and low value of the affected timber, or excessive cost of remedial action, may make it quite impractical to intervene and attempt to alter the normal course of an outbreak. Changing economic conditions, advances in methods of harvesting, improvements in control procedures, and other circumstances peculiar to the situation require that each problem be assessed individually. Direct control methods against insect infestations are usually indicated and undertaken in emergent conditions, such as brief but violent outbreaks in circumscribed areas. Direct control operations consist, for example, of the use of aerial sprays against defoliation. Since 1944 two such aerial spraying operations were carried out in British Columbia. In 1946 some 12,500 acres of hemlock-looper-

infested forest in the Nitinat River area of Vancouver Island were sprayed at a cost of about $1.50 per acre. The cost was shared by the Provincial Government and the industry affected, in the proportion of approximately two to one. Unfortunately, the treatment was too late to prevent fatal defoliation, and heavy timber mortality ensued in spite of the control operation. The second operation was carried out in July, 1948, in the Windermere Valley of the Nelson District, where some 11,200 acres of Douglas fir infested by the false hemlock looper were sprayed by helicopter. The project was organized by the Forest Service, which also bore the cost of the operation (about $3.60 per acre). Excellent results were obtained on the area treated.*

Another direct counter-attack on insects is the use of ground sprays against ambrosia-beetles. The object is to coat the log surface with insecticide before the beetles penetrate the bark. Results of this technique are, as yet, not too encouraging.

Direct control operations against bark-beetles have, so far, consisted of felling, barking, and burning of infected trees, but on a very meagre scale.

Indirect procedures for reducing the insect population are, it appears, more effective over large areas. One course of indirect action is founded upon the knowledge that insects themselves are subject to fatal attacks from parasites, predators, and micro-organisms. These enemies are, in consequence, collected, propagated, and then dispersed throughout the infested areas. One disappointing feature of this method is that our indigenous insects are a hardy lot, and it is only the introduced pest species, such as the emperor larch sawfly and satin-moth, that can be controlled by parasites, which incidentally have also to be imported before being propagated and released to effectuate that purpose.

Biological control principles have not been introduced against tree diseases in the Province, and I am not informed if fungus-parasites could be employed to that end with any practical effect.

From my understanding of the evidence it seems to me that the direct and indirect methods of insect and disease control so far under review, even where effective, are more or less palliative. There are "slum areas" in our forests where pests and diseases find a favourable environment and establish bases for attack. Good housekeeping would reduce the incidence of losses in neighbouring stands. The removal of disease-ridden, overmature, and senile trees, salvage of wind-thrown timber, avoidance of heavy accumulations of slash, prompt removal of logs after felling, and the avoidance of mechanical injury in logging that serve as areas of entrance for disease are some of the more immediate steps that can be taken to discourage heavy insect infestations and the spread of fungous diseases.

* *See* comments relating to salmon-streams for fish mortality due to spraying.

Forest depletion caused by insects and diseases, like most problems affecting the welfare of our forests, has to be viewed as well in a long-term perspective. I do not think that the methods of control, direct or indirect, as now practised nor immediate efforts to clean up " slum areas," while all undoubtedly valuable and beneficial, should be regarded as anything more than the realization of temporary advances on relatively narrow fronts. In the course of time and as our knowledge increases with experience and research, the development of clean, healthy, and vigorous forest stands, coupled with new and improved techniques of control, and including orderly and careful methods of extraction, will create an environment in which losses due to insects and diseases may be lowered to the irreducible minimum.

These long-term objectives can be achieved, in great part, through the application of sound management and silvicultural practices in which Industry, because of its financial interest and extended tenures, must be prepared to play a major role. These practices would include such measures as selection or development by cross-breeding of species or strains of planting stock appropriate to the site and climate and resistant to attack; the establishment of species mixtures and spacing to induce maximum vigour and yield; the creation of staggered age-classes, and especially the avoidance of pure stands or even-age classes of susceptible species over large areas; and the adoption of thinning, pruning, and fertilization practices where these are necessary to promote good form and vigour.

Forests, and nature's agencies designed apparently for their destruction, have been engaged in a relentless struggle for long ages before man appeared on the scene only a relatively short while ago. Research in this Province, in a modern sense, and its practical application, has not extended over the time period occupied by one-half of one rotation, if that long. While much has been learned, much more remains unknown. It is in the questing search for the answers to the many forest enigmas presently unsolved that the way will undoubtedly be found to the perpetuation of our forests and the routing of those forces of destruction now threatening the continued existence of some species and the serious weakening and retardation of others.

Protection of our forests from insect pests and diseases is entrusted to two agencies—Federal and Provincial.

The Federal agency is the Forest Biology Division (with which the Zoology Division is merged) of the Department of Agriculture.

The Provincial agency is the Forest Service, acting through its appropriate officers in co-operation with industry.

The Federal Forest Biology Division is primarily designed to function as a research and survey organization throughout Canada, maintaining

regional laboratories in the various Provinces for the study of forest entomology, pathology, and related subjects.

As part of their assigned duties in extensive control operations against forest insects, members of the Forest Biology Division prepare infestation maps; assess hazard to the forest resulting from the insect population level and the condition of the affected timber; provide technical guidance in methods to be employed and scheduling of the operations; and carry out studies of short- and long-term effectiveness of the control operations, as revealed by insect populations and condition of the treated forest.

Large-scale control projects require in their execution the expenditures of money for, *inter alia,* access roads and the employment of personnel and equipment, not within the ambit of the jurisdiction exercised by the Forest Biology Division. In the result these functions devolve upon the Forest Service, which in turn, in appropriate situations, may invoke the provision of the " Forest Act " (section 125 *et seq.*) and require the owner or licensee of Crown land to dispose of timber or slash infected with any species of injurious insect. Forest management licences also contain clauses requiring the licensee to pay the lesser of:—

(*a*) One-half the cost of controlling and eradicating the insects; or

(*b*) The stumpage value of the licensee's total cut from the licence area in the calendar year affected as appraised by the Forest Service.

On large licences with susceptible tree species and age-classes, the assessed cost could amount to several hundred thousand dollars, with the possibility that the insect attack and consequent cost might continue over several successive years.

When we add all the cost factors together—loss of volume (actual and potential), indirect losses resulting from salvage logging, losses due to degrading, the share of the costs of insect-control operations borne by Industry, to mention a few of the more important items—we can readily appreciate in terms of money and money values the heavy and increasing toll insects and diseases are exacting every hour from our forests.

As I pointed out, there are several avenues of approach to this problem, all having a common objective but operating in differing time fields. First, there are the immediate steps, such as forest sanitation and spraying infected areas. Second, the introduction of biological controls, with a slower reaction period; and, thirdly, a long-term programme based on good forest management and the practice of silvicultural techniques.

Each of these methods can be developed along parallel lines, but the key to the successful application of any of them and the discovery of new procedures lies in unremitting research.*

The present liaison between the Forest Biology Division, the Forest Service, and industry appears satisfactory. Officers of the Federal services meet in conference periodically with the Chief Forester and his divisional

* *See* section on Research.

heads. Provincial Forest Rangers are given basic training in forest entomology and related subjects. Industrial groups submit survey reports, collect insect and disease material. Field staffs are assigned, experimental areas are reserved, and the granting of timber-cutting privileges are other instances of co-operation. The University of British Columbia is extending valuable help in many relevant fields.

Co-ordination of industrial activities in the execution of recommended control methods would seem essential and the desired directives should originate from an authoritative source, in this instance the Forest Service.

OTHER CAUSES OF DEPLETION

I have not been furnished with any statistical material indicating the extent of depletion and retardation by causal factors (in addition to natural mortality) such as wind-storms, frost and snow, and animals (cattle, deer, bear, and porcupine), nor to losses in regeneration caused by seed-destructive agencies such as mice, birds, and squirrels. The losses, direct and indirect, attributable to these causes are, however, by no means negligible and can become serious in areas carrying seedlings and young growth. On our trip to Western Washington and Oregon I learned with some surprise the extent of damage inflicted by bears on young timber, during the spring and early summer, by stripping the bark from the trees to get at the sweet-tasting cambium layer. It is apparently an inherited characteristic and the loss is serious. So far as I am aware, we have not yet had to worry about the damage wrought by our bear population, but it could happen here.

SALVAGE

Before turning to consider depletion by man and his machines, this might be a convenient place at which to consider the salvaging of fire and insect-killed timber, thus minimizing to a degree the losses suffered through these agencies as well as diseases. In so doing many variables are encountered. A tree that is scorched and in consequence dies can be utilized. A tree so badly burned that the trunk is deeply charred has no recoverable volume. The severity of the burn in relation to the size of the tree determines its residual and recoverable volume, if any. This residual volume translated into net recoverable value is the factor that must determine whether or not, in an economic sense, a salvage operation is justified. In consequence, Crown stumpage and royalty of necessity enter into this calculation.

In the Interior, because of the smaller tree diameters, deep charring generally occurs, leaving little, if any, recoverable volume. On the Coast the old-growth trees with heavy bark may die from results of the fire, but the charring is not so deep, and in stands of this character, salvage operations to recover residual-wood volume are feasible. The economics of the operation must, of course, be weighed.

The surface charring by fire in old-growth stands seems to act in some instances as a timber preservative, protecting killed trees from insect attack and the introduction of fungous diseases. Trees weakened but not killed are not so immune.

An examination of Forest Service records indicates that throughout the Province in the past ten years about 50 per cent of fire killed or damaged trees were salvaged. The Coast percentage was higher.

An instance of the successful recovery of fire-killed timber is the salvage operation conducted by Canadian Forest Products Limited on the 1952 Maquilla burn in the Nimpkish Valley on Vancouver Island. This fire, caused by lightning, swept through 187 million feet of old-growth timber and covered an area of 5,680 acres. According to the figures supplied me, 84 million feet had been recovered from 1,783 acres and operations were still continuing. A rebate of royalty granted pursuant to the provisions of section 56 of the " Forest Act," while helpful to the Company, " covered only a small part of the economic loss caused by the fire." This Company added to the last quoted comment the following observation:—

> " While it can be said that salvaging this burn is only good business, it also is good management, because the salvage of damaged timber that otherwise would deteriorate represents a recovery that is just as important as growing an equivalent volume of young timber. Furthermore, the salvage operation is a protection measure of pressing importance, because the sea of snags created by the fire constitutes a hazard of great magnitude."

The recovery of insect-killed timber presents troublesome aspects. Endemic conditions result in scattered losses difficult of economic recovery. An epidemic results in heavy mortality usually contained in circumscribed areas. It is in these restricted areas that salvage programmes can operate with more likelihood of success. It seems that insect-killed trees deteriorate more rapidly than those killed by fire, although the volume and value of the trees that die from insect defoliation are not affected to any marked degree at the moment of death. There is one exception: some reduction in value does occur at time of death in trees killed by bark-beetles, owing to blue-staining of the sapwood by fungi introduced by the beetles. In all cases, however, progressive deterioration sets in after death. Wood-boring beetles invade dead trees during the first year, and sap stains and fungous rots become established in the first year or two and become increasingly important during each succeeding year. In time the cumulative effect of insect tunnels, stains, decay, breakage, and hazards in felling is to render economic salvage impossible. The rate of deterioration varies, of course, with, for instance, the timber species, climatological factors, and the circumstances of death.

Fire-killed trees also suffer from the deleterious and cumulative effect of insects and various rots, but when the charring insulates the tree, salvage

operations may be possible over a period of several decades. It is my understanding that this condition accounts for salvage operations continuing on the 355,000-acre Tilamook burn in Oregon for over twenty years and the amazing recovery of fire-killed trees for use as pit-props in Alberta forty-five years after they were burned.

Extensive operations have been undertaken to salvage insect-killed timber in this Province over the past years. Some of these are, in summary:—

(1) Salvage of timber killed by the hemlock looper in the valleys of the Sarita, Klanawa, and Little Nitinat Rivers on Vancouver Island, undertaken by Bloedel, Stewart & Welch Limited. Roads and camps were constructed in 1947, logging started in 1948 and continued into 1951, when salvage had to be terminated owing to excessive deterioration, breakage, and hazards. Salvage operations covered some 9,700 acres and about 205 million board-feet of killed timber were recovered. About one-third of the dead timber on the area could not be salvaged.

(2) Following the same outbreak of the hemlock looper, British Columbia Forest Products Limited salvaged some 28.5 million board-feet of dead timber on an area of about 2,200 acres in their Cowichan Lake operations.

(3) Patch-killing of hemlock in the Salmon River-Adams River area of Vancouver Island resulted from black-headed budworm attack in the early 1940's. Timber mortality ranged from 15 to 40 per cent in the patches, which varied in size from 500 to over 4,000 acres. Salvage operations over an area of 11,600 acres were undertaken by the Salmon River Logging Company, both dead and green timber being taken, although not recorded separately. The amount of dead timber recovered was small, and salvage was eventually halted due to breakage and hazard to workmen.

(4) Patch-killing of Engelmann spruce by the spruce bark-beetle is currently in progress in the south-eastern part of the Nelson Forest District. The quantity of dead and dying timber is not known, since only intensive ground surveys could reveal this information. The affected timber is accessible, and timber sales are being negotiated by the Forest Service to include both dead and living timber. Purchasers have not, so far, evidenced much interest in buying timber in this infected area upon the terms and conditions proposed by the Forest Service.

(5) During the past four years, fir in the Nimpkish Valley has suffered a very serious infestation of Douglas fir bark-beetle—probably one of the worst outbreaks ever experienced in this Province. Over 75 million feet have been killed and the devastation continues. Salvage operations by Canadian Forest Products Limited are con-

current with control procedures, but it is too soon to evaluate the volume of recovery.

Wood recovered from fire-killed trees has a relatively restricted field of utilization. It can be utilized for milling, for poles and pit-props, but it cannot, for example, be used to any practical degree in the manufacture of pulp, nor to make veneers. On the other hand, wood from trees killed by insect defoliation or girdling can be utilized for these purposes as well as for milling. Even when hemlock-trees are invaded and rotted by some families of the lignin-destroying white-rot type of fungus (e.g., *Fomes pini* and *Fomes annosus*), the resultant residue of cellulose volume is suitable for pulp production. When once the cellulose content is destroyed by the brown crumbly type of fungus-rot (*Fomes pinicola*), the tree is a total loss.

From a study by the Forest Biology Division of the incidence of decay of western hemlock in the Upper Columbia region,* it appears that in this area approximately 57 per cent of total infections and over 60 per cent of the total decay volume was attributed to the fungus *Echinodontium tinctorium,* used by the early Indian warriors as the base in making paints for their facial and bodily adornment. Although causing a brown stringy rot, it is classified as a white type of fungus. In its progressive development it destroys most, if not all, of the heart-wood, leaving only a peripheral shell of sound wood (the so-called " gun-barrel "). There is, in consequence, a very substantial reduction of the cellulose content of the tree. Pulping qualities and yield from residual wood of trees so infected have not been established empirically as far as I am aware, although it is said the sound wood from the residual collar in the form of chips may be considered good pulping material. Studies have been undertaken by the Spokane Research Centre and Inter-mountain Forest and Range Experimental Station in Montana regarding the pulping qualities of diseased hemlock, but I am not aware of the conclusions reached.

White pitted rot caused by *Fomes pini* ranked second and was responsible for approximately 13 per cent of the infections and 25 per cent of the total decay volume. White spongy butt-rot caused by *Fomes annosus* caused relatively little decay in terms of percentage of total volume—0.2 per cent. Residual-timber volumes recovered from trees affected by these two types of white-rot fungus can be used for pulping purposes, and further research will undoubtedly find further uses for Douglas fir not too badly infected.

In the absence of factual data it cannot be concluded that from trees infected with all types of white-rot a substantial wood volume can be recovered, and further relevant research is indicated.

Brown-rots accounted for about 12 per cent of infections and 9 per cent of decay volume. Generally speaking, cellulose values are lost to this type of fungus and residual recovery negligible.

* Canadian Journal of Botany 32:145–171, 1954.

It seems unlikely, assuming a market, that more than 25 per cent of the total stand volume could be utilized for sawmilling purposes.

With a decay loss calculated at an average of 74 per cent of volume in terms of board-feet and 52 per cent in cubic feet, and when it is realized that progressive deterioration in these mature and overmature stands results in an ever-increasing loss of volumes and values, the situation presents a problem of major importance and considerable difficulty of solution.

Most of the areas in the Upper Columbia Valley are regarded as physically accessible and the more productive sites are believed capable of supporting heavy volumes per acre. To leave these potential growing-sites occupied by decadent stands is a form of economic waste we cannot afford to contemplate with resignation.

In 1945 I said this in relation to these decadent stands in the Interior:—

" There are substantial stands of overmature hemlock in the Interior. In the Kootenay River and Arrow Lakes drainage area, for instance, 208,200 acres of the forest-cover is mainly composed of this class of timber estimated to contain 672,000 M B.M. The productive capacity of this area should be put to better use—perhaps the growing of white pine stands.

" Probably less than 10 per cent of this hemlock could be converted into sawn lumber, but it is estimated that 90 per cent thereof would be suitable for pulp production. Shipments of overmature hemlock from this and other Interior areas were made to a pulp and paper company in Spokane during the period 1927 to 1939, and therefore a market appears available. . . .

" It is my opinion that the Crown would be justified in waiving all claims to royalty on overmature Interior hemlock stands in order to encourage their removal so that new growth of more valuable tree species could come in.

" In the long run it would pay the Crown to sell decadent Interior hemlock stands remaining in Crown ownership at a nominal stumpage rate without reservation of royalty, or, perhaps in areas in which white or yellow pine would constitute the greater part of next crop, to subsidize operators to clear cut those areas."

I do not now consider the establishment of white pine stands to be desirable in the absence of measures adequate to control the blister-rust disease. I do, however, reiterate my main recommendation that stumpage and royalty charges should be adjusted to encourage the removal of decadent stands now occupying valuable growing-sites.

I also added this comment in 1945:—

" It was suggested that any residual stands for which no commercial use could be found should be burnt. Whether this would be a sound and practical procedure I am not able to say. . . ."

Mr. I. V. Anderson, Chief of the Forest Utilization Service at the Intermountain Forest and Range Experimental Station at Missoula, Montana, in a letter under date of January 6th, 1955, and written to Mr. R. B. Walkley, of the Kootenay Forest Products Limited at Nelson, said in part:—

> " Our experience during the past thirty years with defective overmature sawlog size hemlock has indicated that this material will eventually be utilized for pulp if left standing in the forests. We have tried girdling, felling, and broadcast burning, and these methods do not appear feasibly economical."

The cost of felling and burning has been roughly estimated at $100 an acre. When the areas involved extend over several hundreds of thousands of acres, it can readily be understood why Mr. Anderson concluded after thirty years' experience that this method of management did not " appear feasibly economical."

The only rational conclusion I can draw from the evidence is that the pulp species and other recoverable volumes should be utilized by an integrated industrial operation, designed to produce pulp products and an ultimate diversity of use and manufacture of wood residuals.

An excellent example of this development is that projected by Celgar Limited in the Arrow Lakes area, in which is included portions of the Columbia River basin decadent hemlock stands. The burden of management of this troublesome area has thus been shifted, in some degree, from the Forest Service to the Celgar Company.

I think it pertinent to this subject to quote in part from the submission of the Celgar Company. After referring to my comments in 1945 concerning the decadent stands in the Interior, the following appears:—

> " It was in part on the basis of the Commissioner's remarks concerning the suitability of the decadent hemlock of this region for pulp that we became interested in this area.
>
> " The results of our initial investigations persuaded us that the timber had real possibilities and that answers to the peculiar problems of the area could be found. Celgar Development Company Limited was formed to attack the problem.
>
> " As a first step in the programme, a forest management licence was applied for, resulting in the Government placing a reserve on a portion of the Arrow Lakes area in October, 1952. This required that Celgar go ahead with a forest inventory survey and submit an acceptable management working plan by April, 1954—later extended for an additional six months' period.
>
> " As a second step, Celgar purchased three operating sawmills and their timber holdings, together with other timber limits in the district.
>
> " These moves placed the Company in a position to make an extensive detailed survey of forest resources and engineering studies for a large-scale industrial development, and at the same time acquire actual experience in the area through the operation of its sawmills and their attendant wood procurement activities.

"As a supplement to this inventory survey, a special study of defect in the mature timber was carried out by Professor J. W. Ker of the Forestry Faculty of the University of British Columbia. This study, which was a follow-up of the pathological studies previously made by the Dominion Department of Agriculture, gave us a more accurate basis for defect deductions and a better understanding of the character of the defective timber.

"Another line of investigation explored the possibilities of hardboard from cedar sawdust and mill waste as well as from decadent cedar logs unsuitable for lumber or shingles. This research project was turned over to the British Columbia Research Council, and was carried out at their laboratory in Vancouver."

After detailing other studies and investigations the submission continues:—

"The total direct cost of all these studies, surveys and investigations up to the time the licence was issued exceeds $500,000.

"The calculation of an allowable cut of 22,000,000 cubic feet per year is based on clear cutting of the mature stands, with ensuing satisfactory regeneration of the cut-over lands. Past practices in saw timber operations in this area have permitted the leaving of defective, unmerchantable and low value trees, but this has resulted in deteriorating residual stands with generally too heavy a crown cover to permit regeneration to come in. It is our intention that as soon as our proposed pulp-mill comes into operation which will permit closer utilization of decadent hemlock and balsam, a rather strict policy of clear cutting—including the felling of the cull trees of all species (except those reserved for seed)—shall be applied, thus providing a better chance for adequate and desirable regeneration to come in on the cut-over lands.

"It is our expectation that with the introduction of this cutting practice, real progress will be made toward closer utilization of defective timber. This does not mean that the rot present in this type of timber is of value in the manufacture of pulp. On the contrary, it is valueless and must be eliminated by one means or another, and the remaining sound wood contents then converted into good saleable cellulose products."

A forest management licence was issued to this Company (No. 23) on July 20th, 1955. This was "made appurtenant to the licensee's forest products manufacturing plants capable of utilizing not less than 24,000,000 cubic feet of wood per year, including a pulp-mill with a rated capacity of 300 tons per day to be erected on the Company's plant site near Castlegar. Construction of the pulp-mill is to begin on or before March 1, 1958, and the mill is to be in operation on or before March 1, 1961. The expenditure involved is estimated at $30,000,000."

(I believe that total estimated expenditure for an established integrated operation is expected to amount eventually to approximately $65,000,000.)

" The establishment of a pulp-mill in the Arrow Lakes district will be of value to the established operators of this area. As has been indicated before, these stands contain a large proportion of timber which, both in species and in grade, is not suitable for economic sawmill utilization. Thus, not only is an improved log market established but—of far greater importance—an outlet is obtained for logs previously left in the woods."

The Celgar pulp-mill, when in operation, will be the first off tidewater in the Province and the first large-scale integrated forest industry in the Interior.

The experience of this enterprise will, within a few years, demonstrate the economic feasibility of utilizing the recoverable wood volumes from decadent hemlock and cedar stands.

In that sense this venture may be regarded as a salvage operation of the greatest magnitude and with far-reaching economic benefits to the Interior of this Province. The Forest Service, in recognition of the ultimate benefits to be derived from the removal and utilization of these overmature stands by this Company from areas included in the licence, wrote into the contract the following clause:—

" There will be established a salvage rate on overmature and decadent hemlock and balsam stands of a quarter royalty plus nominal stumpage for a period of 10 years. The stands to which this will apply are to be designated by the Chief Forester. On the termination of the ten-year period, the salvage rate will be subject to review and may be extended at the discretion of the Minister of Lands and Forests."

The nominal stumpage rate has been fixed at 10 cents per 100 cubic feet.

It is anticipated by the Celgar management that in the normal course of developments a pulp-mill in the Arrow Lakes district will be of value to the operators in the area by creating a demand for logs not suitable for sawmill utilization and previously left in the woods.

This demand will in turn create the incentive to meet it, and thus recoverable volumes of wood suitable for pulp can be expected to move from decadent stands to the pulp-mill. The Forest Service is prepared to assist in this type of salvage operation. Dr. Orchard, in his testimony, said:—

" The Department is prepared now to give to anybody who will use that old decadent hemlock a price of 35 cents a 100 cubic feet, which is less than $1 a thousand—more like 60 cents a thousand—by the old standard board-feet, and shade the scale on the thing. Short of absolutely giving it away, we can't go very much farther."

This statement of policy is based apparently on the 1946 amendment to the " Forest Act " now incorporated in section 56 of our present Act. The amendment was designed to encourage the utilization of material left on the ground after a logging operation and, if practical, relogging for

salvage purposes, and " salvage " in that sense has a different connotation than in the context under consideration.

No salvage permits have ever been issued nor salvage rates applied to assist in the removal and utilization of decadent stands in the Interior, except to the Celgar Company. Dr. Orchard's statement of policy, when giving evidence, was used as the basis for an application for salvage rates on decadent hemlock and cedar by Kootenay Forest Products Limited under date of March 10th, 1955. In answer thereto by letter dated March 15th, 1955, the District Forester at Nelson said in part:—

> " We do not receive any official transcript of the hearings and naturally your information is the first we have on the matter of reduced stumpage and for royalty rates on decadent hemlock."

Mr. G. K. Burns, of the Passmore Lumber Company, carrying on business in the Nelson District, stated in his evidence:—

> " We understand that we may now ask for a salvage rate on our decadent hemlock. We have made repeated requests for such a rate over the past several years but were always turned down."

I trust that the policy of the Department extending the salvage rates on logging waste and small material in force on the Coast since 1946 to salvage of decadent timber in the Interior will be brought officially to the attention of and acted upon by Forest Service officials in the Interior concerned with this subject.

The apparent lack of knowledge in the Interior of the policy of the Service in extending salvage rates to decadent stands is found, I believe, in the evidence of Dr. Orchard, which in part reads as follows:—

> " We have been ready to waive royalty or at least 75 per cent of it on hemlock in the Interior ever since . . . 1946 on those old decadent stands, but the trouble is nobody wanted to take them at any price. Just now there is the prospect of quite a major operation in them. . . ."

In summation then, the answer to the vexing problem of what is to be done with overmature decadent and deteriorating stands in the Interior lies in great part in the presently projected utilization of wood recovery suitable for pulp as raw material for pulp production. Uses for other species not so suited for pulp will in time be developed by integrated operations. For instance, sound cedar volume may be utilized for lumber and shingles and unsound cedar residues for hardboard manufacture.

This is a fairly long-term objective, but there seems to be no other economically feasible way of removing these stands at present cost levels.

I am still of the opinion that a residual and irreducible volume of the decadent stands in the Interior outside forest management licence areas will remain in place because recoverable values are too low to permit economic removal. When that day comes, either some form of subsidized removal or felling and burning by the Forest Service will be, in my opinion, the only alternative courses open to pursue in order that the growth potential of the land may be recovered for future generations.

REGENERATION

A programme designed to maintain our productive forest land on a sustained-yield basis and to prevent the wasteful accumulation of forest land not satisfactorily restocked must, as one of the conditions precedent to the attainment of these objectives, ensure the continuity of forest growth on these lands. There must be a " regeneration " or a continual renewal of tree-growth by natural or artificial means on cut-over and burned-over forest-land areas.

Natural regeneration of cut-over or burned areas depends upon a number of factors, some of which are yet beyond human control, such as topography, soil and climatic conditions, annual seed-crop, and prevailing winds when seed is ripe. Nature can be assisted by the employment of harvesting techniques, primary or final, assuring a residual stand of seed-trees, preparation of a seed-bed by scarifying and exposing the mineral soil when logging during good seed years, rodent-control, and other measures considered helpful to natural regeneration, including the stimulation of seed-cone production.

Artificial regeneration consists of planting seedlings, or direct seeding in which varying methods of seed distribution and seed protection from rodents, birds, and other seed-destroying agencies are employed.

Whatever the means invoked, the objective is clear and beyond dispute: so far as economically feasible new crops must be established as soon as possible and maintained on our cut-over or burned-over productive forest land. Maintenance includes, in this context, the protection of our regenerated juvenile forests from destruction by fire. In the 1945 Report I wrote:—

> " The third step toward a sustained-yield production objective is to start new forests growing on our denuded land area. On the Coast approximately 1 million acres and in the Interior 19 million acres of productive forest land are not satisfactorily restocking. I do not consider there is any great present urgency to replant denuded areas in the Interior. Interior increment is exceeding depletion and assuming augmented fire protection the situation is not as critical there as on the Coast. To support a sustained-yield plan in the future approximately 10 million acres of forest land on the Coast should be producing 400 to 500 b.m. per acre per year. I am satisfied in time we can reach that objective providing cut-over lands are left productive and the areas now denuded are replanted. From the evidence, however, it appears that, of the approximately 1 million acres on the Coast that are not satisfactorily restocking, only about 400,000 acres thereof can be economically replanted. It is of the utmost importance that this acreage be planted at the earliest possible date—certainly within twenty-five years."

In the evidence of Mr. H. G. McWilliams, Forester in Charge of Reforestation, he said:—

> " In 1945 we were of the opinion that there were 1 million denuded acres on the lower Coast, of which 400,000 acres would require planting. This picture has changed considerably over the past ten years, so that we now estimate the area to be planted as less than 100,000 acres. Some of the land has restocked naturally, some has been lost to alder and other deciduous species, with 80,000 acres having been planted. This favourable reduction in the amount of unstocked logged and burned areas is also due to improved survey data. Information available in 1945 was in part from surveys made fifteen years before, at which time no consideration was given to the date of logging or burning or the possibilities of natural regeneration. The lack of sufficient staff made it impossible to keep these surveys up to date with periodic revisions, so that the figure of 1 million denuded acres so often used was not an accurate picture. Recently the introduction of patch logging has increased the natural regeneration of the currently logged and burned areas, and in many instances no artificial regeneration will be necessary. More adequate fire protection has also helped to improve the situation and large devastating burns and reburns are occurring with less frequency."

It seems to me, with deference, that while this analysis by Mr. McWilliams of the present situation as compared with the past is right as far as it goes, it does not tell the entire story. For instance, when we compare the 1945 acreage of the forest land not satisfactorily restocked with the same land classification for 1955, the following figures emerge:—

TABLE 69

ACREAGE NOT SATISFACTORILY RESTOCKED

Year	Coast	Interior	Total
1945	918,000	19,134,000	20,052,000
1955	1,723,168	10,140,951	11,864,119

Acreage is logged on the Coast at the average rate of about 80,000 acres a year. Planting is only carried out in areas in which fir predominates. These fir areas are logged at the average rate of about 40,000 acres a year. Assuming natural regeneration on 75 per cent of this fir area, then 25 per cent or 10,000 acres a year will not restock adequately unless planted. The remaining 40,000 acres a year logged on the Coast are on areas on which species other than fir predominate. No planting at all is undertaken on these areas. If we assume that we could probably expect a 75-per-cent regeneration in these areas, we are left with an additional

10,000 acres a year not restocking. This acreage will in most part be also lost to deciduous growth. To say that it is not economically practical to plant this acreage seems to me to ignore the fact that it was composed of sites sufficiently good to produce trees of a size, quality, and species for which there was a demand, otherwise the areas would not have been logged. In my opinion, the Forest Service should take another look at this probable 10,000 acres a year in the " non-fir " areas which is being added to our steadily growing accumulation of forest land not satisfactorily restocked and " brushing up " with non-commercial cover.

It appears from the foregoing that in every year we are adding 20,000 acres a year to our growing total of productive forest land on the Coast not satisfactorily restocking. In ten years this amounts to the tidy total of 200,000 acres to be added to the Coast total now standing at 1,723,168 acres of N.S.R. forest land.

Our growing stock is also being destroyed by fire. On the ten-year average, 1946–55, immature timber growing on 30,448 acres was fire-killed every year. In ten years that equals about 300,000 acres for the entire Province.

In the Vancouver and Prince Rupert Districts the average fire loss during this same period was 7,000 acres per year.

Particulars are shown in the following table:—

TABLE 70

LOSS BY FIRE OF IMMATURE FOREST IN COAST DISTRICTS

(Acres.)

Year	Vancouver	Prince Rupert	Total
1946	1,627	2,466	4,093
1947	398	41	439
1948	435	2,022	2,457
1949	315	26	341
1950	972	122	1,094
1951	24,008	24,190	48,198
1952	1,984	10,314	12,298
1953	146	618	764
1954	1,031	5	1,036
1955	108	299	407
Totals	31,024	40,103	71,127
Ten-year averages	3,102	4,010	7,112

Records for the Prince Rupert District do not distinguish between fires occurring on the Coast and those in the Interior portion of the District. Assuming that half the area burned was in areas tributary to Coast industry, the average annual loss of immature forest by fire on the whole Coast region has been about 5,000 acres.

Assuming also that after a second burn not more than 30 per cent of this area would be expected to regenerate naturally, we would be left with 3,500 acres to plant from this cause.

Thus, in every year in order to keep abreast of our current losses of productive forest land due to logging and fire and putting aside the economic factors for a moment, we would be required to plant 23,500 acres a year or a total of 235,000 acres in ten years.

In the decade 1946 to 1955 the Forest Service planted about 60,000 acres and private companies about 30,000, a total of approximatcly 90,000 acres or about 40 per cent of 235,000 acres.

From Table 69 it is apparent that since 1945 the area of productive forest land on the Coast classified as not satisfactorily stocked has risen from 918,000 to 1,723,168 acres. The ownership of these 1,723,168 acres has already been given but may be reproduced here for convenience.

Ownership	Acres	Percentage of Total Coast N.S.R. Acreage
Province	896,994	52.1
Timber licences and leases	309,290	17.9
Crown grants	487,439	28.3
Canada	29,445	1.7
Totals	1,723,168	100.0

I think it a fair assumption to assess the current losses in acreage at the same percentage as the ownership of accumulated areas regarded as not satisfactorily restocked. In consequence it follows that in addition to the accumulated 900,000 N.S.R. acres of unalienated Crown land, one-half of 23,500 acres or, say, 12,000 acres a year as a round figure must be added thereto, less the acreage planted by the Crown.

From my interpretation of these figures it appears that the Forest Service should be planting on Crown lands (apart from the economics involved) 12,000 acres a year merely to prevent the present position from worsening, plus 36,000 acres a year if we are to reclaim the lost 900,000 acres in twenty-five years. This would mean a yearly planting programme covering 48,000 acres a year with 38,400,000 seedlings (at 800 to the acre) at a cost of $1,920,000 a year (at $40 per acre). At least part of this cost would, I expect, be borne by the Federal Government.

Dr. Orchard and Mr. McWilliams did not agree and stated, it will be remembered, that it was only possible to plant *economically* 100,000 acres on the Coast. Mr. McWilliams added that a nursery production of 10 million seedlings a year on the Coast would be sufficient to "catch up on the backlog of understocked areas within ten years" and "by then it will be possible to estimate a comparatively modest annual planting programme. . . ."

Dr. Orchard, when giving evidence, broke this 100,000 acres referred to by Mr. McWilliams into two ownership categories, private and Crown,

and stated that this total comprised 66,500 acres in private and 33,500 acres in Crown ownership.

We now see that of the Coast Crown acreage of forest land not satisfactorily restocked, which has doubled in area in ten years from about 900,000 acres in 1945 to approximately 1,800,000 acres in 1955, is continually expanding at the rate of about 22,500 acres a year, and the Forest Service asserts that only 33,500 acres thereof can be economically planted. It is further asserted that planting 10 million seedlings or 12,500 acres a year will not only take care of areas denuded by logging and fire and not expected to restock fully, but will catch up in ten years with the entire backlog of Crown N.S.R. acreage that can be economically planted.

I am, with deference, unable to accept these assertions as a correct explanation of the present situation nor as a sound foundation for a future reforestation policy.

I pointed out above that, excluding economic factors, the Forest Service would have to plant in the neighbourhood of 50,000 acres a year to maintain our productive forest land properly stocked and to reclaim in twenty-five years our present Crown N.S.R. areas. The inhibiting economic factor is defined by Dr. Orchard in the following questions and answers:—*

> " Q.—Please tell us what is embraced in the word ' economic '? A.—Planting is an expensive proposition. It costs a lot of money to plant an acre of land. When you get into 10 or 20 thousand acres a year it adds up to a pretty considerable sum at $40 an acre. We can't see any justification in spending the public's money in planting acres which we are reasonably sure will never pay us back that $40 an acre plus some little profit on it, over the course of a rotation. When we started to plant, it was a very simple matter to find the high sites on which we had no misgivings whatever it would pay to plant, and we proceeded to plant those, and progressively we have used up, planted those better sites. At the present moment we think that there are in the neighbourhood of 100,000 acres that it would be a good business proposition to plant, and there is 439 or 437 thousand acres in which the profit factor is so doubtful that we wouldn't be justified in planting. There is the whole story."

After making all due allowances for the exclusion of certain poor site areas from a reforestation programme, I am still of the opinion that the Forest Service is putting too much stress on the economics involved and that its estimates of areas to be planted are far too conservative and require drastic revision upward.

It is, I think, common ground that about 75 per cent of those areas classified as not satisfactorily restocked have been taken over by brush and other non-commercial cover. This means a loss of potential growth on the Coast on 75 per cent of 900,000 acres of Crown land or a loss of forest-

* Pp. 15729–15739.

cover on 675,000 Crown acres. Estimated at an average growth rate of 420 board-feet per acre per year, this equals a yearly loss of future production amounting to 283.5 million board-feet which we ought to preserve for the demands of the future. Further study should be made of good growing-sites lost to alder, other deciduous species, and scrub conifers with a view to recapturing these areas where and when practicable by removing the brush cover and replanting with commercial coniferous species. Alder growing with trees of single stems is of value, but, when degenerated into useless bushes, is occupying, usually accompanied by willow and other worthless growth, land capable of producing timber values.

In time, of course (about 150 years according to Dr. Orchard), the weed-trees will die out and the areas now classified as not satisfactorily restocked will have come back in some measure to producing balsam, spruce, hemlock, cedar, and fir trees.

In the meantime we are losing the increment from valuable growing-sites, a situation which cannot be viewed with any complacency.

In addition to undertaking a survey to determine when and where it would be economically feasible to justify an expenditure necessary to remove valueless cover by poisoning or such other means that may be found practical, the Forest Service should speed up planting in logged areas of Crown land. Quicker planting is an effective answer to " brushing up " and consequent loss of good growing-sites.

In the end result the values recovered and maintained from regeneration obtained by speedy planting after logging or fires outweigh the costs incurred. In my opinion the better sites on the Coast should be planted up as soon as it appears that the areas examined are not restocking adequately, with the ultimate objective of planting these up within one or two years after they are cleared of logs.

When Dr. Orchard was being questioned concerning the obligation of a forest management licensee to ensure regeneration, the following appears:—*

> " Q.—When you enforce the reforestation provisions of the management licence contract or ask the licensee to perform them, is the contract being so administered or is he undertaking to see that the land is not going to be lost to brush and deciduous cover? A.—Some small part of it unquestionably will; the very finest lands, they come up very promptly, but we will keep a close enough eye on them that the loss on that score will not be significant."

It does not seem unrealistic to insist that the Forest Service come within a reasonable degree of fulfilling on Crown lands the primary obligation requiring the forest management licensees to assure regeneration of cut-over or otherwise denuded forest land within the licence area.

* P. 17815.

That primary obligation is found in the standard form of a management licence contract and reads as follows:—

> "(19) As a first essential to the primary object of sustained yield management of this licence, it is agreed that all potentially productive forest land within the licence area shall be kept by the Licensee in growing stock as provided in Clause 20 hereof, and adequately stocked in accordance with standards to be defined from time to time by the Forest Service for comparable lands in British Columbia."

Clause 20 referred to therein is apparently designed (*inter alia*) to permit the Forest Service to exercise a discretionary power to excuse the licensee from the strict fulfillment of his obligations specified in clause 19. It reads as follows:—

> "(20) Any lands in the licence area denuded before the date of this licence which are found to be stocked below the minimum standards defined by the Forest Service as provided in Clause 19 above, shall be classified as to site quality and those determined by the Forest Service to be of a site quality index equal to or better than 80, unless in the opinion of the Licensor they are occupied by an advanced growth of brush, or otherwise in such condition as to make planting operations economically impractical, shall be reforested by the Licensee by artificial means with a timber-producing species suitable to the locality at a rate per year of not less than one thousand acres, or ten per cent of the total acreage of such lands, whichever is the lesser, all to the satisfaction of the Licensor.
>
> " The Licensee further agrees that lands of site quality index better than 110 denuded after the date of this licence, and not found to be restocked satisfactorily five years after logging, will be artificially regenerated by the Licensee before the end of the seventh year after logging; and that lands of site quality index between 80 and 110 not found to be restocked satisfactorily eight years after logging will be artificially regenerated by the Licensee before the end of the tenth year after logging, all to the satisfaction of the Licensor."

It may well be that when some Crown acreage of previously denuded and not satisfactorily restocked forest land is included in the licence area, it is hardly just to compel the licensee, who was not responsible for the condition of this Crown land, to enter upon a costly clearing and replanting programme for which he will not recover his expenditures in return. On the other hand, if it is his own previously denuded land which he has allowed to degenerate into brush that is added to the licensed area, I suggest that the Forest Service should be slow to exercise the discretionary powers of relief conferred by clause 20, except in special circumstances.

Similarly, it seems to me the Forest Service should not evade its responsibility of maintaining Crown forest land in growing stock by pleading its previous flaccidity in this regard as a present excuse for not clearing and

planting up coniferous areas lost to deciduous and other worthless growth. I am not unmindful of the fact that some day deciduous trees may be a more valuable source of cellulose than conifers, but I do not think we can at present afford to take that chance.

In the Interior the areas classified as not satisfactorily restocking have seemingly been reduced from 19 million to 10 million acres. No planting of any consequence has been undertaken in the Interior, so I assume the difference is chiefly accounted for by natural regeneration and in part by improved surveys. I am not informed concerning the site qualities of these present N.S.R. areas nor their condition, consequently, I am unable to formulate any specific recommendations in relation thereto. The future needs of the industry will, however, it seems to me, necessitate in time a revision of the presently prevailing attitude regarding Interior regeneration. I am not unmindful of the economics involved: in many areas the return from poorer sites producing small timber at low stumpage prices does not equal the present cost of planting. There are, however, existing counterbalancing aspects that must not be overlooked. Those are the indirect effects and benefits that can be derived to-day from the maintenance of a forest-cover, such as watershed protection, game sanctuaries, and æsthetic values, to mention just a few. When these factors are present in regional or local areas, then the cost of present planting may well be justified in those areas.

Just how far bare economics should control planting by Government agencies is a matter upon which a conflict of opinion can very easily arise. Let us examine the situation in the Prince George area. Regeneration there is not satisfactory, but, in the opinion of Dr. Orchard, planting is not economically sound in that part of the Province. What is the result? Areas that prior to logging contained 90 per cent spruce—the valuable species—and 10 per cent balsam, after logging and perhaps fire, regenerate naturally but in reverse proportions; i.e., to 10 per cent spruce and 90 per cent balsam. In areas where cutting has been too severe, jack-pine takes over, especially if fires have occurred. In my view a wider discretion should be exercised in the determination of whether to plant or not to plant selected areas in the Interior as well as on the Coast than that presently guided solely by the recoverable values measured by the demands of our immediate timber economy.

In accordance with that view, I think it is desirable and in the public interest that an experimental spruce nursery be established at some suitable location in the Northern Interior as a step toward the day when planting of spruce will be regarded as a prudent course to pursue to ensure the future growth of that species in areas of continuing demand.

We are trustees of our forest wealth, and it seems to me that if the Government continues to be influenced unduly by the profit motive, it is inevitable we will pass on to future generations an impaired and diminished forest resource.

The situation in the Southern Interior of the Province was canvassed thoroughly in a presentation to the Commission by Mr. Alan Moss, on behalf of the Interior Lumber Manufacturers' Association, composed of about eighty member firms operating in an area embracing approximately 75,000 square miles. In relation to regeneration he said (in part), as follows:—

"The existing situation in the Southern Interior consists of two problems which are mainly the responsibility of the Government, but also of Industry.

"These two problems are:—

"(*a*) The reforestation of acres denuded by past malpractices or natural disaster. This will mainly be by artificial reforestation.

"(*b*) The reforestation of those acres being cut or to be cut in the future. This should be mainly by natural reforestation.

"Planting in the Southern Interior commenced in 1950, and up to the end of 1953* the Forest Service have carried out experimental plantings totalling 148.0 acres and plantings on Crown land totalling 576.0 acres. One forest management licensee planted 47.0 acres in the same period and has by the present date (May, 1955) increased this figure to 147.0 acres. Private planting and farm wood-lots accounted for the planting of 22.0 acres during the same period. A total of 793.0 acres had thus been planted by the end of 1953, involving 614,700 plants. The great majority of the plants concerned came from the Forest Service nursery at Cranbrook.

"In relation to the amount of work to be done, the total acreages planted are very small indeed and increased effort is inevitable if the Province is to make proper use of the land in the Southern Interior. This is one project to which greater amounts of Government revenue should be directed. However, rapid progress cannot be expected in view of the paucity of existing knowledge of results of our methods. We wish to point out some of the factors which need urgent investigation by research. These are:—

"(i) Is the Cranbrook nursery suitable for the supply of plants to the whole Southern Interior? For climatic reasons alone, we feel that it will be of limited use since the nursery is sometimes under snow when planting areas are ready for planting.

"(ii) Are plants of the correct provenance of seed being supplied to each planting area? Seed, we believe, should be collected from the area in which the plants are to be put in and, in addition, should be collected from premium trees instead of from squirrel caches.

* The Forest Service, up to the end of 1955, had planted 2,029 acres in the Interior.

"(iii) Is it correct, with ponderosa pine, to plant two year stock or older, or would it be preferable to use one year plants and attempt to avoid severe pruning of the tap root?

" The answers to these and other questions should be made the subject to research. In the meantime, of necessity, we have to continue to increase our planting effort. For this, consideration should be given to the advisability of providing an additional nursery or nurseries in the region.

" The problem of lower quality sites which are denuded and are not being restocked satisfactorily needs consideration. On these sites or on higher quality sites occupied by non-commercial cover, the high costs of planting may render the operation uneconomic under existing conditions. The problem needs to be studied but actual reforestation can be delayed until our more valuable sites are restocked.

" Study should also be given to the best methods of converting understocked forest badly depleted by one or more logging operations and not satisfactorily restocking into new, thrifty stands.

"(*b*) *The forestation of those acres currently being cut or to be cut in the future.*

" Because of the high costs of artificial reforestation, we should not automatically rely on this method for restocking stands which we are now, or will be, cutting. Our silvicultural methods of felling need to be designed with the object of compromising between the most economical methods of logging and the most economical methods of obtaining suitable reforestation. We believe that there is need for the following:—

"(i) A recognition on the part of the Provincial Government that higher logging costs than average may be justified for the sake of long term economy, with the corollary that these higher costs should be reflected accurately in a reduced stumpage rate.

"(ii) The recognition that, in a condition of having some overmature stands and some thrifty stands in a wide variety of stand compositions by species, various methods of felling should be employed in accordance with local stand requirements. The decision on what methods are to be employed should be at the discretion of the local forester, provided that he has acquired the necessary local knowledge of his forest.

"(iii) More intensive research into the regeneration characteristics of species. Some work of this nature is being carried out at Bolean Lake, but the scope of this work should be broadened.

"(iv) A more flexible maximum allowable period for reforestation should be allowed in the Forest Management Licence con-

tract since present fixed periods may be too short on some high elevation sites to allow of the occurrence of a major seed crop on the seed source within the period."

It seems to me that the submissions of the Interior Lumbermen's Association have adequately expressed the view-point of the majority of operators in the Southern Interior, and I concur in general in their recommendations with one exception: that contained in the last paragraph. Quick planting of forest management areas to prevent loss of good growing-sites and to secure early regeneration is essential to a sustained-yield programme, and I would not agree to relax any provisions in forest management licences designed to that end.*

In the East Kootenay region, studies were commenced in 1948, principally of yellow pine regeneration. In 1950 a nursery-site was chosen on Perry Creek near Cranbrook. The annual production of this nursery is now about 1 million seedlings. Sixty-thousand acres in this region were intensively surveyed, and only about 25 per cent of this area was found to be regenerating naturally. If the forest land in this area is to be preserved for and maintained in growing stock, nursery production and planting must be increased to a very considerable degree. Just how effective direct seeding would be in this area is a matter of present conjecture and future experiment.

On the Coast the large operators have manifested an interest in regeneration on Crown-granted lands or areas held by them on long-term tenures. It will be seen from the following table and accompanying graphs that since 1953 private planting is just about on a parity with Government planting.

* *See* comment on forest management licence contract provisions concerning obligation to regenerate at p. 295.

TABLE 71

SUMMARY OF PLANTING DURING THE YEARS 1946–55

Year	Experimental		Forest Service on Crown Land		Private Companies		Community Forests		Private Planting and Farm Wood-lots		Total	
	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres
Coast												
1955	10.0	15.0	2,174.6	3,410.0	4,623.4	7,076.0	40.0	15.0	62.2	80.0	6,910.2	10,596.0
1954	27.5	30.0	5,679.0	7,135.0	3,302.0	5,024.0	59.5	36.0	73.7	72.0	9,141.7	12,297.0
1953	28.5	33.0	2,377.0	2,860.0	2,740.1	3,808.0	25.0	31.0	21.0	6.0	5,191.6	6,738.0
1952	8.1	5.0	4,228.4	4,865.0	1,664.2	2,065.0	137.4	210.0	40.9	15.0	6,079.0	7,160.0
1951	12.0	20.0	5,733.9	6,070.0	1,808.0	2,235.0	110.0	130.0	31.2	25.0	7,695.1	8,480.0
1950	.....	.....	6,261.6	6,670.0	553.1	680.0	52.0	50.0	20.9	.....	6,887.6	7,400.0
1949	15.3	15.0	7,418.5	8,125.0	855.5	1,010.0	5.0	.....	23.2	15.0	8,317.5	9,165.0
1948	3.4	4.0	9,123.3	10,560.0	1,402.0	2,140.0	5.0	5.0	18.4	20.0	10,552.1	12,729.0
1947	.....	.....	3,466.5	4,380.0	473.5	490.0	.....	.....	34.0	20.0	3,974.0	4,890.0
1946	.....	.....	3,670.2	6,000.0	3,854.2	4,700.0	.....	.....	6.7	7.0	7,531.1	10,707.0
Previously planted	710.0	617.7	33,085.0	41,205.0	2,978.1	3,576.3	299.0	317.0	75.8	75.0	37,147.9	45,791.0
Totals to date	814.8	739.7	83,218.0	101,280.0	24,254.1	32,804.3	732.9	794.0	408.0	335.0	109,427.8	135,953.0
Interior												
1955	1.5	2.0	215.8	288.0	81.0	105.0	.....	.....	12.2	10.0	310.5	405.0
1954	5.6	8.0	590.9	1,007.0	94.0	109.0	.....	.....	7.2	9.0	697.7	1,133.0
1953	2.0	2.0	282.3	284.0	35.0	47.0	.....	.....	10.4	17.0	329.7	350.0
1952	27.0	38.0	167.2	292.0	2.0	.....	.....	.....	3.1	4.0	199.3	334.0
1951	56.5	78.0	0.2	.....	.....	.....	0.5	.....	1.2	1.0	58.4	79.0
1950	27.2	30.0	.....	.....	.....	.....	.....	.....	0.1	.....	27.3	30.0
Totals to date	119.8	158.0	1,256.4	1,871.0	212.0	261.0	0.5	.....	34.2	41.0	1,622.9	2,331.0
All planted to date	934.6	897.7	84,474.4	103,151.0	24,466.1	33,065.3	733.4	794.0	442.2	376.0	111,050.7	138,284.0

FIG. V

NUMBER OF TREES PLANTED IN VANCOUVER FOREST DISTRICT, IN MILLIONS OF TREES, FOR YEARS 1930 TO 1955

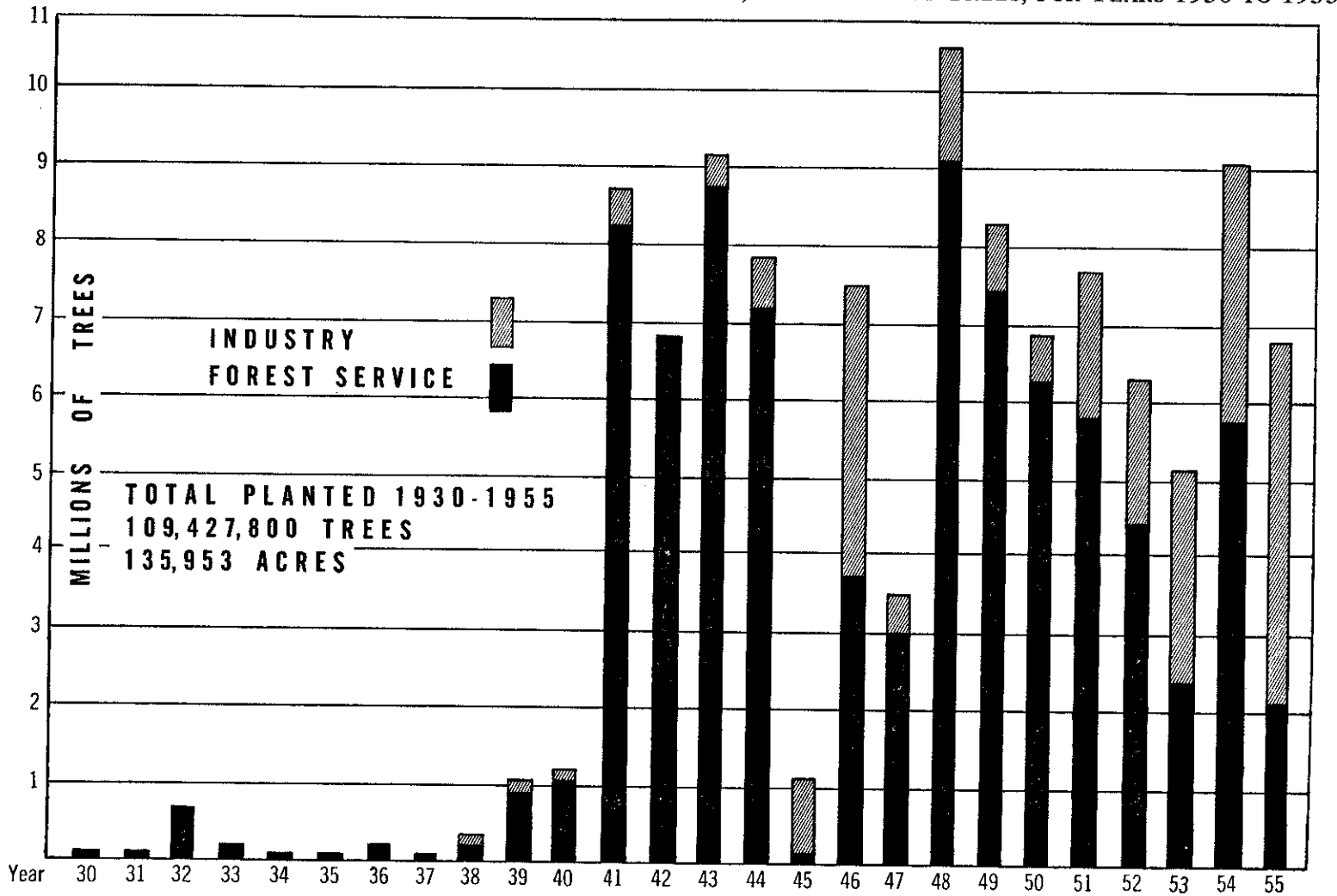
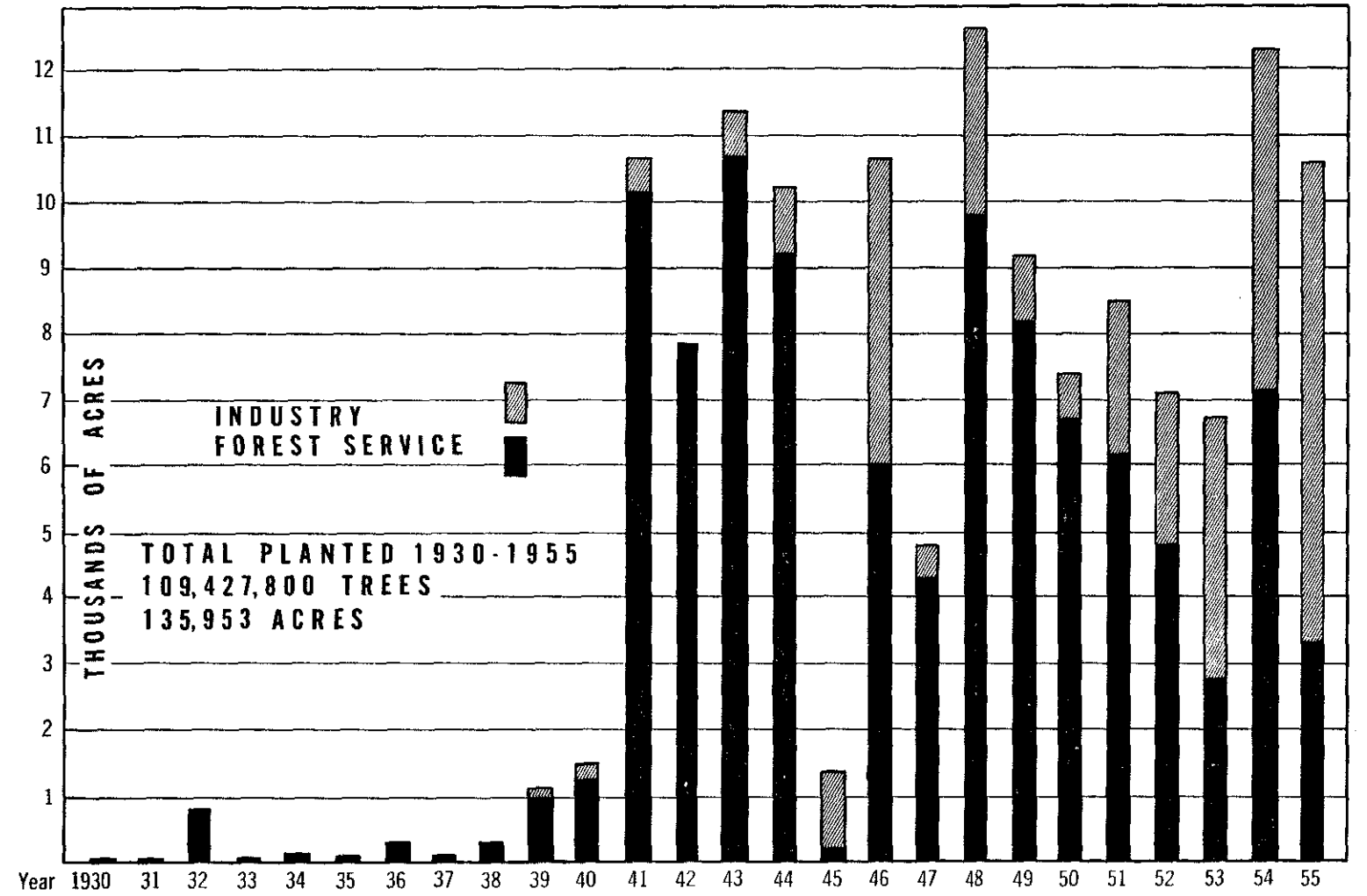


FIG. VI

NUMBER OF ACRES PLANTED IN VANCOUVER FOREST DISTRICT, IN THOUSANDS OF ACRES, FOR YEARS 1930 TO 1955



On the Coast five companies have carried out planting programmes; i.e., Elk Falls Company, MacMillan & Bloedel Limited, Western Forest Industries, British Columbia Forest Products Limited, and Canadian Forest Products Limited. In the Interior one company—S. M. Simpson Limited, at Kelowna—has embarked upon a programme of this nature, but only within the past few years and on a small scale.

The Elk Falls Company, from 1943 to 1954, planted over 9 million trees on 11,810 acres at a cost of $170,000. On the Coast some private companies have done a considerable amount of direct seeding, notably MacMillan & Bloedel Limited. This Company, from the last figures furnished me, had planted 10,650 acres and seeded 2,260 acres after experimenting with various kinds of chemicals with which to poison the seed as a deterrant to seed-consuming rodents.

Cost of planting to the Forest Service on the basis of 800 seedlings per acre is estimated to be about $40 per acre. This figure, on an acre basis, is arrived at as follows:—

	Per Acre
Cost of stock	$4.00
Roads, camps, etc.	5.00
Snag-falling	8.00
Supervision	3.00
Planting	20.00
Total cost	$40.00

Cost of growing and planting seedlings in the Interior is slightly higher than on the Coast due to the necessity of transplanting the seedlings, which must be 4 years old before considered sturdy enough to set out in areas to be planted. On the Coast the 2-year-old seedlings can be taken directly from the nurseries to the planting area.

The cost of planting incurred by companies on their own and Crown lands held on temporary tenures is subject to wide variations and runs from $6.79 per acre (Canadian Forest Products) to $20 per acre (MacMillan & Bloedel). The Forest Service supplies the seedlings, so the major cost item borne by the companies is for the labour engaged in the actual planting operation. This cost in turn reflects the number of trees planted to the acre. The Canadian Forest Products Company, for example, favours speedy planting with seedlings widely spaced. In 1954 this Company planted 148,000 Douglas fir seedlings on 424 acres in the Woss logging area at a total cost of $2,879.46. This indicates a spacing of 350 seedlings to an acre at a cost of $6.79 per acre, which is a comparatively low figure. The Elk Falls Company cost averages out over the years of the planting programme at about $14 an acre on a higher per acre stocking.

Mechanization of planting in use in the South-eastern United States,* with consequent reduction in cost, would assist in expanding our replanting, provided, of course, the methods adopted there for field planting could be

* With the aid of a planting-machine, cut-over or formerly farm lands in those areas can be planted at the rate of 9,000 pine seedlings in an eight-hour days.

adapted to the topography of this Province. I realize that machinery designed for planting former cotton-fields with pine seedlings may not be of practical use on our stony and rugged Coast terrain, but I have not been informed of any experimental attempt to adapt tractors, for example, for planting up on Coast logged-off land where tractors were used in logging off the land.

Regeneration by direct seeding will, I think, be extended in the future, when more effective measures of rodent-control are discovered either by pre-poisoning the area to be seeded or by treating the seeds with poison or a rodent repellent. When other food sources are scarce, one white-footed mouse, a species which congregates on cut-over lands, will consume close to 300 Douglas fir seeds per day. With a high mouse population, the extent of this hazard to disseminated Douglas fir seed can be readily understood.

Seed-bed conditions may also present an unfavourable environment, such as heavy slash or vegetative cover, which will adversely affect Douglas fir seed germination, although on unburned cut-over lands hemlock and cedar are usually successfully re-established by seeding. Topography is a factor as well, and burning will, in some areas, influence seed-bed conditions by affecting the moisture-holding capacity of the upper organic layer of the forest floor and by changing its nitrogen content and soil acidity. A slash fire following natural or artificial seeding will destroy up to 70 per cent of the seeds in the soil.

A further condition influencing germination of coniferous seed is shade from slash, stumps, and herbaceous growth. The seeds from coniferous trees such as Douglas fir, hemlock, and cedar are capable of being broadcast and germinating, but seed-bed receptivity and the many variables which influence germination either adversely or beneficially, in combination, still render artificial seeding an uncertain procedure.

Another basic circumstance to which consideration must be given in any programme of artificial seeding is the supply of required seed. Seed should be of a genetically superior quality, selected from sources suitable in origin both climatically and topographically. For example, for satisfactory results, seedlings should not be planted more than 500 feet above or below the seed source and the mean annual temperature must be within 2 degrees Fahrenheit of it. As logging moves into more rugged and mountainous terrain, seeds must be collected from these areas if, after logging, they require replanting. Lack of cone-crops over a period of years at higher elevations creates a problem of adequate Douglas fir seed supply for growing seedlings suitable for this environment. A partial solution might be found by planting the ubiquitous hemlock in the higher altitudes, although stimulating cone production of fir by introducing suitable chemicals into the root systems may be the answer.

Future research will probably provide other answers to the seed shortage and also how to improve tree strains by cross-pollination.

The establishment of smaller nurseries in areas to be planted deserves consideration, and in this regard weight should be given to seed provenance and the transportation costs now incurred in long hauls from distant nurseries.

Improvement of stock by seed selection and the location of nurseries in areas to be planted may also substantially lower the unit cost of artificial regeneration due to the ultimate increase in yield volumes and values.

The Forest Service does not distribute seed as it does seedlings. It leaves the selection and purchase or collection of seed to the judgment of the companies engaged in this type of regeneration on their own lands.

The programme I envisage will require greatly increased supplies of seed, especially if broadcast seeding by aeroplane or helicopter is found to be successful and more economical than planting. Some of the cost of establishing new nurseries and raising the additional millions of transplants required may be saved by increasing the acreage of direct seeding. In consequence, direct seeding should be encouraged by the Government, if found practical, by supplying free seed to responsible forest-land owners on similar conditions to those presently regulating the supply of free seedlings.

Nature is seemingly unpredictable in the irregularity in which coniferous trees produce seeds. There are more lean years than good ones, and this fluctuation in seed-supply tends to keep the price fairly high and necessitates the storage of the surplus years under controlled conditions of temperature and humidity. The viability of fir-seed is good for many years when stored under proper conditions, and with so much reforestation to be undertaken it would be better to risk a reasonable loss of seed and nursery stock, should a succession of good seed years and successful natural regeneration chance to reduce the demand, than to lose the opportunity of reforesting because seed or seedlings in full supply cannot be provided at the time of necessity.

Coniferous-tree seeds are surprisingly fine in size and are by no means cheap on a weight basis. The following table is of interest in this regard:—

TABLE 72

Species	Average Yield of Cleaned Seed per Bushel of Cones (Lb.)	Number of Seeds per Pound	Price per Pound ($)	Broadcast per Acre (Lb.)
Douglas fir (Coast)	0.44	40,000	9–12	¾–1
Western hemlock	1.00	300,000	18.00	¼–½
Western red cedar	1.50	400,000	8.00	¼
Sitka spruce	0.75	210,000	8.00	¼
Englemann spruce	0.75	135,000	8.00	¼
White fir (*A. amabilis*)	3.00	11,000	5.00	4
Grand fir (*A. grandis*)	1.00	19,000	4.00	2
Alpine fir (*A. lasiocarpa*)	1.00	35,000	5.00	2
Ponderosa pine	1.25	10,000	4.00	3–4
Lodgepole pine	0.35	100,000	7.00	½
Larch (*L. occidentalis*)	0.5	143,000	5.00	1

Source: British Columbia Forest Service.

The prices quoted are for large quantities purchased in the Northwestern States for Government or industrial planting. There is not an adequate supply source in British Columbia even of Douglas fir. In addition to fir, species in some demand for seeding or planting are hemlock and spruce. Yellow pine (ponderosa) is being increasingly planted in the Interior, and there have recently been requests for larch for Interior planting. Experiments are being made in underplanting grand fir (*Abies grandis*), on areas occupied by alder or other deciduous growth. The three *Abies* species, true firs, in the above list are all locally known as balsam.

Notwithstanding the difficulties to which I have made passing reference and the relatively high price of seed, regeneration by broadcasting seeds from helicopters is less costly per acre over extensive areas than planting seedlings. Cost of direct seeding from the air is, however, subject to variables; for example, the intensity of the flying required, governed by the amount of seed distribution per acre, and the type of chemical treatment employed.

I am advised that once a helicopter is on the area to be seeded and excluding any other costs, actual seed dissemination runs to about 65 cents per acre. On the other hand, other studies before me indicate that on a large United States project using one-half to three-fourths pound of Douglas fir treated seed per acre, the cost of aerial seeding amounted to about $7 an acre.

In any event, it seems clear that to seed an acre to fir by helicopter, the cost can be calculated, on large areas, to be about one-third to one-half the cost of planting fir seedlings.

Then, too, as I have mentioned before, the Forest Service does not grow hemlock or cedar trees in its nurseries, but, apart from experimental plots, limits its output to Douglas fir growing stock. It follows that, if we are to regenerate artificially denuded areas by growing hemlock or cedar, these species must be brought into production by artificial seeding until such time as the Forest Service is prepared to produce hemlock and cedar seedlings in its nurseries.

As we are moving deeper and deeper into a hemlock economy, perhaps the future emphasis will be on seeding or planting hemlock on suitable N.S.R. areas rather than the present concentration on Douglas fir regeneration. After our mature Douglas fir forests are cut out, hemlock should occupy the dominant position in our forest economy. We must accept this fact as one already influencing the present and future development of our wood-consuming industries. We can never recreate our ancient and giant Douglas firs, upon which our dominant position in the world lumber market was founded. To try to keep our forests predominantly fir is, to my way of thinking, an outmoded uneconomic philosophy based largely on sentiment and the refusal to realize that we are witnessing the swift passing of an era soon to be nothing more than a memory. We are now close to,

if not actually in, the hemlock age and must govern our thinking and our policies accordingly.

I am not suggesting that Douglas fir will not, as a second rotation crop, find its proper place. It will undoubtedly continue to be a useful and valuable source of wood. A doubt exists in my mind, however, as to whether we should direct our efforts, as now, to the artificial regeneration of Douglas fir when the simple fact is that lack of reproduction of this species in logged-over fir areas is largely due to a failure to observe proper cutting practices, and thereby not leaving adequate seed sources of this species, thus favouring the reproduction of the associated hemlock and cedar.

If we are to continue to grow Douglas fir to a considerable degree, as I am sure we will, then the emphasis probably should not be so much on planting Douglas fir seedlings, but in controlling the mechanics of logging and cutting practices where possible to "(1) provide for an adequate source of seed for regeneration, by reservation of blocks or strips of seed-trees adjacent to clear-felled cuttings, or by leaving seed-trees uniformly scattered on seed-tree cuttings (shelterwood fellings); (2) provide a satisfactory seed-bed by regulated slash burning, or clean logging without burning; (3) protect seed in the soil from depredations by rodents; and (4) prepare against loss of seedlings caused by physical and biotic agencies."*

I would accept these suggestions of Mr. E. H. Garman, with this qualifying observation concerning Douglas fir: it is my view that leaving scattered seed-trees of this species, except in carefully selected areas, is a comparatively costly method of securing regeneration, especially when stumpage prices are high. The residual seed-trees represent an investment not likely to be recovered by a later logging programme, because these isolated trees are either blown down or, if they remain in place for any length of time, become surrounded by young growth, which should not be endangered by a logging venture. Cedar and hemlock apparently cannot be left as scattered seed-trees with any expectation they will retain their vitality for any length of time. According to the evidence, they soon die of exposure. Patch logging, where practical, leaves an adequate seed source without any substantial investment in seed-trees left as such, and the residual stand can be recovered as part of a planned cutting programme.

Turning to consider for a moment the position of privately held lands classified as not satisfactorily restocked, it is, I think, reasonable to assume that in 1945 somewhere in the neighbourhood of 400,000 acres were in this category, and in 1955 the closer estimate of 487,439 acres may be accepted. In the 1945 Report, I stated:—

* *See* "Regeneration Problems and Their Silvicultural Significance in the Coastal Forests of British Columbia," by E. H. Garman (1955).

"The first step toward bringing these privately owned, denuded lands into productivity should be a survey to determine what proportion thereof are best suited for the growing of forest crops. These lands, when so selected by survey, would be classified as 'forest lands.' The owner of denuded 'forest lands' should not be permitted to allow his productive acreage to remain unproductive. In my opinion he should be directed to replant his land within such time and upon such conditions as may be considered reasonable by the Service."

In 1953 the following section (as amended in 1955 to limit its application to the Coast) was added to the "Forest Act" to implement this recommendation:—

"167. (1) In this section, 'land' means land that has been alienated by the Crown.

"(2) The Minister may from time to time cause land west of the Cascade Mountains, designated by him, to be examined by the Forest Service for the purpose of ascertaining:—

"(*a*) What area in the land is such that it will have its best economic use under forest crop:

"(*b*) The extent to which such area is satisfactorily stocked with forest-growth.

"(3) Where the Minister has ascertained that an area of land is such that it will have its best economic use under forest crop, he shall classify that area as forest land.

"(4) The Minister shall further classify all forest land as satisfactorily stocked with forest-growth of commercially valuable species of trees or as unsatisfactorily stocked with forest-growth of commercially valuable species of trees, as the case may be.

"(5) When classifications have been made under subsections (3) and (4), the Forest Service shall:—

"(*a*) Give notification thereof by registered mail to all persons known by the Forest Service to have any interest in the land:

"(*b*) Make an appropriate filing or registration in the proper Land Registry Office in accordance with regulations made by the Lieutenant-Governor in Council.

"(6) The officials, employees, and agents of the Forest Service shall be entitled to free and uninterrupted access to land for the purpose of examination thereof.

"(7) When land is classified as forest land that is unsatisfactorily stocked with forest-growth, the Minister by direction in writing may require the owner to stock the land in the manner, to the extent, and at the times specified in the direction.

"(8) An owner to whom a direction is given under subsection (7) shall carry out the direction.

"(9) If an owner to whom a direction is given under subsection (7) fails to carry out the direction or any part thereof, the Minister shall have power to enter on the lands and to plant or otherwise reforest them.

"(10) The owner of lands planted or otherwise reforested under subsection (9) shall pay to the Crown the cost of the planting and reforesting, and such cost may be recovered with costs by action at the suit of the Crown.

"(11) Where lands have been entered upon and afforested or reforested under this section, the indebtedness of the owner shall be the actual cost of the operation to the Crown, and the owner of the land shall repay the indebtedness at an annual rate to be fixed by the Minister, but such annual rate shall not, without the consent of the owner, exceed ten per centum of the cost of the operation. The Minister may direct that the indebtedness from time to time outstanding shall bear interest at a rate to be fixed by him.

"(12) The Crown shall have a lien on lands planted or otherwise reforested under subsection (9) for the cost of the planting and reforesting, and the lien shall constitute a charge to the like extent and shall confer the same rights and shall be enforceable in the same manner as a lien created under this Act for the recovery of royalty, including absolute and unconditional power to sell."

The Forest Service has done little, if anything, to enforce the provisions of this section, although surveys have been undertaken for the purpose of classifying some areas of alienated Crown lands.

An earlier amendment in 1950 authorized the Chief Forester, with the approval of the Minister, to enter into an agreement with the owner or occupier of privately held lands for the reforestation of such lands by the Forest Service. It reads as follows:—

"166. (1) The Chief Forester, with the approval of the Minister, may enter into an agreement with the owner or occupier of Crown-granted or otherwise alienated lands for the forestation of such lands on such terms and conditions as the Minister deems advisable.

"(2) The Minister may spend moneys voted or otherwise provided for afforestation of reforestation for the purposes of forestation of lands subject to agreement as provided in subsection (1).

"(3) Subject to subsection (5), all moneys expended pursuant to subsection (2) shall be repaid to the Crown by the owner or occupier with whom an agreement is made, within the time limited in the agreement.

"(4) The Crown shall have a lien on lands forested pursuant to an agreement under subsection (1) for the costs of the forestation, and the lien shall constitute a charge to the like extent and shall confer the same rights and shall be enforceable in the same manner as a lien created

by the provisions of this Act for the recovery of royalty, including an absolute, unconditional power to sell.

"(5) The Chief Forester, with the approval of the Minister, may supply young trees from Forest Service tree nurseries, at cost or less than cost, or free of cost, to an owner or occupier of Crown-granted or otherwise alienated lands for the purpose of forestation."

The Forest Service, pursuant to the provisions of this section, has entered into two contracts: one in 1951 with Western Forest Industries, a subsidiary of Alaska Pine and Cellulose Company, resulting in the planting of 3,565 acres in the Gordon River area south of Cowichan Lake and the undertaking to plant about 1,000 acres more in the same area, and the other recently with Elk River Timber Company covering a large area south of Campbell Lake.

HARDWOOD REGENERATION

So far I have been directing my attention to the regeneration of softwood species. There is at least one hardwood that should not be overlooked in future forest policy. I refer to poplar and in particular to cottonwood (*P. trichocarpa*), which is the most important commercial poplar native to this Province. Cottonwood can be managed in plantations to produce a substantial volume of wood for a wide range of purposes, from veneer and plywood to newsprint. Western Plywood Company has been using cottonwood as its main source of supply for the manufacture of plywood for about ten years, and the Westminster Paper Company Limited has been manufacturing ground-wood pulp and specialty paper products from cottonwood since 1949. Due to the logging activities of these two companies, there has been a progressive depletion of economically accessible supply of this wood, and natural regeneration does not seem to follow logging.

In consequence, cottonwood and other suitable poplars must be planted to assure a future supply of this raw material. Cottonwood is established by planting cuttings in plantations on alluvial soils and is managed in its early years with the same care and intensity as an agricultural crop. In my view it is in the public interest to encourage regeneration of the poplar types by private enterprise, and I recommend that Crown land suitable for poplar cultivation, such as alluvial islands in the larger rivers, be sold to tree-farmers, under the revised regulations affecting tree-farms which I have recommended, upon such terms and conditions as may appear just and equitable.

PLANTING ELSEWHERE

As I had occasion to mention in another part of this Report, extensive planting is being carried out in other wood-producing areas of the world. usually by private as opposed to government enterprise.

The following is a short summary of the planting carried on in the Southern States by private interests, mostly small private land-owners.

" Pine plantations are made on abandoned fields, eroded ground and cut over areas. Fields require little other work than removal of old fences, hedgerows and other obstructions. Eroded ground requires filling heads of gullies with brush and other materials to retard rate of runoff. Non-merchantable species growing on cutover areas require girdling and poisoning. Scrub oak land is reclaimed by bulldozers and root cutters in strips. Costs vary from nothing for fields to $2.00–$5.00 per acre for cutover land and $10.00–$15.00 for land converted by machines.

" Seedlings are produced in 9 months in large nurseries operated by State Government or by private industry. Cost of growing seedlings $5.50 to $6.00 per thousand. Sold to public for $3.00 per thousand.

" Spacing on poor sites is 6'x6', on average sites 7'x7' and on good sites 8'x8'.

" Cost of planting (including cost of seedlings):

" Open fields by machines $5–$8.00 per acre, by hand $7–$9.00 per acre.

" Cutover areas $9–$10.00 per acre by hand.

" Bulldozed areas $7–$9.00 per acre by hand or machine.

" Summary of planting costs:

Preparation	Zero to $15.00 per acre
Seedlings	$1.80 to $3.60 per acre
Labour and machines	$5.00 to $9.00 per acre
	$6.80 to $27.60 per acre*

" Planting of pine now (1956) exceeds 500 million trees a year and will increase far beyond this figure."

Anticipated seedling production in 1958–59 is expected to reach, if not exceed, one thousand million.

Projected increases in pine seedling nursery capacity for eleven Southern States in Region 8 are estimated as follows together with projected increases for six of those States:—

* From brief presented by A. W. Bentley.

TABLE 73

PROJECTED INCREASE, PINE SEEDLINGS NURSERY CAPACITY

(THOUSANDS.)

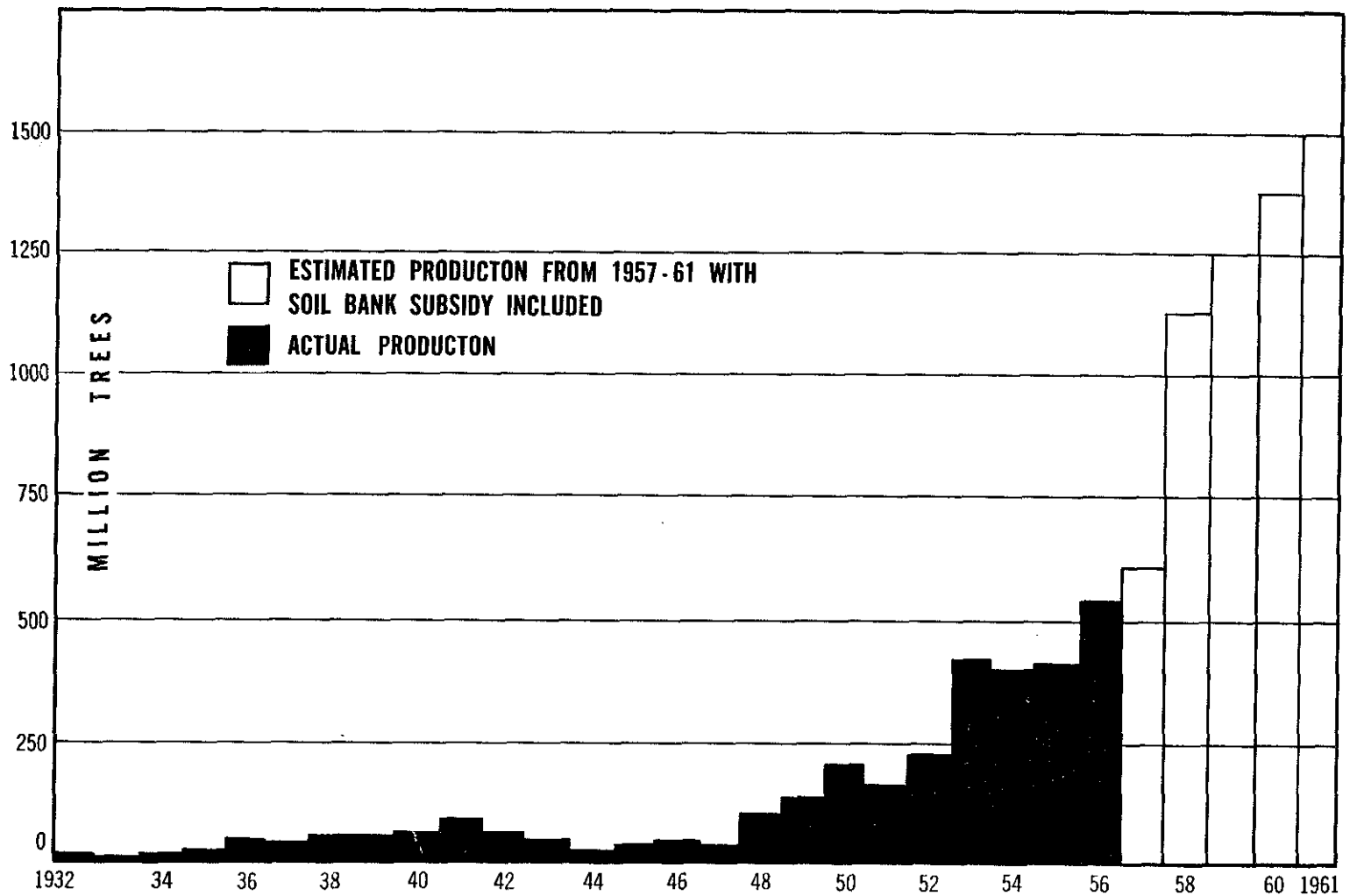
States	Industrial	State	Federal	Total
11 States				
1956–1957	78,000	436,000	97,000	611,000
1957–1958	154,200	822,000	145,000	1,121,200
1958–1959	200,000	930,000	155,000	1,285,000
Tennessee				
1956–1957	.....	25,000	22,000	47,000
1957–1958	.....	40,000	40,000	80,000
1958–1959	.....	50,000	50,000	100,000
Alabama				
1956–1957	7,000	50,000	.....	57,000
1957–1958	7,000	80,000	15,000	102,000
1958–1959	7,000	100,000	15,000	122,000
Mississippi				
1956–1957	5,000	40,000	47,000	92,000
1957–1958	10,000	90,000	50,000	150,000
1958–1959	10,000	110,000	50,000	170,000
Georgia				
1956–1957	16,000	85,000	.....	101,000
1957–1958	34,000	175,000	.....	209,000
1958–1959	34,000	185,000	.....	219,000
North Carolina				
1956–1957	.....	40,000	.....	40,000
1957–1958	10,000	85,000	.....	95,000
1958–1959	10,000	95,000	.....	105,000
South Carolina				
1956–1957	.....	37,000	.....	37,000
1957–1958	20,000	64,000	.....	84,000
1958–1959	20,000	77,000	.....	97,000

PROJECTED PROGRAMME FOR PRIVATE INDUSTRIAL NURSERIES IN THE ELEVEN STATES OF REGION 8

	Pine Seedlings		Pine Seedlings
1954–1955	30,000,000	1958–1959	200,000,000
1955–1956	67,000,000	1959–1960	225,000,000
1956–1957	78,000,000	1960–1961	250,000,000
1957–1958	154,000,000		

The expected and projected increases may be expressed in the following form:—

REGION 8 SEEDLING PRODUCTION FOR THIRTY YEARS, WITH PROJECTED INCREASE DUE TO SOIL BANK SUBSIDY



It is almost incredible to think of an annual nursery production amounting to 1,500 million seedlings by 1961. The present production (1956) of over 500 million seedlings is itself a fantastic figure. These present and projected calculations are based, however, upon information secured by Mr. A. W. Bentley at my request from Mr. Frank Albert, Assistant Regional Forester in charge of State and Private Forestry for Region 8, and I see no reason to doubt their accuracy.

Turning from seedling production and nursery capacity to areas planted, the following table indicates acreage planted in Region 8 in 1955 (note percentages of planting on private lands):—

TABLE 74

SOUTHERN PINE REGION, DISTRICT NO. 8, U.S.F.S.

(Acres.)

	Federal Lands	State Agencies	Private Lands	Total
Alabama	1,081	204	36,729 (97%)	38,014
Arkansas	837	51	13,671 (94%)	14,559
Florida	2,308	2,511	91,112 (95%)	95,931
Georgia	2,367	434	96,384 (97%)	99,185
Louisiana	1,436	202	45,244 (97%)	46,882
Mississippi	2,183	259	51,866 (96%)	54,308
North Carolina	1,329	490	22,007 (92%)	23,826
Oklahoma	.....	194	1,698 (90%)	1,892
South Carolina	10,852	1,729	32,999 (72%)	45,580
Tennessee	3,823	1,056	18,066 (79%)	22,945
Texas	41	89	22,428 (99%)	22,558
Totals, District No. 8	26,257 (6%)	7,219 (2%)	432,204 (92%)	465,680

Turning to the Pacific Coast States and including British Columbia, the 1955 planting figures are as follows:—

TABLE 75

PACIFIC COAST STATES, 1955

(Acres.)

	Federal Lands	State Agencies	Private Lands	Total
Washington	9,155 (53%)	2,179 (12%)	6,110 (35%)	17,444
Oregon	16,694 (59%)	5,758 (20%)	5,864 (21%)	28,316
California	3,083 (69%)	195 (4%)	1,206 (27%)	4,484
Totals	28,932 (58%)	8,132 (16%)	13,180 (26%)	50,244
B.C. Coast	.....	3,425 (32%)	7,156 (68%)	10,581

TABLE 76

NURSERY PRODUCTION IN 1955

	Federal	State	Private	Total
Washington	7,801,000	6,094,000	4,867,000	18,762,000
Oregon	2,475,000	5,916,000	.....	8,391,000

In Washington projected Federal production is 22 million and State 30 million seedlings. In Oregon a second State nursery is going into production in 1957 with an anticipated production of 20 million seedlings, and a new commercial nursery at Salem produced 19 million in 1956. A major factor in causing these increases in production in these States and in the Southern Pine Region is the Federal Soil Bank Policy, by which farmers are encouraged to convert suitable land from surplus farm production to forest planting with the Federal Government providing a major part of the cost.

The following table gives an estimate of tree planting required in the regions mentioned in the United States as of the year 1953. It is extracted from a report of the U.S. Forest Service of January, 1956. The comment following the table is also that of the U.S. Forest Service.

TABLE 77

(Thousands of acres.)

Regions	Commercial Forest Land	Non-commercial Forest Land	Windbarrier Lands	Total
New England States	1,228	18	0	1,246
Middle Atlantic States	3,725	2	0	3,727
Lake States	7,651	636	200	8,487
Central States	7,869	402	124	8,395
Plains States	975	448	2,337	3,760
Totals, North	21,448	1,506	2,661	25,615
South Atlantic States	4,081	0	0	4,081
South Eastern States	14,214	0	0	14,214
West Gulf States	3,652	0	0	3,652
Totals, South	21,947	0	0	21,947
Pacific Northwest States	2,468	354	10	2,832
California	4,104	3,107	0	7,211
North Rocky Mountain States	1,169	105	190	1,464
South Rocky Mountain States	812	375	83	1,270
Totals, West	8,553	3,941	283	12,770
Totals, Continental U.S.	51,948	5,447	2,944	60,339

"These are the figures with which the annual accomplishments shown in this Report must be contrasted. Furthermore, not every acre so reported can be considered as a reduction of the acres shown in the table, since obviously not all plantations survive satisfactorily, and some

of the current planting is not reducing the backlog shown above but is, instead, being done on newly cut-over acres that would have restocked naturally had their owners been willing to wait awhile. In other words when the accomplishments of any one year are considered in the light of the above facts it is seen that our present progress is indeed slow."

It will be noted that in 1953 an estimated 2,832,000 acres in the Pacific Northwest States required planting. In 1955, 45,760 acres, or less than 2 per cent, were planted. In British Columbia, of the 11,864,000 acres requiring planting, 11,000 acres, or less than one-tenth of 1 per cent, were planted in 1955.

It is manifest that this Province, with areas classified as not satisfactorily restocked four times the size of similar areas in the Pacific Northwest States, actually planted only one-quarter as much N.S.R. acreage as those planted by these Pacific Northwest States.

This may be considered an unfair comparison, and it may be said that we should regard only the Coast areas requiring planting. On the Coast, N.S.R. acreage totals 1,723,000 acres. Planting on the Coast in 1955 totalled 10,500 acres. On this narrower basis of comparison we planted on the Coast on our N.S.R. areas, which are a little over one-half the size of those classified as such in the Pacific Northwest States, less than one-quarter of the planting done by those States in 1955. The progress of replanting in the neighbouring States, while greatly in excess of our own programme, is regarded by the U.S. Forest Service as " indeed slow."

Because of the spectacular expansion of seedling production and planting in the Southern States and because Washington and Oregon are our nearest competitors, I have stressed the developments leading to regeneration in these sections of the United States. In order to present a more comprehensive picture, I reproduce the following table, which is a later summary of tree planting undertaken in the continental United States for the year 1955–56. Attention is drawn to the fact that private planting, excluding wind-barrier planting, accounts for about 85 per cent of the current planting and about 60 per cent of the accumulated planting of past years.

TABLE 78

SUMMARY OF TREE PLANTING IN THE [illegible]

TABLE 78

SUMMARY OF TREE PLANTING UNDERTAKEN, JULY 1ST, 1955, TO JUNE 30TH, 1956

(Areas in acres.)

State	FOREST PLANTING									WIND-BARRIER PLANTING			GRAND TOTALS		
	Federal Acres Planted			Other Public (Non-Federal) Acres Planted			Private Acres Planted			All Owners Wind-barrier Acres Planted					
	Current Year	Previous Years	Total	Current Year	Previous Years	Total	Current Year	Previous Years	Total	Current Year	Previous Years	Total	Current Year	Previous Years	Total
Alabama	857	72,867	73,724	221	4,195	4,416	49,519	221,052	270,571		78	78	50,597	298,192	348,789
Arizona	411	6,365	6,776					1,444	1,444	867	4,588	5,455	1,278	12,397	13,675
Arkansas	270	23,808	24,078		643	643	15,354	115,465	130,819				15,624	139,916	155,540
California	4,061	54,436	58,497	611	404	1,015	1,043	39,305	40,348	74	5,274	5,348	5,789	99,419	105,208
Colorado	267	69,699	69,966		160	160	7	3,248	3,255	824	20,897	21,721	1,098	94,004	95,102
Connecticut		650	650	55	14,444	14,499	741	26,786	27,527				796	41,880	42,676
Delaware		100	100	16	613	629	273	2,257	2,530				289	2,970	3,259
Florida	3,248	37,713	40,961	1,676	14,076	15,752	77,847	505,782	583,629	250		250	83,021	557,571	640,592
Georgia	5,022	16,320	21,342	4,021	8,185	12,206	117,888	598,649	716,537	5		5	126,936	623,154	750,090
Idaho	1,128	102,022	103,150	14	854	868	318	2,395	2,713	250	6,899	7,149	1,710	112,170	113,880
Illinois	1,966	46,280	48,246	1,392	12,417	13,809	5,230	63,670	68,900	101	2,300	2,401	8,689	124,667	133,356
Indiana	1,873	23,080	24,953	883	24,619	25,502	4,224	60,857	65,081	831	11,428	12,259	7,811	119,984	127,795
Iowa	10	1,848	1,858	250	7,742	7,992	810	261,772	262,582		28,067	28,067	1,070	299,429	300,499
Kansas		100	100		4,000	4,000	25	25,035	25,060	800	204,877	205,677	825	234,012	234,837
Kentucky	40	10,789	10,829	136	2,030	2,166	6,540	29,350	35,890	30	25	55	6,746	42,194	48,940
Louisiana	2,337	106,265	108,602	1,199	10,706	11,905	58,236	444,010	502,246				61,772	560,981	622,753
Maine		401	401	73	1,232	1,305	1,057	21,667	22,724				1,130	23,300	24,430
Maryland		1,436	1,436	860	5,228	6,088	2,824	34,431	37,255	24		24	3,708	41,095	44,803
Massachusetts		500	500	150	61,831	61,981	430	36,111	36,541				580	98,442	99,022
Michigan	4,161	559,113	563,274	10,916	320,064	330,980	37,130	220,869	257,999	154	6,650	6,804	52,361	1,106,696	1,159,057
Minnesota	3,172	144,499	147,671	6,408	73,123	79,531	7,777	113,969	121,746	40	15,884	15,924	17,397	347,475	364,872
Mississippi	2,591	154,105	156,696	436	3,995	4,431	81,844	310,246	392,090				84,871	468,346	553,217
Missouri	827	65,838	66,665	733	5,364	6,097	1,548	22,278	23,826	48	2,080	2,128	3,156	95,560	98,716
Montana	1,407	42,280	43,687	43	31	74	137	1,202	1,339	451	12,947	13,398	2,038	56,460	58,498
Nebraska		30,969	30,969		1,646	1,646	700	14,951	15,651	4,420	298,707	303,127	5,120	346,273	351,393

Table continued overleaf.

TABLE 78—*Continued*

(Areas in acres.)

State	FOREST PLANTING									WIND-BARRIER PLANTING			GRAND TOTALS		
	Federal Acres Planted			Other Public (Non-Federal) Acres Planted			Private Acres Planted			All Owners Wind-barrier Acres Planted					
	Current Year	Previous Years	Total	Current Year	Previous Years	Total	Current Year	Previous Years	Total	Current Year	Previous Years	Total	Current Year	Previous Years	Total
Nevada	150	167	317							10	449	459	160	616	776
New Hampshire		1,153	1,153	58	12,667	12,725	1,218	27,900	29,118				1,276	41,720	42,996
New Jersey	21	587	608	34	13,684	13,718	1,200	31,498	32,698				1,255	45,769	47,024
New Mexico	212	5,558	5,770					2,093	2,093	826	5,058	5,884	1,038	12,709	13,747
New York	25	7,973	7,998	4,480	518,055	522,535	23,857	438,055	461,912	7	1	8	28,369	964,084	992,453
North Carolina	1,951	18,170	20,121	1,401	6,010	7,411	30,764	123,537	154,301	20	32	52	34,136	147,749	181,885
North Dakota		967	967					2,000	2,000	7,181	94,636	101,817	7,181	97,603	104,784
Ohio	1,481	16,233	17,714	1,767	35,179	36,946	11,087	139,895	150,982	94	2,049	2,143	14,429	193,356	207,785
Oklahoma		5,757	5,757	32	778	810	1,227	37,035	38,262	520	57,377	57,897	1,779	100,947	102,726
Oregon	17,353	110,961	128,314	8,026	73,038	81,064	14,934	84,330	99,264	6	82	88	40,319	268,411	308,730
Pennsylvania	258	21,346	21,604	1,090	87,489	88,579	50,847	349,108	399,955	6	4	10	52,201	457,947	510,148
Rhode Island		423	423	54	10,940	10,994	244	21,514	21,758		1	1	298	32,878	33,176
South Carolina	11,036	62,792	73,828	1,979	19,987	21,966	30,561	270,796	301,357				43,576	353,575	397,151
South Dakota	876	31,555	32,431	208	1,875	2,083	1	15,801	15,802	7,535	92,884	100,419	8,620	142,115	150,735
Tennessee	2,859	60,452	63,311	1,204	26,165	27,369	27,901	204,982	232,883	10	44	54	31,974	291,643	323,617
Texas	802	52,710	53,512	40	3,029	3,069	19,535	147,725	167,260	261	28,022	28,283	20,638	231,486	252,124
Utah	7	4,014	4,021	10	30	40	13	500	513	213	2,392	2,605	243	6,936	7,179
Vermont	2	1,324	1,326	105	7,597	7,702	2,126	28,811	30,937				2,233	37,732	39,965
Virginia	423	8,089	8,512	295	3,543	3,838	19,635	73,648	93,283	29	77	106	20,382	85,357	105,739
Washington	9,524	123,329	132,853	3,696	49,710	53,406	10,343	114,822	125,165	733	5,849	6,582	24,296	293,710	318,006
West Virginia	42	16,533	16,575	121	3,104	3,225	2,973	28,327	31,300				3,136	47,964	51,100
Wisconsin	1,260	235,635	236,895	6,559	199,998	206,557	21,191	217,403	238,594		7,610	7,610	29,010	660,646	689,656
Wyoming	1,702	7,581	9,283							646	8,710	9,356	2,348	16,291	18,639
Totals, Continental U.S.	83,632	2,364,792	2,448,424	61,252	1,650,480	1,711,732	741,159	5,536,581	6,277,740	27,266	925,978	953,244	913,309	10,477,831	11,391,140

Source: U.S. Department of Agriculture, Forest Service Planting Report.

Upon consideration of all the circumstances, the regeneration programme I recommend be undertaken in the public interest by the Crown, of direct and indirect benefit, cannot be considered extravagant or unrealistic, especially when measured against what has been accomplished and planned for the future in other competitive jurisdictions, nor when the varied necessities compelling the implementation of such a programme in this Province are fully understood and appreciated.

Before leaving this aspect of this Report I would like to mention a development which has as its objective not only the rehabilitation of our forests, but at the same time the rehabilitation of men. I refer to the utilization of inmate prison labour in forestry projects. California seems to have pioneered this field, starting a programme in 1945, and now has field camps housing over 1,000 inmates. Oregon has had in the last five years a camp for about sixty inmates working on the Tillamook burn area, and Washington has recently opened two camps for about sixty-five men each—one on the Yacolt burn and the other on the Olympic Peninsula. These experiments have proven successful in the United States.

In this Province the Attorney-General, Hon. Mr. Bonner, has encouraged the use of forestry camps for prison inmates, and the Forest Service has been a willing participant. Two separate programmes are under way.

The first of these is a rehabilitation forest camp situated on Gold Creek in the southern portion of Garibaldi Park, near Haney. This camp was started in the spring of 1956 and has accommodation for forty-eight inmates, selected by a Classification Committee at Oakalla. These inmates have been drawn from Oakalla Prison Farm proper, from the Young Offenders' Unit and the Westgate Unit at Oakalla. Steps are presently being taken to increase the capacity of this camp to sixty inmates.

The men at the camp have been under the general direction of Mr. S. Rocksborough-Smith, Director of New Haven, and during 1956 were responsible for the following accomplishments:—

(1) Built the actual camp, complete with living-quarters, kitchen, administration building, and wash-house.
(2) Constructed a thirty-man camp for the Parks Division of the British Columbia Forest Service.
(3) Slashed and piled 4 miles of road, 100-foot right-of-way.
(4) Burned slash and grubbed 2 miles of the 4 miles mentioned in (3).
(5) Carried out maintenance on 5 miles of park road. This maintenance has consisted mainly of repair and construction of culverts and small bridges.

Due to the problems arising from the increasing population at Oakalla Prison Farm, it became evident in the fall of 1956 that measures would have to be taken to relieve the overcrowding at that institution. The Department of the Attorney-General contacted the Forest Service with a view to establishing two or more sixty-man forest camps which could be

utilized to accommodate older inmates—not necessarily with a view to rehabilitation—prior to release, and as a result the Forest Service officials recommended establishment of up to two such camps in the Chilliwack River valley for clearing and construction of forest roads in that area. One sixty-man camp is now completed, and inmates of this camp are working on construction of the second camp. These camps are presently under the supervision of Warden Christie of Oakalla Prison Farm.

Perhaps of more immediate and relevant interest is the fact that during September and October, 1956, a tree-planting project arranged between the Socal Welfare Branch and the Forest Service on an experimental basis engaged twenty-five boys from the Brannen Lake School for Boys for six weeks in the Great Central Lake Region. During this time 255,000 trees were planted over 525 acres.

The boys were under the supervision of staff members of the School at all times, and the project was considered as a continuation of the correctional training of the boys selected. The School staff consisted of three supervisors, and the School progress and rating system was carried on in the project on the same basis as it is for the boys in the normal school setting.

The boys had an opportunity to demonstrate their ability as workers and proved themselves satisfactory in all respects.

The value of this project in terms of rehabilitation has been amply demonstrated, and another similar project is planned for 1957.

The Forest Service is also pleased with the results of the project. While the daily output per boy was lower than that ordinarily obtained through labour from the open market, the quality of planting was higher than average.

Total costs involved compare favourably with other forms of projects. The Forest Service supplied a cook and project personnel as well as camp facilities.

I feel sure that I can speak for the judiciary as well as myself when I commend this form of rehabilitation for young offenders. It is a programme which ought to be extended as far as practicable.

DEFINITION OF " N.S.R."

When dealing with the forest inventory and regeneration, I used the expression " not satisfactorily restocked " as one in common usage to convey a concept familiar to foresters. It has been my experience, however, that while foresters in general talk the same language, the words they use are not always intended to convey the same precise meaning. This may be easily ascertained by asking six professional foresters for a definition of sustained yield. The questioner will in all probability get six answers differing, if not basically, at least in degree.

In my usage of the phrase denoted by the abbreviation " N.S.R." I have endeavoured to keep within the Forest Service definition, which may be summarized as follows:—

For forest-inventory purposes the term " immature " is restricted to young trees of commercial species growing on forest land which may be expected to produce volumes commercially useful at maturity. This excludes young trees growing on alpine or other lands of " non-productive " quality, and also on better sites if the stocking is not adequate to produce a merchantable volume per acre. It is not, however, necessarily " fully stocked." As a general guide to decide classification between " immature " and " N.S.R.," the following numbers of trees per acre are regarded as full stocking:—

Age-class	Number per Acre	Age-class	Number per Acre
10 and under	1,000	61–80	200
11–20	750	81–100	150
21–40	500	101 and over	100
41–60	300		

These numbers are not used as a rigid dividing point. Decision as to whether a stand is to be compiled as " immature " or " N.S.R." depends also on the cruiser's judgment. A lesser number of trees per acre may be accepted if they, especially the important species, as fir on the lower Coast, are well distributed and in condition so that they may be expected to approach the "normal" number and volume as they grow older.

Tallying is done by the line-plot method, with size of plots regulated by age and size of the trees. In stands up to 40 years the plot size is one-hundredth of an acre; 41 to 80 years, one-fiftieth of an acre. For very young reforestation the " stocked quadrat " method is used, as in the case of surveys for artificial reforestation, in order to decide whether the existing natural regeneration is adequate or not.

By this method, groups of four square plots (each 6.6 feet square, or equal area in a circle) are examined at 1¼ chain intervals on parallel lines run 10 chains apart. Each of these plots contains one-thousandth of an acre and is known as a " milacre quadrat." Each quadrat is considered to be stocked if it contains one or more established seedlings of a commercial species, provided not more than four consecutive groups are completely

blank. " Established " means in condition to have a good chance of survival; in the Douglas fir region it must be at least in its second year, but three healthy seedlings in their first year are considered equivalent to one established seedling. If 31 per cent or more of the quadrats are stocked, the condition of the area is defined as adequate stocking. If 30 per cent or less, the area is not satisfactorily reforested.

Mathematically this means that there are 310 seedlings per acre, but actually there are many more. Good distribution of the seedlings is of more importance than the actual number per acre. Nature can be erratically prolific; small patches of hemlock in its second year have been counted at half a million stems per acre on the lower Coast. After fire on the Interior plateaux, lodgepole pine may be reproduced so generously that at 25 years of age there are still over 30,000 living trees per acre, none of them over 6 feet high or 2 inches in diameter at ground-level. In such overcrowded stands, growth is almost stagnant. The percentage of area stocking is generally found to be twice the percentage of plot stocking, ascertained by the above methods; e.g., if 25 per cent of the *plots* are stocked, the *area* is 50 per cent stocked but is not satisfactorily restocked by Forest Service standards.

For forest management licences the requirements for restocking are related to site quality, and I have made previous reference to the relevant standard contract clauses.

Definition of " adequately stocked " and methods for ascertaining whether land meets this requirement when once determined are not, however, unalterable. Definitions may vary from time to time. For example, the West Coast Forestry Procedures Committee, founded in 1945 as a standing committee of the Western Forestry and Conservation Association, recommends somewhat different methods of survey, with larger quadrats and " adequate stocking " requiring 40 per cent of them to be stocked. There are various technical reasons for choice of different methods, but, as I have said, the definitions in this Report are based upon Forest Service standards presently in use in this Province.

THE LOGGING AND LUMBERING INDUSTRIES

Logging is British Columbia's leading primary industry. Without logs our many plants converting wood into various merchantable forms would lie idle and useless; thousands of employees would be out of work; and our entire Provincial economy would suffer from a very severe financial malnutrition.

The logs, however, still continue to flow from our forests in an ever-increasing volume. The increase is largely attributable to the greater cut in the Interior, which increased from 577,166 M f.b.m. in 1944 to 2,416,886 M f.b.m. in 1956.

The following tables are of interest:—

TABLE 79

PRINCIPAL STATISTICS OF LOGGING OPERATIONS

Year	Firms Reporting	Number of Operations	Employees	Salaries and Wages	Cost of Materials	Gross Value of Production	Net Value of Production[1]
1943	521	5,789	9,174	$21,759,991	$12,123,625	$51,691,918	$39,568,293
1944	546	5,917	9,111	21,705,809	12,958,573	59,906,045	46,947,472
1945	639	6,353	9,183	21,862,917	12,870,104	64,307,247	51,437,143
1946	816	6,654	10,194	24,464,150	16,834,928	77,462,835	60,627,905
1947	952	7,623	15,102	42,403,015	26,000,298	120,149,681	94,149,383
1948	893	8,834	13,864	43,125,902	30,598,439	142,874,860	112,276,421
1949	858	10,852	11,280	36,028,431	26,330,779	129,098,690	102,767,911
1950	1,091	9,007	13,999	42,279,601	36,861,159	170,759,943	133,898,784
1951	1,253	10,220	15,838	62,517,748	47,707,651	214,051,202	166,343,551
1952	1,197	11,458	12,484	53,203,530	38,596,340	204,146,915	165,550,575
1953	1,057	10,711	11,744	50,728,308	36,216,499	202,364,186	166,147,687
1954	1,106	.....	12,261	56,195,020	41,345,885	219,448,210	177,602,325
1955 (estimated)	1,226	.....	13,248	60,521,026	44,862,000	235,263,000	190,401,000

[1] The net value of production is that portion of the gross or sale value of production which has been added by the manufacturing process and is obtained by subtracting from the gross value the costs of materials and supplies, fuel, and electricity.

Source: Bureau of Economics and Statistics, Victoria, B.C.

TABLE 80 PRIMARY FOREST PRODUCTION BY

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir
1943	1,218,018,771	511,415,437	336,544,454	589,644,840	134,994,151
1944	1,210,324,357	523,871,497	341,910,591	622,452,088	148,618,002
1945	1,175,673,433	557,593,614	310,195,487	643,238,149	165,984,229
1946	1,235,382,842	614,567,545	290,185,426	635,216,631	168,597,745
1947	1,652,193,732	814,193,127	385,662,832	823,063,771	241,000,661
1948	1,671,863,803	804,478,880	432,935,565	874,515,244	218,156,073
1949	1,704,540,011	673,123,692	416,634,594	808,279,819	189,051,280
1950	1,834,198,021	801,286,098	486,887,786	920,389,530	239,433,158
1951	1,841,750,075	722,057,293	623,870,951	925,052,431	262,234,975
1952	2,022,043,970	677,283,925	655,893,267	948,276,008	278,899,154
1953	2,076,493,216	811,992,689	676,670,348	1,083,796,935	291,713,926
1954	2,127,861,287	831,588,834	595,994,033	1,294,256,965	386,435,215
1955	2,381,621,313	897,728,032	781,663,070	1,227,208,220	381,361,959
1956	2,434,849,460	870,985,506	881,223,017	1,277,727,687	365,479,135

[1] Includes some volumes of cypress from Coast for the years 1946 to 1956, as in Table 81.

TABLE 81 PRIMARY FOREST PRODUCTION

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir
1943	1,118,256,812	463,521,928	172,096,144	575,432,398	132,117,922
1944	1,080,542,946	466,159,964	177,699,096	597,468,940	143,669,775
1945	1,036,411,731	495,262,595	125,715,495	619,126,393	159,732,535
1946	1,060,403,032	542,171,858	97,023,864	616,794,804	161,791,077
1947	1,374,068,070	727,585,898	107,894,761	796,652,302	228,891,816
1948	1,345,017,400	725,666,119	99,772,821	845,803,036	203,362,597
1949	1,418,224,859	606,676,734	103,534,909	787,766,600	179,621,396
1950	1,484,155,264	731,171,856	100,545,171	892,288,088	226,265,667
1951	1,362,093,659	666,975,892	138,196,907	879,738,126	241,124,803
1952	1,427,668,929	603,102,955	127,197,440	884,569,420	248,966,243
1953	1,497,003,590	733,414,795	143,767,069	1,022,414,414	255,113,215
1954	1,462,332,884	773,706,759	127,232,419	1,235,065,029	347,995,863
1955	1,426,960,758	829,339,186	132,331,813	1,145,694,368	334,025,916
1956	1,399,111,163	791,801,663	150,020,498	1,180,964,598	308,003,176

Source: Bureau of Economics and Statistics, Victoria, B.C.

TABLE 82 PRIMARY FOREST PRODUCTION

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir
1943	99,761,959	47,893,509	164,448,310	14,212,442	2,876,229
1944	129,781,411	57,711,533	164,211,495	24,983,148	4,948,227
1945	139,261,702	62,331,019	184,479,992	24,111,756	6,251,694
1946	174,979,810	72,395,687	193,161,562	18,421,827	6,806,668
1947	278,125,662	86,607,229	277,768,071	26,411,469	12,108,845
1948	326,846,403	78,812,761	333,162,744	28,712,208	14,793,476
1949	286,315,152	66,446,958	313,099,685	20,513,219	9,429,884
1950	350,042,757	70,114,242	386,342,615	28,101,442	13,167,491
1951	479,656,416	55,081,401	485,674,044	45,314,305	21,110,172
1952	594,375,041	74,180,970	528,695,827	63,706,588	29,932,911
1953	579,489,626	78,577,894	532,903,279	61,382,521	36,600,711
1954	665,528,403	57,882,075	468,761,614	59,191,936	38,439,352
1955	954,660,555	68,388,846	649,331,257	81,513,852	47,336,043
1956	1,035,738,297	79,183,843	731,202,519	96,763,089	57,475,959

Source: Bureau of Economics and Statistics, Victoria, B.C.

SPECIES, COAST AND INTERIOR (F.B.M.)

Yellow Pine	White Pine	Lodgepole or Jack Pine	Larch	Cottonwood	Miscellaneous	Total
31,784,000	27,315,892	11,050,106	48,054,730	3,796,474	166,147,929	3,078,766,784
34,680,483	30,056,303	18,459,849	57,185,141	6,898,441	101,876,332	3,096,333,084
34,171,959	28,884,965	27,375,115	61,762,689	8,872,874	67,482,977	3,081,235,491
					Hardwoods	
33,860,456	26,801,260	74,133,702	85,843,564	12,485,745	14,070,702	3,193,665,132[1]
44,972,440	38,023,436	57,810,931	96,501,509	15,095,555	12,208,370	4,187,816,199[1]
55,094,503	41,585,294	61,603,929	102,252,168	13,436,466	10,243,088	4,293,465,019[1]
40,388,161	40,236,638	65,071,529	91,906,266	4,160,373	10,955,529	4,049,682,327[1]
46,978,729	45,950,159	60,867,357	102,204,923	6,190,904	9,287,631	4,560,080,124[1]
53,320,615	46,544,286	91,602,938	102,556,968	8,587,665	10,462,661	4,696,346,812[1]
46,310,093	46,986,859	119,880,698	115,383,602	10,111,600	7,979,924	4,937,965,443[1]
44,423,514	59,050,039	118,422,384	101,257,955	7,427,055	8,787,006	5,291,587,324[1]
40,661,710	53,352,356	108,983,148	99,958,872	7,674,009	3,976,836	5,567,422,607[1]
50,943,076	58,265,948	154,219,716	131,096,273	20,366,335	4,708,083	6,109,201,888[1]
47,909,018	61,041,069	190,451,035	133,126,163	17,992,986	6,130,070	6,307,318,624[1]

Source: Bureau of Economics and Statistics, Victoria, B.C.

BY SPECIES, COAST (F.B.M.)

Yellow Pine	White Pine	Lodgepole or Jack Pine	Cypress	Cottonwood	Miscellaneous	Total
.....	17,691,186	.....	.....	1,467,994	44,646,910	2,525,231,294
.....	18,786,967	.....	.....	3,409,930	31,429,837	2,519,167,455
69,084	18,539,575	.....	.....	5,900,298	22,221,471	2,482,979,177
					Hardwoods	
38,862	18,251,827	199,136	2,519,514	7,177,472	13,310,527	2,519,681,973
965,039	23,587,550	80,400	7,090,285	8,032,446	11,138,985	3,285,987,552
804,033	23,194,807	87,311	7,300,006	6,292,681	9,083,500	3,266,384,311
338,556	22,316,822	167,231	5,334,435	2,768,217	10,127,662	3,136,877,421
95,366	22,108,084	110,076	6,396,333	4,291,527	8,664,998	3,476,092,430
773,096	18,912,758	14,679	8,305,954	5,314,422	10,104,731	3,331,555,027
694,682	19,248,540	157,919	8,916,343	7,157,552	7,461,567	3,335,141,590
8,673	24,118,196	46,510	11,552,257	6,186,144	8,472,895	3,702,097,758
592,108	24,548,392	60,113	16,679,342	6,093,485	3,674,523	3,997,980,917
83,500	24,598,780	19,214	20,019,863	14,683,443	3,885,289	3,931,642,130
350,585	23,245,177	74,236	20,403,478	11,450,661	5,006,917	3,890,432,152

BY SPECIES, INTERIOR (F.B.M.)

Yellow Pine	White Pine	Lodgepole or Jack Pine	Larch	Cottonwood	Miscellaneous	Total
31,784,000	9,624,706	11,050,106	48,054,730	2,328,480	121,501,019	553,535,490
34,680,483	11,269,336	18,459,849	57,185,141	3,488,511	70,446,495	577,165,629
34,102,875	10,345,390	27,375,115	61,762,689	2,972,576	45,261,506	598,256,314
					Hardwoods	
33,821,594	8,549,433	73,934,566	85,843,564	5,308,273	760,175	673,983,159
44,007,401	14,435,886	57,730,531	96,501,059	7,063,109	1,069,385	901,828,647
54,290,470	18,390,487	61,516,618	102,252,168	7,143,785	1,159,588	1,027,080,708
40,049,605	17,919,816	64,904,298	91,906,266	1,392,156	827,867	912,804,906
46,883,363	23,842,075	60,757,281	102,204,923	1,899,377	622,633	1,083,987,694
52,547,519	27,631,528	91,588,259	102,556,968	3,273,243	357,930	1,364,791,785
45,615,411	27,738,319	119,722,779	115,383,602	2,954,048	518,357	1,602,823,853
44,414,841	34,931,843	118,375,874	101,257,955	1,240,911	314,111	1,589,489,566
40,069,602	28,803,964	108,923,035	99,958,872	1,580,524	302,313	1,569,441,690
50,859,576	33,667,168	154,200,502	131,096,273	5,682,892	822,794	2,177,559,758
47,558,433	37,795,892	190,376,799	107,413,253	6,542,325	1,123,153	2,416,886,472

To render a tree of utilizable value it must be felled and moved from the woods to mills of various kinds to be converted into lumber and other merchantable products. Sawmilling has taken great strides since the pioneering days of 100 years ago and ranks to-day as a most important industry in the Province. Our changing economic concepts and the necessity of achieving higher values of recovery at economic cost levels have led to the establishment of integrated operations so that the log will find its way to the best profitable use, ending up as lumber, veneer, plywood, pulp, and a variety of other products according to its species, size, grade, and other relevant and related factors.

The production of lumber by our sawmills is, however, at present the dominant equation in any calculation of log utilization and will continue to be so as long as we can produce high-grade lumber from old-growth stock. In a second-growth economy our lumber production will be less distinctive.

In 1954 the lumber industry in British Columbia produced a total cut of 4,378,695,000 f.b.m. as against a cut of 7,243,855,000 f.b.m. for the whole of Canada. Thus British Columbia produced in that year 60.4 per cent of the total Canadian production, the percentage relationship for the decade 1943–54 averaging about 55 per cent. Of the British Columbia cut of 4,378,695,000 f.b.m., Coast and Interior contributions were as follows: Coast, 2,683,649,000 f.b.m. or 61.3 per cent; Interior, 1,695,046,000 f.b.m. or 38.7 per cent.

When we speak of the lumber industry, we envisage a stream of products not only of sawn lumber of all dimensions, but shingles, laths, sawn ties, hardwood squares, box-shooks, staves and headings, other sawn products, and the barking of pulpwood in plants other than pulp-mills.

With that in mind we have the context in which to measure our lumber industry against the whole of Canada in 1954 with the following cheerful result:—

TABLE 83

	British Columbia	Canada	Relationship (Per Cent)
Net value of production ($)	196,770,735	296,940,188	66.3
Employment (No.)	31,316	58,586	53.5
Salaries and wages ($)	103,527,735	152,556,819	67.9
Cost of fuel and electricity ($)	5,546,638	8,672,598	64.0
Lumber production (M f.b.m.)	4,914,285	7,920.033	62.0
Lumber planed in sawmills (M f.b.m.)	2,400,395	2,767,805	86.7
Shingle (squares)	2,798.641	2,896,080	96.6
Ties, sawn (No.)	1,522,265	4,490,797	33.9
Laths, sawn (M)	28,185	149,663	18.8
Box-shooks (M f.b.m.)	18.913	36,287	52.1
Other products, by-products, and work done ($)	37,731,711	59,453,464	63.5

Source: Bureau of Economics and Statistics, Victoria, B.C.

SAWMILLS

Our 1955 production of lumber was sawn into different forms in 2,489 operating sawmills.

It would be of interest to look at the 1955 picture in more detail with a glance back to 1944.

TABLE 84

Year	Number of Active Sawmills[1]	Daily Capacity[1] (M F.B.M.) (8 Hours)	Number of Inactive Sawmills[1]	Daily Capacity[1] (M F.B.M.) (8 Hours)	Total Production of Sawn Lumber[2] (Millions of F.B.M.)	Average Log Prices, All Species[3]	Average Lumber Sale Prices F.O.B.[2]
1944	807	14,974	110	702	2,040	$21.37	$36.00
1945	931	13,590	137	808	1,859	22.05	37.00
1946	1,228	15,256	115	741	2,202	27.41	45.00
1947	1,634	17,546	143	754	2,703	38.33	68.50
1948	1,671	18,570	179	840	2,862	40.37	72.25
1949	1,671	19,082	314	2,373	2,973	37.38	63.50
1950	1,826	19,143	234	1,462	3,450	46.67	67.30
1951	2,100	21,748	294	1,474	3,500	58.76	75.90
1952	2,223	23,433	332	2,092	3,350	49.69	69.45
1953	2,413	23,300	286	2,186	3,716	44.20	66.05
1954	2,346	25,602	367	2,281	4,125	47.32	65.70
1955	2,489	28,016	404	2,285	4,825	54.97	69.50

[1] Annual Reports, Forest Service.
[2] B.C. Lumber Manufacturers' Association.
[3] B.C. Loggers' Association.

It has been the experience in this Province, and as the foregoing table demonstrates, that a good demand for lumber at high prices results in an increase in the number of sawmills. Many of them are, however, small producers with substandard or obsolete equipment operating on timber sales in the Interior.

For example, in 1944, 807 sawmills with a combined daily capacity of 14,974 M f.b.m. produced 2,040 million f.b.m. In 1955 the number of operating sawmills had increased to 2,489 or about three times the 1944 total, but capacity had only increased to 28,016 M f.b.m. and production to 4,825 million f.b.m. or about double the 1944 figures.

With a continued decline in prices and sales a considerable mortality would be evident.

The following compilation shows the average values 1943–55:—

TABLE 85

AVERAGE VALUE IN DOLLARS PER THOUSAND BOARD-FEET, BY SPECIES

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir	Yellow Pine	White Pine	Lodgepole or Jack Pine	Larch	Cypress	Cottonwood	White Birch	Maple	Unspecified	Alder	Average, All Species
1943	30.88	44.40	50.37	31.05	25.47	29.93	36.18	29.01	25.12	40.32	33.13	60.28	61.64	40.14	51.65	33.89
1944	33.38	47.13	45.38	31.48	31.30	30.93	39.62	25.89	27.26	55.36	38.75	53.25	58.95	.....	51.09	35.35
1945	35.11	47.11	42.32	35.22	33.45	32.76	47.27	33.59	29.74	58.05	44.57	58.77	67.33	30.80	49.91	37.15
1946	43.12	57.35	41.22	44.21	36.98	38.15	56.27	28.92	32.96	63.88	49.99	64.97	72.48	29.43	57.90	44.43
1947	60.68	78.70	46.70	63.15	47.20	44.80	67.23	35.74	38.84	74.47	49.36	62.21	69.34	67.00	57.11	60.66
1948	63.91	89.66	45.98	63.26	41.46	47.46	72.96	36.95	42.62	68.95	54.57	76.57	84.66	89.50	75.59	62.98
1949	59.16	89.77	49.29	57.96	44.24	50.39	75.69	37.18	45.31	65.55	52.63	65.81	70.79	40.00	65.06	60.22
1950	68.03	110.85	57.77	68.54	53.20	62.61	86.22	40.54	52.48	62.34	52.83	85.05	101.36	40.91	75.38	70.32
1951	80.66	112.35	61.21	80.34	67.44	70.37	93.86	46.21	59.98	85.63	64.82	89.41	102.11	52.68	86.50	79.72
1952	75.89	86.33	61.20	77.68	58.61	72.36	89.45	49.05	59.03	103.23	81.88	93.83	106.84	.....	86.83	73.82
1953	69.25	91.01	57.86	64.09	52.39	67.71	88.90	46.38	54.76	92.25	44.50	70.75	73.39	112.91	81.00	68.36
1954	66.78	89.38	57.74	63.85	57.87	70.31	86.11	45.13	55.46	77.07	46.10	83.18	90.26	13.00	68.00	67.01
1955	69.94	92.75	58.20	68.23	59.22	69.93	93.56	46.09	61.20	96.94	46.90	77.91	84.87	.....	70.67	71.17

Source: Bureau of Economics and Statistics, Victoria, B.C.

Breaking these figures down into Coast and Interior values, we find the following emerges as sawmill prices including planing:—

TABLE 86

AVERAGE VALUE IN DOLLARS, PER THOUSAND BOARD-FEET OF BRITISH COLUMBIA LUMBER, BY SPECIES

Operation on the Coast

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir	Yellow Pine	White Pine	Lodgepole or Jack Pine	Larch	Cypress	Cottonwood	White Birch	Maple	Unspecified	Alder	Average, All Species
1944	33.59	48.68	70.29	31.78	39.14	.....	46.77	33.41	25.15	55.36	39.84	52.61	59.19	.....	51.14	36.30
1945	35.51	48.22	63.75	35.77	34.25	35.00	56.82	37.27	.....	58.05	47.26	59.55	67.34	30.80	49.91	38.15
1946	44.17	59.07	58.51	44.77	38.55	47.03	66.19	25.14	.....	63.88	55.34	66.16	72.61	.....	57.90	46.65
1947	63.63	81.09	68.33	64.61	58.20	84.76	80.96	44.41	.....	74.47	53.68	63.65	69.39	64.50	57.11	66.34
1948	67.49	92.23	68.16	63.96	45.87	45.43	91.63	38.03	57.37	68.95	65.66	80.08	84.66	89.50	75.59	70.05
1949	61.73	92.52	82.11	58.38	50.42	55.97	94.87	.....	50.00	65.55	55.88	69.38	70.79	.....	65.15	65.44
1950	70.94	114.50	96.95	68.97	61.87	85.51	98.92	.....	44.23	62.34	56.75	86.75	101.36	75.00	76.16	76.56
1951	86.45	115.14	104.81	81.15	83.34	97.01	115.70	51.18	77.38	85.63	73.25	107.40	104.70	53.03	86.97	89.40
1952	82.44	87.61	97.13	78.42	59.12	67.25	111.25	44.68	.....	103.23	89.11	99.61	106.84	.....	86.83	82.65
1953	75.39	92.35	75.39	64.33	61.98	58.16	100.31	41.20	60.00	92.25	48.45	73.05	73.39	116.36	81.01	75.30
1954	73.51	90.73	91.43	63.81	60.32	.....	92.22	.....	.....	77.07	50.00	.....	90.69	.....	68.00	73.88
1955	78.75	94.59	98.70	68.54	63.62	63.44	103.57	45.20	.....	96.94	43.81	79.47	85.08	.....	70.67	78.87

Operation in the Interior

1944	30.25	29.88	32.54	27.55	31.02	30.93	32.92	25.35	27.43	.....	31.05	55.73	35.93	.....	32.00	30.77
1945	31.06	35.16	35.35	28.24	32.93	32.75	37.24	33.56	29.74	.....	31.41	46.51	53.50	.....	54.00	33.15
1946	35.32	37.95	38.47	33.69	36.01	37.94	43.52	28.98	32.96	.....	34.63	56.86	54.00	29.43	40.00	36.76
1947	42.53	48.05	43.88	42.33	38.12	44.26	51.42	35.46	38.84	.....	40.21	58.48	47.00	.....	48.00	43.27
1948	43.88	53.13	43.56	53.30	39.89	47.49	57.61	36.95	42.62	.....	41.42	64.92	.....	.....	.....	44.56
1949	46.05	52.65	43.50	45.73	40.78	50.36	62.70	37.18	45.30	.....	39.59	62.24	.....	40.00	55.00	45.66
1950	54.99	63.55	52.55	58.95	45.22	61.73	76.39	40.54	52.49	.....	44.22	77.02	.....	40.00	54.03	54.60
1951	61.05	65.42	56.43	64.55	49.09	69.88	79.80	46.21	59.96	.....	44.85	64.75	74.53	41.80	78.08	59.49
1952	59.77	69.11	57.17	65.36	57.77	72.64	80.46	49.06	59.03	.....	56.17	73.22	.....	.....	.....	59.67
1953	55.30	66.44	54.93	60.47	50.15	67.77	82.79	46.39	54.76	.....	42.74	55.92	.....	39.09	80.00	56.24
1954	55.01	65.96	54.96	64.52	50.96	70.00	82.46	45.08	55.46	.....	.....	.....	.....	.....	.....	56.14
1955	57.97	67.67	55.46	63.06	49.06	69.97	86.94	46.08	61.20	.....	.....	.....	.....	48.93	.....	57.82

Source: Bureau of Economics and Statistics, Victoria, B.C.

When we turn to examine lumber production by species we find Coast production in quantity and values as follows:—

TABLE 87

LUMBER PRODUCTION ON THE COAST, BRITISH COLUMBIA, BY SPECIES

QUANTITY (IN THOUSANDS OF FEET BOARD-MEASURE)

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir	Yellow Pine	White Pine	Lodge-pole or Jack Pine	Larch	Cypress	Cotton-wood	White Birch	Maple	Unspeci-fied	Alder	Total, All Species
1944	1,066,890	128,726	77,175	339,447	3,494	..	8,973	162	3,709	2,341	3,432	450	2,675	.....	3,678	1,641,152
1945	1,047,574	161,302	62,011	347,937	3,928	25	10,029	33	..	1,899	4,674	677	2,823	5	3,232	1,646,149
1946	994,525	188,088	36,042	429,338	2,520	427	13,833	133	..	1,433	5,671	698	3,485	.....	7,222	1,683,415
1947	1,212,777	263,736	39,782	481,190	4,688	474	18,065	188	..	3,600	4,620	910	3,953	301	5,664	2,039,948
1948	1,284,470	270,966	42,163	487,484	3,145	578	16,381	33	38	6,479	2,041	808	2,941	8	5,207	2,122,742
1949	1,331,670	258,501	56,514	490,077	2,310	234	16,390	..	100	3,157	2,336	655	4,302	..	6,122	2,172,188
1950	1,457,134	303,473	59,097	648,311	8,346	1,850	22,051	..	151	1,685	1,713	600	2,676	2	4,642	2,511,731
1951	1,372,275	325,369	60,451	713,443	10,112	735	24,610	17	80	2,712	952	510	3,428	159	4,675	2,519,528
1952	1,238,846	324,821	71,359	585,449	23,250	2,780	17,214	62	..	4,942	928	752	2,499	.....	2,696	2,275,508
1953	1,368,768	392,576	97,950	676,526	[1]2,592	305	19,379	104	14	7,102	129	496	2,403	940	2,347	2,571,631
1954	1,351,297	433,828	51,620	776,239	30,695	..	23,925	.....	..	12,523	3	..	1,771	815	933	2,683,649
1955	1,308,135	468,192	53,795	844,643	36,758	269	27,836	160	..	12,664	21	418	1,840	847	1,367	2,756,096

VALUE (IN DOLLARS)

1944	35,834,703	6,266,594	5,424,623	10,786,703	136,743	..	419,674	5,413	93,298	129,600	136,743	23,675	158,338	.....	188,083	59,579,134
1945	37,198,550	7,778,172	3,946,874	12,444,299	134,527	875	569,805	1,230	..	110,245	220,905	40,316	190,111	154	161,302	62,797,365
1946	43,928,393	11,109,749	2,108,754	19,221,040	97,149	20,080	915,671	3,343	..	91,537	313,807	46,182	253,058	...	418,180	78,526,943
1947	77,171,269	21,385,592	2,718,135	31,087,297	272,847	40,174	1,462,618	8,349	..	268,106	248,022	57,921	274,285	19,416	323,458	135,337,489
1948	86,689,696	24,991,856	2,874,039	31,178,074	144,276	26,258	1,501,049	1,255	2,180	446,712	134,020	64,707	248,996	716	393,615	148,697,449
1949	82,207,717	23,915,732	4,640,413	28,610,866	107,400	13,096	1,554,942	..	5,000	206,954	130,524	45,446	304,528	.....	398,862	142,141,480
1950	[1]03,362,998	34,746,628	5,729,478	44,713,065	516,368	158,200	2,181,391	..	6,678	105,038	97,205	52,047	271,241	150	353,557	192,294,044
1951	118,638,920	37,463,318	6,336,039	57,896,811	842,711	71,301	2,847,319	870	6,190	232,231	69,735	54,775	358,898	8,431	406,596	225,234,145
1952	102,130,544	28,456,474	6,931,278	45,913,374	1,374,646	186,962	1,905,116	2,770	..	510,183	82,696	74,906	266,990	..	234,098	188,070,037
1953	103,196,955	36,253,267	7,384,298	43,520,418	160,647	17,738	1,943,969	4,285	840	655,181	6,250	36,233	176,356	109,385	190,123	193,655,945
1954	99,336,288	39,361,610	4,719,661	49,537,786	[1]851,771	..	2,206,417	..	..	965,191	150	..	160,622	274,172	63,447	198,277,115
1955	[1]03,014,508	..	5,309,789	57,895,324	2,338,633	17,065	2,883,113	7,232	..	1,227,471	920	33,217	156,552	..	96,606	217,267,284

[1] Approximately 25,000 M f.b.m. included with hemlock. [2] Other species.
Source: Bureau of Economics and Statistics, Victoria, B.C.

The same comparative figures for the Interior are shown on this table:—

The same comparative figures for the Interior are shown on this table:—

TABLE 83

LUMBER PRODUCTION IN THE INTERIOR, BRITISH COLUMBIA, BY SPECIES

QUANTITY (IN THOUSANDS OF FEET BOARD-MEASURE)

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir	Yellow Pine	White Pine	Lodge-pole or Jack Pine	Larch	Cotton-wood	White Birch	Maple	Unspeci-fied	Alder	Total, All Species
1944	72,481	11,622	149,819	26,088	7,396	16,277	9,593	2,272	45,138	487	115	28	..	10	341,326
1945	101,988	15,030	189,679	27,246	5,999	17,252	9,546	3,177	38,014	955	43	2	..	2	408,933
1946	133,324	16,659	226,167	22,686	4,067	17,939	10,778	8,507	43,446	1,971	103	25	7	2	485,681
1947	197,400	20,510	305,817	33,650	5,683	35,309	15,697	5,866	44,629	2,183	351	8	..	1	667,104
1948	229,648	19,067	386,962	34,300	8,812	34,326	19,938	14,785	64,864	1,722	244	.....	.....	.....	814,668
1949	261,886	19,134	320,796	17,014	3,807	43,332	24,203	15,039	72,486	582	658	.....	3	55	778,995
1950	325,138	23,379	443,386	29,022	9,075	47,968	28,505	20,302	69,128	780	127	.....	75	171	997,056
1951	405,773	19,364	550,623	36,564	8,757	40,360	38,209	29,407	73,931	402	372	321	5	261	1,204,349
1952	503,831	24,138	637,715	35,170	14,323	50,514	41,500	30,528	82,760	261	211	.....	.....	.....	1,420,951
1953	602,323	21,417	587,085	45,269	11,097	48,834	36,232	40,660	80,744	291	77	.....	44	20	1,474,093
1954	773,032	25,040	626,314	40,435	10,909	41,079	40,155	45,182	92,508	.....	[1]392	.....	.....	.....	1,695,046
1955	962,333	34,320	795,355	51,801	15,929	42,812	42,055	78,194	134,538	.....	[1]352	.....	.....	.....	2,158,189

VALUE (IN DOLLARS)

Year	Douglas Fir	Cedar	Spruce	Hemlock	Balsam Fir	Yellow Pine	White Pine	Lodge-pole or Jack Pine	Larch	Cotton-wood	White Birch	Maple	Unspeci-fied	Alder	Total, All Species
1944	2,192,456	347,311	4,875,621	718,852	229,445	503,440	315,825	57,598	1,238,086	15,119	6,409	1,006	.....	320	10,501,488
1945	3,167,419	528,493	6,704,929	769,513	197,548	565,039	355,474	106,609	1,130,351	30,001	2,000	107	..	108	13,557,591
1946	4,708,612	632,209	8,700,139	764,357	146,465	680,545	469,071	246,543	1,432,105	68,250	5,857	1,350	206	80	17,855,789
1947	8,395,690	985,469	13,419,621	1,424,553	216,639	1,562,877	807,194	208,018	1,733,467	87,780	20,526	376	.....	48	28,862,258
1948	10,076,095	1,013,028	16,855,159	1,828,186	351,519	1,630,261	1,148,727	546,240	2,764,233	71,318	15,841	.....	.....	.....	36,300,607
1949	12,060,726	1,007,334	13,955,323	777,992	155,244	2,182,374	1,517,417	559,206	3,283,806	23,044	40,956	.....	120	3,025	35,566,567
1950	17,880,613	1,485,744	23,300,831	1,710,839	410,344	2,961,050	2,177,555	823,031	3,628,853	34,490	9,781	.....	3,000	9,239	54,435,370
1951	24,774,178	1,266,868	31,069,906	2,360,290	429,895	2,820,557	3,048,978	1,358,832	4,433,033	18,031	24,086	23,925	209	20,380	71,649,168
1952	30,113,821	1,668,196	36,460,863	2,298,635	827,461	3,669,514	3,338,883	1,497,617	4,885,012	14,660	15,449	.....	.....	.....	84,790,111
1953	33,306,614	1,422,931	32,248,847	2,737,204	556,470	3,309,492	2,999,630	1,886,176	4,421,189	12,438	4,306	.....	1,720	1,600	82,908,617
1954	42,531,092	1,651,737	34,427,036	2,609,084	555,990	2,875,787	3,311,481	2,037,190	5,131,102	.....	.....	[1]21,830	.....	.....	95,152,329
1955	55,782,079	2,322,513	44,103,390	3,266,823	781,470	2,995,378	3,656,049	3,603,871	8,233,366	.....	.....	[1]41,687	.....	.....	124,791,626

[1] Other species.

Source: Bureau of Economics and Statistics, Victoria, B.C.

Having examined quantities and values, let us look at what principal products were produced by the sawmilling industry on the Coast and in the Interior:—

TABLE 89

PRINCIPAL PRODUCTS OF THE SAWMILLING INDUSTRY ON THE COAST, BRITISH COLUMBIA

Year	Lumber		Shingles, Sawn		Ties, Sawn	
	Quantity (M F.B.M.)	Value ($)	Quantity (Squares)	Value ($)	Quantity (No.)	Value ($)
1944	1,641,152	59,579,134	2,294,759	9,796,341	2,578,757	2,940,155
1945	1,646,149	62,797,365	2,316,141	10,267,246	1,432,234	1,718,115
1946	1,683,415	78,526,943	2,337,749	13,107,532	1,702,656	2,187,606
1947	2,039,948	135,337,489	2,825,883	23,009,244	2,128,833	4,310,698
1948	2,122,742	148,697,449	2,824,281	23,198,835	1,846,017	3,788,080
1949	2,172,188	142,141,480	2,588,272	18,188,557	1,061,566	1,987,565
1950	2,511,731	192,294,044	2,940,437	29,829,545	826,270	1,585,012
1951	2,519,528	225,234,145	2,742,655	26,123,665	968,892	2,720,728
1952	2,275,508	188,070,037	2,203,718	17,764,032	1,021,017	3,057,534
1953	2,571,631	193,655,945	2,370,724	18,120,990	928,368	2,513,060
1954	2,683,649	198,277,115	2,469,777	22,247,456	175,257	424,740
1955	2,756,096	217,267,284	2,610,799	27,344,728	814,887	2,401,380

Year	Lath, Sawn		Box-shooks		Pulpwood, Cut Up and Barked	
	Quantity (M)	Value ($)	Quantity (M F.B.M.)	Value ($)	Quantity (Cords)	Value ($)
1944	29,424	176,757	54,871	4,164,370	354,962	5,629,572
1945	32,096	210,450	50,316	4,586,276	370,013	6,345,704
1946	42,438	275,950	46,324	4,867,426	379,056	7,468,318
1947	44,189	361,884	51,128	6,780,805	413,844[1]	10,818,248
1948	41,548	395,069	18,830	1,975,107	36,381	326,556
1949	31,929	306,100	7,407	676,217	21,095	136,396
1950	25,163	263,181	10,692	1,032,977	39,218	238,430
1951	17,764	208,026	9,366	1,101,884	29,822	205,120
1952	21,334	257,347	5,464	712,686	16,473	112,199
1953	26,551	301,169	3,690	348,430	22,872	113,256
1954	20,649	250,546	3,766	399,823	13,557	96,241
1955	25,693	313,256	3,882	450,817	13,713	206,069

[1] The cutting-up of pulpwood by the pulp and paper industry in British Columbia, which was formerly considered a sawmill operation, has, since 1948, been included in pulp and paper operations.

Source: Bureau of Economics and Statistics, Victoria, B.C.

TABLE 89—*Continued*

Year	Hog-fuel		Sawdust Sold		Slabs and Edgings Sold	
	Quantity (Units)	Value ($)	Quantity (Units)	Value ($)	Quantity (Cords)	Value ($)
1944	173,709	141,483	370,078	938,603	262,723	619,914
1945	288,250	311,984	377,973	928,958	331,837	738,093
1946	208,306	226,640	382,529	983,110	363,767	800,480
1947	238,710	291,151	376,350	904,777	329,411	732,228
1948	260,849	247,960	312,591	739,485	362,095	870,473
1949	253,399	194,011	333,632	822,587	366,665	885,631
1950	264,261	206,497	345,431	828,917	389,619	965,922
1951	302,642	286,293	281,346	725,141	297,973	787,259
1952	306,447	307,959	325,199	846,171	286,562	787,300
1953	541,097	468,390	253,347	611,079	246,968	622,608
1954	556,598	539,651	296,246	683,745	.....	.....
1955	509,489	489,705	275,779	665,978	208,916	742,764

Year	Lumber Sawn for Sale, Planed[1]		Lumber Milled in Transit or Custom Milled	
	Quantity (M F.B.M.)	Value ($)	Quantity (M F.B.M.)	Value ($)
1944	506,425	19,175,225	206	1,302
1945	514,574	21,265,315	12,239	49,714
1946	458,612	24,246,710	9,057	61,397
1947	614,740	44,600,684	5,731	31,124
1948	683,580	54,118,420	12,711	90,332
1949	872,653	61,338,926	13,159	156,508
1950	1,117,105	90,968,445	16,883	175,668
1951	1,000,210	95,730,859	21,770	207,048
1952	968,917	84,833,682	12,189	123,853
1953	1,330,933	107,127,102	51,248	524,316
1954	.....	.....	.....	.....
1955	.....	.....	.....	.....

[1] This lumber sawn and planed is included in all figures for lumber given in other tables.
Source: Bureau of Economics and Statistics, Victoria, B.C.

TABLE 90

PRINCIPAL PRODUCTS OF THE SAWMILLING INDUSTRY IN THE INTERIOR, BRITISH COLUMBIA

Year	Lumber		Shingles, Sawn		Ties, Sawn	
	Quantity (M F.B.M.)	Value ($)	Quantity (Squares)	Value ($)	Quantity (No.)	Value ($)
1944	341,326	10,501,488	6,649	26,672	1,493,844	1,354,202
1945	408,933	13,557,591	14,135	55,995	1,462,993	1,318,042
1946	485,681	17,855,789	11,907	54,755	1,598,458	1,608,268
1947	667,104	28,862,258	19,299	107,305	1,841,866	2,336,759
1948	814,668	36,300,607	8,952	58,097	2,131,634	2,674,229
1949	778,995	35,566,567	100,361	685,404	1,367,791	1,677,440
1950	997,056	54,435,370	133,773	1,378,897	939,960	1,290,253
1951	1,204,349	71,649,168	124,029	1,188,125	1,405,751	2,453,330
1952	1,420,951	84,790,111	126,489	969,252	2,319,800	4,312,903
1953	1,474,093	82,908,617	138,106	1,194,018	1,108,882	2,015,485
1954	1,695,046	95,152,329	156,900	1,315,277	1,014,942	1,732,894
1955	2,158,189	124,791,626	187,842	1,912,096	707,378	1,554,354

Year	Lath, Sawn		Box-shooks		Sawdust Sold	
	Quantity (M)	Value ($)	Quantity (M F.B.M.)	Value ($)	Quantity (Units)	Value ($)
1944	2,140	15,190	17,130	879,020	20,092	36,941
1945	2,505	13,638	17,185	939,977	19,729	42,570
1946	2,789	18,500	18,960	936,421	18,305	52,130
1947	2,029	16,711	16,805	956,167	23,360	78,060
1948	2,137	18,615	18,030	1,163,787	35,127	112,756
1949	2,000	21,809	18,555	1,201,953	32,767	107,344
1950	2,357	23,495	14,719	963,811	37,190	113,035
1951	2,516	26,245	18,551	1,427,265	39,890	122,121
1952	2,475	28,362	14,187	1,325,914	33,626	122,236
1953	2,346	30,509	10,836	996,221	33,180	111,065
1954	1,643	19,933	12,127	996,892	26,274	83,724
1955	2,492	32,383	15,031	1,136,907	31,646	101,392

Year	Slabs and Edgings Sold		Lumber Sawn for Sale, Planed[1]		Lumber Milled in Transit or Custom Milled	
	Quantity (Cords)	Value ($)	Quantity (M F.B.M.)	Value ($)	Quantity (M F.B.M.)	Value ($)
1944	40,655	102,784	132,814	4,561,991	5,334	20,672
1945	45,418	110,490	151,683	5,413,227	18,285	151,750
1946	43,339	121,229	159,868	6,556,318	10,374	52,717
1947	55,389	181,034	209,890	10,457,415	13,074	98,614
1948	56,112	176,911	261,419	13,953,858	34,463	236,861
1949	56,940	194,041	272,579	13,706,862	12,227	114,453
1950	57,923	184,456	346,405	22,869,615	8,047	76,881
1951	53,878	185,966	383,940	27,497,716	18,437	300,316
1952	45,072	172,978	508,522	34,705,613	2,762	29,226
1953	33,031	125,365	508,431	33,726,343	1,434	13,083
1954	43,223	158,333	.....	.....	2,580	21,941
1955	44,346	162,808	.....	.....	13,654	132,207

[1] This lumber sawn and planed is included in all figures for lumber given in other tables.
Source: Bureau of Economics and Statistics, Victoria, B.C.

TABLE 91

MISCELLANEOUS PRODUCTS OF THE SAWMILLING INDUSTRY IN BRITISH COLUMBIA, 1947–55

Year	Hardwood Squares		Flattened Mine-timbers		Shingle-bands		Staves		Barrel-heads	
	Quantity (M F.B.M.)	Value ($)	Quantity (No.)	Value ($)	Quantity (M)	Value ($)	Quantity (M)	Value ($)	Quantity (M Pairs)	Value ($)
1947	2,691	106,861	1,870	5,510	15,998	78,242	1,800	219,459	64	83,261
1948	13,632	694,554	3,600	4,506	13,496	78,488	2,122	208,022	89	60,361
1949	2,846	122,135	5,223	6,479	14,843	84,948	2,594	236,785	109	73,476
1950	5,561	308,534	23,000	34,515	13,601	98,539	3,465	313,680	143	93,390
1951	2,419	153,591	.....	.....	18,922	155,696	3,051	356,878	147	115,576
1952	501	38,147	3,500	7,000	12,901	104,019	2,077	249,389	102	93,949
1953	1,279	45,322	19,100	39,143	14,261	114,904	1,965	167,978	81	53,639
1954	5,105	284,935	.....	.....	.....	.....	2,636	246,586	105	83,356
1955	.....	.....	8,518	17,536	13,033	104,915	2,563	257,586	111	108,892

Source: Bureau of Economics and Statistics, Victoria, B.C.

In order to round out the statistical background the following table should, I think, be included:—

TABLE 92

PRINCIPAL STATISTICS OF THE LUMBER INDUSTRY IN BRITISH COLUMBIA, COAST AND INTERIOR OPERATIONS, 1944–55

Operations on the Coast

Year	Establishments (No.)	Employees (No.)	Salaries and Wages ($)	Cost of Fuel and Electricity ($)	Cost of Materials Used ($)	Gross or Sale Value of Production ($)	Net Value of Production ($)
1944	203	12,250	23,159,671	557,633	45,479,471	85,387,190	39,350,086
1945	254	12,952	23,691,402	594,737	46,101,833	88,742,244	42,045,674
1946	343	14,084	25,989,031	684,931	55,679,189	109,574,803	53,210,683
1947	413	16,973	36,720,491	867,687	88,615,042	185,166,481	95,683,752
1948	511	18,459	43,342,323	1,075,334	86,971,475	183,259,661[1]	95,212,852
1949	391	17,133	44,230,168	1,317,983	84,834,205	168,846,695	82,694,507
1950	422	19,747	51,922,349	1,626,714	116,024,343	232,804,248	115,153,191
1951	387	19,239	60,099,704	1,796,535	142,620,287	267,621,125	123,204,303
1952	366	17,526	56,118,019	1,689,752	116,723,159	221,815,478	103,402,567
1953	333	17,753	61,287,577	1,846,041	117,468,794	227,968,120	108,653,285
1954	336	17,929	63,864,545	2,111,837	126,660,109	240,859,821	112,087,875
1955	300	17,941	66,753,701	2,389,546	148,234,700	274,180,941	123,556,695

Operations in the Interior

1944	295	3,024	3,951,811	248,426	5,844,740	12,994,654	6,901,488
1945	364	3,623	4,876,637	298,726	7,244,618	16,230,606	8,707,262
1946	515	4,516	6,120,375	406,877	9,276,850	20,858,822	11,175,095
1947	651	5,973	9,235,382	596,487	14,415,824	33,068,710	18,056,399
1948	1,004	7,567	12,182,361	812,664	17,931,642	41,404,495	22,660,189
1949	899	6,894	12,297,418	854,439	18,511,720	40,760,816	21,394,657
1950	1,040	7,957	15,745,546	1,260,456	25,824,621	60,218,046	33,132,969
1951	1,177	10,223	21,651,545	1,666,327	34,062,403	79,526,265	43,797,535
1952	1,447	11,072	26,729,273	2,139,914	42,101,387	94,908,109	50,666,808
1953	1,491	10,841	26,281,691	2,090,827	45,723,692	95,506,402	47,691,883
1954	1,574	11,413	28,614,891	2,429,715	50,009,570	107,023,830	54,584,545
1955	1,575	13,375	36,774,054	3,157,092	64,389,469	140,763,601	73,217,040

[1] The cutting-up of pulpwood by the pulp and paper industry in British Columbia, which was formerly considered a sawmill operation, has, since 1948, been included in pulp and paper operations.

Source: Bureau of Economics and Statistics, Victoria, B.C.

In the beginning of this Report, I pointed out the extent to which our prosperity depends upon the combined export of the products of our forests.

The following table shows reported shipments of sawn timber and ties from B.C. sawmills for the years indicated:—

TABLE 93

REPORTED SHIPMENTS OF SAWN LUMBER AND TIES FROM BRITISH COLUMBIA SAWMILLS

(Thousand board-feet.)

Market	1948	1949	1950	1951	1952	1953	1954	1955
British Columbia	606,947	585,338	541,292	564,897	588,893	644,897	736,675	921,915
Other Canadian	444,204	432,923	397,320	426,026	423,151	466,562	429,244	437,300
Total Canadian	1,051,151	1,018,261	938,612	990,923	1,012,044	1,111,522	1,165,919	1,359,215
United States	546,610	731,814	1,376,763	870,290	993,828	1,238,287	1,391,193	1,503,789
United Kingdom	379,601	306,327	227,928	729,630	693,072	468,949	655,738	600,096
Other countries	235,710	259,097	255,249	290,430	151,288	311,362	333,524	416,425
Destination or carrier not specified	17,200	8,002	.....	.....	.....	.....	.....	.....
Total shipments reported	2,230,272	2,323,501	2,798,552	2,881,273	2,850,232	3,130,120	3,546,374	3,879,525
Estimated shipments of non-reporting mills	367,990	380,154	409,247	446,606	452,648	446,549	729,877	897,833
Total shipments reported and estimated	2,598,262	2,703,655	3,207,799	3,327,879	3,302,880	3,576,669	4,276,251	4,777,358

Source: Bureau of Economics and Statistics, Victoria, B.C.

A breakdown of the 1955 shipments is shown hereunder:—

TABLE 94

SHIPMENTS OF SAWN LUMBER AND TIES FROM BRITISH COLUMBIA SAWMILLS, 1955

(Thousand board-feet.)

	By Truck (Local Sales)	By Rail	Water-borne	Total Shipments
Coast Mills				
To points in Canada—				
British Columbia	512,327	21,631	16,553	550,511
Yukon and Northwest Territories		148	51	199
Alberta		27,445	..	27,445
Saskatchewan		11,020		11,020
Manitoba		16,578		16,578
Ontario		84,085	3,464	87,549
Quebec		25,864	873	26,737
New Brunswick		2,632	100	2,732
Nova Scotia		3,628		3,628
Prince Edward Island		345		345
Newfoundland		2,568		2,568
Totals for Canada	512,327	195,944	21,041	729,312
To points in United States—				
Pacific ports		19,011	6,070	25,081
Atlantic ports		18,879	334,261	353,140
Other points, by rail		579,632		579,632
Totals for United States		617,622	340,331	957,853
United Kingdom[1]		1,942	585,816	587,758
Other countries[1]		2,752	412,695	415,447
Total shipments reported	512,327	818,160	1,359,883	2,690,370
Estimated shipments of non-reporting mills				102,140
Total shipments reported and estimated	512,327	818,160	1,359,883	2,792,510
Interior Mills				
To points in Canada—				
British Columbia	320,840	50,564		371,404
Yukon and Northwest Territories		1,641		1,641
Alberta	12,118	42,347		54,465
Saskatchewan		43,998		43,998
Manitoba		60,632		60,632
Ontario		86,095		86,095
Quebec		11,155		11,155
New Brunswick		184		184
Nova Scotia		166		166
Prince Edward Island		26		26
Newfoundland		137		137
Totals for Canada	332,958	296,945		629,903
To points in United States—				
Pacific ports		8,885		8,885
Atlantic ports		29,271	99	29,370
Other points, by mail		507,681		507,681
Totals for United States		545,837	99	545,936
United Kingdom[1]		2,947	9,391	12,338
Other countries[1]			978	978
Total shipments reported	332,950	845,729	10,468	1,189,155
Estimated shipments of non-reporting mills				795,693
Total shipments reported and estimated				1,984,848
Total shipments from British Columbia	845,285	1,663,889	1,370,351	4,777,358

[1] Shipped by rail to eastern seaboard port.

Source: "Production, Shipments and Stocks on Hand of Sawmills in British Columbia," Dominion Bureau of Statistics, Ottawa, monthly.

Source: Bureau of Economics and Statistics, Victoria, B.C.

Recording the development of our sawmilling industry in statistical form gives a clear indication of its growth to those who like to immerse themselves in a sea of figures (I regret to say I am not one of that company) but does not disclose the varied developments that have occurred over the past ten years. Probably the most striking evolution is that seen in the expansion of integrated operations. We also see a form of co-ordination in the close relationship that has been built up between independent sawmills producing chips from sawmill residuals for pulp companies both here and in the Puget Sound area. This waste utilization has become a very important side-line, especially to those mills processing hemlock.

It is with regard to the independent mill of small and medium size that other and curious developments have occurred.

Large operators, in an endeavour to assure a continuity of supply of raw material, in addition to what they already had, began to finance loggers to acquire, or who had acquired, timber of their own at timber sales on the understanding that they would be the recipients of the logs.

As areas of easy accessibility and relatively cheap logging became scarcer and demands grew sharper, loggers, who were still supplying the open log market upon which the smaller and medium-size mills largely depended, found that they were forced to acquire and log tracts less accessible, requiring more costly road construction and heavier and more expensive equipment. Mounting labour costs also pointed up the need for greater mechanization. These factors resulted in a capital cost structure beyond the financial capacity of the average logger. This led to the gradual involvement of the small and medium-size mills in financial deals with loggers who, like those supplying large corporations, became tied to the smaller operators through working agreements under which the mills were given the first refusal to purchase the logs. This understanding was not, however, a one-way street. As more and more loggers were supplying specific mills, the open log market diminished accordingly, and thus it came about that the logger was not so much tied to the mill as the mill to the logger. A brisk demand with good prices and a scarcity of logs on the open market created competition for the services of logging contractors and the logs they had to supply—a situation in which log-consumers, large and small, found themselves entangled. As one witness* expressed it:—

> "Some (logging) operators established themselves in a position where they could command economically unwarranted prices for their logs, calling for the mill to provide the timber and capital, requesting the mill to undertake the full risk while the logger insisted on top market price, refusing at times to pay interest on money borrowed for logging purposes. A great part of the normal milling profit had to be

* Samuel Heller, Pacific Pine Company, p. 12995.

passed on to the logger, giving him, in some cases, profits not commensurate with his investment and effort, while reducing the sawmill operator's profit to a 'break-even' point.

"Those conditions made it necessary for smaller and medium-sized sawmills generally to undertake logging operations of their own and provide themselves with camps, equipment, and management."

The inevitable consequence of this development meant that, to a degree, the independent loggers and sawmills became competitive. In this arena the sawmills were in a position to outbid the loggers for desirable timber because it was not an essential to their survival that the logging be carried on at a profit, providing the finished lumber could be sold profitably.*

The end result of this development was that logs formerly flowing to the open log market became in short supply, regionally, because timber formerly available to the independent logger was being taken up by tied loggers or by sawmills doing their own logging.

In general and in relation to sources of supply of logs, sawmills may be then divided roughly into several broad classifications. These are sawmills (*a*) as part of an integrated industry backed by an assured supply of timber, (*b*) as independent mills with some assurance of continuity of supply for varying periods from private holdings and financed loggers, and (*c*) non-integrated mills with no reserve of their own and dependent upon timber sales and the open log market for their supply.

It is this last classification—the more or less marginal operators—that seems to me to face a rather difficult future. Lacking an assured and dependable log-supply, they cannot justify the heavy investment necessary to provide for a higher degree of utilization, neither can they finance desirable modernization programmes designed to increase efficiency with resultant lower unit production costs. For example, the installation of a hydraulic barker and chipper not only brings in a substantial return from chips made from mill residuals, but also increases sawing efficiency by the sawyer, resulting in an increased rate of production and improved quality of manufacture. Whole-log barking also saves saw damage from foreign material imbedded in the removed bark, extending the life of the saws. It has been estimated that the installation of a hydraulic barker saves, just by increasing sawing efficiency alone, about $1.50 per 1,000 board-feet processed. But these installations are at present costly, and a mill-owner, in the absence of a continuity of supply of logs, will not build them into his sawmill. In the result, this class of mill, even operating efficiently within the limitations of its equipment, is suffering a considerable handicap. A diminishing supply of open-market logs plus a weak lumber market will, if such a situation continues for any length of time, result in a severe mortality of this type of mill.

* *See* section on Timber Sales.

In the 1945 Report I wrote:—

". . . A good demand for lumber with concomitant higher price-levels has been the prime factor which has governed the fluctuation in the number of operating sawmills.

"Probably the basic reason for this relationship may be found in the fact that higher lumber prices stimulate log production; thus, in periods of short supply, areas of accessibility expand. This results in a flow of logs to the open log market, and, in turn, to the log-buying mills.

"I very much doubt, however, that this trend will continue in the future. It seems to me, from the evidence, that those areas that have supplied the open log market in the past are drying up or are no longer available for that purpose. Thus, high lumber prices cannot, in the future, attract logs to the open market from depleted areas, or from areas controlled by sawmills requiring the production from their own areas for their own survival.

"Unless the log-buying mills can get logs to process they cannot operate. . . . I do not think it safe to assume that a high price for lumber will, in itself, assure them continuance as operating units. The material needs of efficient log-buying mills contributing to the social and economic stability of our communities must be considered in any future forest programme."

While public working circles were primarily established as a means of bringing productive Crown forest land under management, another important consideration for their creation was to ensure the continuation of a supply of raw material to mills without any or any quantity of lumber of their own, a subject I shall return to later on.

I think it may be said that over the last decade the major developments in the sawmilling industry on the Coast in addition to integration have been the changes in the pattern of supply resulting from a great number of mills entering into the logging end of the business either directly or indirectly, the increase in utilization of mill residues, the increase in flexibility consequent upon modernization of milling techniques permitting greater latitude in the selection of species, and generally the gradual evolution from the old-type mills cutting heavy fir timbers to the faster mills with lighter and more efficient equipment, geared to manufacture hemlock and other species as well as fir. This change and adaptation is not by any means Province-wide as yet, but the modernized type of independent mill should and will have a place in our future economy, provided, of course, our forest policy recognizes as a basic tenet the fact that the Government, as the monopolistic owner of our timber resource, must, in the disposal of it, take cognizance of social and economic values far greater in long-term significance and worth than moneys received from timber sales alone. The Forest Service is now much like a storekeeper selling his goods to everyone

who can afford to buy at the prices asked. It seems to me that the time has come when the sale and disposal of Crown timber must be the instrument and reflection of a Governmental policy in which the indirect values, such as the stability of communities and the general welfare of our people at large, must be the dominating factors. Unless we accept the responsibility inherent in Crown ownership to see to it that the disposal of Crown timber is not merely a method of adding money to the Treasury, but as a powerful means of strengthening and stabilizing our present and future economy, then the only rational alternative that I can see is the orderly disposal of our Crown productive forest lands to private enterprise. The Government will then be out of the business of growing and selling timber and with none of the concomitant obligations which I believe should rest upon a Government, as trustee, exercising a monopolistic control over the disposal of a natural resource.

SHINGLE-MILLS

The shingle industry in this Province is subject to wide fluctuations in demand, an irregular supply of red cedar at erratic prices, and stiff competition from producers, at low cost, of asphalt and other shingle substitutes. In spite of the many hazards challenging its existence, this industry maintains a remarkably stable sales record over the years, reflecting to some degree an expenditure on advertising and trade promotion, estimated as high as 80 cents per thousand feet of logs used. A low profit margin of from 1 to 5 cents a square of shingles is probably one reason why this industry remains competitive.

The production figures from 1943 to 1955 are as follows:—

Year	Squares	Year	Squares
1943	2,118,258	1950	3,074,210
1944	2,301,408	1951	2,866,684
1945	2,330,276	1952	2,330,207
1946	2,349,656	1953	2,430,442
1947	2,845,182	1954	2,445,956
1948	2,833,233	1955	2,524,720
1949	2,688,633		

It will be recalled that the shingle production in British Columbia is about 95 per cent of the total shingle production of Canada.

There are seventy-five shingle-mills in British Columbia either operating or capable of being operated. Of these seventy-five mills, twenty-nine of them operate 288 shingle-machines and in 1955 produced 2,364,213 squares out of the total industry production of 2,524,720 squares.

There are three small shingle-mills in the Interior, the remainder, or seventy-two, are on the Coast. Deducting the twenty-nine large shingle-producers' mills from the seventy-two, we are left with forty-three very small or non-operating mills contributing very little, or nothing, to the production totals.

Shingle-mills are termed " combination " (forming part of a sawmill operation) or " straight " mills operated as independent units. Their size ranges from small one-machine mills on up to the largest twenty-four-machine mill. A large percentage of mills have their own dry-kilns. In recent years many mills have installed additional machinery for remanufacturing shingles into machine-grooved shakes and other allied products. Many of the latter mills have also installed staining facilities to meet the demand for coloured sidewall shakes and shingles.

Both " combination " and " straight " shingle-mills are dependent to a greater or less degree on the open market for purchase of cedar logs for the manufacture of shingles and shakes.

In most instances the " straight " shingle-mills purchase the bulk of their raw-material requirements from independent loggers on the open market. Otherwise both "combination" and "straight" shingle-mills draw from timber-sale sources in which they have a financial interest or from trades.

The " straight " shingle-mill, particularly, is vulnerable to the very wide fluctuations in log prices characteristic of the cedar log market.

Seasonal variations in the supply and demand of logs, on the one hand, and consumer demand for shingles and shakes, particularly in export markets, on the other hand, are reflected frequently in uneconomic bid prices for timber-sales stumpage.

There are three types of cedar logs harvested from the Coast forests—lumber cedar logs, peewee logs, and low-grade logs suitable only for manufacturing into shingles. The shingle-mills of British Columbia convert about 40 per cent of the red cedar log production of the Coast region into shingles and other allied products. Old-growth cedar from 300 to 1,000 years old, almost wholly logged on the Lower Mainland and Vancouver Island, is used to produce a sufficient quantity of the all-clear No. 1 edge-grained shingle, without which the industry would not maintain its markets. The average cedar log grades scaled by official scalers in the Coastal area for the years 1946 to 1954, inclusive, show, in each year, a decline in Grades 1 and 2 and a corresponding increase in Grade 3 logs. This lessening of log grades has reduced, and will continue in the future over the long term to reduce further, the relative proportion of No. 1 shingle production. On the other end of the scale, shingle-mills can utilize a lower grade of cedar logs than a mill producing lumber, due to their ability to use shorter pieces and thus cut between the knots.

The British Columbia shingle industry is primarily an export industry. In 1955, out of the total red cedar shingle production of 2½ million squares, over 2 million squares or 87 per cent was exported, with only 13 per cent consumed in Canada. Of this exported production, 84 per cent was shipped to the United States, our major market, with the other 3 per cent going to the United Kingdom and British Commonwealth destinations.

The industry has, as I have said, developed two other products allied to shingles—shakes for use on side-walls, of which, in 1955, 4 million "wall squares" were sold, and shakes for roofing. These shakes were valued at $2,500,000.

Utilization of cedar logging and mill residues constitutes a very definite problem, which I propose to consider at another part of the Report, although I may say here that these shakes for roofing purposes are made from cedar stumps and slabs recovered in salvage operations on logged-over land.

The shingle industry operates the year around and employs about 2,000 people, to whom it pays in wages, salaries, and benefits in excess of $6,500,000 a year. The total capital investment in shingle-mill plant and equipment on a replacement value basis is estimated at approximately $10,000,000.

In 1955 this industry converted 300,000,000 feet of cedar logs, valued at $15,000,000 into 2,500,000 squares of shingles of a gross approximate value of $30,000,000.

The shingle industry plays a relatively small but important part in the economy of this Province and is doing so against odds, not the least of which are increasing stumpage prices and a diminishing open cedar-log market.

THE PULP AND PAPER INDUSTRY

The first paper-mill in British Columbia began production at Port Alberni in 1894. It was a second-hand rag-mill brought out from England.

This operation, beset with shortages of rag-supply, inadequate machinery, and inability, after experimentation to produce pulp from wood, closed down in 1896.

In 1901 the Government decided to inaugurate policies which, it was thought, would encourage the development of a pulp and paper industry in this Province utilizing wood as a basic raw material.

An amendment to the "Land Act" in that year empowered the Government to place certain timbered areas under a temporary reserve for a period of two years. The object was to permit those interested in building pulp-mills to select for that purpose from the reserved areas the properties they deemed desirable. Leases of the areas selected were to be granted for a term of not more than twenty-one years at a rental of 2 cents an acre in consideration of an undertaking to build and operate a pulp-mill.

Consequent upon the opportunities afforded by this legislative amendment, several companies were organized and in turn the Government placed land areas under reserve. Four companies finally located and selected areas over which they secured leases. These companies with leased acreage were as follows:—

	Acres
Oriental Power & Pulp Co. Ltd.	84,180
Quatsino Power & Pulp Co. Ltd.	55,669
Canadian Industrial Co. Ltd.	134,551
Bella Coola Development Co. Ltd.	79,999
Total	354,399

The Government in 1903 repealed the 1901 legislation. I assume this step was taken under the impression that these four companies had or would fully occupy the field.

In December of 1907 the Government, because vast areas of the Province had been blanketed by special timber licences (taken up mostly by speculators), terminated all alienations of Crown timber land. This prohibition remained in force for about four years, or until the passage of the 1912 "Forest Act" in February of that year. This Act only made provision for the sale of Crown timber for immediate logging. Such sales were usually small in area and rarely exceeded three years in duration.

Three new pulp-mills went into production in 1912, including the then $3,000,000 newsprint plant of the Powell River Company. These operations did not rely on timber sales, but drew the bulk of their raw material from the pulp leases issued pursuant to the 1901 legislation. The Powell River Company, for example, acquired the leases held by Canadian Industrial Company Limited.

The year 1912 witnessed the beginning of operations by the Ocean Falls Company pulp-mill, built at a cost of $1,500,000. This Company had acquired the Bella Coola Development Company pulp leases. In 1914 the properties of this Company were transferred to Pacific Mills Limited, a subsidiary of Crown Williamette Paper Company of San Francisco; later to Crown Zellerbach Corporation; and then to the present company, Crown Zellerbach Canada Limited.

The pulp leases issued to Quatsino Power and Pulp Company under the 1901 legislation were eventually acquired in whole or in part through a chain of transfers by Alaska Pine and Cellulose Limited.

From 1907, when the alienation of Crown timber land by long-term licences was terminated, until 1947, when the forest management licence legislation was enacted—a span of forty years—there was no way for a company, without timber of its own, to create a sufficiently large enough timber reserve from Crown lands to justify the expenditure of the very substantial sums of money required to erect a pulp or paper mill.

In the other Provinces in Canada no such restriction existed, and this forty-year period saw new companies being formed and mills built in Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, and Newfoundland, as well as in Eastern, Southern, and Western United States. The Baltic countries and Russia were also developing pulp and paper industries.

Following, and in great measure consequent upon, the 1947 legislation which freed the Crown forests from being locked in by a forty-year "deep freeze," the pent-up development of new pulp or paper plants in this Province and the overdue expansion of existing facilities, when thus released, have been phenomenal.

Including the time that has elapsed since 1947 and during the next ensuing five-year period from now (1956) it is estimated that the total expenditures already incurred, and estimated cost of new undertakings to which companies are committed in mills and facilities alone, together with important expansions of existing mills, will exceed $350,000,000 a sum much larger than the cost of all the pulp and paper mills in existence in this Province in 1947.

In 1955 nine companies operated twelve pulp and paper mills on the Coast. One mill is being built at Crofton on Vancouver Island and another is projected for the Interior at Castlegar, the first pulp and paper mill in the Interior.

Operating companies and mills in production are as follows:—

PULP AND PAPER MILLS IN BRITISH COLUMBIA

Company	Mill location	Products
Alaska Pine & Cellulose Ltd.	Port Alice	Bleached sulphite pulp, dissolving and paper grades.
Alaska Pine & Cellulose Ltd.	Woodfibre	Bleached sulphite pulp, dissolving and paper grades.
Canadian Forest Products Ltd.—		
Howe Sound Pulp Division	Port Mellon	Unbleached and semi-bleached sulphate pulp.
Pacific Veneer & Plywood Division	New Westminster	Defibrated wood pulp, building-boards.
Columbia Cellulose Co. Ltd.	Port Edward	Bleached sulphite pulp, dissolving and paper grades.
Crown Zellerbach Canada Ltd.	Ocean Falls	Ground-wood, mechanical screenings, bleached sulphite (paper pulp), unbleached sulphite (news grade), unbleached sulphate pulp, chemical screenings, newsprint, ground-wood printing and specialty papers, tissues, wrapping and building papers.
Elk Falls Co. Ltd.	Duncan Bay	Ground-wood pulp, sulphate pulp, and newsprint.
MacMillan & Bloedel Ltd.—		
Alberni Pulp Division	Port Alberni	Unbleached sulphate pulp.
Harmac Pulp Division	Nanaimo	Bleached, semi-bleached, and unbleached sulphate pulp.
Powell River Co. Ltd.	Powell River	Ground-wood, mechanical screenings, unbleached sulphite (news grade) pulp, chemical screenings, newsprint, paper boards, and laminated papers.
Sidney Roofing & Paper Co. Ltd.	Victoria	Ground-wood pulp, building-papers, and paper boards.
Westminster Paper Co. Ltd.	New Westminster	Ground-wood pulp, tissues, towels, wrapping-papers, and specialties.

These twelve mills have made and are making the following contribution to the Canadian economy:—

TABLE 95

PERCENTAGE RELATIONSHIPS OF THE PULP AND PAPER INDUSTRY IN BRITISH COLUMBIA TO CANADIAN PRODUCTION, 1954

	British Columbia	Canada	Percentage Relationship
Net value of production ..... $	90,056,949	641,410,070	14.0
Employment ..... No.	6,881	60,837	11.3
Salaries and wages ..... $	31,455,638	252,598,383	12.4
Electricity used ..... kwh.	1,023,783,477	15,642,815,063	6.5
Cost of fuel used ..... $	6,945,570	49,779,216	13.9
Apparent pulpwood production ..... cords	1,362,109	14,254,332	9.5
Wood used in pulp-manufacture ..... „	1,745,186	13,275,510	13.1
Pulpwood ..... „	1,179,896	12,580,630	9.3
Waste wood ..... „	565,290	694,880	81.3
Wood-pulp production ..... tons	1,277,082	9,673,016	13.2
Mechanical ..... „	475,150	5,337,610	8.9
Sulphite ..... „	381,861	2,607,291	14.6
Sulphate ..... „	390,094	1,386,127	28.1
Other pulp ..... „	29,977	341,988	8.7
Paper production ..... „	683,384	7,649,607	8.9
Newsprint ..... „	536,903	6,000,895	8.9
Other paper ..... „	146,481	1,648,712	8.8

Source: Dominion Bureau of Statistics, Ottawa.

TABLE 96

PRINCIPAL STATISTICS FOR THE PULP AND PAPER INDUSTRY IN CANADA AND BRITISH COLUMBIA, 1954 AND 1955

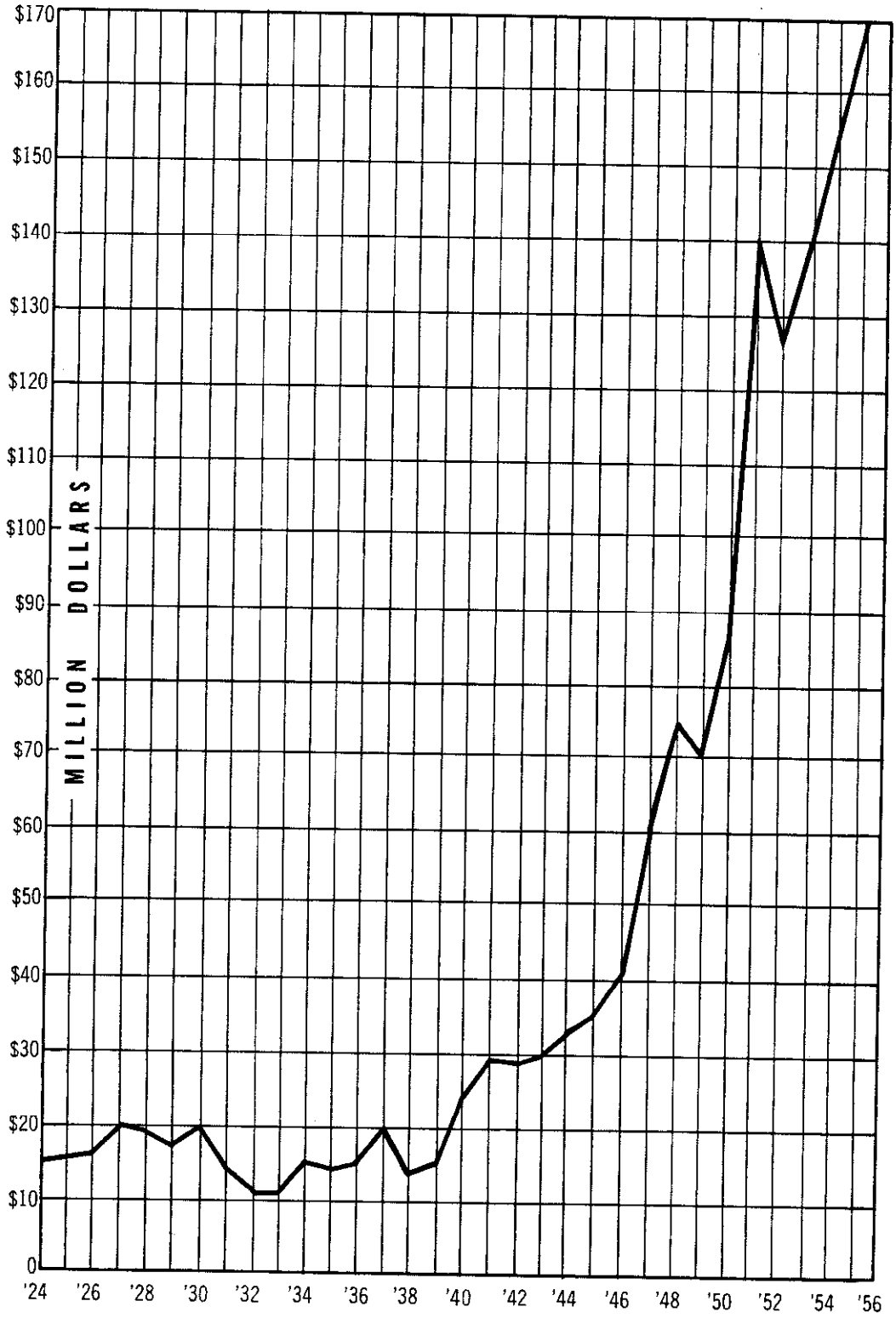
	Establishment	Employment	Salaries and Wages	Cost of Fuel and Electricity	Cost of Materials	Gross Value of Production	Net Value of Production
1954							
Canada	125	60,837	$252,598,383	$84,890,786	$515,257,595	$1,241,665,451	$641,517,070
British Columbia	12	6,881	31,455,638	8,288,317	59,436,311	157,781,577	90,056,949
1955							
Canada	125	62,205	265,298,119	91,040,773	546,079,192	1,326,938,138	689,818,173
British Columbia	12	6,651	31,632,621	8,320,481	68,910,308	169,370,459	92,139,670

It will be seen that for British Columbia in 1955 the gross value of production or sales value for that year amounted to a sum in excess of 169 million dollars.

The following graph indicates the expansion of the industry in this Province in terms of gross value of production:—

FIG. VIII

GROSS VALUE OF PRODUCTION OF THE PULP AND PAPER INDUSTRY, BRITISH COLUMBIA



Source: Statistical Record of Pulp and Paper Industry in British Columbia, Bureau of Economics and Statistics, Victoria, B.C.

Expansion in terms of volume production is evidenced in the following table:—

TABLE 97

PRODUCTION OF PULP AND PAPER IN BRITISH COLUMBIA, 1940–55

(Short tons.)

Years	All Pulps	All Papers	All Pulps and Paper Not Including Newsprint	All Newsprint	All Papers Not Including Newsprint	Total, All Pulps and Papers
1940	131,948	339,374	204,415	266,907	72,467	471,322
1941	177,603	350,698	249,665	278,636	72,062	528,301
1942	171,024	321,414	250,366	242,072	79,342	492,438
1943	176,703	289,982	250,648	216,037	73,945	466,685
1944	182,334	326,673	265,354	243,653	83,020	509,007
1945	190,160	344,639	276,735	258,064	86,575	534,799
1946	175,733	402,432	275,971	302,194	100,238	578,165
1947	214,352	411,407	292,900	332,859	78,548	625,759
1948	189,201	468,112	315,733	332,580	135,532	648,313
1949	171,089	503,946	293,770	381,265	122,681	675,035
1950	255,640	528,700	398,000	386,340	142,360	784,340
1951	468,114	494,673	576,072	386,715	107,958	962,787
1952	418,424	522,529	519,235	421,718	100,811	940,953
1953	502,791	600,262	609,110	493,943	106,319	1,103,053
1954	633,805	653,628	743,536	543,897	109,731	1,287,433
1955	678,675	728,886	831,973	575,588	153,298	1,407,561

Source: Pulp and Paper Association.

Wood is, of course, the raw material from which the finished product is manufactured. It is commonly said that while converting a log into lumber doubles its value, the same log quadruples in value when converted into pulp.

The total log consumption by the pulp and paper industry in comparative relationship in value to total annual log cut on the Coast from 1944 to 1955 and percentage of values derived is shown on the following table:—

TABLE 98

TOTAL ANNUAL LOG CUT IN MILLIONS OF F.B.M. IN THE BRITISH COLUMBIA COAST REGION AND ANNUAL LOG CONSUMPTION BY PULP-MILLS IN BRITISH COLUMBIA, 1944–55.

Year	Total Annual Log Cut, Coast Region	Whole Logs Consumed by Pulp-mills[1]	Percentage of Coast Log Cut Consumed by Pulp-mills	Gross Value of Production—Percentage of Pulp and Paper to Total Coast[2]
1944	2,519	390	15.5	25.3
1945	2,483	415	16.7	26.0
1946	2,520	426	16.9	25.3
1947	3,286	484	14.7	22.8
1948	3,266	519	15.9	26.3
1949	3,137	425	13.5	26.5
1950	3,476	498	14.3	24.8
1951	3,332	533	16.0	31.3
1952	3,335	550	16.5	32.2
1953	3,702	604	16.3	(3)
1954	3,998	787	19.7	(3)
1955	3,932	921	18.0	39.97

[1] Includes forest salvage and small logs, but not sawmill residue.
[2] Total Coast=Coast lumber, pulp and paper, and plywood.
[3] Not available.

The percentage of the various wood species converted by pulp-mills and increases therein are shown in the following table:—

TABLE 99

INDEX OF PULPWOOD USED IN THE MANUFACTURE OF WOOD-PULP IN BRITISH COLUMBIA, 1916, 1935, 1945, 1950, 1953, AND 1954

(1916=100. Volume in cords.)

	1916		1935		1945		1950		1953		1954	
	Volume	Index	Volume	Index	Volume	Index	Volume	Index	Volume	Index	Volume	Index
Spruce and balsam	42,004	100	153,039	364.4	170,422	405.7	210,671	501.5	254,717	606.4	365,124	869.3
Hemlock	65,529	100	257,414	392.8	356,612	544.2	484,082	738.7	568,262	867.2	759,789	1,159.5
Jack-pine	.....	.....	.....	.....	.....	.....	.....	.....	2,237	.....	2,393	.....
Cottonwood	1,464	.....	.....	.....	.....	.....	.....	.....	15,624	.....	15,615	.....
Cedar	.....	.....	8,944	.....	11,452	.....	5,286	.....	5,015	.....	861	.....
Douglas fir	.....	.....	1,057	.....	10,667	.....	2,849	.....	17,258	.....	36,114	.....
Other kinds	.....	.....	932	.....	41,445	.....	880	.....	.....	.....	.....	.....
Totals, all species	108,997	.....	421,386	.....	590,598	.....	703,768	.....	863,113	.....	1,179,896	.....

PERCENTAGE INCREASES OF PULPWOOD USED IN THE MANUFACTURE OF WOOD-PULP IN BRITISH COLUMBIA

	1916–35	1935–45	1945–50	1950–54
Spruce and balsam	264.4	11.4	23.6	73.3
Hemlock	292.8	38.5	35.7	56.8
Jack-pine, cedar, Douglas fir, and cottonwood	647.3	505.4	75.0	231.5
Totals, all species	286.6	40.8	19.9	65.9

Wood arrives at the pulp-mills in the form of normal logs, salvaged wood from logging operations, and as chips manufactured from sawmill residuals.

Two of the most striking developments in this branch of the forest industry in recent years, apart from its expansion, are the integration of manufacturing processes and the utilization of so-called waste material. Up until about seven or eight years ago a long established pattern, existing over forty years, seemed well entrenched: pulp companies, while logging for their own use, considered themselves, with a few exceptions, separate entities in the forest industry. The first signs of an awakening gregariousness appeared, however, about ten years ago.

In 1945 I wrote when dealing with sawmill waste:—

"Some fields offer attractive possibilities for exploration right at home; for example, at least five mills are selling hemlock 'mill-waste' to American pulp-mills and . . . I see no reason why our own companies can not find it an economically feasible source of supply. Several pulp companies have, in fact, with commendable foresight, been carrying on experiments in the use of hemlock mill-waste. The results are encouraging and in view of the trend towards a greater hemlock cut a co-operative effort to this end between sawmill operators and pulp producers would be desirable. Some sawmills, for instance, having a heavy hemlock recovery would find it economically practicable to install hydraulic barkers. This process would improve the quality of the hemlock chips and, incidentally, would enable the mill to improve both grade and quantity of its manufactured lumber and effect important economies in milling costs.

"From my own observations, made during trips of inspection to Coast and Interior mills, I am satisfied that mill operators, in general, are using every reasonable endeavour to find a marketable use for mill-waste. It is to their advantage to do so, because any monetary return from the commercial use of this wastage lowers the unit cost of production. Future outlets will result from further research in the use of this material—e.g., in the study of lignin plastics, wood hydrolysis and distillation. I believe, too, the future will force a closer integration between sawmills and secondary industries designed for, or capable of,

utilizing mill-waste. This development is foreshadowed by the decision of a large sawmill near Alberni to install a pulp-mill as a subordinate processing unit.

"As I mentioned in an earlier part of this Report I thought the future would see the sawmill industry moving to install manufacturing units for the processing of sawmill-waste. In particular it will be recalled that one large sawmill was building a pulp-mill as an adjunctive unit. Several pulp-mills have built and are operating sawmills as subordinate units for the purpose of manufacturing high-grade logs into specialty lumber. The principle is one of integration in both instances.

"The pulp companies operating sawmills sort the logs which may yield high-grade lumber and allocate these to those mills. Those selected logs represent from 20 to 25 per cent of the total logs received and yield about 50 per cent high-grade lumber. The volume of wood rejected by the sawmills goes to the pulp-mills for processing. This method of close and selective utilization results in the maximum economic use of the raw material and minimizes waste."

Production figures for 1955 indicate the degree of integration now achieved.

TABLE 100

PRODUCTS MANUFACTURED FOR SALE FOR THE YEAR 1955 BY THE PULP AND PAPER COMPANIES AND INTEGRATED INDUSTRIES

Sulphite pulp	tons	118,074
Sulphite pulp, dissolving	,,	165,654
Sulphate, unbleached	,,	131,333
Sulphate, bleached and semi-bleached	,,	239,549
Ground-wood	,,	5,150
Newsprint	,,	576,249
Kraft paper	,,	40,617
Box board	,,	36,130
Building and paper-board felts	,,	13,262
Specialties	,,	38,831
Hardboard	sq. ft.	55,543,120
Chips (export)	units	191,795
Lumber	M f.b.m.	1,240,127
Shingles	squares	930,393
Doors	units	463,366
Plywood	sq. ft.	527,806,774

As an indication of the extent to which individual operations have achieved integration, the following production figures of a correlated enterprise carried on by Crown Zellerbach Canada Limited, Canadian Western Lumber Company, and the Elk Falls Company for the year ended April 30th, 1955, are of interest:—

Paper

Newsprint	tons	171,626
Kraft wrapping and specialties	,,	39,051
Sulphate wrapping and specialties	,,	3,466
Tissues	,,	3,208
Kraft container board	,,	17,588
Total paper	,,	234,939

Lumber and Lumber Products

Lumber	f.b.m.	166,908,000
Shingles	squares	178,053
Plywood (⅜-inch basis)	sq. ft.	63,419,000
Doors	No.	110,304

The 1955 production from the integrated operations of MacMillan & Bloedel are also of interest:—

Pulp

Unbleached	tons	84,000
Bleached	,,	219,000

Lumber and Lumber Products

Lumber	f.b.m.	580,000,000
Shingles	squares	413,000
Plywood (⅜-inch basis)	sq. ft.	233,000,000
Doors	No.	430,000

In 1957 this Company will also be producing newsprint.

Table 98 sets out the whole-log, salvage, and small-log consumption by the pulp and paper industry in its pulp-mills in 1955 as 921 million f.b.m.

Of this 1955 total, 101 million f.b.m. or about 11 per cent was made up of salvaged wood and small logs.

Whole logs and salvaged wood do not, however, supply all the wood requirements of the industry.

The following Table 101 demonstrates that the total wood consumption in 1955 amounted to 1,227 million board-feet, made up of 921 million feet of whole salvage and small logs, and the equivalent of 306 million feet of logs in the form of sawmill residuals. This means that about 25 per cent of the total wood consumption by the pulp and paper industry is supplied by material from sawmills, not long ago regarded as waste and burned. If we add to the 25 per cent representing sawmill residuals the 8 per cent utilization of small logs and salvage, we get a total of 33 per cent of the industry requirements of raw material supplied by wood from sources considered as non-recoverable waste a decade ago. The utilization of this volume of wood preserves for future cutting and retards the current annual forest depletion by 407 million f.b.m., representing the annual sustained-yield increment on about 900,000 acres of Coastal productive forest land, estimated on the basis of an increment of 450 f.b.m. per acre per year. This is a meritorious achievement, for which the industry is deserving of commendation.

TABLE 101

USAGE OF LOGS, RESIDUALS, AND SALVAGE WOOD, 1945–55

Year	Whole, Salvage, and Small Logs Consumed (Million Feet) (Equiv. B.C.L.S.[1])	Sawmill Residual Wood Consumed (Million Feet) (Equiv. B.C.L.S.[1])	Total Wood Consumption (Million Feet) (Equiv. B.C.L.S.[1])	Percentage of Sawmill Residual Wood to Total Wood Consumed
1945	415	.....	415	.....
1946	426	.....	426	.....
1947	484	9	493	1.8
1948	519	50	569	8.8
1949	425	64	489	13.1
1950	498	110	608	18.1
1951	533	166	699	23.7
1952	550	154	704	21.9
1953	604	220	824	26.7
1954	787	281	1,068	26.3
1955	921	306	1,227	24.92

[1] Cords converted to British Columbia log-scale at 700 f.b.m. per cord, per D.B.S. "The Pulp and Paper Industry, 1937." *See* text following below.
Source: "Statistical Record of the Pulp and Paper Industry in B.C.," Victoria.

The conversion factor was changed in 1955, but in order to keep the comparison free from confusion, the 700 f.b.m per cord factor was used for that year in compiling the above table. *See* excerpt from pages H-16 and H-17, "The Pulp and Paper Industry, 1955," Dominion Bureau of Statistics, reading as follows:—

"A change has been made this year in the method of compiling statistics for consumption of pulpwood in British Columbia. The large mills of that Province usually report the roundwood they use for making pulp in thousand feet board measure, B.C. Log Scale. Such volumes were formerly converted to rough cords on the basis of 700 ft. b.m. equals one cord, a factor also used for many years by the B.C. Forest Service. This factor may have been fairly accurate when the mills were using huge logs in the early days of the industry, but the supply of very large logs has gradually diminished and it has also become more and more profitable to use the larger logs for the production of lumber and veneer. The size of the logs used by the pulp-mills has consequently steadily decreased. Because the actual cubic contents of one thousand ft. b.m., B.C. Log Scale increases considerably as the top diameter of the log decreases and the various mills do not use logs of the same average size, not only is the 700 feet factor much too high but the actual ratio of board feet to rough cords varies from year to year for each mill, depending on the average size of the logs used, and any constant factor cannot be used for all mills reporting feet board measure.

"The method that has been adopted can be applied to past, present and future compilations and is not affected by variations in log

diameters. It is based on the assumption that one rough cord of roundwood yields one ton of groundwood or mechanical pulp. When the volume of wood used in making groundwood is reported in feet board measure, the number of feet per cord, for that particular mill and year, is obtained by dividing the tonnage of groundwood produced into the total number of feet used. This number of feet per cord is used as a factor to convert from feet board measure to cords roundwood used by the same mill to produce sulphite or sulphate pulp. Yields of sulphite or sulphate pulp per cord for such mills are then calculated and applied to mills that make sulphite or sulphate only. When pulpwood is reported in cubic feet, the volume is converted to rough cords at 85 cu. ft. per cord. Volumes actually reported in cords are altered only in the case of peeled wood. This new method, despite its known deficiencies, appears to be more accurate than the old one and at least gives figures that are comparable from year to year with those for mills in eastern Canada."

Pulp and paper companies are stabilizing business forces and assets of great economic value to the Province in the direct and indirect benefits that flow from their operations. As an illustrative example of the activities of these pulp-mills—large and costly in the terms of our economy—I quote from the brief of the Powell River Company, manufacturers of pulp and pulp products and operators of the largest single newsprint plant in the world:—

"(1) Powell River Company started as a family business. The enterprise has become a public company with 11,500 shareholders—95 per cent of whom are Canadian residents, a large number of whom live in British Columbia. Incidentally, we sometimes wonder if everyone realizes that anyone can become a part owner of Powell River Company Limited.

"(2) Because a substantial number of shares are owned by Insurance Companies, Investments Trusts and Pension Funds, the Company actually is indirectly responsible to many thousands of individuals.

"(3) All of our officers and eight of our twelve directors are Canadians, seven of whom are permanent residents of British Columbia.

"(4) We have 4,500 permanent employees. During 1955 the Company paid out approximately $19.5 million in wages, salaries and benefits.

"(5) Our nine year average dividend payments have been $5,515,000 per year.

"(6) The average annual capital expenditure for the past nine years exceeded $7 million.

"(7) Our 1955 federal income tax bill was $11,556,000.

"(8) During 1955 we paid to the Provincial government $1,649,000 in taxes and $1,378,000 in stumpage and royalty. If to these figures we add the estimated 18 per cent return to the Province of our federal income tax, then our total contribution to the provincial treasury was $5,007,000.

"(9) In 1955 log purchases, from outside sources, amounted to $6,762,137.

"(10) The Powell River Company installed the first hydraulic barker and whole log chipper in Canada. This resulted in a wood saving of approximately 9 per cent.

"(11) During 1954, we put into service two self-dumping log barges designed and built in British Columbia. This revolutionary method of transporting logs was developed to reduce the log towing losses and teredo damage.

"(12) We were the first paper company in the world to exceed a speed of 2,000 ft. per minute on a newsprint machine.

"(13) In 1938 we established the first pulp and paper research laboratory in British Columbia. We presently employ 35 technically trained people in this division.

"(14) The Powell River Company pioneered the conversion of salvage wood from logging operations. The Company installed a hydraulic barker designed especially to bark this type of material.

"(15) We have had industrial peace in the Powell River plant for over seventeen years.

"At the present time the Powell River Company operates 13 logging camps, scattered from the Sechelt Peninsula to the north end of the Queen Charlotte Islands. Individual production in these camps varies from 3 million board feet to 70 million feet per year.

" To illustrate the extent of our annual logging operations we cite the following facts relative to the year 1954 and which may be regarded as typical:

"(*a*) 1,300 men are employed.

"(*b*) 260 million board feet of logs are produced.

"(*c*) 10 million board feet of salvage wood are recovered.

" Our several conversion plants are consuming wood at the rate of 328 million board feet per year. Included in our log production is some 50 million board feet of shingle cedar, which is either sold on the open market or traded for other species. The balance of our requirements, 108 million board feet, we obtain from logging contractors and independent suppliers. Since we are still dependent on small loggers and the open market for over 108 million board feet per year, we are more than academically interested in the fate of this type of producer."

This Company applied for a forest management licence in 1947. It was approved for advertising on April 1st, 1952, and advertised on June 26th, 1952, but has not yet been granted.

The production of the pulp and paper industry in this Province when compared with the output from Eastern Canada is relatively small.

We are inclined to forget that, while our lumber production is higher than the rest of Canada, Eastern Canadian pulp and paper companies are giants in that field and account for the tremendous Canadian production of pulp and paper products.

A few selected figures for 1955 demonstrate that fact:—

PRODUCTION OF ALL PULP AND PAPER PRODUCTS IN 1955

	Tons
International Paper Co.	4,471,621
Abitibi Power & Paper	1,001,715
Bowater Corporation	1,606,515
Price Bros.	505,516
St. Lawrence Corporation	563,521
Total	8,148,888

We see that in 1955 five Eastern Canadian companies produced over 8 million tons of paper and paper products.

In Ontario and Quebec there are a total of 110 pulp and paper mills producing newsprint and paper products of one kind or another. Of this number, sixty-two are in Quebec and forty-eight in Ontario. New Brunswick has seven mills, Newfoundland two, and Nova Scotia four. The two Newfoundland mills—Anglo Newfoundland Development Company and Bowaters Newfoundland Pulp and Paper—produce in excess of 500,000 tons of newsprint a year.

Total Canadian production of pulp and paper products in 1954 was approximately 17.5 million tons, to which total this Province contributed less than 2 million tons. This amount from our twelve mills equals less than one-half the production from one Quebec company—International Paper Company.

In the field of newsprint, the total Canadian production amounted to 6 million tons, about one-half of total world production, and British Columbia production was a little over a half of 1 million tons.

When we look at these figures and at the steadily increasing volume of pulp production throughout the world, our production, when measured in that frame of reference, shrinks to comparative insignificance.

To us, however, our pulp and paper industry is a very important segment of our Provincial economy. It is being managed by intelligent and dedicated men who are engaged in a continuous effort to produce high standard quality products, saleable in distant markets at competitive prices.

I am convinced that, given a favourable economic climate in which to operate and expand, our pulp and paper industry, with its integrated operations, will continue to contribute in a great measure to the financial stability of this Province.

POLES, PILING, PLYWOOD, AND VENEER

POLES, PILING, AND TIES

In relation to the production of poles, piling, and railway ties, two factors emerge for consideration: (*a*) The increasing scarcity of this class of material and (*b*) the use of wood preservatives as one means of extending the useful life of wood used for these purposes with a consequential lessening in future demands upon our forest resource.

Poles and piling are produced from small-sized relatively young timber which has grown as a result of early forest fires or early logging. In addition, such products are often available from the under-story of mature and overmature forests.

Poles and piling are specialty products which require only light production equipment with a minimum of investment and generally two- or three-man crews.

The logging of the small-sized trees requires, however, careful selection of the product to meet specifications as well as careful handling techniques to avoid tree damage.

Logging for poles and piling is an ideal business for small loggers, who can be important contributors to the local community economy, especially in areas such as the lower Fraser Valley, Sechelt Peninsula, the Gulf Islands, and the lower east coast of Vancouver Island. Also such small operators can, in many instances, make efficient use of small tracts of timber which cannot be economically logged by the large operations.

During 1955 there were approximately 200 companies engaged in producing poles and piling on the Coast for the wood-preserving industry in addition to green-pole suppliers.

These producers receive a higher unit return for their efforts in producing poles and piling than they would if the same material were sold for sawlogs or pulpwood. Furthermore, the Crown receives a greater stumpage and royalty per unit of wood from Crown timber used for poles and piling compared with their alternative use as small sawlogs and pulpwood.

In the past, western red cedar has been the chief species from which poles were cut and is still dominant in this field, although in more recent years it seems that Douglas fir is becoming an important pole species as well. On the other hand, Douglas fir is the only species used, to any substantial degree, for piling.

At present this timber is obtained from privately owned forests, land-clearing projects, and normal old-growth timber logging operations, either during primary operations or by pre-logging.

The evidence indicates that in the past it was quite easy to place orders for as much as 1,000 pieces of piling with one operator, but at present, due to shrinkage in sources of supply, orders in excess of 100 to 200 pieces can seldom be placed with any anticipation that they will be filled.

This shrinkage is attributed by the wood-preserving industry to the several following factors:—

(1) Considerable acreage of privately held immature forests on the Coast have been purchased by the major companies in recent years. These companies have integrated sawmill and pulp-mill conversion units and have acquired such forests with a view to their future wood utilization in their own plants.

(2) The increased interest by gang sawmills and pulp-mills in smaller timber makes it more difficult to obtain pole and piling material from logging operations being conducted in old-growth forests, either privately owned or on timber sales.

(3) The Forest Service will not make timber sales on the Coast in immature timber for poles and piling.

The validity of this last contention (3) rests upon the meaning attributed to the phrase " immature timber " by the Forest Service in this context. The age of maturity must, in an economic sense, relate to the end use of the product and not in all instances be measured in terms of sawlog utilization and a corresponding rotation age.

As a result of the presently prevailing conditions, branches of the construction industry using piling are finding themselves in a position of some embarrassment. For example, the members of the Pile Driving Division of the General Contractors Association state they " are experiencing great difficulty in securing these two types of piling (western red cedar and Douglas fir) which are used in their industry for over 95 per cent of the work. . . . Previously the main source of piling was throughout the Fraser Valley, but this has been practically logged off and thus eliminates that section of the country as a producer. . . . The majority of our members depend on small pole and piling cutters for their material because most of the bigger operators will not bother to sort piling from their logging operations."

With regard to poles, the B.C. Electric Company has gone on record as saying:—

> " Being heavy consumers of western red cedar poles, we are becoming increasingly concerned as to future supplies. We are encountering difficulties in securing our needs and are to-day apprehensive of our ability to obtain our requirements during the years to come.
>
> " We would like the Forest Service to give full consideration to the seriousness of this situation, and we would certainly appreciate their assistance in helping to find a solution. It might be that a policy of cutting second-growth timber would be necessary in order to alleviate the present condition. Such a policy could be laid down so that cutting would be properly supervised and done on a selective basis."

I consider that I have entered into this field far enough to justify me in saying that in my view the present evidence indicates the need of finding

and securing some continuing source of supply on the Coast, of poles and piling, sufficient for the future needs of industry. I use " industry " in this context to mean the loggers, the companies operating preservative plants, and the consumers.

The manner in which this supply of material is to be secured on the Coast involves varying silvicultural economic and administrative factors which must be weighed and evalued before an answer can be found. Whether or not the answer lies in timber sales for selective cutting, allocation of suitable areas in forest management licences limited to this type of log production for this special purpose, or some other solution or solutions is a matter I am unable to resolve. I lack sufficient evidence on the variables inherent in this problem to justify a firm conclusion. It is one, however, which should not be overlooked in future forest policy and planning.

I do not suggest that there be included therein any provisions that would in any way compel private users of pole, piling, and ties to use treated wood for these purposes.

I do think, however, that wood-preservative companies seeking to acquire Crown timber for the purpose of reselling a treated product might well merit some priority in supply.

It is, I believe, essential that, as a means of conservation of our timber resource, piles, poles, and railway ties be treated with wood preservatives in order to extend their useful life as long as possible. This endeavour is not something new nor unproven. Early Greek and Roman narratives speak of preserving wood by the use of astringents, and in more recent years, relatively speaking, England was much concerned over the wood decay in her oaken battleships and merchant marine. To preserve one wooden seventy-gun warship from decay meant conserving, for other needs, the yield from 40 acres of oak forest. From this prod of necessity, experimentation led to the use of coal-tar creosote under pressure as a wood preservative.

In British Columbia there are seven commercial wood-preserving plants. Three of these impregnate wood under pressure when it is to be utilized for various purposes, such as railway ties, piling, poles, and timbers. The remaining four use non-pressurized systems of wood impregnation for such products as cedar poles (butts) and fence-posts.

A new development is the treatment of plywood by preservatives. When pressure-creosoted, plywood can be used in salt water for pontoons, floats, protective sheathing for scows, and similar installations where marine borers would render it unfit in a short time if not so treated.

The lessening of the drain on our forest resource by the use of preservatives may be illustrated by the following examples, furnished me by the wood-preserving industry:—

The Railway Cross-tie.—The life of Douglas fir ties untreated varies from 4 to 13 years in British Columbia, with an average life of

7 years. Thus, over a period of 28 to 30 years it would be necessary to install four untreated ties or 300 per cent more timber than would have been necessary had the original tie been treated. Hemlock is structurally suitable for ties but will last only a few years if untreated, while if properly creosoted, its life will be greatly extended.

Salt-water Piling.—Piling in salt water will resist attack from marine borers for only a comparatively few months in the untreated state. When properly treated with preservatives, their life is extended to at least 40 years.

In both selected cases there is a variable replacement charge to be considered. In the case of the cross-tie, renewal is a simple process and the cost can be readily determined. This is not true, however, of most structural timbers where the replacement may involve dismantling and reconstruction of adjoining members or structures, as well as a disrupting of some functional service. Similarly, replacement of piling used as supports may involve costs high enough to be prohibitive because of the difficulty of redriving under the superstructure.

Therefore, in general, the use of preservatively treated instead of untreated wood reduces the number of replacements required over a given period of service, decreases the cost of maintenance, adds to the safety of the structure, eliminates much lost time and delay by providing continuous and unbroken service, and correspondingly relieves the drain on our forest resource.

PLYWOOD AND VENEER

The production of plywood and veneer has shown a marked increase over the last decade.

Gross values of this branch of the industry in 1955 amounted to $70,059,477. The following table is illustrative of the steady expansion of production:—

TABLE 102

Year	Number of Establishments	Veneers (M Sq. Ft. 1/10" Basis)	Plywoods (M Sq. Ft. 1/4" Basis)
1944	8	35,739	220,158
1945	8	26,781	289,560
1946	9	46,006	271,791
1947	10	65,107	307,620
1948	11	67,302	395,061
1949	11	140,652	360,389
1950	11	194,845	389,010
1951	11	331,148	482,626
1952	11	185,654	464,417
1953	12	260,594	628,621
1954	12	214,044	757,376
1955	14	319,857	854,663
Totals	..	1,887,729	5,421,292

British Columbia now produces over 90 per cent of the total Canadian plywood and veneer. I think the most significant features of plywood production are the use of hardwoods (which should be encouraged), the development of techniques permitting the use of logs down to 12 inches in diameter as " peelers," and the close degree of integrated manufacture of which it is a part.

OTHER INDUSTRIES

In addition to the main conversion units converting wood into some form of manufactured product, and to which I have made reference, there are other wood- and paper-using industries not included therein.

In the aggregate they make a considerable contribution to our economy, as will be seen from the following table:—

TABLE 103

PRINCIPAL STATISTICS OF THE OTHER WOOD- AND PAPER-USING INDUSTRIES IN BRITISH COLUMBIA, 1954

Industry	Establishments	Employees	Salaries and Wages	Cost of Fuel and Electricity	Cost of Materials	Value of Factory Shipments	Net Value of Production
Furniture	221	2,050	$5,459,575	$181,048	$8,503,076	$16,797,448	$8,093,058
Sash, door, and planing mills	214	3,275	9,887,649	794,583	35,490,166	54,164,602	17,832,401
Boxes and baskets, wood	20	188	460,884	21,870	786,191	1,722,957	959,040
Miscellaneous wood products (N.E.S.)	44	656	1,964,781	150,141	5,575,677	9,115,537	2,915,655
Beekeepers' and poultrymen's supplies	1						
Cooperage	2	82	257,576	9,605	605,286	972,550	353,771
Excelsior	1						
Flooring, hardwood	1						
Boxes and bags, paper	16	820	2,488,342	89,097	9,171,495	14,604,817	5,389,589
Roofing-paper	4	213	724,337	59,978	2,057,478	3,878,629	1,785,316
Miscellaneous paper goods	13	612	1,752,990	76,683	7,906,463	12,841,088	4,886,913
Totals	537	7,896	$22,996,134	$1,383,005	$70,095,832	$114,097,628	$42,215,743

UTILIZATION OF WASTE

The extractive and conversion processes by which a standing tree is converted into various articles of commerce leave a considerable proportion of its original wood volume unused. To the degree that this material may be salvaged economically, its use retards the depletion of our forest resource.

It is, therefore, of considerable consequence to our forest economy that this residual material commonly called " waste " be utilized as far as it is practical so to do.

It seems to me that some confusion of meaning can very easily attach to phrases such as " logging waste " and " sawmill waste." In the first place I do not consider " waste " to mean, in an exclusive sense, a useless by-product of those operations in the form of logging debris or mill refuse.

In the relevant context " logging waste " may be defined as that portion of the tree left in the woods which, when and if salvaged, has a utilizable and merchantable value. " Mill waste " is used in the same context to mean sawmill residues for which a profitable use may be found.

While " waste " can be thus defined, a further difficulty arises in determining whether or not certain residuals from logging or sawmilling fall within the definition. Once we accept as part of the definition of " waste " the factor of its economic utilization, then we are immediately confronted by a variable dependent upon the circumstances prevailing at any one place at any one time. Shortly put, what is " waste " to-day may be debris or refuse to-morrow. The converse is also true. In areas close to markets for logging residuals at prices high enough to justify salvage operations, this material should come out of the woods to conversion plants. To leave it in the woods to rot or to burn is a " waste " of wood volume.

There are areas from which, by reason of distances involved, difficulty of terrain, type of stand, and other inhibiting factors, logging residuals cannot be moved to utilization plants except at a cost greater than the recoverable values. It is, in consequence, left in the woods at present and cannot be regarded as salvable waste. In that sense it is not an asset that is wasted. It is, because of the economic factors involved in its removal, nothing more than accumulated logging debris creating an additional fire-hazard. It follows then that areas from which logging residuals will be salvaged must expand or contract in direct relation to existing economic forces.

The compulsion to recover utilizable material can be generated by only one incentive: the chance of making a profit on the operation. It is in the public interest that as great a proportion as possible of logging residuals be salvaged and utilized. This closer utilization has several beneficial aspects; e.g., it retards depletion of our forest resource, it leaves less slash as a fire-hazard (a salvage operation " digs deeper into the slash "), and it leaves a cleaner forest floor for regeneration. In consequence, as a pro-

gramme of utilization of logging waste is in the public interest, and as economic factors limit or expand geographic areas of waste utilization and species recoverable, the Forest Service should encourage and assist this programme by a more sympathetic and liberal attitude in relation to stumpage and royalty charges on salvaged material.

After a clear-cut logging operation with high-lead equipment, there is left on the ground material such as high stumps, long tops, sound logs with either one or both ends broken, short sections of sawlogs resulting from breakage on falling, sawlogs overlooked by yarding crews, defective logs, and under-story trees, too small for sawlogs, torn down and broken into small pieces during the falling and yarding of large timbers.

In 1955 the Forest Products Laboratory at Vancouver released a study by Mr. G. R. W. Nixon on logging losses on the Coast of British Columbia, conducted between 1948 and 1950, on two typical areas and covering nineteen settings. On these two areas examined the total volume of logging residuals suitable for small sawlogs and pulp amounted to approximately 18,000 f.b.m. per acre.

In theory this entire volume was utilizable in a physical sense, but how much of it could be regarded as salvable waste would depend upon economic factors not explored before me.

The following table summarizes the losses in these two areas; they are expressed as a percentage of the gross merchantable stand volume and indicate the shrinkage of original wood volume consequent upon various phases of logging operations. On a net volume scale the percentage losses would naturally be appreciably higher.

TABLE 104

SUMMARY OF TOTAL LOSSES, AREAS 1 AND 2

(Percentages expressed in terms of gross merchantable volume.)

Area 1

	Cedar (Based on 531 Trees, 1,171 Logs)		Hemlock (Based on 509 Trees, 790 Logs)		Fir (Based on 22 Trees, 57 Logs)		Total (Based on 1,062 Trees, 2,018 Logs)	
	F.B.M.	Per Cent	F.B.M.	Per Cent	F.B.M.	Per Cent	F.B.M.	Per Cent
Gross merchantable volume[1]	1,676,217	100.0	276,131	100.0	86,792	100.0	2,039,140	100.0
Defect volume		9.1		5.4		5.1		8.4
Stump waste[2]		0.5		0.6		0.4		0.5
Felling and bucking losses—								
Primary[3]		14.1		4.3		9.8		12.6
Secondary[4]		1.5		2.6				1.6
Bucking[5]		0.1		0.1				0.1
Yarding and loading losses		8.3		7.2		5.5		8.0
Logs left in the slash		2.1		4.9		2.2		2.5
Net volume of logs on trucks	1,078,048	64.3	206,813	74.9	66,851	77.0	1,351,712	66.3

Area 2

	Cedar (Based on 98 Trees, 173 Logs)		Hemlock (Based on 141 Trees, 292 Logs)		Fir (Based on 366 Trees, 1,008 Logs)		Total (Based on 605 Trees, 1,473 Logs)	
	F.B.M.	Per Cent	F.B.M.	Per Cent	F.B.M.	Per Cent	F.B.M.	Per Cent
Gross merchantable volume	80,673	100.0	185,669	100.0	943,855	100.0	1,210,197	100.0
Defect volume		5.3		9.9		9.8		9.6
Stump waste		1.6		0.2		0.6		0.6
Felling and bucking losses—								
Primary		8.0		11.7		10.9		10.8
Secondary		8.7		4.6		1.7		2.6
Bucking		0.3		0.1		0.2		0.2
Yarding and swinging and loading losses		3.1		1.1		0.7		0.9
Logs left in the slash		3.2		1.4		0.4		0.7
Net volume of logs on railroad cars	56,303	69.8	131,773	71.0	714,854	75.7	902,930	74.6

[1] "Gross merchantable volume" was the gross volume of the trees including defects and breakage, but not including the volume contained in stumps of normal height and tops of unmerchantable quality.

[2] "Merchantable stump waste" applied to waste in side-winders, windfalls, and high, sound stumps. For the down trees, it was the volume of merchantable wood between the first cut and a point approximately 18 inches above the average ground-level.

[3] "Primary breakage" was the loss in volume caused by the falling of the tree. Much of this initial breakage was due to striking stumps, logs, and rock outcrops, many of which were hidden.

[4] "Secondary breakage" was the loss in volume caused to felled and bucked logs by other trees falling on them.

[5] "Bucking breakage" was the loss in volume due to breakage in the bucking operation; e.g., slabbing the end of a log.

From this table it is seen that losses expressed in percentage of gross merchantable volume can be summarized as follows:—

	Area 1 (Per Cent)	Area 2 (Per Cent)
Defect	8.4	9.6
Stump waste	0.5	0.6
Felling and bucking	14.3	13.6
Yarding and loading	8.0	0.9
Logs left in the slash	2.5	0.7
Totals	33.7	25.4

Subtracting stump waste and defective material as non-recoverable volume from the above totals leaves on the ground 24.8 per cent on Area 1 and 15.2 per cent on Area 2 usable wood in terms of percentage of gross merchantable volumes. Total losses, including defects, when related to species are shown as follows:—

	Area 1 (Per Cent)	Area 2 (Per Cent)
Douglas fir	23.0	24.3
Hemlock	25.1	29.0
Cedar	35.7	30.2

The Forest Service has also compiled a valuable study relating to percentages of decay waste and breakage in terms of gross merchantable volume measured in cubic feet. These figures do not, however, include yarding and small-tree losses. Zones 1 and 2 are on the Coast, Zone 4 is the Central Interior, Zone 5 is Southern Interior, and Zone 6 is the south-eastern part of the Province.

In tabular form it appears as follows:—

TABLE 105

INTERIM NET VOLUME FACTORS[1] APPLICABLE TO PROVINCIAL INVENTORY[2] GROSS CUBIC-FOOT VOLUME SUMMARIES COMPUTED ON THE BASIS OF CLOSE UTILIZATION STANDARDS[3] FOR THE TREE SPECIES OF BRITISH COLUMBIA.

Zones 1 and 2[4]

Species[5]	Decay[6]			Decay and Waste[7]			Decay, Waste, and Breakage[8]		
	Tree Class 1[9]	Tree Class 2[10]	Tree Class 0[11]	Tree Class 1	Tree Class 2	Tree Class 0	Tree Class 1	Tree Class 2	Tree Class 0
Douglas fir	.98	.89	.93	.92	.74	.82	.87	.69	.77
Western red cedar	.81	.73	.76	.60	.46	.51	.55	.41	.46
Western hemlock	.87	.82	.84	.71	.62	.65	.66	.57	.60
Balsam species	.96	.88	.93	.88	.73	.82	.83	.68	.77
Sitka spruce	.98	.89	.93	.92	.74	.82	.87	.69	.77
Interior spruce species	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow cedar	.81	.73	.76	.60	.46	.51	.55	.41	.46
White pine	.99	.85	.92	.94	.67	.80	.89	.62	.75
Lodgepole pine	.99	.94	.96	.94	.84	.88	.89	.79	.83
Yellow pine	.....	.....	.....	.....	.....	.....	.....	.....	.....
Larch	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cottonwood	.72	.55	.70	.44	.17	.41	.39	.12	.36
Alder	.95	.87	.89	.86	.71	.74	.81	.66	.69
Maple	.95	.87	.89	.86	.71	.74	.81	.66	.69
Birch	.95	.87	.89	.86	.71	.74	.81	.66	.69
Aspen	.60	.60	.60	.25	.25	.25	.20	.20	.20

[1] Derived as averages for all ages (81 years and over for coniferous species, 41 years and over for deciduous species), sites and stand conditions in natural stands sampled in the zones indicated. The factors indicate the percentage of volume recoverable when allowances are made for the losses shown.

[2] Provincial inventory summaries are quoted less deductions for decay only. Therefore, usable species should be further reduced for waste and breakage to obtain current sawlog-recovery potential.

[3] Close utilization standards defined as the volume between a 1-foot stump and a 4-inch top diameter inside bark.

[4] Zone 1 includes Regions 61, 62, 63, 64 (Compts. 7, 9–21 excluded), 75 (Compts. 1–10, 15, 16, 17, 83–110 only); Zone 2 includes Regions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 26, 27, 28, 29, 30, 31, 32, 49 (Compts. 29–31,34–40 excluded), 50, 51, 52, 53, 54 (Compts. 83–100 excluded).

[5] Minor products excluded.

[6] "Decay" represents the actual volume of decayed wood.

[7] "Waste" represents the sound waste between a 1-foot stump and a 4-inch top diameter inside bark, resulting from the arbitrary culling of logs greater than 66 per cent defective and trees greater than 50 per cent defective, based on a minimum log length of 16 feet.

[8] "Breakage" represents felling breakage only. Yarding and small-tree losses not included.

[9] Tree Class 1—living trees bearing no visible signs of decay.

[10] Tree Class 2—living trees bearing one or more visible signs of decay (i.e., conks, blind conks, scars, fork or crook, frost crack, mistletoe trunk infections, rotten branches, broken top).

[11] Tree Class 0—all living trees regardless of pathological classification.

TABLE 105—*Continued*

Zone 4[12]

Species[5]	Decay[6]			Decay and Waste[7]			Decay, Waste, and Breakage[8]		
	Tree Class 1[9]	Tree Class 2[10]	Tree Class 0[11]	Tree Class 1	Tree Class 2	Tree Class 0	Tree Class 1	Tree Class 2	Tree Class 0
Douglas fir	.98	.89	.93	.92	.74	.82	.89	.71	.79
Western red cedar	.32	.27	.29	.02	.02	.02	.....	.....	.....
Western hemlock	.87	.70	.76	.71	.41	.51	.68	.38	.48
Balsam species	.79	.76	.77	.56	.41	.53	.53	.38	.50
Sitka spruce	.....	.....	.....	.....	.....	.....	.....	.....	.....
Interior spruce species	.93	.87	.90	.82	.71	.76	.79	.68	.73
Yellow cedar	.....	.....	.....	.....	.....	.....	.....	.....	.....
White pine	.98	.92	.96	.92	.80	.88	.89	.77	.85
Lodgepole pine	.94	.91	.92	.84	.78	.80	.81	.75	.77
Yellow pine	.....	.....	.....	.....	.....	.....	.....	.....	.....
Larch	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cottonwood	.72	.28	.40	.44	.02	.03	.41	.....	.....
Alder	.95	.87	.89	.86	.71	.74	.83	.68	.71
Maple	.95	.87	.89	.86	.71	.74	.83	.68	.71
Birch	.95	.87	.89	.86	.71	.74	.83	.68	.71
Aspen	.73	.57	.60	.46	.20	.25	.43	.17	.22

Zone 5[13]

Douglas fir	.98	.93	.96	.92	.82	.88	.89	.79	.85
Western red cedar	.77	.60	.65	.53	.25	.32	.50	.22	.29
Western hemlock	.92	.75	.81	.80	.49	.60	.77	.46	.57
Balsam species	.84	.74	.78	.65	.47	.54	.62	.44	.51
Sitka spruce	.....	.....	.....	.....	.....	.....	.....	.....	.....
Interior spruce species	.91	.88	.90	.78	.73	.76	.75	.70	.73
Yellow cedar	.....	.....	.....	.....	.....	.....	.....	.....	.....
White pine	.98	.92	.96	.92	.80	.88	.89	.77	.85
Lodgepole pine	.99	.94	.96	.94	.84	.88	.91	.81	.85
Yellow pine	.99	.94	.96	.94	.84	.88	.91	.81	.85
Larch	.98	.87	.92	.92	.71	.80	.89	.68	.77
Cottonwood	.72	.55	.70	.44	.17	.41	.41	.14	.38
Alder	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maple	.....	.....	.....	.....	.....	.....	.....	.....	.....
Birch	.95	.87	.89	.86	.71	.74	.83	.68	.71
Aspen	.60	.60	.60	.25	.25	.25	.22	.22	.22

5 6 7 8 9 10 11 As on p. 370.

12 Zone 4 includes Regions 55, 56, 57 (Compts. 1, 2, 4 excluded), 58 (Compt. 1 excluded), 59, 60, 66 (Compts. 68–75, 78, 79, 80, 81, 82, 90 excluded), 67 (Compts. 13, 14, 15, 16 excluded), 68, 69, 74.

13 Zone 5 includes Regions 13, 25, 33, 34, 35, 36, 45, 46, 47, 48, 49 (Compts. 29–31, 34–40 only), 54 (Compts. 83–110 only), 58 (Compt. 1 only), 57 (Compts. 1, 2, 4 only).

TABLE 105—*Continued*

Zone 6[14]

Species[5]	Decay[6]			Decay and Waste[7]			Decay, Waste, and Breakage[8]		
	Tree Class 1[9]	Tree Class 2[10]	Tree Class 0[11]	Tree Class 1	Tree Class 2	Tree Class 0	Tree Class 1	Tree Class 2	Tree Class 0
Douglas fir	.99	.95	.97	.94	.86	.90	.91	.83	.87
Western red cedar	.77	.60	.65	.53	.25	.32	.50	.22	.29
Western hemlock	.92	.75	.81	.80	.49	.60	.77	.46	.57
Balsam species	.84	.74	.78	.65	.47	.54	.62	.44	.51
Sitka spruce	.....	.....	.....	.....	.....	.....	.....	.....	.....
Interior spruce species	.97	.90	.93	.90	.76	.82	.87	.73	.79
Yellow cedar	.....	.....	.....	.....	.....	.....	.....	.....	.....
White pine	.98	.92	.96	.92	.80	.88	.89	.77	.85
Lodgepole pine	.99	.94	.96	.94	.84	.88	.91	.81	.85
Yellow pine	.97	.97	.97	.90	.90	.90	.87	.87	.87
Larch	.98	.87	.92	.92	.71	.80	.89	.68	.77
Cottonwood	.72	.55	.70	.44	.17	.41	.41	.14	.38
Alder	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maple	.....	.....	.....	.....	.....	.....	.....	.....	.....
Birch	.95	.87	.89	.86	.71	.74	.83	.68	.71
Aspen	.60	.60	.60	.25	.25	.25	.22	.22	.22

5 6 7 8 9 10 11 As on p. 370.

14 Zone 6 includes Regions 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 37, 38, 39, 40, 41, 42, 43, 44.

When we examine the incidence of losses expressed in this table, we see, for example, Douglas fir on the Coast, losses in Tree Class 0 (which is the broad average of Tree Classes 1 and 2) 7 per cent to decay, 11 per cent to waste as defined in the footnote, and 5 per cent to breakage, a total of approximately 23 per cent of gross volume. The same figures for hemlock are seen to be 16, 19, and 5 per cent, totalling 40 per cent, and for cedar 14, 25, and 5 per cent, totalling 44 per cent.

After allowance for the areas of sampling in each study and the differences in calculating percentages in terms of board-feet and cubic feet, together with variations in the definition of waste, it seems to me that the end results are reasonably parallel. It cannot be assumed, however, that after applying the economic factors of cost and value it would be practical to salvage these entire volumes. It has been estimated by Mr. Kenneth G. Fensom, superintendent of the Vancouver laboratory of the Federal Forest Products Laboratories, and other witnesses that recoverable waste, generally speaking, amounts to between 10 and 16 per cent of the gross merchantable volume of the original stand.

That estimate, when applied to regional or smaller areas, might not be an exact reflection of actual recovery volumes, but in a wide and general sense it is, I think, consistent with other evidence in this Commission and can be accepted in that context as reasonably accurate.

Utilization in the woods has not appreciably changed for the better over the last decade, except for the commendable efforts of the larger integrated companies to take out salvage material either by pre-logging or during the main or primary logging, or by re-logging the area. Some percentage of the smaller operators are, in fact, logging more cleanly than in former years, due to higher values of lower-grade logs. This cannot be regarded as salvage logging as such. A properly organized and conducted salvage operation requires the use of light portable and specialized equipment, the capital cost of which can run as high as a million dollars.

Pre-logging is indicated in a stand of big timber with a thrifty young under-story. As I mentioned above, unless these smaller trees are logged before the main logging operation, many of them are torn down and broken into pieces when the big trees are felled and yarded.

Equipment designed for heavy logging cannot be used to advantage to take out big and small trees together. In smaller stands this can be accomplished but with a higher unit cost.

It follows that, generally speaking, salvage logging is conducted as re-logging operation. The Forest Service tends to limit salvage logging to this type of recovery by not extending salvage rates to this class of material taken out by pre-logging or during the primary or main logging operation.

I am not unaware of the administrative difficulties that may be encountered should the salvage rate be extended to include recovery of logging waste (or trees that would inevitably be knocked down and broken and become waste) on pre-logging or main logging operations. These administrative problems are, however, not insuperable, and I recommend that, in suitable cases and when and where circumstances are such that the public interest would benefit thereby, the Forest Service should extend its salvage rates to material recovered by pre-logging and main logging as well as by re-logging.

The extraction and use of residual-wood volumes began in an experimental way in this Province in 1943 in a project carried out by the Comox Logging and Railway Company, the Powell River Company, and the Forest Service at Ladysmith, in a joint effort to ascertain whether sound wood left in the woods after logging could be economically salvaged and used in the manufacture of pulp. The area was 260 acres in extent and the total recovery amounted to about 400,000 cubic feet. The volume of sound and useable wood delivered to the Powell River Company amounted to 370,000 cubic feet. This volume, when converted into pulp, equalled the pulp yield of 2 million f.b.m. of normal pulp-logs.

In 1945 I said this:—

> " The Ladysmith experiment disclosed the fact that costs of handling the salvaged material at Powell River were about the same as those incurred for handling normal pulp-logs while wood losses in the preparation of this material for pulping were lower. The installation

of hydraulic barkers will materially reduce wood losses now incurred in barking normal pulp-logs with consequent alteration of the relative costs. Based on the experimental methods used, logging costs of this material came ' very close to the valuation of the salvage as pulp-wood supply.' Experience will undoubtedly evolve cheaper methods of recovery and lowered costs of loading and transportation may be anticipated."

I am happy to say that these predictions have come true. I continued:—

"It is in the public interest that logging-waste be salvaged and utilized, therefore the Government should encourage its recovery by measures designed to effectuate that purpose. These measures should have as a primary objective the lowering of recovery costs. This objective may be attained by the creation of a new grade for salvaged material without reservation of royalty and by adjustment of over-all stumpage prices to render it possible to pre-log or re-log areas selected as suitable for this purpose."

This recommendation has been implemented in part by the 1946 amendment to the "Forest Act," now section 56 previously referred to and reading as follows:—

"Where standing timber has been killed by fire and a material decrease in the value of the timber has resulted therefrom, upon a report of the Forest Service showing the extent of the damage so caused to the timber and that the damage was not caused through any negligence or design on the part of the owner or holder of the timber or other person interested therein, *and where other timber has a salvage value only*, upon the recommendation of the Deputy Minister the Minister may, in his discretion, allow a reduction of royalty in respect of the damaged or salvage timber, such reduction not to exceed seventy-five per centum of the royalty otherwise payable in respect thereof."

Pursuant to this authority, salvage rates on re-logging operations are chargeable at 25 per cent of royalty plus 10 cents per 100 cubic feet (cunit).

It is of interest to note that the Powell River Company was in 1955 using 12 million board-feet of wood salvaged from its own woods operations and was purchasing an additional volume of salvage wood on a cubic-foot basis equivalent to an additional 10 million board-feet. It was expected that in 1956 this Company would use the equivalent of 32 million board-feet of salvage and in 1957 at least 50 million board-feet which is about 12 per cent of its total wood consumption. Its own salvaged material is recovered by re-logging areas logged over by this Company, and in consequence salvage rates apply thereto.

The Harmac mill is planning to use a similar percentage of salvage wood in its Nanaimo operation.

In 1956 Crown Zellerbach utilized in its Elk Falls pulp-mill 15 million board-feet of small logs recovered for pulpwood by pre-logging, re-logging, and other conventional methods. This recovery represented 23.5 per cent of the total wood-supply for the mill.

Considerable quantities of material previously left on the ground are now being salvaged and used by other pulp and paper companies.

This usage would probably be more extensive were it not for the rapidly expanding use of chips processed from so-called sawmill waste.

Mill waste is a cheaper commodity than logging waste. There are, as far as I am aware, only two or three pulp-mills that buy logging left-overs to supplement material salvaged from their own logging operations. The market for logging waste, because of scarcity of demand due to adequate supplies at present of large logs and sawmill residues, sufficient for the needs of the pulp-mills, is unattractive and erratic.

It will, in consequence, be some considerable time yet before a greater percentage of logging left-overs are moved from the woods than at present to conversion plants at competitive prices unless the Forest Service is prepared to assist in this endeavour. I think the public interest could be served in the present state of our economy if immediate encouragement be extended and designed to speed up the flow of salvage from wood operations to conversion plants.

The market place is sensitive and reacts with some alacrity to any policy that tends to reduce the cost of production by making available supplies of raw material at attractive prices.

The permit issued by the Forest Service to conduct a salvage operation on the Coast by re-logging an area already logged defines salvage in a narrower sense than that usually employed. It reads in part as follows:—

> "Salvage material, comprising material which would be normally left on the ground following primary logging, being of too low a grade to be removed at that time, shall be defined as:—
>
> "(*a*) Logs and chunks less than 16 feet in length, any diameter, not suitable for the manufacture of lumber; or
>
> "(*b*) Logs, which if cut in 16-foot lengths, would not exceed 12 inches in top diameter.
>
> "All material produced over a 12-inch top diameter and 16 feet or over in length will be graded and scaled as sawlogs, and royalty charged without the reduction referred to above. Full royalty will also be charged on any portion of a log 16 feet or over in length with a top exceeding 12 inches in diameter."

In the Interior, salvage rates apply on a stand basis regardless of the size of the individual trees. If my recommendation be accepted that some part of the recovery from pre-logging or main logging be granted salvage rates, then I think it must follow that the Forest Service definition of salvage should be amended to correspond with this adjustment in rates.

Pre-logging on a salvage basis would, for example, remove and save small trees from breakage and resultant wastage in recoverable volume, but when unbroken these smaller trees would not fall, in many instances, within the present definition of salvage. Experience should demonstrate the necessity for other amendments to the Forest Service definition of salvage.

To remove any possibility of my recommendation in this regard being misunderstood, I wish to state emphatically that I do not for a moment suggest in every instance young under-story trees should be pre-logged as salvage material. There are, no doubt, many stands where young and immature trees should be left to grow. If thinnings are a silvicultural requirement in such a young stand, I see no reason in such instances why salvage rates should not apply where the economics of these operations so demand.

I said in the 1945 Report:—

> " Logging by the high-lead system results in the destruction of thrifty young growth. Much of this is probably unavoidable and even if the scattered young under-story trees were left standing they become, in most part, wind-thrown when deprived of the protection of the old-growth trees or burned in slash fires. There is, however, one practice that cannot be permitted to continue on any form of tenure—Crown-granted or otherwise: I refer to the reprehensible destruction of dense, thrifty second-growth stands by logging operations carried on for the sole purpose of recovering a few scattered old-growth trees in those young stands. This wanton waste and ruthless destruction of our future forests demands that, in the public interest, such a practice be stopped."

Dr. Orchard, when questioned concerning the prevalence of that sort of operation to-day, said:—

> " Larger operators, better financed, better established, even on their own lands, I think, learned that this is a peculiarly wanton type of destruction and have pretty well eliminated it from their operations. On Crown lands, we make every effort and I think it has been eliminated in that we absolutely refuse to sell Crown timber values in these small stands that would be destroyed by the logging of the other values. The smaller operators throughout the Province are not nearly so helpful or so careful, and a certain amount of this kind of destruction still goes on. The only steps we take are in the conditions laid down in the contract terms in the sale of Crown timber. We guard against it as fully as we possibly can. In the case of privately owned lands, timber licences, privately held lands of other tenures, we have no means to stop them. We have no effective means of controlling his operations. All we can do, as in the case of a timber licence, or licences to cut other than the timber sale, is to go in and assess royalty on what we consider to be wanton waste of merchantable timber. Assess the statu-

tory royalty rates on the merchantable material that was not taken off the ground."

While I thought in 1945 the Forest Service should control the cutting of timber on Crown-granted lands, I was not unmindful of the difficulties that might be encountered by the Government in passing appropriate legislation vesting the Forest Service with that authority. In consequence, and because Crown-granted areas when included in forest management licences are now made subject to Forest Service control, I do not consider it necessary to repeat this recommendation. I do, however, still maintain that in other forms of temporary tenures, such as licences which are essentially nothing more than the right to cut Crown timber, the Forest Service should be empowered to write into them provisions designed to prevent wanton and flagrant breaches of good forest management practices, short of compelling sustained-yield production but, for instance, prohibiting the unnecessary destruction of vigorous young stands.

At this juncture I can return to the subject under discussion—salvage—by stating that the circumstances in each case must determine whether or not areas of mature growth should be harvested at the expense of young under-story trees. For example, in one area young growth may be scattered and sparse. In such an area when logging the mature trees it is almost certain that the majority of young trees will be torn down and broken or, if left standing, will become wind-thrown. They can, of course, be salvaged, and if salvaged on a pre-logging operation, greater recoverable volumes will result. Better utilization would be thus encouraged by extending a salvage rate to this type of recovery.

There may be another area, for example, in which conditions are entirely dissimilar: a comparatively few mature trees in a sea of thrifty young growth. It would be unthinkable that this young forest be damaged by the removal of a few large timbers and that the torn and broken young trees be regarded as salvage.

Running throughout the evidence concerning salvage and utilization of logging waste was one refrain: the economics of the operation. The fact that cedar is not used in any quantity for pulp-manufacture is an example of the working of the inexorable law of supply and demand. Cedar waste suitable for pulp is not salvaged to any degree and generally stays in the woods, although material suitable for hand-split cedar shakes is marketable and accounts for many thousands of cords of cedar wood being salvaged from logged off lands.

Mr. H. R. MacMillan expressed the economic aspect of salvaging waste wood when he said:—

> "You get your logging people together and you give them a talk about wasting something and they must do better, and you go out and find out that they have stopped wasting wood and started wasting money."

That undoubtedly could be true, but it seems to me that Mr. R. J. Filberg supplied the answer in part when he said:—

> "There are times when we are recovering salvage, for instance, that it is costing us more to recover than it is worth, but we will catch it on the other end. Ten, or fifteen, or twenty years from now we will have conserved some timber that we will make some money on and that will make up for what we have lost to-day."

The other part of the answer must be offered by the Forest Service in order to get as great a proportion as possible of salvable material into the blood-stream of industry.

In the Interior there is at present no market for logging residuals, and in consequence no incentive to bring this material out of the woods. There has been, however, a decided improvement in logging methods employed by larger operators, leading to cleaner logging and better utilization. Stump heights have lowered, tops are often cut to 6 inches instead of the legal minimum of 8 inches, and poorer grades of logs are being brought to and utilized by the sawmills. The spur of necessity has brought about the switch, in larger operations, from horse to mechanized logging and consequent better utilization, although residual stands are probably suffering greater damage than formerly due to power-skidding.

Logging waste in the Interior will continue to be a problem, without any real solution, until integrated conversion plants are established in key localities, or until some means may be found to chip the waste from logging and milling residues and to transport the material thus recovered to Coastal consumers at an economic price.

The Pacific Great Eastern Railway could, in this regard, and as a railway owned by the people of this Province and operated in the public interest, perform a valuable service to the economy of the Northern Interior, as well as assist in retarding depletion of the Coast forests. Transcontinental railways and their feeder lines have, in the past, on occasion, considered the freight-rates structure as something more than a means of revenue collection and have accordingly, by using the rate structure as an instrument of policy, assisted young communities and new settlements to achieve a stable financial success.

I have no evidence before me to justify any further comments on this special aspect of salvage utilization, and I am not suggesting anything more than that consideration be given to this question by those competent to assess its possibilities.

SAWMILL RESIDUE

We have seen that the wood lost in the various phases of logging amounts to about 30 per cent of the gross merchantable volume of the stand. An amount of wood equal to about 15 per cent of the stand—

i.e., 50 per cent of the residue—has a recoverable salvage value assuming the existence of favourable economic factors.

We now have the log at the sawmill.

Logs are circular and lumber is flat. The first milling operation is designed, therefore, to change the log with its round section into lumber with rectangular sections. The edges of each successive board cut from the log after the half-round side slabs are removed represent a small part or segment of the circle. These rounded or wavy edges are trimmed off. From these preliminary stages of manufacture two types of waste are incurred: sawdust from the saw kerf and solid residuals in the form of slabs and edgings. (Bark is generally regarded as non-productive waste, although it constitutes about 10 per cent of the volume of logs. A plant near Vancouver is now producing from hemlock bark a product useful in drilling oil wells ("Rayflo").)

As the processes of manufacture continue, the planks or boards are cut or trimmed to various lengths, widths, and thicknesses. Further sawdust results and solid residues are increased by the bits and pieces from the trimming operations. Some portion of the lumber—probably about one-half on the average—is put through planing-mills to enhance its appearance, to obtain uniform sizes, and to meet the demand for special products such as floorings, window-casing, moulding, and such like, resulting in a residual of shavings and trimmings.

Excluding waste from planing processes—shavings and trimmings—the evidence indicates that on the average very close to 66 per cent of the log emerges as green lumber from Coast sawmills. Planing-mill losses are subject to wide variation, but it has been estimated to be about 30 per cent of the green-lumber volume processed.

The following tables are extracted from a 1953 publication of the results of a study made by Mr. F. W. Guernsey, of the Vancouver laboratory of the Federal Forest Products Laboratories Division, of sawmill residues in this Province:—

TABLE 106

VOLUME OF SOLID RESIDUE PER M F.B.M. LOG-SCALE

NOTE.—Percentages based on contents of log in cubic feet. Volume in cords based on 60 cubic feet per cord for Douglas fir and 71.5 cubic feet per cord for western hemlock.

Mill	Species	Cut	Volume per M F.B.M. Log-scale								
			Slabwood		Edgings		Trimmings		Total		
			Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cords
1	Douglas fir	Over 100 M f.b.m. per day	7.6	4.6	9.6	5.8	4.4	2.6	21.6	13.0	.36
2	,,	,, ,,	8.2	5.0	6.8	4.1	3.7	2.3	18.7	11.4	.31
3	,,	,, ,,	8.7	5.1	8.0	4.7	5.9	3.5	22.6	13.3	.38
4	,,	,, ,,	4.8	3.0	4.9	3.1	11.8	7.6	21.5	13.7	.36
5	,,	,, ,,	3.5	2.2	11.5	7.2	6.7	4.2	21.7	13.6	.36
6	,,	,, ,,	6.3	4.2	6.7	4.4	6.4	4.2	19.4	12.8	.32
8	,,	,, ,,	4.2	2.8	4.6	3.1	10.6	7.0	19.4	12.9	.32
9	,,	,, ,,	5.6	3.4	4.5	2.7	9.5	5.7	19.6	11.8	.33
Averages of mills cutting over 100 M f.b.m. per day			6.1	3.8	7.1	4.4	7.3	4.6	20.5	12.8	.34
10	Douglas fir	Under 100 M f.b.m. per day	11.1	7.0	13.2	8.3	4.1	2.6	28.4	17.9	.47
11	,,	,, ,,	5.8	3.4	6.0	3.5	10.5	6.1	22.3	13.0	.37
12	,,	,, ,,	12.6	7.2	8.6	4.9	6.7	3.8	27.9	15.9	.46
13	,,	,, ,,	11.8	6.6	5.3	3.0	7.0	3.9	24.1	13.5	.40
Averages of mills cutting less than 100 M f.b.m. per day			10.3	6.1	8.3	4.9	7.0	4.1	25.6	15.1	.43
14	Douglas fir	Gang-mill	0.8	0.5	21.6	13.9	9.3	6.0	31.7	20.4	.53
15	,,	,, ,,	———	———	17.2	9.9	12.5	7.2	29.7	17.1	.50
Averages of gang-mills			0.4	0.2	19.4	11.9	10.9	6.6	30.7	18.7	.51
16	Hemlock		5.9	3.7	8.1	5.0	10.5	6.5	24.5	15.2	.35
17	,,		5.3	3.3	5.6	3.5	10.0	6.2	20.9	13.0	.29
18	,,		6.3	3.9	10.0	6.2	7.3	4.6	23.6	14.7	.33
19	,,		5.0	2.9	7.6	4.4	16.4	9.3	29.0	16.6	.41
Averages of hemlock-mills			5.6	3.5	7.9	4.8	11.0	6.6	24.5	14.9	.34

Table 107 shows the volume of sawdust per thousand board-feet log-scale produced by (*a*) band-mills, (*b*) circular-mills, (*c*) gang-mills, and (*d*) hemlock-mills. The volume of sawdust as shown refers to the wood in solid form. When it is converted to sawdust, it assumes a greater volume, owing to the air-spaces between each particle. Weighing and volume studies on sawdust indicate that 2.5 cubic feet of sawdust are produced from 1 cubic foot of solid wood.

Kerfs of various saws used in Coast sawmills are as follows:—

Headsaws—	
Band	12/64 to 16/64 in.
Circular	22/64 to 26/64 in.
Gang	10/64 to 20/64 in.
Edgers—	
Main	22/64 to 26/64 in.
Pony	20/64 in.
Band resaws	12/64 in.
Trimmers	16/64 in.

TABLE 107

VOLUME OF SAWDUST PRODUCED PER M F.B.M. LOG-SCALE

NOTE.—Percentages based on contents of log in cubic feet.

Mill No.	Species	Type	Headsaw		Edger		Resaw		Pony Edger		Trim-saws		Total		
			Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Ft. Cent	Cu. Per	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Units
1	Douglas fir	Band	9.5	6.1	7.6	4.9	7.2	4.6	.....	.....	0.2	0.2	24.5	15.8	.31
4	,,	,,	11.9	7.5	7.8	5.0	5.3	3.3	1.3	0.8	0.5	0.3	26.8	16.9	.33
5	,,	,,	6.6	4.2	6.2	4.0	5.3	3.4	.....	.....	0.4	0.3	18.5	11.9	.23
6	,,	,,	7.9	4.8	6.6	4.0	6.5	3.9	0.8	0.5	0.4	0.3	22.2	13.5	.28
8	,,	,,	11.1	7.4	2.6	1.7	4.8	3.2	0.8	0.5	0.7	0.5	20.0	13.3	.25
Averages of band-mills			9.4	6.0	6.2	3.9	5.8	3.7	0.6	0.4	0.4	0.3	22.4	14.3	.28
2	Douglas fir	Circular	16.0	10.4	7.1	4.7	5.3	3.5	0.9	0.6	0.2	0.2	29.5	19.4	.37
3	,,	,,	16.2	10.6	6.0	3.6	6.2	4.0	0.8	0.5	0.3	0.3	29.5	19.4	.37
9	,,	,,	17.1	10.2	9.7	5.8	5.1	3.0	0.8	0.5	0.2	0.1	32.9	19.6	.41
10	,,	,,	24.9	15.7	6.7	4.2	2.5	1.6	.....	.....	.....	.....	34.1	21.5	.43
11	,,	,,	16.0	10.3	6.2	4.0	1.9	1.2	.....	.....	2.3	1.5	26.4	17.0	.33
12	,,	,,	20.0	12.1	7.9	4.8	6.4	3.9	.....	.....	5.9	3.6	40.2	24.4	.51
13	,,	,,	21.4	13.2	6.4	3.9	4.3	2.7	.....	.....	0.1	0.1	32.2	19.9	.40
Averages of circular-mills			18.8	11.7	7.1	4.4	4.5	2.8	0.3	0.2	1.3	0.8	32.2	19.9	.40
14	Douglas fir	Gang	16.3	10.5	8.2	5.3	.....	.....	.....	.....	2.9	1.9	27.4	17.7	.34
15	,,	,,	7.8	4.9	10.7	6.7	4.0	2.5	.....	.....	2.4	1.5	24.9	15.6	.31
Averages of gang-mills			12.1	7.7	9.5	6.0	2.0	1.2	.....	.....	2.7	1.7	26.3	16.6	.33
16	Hemlock	Circular	17.7	11.1	4.1	2.6	9.5	6.0	.....	.....	0.2	0.2	31.5	19.9	.39
17	,,	,,	15.8	11.0	3.0	2.1	8.3	5.8	.....	.....	0.5	0.3	27.6	19.2	.35
18	,,	,,	18.0	11.3	6.4	4.0	5.3	3.4	.....	.....	0.3	0.2	30.0	18.9	.38
19	,,	,,	10.2	5.8	7.0	3.9	7.3	4.1	1.9	1.1	0.1	0.1	26.5	15.0	.33
Averages of hemlock-mills			15.4	9.8	5.1	3.1	7.6	4.8	0.5	0.3	0.3	0.2	28.9	18.2	.36

In the 1945 Report I said this:—

"A study of fourteen large Coast mills by Mr. J. H. Jenkins in 1928 revealed that the amount of wood converted into lumber and other material, resulting from the manufacturing processes then in use, and expressed in percentage of the cubic volume of Douglas fir and hemlock logs, was as follows:—

	Douglas Fir	Hemlock
Slabwood edgings and trim	12.9	14.9
Sawdust	16.1	18.3
Total	29.0	33.2
Green lumber	71.0	66.8
	100.0	100.0 "

These figures are very close to present calculations, and it is manifest that sawmilling techniques on the Coast, measured in terms of mill residuals, have not changed to any degree over the past thirty years. We are still subtracting as a concomitant of our sawmilling processes the same relative percentages of wood volume as formerly.

I think it should be recorded that these studies, made years ago as well as recently, were at efficient representative Coastal mills and probably reflect a higher degree of output of green lumber in relation to intake of logs than would be found in the majority of mills.

Mill waste has one attribute in common with logging waste, apart from the fact that both were once part of growing trees: mill waste will be utilized if the end product justifies the cost. It is astonishing to observe on the Coast the degree to which mill waste is now being converted into usable and profitable products. It can be said that no region in North America can exceed the achievement of the industry in the Vancouver Forest District in the utilization of mill waste residues.

The advent of the hydraulic barker and chipper marked the beginning of this present expansion.

" Studies have shown that where a hemlock-mill is selecting mill waste and selling it as solid pulpwood, about 36 per cent of the total solid waste is suitable. Where a chipping plant was installed at the mill, 63 per cent of the solid waste could be converted to chips. This figure varies with factors such as size of log, sawing practices, and degree of remanufacture."*

Utilization of waste from mills forming part of an integrated operation, or located in areas close to consumer markets for chips, sawdust, and other waste products, is practically complete. This accomplishment has, for example, the net effect of increasing the gross return from the manufacture of pulp and hardboard (produced solely from mill residues) to the Canadian Forest Products Limited of about 19 per cent, equalling about $6,560,000 a year with a resultant " saving " of approximately the 85 mil-

* Source: Canada Department of Resources and Development, Forestry Branch Bulletin No. 109, 1953.

lion f.b.m. of logs a year which would have been required to produce this same amount of pulp and hardboard. This volume of wood is equivalent to one year's sustained-yield production from approximately 190,000 acres of forest land growing 450 board-feet per acre per year. This Company did not have enough mill waste left over to fire its boilers, and in consequence buys mill waste from other mills to burn as fuel supplementing electric power.

The Crown Zellerbach Ocean Falls pulp and paper mill uses chips to supply about 20 per cent of its wood consumption. These chips are transported by barge to the mill from the Company's chipping plants on the Lower Mainland, a distance of about 400 miles. This is said to be the longest haul of such material in North America.

The pulp and paper industry in this Province in 1955 consumed about 1,227 million f.b.m. of wood. Mill waste accounted for 306 million feet of this total, or 25 per cent. This " waste " is equivalent to the annual sustained-yield production from approximately 680,000 acres of average Coastal forest land, growing about 450 board-feet per acre per year, and is an amount of wood closely approaching 10 per cent of the Coast annual cuts. Approximately 85 to 90 per cent of the sulphate pulp now produced in British Columbia is made from what was formerly wasted wood in the form of sawmill residue.

It seems probable every large or medium-size sawmill in British Columbia will be producing chips in the near future.

In addition to the production of chips, mill residues are used or sold for fuel—both sawdust and solids—laths, shingle-bands, broom-handles, pressed logs, and building-boards. Sawdust and shavings have been found to be a means of enriching the soil and as a mulching material, as a basis for wood-flour used in the manufacture of linoleum, plastics, and explosives, and as a mix with cement for various purposes. Potential uses include by-products of wood distillation or fermentation, not yet fully developed or explored in this Province.

An odd and indirect effect of the increased use of mill resources for pulp-chips has caused a very real fuel shortage in Victoria and Vancouver.

Further research is indicated in order that cedar mill waste might be used in greater quantities than now for pulp and other products. The "Bouffé" nitric acid pulping process developed by J. X. Desforges could be an important step in this direction if actual operating experience proves practical and profitable.

The utilization of mill waste can be rated in relation to the distance of the mill from areas of consumer demand. The percentage volume of utilized waste decreases as the distance increases.

In the Interior of the Province most sawmill waste is burned. Many factors contribute to this lamentable situation.

The actual production of waste is higher than on the Coast, due in part to the large number of portable and semi-portable mills now operating, many with unskilled labour, resulting in inaccurate sawing and edging. Then, too, logs are generally smaller in size, and the larger the log the lower the percentage of waste. The following table is illustrative of this:—

TABLE 108

CUBIC VOLUME OF LUMBER, SOLID RESIDUE, AND SAWDUST EXPRESSED AS A PERCENTAGE OF THE CUBIC LOG VOLUME FOR LOGS OF THE FOLLOWING DIAMETERS.

Diameter (Inches)	Percentages of Log Volume		
	Lumber Volume	Residue	
		Solid	Sawdust
6	46	34	20
7	47	33	20
8	48	32	20
9	50	30	20
10	53	28	19
11	55	26	19
12	57	24	19
13	59	23	18
14	61	21	18
15	62	20	18
16	63	19	18
17	63	19	18
18	64	18	18
19	64	18	18
20	64	18	18

It will be noted that the percentage of lumber recovered from 6-inch logs is 72 per cent of that recovered from 20-inch logs. The proportion of solid residue is higher for small logs than larger logs. The percentage of sawdust produced remains fairly constant.

It takes about ten to twelve logs in the Interior, as compared with two to three on the Coast, to produce 1,000 f.b.m. of lumber.

Two studies have been made by Mr. C. F. McBride in recent years of sawmill residues in the Interior. One relates to mills in the Prince George area, and the other to mills in the Southern Interior.

The following tables are for the Prince George area:—

TABLE 109

VOLUME OF SOLID RESIDUE PER M F.B.M. LOG-SCALE

Mills Cutting More than 20 M F.B.M. per Eight Hours

Mill No.	Slabwood		Edgings		Trimmings		Total		
	Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Cords	Per Cent
4	13.6	7.5	18.4	10 2	8.7	4.8	40.7	0.54	22.5
7	9.5	5.5	19.1	10.8	5.7	3.3	34.3	0.46	19.6
8	15.5	9.2	18.2	10.9	5.3	3.1	38.9	0.52	23.2
9	10.4	6.1	18.7	10.9	4.0	2.3	33.1	0.44	19.3
11	12.4	6.9	19.3	10.8	2.8	1.6	34.5	0.46	19.3
Averages	12.3	7.1	18.7	10.7	5.3	3.0	36.3	0.48	20.8

Mills Cutting 20 M F.B.M. and Less per Eight Hours

1	22.4	11.5	21.3	11.0	2.7	1.4	46.4	0.62	23.9
2	11.7	6.2	19.7	10.5	5.0	2.7	36.4	0.49	19.4
3	20.0	10.9	27.3	14.8	6.1	3.3	53.4	0.71	29.0
5	11.9	7.2	16.3	9.9	3.4	2.1	31.6	0.42	19.2
6	20.2	10.7	21.2	11.1	2.2	1.2	43.5	0.58	23.0
10	17.6	9.4	21.9	11.6	6.1	3.2	45.6	0.61	24.2
12	18.4	9.9	21.6	11.5	2.3	1.2	42.3	0.57	22.6
Averages	17.4	9.4	21.3	11.5	4.0	2.1	42.7	0.57	23.0
Averages of all mills	15.3	8.4	20.2	11.2	4.5	2.5	40.1	0.54	22.1

TABLE 110

VOLUME OF SAWDUST PRODUCED PER M F.B.M. LOG-SCALE

Mills Cutting More than 20 M F.B.M. per Eight Hours

Mill No.	Headsaw		Edger		Trim-saws		Total		
	Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Per Cent	Cu. Ft.	Units	Per Cent
4	32.0	17.6	6.5	3.6	0.2	0.1	38.7	0.48	21.3
7	19.0	10.7	4.6	2.5	0.2	0.1	23.8	0.29	13.3
8	26.1	15.5	4.1	2.4	0.2	0.1	30.4	0.38	18.0
9	31.0	17.4	4.7	2.6	0.2	0.1	35.9	0.45	20.1
11	29.9	16.8	7.2	4.1	0.2	0.1	37.3	0.46	21.0
Averages	27.6	15.6	5.4	3.0	0.2	0.1	33.2	0.41	18.7

Mills Cutting 20 M F.B.M. and Less per Eight Hours

1	30.5	16.4	8.8	4.7	0.3	0.2	39.6	0.49	21.3
2	23.3	12.6	5.9	3.2	0.2	0.1	29.4	0.36	15.9
3	28.1	15.4	5.8	3.2	0.2	0.1	34.1	0.42	18.7
5	25.5	15.5	4.1	2.5	0.1	0.1	29.7	0.37	18.1
6	28.0	14.9	6.3	3.4	0.2	0.1	34.5	0.43	18.4
10	26.1	13.7	7.2	3.7	0.2	0.1	33.5	0.42	17.5
12	21.6	11.5	7.3	3.9	0.2	0.1	29.1	0.36	15.5
Averages	26.1	14.3	6.5	3.5	0.2	0.1	32.8	0.41	17.9
Averages of all mills	26.8	14.9	6.0	3.3	0.2	0.1	33.0	0.41	18.3

NOTE.—In mills with a cant gang the sawdust was included under headsaw sawdust.

Planing-mill losses are approximately 30 per cent of the green lumber.

The volume of sawmill residues produced in the Prince George Forest District in 1950 was estimated at approximately 155 million f.b.m. Solid residues used for boiler-fuel in steam plants are excluded from this total, and if included would increase this estimate.

The following tables relate to mills in the Southern Interior:—

TABLE 111

SOLID RESIDUE

(Percentage of net log-scale.)

	Slabs	Edging	Trim	Total
	11.7	7.6	3.7	23.0
	7.4	6.1	3.2	16.7
	8.5	3.7	3.5	15.7
	8.5	3.8	1.6	13.9
	6.6	5.7	1.5	13.8
Averages	8.5	5.4	2.7	16.6

TABLE 112

SAWDUST

(Percentage of net log-scale.)

	Headsaw	Gang	Edger	Trimmer	Total
	20.2	.....	2.5	0.1	22.8[1]
	5.2	7.0	1.6	0.1	13.9[2]
	6.9	7.1	1.7	0.2	15.9[1]
	12.0	7.5	1.2	0.1	20.8[1]
	18.1	.....	3.8	0.1	22.0[1]
Averages..	14.6	4.3	2.1	0.1	19.1

[1] Circular. [2] Band.

British Columbia log-scale, 4.3 per cent; cubic scale, 5.5 per cent.

In combination the foregoing tables may be summarized in the following form on the same comparative basis, although not weighted:—

Sawmills	Sawdust	Slabs	Edgings	Trim	Total	Rough Green Lumber
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Coast	17.2	3.9	6.5	5.5	33.1	66.9
Northern Interior	18.3	8.4	11.2	2.5	40.4	59.6
Southern Interior	19.1	8.5	5.4	2.7	35.7	64.3

From these average figures and after allowance for defect and shrinkage, Mr. C. F. McBride prepared an estimate of the volume of a log that finally is made into finished lumber in the Southern Interior mills.

The shrinkage factor is not always taken into account but is a legitimate loss because the sawyer has to allow for it when cutting a piece of lumber. The estimate is as follows:—

TABLE 113

LOSSES FROM LOG TO FINISHED DRY LUMBER

	Cu. Ft.
Gross log volume	100.0
Defect (average), 5 per cent	5.0
Net log volume	95.0
Sawdust, 19.1 per cent, and solid waste, 16.6 per cent ..... $.95 \times 35.7 =$	33.9
Green-lumber volume	61.1
Shrinkage, 6 per cent	3.7
Gross dry-lumber volume (rough)	57.4
Planer-mill trims, 2.5 per cent	1.4
Net dry-lumber volume (rough)	56.0
Planer shavings, 26 per cent	14.5
Net volume of finished lumber	41.5

The end production of lumber in terms of relative percentage of log volumes processed, while probably not ideal, is close to the experience of other lumber-producing countries.

A recent study of Swedish sawmills based on the lumber recovered from logs 15 feet in length and with a top diameter of 8 inches, which is the average log in that country and corresponds to our Interior log, showed a deduction of 34 per cent for slab, edgings, and trim, and for sawdust, 13 per cent in one mill group and 19 per cent in another. Turning back to Table 108 we see that for a log with a diameter of 8 inches our solid residues amount to 32 per cent and sawdust 20 per cent, leaving us a recoverable volume of 48 per cent as against the Swedish figure of 47 or 53 per cent, depending upon what sawdust deduction is selected, i.e., either the 13 or 19 per cent.

It might be noted also from Table 108 that when the largest-size logs encountered (20 inches) were processed, the recoveries were very close to Coast figures.

The Interior problem is to find a profitable outlet for the mill residues.

On the Coast, because of the larger-size logs and generally better technical equipment, together with the high degree of waste utilization, it would, I think, be a fair statement to say that between 80 and 90 per cent of the volume of the Coastal log is utilized in some form or another.

In the Interior it is my opinion that on the average only 40 to 50 per cent of the volume of the Interior log is so utilized. The rest is unproductive waste.

It follows that utilization of mill residues in the Interior is not within hailing distance of that of the Coast.

Some sawdust and solid residues are sold for domestic use and some used as fuel for steam-operated mills. Most of it is, however, burned or left in the woods in the form of slabs and edgings, due to the fact that many small portable and semi-portable mills are powered by gasoline-motors. This type of waste is, in total volume, distressing to those who are interested in our forest economy. The following photographs are illustrative of what is a common sight in various sections of the Interior.

The advent of pulp-mills in the Interior and integrated operations will bring the answer to this problem. Short of chipping mill waste by custom chippers and transporting it to the Coast by truck or rail, which may or may not be practical, there is not, as far as I know, any other answer, unless, of course, some new development in the field of wood chemistry creates the demand for this material.

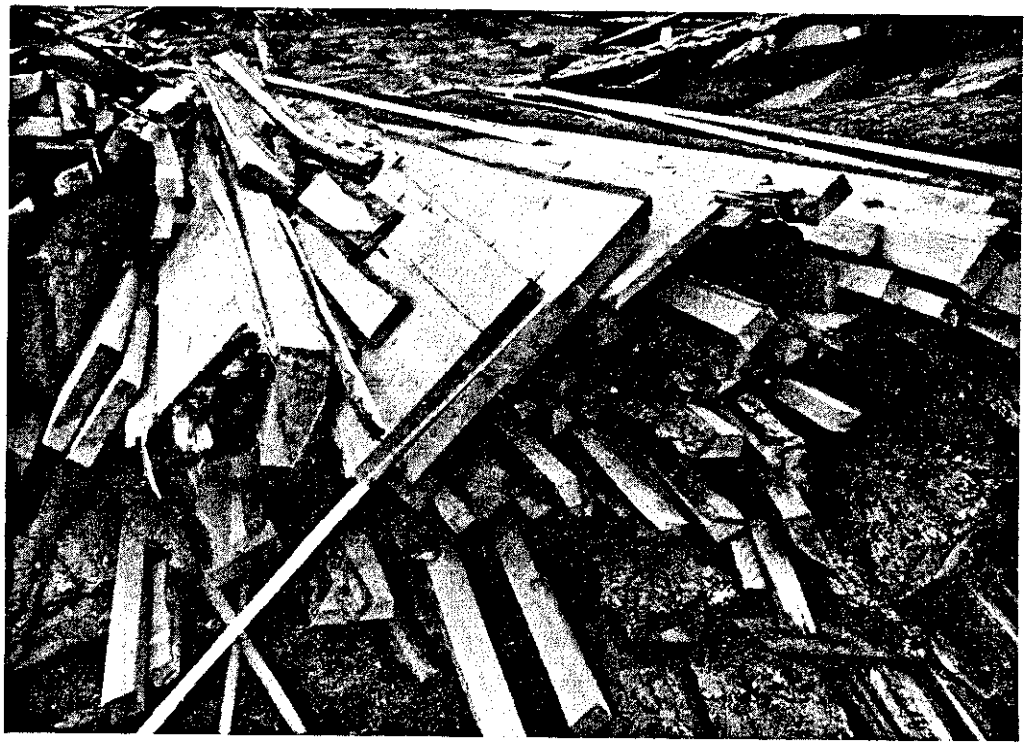
I use the expression " custom chipper " because the cost of a barker and chipper may run into many hundreds of thousands of dollars and be beyond the means of any one Interior sawmill.

Whether it would pay a Coast pulp company to erect a chipping plant in a strategic area in the Interior and transport the chips to its mill I do

FIG. IX

WASTE BY PORTABLE MILLS IN THE INTERIOR





not know. Freight rates would undoubtedly tend to encourage or discourage such a venture and, as I said above, this specific aspect of the problem merits further consideration.

I said in 1945 that I thought portable mills should be licensed to compel the operators to conform to a reasonable standard of efficiency when cutting Crown timber. I still think so.

SHINGLE-MILL WASTE

Shingles are made from western red cedar, a major timber species, and at this juncture I propose to look solely at the cedar waste from those mills.

Losses from sawdust, spaults, trims, slabs, and other deductions from volume due to manufacturing processes amount to about 63 per cent. In other words, for every 100 cubic feet of cedar processed, 37 cubic feet emerges in the form of shingles and the rest, or 63 cubic feet, is waste.

Converting cubic feet into pounds, we discover that for every square of 16-inch shingles, a minimum of 452 pounds of cedar is wasted in one form or another. If cutting 18-inch and 24-inch shingles, the waste will be higher.

In 1955 the shingle industry produced about 2,500,000 squares from approximately 300,000,000 feet of cedar logs. On the basis of the above figures, we can estimate that in 1955 alone about 189 million feet or close to 560,000 tons of cedar were wasted.

Cedar waste can be utilized for pulp in some degrees in the sulphate or kraft process, but its yield of about 30 per cent of that of Douglas fir, coupled with digester corrosion caused by the thujaplicins and water-soluble phenols in its composition, militates against its use for this purpose.

The corrosion problem can be overcome by the use of digesters lined with carbon brick or stainless steel, or by extracting the corrosion-causing chemicals from the chips before they are fed into the digester. It may be that the end value of the extracted chemicals will make up the extra cost occasioned by the relatively low pulp yield. Then, too, new and cheaper pulping processes may in time be developed. The amount of waste from shingle-mill operation is, as one witness in the shingle industry said, "terrific." I am sure that every channel is being explored in order to improve milling techniques and to discover profitable end uses for shingle-mill residues in order to minimize as far as possible the present appalling waste.

CHIPS

As I have mentioned, one of the most striking developments in this Province during the last decade has been the tremendous expansion in the utilization of chips by pulp and paper producers from sawmill residuals and small salvaged logs previously regarded as waste. While the conversion into chips of thinnings, long tops, logs too small or otherwise not

suitable for lumber, and other material from logging left-overs is of considerable moment, this development in closer utilization is overshadowed by the spectacular rise in the use of chipped sawmill residuals for pulp production.

It was the early demand as far back as 1930 from American pulp companies in the Puget Sound area for our waste wood in the form of slabs and box ends that was the small beginning of the present development.

The Puget Sound Pulp and Timber Company at Bellingham was a pioneer in this field, and from 1930 to 1947 purchased sawmill waste wood from British Columbia to the total value of $843,000.

In 1948 to the end of 1955 the same company purchased from British Columbia sawmills 534,078 units of chips made from mill waste and valued at $9,185,374. Towing costs paid to Canadian companies amounted to $1,338,962, adding $6.60 to every ton of pulp produced from these chips.

I may interject here to say that a unit of chips, gravity packed, has a gross cubic content of 200 cubic feet. The average volume of solid wood per unit is 72 cubic feet, using 2.8 as a conversion factor, subject, of course, to considerable variation due to differing manufacturing processes.

Chips are made by wood being brought into contact with blades attached to a disk spinning at a high speed. The wood is usually in one of three forms—i.e., whole logs; material salvaged from logging operations such as small logs, long tops, chunks, and such like; and sawmill residuals usually in the form of slabs and edgings. Except for the whole logs, the remainder of the material chipped was formerly left in the woods or burned as valueless waste.

Chip recovery from whole logs is a fairly constant factor, averaging about 2.5 units of chips for each 1,000 f.b.m. of logs scaled. Recovery from logging left-overs and sawmill residuals has a wider range, dependent upon species, size, and quality of small logs and culls in terms of defect, plus variations in mill practices and other variables. As a basis suitable for a rough estimation, it can be said that for every 1,000 feet of logs sawn the average recovery of chips from the "fall down" runs to between 0.5 to 0.7 of a unit. On the basis of the established and averaged percentage of logging waste recoverable from each 1,000 feet logged on the Coast, it would appear that the chip recovery from this material is approximately the same—i.e., about 0.5 of a unit for each 1,000 board-feet logged. This is, of course, merely a rough estimate and is also subject to the influence of fluctuating factors. Generally speaking, it requires 2.35 units of chips to produce 1 ton of pulp.

Chips cannot be ground and in consequence cannot be used to produce newsprint. Mills producing newsprint can and do, however, use a considerable amount of logging left-overs in the ground-wood process.

I have already recognized the utilization of chips as an important measure in forest conservation and at the moment wish to relate my comments more to the economics involved in this development.

There is no doubt that the continuing demand for chips by pulp companies has led to their increased production by sawmills, integrated or independent, from residuals. In this field this Province is leading the procession. The installation of hydraulic barkers and chippers is, however, still an expensive business, and independent sawmill operators are in consequence, in many instances, assisted financially by pulp companies to enable them to install this equipment. This in turn assures the pulp companies both here and in the Puget Sound area of a continuity of chip-supply. It is estimated that about $10,000,000 has been spent to install chipping plants and equipment in British Columbia sawmills. Only one independent sawmill has installed a whole-log chipper and uses this to chip logs too small for sawing into lumber. The usual type of installation in non-integrated sawmills is designed to chip slabs, edgings, trim, and such like.

An approximate calculation estimates our total chip production in this Province at a figure in excess of 1,200,000 units per year, the equivalent of 480 million board-feet. This production is valued at about $20,000,000 a year, and that proportion of it produced by many of the smaller Coast mills is of very real financial consequence to them.

Utilization of vast quantities of previously unused wood as chips is bringing these substantial benefits to British Columbia's economy:—

(*a*) Creation of important sources of new income for sawmill and plywood-mill operators:

(*b*) Development of new jobs for British Columbia labour in the operation of chipping-plant equipment and the transport of chips:

(*c*) Stimulation of new pulp-mill construction and the expansion of existing pulp-manufacturing facilities:

(*d*) A substantial reduction in the ratio of pulpwood cut in proportion to the increasing pulp and paper production of the Province.

Because of the continuing interest of American pulp-mills in acquiring chips from us and the financial encouragement they have extended to our sawmills in an endeavour to maintain this source of supply, we are now, as a result, producing more chips from independent sawmills than we can use in our own pulp-mills. The surplus is exported to those American pulp-mills financing the over-production. We export about 36,000 units of chips a month, most, if not all, of which are produced by independent sawmills from sawmill residuals in which hemlock predominates. This export has a marked beneficial effect on our economy in that, while not depriving us of anything except what was formerly regarded as waste, it keeps a number of sawmills in profitable operation and incidentally brings in a substantial revenue to our tow-boat operators. A good market for chips also helps indirectly to increase the price of hemlock logs, with higher resultant

revenue to the Crown for stumpage. The increase in price of hemlock because of a growing demand for this species has resulted in narrowing the spread between log prices and selling price for finished lumber to such an extent that many mills could not recover production costs were it not for the profitable sale of chips from the hemlock waste. Hemlock chips bring a higher price than fir chips because of their wider range of use in the production of pulp. How far stumpage should reflect the profit recovered from utilization of waste in another subject to be covered later.

The following figures showing total average monthly consumption in British Columbia pulp-mills of chips (*a*) purchased from independent sawmills, (*b*) supplied from integrated sawmills, and (*c*) from whole logs are, I believe, reasonably accurate:—

	Units
MacMillan & Bloedel, Harmac	31,500
MacMillan & Bloedel, Port Alberni	13,000
Canadian Forest Products, Howe Sound	12,500
Crown Zellerbach	6,000
Powell River Company	1,600
Total	64,600

Chips purchased from independent sawmills and consumed in British Columbia total, on the average, 14,400 units a month, made up as follows:—

	Units
MacMillan & Bloedel	8,000
Canadian Forest Products	4,800
Powell River Company	1,600
Total	14,400

We export about 36,350 units a month. Two companies, Crown Zellerbach, and Puget Sound Pulp and Timber Company, take 23,800 and 12,550 units respectively.

Independent sawmills contribute 31,000 units to this total exported, Crown Zellerbach and Puget Sound Pulp and Timber Company purchasing from these suppliers 20,000 and 11,000 units respectively. It can be seen from these figures that the American consumer buys over twice as many chips from our independent sawmills as do our local pulp-mills—14,400 as against 31,000 units.

The following table, showing a species breakdown of chips purchased from independent sawmills, may be of interest:—

TABLE 114

CHIP PURCHASES BY PULP-MILLS FROM INDEPENDENT SAWMILLS, PER MONTH

	Totals	Breakdown of Species		
		Fir	Hemlock	Cedar
Exported				
Crown Zellerbach	20,000	12,000	4,000	4,000
Puget Sound Pulp and Timber Co.	11,000	.....	11,000	.....
	31,000			
Home Consumption				
MacMillan & Bloedel	8,000	6,000	2,000	.....
Powell River Co.	1,600	.....	1,600	.....
Canadian Forest Products	4,800	1,440	2,160	1,200
	14,400			
	45,400	19,440	20,760	5,200

Were we to cut off the export of chips—assuming the power to do so—the addition of 31,000 units a month to a market now purchasing only 14,400 units would, while operating to the benefit of the few British Columbia pulp companies who buy chips, create an unsaleable surplus and, by driving the price down, cause great and unnecessary financial distress to a number of smaller Coast sawmills whose chip production for our own and the export market means the difference to them between operating at a profit instead of at a loss.

I do not foresee any reasonable possibility of a future shortage of chips for our own pulp-mills now in operation or projected. There are still many sawmills within an economic radius of pulp-producing plants which could, with some financial assistance, install a barker and chipper and thus add to the present flow of chips from sawmill residuals. This potential supply has been estimated at an additional 20,000 units a month. The development in time of practical light and cheap portable barking and chipping units will make available yet untouched forest material suitable for chipping, including logging left-overs, thinnings, and such like. If, however, a shortage of chips for local consumption does develop, the question of prohibiting the export of chips will become more acute. It is a subject not free from legalistic difficulties.

EXPORT OF CHIPS

This question involves the validity and interpretation of several sections of the "Forest Act," but before examining these sections it would, I think, be desirable to consider briefly the export situation in a broad sense, and in that regard I do not believe I can add anything useful to what I wrote in the 1945 Report, which follows (in part):—*

* Pp. 98, 99.

"An examination of the various forms of forest tenures has disclosed that logs cut from some areas are exportable without permit, while the log production from other areas cannot be exported without approval of the Lieutenant-Governor in Council. This result is a consequence of the division of legislative powers between the Dominion and Provincial Governments under the terms of the 'British North America Act.'

"Matters of international trade and commerce, such as exports, are assigned exclusively to the Dominion Parliament, and this Province has no jurisdiction to enact any statutory provisions forbidding the export of goods from this Province. This Province can, however, impose terms and conditions upon purchasers of Crown timber. In some instances it has, in its contracts, imposed terms preventing the export of logs cut thereunder unless by consent of the Lieutenant-Governor in Council. In others—for example, Crown grants prior to April, 1887—the Crown did not insert therein any provisions restrictive of export. In consequence, the Government of this Province, not having any contractual restrictive control over the log production from such areas, and not having the legislative power to prohibit or restrict export by statute, cannot interfere with the export of logs from these areas within this classification. That control, then, lies solely within the competence of the Federal Government.

"It has sometimes been said that the areas from which the Provincial Government is powerless to prevent the export of logs have an 'export privilege.' This is a misnomer. It is not a 'privilege.' The right to export arises from an absence of either contractual or legislative jurisdiction to regulate this activity.

"The control over the export of logs from areas covered by restrictive forms of tenure is vested in the Lieutenant-Governor in Council who must approve of all export shipments from these areas. The Lieutenant-Governor in Council is advised in these matters by an Export Advisory Committee. . . ."

The first statutory provision to be considered is the present section 89 of the "Forest Act," reading as follows:—

"All timber cut on Crown lands, or on lands granted after the twelfth day of March, 1906, or on lands held under pre-emption record, shall be used in the Province, or be manufactured in the Province into boards, deal, joists, laths, shingles, or other sawn lumber, or into woodpulp or paper, except as hereinafter provided; and all logging and manufacturing camps or premises used or occupied for any purpose of or in connection with the cutting or manufacture of such timber shall be located in the Province."

This section might be an expression of policy by the Crown as owner of timber lands and effective as a consequential provision to be written into

contracts for sale of Crown timber, or it may be considered as an endeavour to legislate in relation to the export of goods to a foreign market and thus be regarded as legislation in relation to international trade and commerce.

Then, too, the question may be asked whether chips can be exported as a manufactured product within the meaning of this section. If not, we must then turn to section 92, which reads as follows:—

> " The Lieutenant-Governor in Council may, on such terms and conditions and upon payment of such charges as may be imposed by him, authorize the export of piles, poles, railway-ties, crib-timber, and other minor forest products cut on Crown lands, or lands held under pre-emption entry and record, or lands granted after the twelfth day of March, 1906, or lands included in a forest management licence. . . ."

The point for consideration under this section is whether or not chips are " a minor forest product " for which an export permit may be granted.

It is clear from the evidence that the Forest Service recognizes a distinction between chips manufactured from whole logs and those from sawmill waste. It has also been established that the only chips presently being exported are those manufactured from sawmill waste. I asked Dr. Orchard about the effect of this distinction and my question and his answer follow:—*

> " Q.—Does the Department make any distinction between permits for exporting chips from whole logs and chips from mill waste or are they treated alike? A.—We have not insisted on a permit for chips from mill waste unless they came and asked us about it, which they have in one or two cases. If we found a chipping mill exporting chips from whole-log chips, we would crack down on them and see that they got a permit or ceased to export or something. The mill that is making chips out of mill waste, we haven't so far sought to interfere with."

It would appear that the " Forest Act " in this connection requires amendment in order to clarify with more precise definition what chips are exportable and what are not, provided, of course, that *intra vires* legislation can be devised to effectuate this purpose.

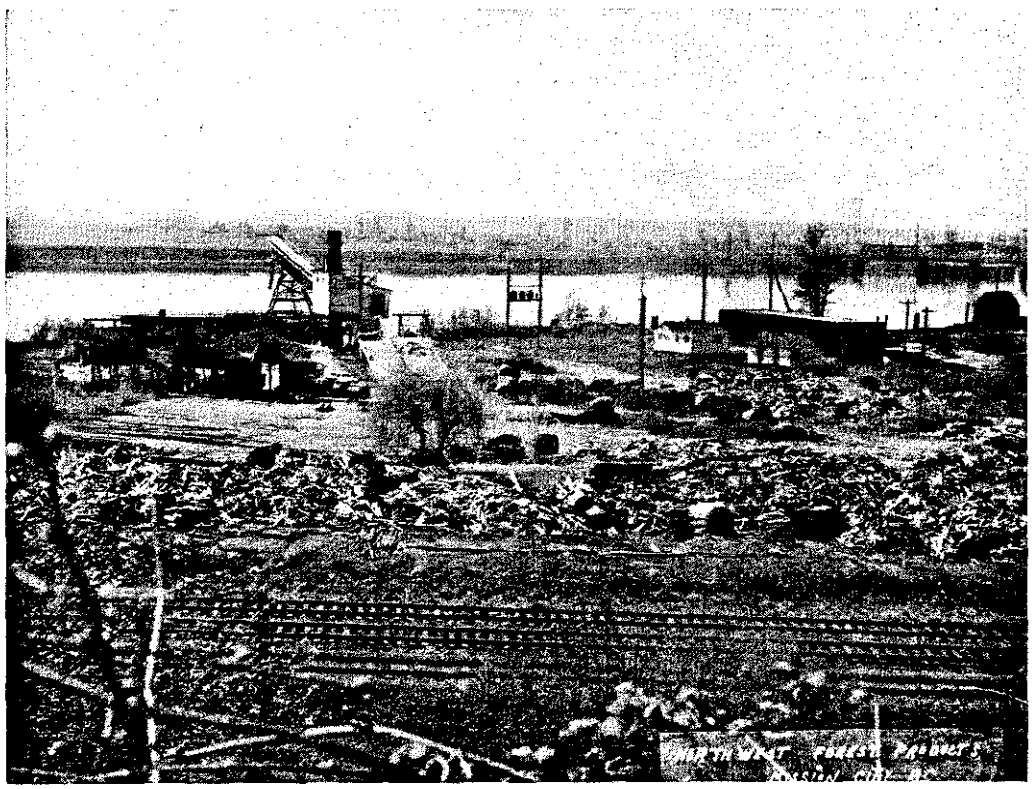
Apart from all the difficult constitutional questions that are implicit in any legal problems that may arise in connection with the export of chips—none of which are before me for decision as Royal Commissioner—and looking at the situation as a matter of policy only, it is my considered view that the export of surplus chips should continue without interruption. Should the day arrive when our total chip production can be consumed by our pulp-mills, the Forest Service may then, if the public interest demands, exercise such powers of restraint of export as they may legally possess.

* *See* p. 15616.

Before leaving the subject I would like to record an interesting development, and one which will, I believe, in extension, prove of very real value to smaller mills not able to finance by loan or otherwise the installation of a barker and chipper. I refer to a custom chipper installation at Mission on the Fraser River owned and operated by Northwest Forest Products. This plant is equipped to de-bark and chip slabs, smaller cull logs, cordwood, and sawmill waste trucked to the plant by small operators. The greater percentage of the chips are produced from sawmill residue. As far as I am aware, this is the only custom chipper plant in the Province, and for that reason a photograph of this installation may be of interest.

FIG. X

CUSTOM CHIPPER, NORTHWEST FOREST PRODUCTS



FUTURE TRENDS AFFECTING POLICIES

During the hearings of the Commission, a number of witnesses contended that forest policies must not be tailored solely to the compulsive forces then immediately operating in our forest economy, but must be alive to future potentialities and designed to meet changes that are likely to occur in world economics. I am in complete accord with this contention. The difficulty lies in attempting to forecast to any reasonably accurate degree just what changes may be expected in the next ninety years, the average period of one rotation on the Coast.

Mr. H. R. MacMillan, in presenting a brief on behalf of MacMillan & Bloedel Limited, made an interesting compilation to demonstrate what changes have occured in the last ninety years. He said:—

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

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

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

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

"The population of Canada has grown from 3½ million to 15½ million, and that of British Columbia from 30,000 to 1,500,000.

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

"Income taxes have come to Canada.

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

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

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

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

"China has driven out the foreigner and gone Communist.

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

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

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

I, for one, do not feel competent to predict the structure of our economy, and the part our forest industry will play in it, ninety years from now, in A.D. 2046, nor do I consider a projection to that period necessarily essential to the present formulation of our future forest policies. We are, as I have said before, in a period of transition from one forestry concept to another. Many years will elapse—probably closer to 200 than 90—before we can expect our forests to approach, closely, the ideal of a so-called normal forest, with its age-classes properly balanced and distributed geographically and by species, so that sustained-yield production in its fullest sense may be assured.

It seems to me our progress toward that distant goal should be a step-by-step process—a method of trial and error if you like—with a pause every decade to look back and evaluate what has been accomplished during that period.

It is my view that consideration of our forest policies and their formulation should be predicated upon the projection of present trends, as far as it is reasonably possible to forecast these in a secular sense, up to but not much beyond 1966.

At that time another Royal Commission could assist in charting the course ahead for the next decade.

We are surmounting the first forest management hurdle, and while there are present obstacles to overcome and many problems will yet arise for solution, we can nevertheless now move ahead in this field with confidence supported by the knowledge that while our basic forestry objectives will remain constant, the means to those ends may be adjusted and modified every ten years or so to meet the evolutionary changes and advances that are bound to occur in our future economy and forest industry.

A desirable degree of administrative flexibility, when properly exercised in the intervening years, could, in itself, avert or minimize any unforeseen

* Exhibit 206, p. 23.

and detrimental consequences that might arise from the projection of our present concepts into the unknown years ahead.

There is a fundamental fact basic to our planning and one which I am certain will be just as vital in 1966 as it is to-day, if not more so. Expressed briefly it is this: We live by our exports. We must sell on world markets in order to survive. Our forest policies must in consequence be geared to the stark necessity of assisting our industries in every reasonable way to remain competitive in these markets. It is, in consequence, essential for us to take a long look out of our windows to see what is transpiring in other parts of the world and to adjust our perspective according to what we see.

UNITED STATES

In Europe the use of lumber has been stabilized for a long period around 230 board feet *per capita*. This is about one half the rate of consumption used in North America. In the building trades in Europe brick and stone and other non-metallic minerals have competed successfully with lumber in the building of houses, factories and such like. In North America around 1900 the consumption of lumber was about 1,000 board-feet *per capita*. The great building boom to house the people of America in buildings made of lumber from 1850 onwards took them out of log and square timber construction into frame houses. After 1900 the decline in the use of lumber in the U.S.A. began and has continued steadily until today the *per capita* use of lumber is just one half of what it was fifty years ago. In recent years we have witnessed the greatest building boom since 1900 but the total lumber used is just about equal to what it was in 1900 when the population of the U.S.A. was half its present number. In certain lines of structures, such as multi-story office buildings and factories, apartment buildings (*et al.*), the use of lumber in construction has practically disappeared. In housing, construction lumber is fighting a losing battle with substitutes made up from non-metallic minerals and minerals. These substitutes are generally cheaper and in most cases better suited to their purpose than lumber. With the high cost of labour in the building trades, lumber is at a disadvantage compared to many of its competitors. Also the cost of labour in maintenance of wooden buildings is higher than with non-metallic minerals or minerals. In many cases only those who can afford to pay for a high priced home can afford to use lumber for floors, outside trim, roofing, and so on. Architectural changes, such as the trend toward one story dwellings, the use of cement slabs for foundations and interior tiling—to mention a few—are also responsible for a decline in the consumption of lumber for house construction in the United States.* From 1920 to 1953 the board foot usage of lumber in dwelling construction dropped 44 per cent per unit.†

* From the brief submitted by Mr. A. W. Bentley.

† For an interesting and informative analysis *see* the report of the Stanford Research Institute, "America's Demand for Wood, 1929–1975," prepared for the Weyerhaeuser Timber Company.

While it is more than likely the use of lumber in North America will continue to decline on a *per capita* basis, the tremendous and steady expansion in population should act as an offsetting factor and the demand for lumber should remain at fairly constant levels for some time to come. It is startling to be reminded that the world population has doubled in the last 100 years. By applying the ordinary principles of geometric progression, it is manifest world population is increasing at an explosive rate and should double again in the next *fifty* years.

Products of the pulp and paper industry differ in use in marked degree from lumber. Lumber generally goes into a fixed position and remains for some years. Pulp and paper products are generally used once and thrown away and then replaced. In some uses this occurs several times a day. This simple fact explains in great part the present-day booming market for paper in United States, Canada and Great Britain, with a *per capita* annual consumption of 384,280 and 161 pounds respectively. France uses 85 pounds on this basis and Spain 20 pounds. The hundreds of millions of people in India and Asia consume only about 2 pounds per person per year. If and when the standard of living of these people is raised, even slightly, an enormous demand for paper products would result well beyond the present world supply.

As the market for our lumber in the United Kingdom has declined due to the stringent credit regulations of that country and because the high and ever-ascending freight and ocean rates render our competitive situation there difficult, we must become increasingly dependent upon the American market, which in turn is approaching each year closer to that point at which any considerable degree of our exports will not be required in their economy. At the present time their immediate demand is also being curtailed by increasing credit restrictions affecting house construction. The discount of the American dollar is also influencing prices, and freighting costs on lumber moving from this Province via the Panama Canal to the Atlantic seaboard, higher than those paid by Washington and Oregon shippers, are operating to our disadvantage.

These inhibiting factors are due, however, to circumstances extraneous to the Forest Industry, and I do not consider them anything more than of oblique importance when we are endeavouring to measure our forest resource and its long-term future against the similar resources of those areas to which we have been suppliers for many years. These factors are, of course, like other world economic conditions, of direct effect upon our competitive position in a financial sense.

The United States as a whole is producing annually about 4 billion board-feet more wood than its total annual consumption, including losses due to insect pests, natural mortality, and other depletory agencies.

Coming closer to home, it appears that Washington, Oregon, and Northern California Coast regions contain about four times as much tim-

ber and about ten times more Douglas fir than the Coast region of British Columbia.

The 1954 Washington production was valued at $790,823,000, which sum does not include value of poles and piling, wooden boxes and furniture, cooperage, and such like items. This total is arrived at as follows:—

		Production	Value
Lumber—			
Douglas fir region	M bd.-ft.	2,313,000	$167,020,000
Ponderosa pine region	„	837,500	65,500,000
Plywood	M sq. ft.	1,330,973	123,100,000
Shingles	squares	2,245,000	20,200,000
Fir doors	No.	2,232,633	10,828,000
Pulp	tons	2,377,000	297,125,000
Paper and paper board	„	1,170,000	99,450,000
Hardboard	M sq. ft.	60,000	3,600,000
Christmas trees and greens			4,000,000
Total			$790,823,000

NOTE.—Subtracting the $65,500,000 worth of lumber produced in Eastern Washington, the approximate value of forest products in Western Washington was $725,323,000 in 1954.

The 1954 Oregon production was, on the same basis, valued at $975,-639,000. Particulars are as follows:—

		Production	Value
Lumber—			
Douglas fir region	M bd.-ft.	6,539,000	$472,180,000
Ponderosa pine region	„	1,622,383	133,000,000
Plywood	M sq. ft.	2,080,614	192,500,000
Shingles	squares	561,000	5,050,000
Fir doors	No.	1,269,795	6,159,000
Pulp	tons	722,000	90,250,000
Paper and paper board	„	647,000	55,000,000
Hardboard	M sq. ft.	350,000	20,000,000
Christmas trees and greens			1,500,000
Total			$975,639,000

NOTE.—Subtracting the $133,000,000 worth of lumber produced in Eastern Oregon, the approximate value of forest products in Western Oregon was $842,639,000.

Over 90 per cent of the lumber produced in the North-western United States is sold and consumed in the domestic market—the continental United States—on a demand and at prices more stable than is experienced by sellers dependent upon the vagaries of a foreign market. The Southern Pine States are the principal competitors of Oregon and Washington in the U.S. domestic market. They are better situated in relation to the major lumber-consuming centres in the Central and Eastern States and enjoy an advantage in freight rates. American lumber-producers in the Western States have sought, with apparent success, to preserve a reasonable rate differential in order to remain competitive. This effort led to the adoption of so-called " Hattiesburg to Chicago " formula. I merely draw attention to this subject in passing in order to indicate the kind of competition we have to face, and may later expect in more intensive manner, from Americans in selling our lumber in U.S. markets. It should also be remembered

that Washington and Oregon enjoy a cheaper water-borne rate than we do when shipping to Atlantic seaboard markets, amounting to about $12 a thousand f.b.m. I think it should also be noted that our forests are not of as high quality, have a slower growth rate, and cost more to log than those of Washington and Oregon generally because of our rougher topography.

Alaska is becoming an important area of pulp production. A pioneer mill at Ketchikan owned jointly by the American Viscose Corporation and the Puget Sound Pulp and Timber Company, with a production of about 400 tons a day, is now in operation. The United States Government has authorized the Ketchikan Pulp Company—the operating company—to write off 65 per cent of the cost of its plant within five years. Under U.S. income-tax laws, the Company has a period of years with which to offset past deficits against present earnings before it is subject to corporate income taxes. The 1955 net earnings, after providing for interest on a $36,000,000 bond issue and ordinary charges for depreciation, amounted to $1,429,081. After allowing for the extraordinary charges for the permitted depreciation, the Company reported a deficit of $3,735,521, which amount can be charged off against future earnings.

I would also mention that in August of 1955 the U.S. Forest Service and the Georgia Pacific Plywood Company entered into an agreement wherein the latter was given exclusive cutting rights to 7½ billion feet of timber, largely on tidewater in Alaska. The contract calls for the erection of a newsprint or pulp mill prior to 1961 which will use 100 million board-feet of timber annually. Timber stumpage rates are fixed until 1971, after which they will be adjusted upward or downward at intervals of five years. Spruce stumpage is set at $2.80 per thousand board-feet, hemlock and other species at $1.70 per thousand board-feet. Both prices include a reserve of 20 cents per thousand, which is to be spent by the Government for forest improvement on the second crop. The lessee has no obligations respecting regeneration. I do not know if the same encouraging income-tax formula enjoyed by the Ketchikan Company is also applicable to this development.

It is quite a jump from the Far North to the Deep South, but on this quick roving glance around the world the present and future potentialities of the Southern States* as competitors deserves serious attention. The expansion of production in those States over the last twenty-five years has been phenomenal, due to technological advances in the science of producing pulp suitable for making paper from the prevailing wood species of these States, chiefly the abundant southern pine (loblolly, slash, and longleaf). With this obstacle removed, other natural advantages come into play,

* E.g., Texas, Louisiana, Arkansas, Tennessee, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, West Virginia, and Florida.

such as a mild climate with long growing seasons producing merchantable trees in 40 years or less, year-round woods operations, and less costly plant construction and maintenance.

Excellent harbours along the Atlantic Ocean and Mexico coasts served by a network of highways and railways give ready access to markets. Natural gas, oil, and coal are readily available.

Untrained and unorganized labour was plentiful and available at relatively low wage rates until recent increases in minimum wage rates and other factors are forcing wages to higher levels. Lack of skilled labour and not an overabundance of water were and are continuing liabilities.

Many communities anxious to encourage the establishment of pulp-mills in their areas offered free plant-sites, tax exemptions ("a free tax ride" as one witness expressed it), and other inducements, including the contribution of capital sums at low and deferred interest rates in aid of plant construction.

As a result of this sensational combination of factors, there are now at least seventy-one pulp-mills in the Southern States which consumed, in 1954, about 16 million cords of wood and produced 14,108,000 tons of pulp, which was about 60 per cent of the total annual quantity of pulp produced in the entire United States. For sake of comparison, I might repeat here that our twelve mills consumed 1,180,000 cords of wood and produced about 1,287,000 tons of pulp in 1954. (The conversion factors may differ, but for this purpose these figures are, I think, sufficiently accurate.)

Consumption in the southern pine region is expected to rise in the spectacular projection shown on the following graph, upon which expected yield from plantations is also depicted.

It will be noted that in 1966 yield is expected to reach 30 million cords and consumption between 26 and 28 million cords. It will be interesting for the Royal Commission in that year to compare the projection with reality. Looking at this graph now is a startling experience!

Pulp and paper products from the South can be landed water-borne at Chicago and other eastern centres at costs ranging from $12 to $20 a ton less than it costs to land similar B.C. products at these same points.

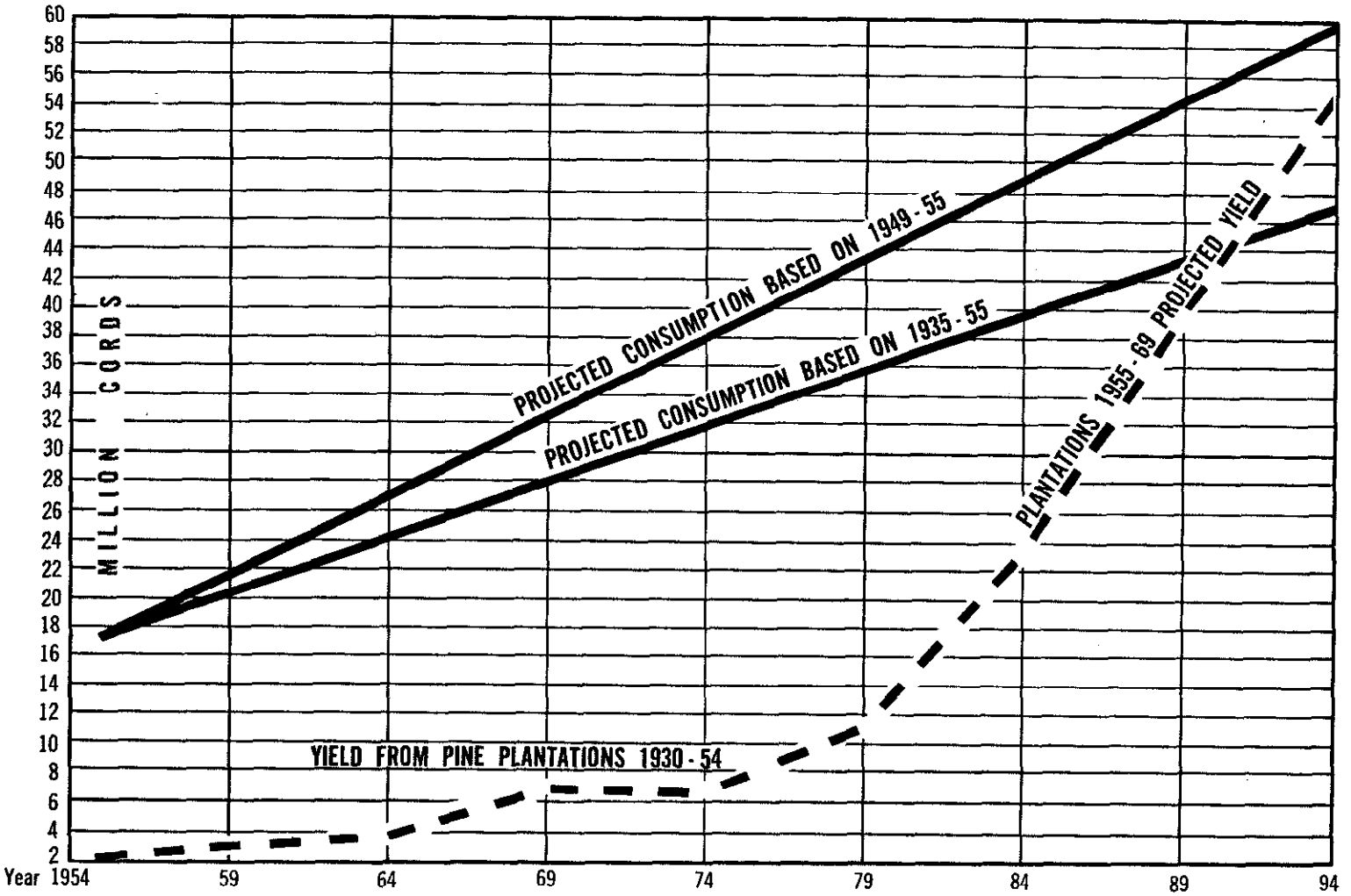
Every endeavour is being made to bring Southern productive land areas under sustained-yield management. Nurseries are producing in excess of 600 million seedlings a year.* On the over-all picture, Southern forests, largely due to intense efforts at reforestation, are now growing annually 25 per cent more wood than is being harvested.

Industry employs about 800 trained foresters, many of whom are fully occupied in assisting small-land owners who are growing trees as a crop and who supply about 70 per cent of the annual wood consumption of the Southern mills. Industry is, however, moving toward the concept of self-sufficiency, and to that end has purchased about 33 million acres of forest

* *See* section on Regeneration.

FIG. XI

PINE PULPWOOD, SOUTHERN REGION



land and leases an additional 1.5 million acres. Total productive forest land amounts to about 193,000,000 acres. Industry is also increasing the integration of its conversion operations with a diversification of products, improving its timber management programmes to minimize forest waste and to obtain maximum returns from its forest resources. The expansion in pulp production has led to a demand for mill residuals in the form of chips. More than 100 independent pine-mills are producing chips at the rate of approximately 600,000 cords a year, which amounts to approximately 720,000 units or about 60 per cent of our total Provincial production of chips. In relative terms it is not yet a very significant contribution when measured in terms of total and projected consumption. While pulp production soars, lumber cut from southern pine is facing serious competition from Douglas fir lumber supplied from Pacific Northwest mills and sold below the pine market. This situation is probably unique when considering the long haul and freight rates involved, but seems to be due in great part to the general decline in demand for lumber and the fact that Douglas fir lumber cut from large trees costs less per unit to produce and, in addition, can be shipped green.

I do not know if there is any significance to us in this development, which may be permanent as long as the emphasis is on growing and harvesting pine for pulp. There is nothing of a transitory nature in the present and future threat to our pulp and paper industry from the tremendous expansion of the competitive plants in the Southern States, backed as they are with unlimited capital and managerial experience contributed by some of the largest producers of this material in the world, including, I may add, the giant Eastern Canadian companies.

The use of hardwoods for pulping purposes in the Lake and northeastern sections of the United States has opened a new and vast area of a relatively cheap pulpwood-supply equal in quality for this purpose to our best softwood species.

GREAT BRITAIN

There is a large planting programme in Great Britain. Since the war, progress has been good. Older plantations are now producing thinnings to the extent that the first ground-wood pulp-mill to be built in the north of England is to be supplied from local wood. Most of the planted forest is being grown to provide future lumber reserves. As B.C. fir and spruce grow better in England than on our west coast, the eventual effect of this planting programme will be reduced imports of lumber and pulp from other countries.

In England our forest products and those of the Scandinavian and other countries meet in competition. Outside of the United States it is the largest export market for B.C. forest products, but we have to overcome the handicap of high ocean freight rates (when tonnage is available) in order to be

competitive with products carried only a few hundreds of miles at stable rates.

In recent months in Great Britain money rates were raised and the volume of bank loans reduced by Government direction. Consequent upon this policy and shrinking dollar balances, housing and building demand for lumber fell off sharply with a resultant 50-per-cent decline of sales to the United Kingdom market from this Province, with the exception of a few special items not produced by Baltic suppliers. Lost markets cannot be as quickly regained as they are lost. Just what the long-term effect of this present shrinkage in U.K. demand for B.C. lumber will have on our future economy is something I would not care to speculate upon. Their population is not expanding as in other world areas, and if we were now selling the products of second-growth forest I would think that we would have a difficult task to re-create a demand for our lumber at the price we would have to charge for it in order to meet the cost of producing and delivering it to that market. The fact that we are still able to produce high-quality premium lumber from old-growth trees, and will be able to do so for some years yet, is the one heartening factor in an otherwise rather sombre picture confronting us in this direction.

SOUTH AFRICA

This is a large country with a small white population of about 2¼ million. The indigenous forests did not contain softwoods and few usable hardwoods. The main industry, mining, planted wattle and eucalyptus, imported from Australia, to furnish its requirements. Various species of pine were planted by the State Forest Service about 1900, and after 1920 planting in the various sections of South Africa began on a scale sufficient to amount to 268,000 acres in 1941, and the growth to reach a sustained annual yield of 31,576,000 cubic feet. During the war these plantations were severely depleted as South Africa was cut off from outside supplies of wood. Since 1946 imported lumber amounts to about one-half the requirements, and this is largely obtained from the Pacific Coast of North America. The cost of imported lumber is very high, around $200 per M f.b.m. at retail levels, and the profits from the plantations when converted into lumber are correspondingly high. Since 1946 the amount of planting has increased to the point that there was not sufficient seed to satisfy the demand. A combination of virgin prairie soil, adequate rainfall of from 40 to 60 inches, in a belt running from Capetown along the eastern part of South Africa up to the equator, produces a rate of growth up to 250 cubic feet per acre per year over an area of 25 to 50 million acres. This potential adds up to an annual growth greater than British Columbia's annual cut of 6 billion f.b.m.

The actual progress in planting is impressive. The State alone, from 268,000 acres in 1941 (with the war years intervening when work prac-

tically stopped) to March, 1953, increased its planted area to 377,470 acres of pine plantations and 92,478 acres of hardwoods. The current annual rate is 32,000 acres a year, so that in 1955 there were about 473,000 acres of pine plantations in State ownership.

Private plantations in 1950 amounted to 182,226 acres of pine and 1,028,512 acres of hardwoods. In 1954 this had increased to 219,500 acres of pine and 1,091,900 acres of hardwoods. In combination State and private plantations mount up to an impressive total acreage.

In addition to South Africa, in Swaziland, pine plantations amounted to 123,500 acres in 1954 and 4,500 acres of hardwoods. Extensive plantations are also present in Northern and Southern Rhodesia.

These presently planted pine forests of nearly a million acres are producing wood at the rate of around 2½ million cords a year.

With a nationalistic government in power, importation of foreign lumber can be expected to be reduced as rapidly as the local supply can be built up. At 15 years of age, plantations are about 9 inches in diameter and have a volume of approximately 3,800 cubic feet per acre. It will, therefore, not be long before the imports of B.C. timber to South Africa are reduced considerably and then perhaps lost completely.

Two kraft pulp and paper mills built since the war are already in operation, also one mill making dissolving pulp and another making hardboard. At present the high returns from lumber make it difficult for them to get wood. However, they are planting their own requirements and in 10 years will have 30 cords per acre of pulpwood. Land for planting is open prairie and sells for £5 per acre (about $14 Canadian). South Africa has abundant unskilled labour but lacks skilled and experienced technicians. It is asserted by some authorities that educational programmes will eventually remove this disability. Water is not plentiful, except in the larger rivers, which are sufficient to provide for a large paper industry. Coal is plentiful, well distributed, and cheap. The cost of growing and harvesting wood close to a mill is very low. B.C. manufacturers of pulp and paper can expect future competition in world markets from a very low-cost production as these plantations increase and mature.

NEW ZEALAND AND AUSTRALIA

In New Zealand, pine plantations started only 40 years ago are now producing wood sufficient to provide for a lumber production that allows for the export of lumber to Australia. Two pulp and paper mills already in operation also supply the local market and export most of their production. This does not mean expanding markets for B.C. production, but only more severe competition in that part of the world. About 1 million acres have been planted, and the total potential forest area is around 3 million acres. With a growth rate like South Africa around 250 cubic feet per acre per year, their rate of growth is three times the rate of our Coastal forests.

RUSSIA

From the information supplied me by Mr. A. P. MacBean, of MacMillan & Bloedel Company, who visited the U.S.S.R. in July and August of 1956 as a member of a delegation of Canadian lumbermen, I have extracted the following figures:—

Total productive forest area, 1,628 million acres.
Plantations included in this figure, 17.3 million acres.
Average area planted annually (since 1948), 1,309 thousand acres.
Annual allowable cut, 180 billion f.b.m.
Actual cut in 1955, 65.5 billion f.b.m.
Anticipated cut in 1960, 80.5 billion f.b.m.

1955 PRODUCTION BY THE DEPARTMENT OF FOREST INDUSTRIES

(Millions of cubic feet.)

Product	Europe	Siberia	Total
Ties and sawn wood	1,398	576	1,974
Pulpwood and pit-props	688	227	915
Poles and construction timber	423	171	594
Hardwood (merchantable)	108	10	118
Fuel-wood	1,218	287	1,505
Totals	3,835	1,271	5,106

This total when converted equals approximately 21.6 billion f.b.m., excluding 1.5 million cubic feet used for fuel. The volume of timber cut in 1955 was 10,908 million cubic feet, equivalent to 65,500 million board-feet. In addition, 6,350 million board-feet were cut by collective farms for their own use. Of this total, 30,600 million board-feet were produced by the Department of Forest Industry, the remainder by other organizations. This Department is responsible for logging and lumber-manufacture, but not for forestry, which is administered by a branch of the Department of Agriculture.

In 1955 exports of sawn and planed softwoods from the U.S.S.R. to European countries, Egypt, and Turkey totalled 756 million board-feet, of which total the United Kingdom received 476 million board-feet.

The 1955 F.A.O. Yearbook of Forest Product Statistics shows an export in 1954 of 46 million cubic feet (552 million f.b.m. of sawn wood) and 2.2 million cubic feet of plywood.

There does not appear to be any surplus pulp or paper products to export. Production of paper products must in consequence be relatively small because Russian consumption of paper and pulp products on the 1950–54 average amounted only to about 20 pounds *per capita*.

Sawn lumber exported is a very small percentage of total production. The heavy domestic demand absorbs the remainder and probably will continue to do so for some considerable time.

Any endeavour to forecast developments of the vast forest resources of Russia and probable future effect of its wood production on free world markets is rendered almost impossible by the enigmatic nature of the political atmosphere in which its people live. Tests usually applied in relation to the productive capacities, domestic absorption, and anticipated exports in a normal free-enterprise society have no validity when applied to an industry controlled, owned, and operated by a communistic state.

If, for example, foreign exchange were required, it might be considered a wise and prudent policy to increase, in large measure, exports of forest products to the point of depriving the citizens of the country of badly needed housing and other essential construction, such as schools and hospitals. A like course of conduct could not, in the normal course of events, be expected from the government of a free-enterprise state, but it could happen in a communistic state operating without regard to the profit motive or the political effects of such a policy. Serious and far-reaching effects upon the price structure now based upon the present world supply of and demand for forest products would follow such a decision.

At the moment the threat of a world market saturation by a continuing flow of cheap Russian forest products to areas of demand does not seem likely to become a reality. On the other hand, the possibility of such an occurrence cannot be dismissed completely nor, for that matter, exorcized by any process of wishful thinking.

CANADA

Coming back to Canada, we must shake ourselves into an awareness of the vast timber areas of the Eastern Provinces. Tremendous regions are yet untapped. Quebec, for instance, south of latitude 52° (same latitude as Namu, Williams Lake, and the Big Bend of the Columbia River) has an allowable annual cut of 6 million cords (equalling more than 3 billion b.m.) in districts yet untouched. These forests average less than 100 miles from the north shore of the St. Lawrence River or the National transcontinental railroad. They can be brought to the markets of Europe or Eastern United States more cheaply than the most accessible forest of British Columbia.

We have already taken a brief look at the pulp and paper production in Eastern Canada.* Coming out west it is reported that a pulp-mill is presently being constructed at Hinton, Alta., on the Canadian National Railway, by North Western Pulp and Paper Limited, a subsidiary of the St. Regis Paper Company, with a minimum capacity of 300 tons per day. The Province of Alberta has set up a timber reserve for its exclusive use,

* *See* section on Pulp and Paper.

containing 1,920,000 acres of timber lands. The initial reserve is for 21 years and renewable thereafter in periods of 21 years, subject to such terms and conditions as may be fixed by the Minister. The lands are to be operated on a sustained-yield basis. Ground rental is set at 4.7 cents per acre per annum and fire-protection fees at 2 cents per acre per year. Stumpage rates are fixed for 21 years and vary from 30 cents per cord to $1.50 per cord, depending on species. Also, the Government pays all fire-fighting expense on the whole reserve, unless such fire originates within the cutting area.

These are very favourable terms, and especial attention is drawn to the low cost of Crown timber reserved for this Company, to all intents, in perpetuity and the difference between the fire-fighting obligations imposed on the licensee there and here.

The global look, sketchy as it must be for inclusion within the limits of a Report of this size and nature, demonstrates, at least to my own satisfaction, the validity of my previous comment that the prosperity of our forest industry is in direct relation to the measure of our exports to the markets of the world. When markets for lumber soften, prices decline.

The following price summaries are indicative of the 1956 trend extending into 1957:—

B.C. COAST DOUGLAS FIR (F.O.B. MILL), 1956

	Weeks 1st to 15th	Weeks 15th to 30th
January	$77	$82
February	80	80
March	80	82
April	83	85
May	80	81
June	78	77
July	76	76
August	70	72
September	70	70
October	70	68
November	68	67
December	66	66

NOTE.—All sales were green dimension.

GREEN DOUGLAS FIR DIMENSION (F.A.S. VANCOUVER), 1956

Prices subject to 2 per cent discount only for U.S. Atlantic trade.

January	$78	July	$80
February	78	August	77–75
March	80	September	75–70
April	80	October	68
May	83–85	November	68–70
June	82–80	December	68

WESTERN RED CEDAR (F.O.B. MILL), 1956

	2 x 4, R.L.	1 x 8 Shiplap, R.L.
January	$63–$64	$63–$65
February	66– 68	66– 67
March	67– 68	67– 68
April	67– 68	67– 68
May	69– 70	68– 70
June	69– 70	68– 70
July	69– 70	68– 70
August	68– 67	68– 67
September	66– 62	65– 62
October	60– 56	60– 59
November	56	58– 56
December	56	56– 64

NOTE.—These sales were all made into Ontario or Quebec.

The production of lumber in this Province is only between 4 and 5 per cent of world lumber production. It follows that we cannot control prices on world markets. On the other hand, we ought to be able to maintain this relative position in terms of supply. But to do so we must remain competitive in terms of price, and as price is beyond our control we must produce at a cost which permits us to sell profitably at world prices. Industry does have some control over the costs of production by, among other things, operating at the peak of efficiency, with close utilization and diversification of products, provided, however, that the other partners in the deal—government and labour—exercise an intelligent co-operation in maintaining the stability of our economy.

This Province is extremely sensitive to the impact of world conditions. The decline in our lumber sales in the United Kingdom, the United States, and Canada clearly demonstrates our vulnerability to outside influences over which we have no control. On the other hand, the prosperity of our forest industry during the past few years was also the reflection of a building boom and world demand for lumber.

The same conclusions apply to our plywood and shingle production.

So far as pulp and paper products are concerned, world demand still exceeds supply, even if by a narrow margin. This demand is reflected in the price structure. There was, for instance, no price decline for sulphite and dissolving pulp during the calendar year of 1956. Bleached and unbleached sulphate pulp in fact increased in price by $5 a ton during 1956 and newsprint advanced from $122 to $126 a ton during that year. I understand the differential between demand and supply does not exceed 3 per cent, and how long that condition will last is uncertain. One fact is undoubtedly true: competitive sources of low-cost pulp-supply are rapidly becoming available to world buyers.

If it happens that products of our forests cannot continue to be marketed in the future at past prevailing prices and inventories increase to

substantial degree, then the alternatives open are not difficult to catalogue. As I see it, industry must either reduce production or reduce prices.

The Canadian pulp and paper companies, assuming they can do so within a legal framework, are probably better able to reduce over-all production if necessary and thus assist in maintaining world prices at a profitable level than are the more heterogeneous producers of lumber and other sawn products. This last type of producer, who is the foundation of our industry, must reduce his costs if he is to reduce his price to competitive levels and still remain solvent.

Canada is the leading producer of newsprint, accounting for about one-half of the total production of the entire world. Over 80 per cent of this production is exported to the United States.

The following table is a compilation of world production:—

TABLE 115

WORLD NEWSPRINT OUTPUT

(In tons.)

Country	Average 1935–1939	1953	1954	1955	1956
Canada	3,336,786	5,721,296	5,984,207	6,180,000	6,468,000
United States	907,804	1,083,982	1,211,156	1,552,000	1,717,000
Argentina	.....	8,880	28,000	20,000	20,000
Brazil	4,000	37,000	40,000	40,000	40,000
Chile	4,350	10,339	13,619	12,000	12,000
Britain	961,800	675,242	685,800	694,000	728,000
Finland	436,125	484,164	492,863	602,000	704,000
Norway	205,500	172,309	173,961	175,000	193,000
Sweden	299,015	372,115	372,962	386,000	407,000
Austria	70,550	92,500	116,410	128,000	132,000
Belgium	51,820	61,040	56,690	64,000	80,000
France	397,000	371,000	422,000	427,000	432,000
German Republic	216,000	223,117	250,650	265,000	275,000
Netherlands	99,285	107,000	114,000	117,000	132,000
Portugal	2,000	1,761	1,699	7,000	13,000
Switzerland	34,500	60,000	66,000	66,000	66,000
Greece	.....	.....	.....	.....	5,000
Italy	74,500	128,045	140,900	155,000	175,000
Spain	27,600	33,000	44,000	55,000	55,000
Turkey	.....	2,856	8,300	8,600	9,000
Yugoslavia	.....	3,567	.....	5,000	20,000
Israel	.....	.....	3,250	3,300	3,500
India	.....	.....	.....	5,000	25,000
Taiwan (Formosa)	(1)	8,650	4,500	5,000	9,000
Japan	406,200	469,830	495,681	499,000	540,000
Republic of Korea	(1)	3,944	6,597	9,000	11,000
Australia	.....	48,700	78,861	83,000	83,000
New Zealand	.....	.....	.....	22,000	67,000
Sub-totals	7,534,835	10,180,257	10,812,106	11,532,900	12,361,500
China and North Korea	.....	100,000	110,000	125,000	130,000
Russian bloc	609,000	881,000	952,000	952,000	952,000
World totals	8,143,835	11,161,257	11,874,106	12,609,900	13,443,500

[1] In Japan.

From the foregoing table and information gleaned from various reliable sources, it seems apparent that in the United States, and indeed throughout the world, the race is on between a growing consumption of newsprint and the capacity to produce it.

It will be seen that Canadian production was higher in 1956 than the previous year by about 300,000 tons. United States production was up by 200,000 tons. Adding to this figure an increase in import of about 325,000 tons means a total increase in supply of newsprint in the United States in 1956 of about 500,000 tons.

In 1955 United States consumption of newsprint rose sharply by 475,000 tons. This receded to an increase in 1956 of about 225,000 tons. If we deduct the 1956 increase in consumption (225,000 tons) from the increase in supply (500,000 tons), we find a surplus of 275,000 tons. This has been absorbed and used to build up inventories depleted by the 1955 up-surge in consumption. At the end of 1956 the position was one of equilibrium. In other words, in the United States newsprint-supplies available from normal sources were just about equal to current demand.

In a wider context we find that for the next three years world capacity is estimated to increase by an average of 940,000 tons a year, chiefly in plant expansion in Canada, the United States, and Scandinavian countries. The total average yearly increase in free world consumption has, over the years 1954, 1955, and 1956, amounted to about 650,000 tons a year. This forecasts a net free world excess of capacity expansion over consumption increase by some 290,000 tons a year or 2 per cent per year or 6 per cent for the next three-year period. These figures are based on recent increases in consumption that are higher than secular trends which would, if applied in projection, indicate a figure of excess capacity over consumption of closer to 400,000 tons a year. These figures are, of course, a small proportion of total world newsprint consumption, now amounting to about 13 million tons a year, and can have no noticeably adverse effect upon Canadian nor British Columbia production. But it is an indication, as I have said, that the world race is on, and at the moment the expansion of world capacity is edging slightly ahead of increases in world consumer demand.

The 1956 Preliminary Report of the Royal Commission on Canada's Economic Prospects (the Gordon Commission) says this (p. 40):—

> "The demand for Canadian newsprint in 1980 should be about double what it was in 1955. It is estimated that United States demand for Canadian newsprint will be only half again as large as it is now, but that other foreign demand will increase fourfold and that domestic demand will more than double. In 1980, as in 1955, the great bulk of newsprint production will be exported, but the proportion going to the United States will be somewhat lower.

"Exports of newsprint to the United States will probably increase by only 50 per cent, primarily because total United States requirements are expected to increase at a considerably lower rate than those of other markets. In addition, the expansions of the newsprint industry in the southern states and the development of techniques to utilize the hardwood resources of the northeast will result in some relative decline in the dependence of the United States on Canadian supplies of newsprint."

It would seem to me that an anticipated Canadian production of newsprint of 12 million tons per annum twenty-five years from now must be predicated upon an assumed consumer market to absorb this production. Assuming our export to the United States increases by 50 per cent, we would be exporting about 7.5 million tons in 1980 to this market. That leaves 4.5 million tons. Assuming domestic consumption to double from about 500,000 tons to 1 million tons, we still have to market an additional 3.5 million tons in 1980. Export markets, apart from the United States, now buy from us about 750,000 tons per annum, as appears from the following table:—

TABLE 116

	1956 (Tons)	1955 (Tons)
Central America and Caribbean	137,524	115,120
South America	54,804	51,621
British Isles	355,197	306,910
Other Europe and Balkans	31,017	66,174
Mediterranean and Near East	3,237	5,052
Africa	45,056	38,740
India and Middle East	17,185	19,115
Orient	23,873	32,757
Australia and New Zealand	73,779	99,202
Others	272	211
Export to countries other than United States	741,944	734,902
United States	5,229,748	5,070,211
Total export	5,971,692	5,805,113

As I pointed out before, some of these markets—e.g., Australia, New Zealand, Africa, and the British Isles—are building up their own supplies of pulp material and will, in my opinion, be less and not more reliant upon Canadian newsprint in the future.

It seems to me, with the greatest deference, that it is somewhat unrealistic to anticipate a 500-per-cent increase in newsprint export to the countries (other than the United States) named in the foregoing table during the next twenty-five years, i.e., from 750,000 tons to 3.5 million tons a year.

Whether the United States will require 7.5 million tons of Canadian newsprint in the next two decades to meet its requirements is also a matter concerning which I have grave doubts.

In the result, and with respect, I do not feel that the anticipated expansion of the Canadian newsprint industry to an annual production of 12 million tons is likely to be achieved by 1980 unless other populated world areas, such as India and East Asian countries, can be expected and encouraged to develop a consumer demand, not now as yet in evidence.

It is not within my province to tender any advice to industry, neither would I be rash and presumptuous enough to assume that function. My obligation is to make recommendations, within the ambit of my office, to the Government for acceptance or rejection in whole or in part as the Government sees fit. It is, however, essential that I record the reasons leading to my conclusions and consequential recommendations.

For this purpose I have endeavoured to touch upon the highlights of world conditions and present and potential forest resources of other countries as they do and will affect our future economy and prosperity.

What then is the summation of what I have been saying? It is simply this: Our forest policies as they relate to stumpage rates, taxation in its different forms on forest land and forest products, tenures and the assured supply of raw material at realistic cost levels, regeneration, and other related matters must all be guided by an informed and sympathetic understanding of the vulnerability of our forest industry, its reaction to and dependence upon foreign markets—many of which are even now slipping away from us—and its sheer inability, standing alone, to alter the ineluctable forces operating in the market-places of the world. It must be stressed that the only place open to us in which we can forge, sharpen, and improve our weapons for our forays into the tournaments of world trade is in our own domestic sphere of influence, in which government policy will of necessity play a major and decisive part. The pattern of Crown ownership and virtual monopoly of our forest resources permits of no other rational conclusion.