PUBLIC INQUIRIES ACT
(BRITISH COLUMBIA)

REPORT OF THE COMMISSIONER

The Honourable Gordon McG. Sloan, Chief Justice of British Columbia

relating to

The Forest Resources of British Columbia

1945

VICTORIA, B.C.:
Printed by CHARLES F. BANFIELD, Printer to the King's Most Excellent Majesty.
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ERRATA.

Page 12, third paragraph, line 3: "$958,677,053" should read "$58,677,053."

Page 85, second paragraph under table: Line 3 should read: "to 1,331,760 acres or a total of 1,678,600 acres. I should add that destruction"

Page 103, third paragraph, line 4: "unemployment" should read "employment."

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To His Honour the Lieutenant-Governor of British Columbia:

SIR,—Pursuant to the powers contained in the "Public Inquiries Act," chapter 131 of the "Revised Statutes of British Columbia, 1936," and in accordance with your Order in Council dated the 31st day of December, A.D. 1943, a Commission 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.

The inquiry has been completed and I respectfully submit this report.

I have the honour to be,

Sir,

Your obedient servant,

GORDON McG. SLOAN,

Commissioner.

December, 1945.

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FOREST INQUIRY

REPORT OF THE COMMISSIONER

The purpose and scope of the inquiry is set forth in the terms of the Commission, as follows:—

Whereas it is desirable in the public interest to cause an inquiry to be made into all phases and aspects of the forest resources in the Province and the legislation relating thereto and the policy followed in its administration:

And whereas, under section 3 of the "Public Inquiries Act," being chapter 131 of the "Revised Statutes of British Columbia, 1936," it is provided that whenever the Lieutenant-Governor in Council thinks 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 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

31st day of December, A.D. 1943, appoint you, the Honourable Mr. Justice GORDON MCG. SLOAN, Puisne Justice of the Court of Appeal for British Columbia,[1] a sole Commissioner to inquire into the matters aforesaid.

And we direct you the said Commissioner to report in writing the facts found by you to Our Lieutenant-Governor of Our said Province immediately or as soon as conveniently may be after you shall have concluded such inquiry.

The Commission sat for one hundred and eleven days and sessions were held at Vancouver, Victoria, Prince George, Kamloops, Vernon, Kelowna, Penticton, Nelson, and Cranbrook. The sworn testimony of 293 witnesses (for a list thereof *see* Appendix) was recorded in approximately 10,700 pages of transcript, while the submissions of counsel and others covered an additional 1,200 pages. There was received in evidence 562 exhibits.

INTRODUCTION.

Confronted with this great mass of material, I am reminded of the quandary in which the late Robert Benchley, the American humourist, found himself when attempting to solve the problem of how to teach a bird to roll over. The initial difficulty was how to begin.

As this inquiry is one relating to forestry in all its aspects, the logical beginning would seem to be to consider: What is a forest? To the uninitiated, the simple answer would be that a forest is an aggregation of trees; but that is somewhat of an understatement. The true definition of a forest, akin to the definition of beauty, depends to a large degree upon the eye of the beholder.

To the early pioneer, the farmer, and the rancher it was an undesirable encumbrance to be removed so that the soil upon which it grew might be put to agricultural pasturage and grazing uses. The years have brought a close integration of agriculture and forestry to the benefit of both. To the lumberman the forest is so much wood to be harvested for manufacture into lumber; to the pulp and paper maker it is a cellulose factory; to the fruit and vegetable growers in the Interior of the Province it is the source of their box-shooks and a vast sponge which holds and controls the water run-off so vitally essential to the irrigation schemes upon which the orchards and farms depend for their continued existence. Without irrigation the Okanagan Valley would be a semi-arid desert and irrigation depends upon a forested watershed. To this must be linked the maintenance of water-levels in the hundreds of small streams up which the salmon make their way to the spawning-beds. The hydro-electric engineer also sees a forest in terms of watershed protection and the prevention of wind and water erosion. The forest is, in truth, the " Mother of Waters." To the trapper the forest is the home of the fur-bearing animals upon which his livelihood depends; and to the hunter, fisherman, and tourist the forest offers sport and recreation. The tired and troubled mind seeks rest and solace in its quietude and from the tranquil beauty of its shadowed lakes finds peace and strength. The forest engineer thinks of a forest in terms of silviculture, management and forest conservation, protection, and regeneration. The forest as a source of lumber

(1) NOTE BY KING'S PRINTER—Since appointed The Chief Justice of British Columbia.

for our homes and of wood fuel for cooking and warmth needs no elaboration. The economist, balancing all the multiple uses of the forest and the public benefits flowing therefrom, realizes that it is the broad base upon the continuance of which depends the prosperity and high standard of living of this Province.

One has only to stop to think for a moment to understand how dependent we are upon the use of wood and wood products in our daily existence. I remember that some one in the United States Forest Service, without exhausting the list, but probably his patience, noted over 4,500 commercial and industrial uses for wood, ranging from the heaviest structural timbers to sheer rayon. (Incidentally, 1,000 board-feet of wood can be converted into 14,000 pairs of rayon stockings.) Truly we are surrounded by, and dependent upon, its manifold forms from birth to death; from the wooden cradle to the wooden coffin. The paper upon which these words are printed was once a tree. If the reader will tear the corner from this page and hold it to the light he will see, on the torn edge, fine hair-like filaments. These are the cellulose fibres extracted from the wood of that tree.

How can one then encompass within the framework of a definition the real meaning of a forest? This much is true: the forests of this Province exercise an incalculable influence, directly or indirectly, upon almost every branch of our Provincial economy, and on our way of life.

Then, too, a forest is not merely a haphazard aggregation of trees. It is a living, organic, biological group of plant life in which the individual trees are constantly assisting each other or competing against each other. That inter-relationship is so finely balanced that to cut a single tree in a virgin forest sets in motion a train of events affecting the group. As Professor Baker[1] expresses it:—

> "Conditions of light are at once changed, the sun gets down to the forest floor and heats up the soil and litter and the lower layers of air, night radiation to the sky is freer and frosts become more damaging, the rainfall reaches the ground with less interception, evaporation from the surface soil increases, wind sweeps in a little more freely, soil texture may not be directly or immediately affected, but, as will appear, it—as well as the soil nutrients—may soon be indirectly affected. Changes in these factors may easily affect forest shrubs and herbs, the food plants of many birds and animals of the forest, insects find a new development of foods and of breeding conditions, and so do fungi. If slash is left on the ground, the intensity of fire, if one occurs, is changed. In a word, the cutting of a single tree initiates a series of changes that can logically be followed into every factor of the environment, directly and indirectly affecting all the life processes of the forest."

Thus it appears that a forest is a complex, highly integrated group of living trees, and like all living things, they progress through a life cycle from youth to maturity and to old age and death. Like all living things they too reproduce their kind, and our basic, fundamental, and vital forest problem, in this Province, is to see to it that our forests are perpetuated for the use, profit, and pleasure of our future generations. If we

(1) The Theory and Practice of Silviculture (1934).

fail in this objective then the economic future of British Columbia will, indeed, present a very dark and dismal picture. Fortunately it is not too late to plan now for the future, but the sands are running out and the time is now upon us when the present policy of unmanaged liquidation of our forest wealth must give way to the imperative concept of a planned forest policy designed to maintain our forests upon the principle of sustained yield production. Our forest land must be regarded as the source of renewable forest crops and not as a mine to be exploited and abandoned.

THE ECONOMIC VALUE OF THE FOREST INDUSTRIES.

It is, I think, an impossible task to assess to any precise sum of dollars and cents, or in terms of exact percentage, the contribution from our forests to our total Provincial wealth.

The following table, showing the comparison between net value of primary and secondary forest production and total production in the Province, 1930–39, is reproduced hereunder, but there are many indirect values arising solely from logging and lumbering and secondary industries not included therein, such as power, manufacture and sale of logging equipment, transportation, camp supplies, and such like:—

ESTIMATED NET VALUE OF PRIMARY AND SECONDARY FOREST PRODUCTION IN BRITISH COLUMBIA(1) AND COMPARISON WITH TOTAL NET VALUE OF ALL PRODUCTION FOR THE YEARS 1930–39, INCLUSIVE.

Year.	Estimated Net Value of Primary and Secondary Forest Production in British Columbia.	Estimated Net Value of Total Production in British Columbia.(2)	Per Cent. of Forest Products of Total Production in British Columbia.
1930	$70,006,320	$277,213,682	25.25
1931	43,319,941	199,205,149	21.75
1932	42,203,545	151,873,646	27.79
1933	32,720,585	159,066,141	20.57
1934	46,232,451	171,932,118	26.89
1935	45,872,885	179,079,123	25.62
1936	60,014,008	216,363,724	27.74
1937	70,999,778	254,903,021	27.85
1938	66,294,724	246,404,547	26.90
1939(3)	69,607,738	256,781,477(4)	27.11

(1) Includes Yukon and Northwest Territories.

(2) Canada, Dominion Bureau of Statistics; Canada Year Books, 1935–42.

(3) 1939 Statistics subject to revision.

(4) Canada, Dominion Bureau of Statistics, Survey of Production in Canada, 1940 (revision of figure given in 1942 Year Book).

The generally accepted percentage of forest production in all its aspects to total Provincial production is 40 per cent., but the evidence before me does not contain any amplified explanation of the basis upon which that figure rests, except to the extent of indicating that that is about the ratio which the annual production of the forest bears to the total production of the four major natural resources of the Province, i.e.,

forests, mines, agriculture, and fisheries. In 1944 these production figures were as follows:—

Forest production (gross value)	$146,611,000
Mineral production (gross value)	54,500,000
Agricultural production (gross value)	97,737,000
Fisheries production (gross value)	34,900,000

Such a comparison, however, ignores relevant factors and is not an accurate expression of the true relationship of the wealth produced by the forest industry to the total wealth production of the Province. To hazard an opinion, I would estimate that, in general terms, the wealth produced by processes of extraction and conversion of logs into final manufactured form accounts for at least one-third of the total production of the wealth of this Province.

This same general result may be reached by another avenue of approach. As a rough estimate it may be said that the full-time work of eight men for one year is required to produce one million feet of finished dried lumber. Each of these workers has, on the average, 1.3 dependents. Therefore, 18 people are directly supported by the production of the one million feet of lumber. To take care of the various wants of this group of 18, another 12 are employed as doctors, lawyers, storekeepers, school teachers, telephone operators, bus-drivers, and so on. This service group also has dependents totalling about 28. The " wooden dollar " has therefore found its way from that million feet of lumber into from forty to forty-five pockets. When we add to this list persons engaged in transporting, remanufacturing, and retailing this unit of production the monetary value thereof is more widely spread and will directly benefit at least one-third of our population.

Turning to the industry itself, we find the gross value of the 1934–44 production (including loading and freight within the Province and the value contributed by the wood-using industries) to be as follows:—

1934	$45,461,000
1935	56,941,000
1936	72,010,000
1937	80,872,000
1938(1)	67,120,000
1939	88,221,000
1940	102,804,000
1941	119,920,000
1942	124,720,000
1943	118,434,000
1944	146,611,000

I propose to select the year 1942 as basic, as it is for that year relevant statistical information has been compiled for the use of the Commission. In that year, with a gross production of nearly $125,000,000, the primary industries amounted to over 1,600 logging operations supplying logs to 638 primary manufacturing plants. These 638 conversion units were 551 sawmills, 4 large ply-wood plants, 76 shingle-mills, and 7 pulp and paper mills.

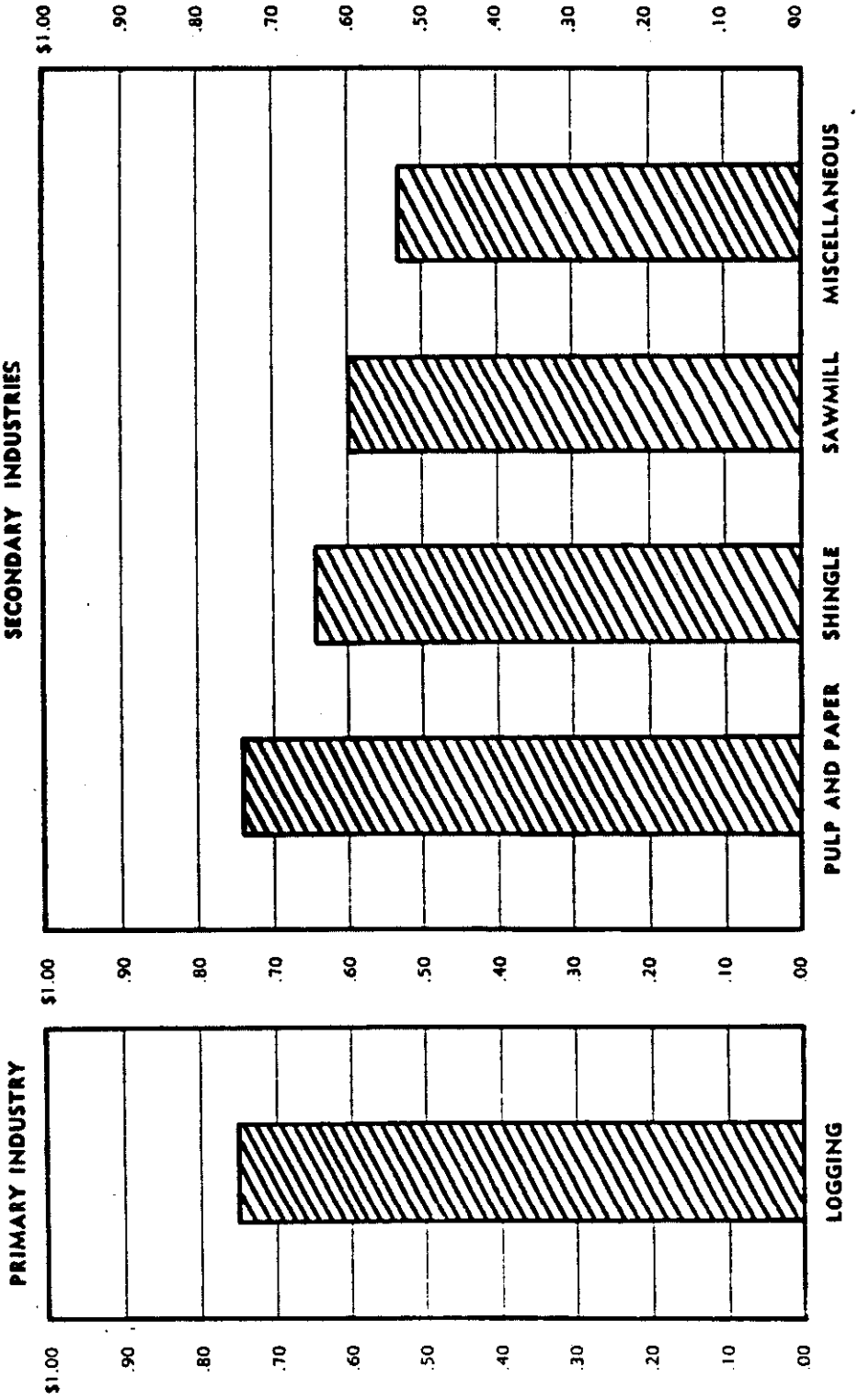
(1) Production in 1938 was curtailed due to extreme fire-hazard.

The secondary wood-using industries in 1942 totalled 198 establishments producing a wide range of manufactured articles for the domestic and export markets.

The capital invested to produce this wealth amounted to, in 1942, $154,112,211. This sum is approximately 45 per cent. of the total amount of capital invested in manufacturing enterprises in the Province in that year ($340,609,179) and did not include the investment in timber in private ownership which amounts to, in round figures, 100 billion board-feet. A rough calculation would give this timber a value of between $200,000,000 to $250,000,000. Thus the forest industries had, and have, an over-all investment amounting to at least $350,000,000.

Direct employment in the forest industries in 1942 averaged 31,686 persons for the twelve-month period and direct wages and salaries paid during that time amounted to $958,677,053. Indirect employment in necessary and resultant auxiliary services dependent upon those industries would increase that sum to an unknown but substantial amount. The average hourly wages paid in 1942 by the forest industries appear on the following graph:—

AVERAGE HOURLY WAGES IN THE FOREST INDUSTRIES OF BRITISH COLUMBIA, 1942.



Production costs in 1942, excluding taxes, but including value of stumpage cut, wages and salaries, fuel, material and supplies, depreciation, amortization, interest and carrying charges, towing and scaling, is estimated, by industry, at more than $114,000,000. Of that sum, local producers of agricultural products received a substantial share and of the supplies and equipment purchased by the industry much of it was supplied by local dealers.

The domestic market can, of course, absorb only a relatively small percentage of the tremendous volume of logs, lumber, and pulp and paper products produced in this Province. The balance is exported to other Canadian Provinces and to Empire and foreign markets. In 1939 wood and wood products found a market in sixty individual countries, and in that year 39 per cent. of all tonnage moving through the Port of Vancouver was products of our forests.

Exports of wood, wood products, and pulp and paper to other Canadian Provinces and to foreign markets for the years 1939 to 1942, inclusive, were as follows:—

Exports.	1939.	1940.	1941.	1942.
To Canadian Provinces	$10,465,738	$11,950,731	$16,572,658	$21,806,382
To foreign countries	57,951,088	70,026,598	79,970,695	73,105,466
Totals	$68,416,826	$81,977,329	$96,543,353	$94,911,848

Average annual export to Canadian Provinces	$15,198,877
Average annual export to foreign markets	70,263,461
Percentage of average production exported—	Per Cent.
Canadian Provinces	17
Foreign markets	83

Of the total export from Canada of wood and wood products and pulp and paper products, British Columbia's production thereof, in a normal year (1939), is the following relative percentages:—

	Per Cent.
Wood and wood products (exclusive of pulp and paper)—	
Canadian export	100.00
Originating in British Columbia	60.97
Pulp and paper—	
Canadian export	100.00
Originating in British Columbia	7.63

The annual value of exported wood, wood products, and pulp and paper totalled in 1939 about 53 per cent. of the value of all British Columbia exports. The foregoing facts establish that beyond any question the forest industries of the Province play a tremendous and important part, not only in the Provincial, but in the national economy. In the over-all picture it is no exaggeration to say that, next to agricultural crops, forest crops have contributed more to the general public welfare than any other national natural resource. Agriculture and forestry both deal with renewable crops, utilizing the fertility of the soil for the production of raw material. True, the time factor of forest crop rotations must, in the

nature of things, differ widely from the annual rotation of the wheat-crop, but if our forest heritage is to be preserved instead of destroyed we must think of forest production in terms of renewable crops, not only for the growing of wood, but for the perpetuation of all those manifold benefits which the forest has bestowed upon mankind.

The future existence of our forest industries depends upon the intelligent management of our forest land to ensure its continued productivity. No industry that continues to deplete the source of its own raw material can hope to survive without providing for the future replenishment of that material.

The vital necessity of continued forest-cover to the public welfare and the importance of the forest industries to our economic structure demands that, in the National and Provincial interest, our forests be perpetuated.

THE FORESTS OF BRITISH COLUMBIA.

In relation to our forests three important questions may be asked: What is our present position? What is our future objective? How are we to attain that objective? The answer to these questions necessarily involves the consideration of many factors and an exhaustive discussion of all or any would require the compilation of a report of many volumes. Incidentally, the evidence relative to these three questions and related topics covers twenty-seven typewritten volumes of transcript. It will, I think, suffice for the present purpose if I endeavour to highlight the main peaks, although I realize in so doing there is the ever-present danger of over-simplification of many important issues.

There is implicit in the first question a primary inquiry relative to the present inventory of our forest resources, but before embarking upon those troubled waters it is required that some general facts concerning the topography of the Province be recorded. This is so because in an area as large as British Columbia (366,255 square miles) many environmental circumstances affecting the forest-cover are encountered.

The mainland of the Province has as its chief topographic features a series of more or less parallel mountain ranges and valleys extending, generally speaking, in a north-westerly direction. The eastern boundary is the Rocky Mountain system. Westward lies a great glacial trough extending for 800 miles, known as the Rocky Mountain Trench. Westward of this again are the Selkirk, Monashee, Cariboo, and Stikine Ranges. West of these mountain ranges is a central plateau which is, however, not all table-land, but eroded and dissected. Elevations range on the plateau from 3,500 to 5,000 feet above sea-level and in the valleys from 1,000 to 2,000 feet. Travelling to the west we come upon the Cascades and Coast Ranges which, averaging 6,000 to 7,000 feet, divide the Interior from the Coastal belt. The Coast Mountains in this Province are considered by orographologists a continuation of the Cascades northward from the lower

Fraser Valley. There is little, if any, Coastal plain lying to the west of the Coast Range.

In the Pacific Ocean, off the Coast, lie the two main islands, Vancouver and the Queen Charlotte group. The mountains on these islands are the northward extension of the Coast Range of Oregon and Washington.

Fronting as it does on the Pacific Ocean, the geographical location of the Province with eleven degrees of latitude between its north and south boundaries, and with the consequential climatic attributes characteristic to its location, coupled with those distinctive topographical features I have described, results in the creation of alternate wet and dry belts. The prevailing winds, moisture laden, sweeping inland from the sea, precipitate the greater part of this as they reach the Coastal belt and then, travelling inland and deriving moisture from the evaporation of the inland land masses, precipitate this moisture as they reach the eastern mountain systems.(1)

West of the Coast Mountains the rainfall ranges from 40 inches in the south to 140 inches in the north. This moisture, coupled with a mild even temperature resulting from the effects of the Japan Current, creates an environment that is productive of the most important forests in the Province.

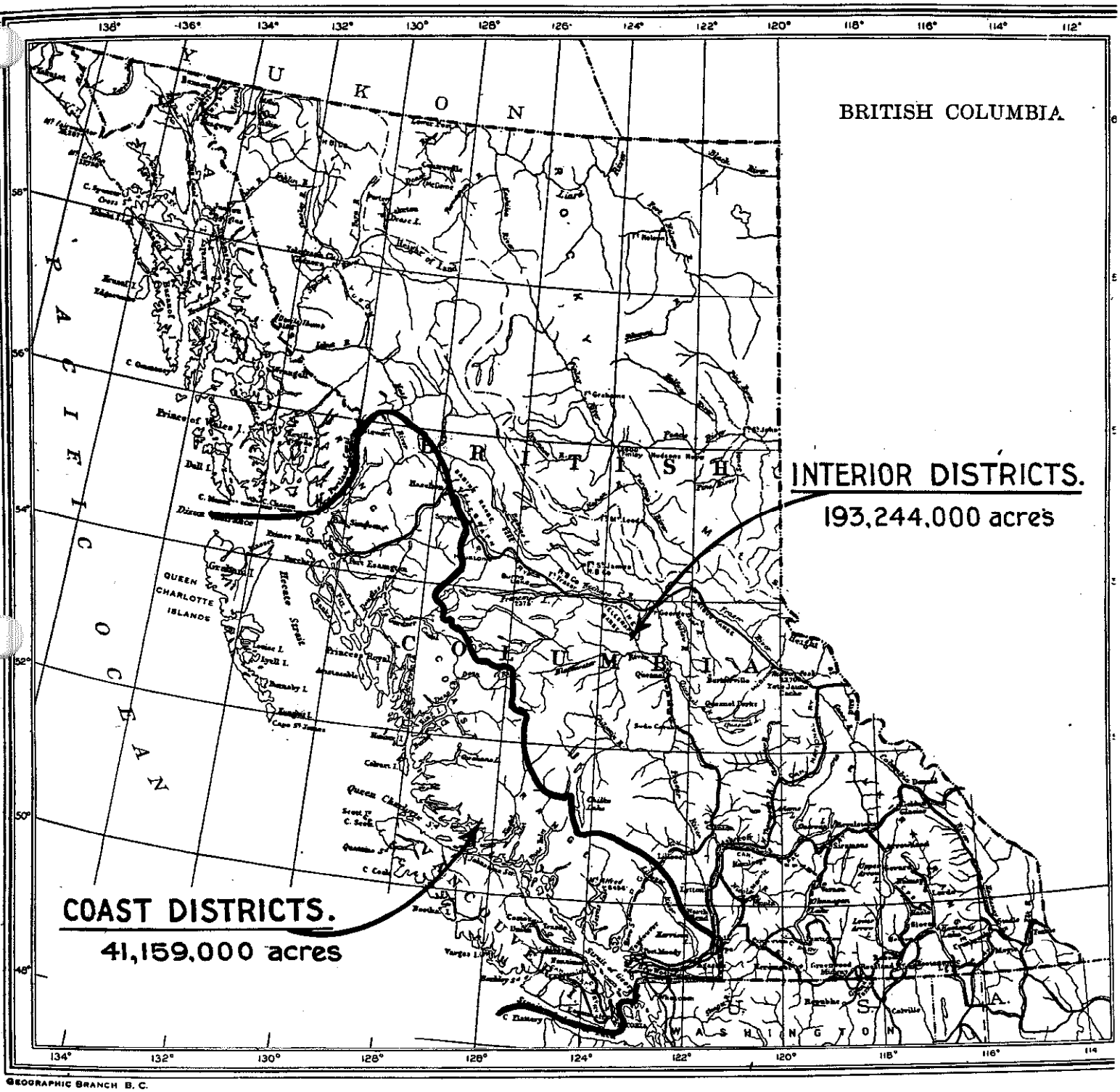
East of the Coast Mountains the southern precipitation ranges from 10 to 15 inches, while 25 to 30 inches is recorded in the northern areas of the Interior. This relatively light precipitation in the areas east of the Coast Range, in combination with extremes of temperature, produces much lighter forest-cover, varying from semi-arid types in the valleys to more dense but low-grade forests on the higher elevations. The heavier precipitation again encountered on the western slopes of the eastern mountains (from 40 to 60 inches) creates more favourable growing conditions and forests resembling those of the Coast result therefrom, but because of greater temperature variations growth is retarded.

The Coast Range is, in reality, the boundary-line separating two distinct and separate forest areas generally described as the "Coast" and "Interior." The accompanying diagram indicates that broad division. While these two great areas present some problems in common, many questions peculiar to each have arisen and must be dealt with separately. Even the common problems—for example, the perpetuation of the milling industry—call for distinctive treatment due to the completely dissimilar climatic and other relevant conditions creating and affecting these problems.

NORTHERN FORESTS.

The great northern forests extending across Canada continue into the northern portion of the Interior Plateau, drained principally by the Peace and Liard Rivers. Approximately 67 million acres lie in unorganized territory and outside the boundaries of any forest district. Approxi-

(1) "Forests and Water in Light of Scientific Investigation," 1927. Zon estimates that only 7 per cent. of all water evaporated from oceans enters into precipitation over land and that 78 per cent. of all precipitation that falls over the peripheral land area is furnished by the area itself.



GEOGRAPHIC BRANCH B. C.

mately 11 million acres, or about 16 per cent. thereof, is productive forest land. This productive land area is restricted to narrow valley-bottoms and the tree species—spruce, hemlock, and lodgepole pine—grow in narrow fringes along rivers, streams, and watercourses. Because of the remoteness of the area and high logging costs, the products of these forests must find an outlet in limited local consumer markets until perhaps the future develops wood uses that would render it economically practicable to harvest and transport this crop to more distant conversion units. The evidence before me touching upon this northern area is of a very sketchy character and does not support any conclusions of value. Future possibilities for the supply of raw material from this area for pulp and paper manufacture is probably indicated.

FOREST DISTRIBUTION.

The forest-cover of the Coast area, reflecting the effect of its growing environment, is composed of four main species—Douglas fir, western hemlock, western red cedar, and silver or balsam fir. A small addition is made up of yellow cypress, white pine, and spruce.

On the southern mainland coast and on the southern and eastern areas of Vancouver Island, Douglas fir is the predominating species up to elevations of about 2,000 feet. If there were a mountain near Vancouver with a gently ascending slope, the climber would find as he progressed upwards that beyond the 2,000-foot line a gradual change in the forest species was encountered. He would notice the Douglas fir was thinning out and the stand was now made up of cedar, hemlock, and balsam, in that order of importance. Still climbing, he would find himself in a forest of hemlock, cedar, spruce, and balsam. Higher up his forest would now be hemlock, balsam, spruce, and cedar. Soon the cedar is left below and the hemlock, spruce, and balsam remain in that order. Should he persist in his climb, he would get into scrub and non-commercial mountain species.

Now, let us conceive of our gradually ascending slope, not as a mountain near Vancouver, but as the Coastal plane of the Province, stretched out from south to north. Let us assume our climber is travelling north up the latitudes instead of up the mountain. He would come upon the same general classification of forest-cover in the same order of species as he encountered on our imaginary Vancouver mountain. Like other generalizations, this concept is subject to exceptions but, in the main, it gives a fair enough picture of the Coastal forest in order of predominant and subdominant species, both in relation to elevation and south to north distribution.

In the Interior, in addition to most of the Coastal species (the main exceptions being Sitka spruce and yellow cedar or cypress) the forests contain Englemann spruce, western yellow pine, western larch, and white spruce as the main commercial cover. In the southern dry site areas are found fir, yellow pine, spruce, lodgepole pine, and larch. Travelling north the yellow pine disappears and spruce, lodgepole pine, and balsam are the

dominant types. Farther north the fir leaves the picture and lodgepole pine and spruce are predominant.

In the Interior "wet belt" (a relative term) we find pure cedar stands in the wetter valley areas with cedar-hemlock forests above on the higher slopes. Above this hemlock, cedar, and spruce cover appears, in association with some fir, white pine, and balsam. Spruce and lodgepole pine are predominant in the higher altitudes ranging up to 6,000 feet.

LAND CLASSIFICATION.

If it be assumed from the foregoing that the forest-cover is distributed over the greater part of the land areas of the Province, that assumption must be corrected or the true position is likely to be misunderstood.

British Columbia's great geographical expanse is in most part made up of barren land and land incapable of supporting other than scrub forest of little or no commercial value. Its land area is 234,403,000 acres. Of this acreage, 41,159,000 thereof is in the Coast district and 193,244,000 in the Interior. When the Coast and Interior acreages are broken down into their component parts we find the following land classifications:—

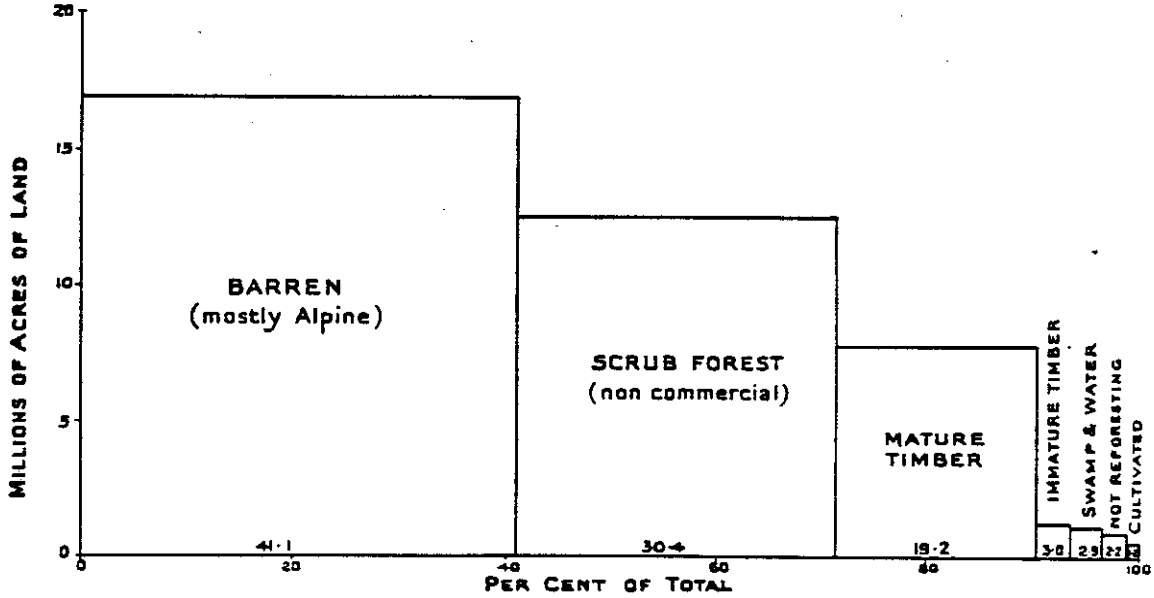
Classification.	Coast.	Per Cent.	Interior.	Per Cent.	Total.	Per Cent.
Mature forests	7,880,000	19.2	14,776,000	7.6	22,656,000	9.7
Immature forests	1,253,000	3.0	31,062,000	16.1	32,315,000	13.8
Not reforesting	918,000	2.2	19,134,000	10.0	20,052,000	8.6
Agricultural	495,000	1.2	4,207,000	2.1	4,702,000	2.0
Scrub	12,515,000	30.4	69,766,000	36.1	82,281,000	35.1
Barren	16,902,000	41.1	48,844,000	25.3	65,746,000	28.0
Swamp and water	1,196,000	2.9	5,455,000	2.8	6,651,000	2.8
Totals	41,159,000	—	193,244,000	—	234,403,000	—

Putting these figures together again in a little different form we get the following results:—

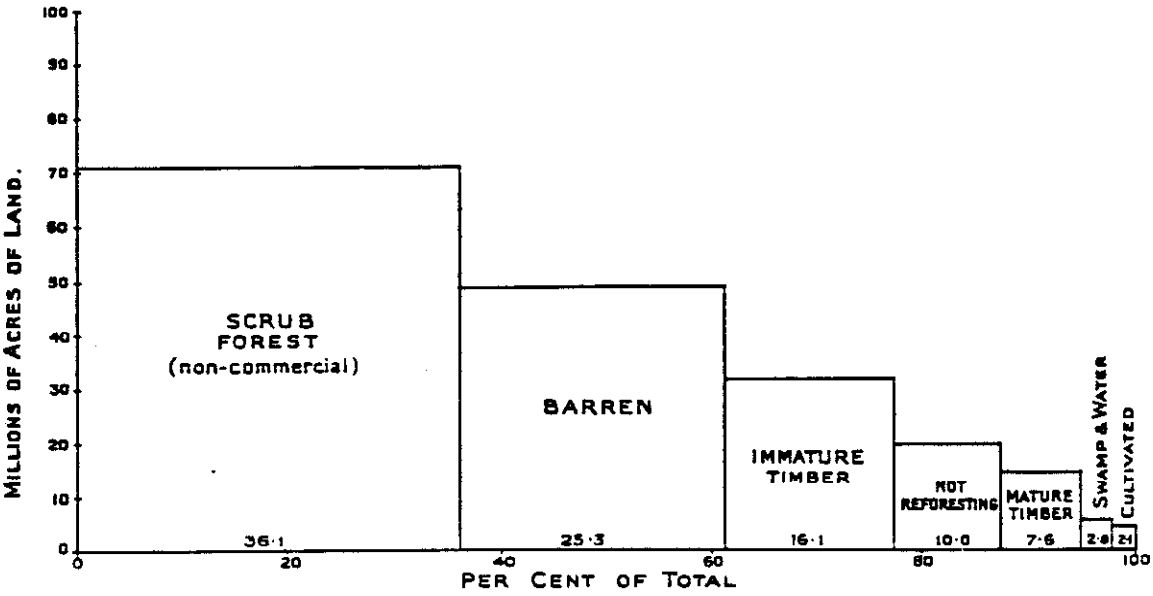
	Acres.	Per Cent.
Land capable of producing commercial timber	75,023,000	32
Land incapable of producing commercial timber (alpine, barren, scrub, swamp, water, etc.)	154,678,000	66
Agricultural land	4,702,000	2

This information appears in the following graphic form:—

LAND CLASSIFICATION, BRITISH COLUMBIA COASTAL REGION.



LAND CLASSIFICATION OF INTERIOR PORTION OF BRITISH COLUMBIA.



It is of interest to note that of the amount of acreage classed as agricultural land 23.6 per cent. thereof is cultivated and the remaining 76.4 per cent. is open grass land.

It is apparent from the foregoing that this Province, because of its topography, soil conditions, and climate, is a geographic unit in which the growing of perpetual forest crops is a prime essential if we are to utilize the fertility of the soil for the purpose for which it is suited. About one-third of our land surface and 98 per cent. of all our productive land is in absolute forest-sites.

The land areas which are of relevant concern are, of course, the productive ones totalling approximately 75,023,000 acres, because those areas are the sites which support our forests, present and potential. An examination of the foregoing tables discloses that they are divided between the Coast and Interior as follows:—

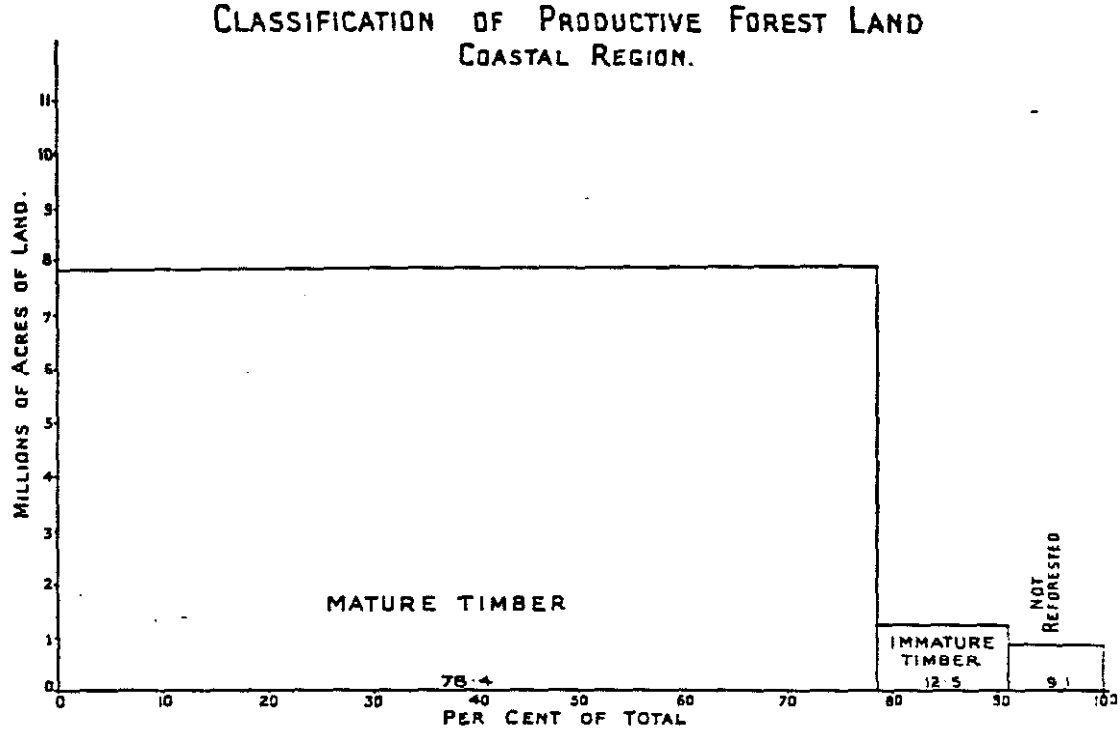
Coast ..... 10,051,000 acres, or 13.4 per cent.
Interior ..... 64,972,000 acres, or 86.6 per cent.

These figures are the result of adding together land areas producing or capable of producing timber. By that same process the following table may be created:—

Classification.	Coast.	Per Cent.	Interior.	Per Cent.	Total.	Per Cent.
Mature forests	7,880,000	78.4	14,776,000	22.7	22,656,000	30.2
Immature forests	1,253,000	12.5	31,062,000	47.8	32,315,000	43.1
Logged, logged and burned, and burned, not reforested	918,000	9.1	19,134,000	29.5	20,052,000	26.7
Totals	10,051,000	—	64,972,000	—	75,023,000	—

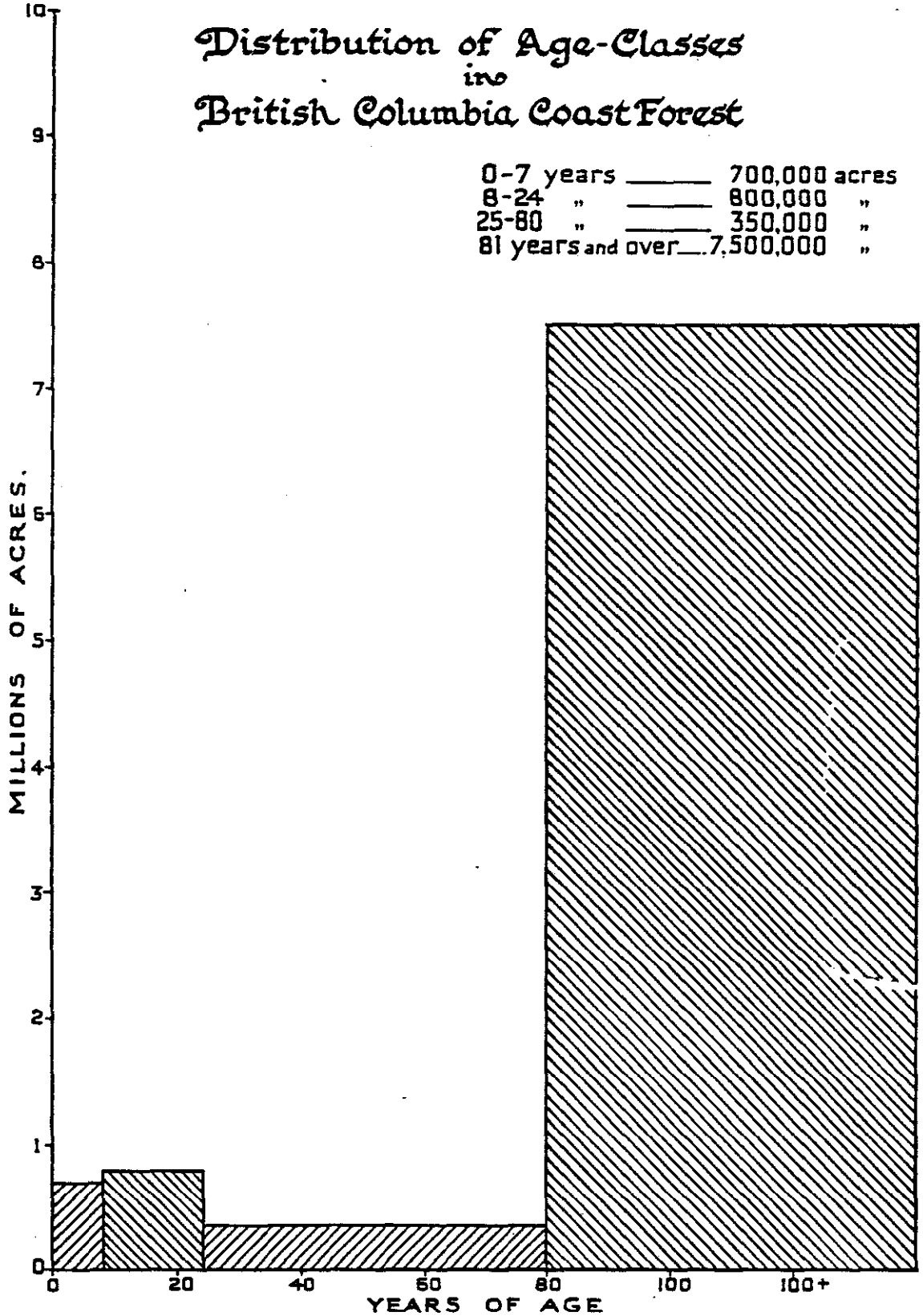
That simple table points to the heart of our present forest problem. Two facts emerge with striking force. The first: that of the total productive sites on the Coast 7,880,000 acres or 78.4 per cent. thereof are covered by mature forests; the second: that 20,000,000 acres of productive forest land in the Province are not reforested.

The following graphs illustrate the first fact:—

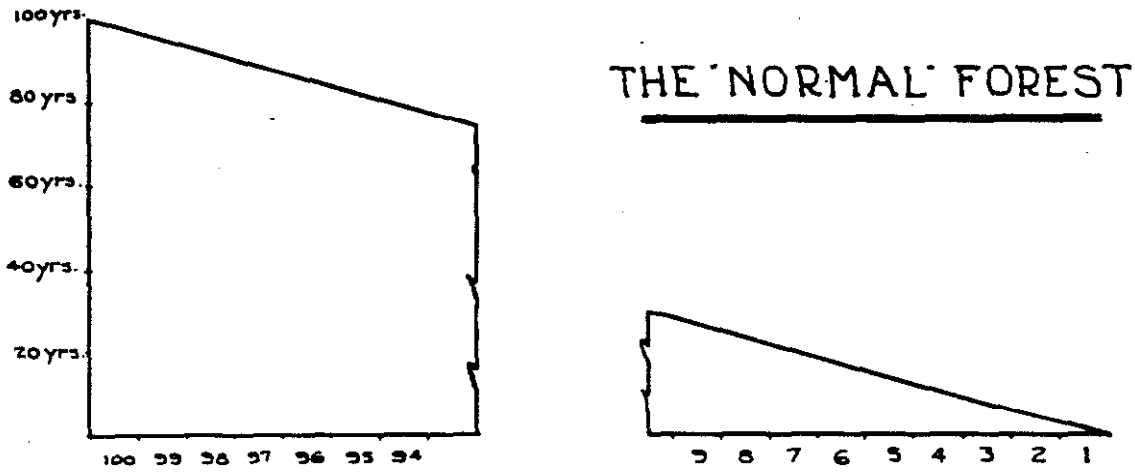


Distribution of Age-Classes in British Columbia Coast Forest

0-7 years _____ 700,000 acres
8-24 " _____ 800,000 "
25-80 " _____ 350,000 "
81 years and over ___ 7,500,000 "



A forest with ideal distribution of age classes should appear in this form:—



All Age classes present on equal areas of equally productive land throughout rotation assumed here to be 100 yrs

The normal distribution of age-classes exists when the forest is composed of a complete series of blocks of trees of equal productivity varying in age by equal intervals from the youngest age-class to the oldest or to the rotation age-class. A forest has a normal growing stock when the increment is the best that can be obtained for the species, site, and rotation, coupled with a normal distribution of age-classes. The normal forest is, in the sense described, an ideal objective of forest management. In the European countries, where forest management has been practised for centuries, the ideal is still the objective and 75 to 80 per cent. of normality is considered a satisfactory attainment.

On the Coast we have far less growing stock than we should reasonably have in relation both to increment and distribution of age-classes. The vast extent of our productive Coast acreage now occupied by mature and overmature timber illustrates the unbalance of our forest resource. These virgin forests are static and making no net growth and must be replaced by growing trees if we are to progress to within any reasonable distance of the ideal or normal forest-cover.

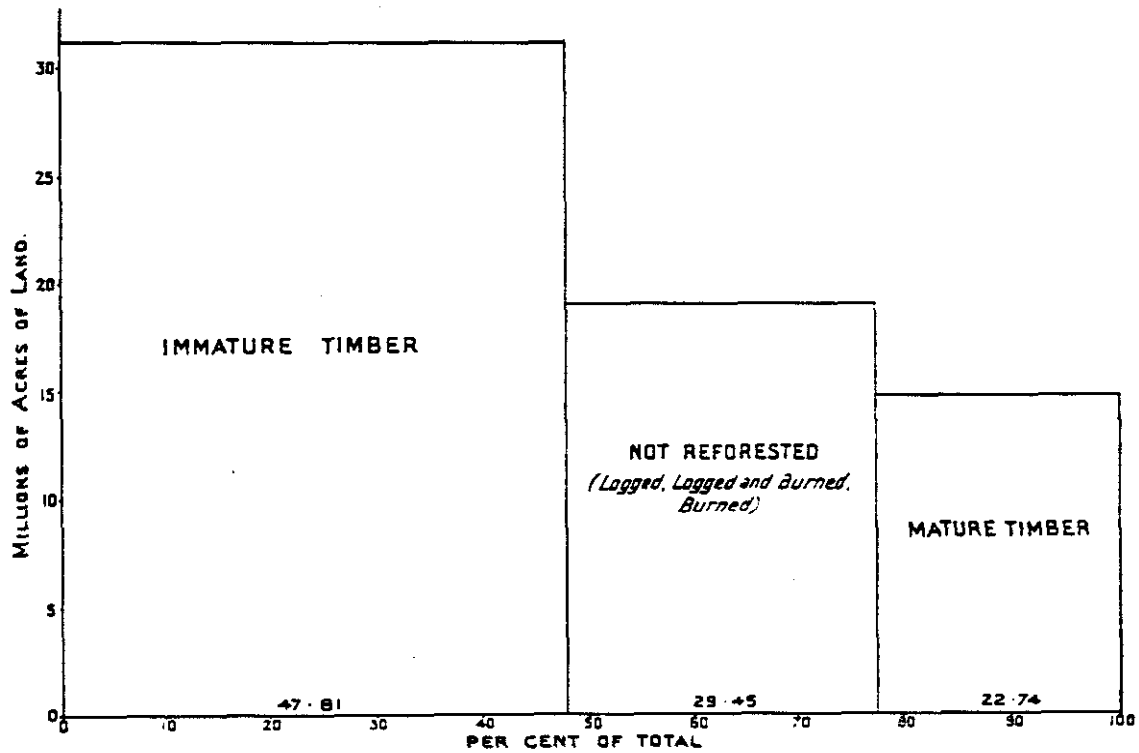
The removal of this surplus of mature growing stock must, however, be regulated by an adjustment of the annual or periodic cut so that the exhaustion of this timber will coincide with the growth of new forests to merchantable size and age. If we fail to ration the present reserve of old growth until the new growth can take its place we will inevitably reach the point where the old forests have disappeared and the new forests are not ready for harvesting. Our forest industry would, in those circumstances, cease to exist with calamitous results to our whole Provincial economy. Such a hiatus must be avoided at all costs.

When, however, this process of conversion is completed continuous production from our forests on a true sustained-yield basis can be assured

by a proper system of regulated forest management. Until that stage is reached the problem is not how to assure sustained yield but sustained production.

The Interior forests present a more balanced division between mature and overmature stands, as will have been noted from figures in the above tables and which may be reproduced graphically as follows:—

CLASSIFICATION OF PRODUCTIVE FOREST LAND—INTERIOR REGION.



The necessity for growing new forests brings me to the second of those factors implicit in the last table. I refer to the extent of our productive land not reforesting, amounting to approximately 20 million acres. That, however, is not the whole story. There is in addition the depressing fact that each year this acreage is increasing.

The logging industry has in the past and is now cutting virgin timber and maintains production by moving to new areas as old areas are cut out. The present logging methods in general use are destructive of young growth and, in addition, do not leave seed sources sufficient to assure satisfactory regeneration. While no precise information is available, the cut-over land, on the Coast, may be conservatively estimated to approximate 65,000 acres a year. It is probably more. Of this acreage approximately 50 per cent. will satisfactorily restock naturally in varying degrees over a period of years. The Forest Department has, since 1940, planted between 10,000 to 15,000 acres a year. I would therefore estimate, from the evidence, that at least 20,000 acres a year are, on the Coast, being added to our present total of approximately 20,000,000 denuded acres.

Logging alone has not brought about this denudation but it results from logging or a combination of logging and fires, or fires alone. For instance, in the ten-year period 1934–43, 343,600 acres on the Coast and 2,926,500 acres in the Interior were burned over, destroying mature and immature forest areas.

Another feature must be remembered in relation to the denudation of our forest land: in this Province, unlike Ontario and Quebec, agricultural and industrial development does not follow the logger's axe. Logged-over lands are for most part unsuitable for the growing of crops because of poor soil conditions, high clearing costs, distances from markets, and so on. Thus if we do not grow timber on denuded land areas we grow nothing thereon except the so-called weed trees.

It will be appreciated from the foregoing in preparing for that not distant day when our mature forests will be completely cut out, our forest programme must insist upon three requisites: (*a*) The presently denuded productive land areas not restocking must be replanted; (*b*) the areas logged in future must be left in such a condition that their continuous productivity is assured; and (*c*) the young growth must be protected from fire. I will refer in more detail to these three "musts" later, but wish to emphasize at this point the importance of protecting our growing stock from fire. Unless, and until, this is done all other activities designed to grow and conserve our forest resources will be frustrated.

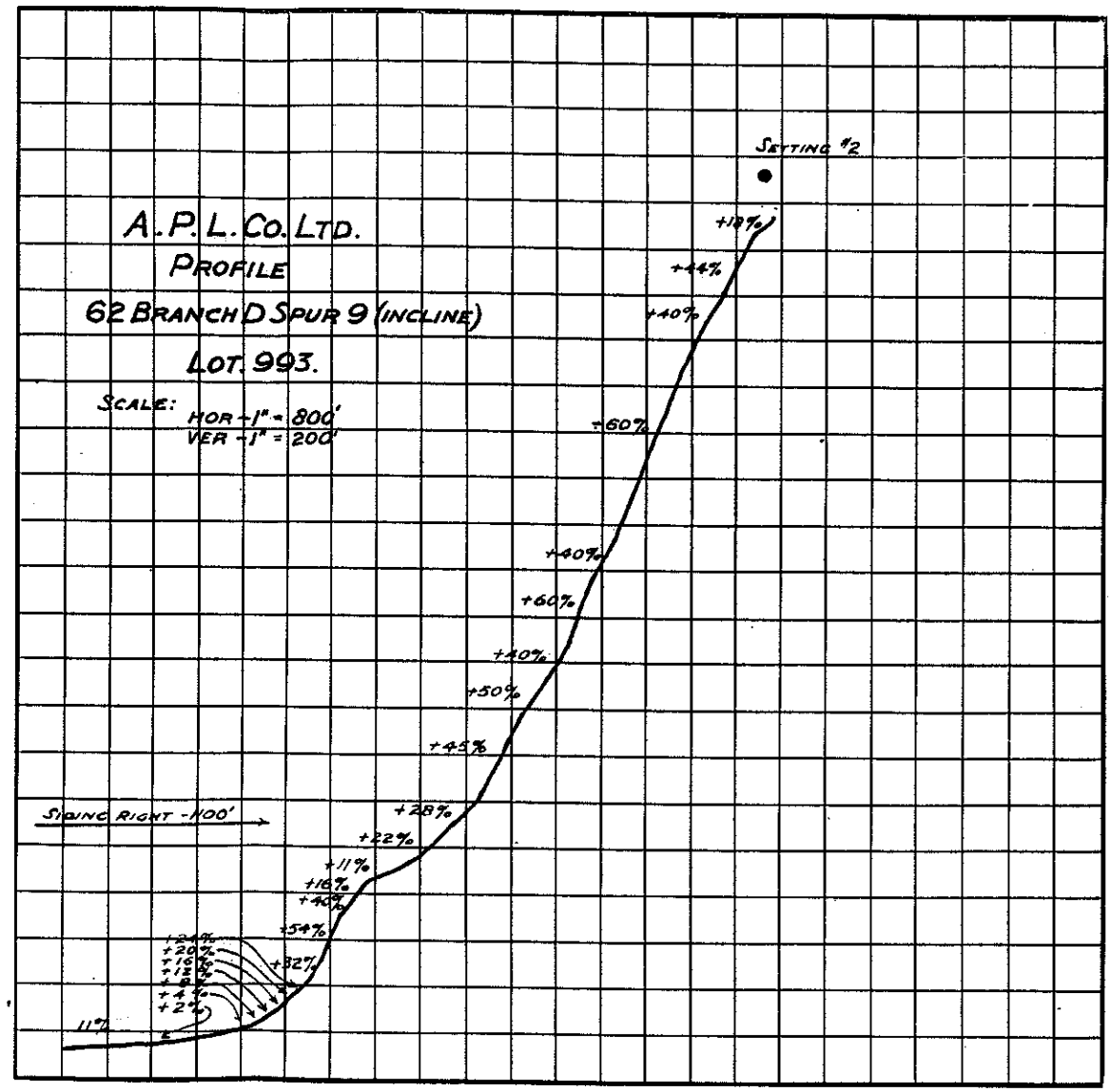
From the consideration of land and age classifications I turn to record the volume of our merchantable timber divided into accessible and inaccessible categories. It is from that volume of timber our present production must be maintained until our new forests have reached merchantable size and age.

It might be advisable to define in what relevant sense the terms "merchantable" and "accessible" are employed.

There are four main gradations of forest growth and development. In the first stage the seedlings have appeared. At this period of forest infancy there is no volume measurable in terms of usable products. The second stage is reached when the seedlings have established themselves as a very young forest but the trees are as yet too small to be made into usable lumber or measured as pulp-wood. The next gradation finds the forest an advanced (so-called) second-growth forest composed of trees sufficient in size to contain measurable amounts of usable material. If normal growth continues, the forest reaches the rotation age or continues on to the maturity of an old-growth forest. Forests in the third and fourth stages of gradation contain trees of a size and quality which, under normal conditions, can be profitably marketed. These are the merchantable trees.

"Accessibility" is a term definitive of area. An accessible area is one from which the forest crop may be harvested at a profit. An inaccessible area is one in which the cost of extraction does not leave a margin of profit. The term is a variable one and its components are computed in terms of (*inter alia*) location, i.e., distance from markets, terrain, logging

Side-hill logging-railroad.



methods, degree of utilization, site quality, and the market price for logs and for the end product. Thus, an area may be inaccessible to-day and accessible to-morrow, depending upon the relation of the cost of production to the realizable price of its crop. The same factors also operate to render inaccessible areas now classed as accessible. Areas of accessibility expand or contract in direct relation to logging economics. Location and difficulties of terrain are merely elements to be considered as affecting production costs.

Logging operators, by the skilled and ingenious development and use of the great power resources now at their disposal, have conquered almost every technical and physical obstacle in their logging ventures. Powerful trucks climb to elevations of over 4,000 feet on well-built roads to tap resources not long ago seemingly out of reach; and logging-railroads wind along and up steep side-hills.(1) The uncontrollable element is the end price which for our exportable products is extremely difficult to foretell. Russia, the Scandinavian, Baltic, and other timber exporting countries will undoubtedly be competitors for our present and potential markets, especially when our production is drawn from our second-growth forests. This competition will, I believe, result in more intensive utilization of our forest crop and less waste in our milling operations due to a closer integration of manufacturing processes—a subject to which I shall return later.

Because of the unexcelled quality of the lumber produced from our old-growth virgin forests, the technological advances in logging in the past which will undoubtedly be projected into the future, improved and increased transportation facilities, and a higher degree of forest utilization and other relevant considerations, it seems to me that about 90 per cent. of our Coast forest areas will be accessible when needed. This figure is, in my opinion, a sufficiently close approximation upon which to base future policy.

The most recent estimate of the forest resources of this Province is to be found in the publication, "Forest Resources of British Columbia." This excellent compilation is the result of many years' effort by the Forestry Branch to bring together relevant forestry facts and figures. Its author, F. D. Mulholland, welded together the statistical and other data into a valuable contribution. It was published in 1937. The following table is made up of figures extracted from that publication and indicates the estimated inventory as of 1936. It will be noted it was estimated that the Coast forests contained a total of approximately 155 billion feet board-measure, the Interior forests a total of approximately 100 billion feet board-measure, and the two areas combined contain about 255 billion feet board-measure. Attention is also directed to the fact that Douglas fir comprises 24 per cent. of the total Coast stand and 19.4 per cent. of the total Provincial stand, while the same figures for western hemlock are 29.7 per cent. and 22.3 per cent. respectively.

(1) *See* accompanying photograph and profile (page 27) of side-hill logging-railroad on Vancouver Island.

MERCHANTABLE TIMBER OF BRITISH COLUMBIA.

BASED ON 1936 ESTIMATE OF VOLUME AND ACCESSIBILITY.

(In millions of feet board-measure.)

Species.	Coast.				Interior.				Total of each Species Accessible and Inaccessible for Coast and Interior.	Per Cent. of each Species to combined Total of all Species.
	Accessible.	Inaccessible.	Total of each Species.	Per Cent. of each Species to Total of all Species.	Accessible.	Inaccessible.	Total of each Species.	Per Cent. of each Species to Total of all Species.		
Western hemlock	22,695	23,440	46,135	29.7	2,288	8,239	10,527	10.6	56,662	22.3
Spruce	6,205	3,744	9,949	6.4	11,426	28,847	40,273	40.5	50,222	19.7
Douglas fir	16,613	20,502	37,115	24.0	7,261	4,893	12,154	12.2	49,269	19.4
Western red cedar	20,491	20,062	40,553	26.2	4,106	4,345	8,451	8.5	49,004	19.3
Silver fir (balsam)	8,396	9,184	17,580	11.3	2,260	11,644	13,904	14.0	31,484	12.4
Lodgepole pine	37	90	127		2,633	7,022	9,655	9.7	9,782	3.8
Yellow cedar	1,398	1,621	3,019	2.0					3,019	1.2
Larch					1,864	258	2,122	2.1	2,122	0.8
White pine	273	378	651	0.4	580	321	901	1.0	1,552	0.6
Yellow pine					1,212	171	1,383	1.4	1,383	0.5
Totals	76,108	79,021	155,129	100.0	33,630	65,740	99,370	100.0	254,499	100.0

Mr. Mulholland, when giving evidence, frankly conceded the 1937 figures to be a very conservative estimate and would add 10 per cent. to the Coast estimates. This additional volume would take care of the cut of the intervening years and depletion from fire, insects, and other causes would be balanced by the normal increment during that period. In the Interior, increment exceeds depletion. Thus the 1937 estimates were, in his opinion, equally valid to-day for both Coast and Interior areas.

A number of highly qualified and experienced witnesses were of the opinion that the present volume of Coast timber amounted to from 180 to 200 billion feet. Mr. Mulholland, while not accepting this increase, did not seriously challenge its accuracy.

I have given this question much serious consideration. After weighing the conflicting view-points as best I can, I have reached the conclusion that because of the many factors involved, which include (*inter alia*) future recovery from scrub areas, closer utilization in the woods, including the salvage of lower grades, the greater production of hemlock, variation between past and present cruise standards, and anticipated increase in recovery of small logs, and the actual recovery of logs in various areas having proven to be greater than the 1937 estimate indicated, it would be safe to assume as a basis for future policy the amount of merchantable timber at the present time on the Coast amounts to, in round figures, 200 billion feet board-measure. Assuming 90 per cent. of this timber will become accessible in the future, it is my opinion, therefore, that on the Coast 180 billion feet board-measure will be available when needed for use.

The estimate of accessible timber was, in the 1937 inventory, declared to be a temporary classification and subject to change. Mr. Mulholland's present view, as stated in his argument (p. 617), is as follows:—

> "I submit the weight of expert evidence is that all of Vancouver Island and probably all of the Coast will become accessible when it is required."

My estimate of 90 per cent. accessibility, based on my understanding of the evidence, seems, therefore, not unreasonably high.

I feel further fortified in the conclusions I have reached in relation to present volume on the Coast and future accessibility by an analysis of the 1937 estimated volume of accessible Douglas fir, which species has accounted for 50 per cent. of the total Coast cut over the past ten years. This estimate is as follows:—

	Millions of Feet (Board-measure).
Coast accessible	16,613
Total cut of Douglas fir on Coast, 1937–44	11,215
Leaving	5,398

I assume this cut to have been taken from areas classified as accessible in 1937.

If this estimate is right, two conclusions are inescapable: that in the eight years since Mr. Mulholland's report our accessible stands of Douglas fir have suffered about 65 per cent. depletion and less than five years will see the complete disappearance of mature virgin stands of that species on

the Coast. No one has suggested to me that such a situation exists, and I feel certain that if that were the present relative position of the Douglas fir stands I would have been so apprised. The answer seems to be that either the estimate of volume on areas considered as accessible was too low or the areas of accessibility were too narrowly defined, or both factors were estimated too conservatively.

DEPLETION.

Having ascertained, within a reasonable degree of accuracy, what we have in our forests, a knowledge of the rate at which that resource is being depleted is of considerable consequence in reaching a proper understanding of our present position. It is also an essential fact in the determination of future policy and as a guide to the extent to which regulation may be necessary to ration our old-growth stands until our new forests are grown. The four main causes of forest depletion are logging, destruction by fire, losses due to insect pests and fungi diseases, and wind-throws. I propose to examine each of these destructive agencies, with the exception of wind damage, which is of relatively little consequence and practically unavoidable in areas of virgin forests.

DEPLETION BY CUT.

The cut of the Coast and Interior for the thirty-year period, 1915 to 1944, is as follows:—

Year.	Coast.	Ten-year Average Coast Cut.	Interior.	Ten-year Average Interior Cut.	Total.	Ten-year Average Total Cut.
1915	830,169,000	———	187,469,000	———	1,017,638,000	———
1916	1,012,051,000	———	268,212,000	———	1,280,263,000	———
1917	1,335,746,000	———	311,529,000	———	1,647,275,000	———
1918	1,430,705,430	———	330,478,976	———	1,761,184,406	———
1919	1,410,621,328	———	347,708,667	———	1,758,329,995	———
1920	1,596,164,595	———	450,304,364	———	2,046,468,959	———
1921	1,407,254,685	———	382,762,680	———	1,790,017,365	———
1922	1,555,284,634	———	343,873,639	———	1,899,158,273	———
1923	2,099,872,396	———	421,862,885	———	2,521,735,281	———
1924	2,066,709,394	1,474,457,846	482,990,787	352,719,199	2,549,700,181	1,827,177,046
1925	2,160,569,607	1,607,497,706	450,696,920	379,041,991	2,611,266,527	1,986,539,899
1926	2,442,789,454	1,750,571,752	475,329,748	399,753,766	2,918,119,202	2,150,325,519
1927	2,411,430,686	1,858,140,220	442,271,776	412,828,044	2,853,702,462	2,270,968,265
1928	2,723,941,046	1,987,463,782	482,964,420	428,076,588	3,206,905,466	2,415,540,371
1929	2,823,189,049	2,128,720,556	522,955,238	445,601,245	3,346,144,287	2,574,321,800
1930	2,243,968,742	2,193,500,971	419,783,596	442,549,168	2,663,752,338	2,636,050,138
1931	1,660,190,013	2,218,794,504	288,214,260	433,094,326	1,948,404,273	2,651,888,829
1932	1,441,848,076	2,207,450,848	169,610,385	415,668,001	1,611,458,461	2,623,118,848
1933	1,711,113,629	2,168,574,971	187,467,435	392,228,456	1,898,581,064	2,560,803,426
1934	1,983,065,380	2,160,210,570	231,726,489	367,102,026	2,214,791,869	2,527,312,595
1935	2,369,399,269	2,181,093,536	279,889,126	350,021,247	2,649,288,395	2,531,114,782
1936	2,705,418,851	2,207,356,476	315,354,443	334,023,716	3,020,773,194	2,541,380,181
1937	2,872,196,877	2,253,433,095	369,718,763	326,768,415	3,241,915,640	2,580,201,499
1938	2,416,782,086	2,222,717,199	362,251,912	314,697,164	2,779,033,998	2,537,414,352
1939	3,041,646,641	2,244,562,958	313,248,925	293,726,533	3,354,895,566	2,538,289,480
1940	3,323,776,432	2,352,543,727	369,378,324	288,686,006	3,693,154,756	2,641,229,721
1941	3,266,379,242	2,513,162,650	413,378,272	301,202,407	3,679,757,514	2,814,365,045
1942	2,711,140,593	2,640,091,902	461,499,586	330,391,327	3,172,640,179	2,970,483,217
1943	2,525,231,294	2,721,503,668	553,535,490	336,998,133	3,078,766,784	3,088,501,789
1944	2,519,167,455	2,775,113,864	577,165,629	401,542,047	3,096,333,084	3,176,655,911

To summarize this table for the last ten-year period, 1935–44:—

	Board-feet.	Board-feet.
Total cut on Coast	27,751,138,640	
Average Coast annual cut		2,775,113,864
Total cut in Interior	4,015,420,470	
Average Interior annual cut		401,542,047
Total ten-year cut, Coast and Interior	31,766,559,110	
Average annual total cut		3,176,655,911

Per cent. of average Coast cut to average total cut, 87.4.
Per cent. of average Interior cut to average total cut, 12.6.

The Coast cut, averaging 87.4 per cent. of the total cut, is harvested from an area containing 69 per cent. of our presently accessible stands or 61 per cent. of our total stands, and in terms of productive forest land acreage upon which we must depend for our future crops the Coast cut of 87 per cent. is taken from 1¼ per cent. of such productive land area. The Interior cut, representing 12.6 per cent. of our total cut, is taken from an area containing 38 per cent. of our total stand or 30 per cent. of our present accessible timber.

DEPLETION BY FIRE.

	Board-feet.
For the ten-year period, 1934–43, the annual average net loss of standing timber by fire on the Coast amounted to	16,353,600
In the Interior for the same period the annual average net loss amounted to	282,412,300
Making a total average annual net loss of	298,765,900

Per cent. of Coast loss, 5.5.
Per cent. of Interior loss, 94.5.

DEPLETION BY INSECTS.

	Board-feet.
Average annual Coast loss due to insects (token estimate)	1,000,000
Average annual Interior loss	400,000,000
Total average annual loss	401,000,000

Loss from disease averages over 414,000,000 board-feet per annum, but is balanced by increment, except in the overmature stands, wherein that condition is taken into consideration in cruisers' estimates.

TOTAL AVERAGE ANNUAL DEPLETION.

Adding the foregoing figures results in the following totals:—

	Cut.	Fire.	Insects.	Total.
	Board-feet.	Board-feet.	Board-feet.	Board-feet.
Coast	2,775,113,864	16,353,600	1,000,000	2,792,467,464
Interior	401,542,047	282,412,300	400,000,000	1,083,954,347
Totals	3,176,655,911	298,765,900	401,000,000	3,876,421,811

ALLOWABLE CUT.

Having ascertained the volume of mature timber and the rate of its depletion, the next question that arises for consideration is the length of time it takes to grow a merchantable forest. This information is important in determining the allowable cut of the old Coast forest during the growing period of the new forest. In other words, if our industries are to survive how long must the old growth be made to last?

A forest becomes of merchantable size at an age when the growing stock will produce the greatest annual return in volume expressed in percentage of the growing stock. The weight of the evidence before me indicates that timber produced on an average Coast site in sixty years will be of merchantable size for the then available markets and manufacturing processes for which that size tree will then be utilized.

Assuming a close recovery in logging, successful regeneration and reforestation, and protection of our young stands from fire, it is my opinion that the following round figures indicate the extent of the allowable annual cut on the Coast over that growing period of sixty years:—

	Board-feet.
Standing accessible mature timber	180 billion.
Divided by 60	3 billion.
Deduct annual fire and insect net losses (approximately)	17 million.
Leaving	2,983 million.
Add increment on growing stock, 1,253,000 acres at 350–400 feet per acre per year	500 million.
Total allowable annual cut	3,483 million.

This estimate of an allowable annual or periodic Coast cut of about 3½ billion feet a year for sixty years is, however, subject to a further qualification, and I do not consider it a safe guide for any greater period than for the next ten years.

An analysis of the Coast cut by species supplies the qualification:—

Species.	Total Cut, 1937–44.	Average Yearly Cut, 1937–44.	Per Cent. of Total Coast Cut.	Per Cent. of each Species to Total Coast Volume of all Species.
Douglas fir	11,214,723,207	1,401,340,400	49.93	24.0
Western hemlock	4,639,616,898	573,702,112	20.61	29.7
Western red cedar	4,440,492,129	555,061,516	19.77	26.2
Spruce	1,059,546,179	132,443,272	4.72	6.4
Silver fir (balsam)	932,046,513	116,505,814	4.15	11.3
White pine	171,021,597	21,377,699	0.76	0.4
Others	12,866,000	1,608,250	0.06	2.0

It will be remembered the forest inventory of 1937 estimated our total Coast stands to contain 155 billion feet and that Mr. Mulholland stated the 1944 stands approximate the same total and that it would all be accessible when required. In my opinion the weight of evidence shows the stands,

accessible when required, total about 180 billion feet. I have, therefore, added 16 per cent. to his present estimate.

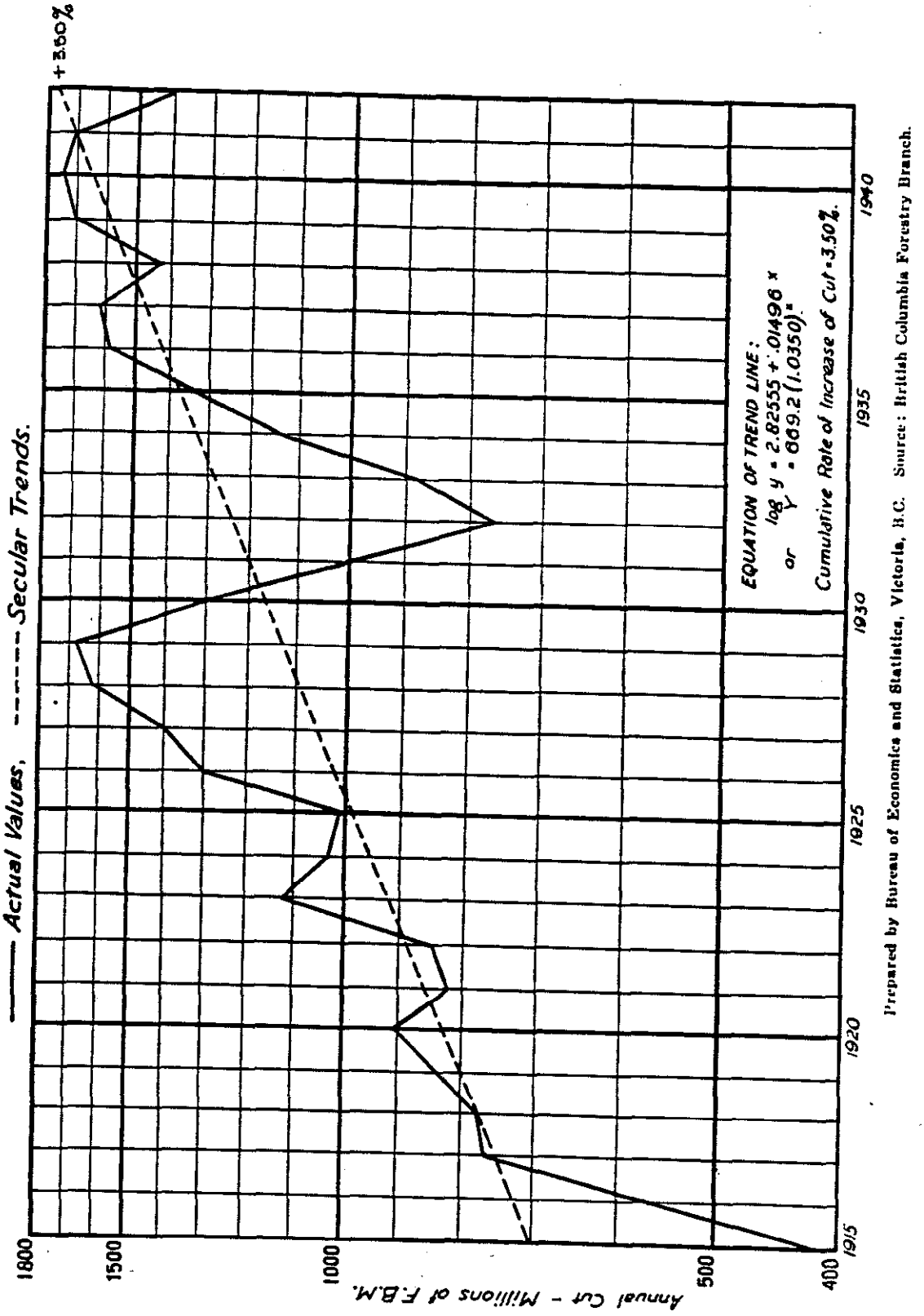
With these figures in mind I now turn to consider how long the present mature stands of the various species on the Coast will last on the basis of the 1937–44 average cut and, as a matter of interest, have contrasted the probable duration of the main species on the basis of Mr. Mulholland's present estimate and my view of the evidence.

Species.	Mulholland's Estimate (Millions of Feet Board-measure).	Supply in Years (Estimate ÷ Average Cut).	My Estimate.	Supply in Years (Estimate ÷ Average Cut).
Douglas fir	37,115	27	43,053	31
Hemlock	46,135	79	53,517	92
Western red cedar	40,553	73	47,041	85
Spruce	9,949	75	11,541	87
Silver fir (balsam)	17,580	150	20,393	176
White pine	651	30	755	35

The reason for my qualifying statement is now evident. When all the mature stock is considered so much raw material it only requires the application of a simple formula to compute the allowable cut over any chosen rotation age. When, however, that stock is divided into species and the volume of each is examined the computation becomes complex. The fact that Douglas fir, supplying the material for 49.93 per cent. of our average annual cut on the Coast comprises only 24 per cent. of our total Coast stand and will be cut out in about thirty years and long before the new fir forests can supply that proportion of the cut, means the logger must turn, in an increasing degree, to other available and marketable species. This will result in a greater annual depletion of the hemlock, cedar, spruce, and balsam fir stands. In other words, when the mature Douglas fir is cut out the billion and a half feet of that species now being cut annually on the Coast must be spread over the remaining species to maintain present overall supply. The cut of Douglas fir from the 350,000 acres of growing stock presently twenty-five to eighty years old, will not relieve the situation thirty years from now to an appreciable degree. Thirty years hence the 800,000 acres of young growth, now eight to twenty-four years old, will not be producing timber of merchantable size. It may be that the Coast operators will direct their attention to the Interior stands of mature Douglas fir to make up the inevitable deficiency of supply to the export market. To say whether such a move would be economically practicable or not would be pure conjecture on my part and thus I do not hazard an opinion thereon.

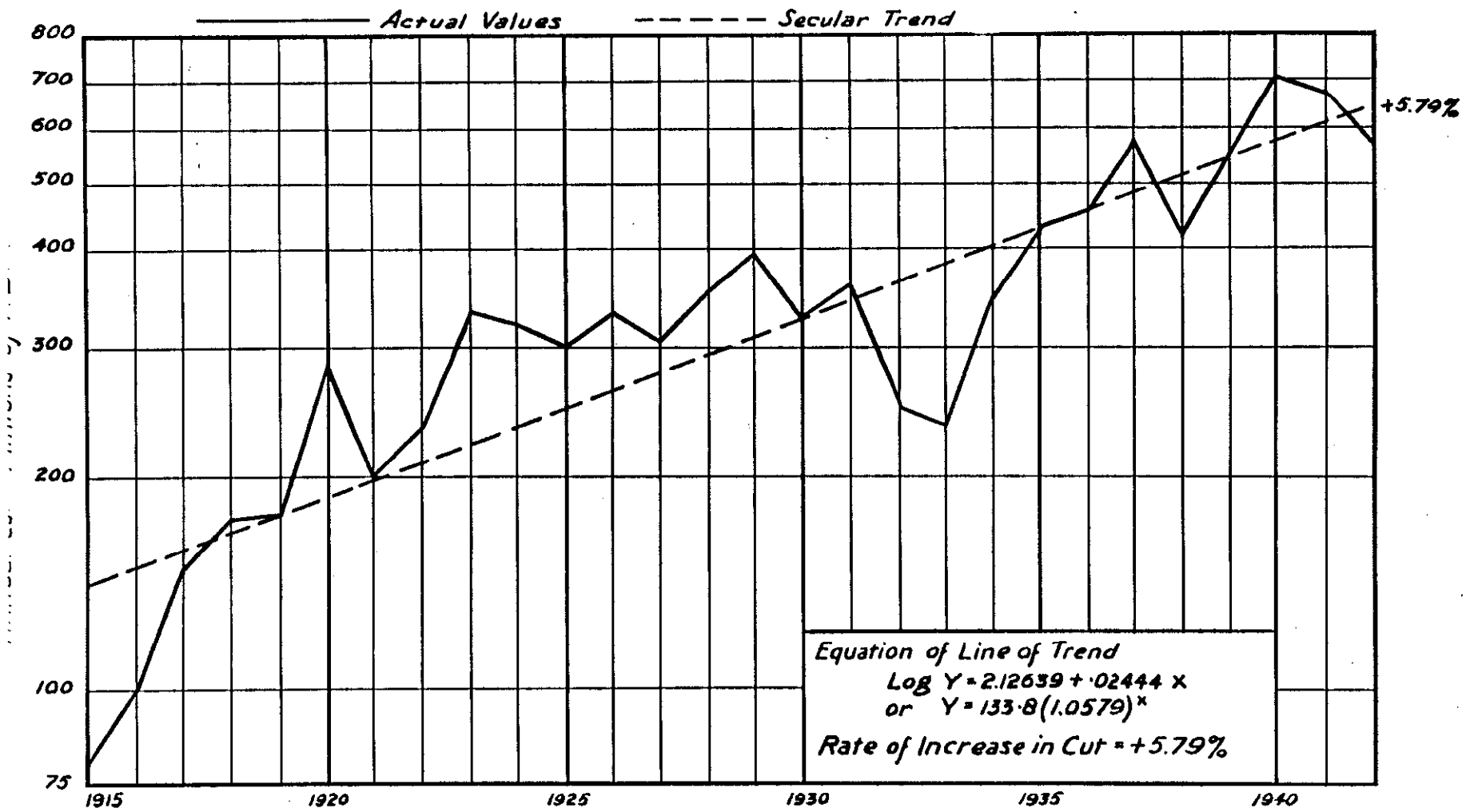
The secular trend of the cut of fir, hemlock, cedar, and spruce, and the total amount cut of all species, are shown on the following charts:—

TOTAL ANNUAL CUT OF DOUGLAS FIR IN BRITISH COLUMBIA FORESTS, IN MILLIONS OF F.B.M., FOR YEARS 1915 TO 1942.



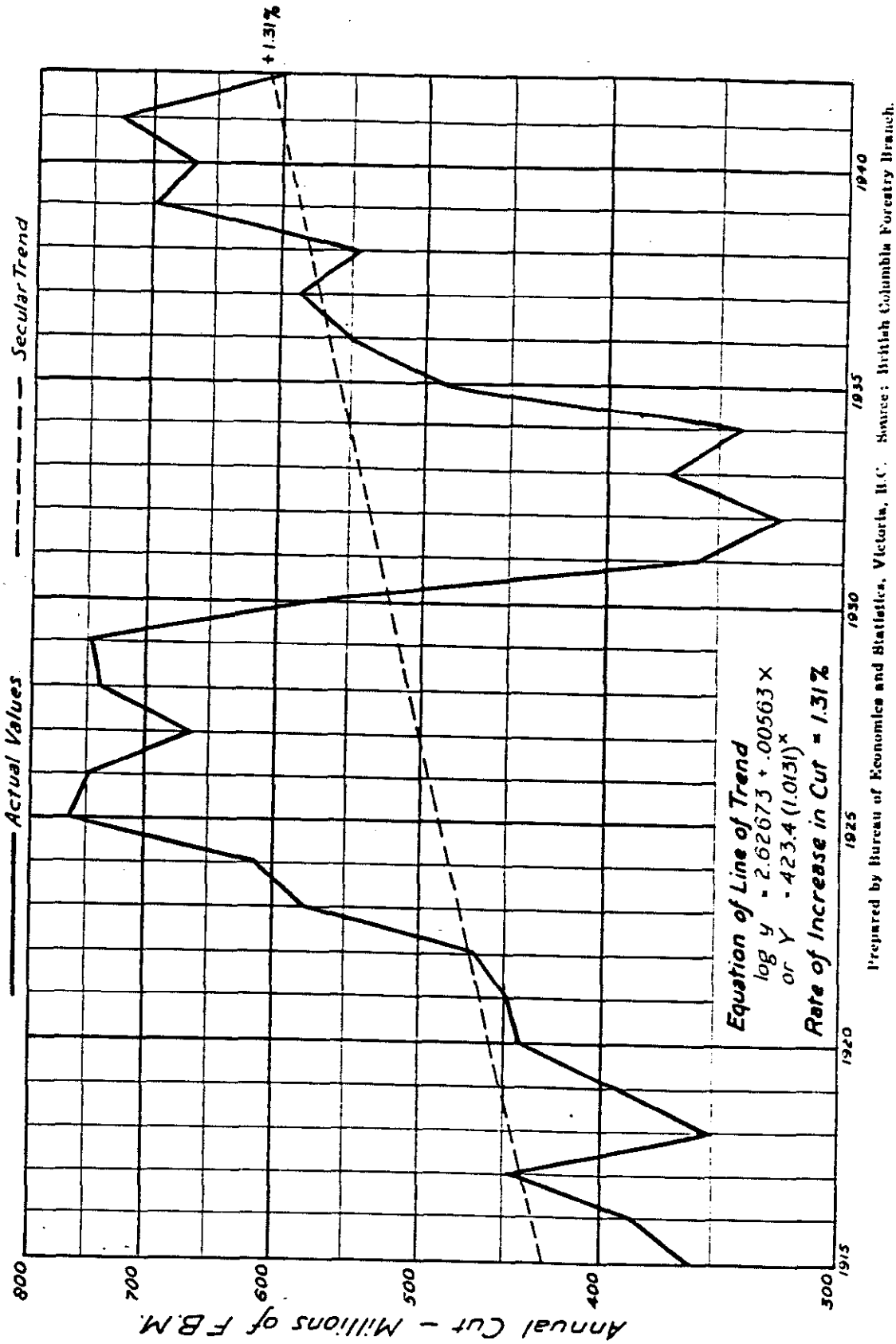
Prepared by Bureau of Economics and Statistics, Victoria, B.C. Source: British Columbia Forestry Branch.

TOTAL ANNUAL CUT OF HEMLOCK IN BRITISH COLUMBIA FORESTS, IN MILLIONS OF F.B.M., FOR YEARS 1915 TO 1942.



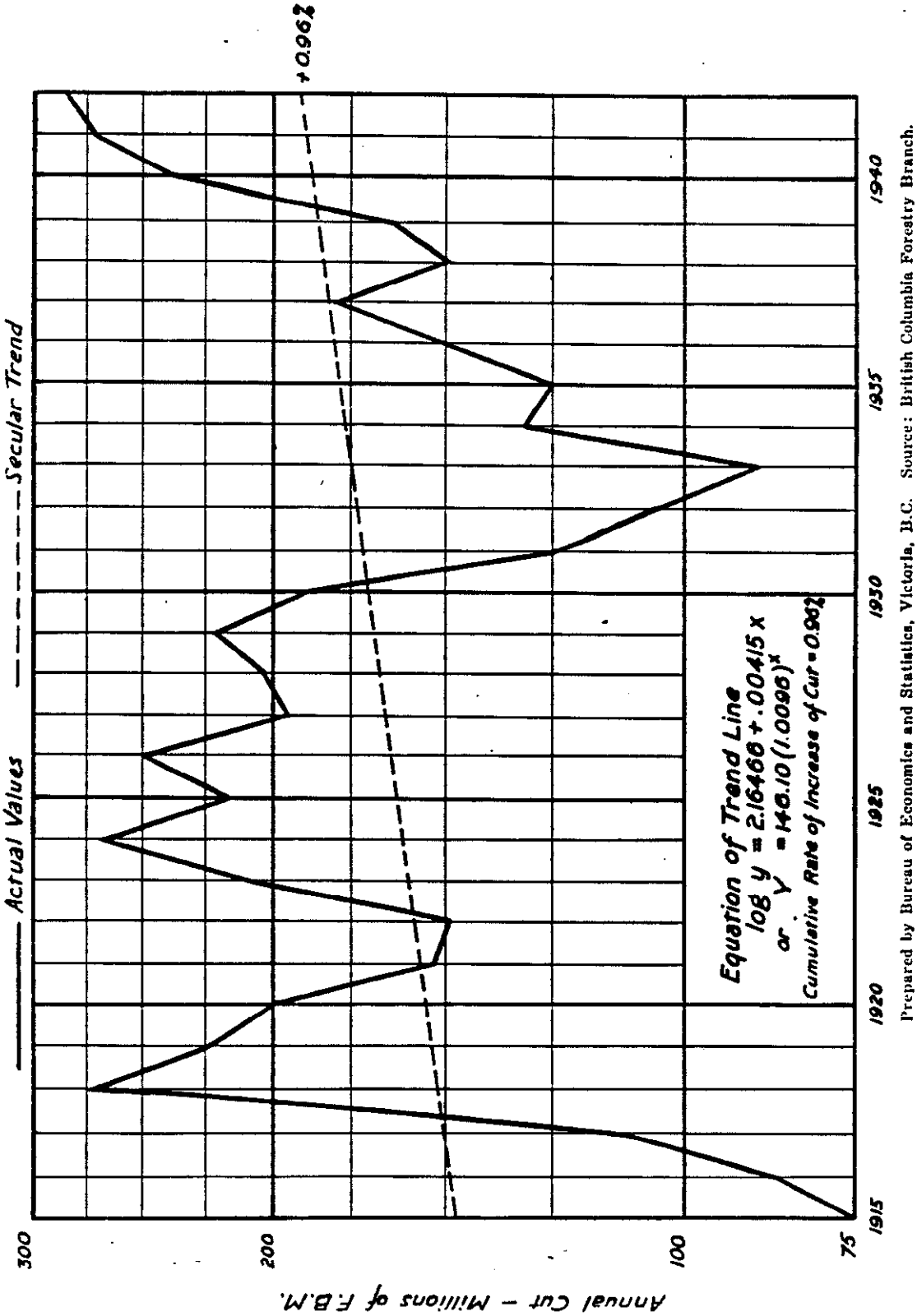
Prepared by Bureau of Economics and Statistics, Victoria, B.C. Source: British Columbia Forestry Branch.

TOTAL ANNUAL CUT OF CEDAR IN BRITISH COLUMBIA FORESTS, IN MILLIONS OF F.B.M., FOR YEARS 1915 TO 1942.



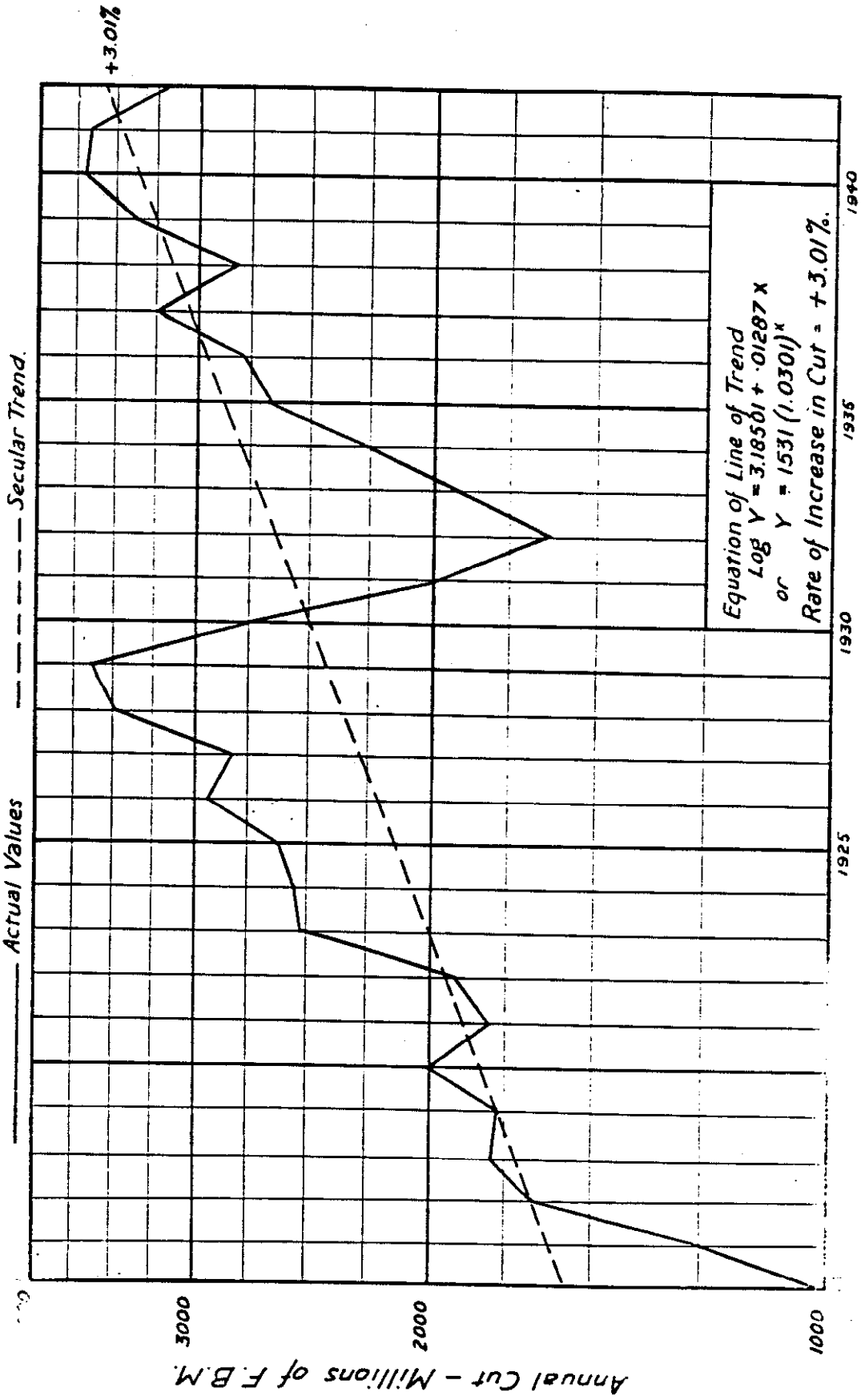
Prepared by Bureau of Economics and Statistics, Victoria, B.C. Source: British Columbia Forestry Branch.

TOTAL ANNUAL CUT OF SPRUCE IN BRITISH COLUMBIA FORESTS, IN MILLIONS OF F.B.M., FOR YEARS 1915 TO 1942.



Prepared by Bureau of Economics and Statistics, Victoria, B.C. Source: British Columbia Forestry Branch.

TOTAL ANNUAL CUT IN BRITISH COLUMBIA FORESTS, IN MILLIONS OF F.B.M., FOR YEARS 1915 TO 1942.



Prepared by Bureau of Economics and Statistics, Victoria, B.C. Source: British Columbia Forestry Branch.

The trend line of the Douglas fir cut cannot continue its present projection and as the mature stands are progressively cut out this line will develop a gradual, descending curve.

My conclusions are based upon opinions which are in part conjectural due to the lack of precise data upon many important aspects of our forest problems. It is therefore a manifest necessity that there be an examination of our entire forestry situation at a period not later than ten years hence. By that 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 the 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. As a basis for present forest regulation it is my firm opinion that the annual cut on the Coast should not be permitted to exceed 35 billion feet during the next ensuing ten-year period. If the exigencies of the future so demand Crown timber may have to be withheld from the market to effectuate this purpose. The average annual Coast cut, it will be recalled, is 2¾ billion feet and in the peak year of 1940 did not reach 3½ billion feet. My estimate, therefore, should take care of the heavy post-war demand for lumber over the next five years it is expected to continue. I do not recommend the average annual cut be not permitted to exceed 3½ billion feet if the exigencies of the post-war market demand a greater production. I do, however, stress the importance of not permitting a greater depletion by cut in excess of 35 billion feet over the next ten-year period.

If I am in error in accepting the evidence of the witnesses who expressed the view that the rotation age of sixty years on the average Coast site will produce timber of merchantable size for future markets the trend of developments during that ten-year period will so demonstrate and adjustments in policy can be made then before any irremediable harm is done to our forest resource.

The present need is to initiate a broad programme designed to lead ultimately to a plan of forest management whereby continuous production may be assured from all our forest land in place of the present system whereby production is the result of cutting out successive forest areas without ensuring the continuous productivity of these areas. The future need will be to adjust that programme to meet the ineluctable developments the years ahead will bring.

DEPLETION IN THE INTERIOR.

The Interior forests are in a much better balance than those of the Coast in relation to the proportionate acreages in mature and immature stands, although the 19 million acres of areas not reforesting calls for serious consideration and future action.

It will be recalled that the Interior stands were estimated, in 1937, to be approximately 100 billion feet of merchantable timber. It was also estimated by Mr. Mulholland that the increment from growing stock added

to that sum 1,580 million feet a year. The average annual depletion is a little over a billion feet a year. There must, therefore, be added to the inventory approximately ½ billion feet a year since 1937 or about 4 billion feet. If the added increment is restricted to those areas considered accessible in 1937, the added increment is a little over 200 million feet a year or 1,600 million in the last eight years. I do not feel justified, upon the evidence, in stating to what extent the areas considered inaccessible in 1937 may be considered now, or in the future, as accessible. Some, but not all, of the reasons which I have previously outlined as increasing the areas of accessibility on the Coast can be validly applied to the Interior. Certainly some areas in the Interior thought inaccessible in 1937 will be logged in the future, but to what particular extent I do not feel qualified to say. But even when the 1937 estimate of accessible merchantable timber areas are accepted without change, the over-all inventory is increasing yearly as the increment exceeds the total over-all depletion. That increment will be greatly increased when fire and insect losses are brought within reasonable control. For the past years those losses have equalled or exceeded the annual cut. Planting of selected acreages in those areas now not reforesting will also add to our Interior resource not only in volume but in quality.

An examination of the cut by species reveals the following figures:—

Species.	Total Cut, 1937–44.	Average Yearly Cut, 1937–44.	Per Cent. of Total Interior Cut.
	F.B.M.	F.B.M.	
Douglas fir	796,582,825	99,572,853	26.2
Western hemlock	81,068,230	10,133,528	2.7
Western red cedar	389,391,842	48,673,980	12.8
Spruce	896,583,906	112,072,988	29.4
Silver fir (balsam)	15,258,965	1,907,370	0.5
Lodgepole pine	125,200,304	15,650,038	4.1
Larch	322,015,887	40,251,986	10.6
White pine	97,008,435	12,126,054	3.2
Yellow pine	320,186,768	40,023,346	10.5

Species.	Mulholland's Estimate, Millions of Feet B.M. (Accessible).	Supply in Years (Estimate ÷ Average Cut).
Douglas fir	7,261	72
Western hemlock	2,288	225
Western red cedar	4,106	84
Spruce	11,426	101
Silver fir (balsam)	2,260	1,184
Lodgepole pine	2,633	167
Larch	1,364	46
White pine	580	47
Yellow pine	1,212	30

Accepting Mr. Mulholland's estimates of Interior volume and accessibility, which are admittedly conservative, the situation at large, that is to say, the relation of depletion to increment, is an assurance that except for

larch, white pine, and yellow pine our Interior timber-supply presents a much better picture on the whole than does the Coast resource.

The Interior, however, presents its own problems and while there is in general an abundance of timber, transportation difficulties confine mills to areas within a narrow radius, with the result that once these areas are cut out the mills cease operations and communities dependent upon them become ghost towns—a situation inimical to the public interest. The shortage of yellow pine is causing the Interior orchardists grave concern. I shall deal with these questions and others relating solely to the Interior at a later stage of this report.

UTILIZATION.

It is a truism that the prevention of waste, both in the woods and in the mills, reduces the drain on our forest supply. It is, therefore, incumbent on me to consider the present extent of the wastage incident to the processes of extracting and converting our timber into lumber and other marketable products in order to ascertain if and how that wastage may be lessened with corresponding reduction in forest depletion over the critical period of transition to sustained-yield production.

LOGGING-WASTE.

The term " logging-waste " is sometimes used as descriptive of logging debris. By " logging-waste " I mean the portion of the tree that has merchantable value but which is not utilized and is left in the woods. According to the evidence adduced before me, the principal forms of logging-waste are as follows:—

(*a*) Sound logs, suitable for sawlogs, that have been left in the woods because either one or both ends have been broken (the bucking of 2 to 4 feet from the shattered end would convert them into good sawlogs); (*b*) short sections of sawlogs resulting from tree breakage during falling; (*c*) trees too small to make sawlogs that have been knocked down during logging; and (*d*) sawlogs that have been overlooked by the yarding crew.

From a study by J. H. Jenkins and F. W. Guernsey, in 1932, of eight representative logging operations using the high-lead system, I have compiled the following tables:—

Average per Acre Volume of Merchantable Timber before Logging (Cu. Ft.).	Average per Acre Volume of Material left on Ground after Logging (Cu. Ft.).	Per Cent. of Original Stands left on Ground after Logging.
14,458	2,714	19.5

Classification of material per acre left on ground after logging:—

Material.	Average Volume (Cu. Ft.).	Per Cent. of Waste.	Per Cent. of Original Stand.
Sawlogs, bucked at both ends	278	10.2	2.0
Sound logs—broken ends	957	35.3	6.7
Logs with rot	51	1.9	0.4
Logs—shattered	181	6.7	1.3
Logs—short, broken	319	11.8	2.3
Tops	106	3.9	0.8
Broken chunks (under 12 inches)	365	13.4	2.6
Small trees	327	12.0	2.3
Large limbs (over 4 inches)	9	0.3	0.1
Sound windfall, snag	121	4.5	0.9
Totals	2,714	100.0	19.5

Material per acre left on ground after logging, classified as to possible uses:—

Material suitable for.	Cubic Feet.	Per Cent. of Material left on Ground.	Per Cent. of Original Stands.
Sawlogs, Grade A	1,009	37.2	6.9
Piling	324	12.0	2.2
Poles	48	1.8	0.3
Ties	15	0.5	0.1
Pulp-wood	294	10.8	2.0
Cordwood	988	36.4	7.8
Shingle-bolts	36	1.3	0.2
Totals	2,714	100.0	19.5

Logging-waste before salvage yarding.

After salvaging. Note the clean ground condition. The small seed-trees left standing are mostly Douglas fir, with some cedar.

THE LADYSMITH EXPERIMENT.

This experimental project was conducted by the Comox Logging and Railway Company, the Powell River Company, Limited, and the Provincial Forest Service, and was intended to ascertain whether sound wood left in the forest after logging could be economically salvaged and used for the manufacture of pulp.

The original logging produced approximately 6,405 cubic feet per acre and logs down to a top diameter of from 9 to 10 inches were recovered, indicating close utilization under present logging methods. Sixty-six per cent. of this volume was Douglas fir, 27 per cent. hemlock. the remainder of the stand being composed of pine and cedar.

Salvage operations were conducted on an area of 260 acres and total recovery amounted to 400,980 cubic feet. About 50 per cent. of this total was made up of small understory hemlock too small for saw timber. Some of these trees were still standing while others were wind-thrown or pulled down during the first logging operation. Over 30 per cent. came from long tops. Other material consisted of broken chunks and a few sawlogs left on the ground. Scattered blocks of scrubby timber were also cut and used. Small standing fir and cedar were left for future seed-supply and only a small part of the cedar on the ground was recovered because not suitable for newsprint (although useful for other purposes). The salvaged material ranged in length from 10 to 90 feet and averaged 34 feet. Small end diameters averaged 6.1 inches. Because of loss through breakage in loading and sap-wood decay of some of the wood, the actual scale of sound wood delivered to the Powell River Company amounted to 370,760 cubic feet, yielding in tonnage of pulp an amount equal to the pulp yield from 2 million F.B.M. of normal pulp-logs.

As mentioned above, the log-recovery from the original logging operation, on the acreage in question, amounted to approximately 6,405 cubic feet per acre. The salvaged wood amounted to 1,550 cubic feet per acre. Thus the salvage was 19 per cent. of the total of the utilized stand and 24 per cent. of sawlog volume.

The parallel between the percentages of recovery in this experimental operation and the percentage figures of recovery resulting from the study of Messrs. Jenkins and Guernsey is worthy of note.

Nelson C. Brown, Professor of Forest Utilization at Syracuse University, has estimated[1] the proportion of total wood volume wasted at 23 per cent. He considers the leaving of unnecessarily high stumps an important loss factor and summarizes the percentage estimate as follows:—

	Per Cent.
Stumps	3.0
Tops, limbs, and branches	12.5
Defective and decayed trunks and boles shattered in falling	5.5
Miscellaneous: Improper log lengths (i.e., cutting even lengths), transportation loss, decay in storage, etc.	2.0
Total	23.0

(1) "General Forestry," 1935, p. 165.

I think I may safely assume that, generally speaking, about 20 per cent. of the total wood volume of our logged areas is left in the woods as waste. Our total annual log production of 3 billion feet is based on logs scaled. That means that 750 million feet of material are left in the woods each year. On the conservative basis of 300 feet per acre per year increment we are thus wasting each year a volume of wood equal to the yearly growth on 2,500,000 acres of productive forest lands. This practice is an uneconomical misuse of the forest resource and, in addition, this mass of material creates a dangerous fire-hazard.

There are, no doubt, many uses that can be found for logging-waste. Wood suitable for pulping purposes can be used for that process; but other avenues are open, as the Jenkins study so reported (*see supra*).

The knowledge that uses may be found for logging-waste does not in itself supply the answer to the problem of its utilization. This question, like all others affecting forest conservation, has an economic aspect. If the operator can salvage this material at a profit he will do so. If he can not it stays in the woods. When lumber prices are high, the degree of utilization is correspondingly increased. When market prices decline, low-grade lumber is difficult to sell and only the logs that can be converted into high-grade lumber are taken out of the woods. Thus the end price of the product and its marketability determines the extent to which logging-waste will be utilized in the future.

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."(1) Experience will undoubtedly evolve cheaper methods of recovery and lowered costs of loading and transportation may be anticipated.

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. Other formulæ will occur to experienced loggers and in co-operation with the forest administration they will, I feel sure, find a way to meet the exigencies of this situation.

The possible adoption of the cubic-foot scale system for measuring salvage material will be dealt with under another heading.

Up to this point I have been directing attention to the extraction of logging-waste to ascertain whether or not continuous supply of this mate-

(1) Report on Ladysmith Experiment.

rial might be maintained. It is my view that not only should this desired objective be reached but that it can be reached.

There is, however, little to be gained by securing a continuity of supply unless there is also an assured continuity of demand for that supply.

It might be thought that the logical consumers of salvage would be the companies producing pulp and those sawmills designed to process the small diameter logs which are recoverable. To a degree that is so, but in so far as our pulp-mills are concerned it must be borne in mind that their product is sold on an exacting and competitive market in which quality of product controls the demand and selling price. Salvaged waste is inferior in quality when compared with normal pulp-logs and very little of this material can be used in the sulphite process. It is doubtful if over 20 per cent. waste can be used in the ground-wood process without a degrade of quality, although research may remove some of the inhibiting factors. It must be assumed that the logging operations conducted by the pulp companies on their own limits will produce 20 per cent. utilizable waste. The conclusion is, therefore, that little, if any, demand for the great quantity of waste from general logging operations will come from the pulp companies unless and until further research, leading to improvements in processing techniques, points the way to a greater utilization of this material.

Sawmills in the Province are equipped for, and geared to, the use of heavy logs. Eight or more of these are, however, now using Swedish gang-saws designed to cut smaller material, eight others have extra head-saws for small logs, and other millers have in contemplation similar installations. It is only a question of time until the present standard type of sawmill becomes obsolete and, when the cut is taken from the new forests, sawmills must be converted to process the logs then being produced. Those mill-owners who foresee the trend are gradually adapting their plants to that end. I think it a reasonable conclusion that once a continuous supply of logging-waste, suitable for milling, is coming out of the woods the millers will be able and willing to manufacture it, provided the finished product can be marketed at a profit.

During periods of short supply with concomitant high prices markets exist for lower grade lumber and other products cut from small logs. During normal market conditions—if any period may be termed " normal " in the logging industry which is subject to wide fluctuations in price and production—markets for this class of material will be much narrower. This would indicate the need for further research into potential uses and markets to ensure a profitable outlet for the end product of salvage.

This opens up a new vista wherein even now may be seen the tremendous potential value of logging-waste as the raw material for the production of the many chemical derivatives of wood scientific advancement has made possible. This Province has so much to gain by the development of new wood-uses that extensive research, financed by the Government, would be amply repaid.

In the years ahead, scientists of those future days, looking back at this era, will characterize our methods of extraction and conversion of the raw

stuff of our forests as crude and wasteful. In the meantime, and in relation to the utilization of logging-waste by our pulp-mills and sawmills, it seems to me that the president of the Powell River Company expressed the correct view when he said:

> ". . . if the price is attractive enough to make the use of this material an economic possibility, the log-using industries will find a use for it despite its deficiencies in quality and its higher cost of processing."

I have made mention of some of the means that should be adopted by the Crown to make the price attractive, thus encouraging a continuity of supply and demand.

There is another aspect of this question of logging-waste to which reference may be made. I see no reason why steps should not be taken, wherever possible, by the forest administration and industry to lessen the present wastage in the woods. Stumps can and should be cut lower. Skilful and careful felling would minimize breaking and shattering of tree-trunks. To log old-growth trees down to 6-inch tops would be impractical because of knots and so on, but understory trees in mixed stands could be taken down to 6-inch tops and probably others to like diameters. To suggest that most of this material could be salvaged on a relogging "show" is not the answer because, due to topography, distance from markets, and other factors affecting costs, relogging for salvage would, in general, be a practicable procedure only on about 60 per cent. of our logged areas.

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 understory 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.

SAWMILL-WASTE.

The fact that about 20 per cent. of the wood volume per acre is now being wasted during logging operations leads me to consider what happens to the 80 per cent. that eventually arrives at the sawmill.

Thirty years ago it was a common sight to see smoke billowing from the large burners that seemed an integral part of sawmill construction. In recent years, as utilization of sawmill-waste has increased, smoke from the sawmill burners has, in most mills, been reduced to a minimum. This is especially so in relation to mills near populated centres offering a market for sawdust, shavings, and wood-waste as fuel for both domestic and commercial use. Then too, less waste is evident since more sawmills have been cutting to European standards. More precision in sawing is required to produce lumber to meet the demand of that market.

A study of fourteen large Coast mills by 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

Of the slabwood edgings and trim, the following percentages were utilized:—

	Douglas Fir.	Hemlock.	
Lath	3.7	0.5	Lath.
Firewood	6.8	3.8	Pulp-wood.
Totals	10.5	4.3	

These figures would seem to indicate that 1.35 per cent. of the fir and 0.64 per cent. of the hemlock slabwood edgings and trim were used to produce lath, pulp-wood, and firewood. The recovery from this material (misnamed mill-waste) is to-day much greater, but to what extent I am unable, on the evidence, to say. Its principal uses are for firewood, mouldings, broom and other handles, lath, shingle-bands, box-ends, small toys, hog-fuel, pulp-wood, and pulp chips.

To sum up the foregoing, it appears from the evidence before me, that about 70 per cent. of the volume of the logs that arrived at the mill was converted into green lumber. This was a loss in volume of approximately 30 per cent., which, added to the 20 per cent. loss in logging, meant that about 50 per cent. of the volume of the tree finally emerged from the mill as lumber. Logging-waste remains to-day at much the same figure as then and while mill-waste, as I have said, has been greatly reduced from the Jenkins estimate, upon which the foregoing figures are based, complete utilization has yet to be attained.

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 if these concerns find it practical to buy, bark, and chip it here, and pay transportation costs thereon to Port Angeles, 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.

I am also satisfied, from the evidence, that most millers are alive to the compelling necessities of the situation and are anxious to reduce wastage in manufacture. My impression is, from hearing the expressed views of many of them, that they are adopting now, and are willing to adopt in the future, all reasonable methods of proven efficiency to effectuate that purpose.

The links in the chain of wood-use begin with the tree in the forest and in time will end in its complete transmutation to various vendible forms and substances and when that day comes—as it will—the wood-using industries will be as efficient as the meat-processing industries in their degree of utilization of the raw material that they process.

Before leaving this subject I would like to add a word concerning the use of wood preservatives as a factor in wood utilization in its relation to forest depletion.

Hemlock and lodgepole pine are suitable for railway-ties. Untreated ties from these species have a life limited to six and seven years respectively, but when treated with preservatives have a service use extending to twenty-one and thirty-one years respectively. I do not know what percentage of ties are made from Douglas fir, but when 3,000 of these are required for each mile of railroad the use for this purpose of treated hemlock and lodgepole pine would assist in lessening, to some degree at least, the present drain on our Douglas fir stands.

The United States Forest Service has estimated that about 10 per cent. of the total cut is used to replace wood rendered unfit by the activities of wood-destroying fungi. Wood treated by preservatives prevents this fungi development and doubles or trebles the useful life of wood products exposed to fungi attack—i.e., ties, fence-posts, poles, mine-timbers, and such like.

The evidence discloses that in mines, where timber rot is a factor, the practice is to use timber sizes larger than load conditions warrant in order to offset the expected rot. Our production of large-size timbers will decline as our mature forests are depleted. The use of smaller sizes will be an economic necessity, but preservatives against rot can, and will, render

this class of material just as effective for its purpose as large untreated timbers.

For these and other reasons I suggest that wood treated with preservatives be used in place of untreated wood wherever practicable in order to lessen forest depletion.

CONVERSION PLANTS.

Conversion plants in this Province fall into two broad classifications: those converting logs into lumber, shingles, and allied lumber products; and those using logs as the raw material for the manufacture of pulp and paper products.

SAWMILLS.

I have tabulated the significant statistical material in the following form:—

Year.	No. of Active Sawmills.	Daily Capacity, M.B.M.	No. of Inactive Sawmills.	Daily Capacity, M.B.M.	Total Production of Sawn Lumber, Millions of F.B.M.	Average Log Prices, all Species.	Average Log Prices, all Species purchased by Log-buying Mills. (1)	Average Lumber Sales Prices F.O.B.
1929	354	11,896	95	2,200	2,460	$14.67	$12.14	$21.44
1930	301	11,020	141	3,204	1,928	12.88	10.80	17.66
1931	334	10,167	158	4,109	1,342	10.46	8.94	13.90
1932	293	7,641	139	4,621	934	9.10	7.79	12.01
1933	295	8,715	134	3,632	1,133	9.53	8.05	12.82
1934	349	9,152	129	2,999	1,464	10.12	9.52	14.85
1935	384	9,822	96	1,962	1,610	10.74	9.01	14.81
1936	410	11,401	122	1,699	2,023	12.36	11.60	17.40
1937	434	11,042	131	1,685	2,072	14.62	12.89	20.79
1938	481	12,159	126	1,406	2,044	13.12	12.20	17.36
1939	461	11,698	147	1,907	2,276	13.46	11.65	18.67
1940	542	12,691	141	1,432	2,324	15.12	13.67	22.03
1941	557	13,820	129	1,083	2,407	16.04	15.27	25.71
1942	551	13,197	149	1,206	2,303	17.80	15.75	29.16

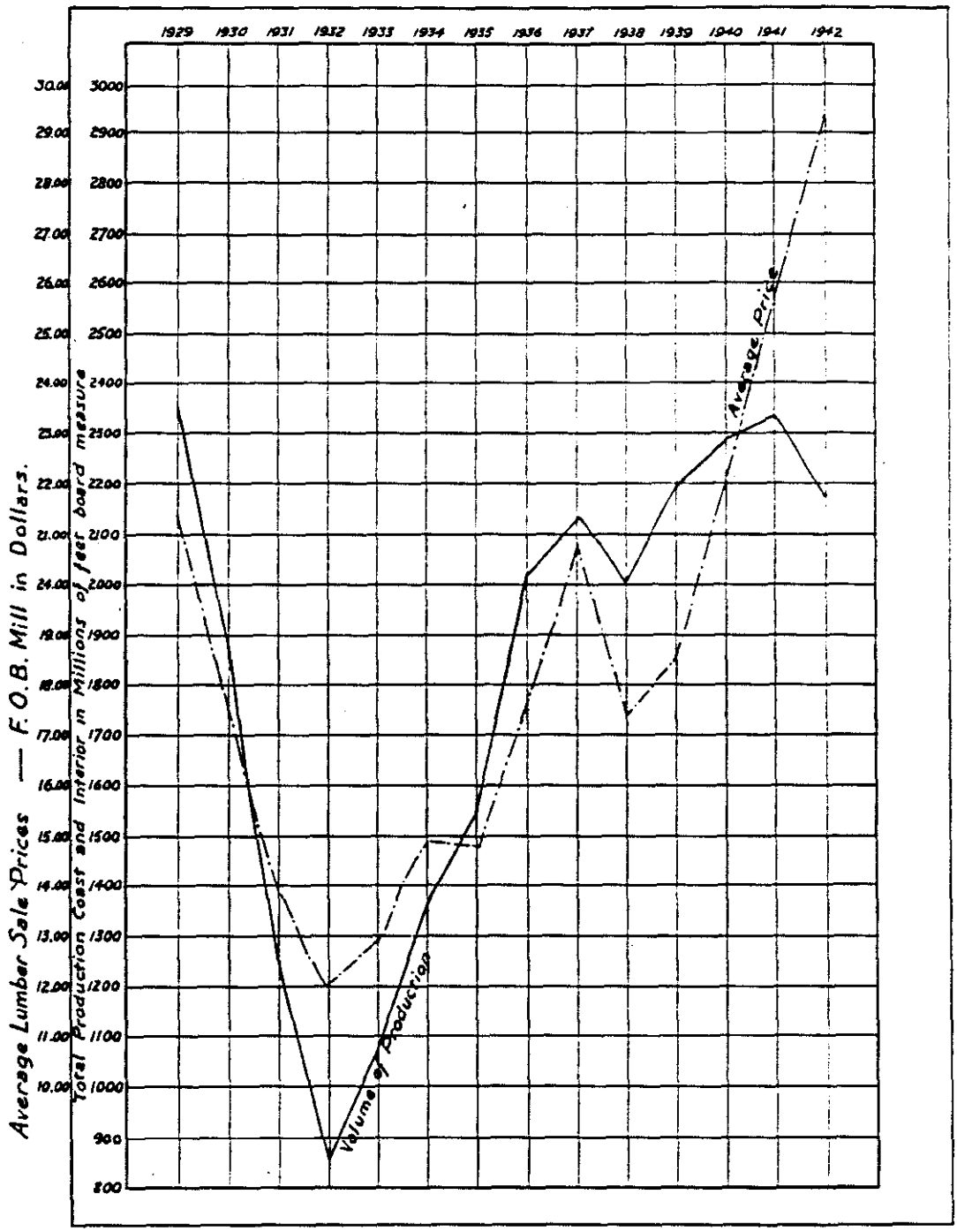
(1) The difference between log prices on open market and general average log price is due to the higher percentage of hemlock and smaller percentage of peeler logs purchased by the log-buying mills.

From the foregoing table I select the following years for purposes of comparison:—

Year.	No. of Active Sawmills.	Daily Capacity, M.B.M.	Total Lumber Production, Millions of F.B.M.	Average Selling Price of Lumber.
1929	354	11,896	2,460	$21.44
1932	293	7,641	934	12.01
1941	557	13,820	2,407	25.71

The conclusion from this comparison must be that 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. The accompanying graph is based upon the above tables:—

TOTAL LUMBER PRODUCTION FOR BRITISH COLUMBIA AND AVERAGE LUMBER SALES PRICES F.O.B. SAWMILL, 1929 TO 1942.



Probably the basic reason for the 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, for there is no profit in sawing air. 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.

It is worthy of note that in 1929, 354 mills with a daily capacity of 11,896 M.B.M. produced 2,356 millions of F.B.M., while in 1941, 557 mills (an addition of 223 mills) had only an added daily capacity of 1,924 F.B.M. and actually produced less lumber than the 354 mills operating in 1929. The 1929 log production of the five major species—i.e., Douglas fir, hemlock, cedar, spruce, and pine—was 3,077,316,706 board-feet. In 1941 this cut had increased to 3,437,320,637 board-feet. Thus, while sawlog production increased, saw-lumber production decreased. The explanation of this paradoxical state of affairs is, I think, in some part at least the retrogressive trend in the grade of the logs being produced and manufactured.

The logging industry, no longer capable of western expansion, is creeping up the Coast northward. Logging activity now centres about 150 miles north of Vancouver. This means that the best stands in the valleys and on the lower slopes are disappearing and operators are taking their cut from higher altitudes, both topographically and geographically. It follows that allied to and paralleling the depletion of the mature stands, and as the timber-line recedes to mountain-slopes and higher latitudes, log grades are slowly but inevitably declining in terms of relative percentage.

This change is manifest in the following figures of selected years of the Coast cut of royalty-bearing timber—i.e., fir, cedar, spruce, and pine:—

Species.	1924.	1928.	1933.	1938.	1942.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Fir—					
No. 1	13	9	6	4	5
No. 2	74	69	67	63	64
No. 3	13	22	27	33	31
Cedar—					
No. 1	23	17	4	9	13
No. 2	56	55	44	51	50
No. 3	21	28	52	40	37
Spruce—					
No. 1	8	12	2	3	4
No. 2	66	61	56	50	52
No. 3	26	27	42	47	44
Pine—					
No. 1	4	6	3	1	3
No. 2	68	74	71	60	57
No. 3	28	20	26	39	40

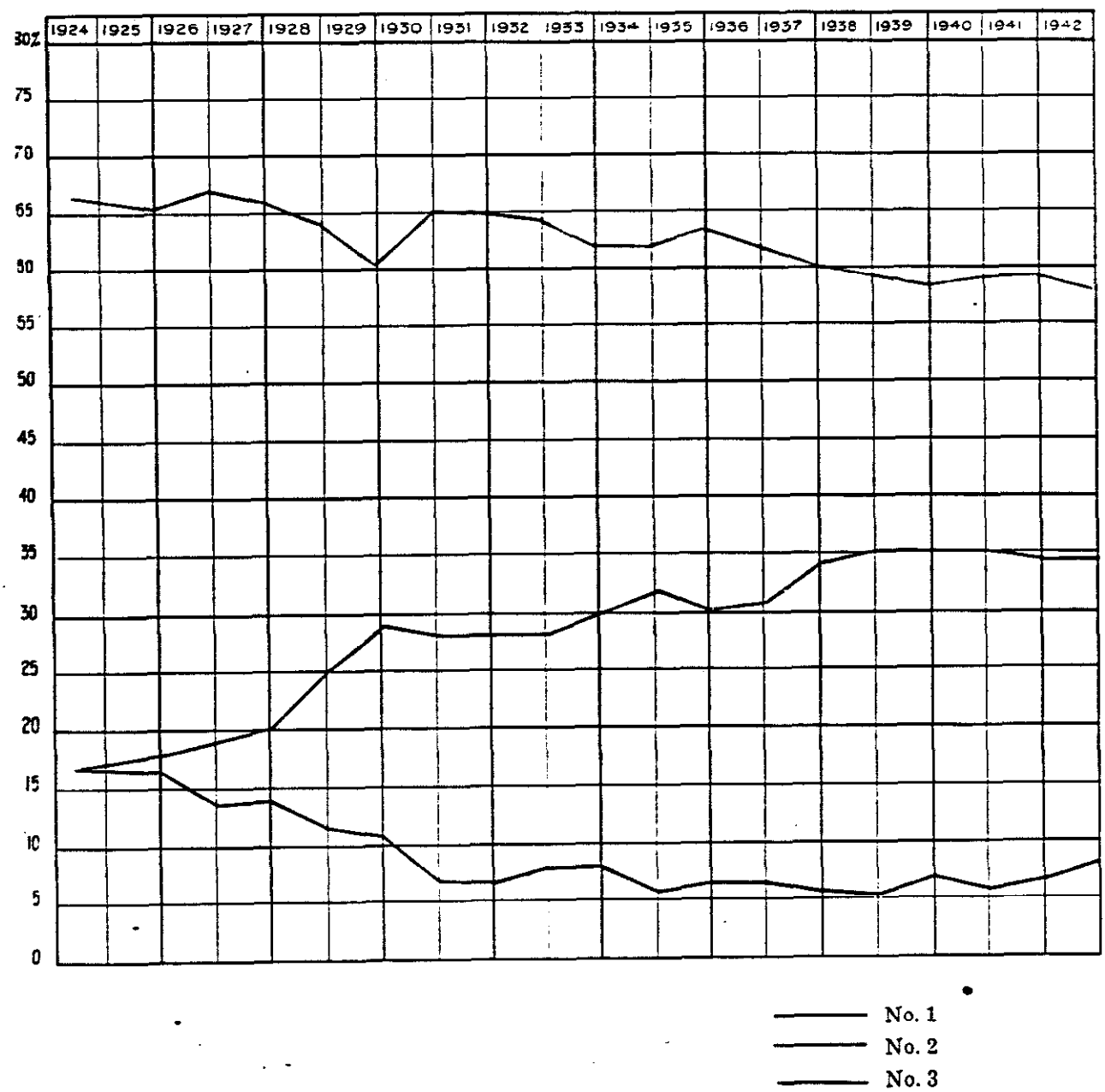
Combined averaged grades for these same four species:—

Grades.	1924.	1928.	1933.	1938.	1942.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
No. 1	17	12	8	6	8
No. 2	66	64	62	59	58
No. 3	17	24	30	35	34

Since 1924, then, the percentage of production of No. 1 logs of the four species has decreased from 17 to 8 per cent. or more than 50 per cent., while No. 3 grade logs have increased in percentage from 17 to 34 per cent. or 50 per cent. Hemlock logs are not included in this tabulation because not subject to grading regulations, nor do these percentages take into consideration timber cut from royalty-free areas; for example, the Esquimalt and Nanaimo Railway lands.

The change of grades throughout the years 1924–42 is shown in detail in the following graph:—

TREND OF LOG GRADES BY PERCENTAGES (ROYALTY-BEARING TIMBER ONLY), FIR, CEDAR, SPRUCE, AND PINE, 1924–42.



This secular decline in the production of high-grade logs will lead to changes in sawmill construction and operation. Large progressive mills even now are developing smaller production units and the future will witness an increased installation of Scandinavian gang-saws designed to cut small round logs in place of or in addition to the present gang-saws cutting squared cants.

The yearly number of mills closed down has averaged 130 over the ten-year period 1933–42. Generally speaking, these mills may be termed marginal producers of small daily capacity. It is impossible to find a common factor for this mortality rate which is due to many causes, including business failures through lack of adequate capital reserves, fire occurrences, exhaustion of cheap accessible stumpage, and inability to acquire an additional and continuous supply of logs on the open log market.

In addition to sawmills producing sawn lumber others produce shingles and ply-wood. In 1942 four large ply-wood plants were in operation as producing units integrated with their parent sawmills.

The number of operating shingle-mills has averaged eighty-one over the ten-year period 1933–42, turning out a high-grade, edge-grained red cedar shingle, with an estimated average daily capacity of 618 M. shingles. Plant investments amount to about $4,000,000, while mill employees number between 1,500 to 1,800 on an annual pay-roll of approximately $2,600,000. Approximately 300 million board-feet of cedar logs are utilized for shingle-manufacture—i.e., from 50 to 60 per cent. of cedar log production—and as about 80 per cent. of the shingles produced are sold on the United States market the prices of shingles and of cedar logs suffer a wide fluctuation due to the quota system which restricts Canadian imports to 30 per cent. of United States consumption of domestic and imported red cedar shingles. This percentage is based upon the average consumption of the three preceding years. Imports exceeding the quota are subject to a duty of 25 cents a square. The result is that when the allowable quota is filled, shingle-mills are forced to curtail production or close down. Future trade agreements between Canada and the United States may, it is hoped, result in the freer exchange of commodities between these two countries. This, if achieved, will do much to stabilize our shingle industry and the price of cedar. Cedar grows, in most instances, in mixed stands and is logged with the other species of the stand. In consequence a steady market for this species is necessary to ensure its proper utilization.

PORTABLE MILLS.

The high price of lumber has led to an increase in the use of portable mills—especially for tie production. Many of these have a carriage of less than 16 feet and do not utilize the side lumber that may be recovered from the slab. A well-designed and properly operated portable outfit does not have a higher percentage of unavoidable waste than the standard type of mill, but unfortunately more than a few of them, due to poor equipment and careless operation, are not within that category. It seems to me, that portable tie-mills should be required to conform to a standard to be set by

the Forest Administration before being permitted to operate. "Free enterprise" is sometimes a handy excuse for a *laissez-faire* policy but should not be permitted to override the public interest in seeing to it that our forests are not wasted by itinerant and irresponsible despoilers of good wood.

LUMBER PRODUCTION BY SPECIES.

Year.	Total Production.	Fir.	Hemlock.	Cedar.	Spruce.	Others.
	M.B.M.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1929	2,460,500	65.1	10.8	6.6	11.8	5.7
1930	1,928,598	65.0	12.1	6.7	10.5	5.7
1931	1,342,164	69.7	9.7	5.2	9.2	6.2
1932	934,373	68.7	13.0	5.8	7.4	5.1
1933	1,133,344	72.2	11.3	3.8	7.5	5.2
1934	1,464,632	70.5	13.9	4.2	6.5	4.9
1935	1,610,347	69.2	14.3	6.1	5.8	4.6
1936	2,023,708	70.2	14.7	5.3	5.4	4.4
1937	2,072,675	67.8	15.0	6.3	6.5	4.4
1938	2,044,876	68.4	14.8	6.8	5.4	4.6
1939	2,276,033	70.0	13.7	7.3	4.9	4.1
1940	2,324,408	72.7	9.7	7.5	6.4	3.7
1941	2,407,800	63.3	9.4	8.5	14.6	4.2
1942	2,303,552	66.5	13.2	7.8	8.6	3.9

It will be remembered that for the last eight years the cut of Douglas fir has averaged about 50 per cent. of the total Coast cut and 26 per cent. of the total Interior cut.

We now see that of the total Provincial lumber production Douglas fir contributes over 60 per cent. of the raw material for that production. Bearing in mind also that the supply of mature Douglas fir on the Coast is good only for about thirty years, it therefore follows that sawmills must be prepared to manufacture other species if production of sawn lumber is to be maintained at or near present levels. As I pointed out earlier, before very long—as time is measured in matters relating to forestry—loggers will have to turn their attention in an ever-increasing degree to the extraction of species other than mature Douglas fir. The inevitable corollary is that millers will have to process and find and maintain markets for these other species in their manufactured form until such time as "second-growth" fir can be grown to merchantable size. It seems that hemlock will have to fill the hiatus that now appears to me certain to occur between the exhaustion of the mature Douglas fir forests and the maturity of the young fir growth. The ugly duckling will grow into a swan. And there is no reason why this should not be so.

HEMLOCK.

Western hemlock (*Tsuga heterophylla*) has suffered in the past in foreign markets from the unsatisfactory characteristics of Eastern hemlock (*Tsuga canadensis*) with which it is likely to be confused by indiscriminative buyers. Eastern hemlock has relatively poor strength qualities, is brashy and splinters. Western hemlock is much superior in quality to

its Eastern relative. Then, too, Western hemlock has not been as highly regarded in foreign markets in the past as its splendid qualities entitle it to because of poorly seasoned shipments to those markets. Happily, many misconceptions concerning the products of this tree species have been removed by educational programmes carried on by trade extension organizations and by the diligent and persistent efforts of the millers of hemlock to produce a high-quality lumber.

The need for the maintenance of foreign markets for this product is manifest and efforts designed to that end should be continued and, in fact, augmented.

Western hemlock is a tolerant tree and is usually found in mixed stands in association with Douglas fir or cedar. It grows from sea-level to altitudes of about 4,000 feet, and where it is the dominant species in the stand has a high yield ranging from 20,000 to 50,000 board-feet per acre. Trees in dense stands grow tall and straight and usually clear of branches for 50 to 75 feet with only a slight taper. Its fine, even-grained wood is due to its uniform rate of growth. The average mature tree reaches a height of from 125 to 175 feet, and from 2 to 5 feet in diameter, although trees of much greater size are occasionally discovered.

In proportion to its weight it is one of the strongest and stiffest of the softwood species and can compete successfully with Douglas fir in many fields of use. For some purposes it is, indeed, when properly seasoned, superior to Douglas fir, especially for interior finishes because free from resin, and for edge-grained flooring because of the uniform hardness of the spring and summer wood accretion, thus ensuring slow and even wearing without ridges or splinters. Oddly enough, it grows harder with age. Western hemlock as material for wooden containers has no superior. When properly dried it is odourless, tasteless, light in weight, takes nails without splitting, and is free from pitch, gum, or colouring matter. Aesthetically it may be termed a beautiful wood, taking a soft and satiny finish or one of shining polish and lustre. When impregnated with specially prepared solutions of urea-formaldehyde resins it is converted into a hard wood of many varied uses.

Green hemlock has a high moisture content. Douglas fir on the Coast averages 37 per cent. while hemlock averages 66 per cent. moisture content. This has led to the belief that hemlock is subject to excessive shrinkage when dried. The fact is, however, that the shrinkage from a green to a 12-per-cent. moisture content[1] results in a reduction in percentage of volume in fir of 12.3 per cent., while the hemlock shrinkage is only 12.9 per cent. Green hemlock weighs 44 lb. per cubic foot as against 39 lb. per cubic foot for fir. This added weight of water in green hemlock restricts its rail distribution because freight rates for lumber shipped by rail are based on weight. This is not a factor in cargo shipments as water carriage rates are based on volume of lumber and not weight.

After drying to a moisture content of 12 per cent. the situation is reversed. Fir, air-dried as stated, weighs 37 lb. per cubic foot as against

(1) 12 per cent. represents a low moisture content for lumber air-dried during the summer.

30 lb. for hemlock. Well-seasoned hemlock is, therefore, under no handicap for shipment to rail export markets.

Green hemlock, due to its high moisture content and absence of resins and protecting oils, is susceptible to attack from wood-destroying fungi and spores producing sap stain and mould. H. W. Eades, of the Forest Products Laboratories, states:—(1)

> "It is possible to prevent fungal growth on lumber in various practical ways: It may be done by poisoning their food supply (the wood itself) through application of antiseptics, by sterilization through the application of heat, as in kiln-drying, or by simply reducing the moisture content of the wood. This last is, of course, a primary method of prevention, and one that entails a minimum of cost.
>
> "The upper limit of moisture content favourable to the growth of wood-inhabiting organisms is very high: the lower limit is at about fibre-saturation point; that is, when the wood has a moisture content, on an average, of about 25 per cent. Reduction to a uniform moisture content of about 20 to 25 per cent., therefore, would inhibit sap-stain, mould, surface growth of wood-destroying fungi, and development of any actual rot, during transit, and would even give the wood a good chance to remain contamination-free if stored at destination under unsanitary conditions. Even at moisture contents of between 25 and 30 per cent., growth of fungi would be slow.
>
> "The moisture-content reduction must be carried out before shipment. . . . From experiments carried out by the Forest Products Laboratory, Vancouver, it has been found that the change in moisture content of air-seasoned and kiln-dried lumber, properly stowed and protected during transit, while *en route* from British Columbia to the United Kingdom, Australia, South Africa, West Indies, or Eastern Canada, is generally negligible and without effect on the condition of the lumber."

It seems to me an inescapable conclusion if we are to secure and maintain export markets for hemlock—as we must—it is essential that it be shipped properly seasoned and not in a green state. The total kiln capacity on the Coast is entirely inadequate to perform this function.

Dry-kilns cost a considerable sum of money and their installation is frequently beyond the financial ability of the smaller sawmill operator. Then, too, air-drying lumber stock for long periods freezes capital needed for continued production. The answer seems to lie in providing custom kilns, built and operated by the Crown, unless the anticipated increase in hemlock production would make such an enterprise financially attractive to private interests. Short-term Government loans could be made available to finance mills air drying hemlock in areas wherein it would not be feasible to erect custom kilns.

Paralleling any endeavour designed to encourage the export of hemlock in a properly seasoned state should be an equal effort having as its objective the discontinuance of green hemlock export shipments. An educational campaign leading to the general acceptance of seasoning specifications for export shipments might prove effective. On the other hand, if ways and means are found whereby the small sawmill operators may kiln-dry their hemlock lumber at a cost within their capacity to pay for

(1) "Sap Stain, Mould and Decay in relation to Export Shipments of British Columbia Soft Woods" (1940), pp. 7 and 8.

such service the economic necessities now impelling green shipments will no longer exist.

In this digression into a discussion of hemlock it might be of interest to reproduce some relevant statistics. I estimated from the evidence that on the Coast about 44 billion feet of hemlock will be accessible when required. This means that the Coast stands contain approximately 25 per cent. of this species. We are now cutting about 500 million feet a year, which is equivalent to 20 per cent. of our total Coast cut. In the Interior (and accepting Mr. Mulholland's estimate of accessibility and volume) there is accessible about 2¼ billion feet, which is a little over 2 per cent. of the total Interior stands of all species. The cut averages a little over 10 million feet, representing about 3 per cent. of the total Interior cut.

For the ten-year period terminating December 31st, 1943, an average of 56 per cent. of the hemlock production was processed by the sawmills producing about 13 per cent. of the total sum of saw lumber.

The following tabulation presents in detail the 1939 (selected as a normal year) market for green and dried hemlock sawn lumber and box-shooks. It will be noted that 85 per cent. and 15 per cent. of shipments to export markets were, respectively, of green and dried lumber. Attention is also directed to the better prices received for properly seasoned lumber in comparison with green or unseasoned lumber. I am unable to say what changes, if any, there have been in recent years in these relative percentages:—

SAWN HEMLOCK LUMBER.

	Shipped Dry.				Shipped Green.				Total Shipments.		
	Volume (Million Feet).	Value.	Average Price per M.	Per Cent. shipped Dry.	Volume (Million Feet).	Value.	Average Price per M.	Per Cent. shipped Green.	Volume (Million Feet).	Value.	Average Price per M.
Export—											
Australia	.....	.....	.....	.....	78.5	$1,142,040	$14.65	100.0	78.5	$1,142,000	$14.65
United Kingdom	16.0	$393,600	$24.60	15.0	90.5	1,241,215	13.71	85.0	106.5	1,634,815	15.35
Africa	4.6	121,000	26.30	100.0	.....	.....	.....	.....	4.6	121,000	26.30
U.S.A.	15.0	247,650	16.51	34.5	28.5	362,524	12.71	65.5	43.5	610,000	14.02
Total export	35.6	$762,250	$21.41	15.0	197.5	$2,745,779	$13.90	85.0	233,100	$3,508,029	$15.04
Domestic	25.0	$490,000	$19.60	32.5	52.0	$650,000	$12.38	67.5	77,000	$1,140,000	$14.80
Totals	60.6	$1,252,250	$20.66	20.0	249.5	$3,395,779	$13.61	80.0	310,100	$4,648,029	$14.98
Box-shooks, Dry.											
Export	34.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Domestic	20.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total shooks	54.5	$1,199,000	$22.00	100.0	.....	.....	.....	.....	.....	.....	.....
Grand total, lumber and box-shooks	115.1	$2,451,250	$21.29	31.5	249.5	$3,395,779	$13.65	68.5	364.6	$5,847,049	$16.03

The pulp companies are heavy consumers of hemlock using, over a ten-year average, about 38 per cent. of the total hemlock production.

Western hemlock is generally conceded to be one of the best of the pulp-wood species. It yields, by the sulphite process, the best chemical and rayon grade of bleached pulp, superior to all the Eastern American and European pulp. As a major ingredient in the kraft process it yields a pulp equal to the best grades in the world markets and when used as the raw material for ground-wood pulps can be manufactured into newsprint papers of the finest quality.

We are very fortunate in having as a secondary source of available raw material a reasonably adequate supply of this admirable species now adaptable to so many diversified uses.

It seems to me, from a consideration of the evidence, the time has now come when hemlock logs should be graded with concomitant adjustment of royalty rates. The present rate of 60 cents per M. appears incommensurate with present and future hemlock production.

I would suggest in the revision of royalty rates on hemlock logs that the position of the pulp companies be kept in mind. Royalties should not be fixed at a rate which would prohibit the use of graded hemlock logs for conversion into pulp. The pulp and paper industry in this Province occupies an important part in our industrial life and, unlike Swedish and other European mills, produces a high quality product requiring a like high quality of raw material. While, as I have pointed out, the pulp companies should be able to utilize some proportion of our wood and sawmill waste any policy which would compel that industry to use inferior material to too great a degree would result in the production of an inferior product with the eventual loss of profitable markets and consequent detriment to a large section of our people.

That brings me back to a consideration of the subject under discussion: conversion plants—and in particular the pulp companies.

PULP COMPANIES.

There are six pulp and paper companies in British Columbia with a combined capital investment in plant and equipment (in 1942) of $58,237,083. I am unable to say what the exact value of their timber holdings is but as a rough estimate I would consider that $20,000,000 might not be too wide of the mark.

Few of the public, I think, realize the importance of the pulp industry to the social and economic life of this Province. Too little is also known of the huge, highly organized and complex units that the ordinary travellers glimpse from the decks of our coastal steamers.

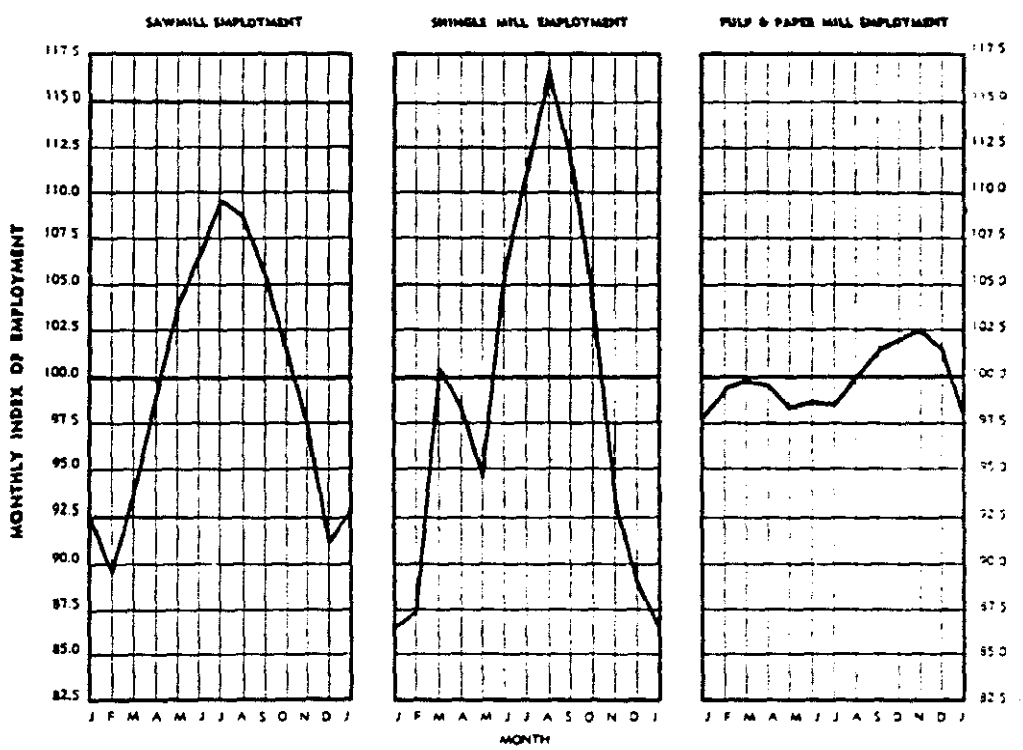
Pulp companies need an abundance of water in their various processes and for power production. Consequently, the larger plants are situated in places supplying this requirement and in areas remote from our urban centres. Settled communities with all the amenities of city life now sur-

round many of these plants housing the men and their families who, in some capacity or other, keep the wheels turning and the pulp flowing. These communities have a combined population of over 10,000. Employees numbered 3,574 in 1942, which means that the ratio of capital investment per employee was $16,295 as compared with $2,895 for the sawmill industry. Average hourly wages paid amounted to 75 cents—the highest rate paid in the secondary forest industries. Wages and salaries paid in 1942 amounted to $8,824,524 and millions of dollars were spent in the purchase of raw material and supplies of all kinds.

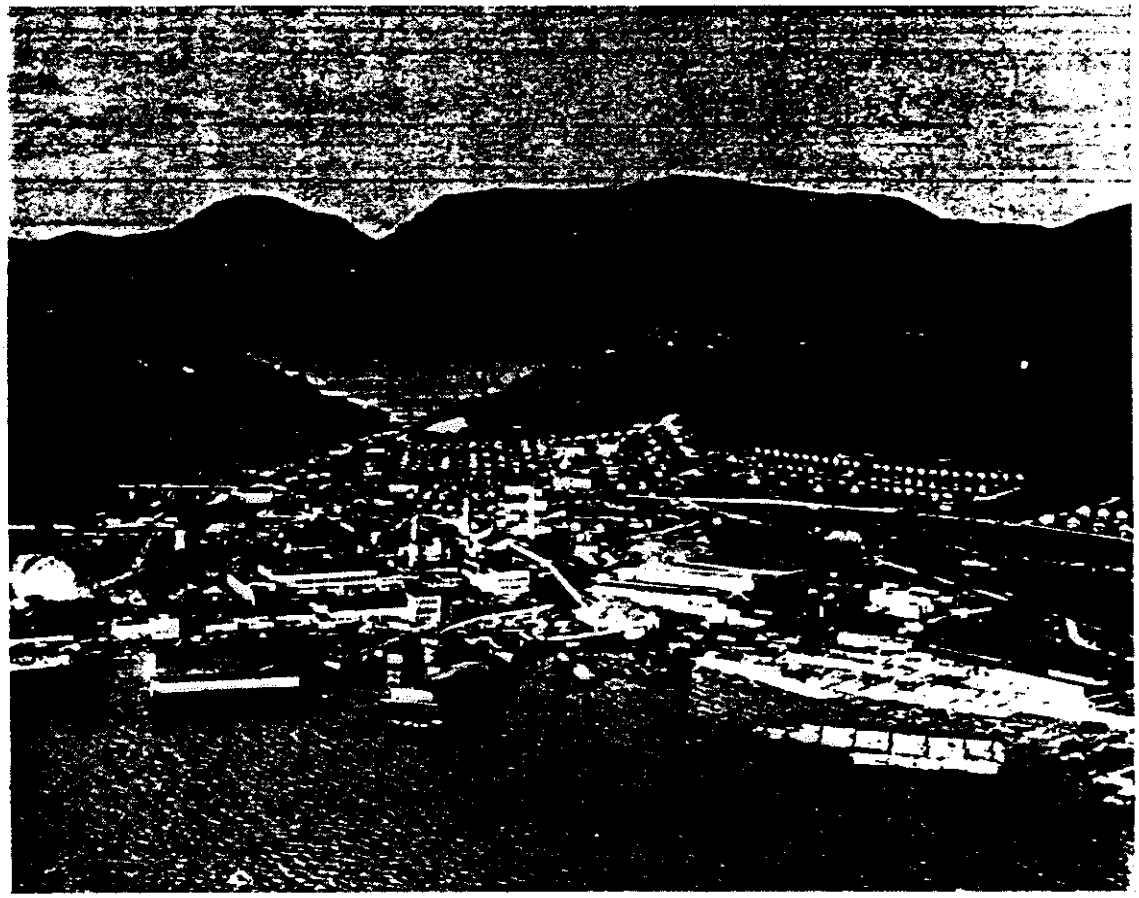
Stability of employment is, of course, of manifest importance in fostering the establishment of permanent and prosperous communities. Year by year employment in the pulp and paper industry is free from marked seasonal changes. The following chart illustrates the comparative employment variations in the three leading secondary forest industries:—

AVERAGE SEASONAL VARIATIONS IN EMPLOYMENT FOR THREE LEADING SECONDARY FOREST INDUSTRIES IN BRITISH COLUMBIA.

(Based on six-year period, 1935–40.)

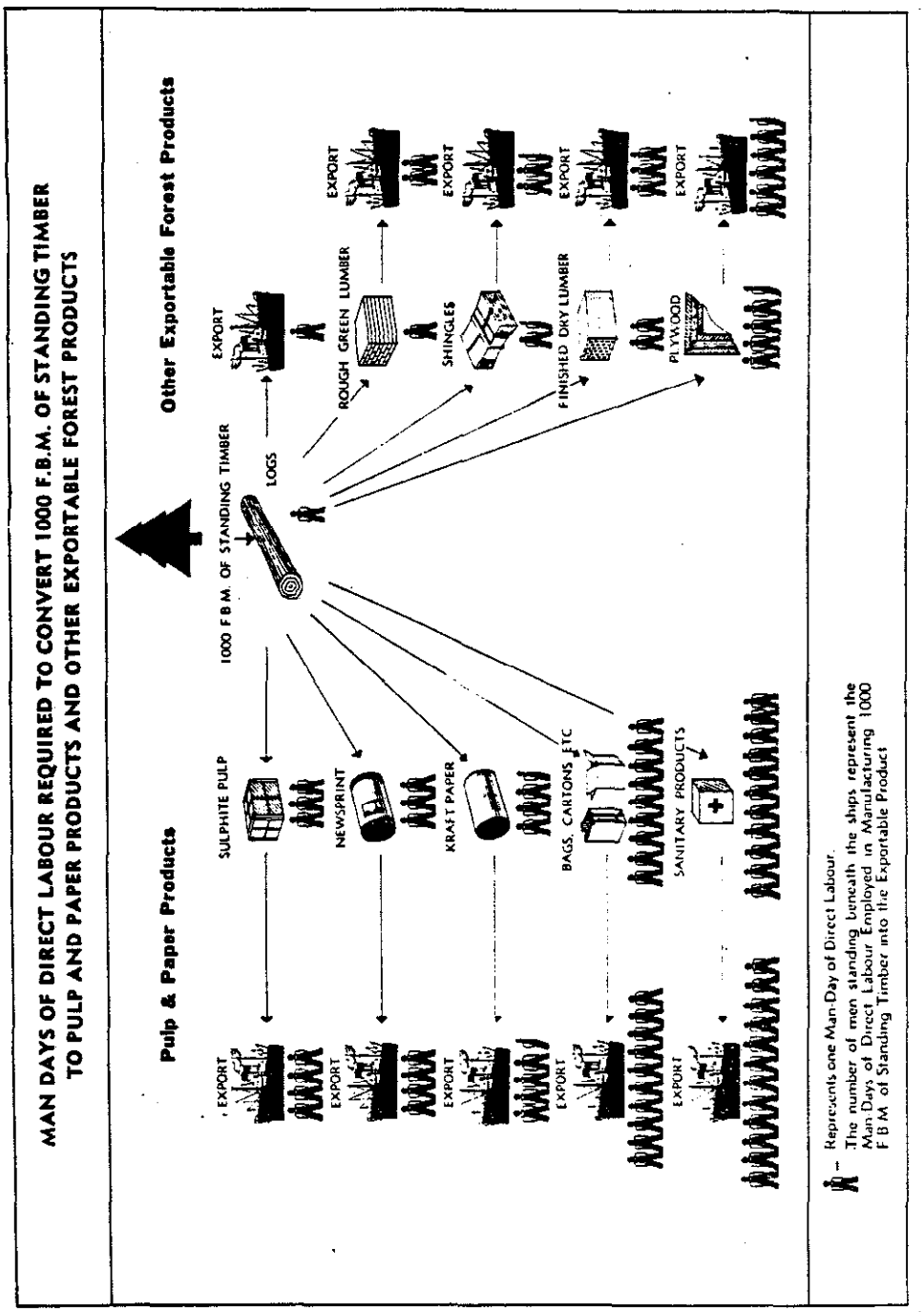


It is axiomatic that any process that converts raw material into manufactured form requires labour services in direct ratio to the degree of manufacture. In other words, the higher the degree of manufacture the greater number of men need be employed to produce the end product. For each 1,000 feet of logs consumed the pulp and paper companies provide employment equivalent to 3.3 man-days, as against 1.67 man-days for all



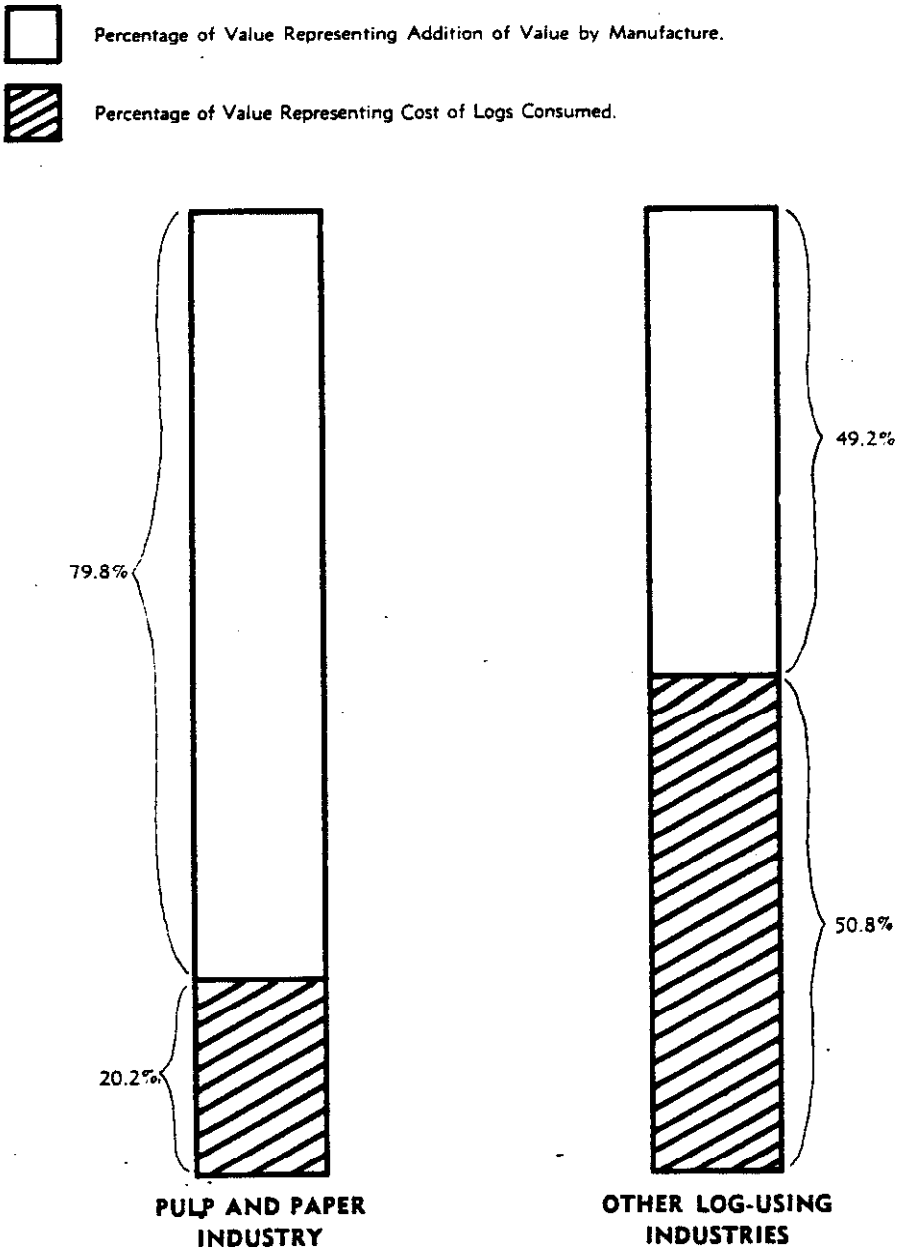
A typical British Columbia pulp and paper mill.

other forest industries. The following chart illustrates the degree of manufacture of various forest products and the man-days of labour required for each degree:—



Each successive degree of manufacture of raw material increases the gross value of that material. A log containing 1,000 F.B.M. taken into a pulp plant emerges in manufactured form worth $58.50 more than its original value as a log. The composite figure for all other log-using industries indicates an addition of $15 in value to each 1,000 feet of log consumption. With logs purchased at $14.82 per M. by the pulp companies and at $15.50 per M. by all other log-using industries the following graph represents comparative additional values added by manufacture in 1942:—

PERCENTAGES OF COST OF LOGS, AND VALUE ADDED BY MANUFACTURE IN THE PULP AND PAPER INDUSTRY AND OTHER LOG-USING INDUSTRIES OF BRITISH COLUMBIA, 1942.



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.

Pulp is made from cellulose fibres. These fibres formerly were extracted from linen and cotton rags, but in the development of pulp and paper production wood has become the basic raw material from which the cellulose now is recovered.

The average values of the chemical constituents of soft-woods are:—

	Per Cent.
Cellulose	60
Lignin	30
Pentosans	8
Resins, etc.	2

The object of all pulping processes is to separate from the wood the cellulose fibres in varying degrees of purity, depending upon the desired end product or use for which the pulp is designed.

There are two distinct methods in use by which wood becomes pulp: mechanical and chemical. Ordinary mechanical pulp is referred to as ground-wood pulp, taking this name from the manner in which it is brought into existence—i.e., the wet grinding of wood blocks by large revolving grindstones. The yield of pulp by this process is approximately 97 per cent. of the original wood volume. This class of pulp is used in the manufacture of building and roofing material and for non-permanent papers such as newsprint.

The term " newsprint " is not confined to paper used only in the printing of newspapers. This class of paper is also used for telephone directories, catalogues, railway guides, wrapping-paper, and so on, and is of a relatively inferior grade due to the shortness and weakness of the fibres. It also deteriorates and turns yellow when exposed to sunlight and air because of the reaction thereto of the lignin content of the pulp.

Chemical pulp is the general description of the product derived from chemical reactions which dissolve most of the lignins and pentosans from the wood, leaving cellulose as an undissolved residuum. Chemical pulps are classified according to the process used—i.e., sulphite pulp, sulphate or kraft pulp, and soda pulp. The soda process is not used in this Province.

In the sulphite process the pulp is obtained by digesting wood chips in an acid bisulphite liquor at high temperature and pressure. As the wood constitutents, except cellulose, are dissolved in the cooking process the pulp yield is equal to about 45 per cent. of the prepared wood. This type of pulp has a wide variety of uses and when specially prepared and bleached is the raw material for industries manufacturing rayon, cellophane, photographic films, explosives, plastics, and related substances.

The sulphate or kraft process is basically the same as that of the sulphite process except that sodium sulphate is used as the dissolvent, and as this process is more rapid than the others its effect is less harsh upon the cellulose fibres, resulting in pulps of high strength suitable for strong wrapping and bag papers and such like. The term " kraft " in fact, comes from a Swedish word meaning " strength." The yield of sulphate pulp is 47 per cent. of the prepared wood volume.

From the foregoing sketchy description of the various methods of producing pulp it would appear that pulp-mills are not utilizing about 55 per cent. of the prepared wood volume. In one sense that is true, but it must be remembered the 45-per-cent. recovery of pulp returns a much greater value than would be received from the wood volume if converted into lumber or other form of forest product. Then, too, in the sulphate process the organic material dissolved from the wood is recovered from the liquor and burned as fuel.

Sulphite mills, after long research, have discovered methods whereby it is anticipated the material in suspension in the sulphite liquor will also be recovered and completely utilized. This liquor contains, in addition to material for fuel, sugar from the pentosan or carbohydrate percentage of the wood volume and this substance can be extracted for the manufacture of ethyl alcohol and yeast.

As I had occasion to comment before, I believe the future will see wood regarded as the basic material from which chemists will extract values probably surpassing the returns from either lumber or pulp and paper manufacture. The pulp companies, because of the nature of their product and with their highly skilled technical personnel, are in a pre-eminent position to take full advantage of new discoveries in wood chemistry.

Western hemlock is suitable for all pulping purposes. Balsam and spruce are also suitable species except for dissolving pulps. Douglas fir, cedar, and jack-pine are usable in the sulphate process. Jack-pine, or lodgepole pine, is not indigenous to the Coast but the supply of this species in the Interior is virtually inexhaustible and one pulp company draws upon this supply for 20 per cent. of its wood requirements.

A greater use of this species, if economically practicable to transport from the Interior, would remove considerable pressure on our Coast forest for future supply of raw material for sulphate or kraft pulp. At present lodgepole pine is costing $14.80 per cord f.o.b. the mill. Included in this total are royalty (at 40 cents a cord), freight on the P.G.E. Railway to Squamish (at 8½ cents per 100 lb.), and unloading costs, amounting in

all to $8 a cord. Some adjustment of these charges—especially freight rates—should encourage greater utilization of the Interior lodgepole stands, thus not only lessening the drain on Coast sulphate pulp species, but offering employment to farmers and settlers in the Interior during slack seasons of the year.

The relative percentages of the various species consumed by the four largest pulp companies follows:—

Mill.	Hemlock.	Spruce.	Balsam.	Douglas Fir.	Cedar.	Lodgepole Pine.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Sorg's	40	1	7	20	12	20
B.C. Pulp & Paper	83	1	16	...	...	...
Powell River Co.	57	27	16	...	...	...
Pacific Mills	27	53	3	8	9	...

The timber resources of the industry are set out hereunder:—

	M.F.B.M.	Per Cent.
Pulp leases	2,980,900	33.1
Pulp licences	2,588,400	28.8
Pulp timber sales	1,401,000	15.6
Crown grant	640,200	7.0
Total	9,004,500	

The approximate rentals, royalties, and Crown stumpage fees paid on these lands during 1943 were:—

	Rentals.	Royalties (all Classes).	Stumpage.	Total Dues paid.
Pulp leases	$11,595.15	$112,496.21	$11,861.32	...
Pulp licences	16,672.00	...	...	...
Pulp timber sale	7,720.46	...	...	...
Crown grants	7,624.46	...	...	...
Timber licences	20,998.37	...	...	...
Timber leases	183.32	...	...	...
Timber sales	2,082.00	...	...	$191,233.29

These timber lands are largely pulp tracts, the average stand containing about 34 per cent. hemlock, 26 per cent. cedar, 21 per cent. spruce, 10 per cent. balsam, and 9 per cent. Douglas fir. The over-all average density of these stands is estimated to average 17,000 F.B.M. The pulp companies cut from their own limits on an average about 52 per cent. of their total wood requirements and purchase the remainder on the open log market, thus competing with sawmills dependent upon this source of supply. The trend toward greater production of hemlock lumber will aggravate this condition in the future. The industry absorbs, on the average, 10.5 per cent. of the total Provincial cut and 11.7 per cent. of the total Coast cut.

Wood-pulp and paper products are consumed by Canadian and export markets. The disposition for 1943 appears in the following table and the high percentage of the product which finds its way to the export market is of value in the creation of foreign exchange credits. This export

trade totalled, in 1943, $23,623,498 while Canadian sales amounted to $6,734,507. The sum of these figures is $30,358,005. The gross value of production of the forest-using industries in 1943 was $118,434,000; therefore the pulp companies in processing 11 per cent.(1) of the total log cut produced about 25 per cent. of the gross value of our forest industries production for that year.

(1) The evidence does not disclose the exact percentage of log consumption by the pulp industry in 1943. I have, therefore, used the average figures for 1922-40 as a basis for comparison.

DISPOSITION OF PULP AND PAPER PRODUCTS MANUFACTURED IN BRITISH COLUMBIA, 1943.

Product.	Canadian Sales.				Exports to United States.				Exports to other Countries.			
	Tons.	Per Cent.	Value.	Per Cent.	Tons.	Per Cent.	Value.	Per Cent.	Tons.	Per Cent.	Value.	Per Cent.
Wood-pulp—												
Sulphate					23,918	7.2	$1,768,030	9.9	2,482	3.0	$197,581	3.5
Sulphite, paper grade	1,814	2.2	$113,738	1.7	12,096	3.6	758,056	4.2	16,731	20.1	1,048,531	18.5
Sulphite, dissolving grade	3,383	4.1	240,937	3.6	51,298	15.5	3,653,444	20.3	19,398	23.4	1,381,526	24.4
Sulphite, unbleached					24,949	7.5	1,290,323	7.2	12,443	15.0	744,591	13.2
Mechanical												
Other												
Screenings												
Total, wood-pulp	5,197	6.3	$354,675	5.3	112,261	33.8	$7,469,853	41.6	51,054	61.5	$3,372,229	59.6
Paper												
Paper and fibre wallboard												
Paper board (N.O.P.)	11,910	14.4	$732,180	10.8	5,846	1.8	$272,409	1.5				
Book paper												
Newsprint	23,373	28.2	1,138,102	16.9	212,055	64.0	10,124,563	56.3	19,405	23.3	$1,129,984	20.0
Wrapping, kraft	12,325	14.8	1,125,909	16.7					4,828	5.8	446,089	7.9
Wrapping (N.O.P.)	1,960	2.4	268,801	4.0					423	0.5	52,307	0.9
Crepe and tissue	10,619	12.8	1,636,264	24.3	35		9,000		2,405	2.9	311,419	5.5
Bond and writing												
Bags, boxes, and cartons	2,585	3.1	207,175	3.1					642	0.8	71,381	1.3
Hangings or wall, rolls												
Roofing and building	3,317	4.0	208,765	3.1					80	0.1	5,721	0.1
Waste					333	0.1	11,816	0.1				
Other paper (N.O.P.)	11,631	14.0	1,062,636	15.8	1,069	0.3	83,076	0.5	4,221	5.1	263,651	4.7
Total, Wood-pulp and paper	82,917	100.0	$6,734,507	100.0	331,599	100.0	$17,970,717	100.0	83,058	100.0	$5,652,781	100.0
Subtotal, "Paper Classification"	77,720	93.7	$6,379,832	94.7	219,338	66.2	$10,500,864	58.4	32,004	38.5	$2,280,552	40.4

The total value of pulp and pulp products in 1939 (a normal year) amounted to $18,697,888, while the total value of the forest industries production for that year amounted to $88,221,000. The percentage is approximately the same—i.e., roughly 22 per cent.—and in that year this value resulted from the processing, by the pulp companies, of 7.6 per cent. of the total Provincial cut.

The foregoing brief summary of the evidence clearly establishes that the pulp and paper companies play an important part in the economic structure of this Province, and not only make a substantial contribution to the stability of our labour market but convert the raw material of our forests into products of greater value than any other forest-using industry. In other words, the ratio of wealth production to forest depletion is higher for this industry than any other.

The technological advance of this industry is highly commendable and the answers to whatever problems remain unsolved are being assiduously sought. But other questions, beyond the power of industry itself to resolve, limit its expansion and, indeed, threaten its future existence. I refer, in this regard, to the effect of the American tariff restrictions upon the importation into that country of the more highly manufactured forms of pulp products and to what is more germane to the scope of this inquiry, and of much more general and public consequence, the fact that the timber resources owned or controlled by the pulp companies are far from adequate to ensure a perpetual supply of the wood requirements of the industry. Their present policy of attempting to conserve what they now have by buying pulp species on the open log market is, at best, a temporary palliative and while alleviating the situation to some degree does not offer a sound solution. The pulp companies' basic requirement is a continuity of supply from areas logged on a sustained-yield basis. This objective can be achieved by a programme of planned forest management wherein the needs of this industry will find proper recognition.

The disadvantageous effect of the American tariff is a subject concerning which I can offer no suggestions of value, except to mention that our export of pulp-logs to American pulp companies might, perhaps, open a field for discussion and reasonable compromise.

The subject of log exports demands some understanding of the various forest tenures of the Province. This seems to me, then, just as good a place as any to turn to the subject of land ownership and tenures.

LAND OWNERSHIP AND TENURES.

Ownership of productive forest land and the volume of timber thereon may be divided into two broad classifications: Crown ownership and Others.

Crown ownership, used in this sense, includes not only unalienated Crown land and timber, but also Crown timber over which cutting rights have been granted under various forms of temporary tenures.

"Others" means land and timber in private ownership, such as Crown grants, Indian reserves, Esquimalt and Nanaimo Railway belt, municipally owned watersheds, small farm wood-lots, and other small holdings.

Bearing in mind the relevant sense in which those terms are used, the following tabulation, based upon the 1937 estimates (relatively the same to-day) shows the percentage distribution between Crown ownership and Others:—

	Crown Ownership.	Others.	Total.
Per cent. of ownership of total Provincial acreage of productive forest land (75 million acres)	93	7	100
Per cent. of ownership of Provincial forest land on Coast and in Interior (acres)—			
Coast (10 million acres)	80	20	100
Interior (65 million acres)	92	8	100
Per cent. of ownership of total Provincial acreage of mature stands (22 million acres)	90	10	100
Per cent. of ownership of mature stands on Coast and in Interior (acres)—			
Coast (7 million acres)	85	15	100
Interior (14 million acres)	93	7	100
Per cent. of ownership of total Provincial volume of merchantable timber (255 billion feet)	89	11	100
Per cent. of ownership of volume of merchantable timber on Coast and in Interior—			
Coast (155 billion feet)	86	14	100
Interior (100 billion feet)	95	5	100

From these figures it will be seen that the Crown owns, in the broad sense, 93 per cent. of the total Provincial area of productive forest land, 90 per cent. of the total Provincial acreage of mature timber stands, and, subject to cutting rights, 89 per cent. of the total volume of merchantable timber. On the Coast the Crown owns 80 per cent. of the productive forest land, 85 per cent. of the acreage of mature stands, and, subject to cutting rights, 86 per cent. of the Coast volume of merchantable timber.

In the Interior the Crown owns 92 per cent. of the productive forest land, 93 per cent. of the acreage of mature stands, and, subject to cutting rights, 95 per cent. of the Interior volume of merchantable timber.

The present relation of Crown ownership to private ownership is the result of the long-continued and wise governmental policy of restricting the absolute alienation of Crown timber lands.

While the Crown retains title to land areas growing merchantable timber, the right to cut the timber thereon has been granted, under various forms of tenure, to licensees under timber licences, to lessees under timber leases, and to timber purchasers under timber sale, contracts, and others. These various cutting rights may be described (for want of a better term) as "temporary alienations."

The following table, based upon the 1937 estimates (but also relatively the same to-day) indicates, in terms of percentage, the extent of these

temporary alienations—i.e., the grant of cutting rights over Crown timber on Crown lands:—

	Crown (unalienated).	Temporary Alienations.	Other Owners.	Total.
Per cent. of total Provincial acreage of mature stands	75	15	10	100
Per cent. of mature timber stands on Coast and in Interior (acres)—				
Coast	53	32	15	100
Interior	87	6	7	100
Per cent. of total Provincial volume of merchantable timber	57	32	11	100
Per cent. of volume of merchantable timber on Coast and in Interior—				
Coast	39	47	14	100
Interior	86	9	5	100

We now see that, while the Crown owns 90 per cent. of the total of 22 million acres of mature forest land in the Province, cutting rights, under various forms of tenure, have been granted over 15 per cent. thereof.

On the Coast, cutting rights have been granted on areas totalling 32 per cent. of the Coast acreage of merchantable timber, representing 47 per cent. of the volume of merchantable timber, thus leaving unalienated, in Crown ownership, 53 per cent. of the Coast acreage and 39 per cent. of the timber volume.

In the Interior, 87 per cent. of the acreage of mature timber of that area and 86 per cent. of the volume of mature timber remains in the Crown.

Cutting rights, or temporary alienations, under the various forms of tenures have been granted over 3,888,678 acres as of February, 1944.[1]

Tenures and acreages are as follows:—

Tenures.	No. of Contracts.	Acreage.	Per Cent.
Timber licences	2,850	1,795,817	46.2
Timber sales	3,721	978,862	25.2
Berths	205	424,671	10.9
Pulp leases	33	335,611	8.6
Leases	152	197,939	5.1
Pulp licences	252	155,778	4.0
Totals	.....	3,888,678	100.0

An ownership analysis of various tenures discloses that, in 1944, cutting rights were held by 2,877 persons or corporations. Of these 2,877 holders 58 or 2 per cent. thereof held cutting rights over 51.7 per cent. of the total area included within the various tenures, while 2,819 holders, or 98 per cent., held cutting rights over 48.3 per cent. of the said area. (These figures do not include unalienated timber lands held by the Esquimalt and Nanaimo Railway Company.)

(1) The 1937 estimates were based on a total of 3,397,500 acres alienated under various forms of tenure. The difference does not make any significant change in the percentage calculations.

The following table shows the 1944 frequency distribution of timber holdings arranged in order of magnitude according to the total acreage of each individual holder:—

Total Acreage held.	No. of Holders in each Class.
Less than 5,000	2,729
5,000 to 9,999	72
10,000 to 14,999	30
15,000 to 19,999	8
20,000 to 24,999	7
25,000 to 29,999	6
30,000 to 34,999	4
35,000 to 39,999	4
40,000 to 44,999	2
45,000 to 49,999	3
50,000 to 54,999	2
60,000 to 64,999	1
65,000 to 69,999	1
70,000 to 74,999	1
75,000 to 79,999	1
80,000 to 84,999	1
90,000 to 94,999	1
185,000 to 189,999	1
205,000 to 209,999	1
220,000 to 224,999	1
245,000 to 249,999	1
Total	2,877

The evidence does not furnish me with any material from which I can translate acreage into volume in each classification nor can I segregate these various holdings into Coast and Interior areas, but some details of the 1943 Coast cut for the Vancouver district are of relevant interest and are as follows:—

Cutting more than (M.F.B.M.)—	No. of Logging Operations.	Per Cent. of Total Cut.
200,000	1	10.0
150,000	1	9.0
75,000	3	13.0
50,000	4	11.0
25,000	7	12.0
20,000	4	3.8
15,000	4	3.6
10,000	14	8.0
5,000	34	12.0
2,500	44	6.5
1,000	68	5.5
500	67	2.3
100	190	2.3
Cutting less than 100 M.F.B.M.	236	1.0
Total	677	100.0

It would thus appear that 24 logging operations out of 677 cut in excess of 15 million feet a year or, in other words, 3.5 per cent. of the operators produce over 60 per cent. of the total cut for that district.

When it is disclosed 58 out of a total of 2,877 persons or corporations control over 50 per cent. of all the alienated merchantable timber areas of the Province, and that on the Coast 24 out of 677 logging operators produce over 60 per cent. of the volume of the cut, and when it is understood these figures do not include the timber presently held by the Esquimalt and Nanaimo Railway Company, 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.

It will be seen, when I come to examine in detail the various classes of tenures, that the Crown has the power to impose conditions upon those presently holding the right to cut timber on Crown lands and as the Crown still retains title to 39 per cent. of the merchantable Coast stands in the future disposition of which terms may also be imposed, I do not anticipate any real difficulty in securing the necessary and desired co-operation from licensees, lessees, or purchasers of Crown timber.

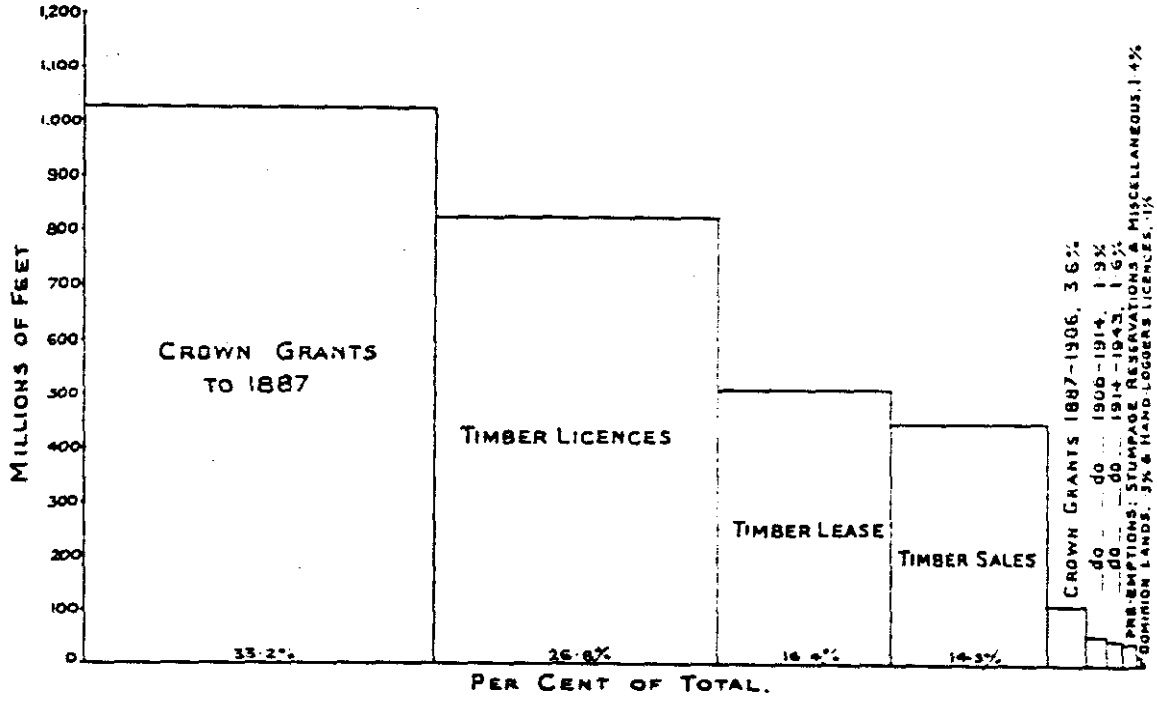
There are, however, a group of owners of Crown-granted lands, which grants carry the right to the timber thereon, and these owners consider themselves in a different position, in relation to any Crown regulations affecting their timber or timber lands, than those whose only right is to cut timber on land, the title to which remains in the Crown.

The relative importance of the various classes of tenures and Crown grantees, in relation to the cut, appears when the average log production for the ten years, 1934–43, is examined hereunder:—

Class of Owner.	Average Cut.	Per Cent.
Crown grants to 1887	1,025,382,594	33.2
Crown grants, 1887–1906	111,186,064	3.6
Crown grants, 1906–1914	58,681,534	1.9
Crown grants, 1914–1943	49,416,029	1.6
Timber licences	827,718,480	26.8
Timber leases	506,514,293	16.4
Timber sales	447,832,759	14.5
Pre-emption, stumpage reservations, and miscellaneous	43,239,025	1.4
Dominion lands	15,442,509	0.5
Hand-loggers' licences	3,088,502	0.1
Total, ten-year average	3,088,501,789	100.0

The percentage figures are reproduced in the form of this graph:—

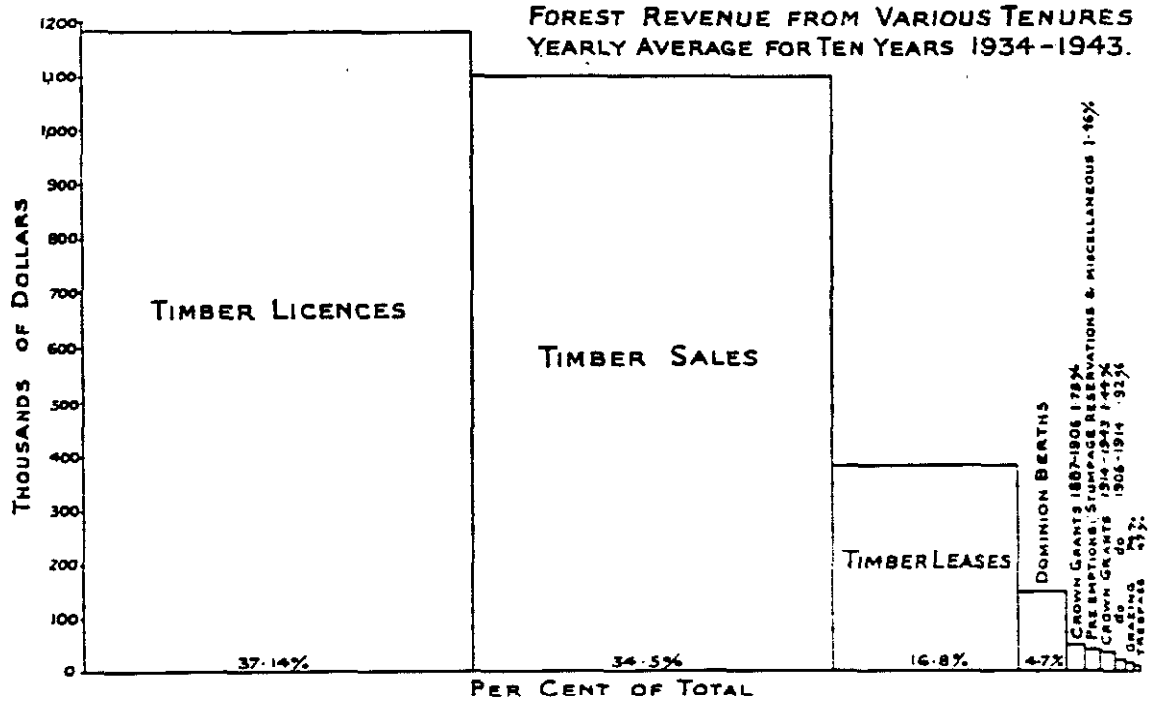
FOREST CUT FROM VARIOUS TENURES. YEARLY AVERAGE FOR TEN YEARS, 1934–43.



For the purpose of comparison I wish to set out, at this place, the relative average amount of revenue the Crown received from these owners for the same ten-year period. Annual average revenue for these years amounted to $3,197,408.

Class of Owner.	Average Annual Revenue.	Per Cent. of Total Average Revenue.
Crown grants to 1887		
Crown grants, 1887–1906	$55,526.00	1.74
Crown grants, 1906–1914	29,155.00	0.91
Crown grants, 1914–1943	45,886.00	1.43
Timber licences	1,188,315.00	37.17
Timber leases	538,715.00	16.85
Timber sales	1,103,873.00	34.52
Pre-emption, stumpage reservations, and miscellaneous	46,523.00	1.43
Dominion berths	151,259.00	4.73
Grazing and trespass	38,156.00	1.20
Total	$3,197,408.00	100.00

These figures are represented in the following graphic form:—



The comparison I wish to emphasize is the relation of the cut from Crown-granted areas to the amount of direct Crown revenue received therefrom. It now appears that while the cut from royalty-free areas, Crown-granted up to 1887, has averaged over 33 per cent. of the total Provincial cut, the Crown has not received any direct revenue therefrom. Other areas covered by grants from the Crown since 1887 produce 7 per cent. of the total cut and contribute a little over 4 per cent. to the total forest revenue. Combining these figures we see that the cut from Crown-granted areas amounts to over 40 per cent. of the total cut, while the Crown receives therefrom, in direct forest revenue, a sum equal to about 4 per cent. of the total forest revenue. I shall have occasion to refer to these figures at a later stage of this report when considering the question of Crown regulation of private timber lands.

This concentration of ownership above referred to has another aspect. About one-half of the Coast mills are dependent either wholly or in large part on the open log market for their log-supply. This simply means some log-producing concerns do not operate sawmills and some sawmills do not hold any reserves of timber. The open log market is the channel through which the process of extraction and conversion are integrated by these two classes of producers and consumers; in other words, it is the link which joins them together.

As the mature timber is gradually disappearing from the more accessible areas and as the remaining stands are held by a comparatively few owners, undoubtedly as reserves for their own mill operations, it follows

that the log-supply for the open market will decline, resulting in a shortage of logs necessary to maintain the future operations of log-buying mills.

While it may be possible for the production from some Crown timber working-circles to be allocated to supply this market (a subject to which I shall return later), it seems to me the future of those mills depending solely, or in most part, on the open market supplies for their logs is none too bright.

PROVINCIAL FOREST RESERVES.

Included in areas classified as in Crown ownership are forty-four Provincial forest reserves. In 1925 the then Minister of Lands, in introducing legislation providing a fund for the development and management of these reserved areas, stated that "the primary object of their creation is to ensure a continuous production of timber."

The latest statistical material made available to me appears in the following tables:—

COAST.

Forest.	Total Area.	Mature Timber.	Immature Timber.	Forest Land not restocked.	Mature Timber.
	Acres.	Acres.	Acres.	Acres.	M.B.M.
Broughton	43,100	18,760	4,230	5,520	376,400
Gilford	111,940	54,790	3,120	6,490	1,485,900
Harbledown	69,610	39,100	12,860	5,580	993,500
Hardwicke	18,110	4,440	1,890	5,710	119,200
Sonora	38,620	12,330	9,530	1,970	344,900
West Thurlow	19,440	1,010	9,990	600	27,900
East Thurlow	25,460	2,810	9,120	700	75,000
Redonda	42,620	12,090	3,720	4,500	181,100
Nimpkish	887,000	334,530	33,930	30,470	10,891,500
Sayward	394,490	273,620	26,790	64,710	12,146,000
Douglas	445,540	100,530	2,560	22,900	2,560,000
Powell	434,660	83,060	55,860	45,650	2,958,900
Loughborough	598,430	160,560	35,770	51,760	4,084,800
Seechelt	774,420	107,160	58,040	25,040	3,314,900
Toba	763,910	77,270	33,720	19,180	2,199,800
Kingsome	454,660	63,700	7,000	11,750	1,464,150
Seymour	580,870	86,970	8,460	28,650	1,999,710
Moresby	851,890	238,160	8,880	15,600	6,235,380
Totals	6,554,770	1,670,890	325,470	346,940	51,459,040

INTERIOR.

Forest.	Total Area.	Mature Timber.	Immature Timber.	Forest Land not restocked.	Mature Timber.
	Acres.	Acres.	Acres.	Acres.	M.B.M.
Aberdeen Mountain	75,800	21,970	48,140	.....	237,100
Babine	1,300,300	237,400	502,900	227,700	2,500,000
Barriere	340,400	85,400	118,200	38,820	683,500
Elk	1,552,900	159,720	271,080	186,830	1,676,800
Flathead	340,400	93,280	38,480	24,400	1,199,500
Fly Hill	162,900	52,840	67,200	21,670	299,300
Grizzly Hills	379,600	87,920	186,640	.....	742,100
Inkaneep	205,300	46,900	88,790	.....	297,300
Kettle	808,200	87,820	333,330	141,400	465,000
Little White Mountain	186,000	46,700	109,000	.....	282,480
Larch Hills	32,600	9,890	19,200	2,670	94,700
Mount Ida	33,100	8,440	20,520	1,210	39,900
Martin Mountain	56,400	22,490	22,800	5,360	90,100
Momich	1,001,900	238,520	183,580	108,420	2,461,300
Monte Hills	222,920	56,500	110,950	24,790	223,090
Morice	579,880	82,550	140,160	114,720	782,800
Nehalliston	707,300	195,100	227,900	150,900	1,766,000
Nicola	217,400	77,200	97,390	21,570	320,700
Niskonlith	286,100	114,700	99,900	54,400	988,700
Okanagan	634,400	218,640	286,850	23,760	1,219,000
Shuswap	230,900	89,460	63,850	19,250	935,700
Spallumcheen	480,100	169,700	161,500	14,900	1,732,500
Tranquille	188,800	71,940	73,320	26,590	396,400
Yahk	624,700	158,890	296,430	36,000	1,598,900
Lower Arrow	481,190	34,590	86,390	62,690	275,600
Upper Arrow	1,193,480	179,320	170,340	23,710	2,231,780
Totals	12,322,970	2,547,880	3,825,340	1,331,760	23,540,250

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.

The result is clearly seen in the acreage classified as "forest land not restocked," amounting on the Coast to 346,840 acres and in the Interior to 331,760 acres or a total of 678,600 acres. I should add that destruction by fire has also made its usual contribution to this unhappy picture. It may be assumed that approximately 50 per cent. of these denuded acres will require replanting.

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 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 rôle in any future planning.

The urgent necessity of financing surveys, and intensive study of the potentialities of our forest reserves with a view to their proper management and utilization in the future, emphasizes the one essential fact basic to all future forest planning: Forest revenue accruing to the Crown must be recognized as capital to be reinvested in our forests to ensure their continued productivity. To persist in the pursuit of any other policy is to invite a deserved disaster.

FORMS OF TENURE.

Forms of forest tenure, in which term I include Crown grants and temporary alienations such as licences, leases, and timber sales, are somewhat complicated and difficult to understand unless viewed in the light of their historical background and statutory development.

In the pioneer days of the Province, timber land as such was not regarded as of any great value. 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.

The Land Ordinance of 1865 contained the following provision:—

> " 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."

This ordinance or proclamation introduced for the first time the system of granting the right to cut timber on Crown lands without alienation of the land itself. It is the foundation upon which our modern tenure systems are based, and although temporary alienations have taken many and varied forms, in substance the principle has remained unaltered throughout the years, resulting in the present Crown ownership of productive forest land areas.

While this principle was written in the early laws of the Colony of British Columbia, Crown lands, timbered or otherwise, were still alienated from time to time by absolute conveyance. After the union of 1866 of British Columbia and Vancouver Island as one Province this practice continued.

In 1871 British Columbia entered Confederation and became part of the Dominion of Canada. By section 11 of the Terms of Union the Dominion 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 that 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 enterprise, the Province also conveyed to the Dominion as " lieu lands " a block containing 5,470 square miles in the Peace River belt. In a separate transaction the Province conveyed to the Dominion 3,000 square miles on Vancouver Island.

In 1930, pursuant to the findings of a Royal Commission, the Dominion returned to the Province the Dominion Railway belt and the Peace River Valley block, subject to any alienations made during its ownership. Cutting rights over timber areas had been granted and these so-called " timber berths " are now subject to Provincial administration. In February, 1944, there were 205 of these timber berths outstanding, averaging 2,072 acres in extent. These lands are subject to an annual rental varying, according to location, from $10 per square mile to 10 cents per acre, plus forest protection tax of 0.06 cent per acre. The timber cut from these berths is subject to a royalty of $1 per M. feet and is not exportable in its unmanufactured state except with the approval of the Lieutenant-Governor in Council.

The Vancouver Island grant contained some of the finest Douglas fir stands on this continent, and eventually was conveyed by the Dominion to the Esquimalt and Nanaimo Railway Company. Large areas in this belt have been alienated by the Company (now controlled by the C.P.R.), but much mature timber still remains in its ownership. These areas are included in the general classification of lands Crown-granted prior to April 7th, 1887.

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 area and in the northern area of British Columbia, and other Crown grants were made to many of them in furtherance of railway-construction. These are now, however, of minor consequence. A total of 8,203,410 acres were granted to various railways during this period; 4,065,076 acres were eventually repurchased in 1910 and 1912 and out of

the remainder over 2,000,000 acres represent lands granted the Esquimalt and Nanaimo Railway.

In 1901 the "Railway Lands Timber Royalty Act" clarified the status of these railway grants in relation to royalty by stating that timber royalty was not a tax, and that the tax exemption privileges in the several railway land grants did not carry exemption from royalty. This Act has never been applied to the Esquimalt and Nanaimo Railway lands.

In 1887 an attempt was made to forbid the sale of Crown lands "chiefly valuable for timber," but the only safeguard provided was the declaration by the applicant that the lands sought to be purchased were "not chiefly valuable for timber." Thus, although the principle of state ownership of timber lands was first recognized in 1884, the means to effectuate it were largely ineffective.

Prior to April 7th, 1887, timber lands were Crown-granted without any reservation of royalty or provision that the timber cut was to be manufactured within the Province. On and from this date the Provincial "Land Act" not only required purchasers of Crown lands to take a declaration that the land in question was "not chiefly valuable for timber," but reserved the timber to the Crown. Lands granted between April 7th, 1887, and April 28th, 1888, became known as "patented lands" and the owner thereof had to obtain a licence to cut the timber, and pay a royalty of 25 cents per thousand feet.

Although the export of timber cut under all forms of temporary alienation had been forbidden as early as 1901, unless with the consent of the Lieutenant-Governor in Council, there was no provision prohibiting the export of unmanufactured timber cut from these "patented lands" or other Crown lands disposed of until the passage of the "Timber Manufacture Act" of March 12th, 1906. This Act required that all timber cut from Crown lands granted after the passage of the Act must be used or manufactured within the Province. The Act did not apply east of the Cascades.

The "Land Act" of 1888 ended the granting of "patented" lands but preserved the right to obtain licences to cut timber thereon. The necessity of obtaining a licence to cut timber thereon was revoked in 1903.

Applicants were still required to take the declaration that the land was "not chiefly valuable for timber," but Crown grants under this and succeeding Acts passed title to the timber, reserving to the Crown a right to royalty. Under the 1888 Act the royalty was 50 cents per M. The price of the land was increased to $2.50 an acre for land valuable for cultivation or lumbering, and $1 per acre for other land. Each individual sale was limited to 640 acres.

The "Land Act" of 1891 provided that the land should be surveyed before purchase, and that the surveyor should classify lands that were not chiefly valuable for timber as follows:—

> Those suitable for lumbering and cultivation, being called first-class lands, and selling at a fixed price of $5 an acre:

Lands suitable for cultivation but not lumbering were known as second-class lands, and sold at $2.50 an acre:
Mountainous and pasture lands were classified as third class, and priced at $1 an acre.

This was the first recognition by the Legislature that timber lands had a greater value than other lands.

The surveyors, however, were not trained foresters, with the result that much of the first-class land sold under this and other Acts, until after the organization of the Forest Branch in 1912, were chiefly of value for timber.

The limit for an individual sale was still 640 acres.

In 1896 " timber land " was first defined to mean land containing 8,000 feet B.M. per acre on the Coast and 5,000 feet B.M. per acre in the Interior. Sale of this land was forbidden. This was the first effective step taken to establish the principle formulated in 1887 that timber lands should be held by the Crown and not permanently alienated.

Proper administrative measures were not introduced, however, and the Act was loosely enforced, with the result that it was still possible for " timber lands " to pass into private ownership.

The 1905 "Assessment Act " contains the first statutory provision to encourage timber preservation. The tax rate was set at 4 per cent. in respect of " wild " (untimbered) land as against 2 per cent. on land carrying 5,000 feet of timber or more per acre.

In 1912 land prices were doubled, and the Lieutenant-Governor in Council was given power to withdraw lands from sale or pre-emption on the ground of public policy.

By 1914 only limited tracts were available for purchase or pre-emption, none of which was chiefly valuable for timber.

STATUS OF CROWN GRANTS RELATIVE TO ROYALTY AND EXPORT.

At present all Crown-granted lands, other than Esquimalt and Nanaimo Railway lands, which are governed by special Acts, are subject to taxes in accordance with the provisions of the " Taxation Act," and to forest protection tax.

The position as regards royalty and right of export is more 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 can not 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 56 and subsections (1) and (2) of section 59 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 was 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 57 and 59 of the "Forest Act."

The various classes of Crown grants and the incidents 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 56 and subsections (1) and (2) of section 59 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 56 and subsections (1) and (2) of section 59 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 57 and 59 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 lands, excluding Esquimalt and Nanaimo grant, amounts to 529,940 acres.

TIMBER LEASES.

While permanent alienations of timber lands were becoming fewer in number, other systems of temporary alienation of timber were being devised.

As was stated, the modes of temporary alienation are leases, licences, and timber sales.

Leases were first granted under the Land Ordinance of 1865 which imposed no limits as to size, rentals, royalties, or terms of lease.

The only fixed principle was that the lands should be leased only to those "actually engaged" in the industry. The purpose of this was to prevent speculation in timber by private interests. This general principle was steadily maintained in effect until December 24th, 1907, when the granting both of leases and licences was discontinued by Order in Council.

Between 1865 and 1888 there were minor variations, but no very substantial change in the statutory provisions relative to leases.

In 1871 and 1888 enactments were passed having the effect of imposing a ground-rent of 5 cents 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 M. 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 such royalty.

Coincidental 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 B.F. 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 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. In 1895 the rentals were 10 cents and 15 cents per acre for mill-owners and non-mill-owners respectively, and were thereafter increased to 15 cents and 25 cents per acre on later leases.

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 M. with a minimum total of fees collected of 50 cents per acre.

In 1901 all existing leases were made renewable for consecutive and 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 interests 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.

In 1915 provision was made for conversion of leases into special timber licences.

At February 2nd, 1944, there were 152 timber leases, averaging 1,302 acres per lease; those west of the Cascade Mountains paying a rental of 21.875 cents per acre, and those east of the Cascade Mountains 15.625 cents

per acre, and in each case a forest protection tax of 0.06 cent per acre. The timber cut from these leases is subject to royalty in accordance with the terms of the "Forest Act," and is non-exportable in its unmanufactured state unless with the approval of the Lieutenant-Governor in Council.

PULP LEASES.

Pulp leases, which were first granted in 1901, while of later development, are merely a form of timber lease grantable to owners of pulp-mills with a capacity of 1 ton of pulp per square mile of lease, with a provision that the mill be operated six months in the year unless excused. Since the timber thereon is generally of less value, the rental and royalty are payable at lower rates than in the case of ordinary timber licences. There is provision, however, for special rental and royalty in respect of sawlogs cut on a pulpwood lease and not manufactured into pulp and paper. At the present time the annual rental on a pulp lease is 4 cents per acre compared with 22 cents per acre on a timber lease. The royalty on sawlogs manufactured into paper is the equivalent of 57 cents per M. feet B.M. whereas the royalty on the same species and grades cut on a timber lease varies from $2 to 60 cents, according to district and grade.

Sawlogs cut on a pulp lease not manufactured into wood-pulp or paper are subject to the higher rates of royalty and additional rental calculated at the rate of 22 cents per wooded acre per year. The result is that substantially less revenue is collected on first- and second-grade logs manufactured into wood-pulp or paper than those cut into lumber. The 1901 Act forbade export of manufactured timber from this form of lease as well as all other forms.

The granting of these leases was discontinued in 1905 but rights of renewal have been maintained from time to time by statute amendments, with the result that all present pulp leases expire September 3rd, 1954, renewable thereafter for consecutive and successive periods of twenty-one years upon such terms and conditions as may, from time to time, be approved by the Lieutenant-Governor in Council.

In 1926–27 provision was made whereby these pulp leases could be convertible into special timber licences when the timber was found to be unsuitable for the manufacture of pulp and paper.

In February, 1944, there was thirty-three wood-pulp leases in good standing or subject to renewal, each with an average of 10.170 acres.

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 from 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.

In 1887 a conflict between pre-emptors of lands 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 M. 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.

Until the year 1903 the whole system of temporary alienation was conducted with the dual purpose of obtaining revenue, and granting timber to operators for use rather than to the speculative public.

Of the two forms, leases which were granted upon varying conditions as to mill operation were a somewhat more secure form of tenure.

The provisions relative to granting of timber licences were now liberalized with the purpose of assuring operators a future source of supply. This led to a period of tremendous activity and speculation in timber licences. The revenues of the Forest Branch soared in consequence.

The 1903 Act did not change the size of the licensed area but lengthened the term of the licence to five years renewable at discretion, and increased the fees to $140 per year west of the Cascades and $115 east of the Cascades, the whole five-year fee being payable at the date of application.

Royalty on timber cut was set at 50 cents per M. feet and 25 cents per cord.

Between the passing of this Act and 1907, speculation was rampant. Some 15,000 licences were issued. An Order in Council, in consequence, was passed on December 24th, 1907, prohibiting all forms of temporary alienation of timber.

It is manifest that for many years the principal source of direct forest revenue has been the moneys received from royalties averaging, over the ten-year period under review, 57.44 per cent. of total receipts. Timber sales accounted for 19.61 per cent. and licences 17.09 per cent. The revenue from timber sales is chiefly stumpage based on an upset price fixed for each sale at a rate per M. feet to be paid for as and when cut and scaled. Royalty is also payable on production from timber-sale areas but as royalty is merely the reservation to the Crown of the Crown's interest in the timber sold I see no valid reason why this interest should not be included in the stumpage price. Cutting rights under the present form of leases and licences on which there is payable a yearly rental are in a different category and the reservation of the Crown's interest in the timber when cut would require the continuance of the present royalty system of translating that interest into money.

As licensed areas are logged off, or licences lapse, the revenue from this source is declining and will be reduced inevitably to the vanishing point. Timber-sale revenue, on the other hand, is increasing in absolute and relative value.

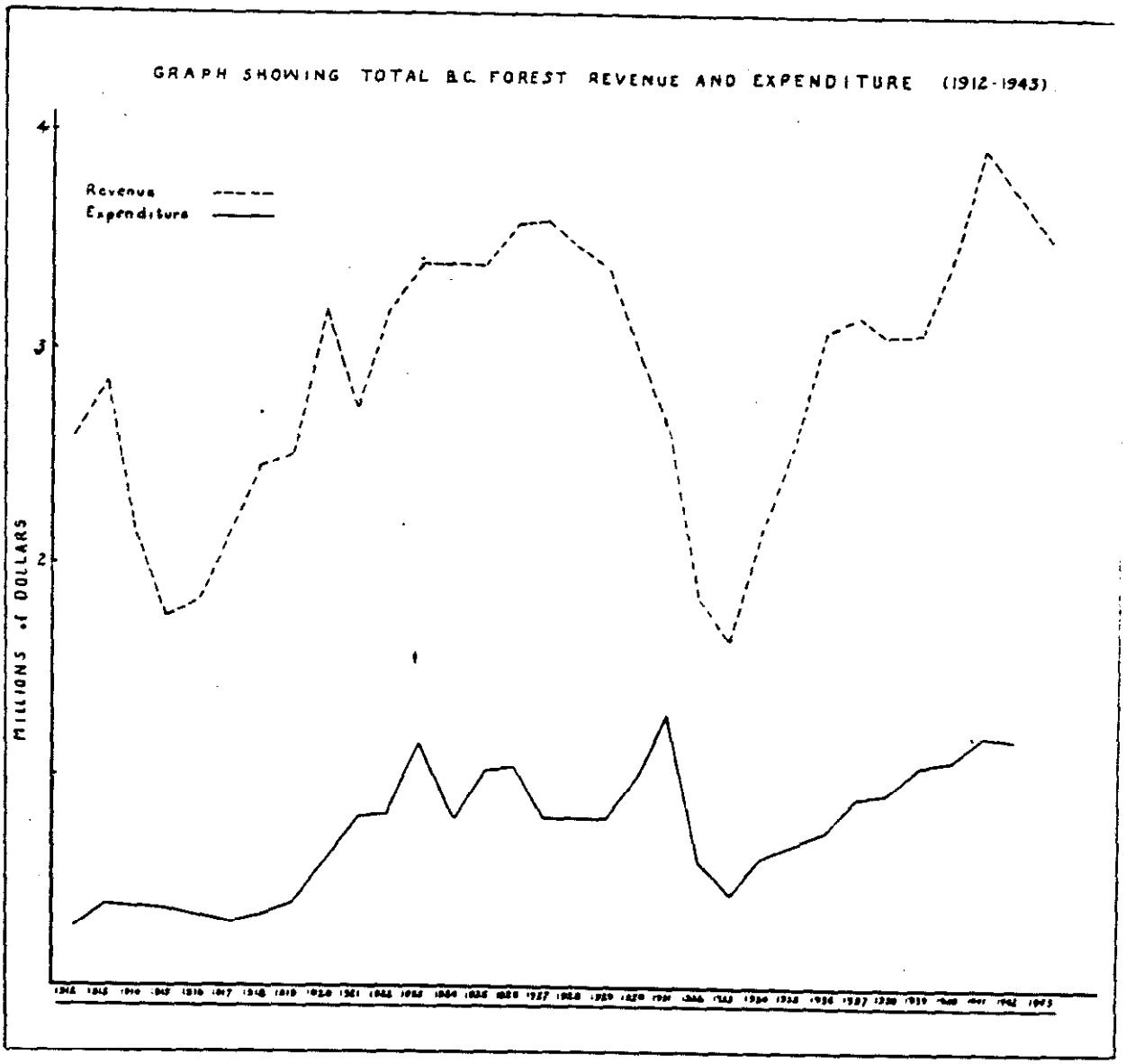
The efficiency and extent of future forest planning will be in direct ratio to expenditures on an adequately remunerated personnel and research in the management, conservation, regeneration and reforestation, and protection of our forest areas.

In 1910 a Royal Commission was appointed to inquire into forestry matters in this Province and an important recommendation was contained in the report of the Commission relative to the forest revenue. It reads as follows:—

> "Your Commissioners regard the income from royalty on timber as differing essentially from any other form of revenue in the Province. Such receipts should be regarded as capital—not as current revenue. We have no hesitation in recommending that the amount so received, large as it may appear, should be expended by the Government for the protection, conservation, and restoration of our timber resources. With our present knowledge regarding re-afforestation, to treat these receipts as other than capital would be utterly unsound in principle and might produce disastrous results in the ultimate impairment of the public estate."

It is regrettable to have to record that for thirty-five years this recommendation has been consistently ignored and disregarded by succeeding Governments. Millions upon millions of dollars have been drained from our forests into the general revenue to help pay for governmental activities and services wholly unconnected with the protection and development of the primary source of our Provincial wealth. (*See* accompanying graph illustrating total British Columbia forest revenue and expenditure for years 1912–43.)

If our forest administration were adequately financed to fulfil properly its function of protection, conservation, management, and development of our forest resources then any surplus forest revenues could be absorbed into the general revenue. But such has never been and is not now the case. Our forest administration for years has not been adequately financed.


GRAPH SHOWING TOTAL B.C. FOREST REVENUE AND EXPENDITURE (1912-1943)
Revenue
Expenditure
MILLIONS of DOLLARS
4
3
2

A comparison between amount received from direct forest revenue and forest expenditures leaves no doubt on that score. That comparison covering the ten-year period 1933–34 to 1942–43 follows:—

FOREST REVENUE AND EXPENDITURE.

Year.	Total Provincial Revenue.	Total Forest Revenue.[1]	Per Cent. of Total Revenue.	Total Forest Expenditure.	Per Cent. of Forest Revenue.	Per Cent. of Provincial Revenue.
1933–34	$20,208,860	$2,215,886	12.0	$420,429	19.0	2.08
1934–35	22,761,719	2,882,924	12.7	643,123	22.2	2.82
1935–36	25,862,077	3,418,211	13.1	697,798	20.5	2.69
1936–37	28,102,612	3,767,608	13.5	753,476	20.0	2.68
1937–38	31,036,943	3,992,337	12.9	911,376	22.8	2.90
1938–39	32,639,826	4,631,123	14.1	935,358	20.1	2.86
1939–40	32,826,438	5,044,597	15.3	1,027,862	20.2	3.19
1940–41	36,253,936	5,339,746	14.5	1,061,609	19.9	2.92
1941–42	38,763,546	5,839,586	15.0	1,187,632	20.3	3.06
1942–43	39,957,353	5,290,795	13.0	1,184,121	22.4	2.96

(1) Includes timber land tax and Provincial income tax on forest industry, collected by the Finance Department and not usually regarded as direct forest revenue.

If the timber land and income taxes are deducted from the foregoing then the following comparisons appear:—

Year.	Total Provincial Revenue.	Total Forest Revenue.	Per Cent. of Total Revenue.	Total Forest Expenditure.	Per Cent. of Forest Revenue.	Per Cent. of Provincial Revenue.
1933–34	$20,208,360	$1,768,999	8.7	$420,429	23.8	2.08
1934–35	22,761,719	2,266,710	9.9	643,123	28.4	2.82
1935–36	25,862,077	2,841,419	10.9	697,798	24.5	2.69
1936–37	28,102,612	3,001,055	10.6	753,476	25.1	2.68
1937–38	31,036,943	3,257,525	10.4	911,376	28.0	2.90
1938–39	32,639,826	2,982,702	9.1	935,358	31.4	2.86
1939–40	32,826,438	3,236,731	9.8	1,027,862	31.8	3.19
1940–41	36,253,936	3,549,931	9.7	1,061,609	29.7	2.92
1941–42	38,763,546	4,057,434	10.4	1,187,632	29.1	3.06
1942–43	39,957,353	3,519,892	8.8	1,184,121	33.6	2.96

Other Canadian Provinces, not nearly as dependent as we are on our forest wealth for our continued prosperity, are spending relatively larger proportions of forestry income on forestry administration than in this Province.

A study of the comparative relationship of direct revenue to expenditures in other Provinces discloses the following:—

The only important legislative change during this period was in 1905. Licences issued under the 1905 Act were annual licences renewable year by year for a period of twenty-one years, and by the same Act existing five-year licences were made renewable year by year for sixteen years after the expiry of the original period, and transferable, and no limit was imposed as to the number of licences per person.

This reduction of the period of the licence from five years to one year may have given an impetus to speculation as five one-year licences could now be obtained for the initial price of one five-year licence under the 1903–04 Act. The speculative fever was fed on the publicity attendant upon the throwing-open of the whole of the Provincial forest resources to " staking."

The 1905 Act also required licence-holders to have the licensed area surveyed before removing timber, or upon order of the Chief Commissioner of Lands, and provided that " in addition to the royalty which is now reserved by section 58 of the ' Land Act ' there shall be paid 10 cents per M. feet B.M. in respect of all timber cut and removed from any special licence heretofore issued or coming within the scope of this subsection."

In 1906 the " Timber Manufacture Act " was passed, incorporating the 1901 provisions relative to the manufacture within the Province of timber cut from leases and licences, and enacted that timber cut from all Crown grants issued after March 12th, 1906, should likewise be used or manufactured within the Province.

The 1908 consolidation and revision of the " Land Act " included provisions for the granting of twenty-one-year licences despite the existence of the 1907 Order in Council. Presumably this was to enable departmental officials to deal with the multitude of applications pending on the 24th of December, 1907.

In 1910 provision was made whereby existing licences could be converted into licences renewable from year to year so long as there was timber of commercial quantities on the licensed area. This enactment made licences an equally secure form of timber tenure as leases. Time for conversion was eventually extended to 1929.

In 1913 all licensees were required to have surveys made before March 31st, 1918. This time-limit was finally extended to 1929.

In February of 1944 there were 2,850 timber licences in good standing or subject to renewal, with an average area of 630 acres, and renewable from year to year while there is on the land sufficient merchantable timber to make it commercially valuable. The annual renewal fee is $140 west of the Cascade Mountains and $100 east of the Cascade Mountains. Licensed lands are subject to the annual forest protection tax, and the timber cut therefrom subject to royalty as provided by the " Forest Act."

These annual renewal fees were fixed until December 31st, 1954, by the " Timber Royalty Act " of 1914, which was afterwards incorporated into the " Forest Act."

PULP-WOOD LICENCES.

In 1919 provision was made for conversion of special timber licences to pulp licences. Pulp licences thus issued were required to be appurtenant to the pulp-mill in respect of which it was issued.

This amendment was repealed in 1921 and the "Forest Act Amendment Act" enacted provisions whereby pulp districts were created to encourage and perpetuate the pulp and paper industry. Disposal of pulp-wood in these districts is restricted so that the annual cut does not exceed the productive capacity of the area. In the same Act provision was made for conversion of pulp licence to special timber licence in certain circumstances. These provisions have been carried forward to the present Act.

In February of 1944 there were 252 pulp licences in good standing or subject to renewal, averaging 618 acres. These are renewable from year to year while there is in the licensed area merchantable pulp timber of commercial value. The annual renewal fee is one-half that payable on timber licences. The areas are subject to forest protection tax and royalty. As these licences were granted subsequent to 1906 the timber is not exportable in an unmanufactured state except with the consent of the Lieutenant-Governor in Council. As pulp-wood is defined as timber "cut upon land specified in any pulp licence" there is consequent loss of revenue where first- and second-grade timber is converted into wood-pulp or paper and not into lumber.

SPECIAL FORMS OF LICENCES.

In addition to these general timber licences there are two special forms of licences—namely, "hand-loggers' licences" and "hemlock-bark licences."

Hand-loggers' Licences.—These licences are personal licences allowing the holder thereof to cut timber. They were first granted in 1886. In 1888 the term for which such licence could be issued was limited to one year. It was in this year that the words, "hand-loggers' licences" were first given statutory use.

This form of licence came under the general ban against alienation of Crown timber in the 1907 Order in Council.

In 1908, after representations by Labour Associations, provision was again made for issuance of these personal licences. The fee was raised from $10 to $25 per year, and the area of the operations confined to certain parts of the northern coast. The 1908 Act also forbade use of steam-powered machinery by the holder of a hand-logger's licence. In 1920 these words were generalized so as to bar use of any form of powered equipment. Timber cut under this form of licence has always been subject to royalty.

Hemlock-bark Licences.—This special form of licence (sometimes called "tan-bark leases") is in reality a lease, but is generally catalogued among licences as all those granted have either lapsed or been converted to special timber licences.

TIMBER SALES.

Between December 24th, 1907, and the coming into effect of the "Forest Act" of 1912 there was no way in which Crown timber could be alienated, either permanently or temporarily.

This state of affairs became unsatisfactory for many reasons. Past forms of licensing and leasing had not systematically covered the forest areas, with the consequence that there were many stands, too small to be logged independently, left isolated and subject to accelerated deterioration when logging operations on near-by limits ceased. Larger stands were in danger of deterioration because of their overmaturity. To remedy this situation a system of timber sales was put into effect. The area to be sold is selected by departmental officials, surveyed, cruised, and classified.

Anything except very small blocks are advertised for sale. Under the 1912 Act the price was made to include a bonus payment, stumpage not less than upset price, cost of survey, cruising, and advertising. Sale was made to the highest accepted bidder, subject to the terms of the forest legislation and the terms of the timber-sale contract.

Amongst other things, conditions of sale included an annual rental subject to reduction as each 640-acre block was eliminated, payment of royalty, forest protection tax, and compliance with regulations.

This principle of disposal of Crown timber is still in effect, though various modifications have been made from time to time to aid in efficient administration and effective control.

In February of 1944 there were 3,087 non-rental timber sales averaging in area 200 acres, 615 timber sales paying rental with an average area of 460 acres. By virtue of the 1906 Act export of unmanufactured timber alienated under timber sales has always been forbidden unless approved by the Lieutenant-Governor in Council under the powers later given.

PULP-WOOD TIMBER SALES.

These are a special form of timber sale and were originally provided for in the 1912 Act. These pulp-wood timber sales have some of the characteristics of pulp-wood leases granted between the date of the 1901 "Land Act" and the 1907 Order in Council and are defined in the "Forest Act" as "pulp licences." Pulp timber is, however, a more appropriate term.

In addition to the general conditions relative to all timber sales the tenderer must prove that he has spent $350,000 in mill erection, or post a bond of $50,000 to guarantee the erection of a pulp-mill within three years.

The contract is renewable from year to year during the period of the contract and must be appurtenant to the pulp-mill. The pulp licences held by the pulp-mill operator must not contain more than thirty years' supply of pulp-wood 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.

At February 2nd, 1944, there were nineteen pulp-timber sales with an average area of 4,176 acres.

As in timber sales, the upset price is in accordance with the appraisal of the accepted tender in excess thereof.

Export of unmanufactured timber is not permitted except upon approval of the Lieutenant-Governor in Council.

My opening comment on the subject of forest tenures was to the effect that they were complicated in structure. The foregoing sketchy outline has at least demonstrated the truth of that remark. It is impossible now to state what reasons, from time to time, dictated the various statutory changes over the years. Looking back, however, there may be discovered a fairly consistent philosophy underlying the gradual evolution of tenures and the terms thereof. It may be summarized under four headings:—

(1.) All productive forest land was to remain in Crown ownership.
(2.) The Crown was to receive a fair share of the wealth produced by the exploitation of this natural resource.
(3.) Speculation in timber by private interests was to be eliminated.
(4.) The export of logs in unmanufactured form was to be reduced to a minimum.

In general, and to a degree, these objectives have been attained.

Past forest policies did not, however, envisage private forestry as an objective. A vice-president of one of the largest logging and sawmill companies operating on the Coast made, I think, a succinct review of the situation when he said:—

> "Up to this time, loggers and lumbermen have been looked upon and treated as transients without any permanent interests in their forests, their own business, or the communities they built and support. This point of view has been reflected in the forest legislation of our Province. There is no provision in our forest laws to allow an operator to plan a permanent operation. Lands chiefly valuable for forests have been reserved from outright sale and such lands have been alienated only under temporary lease or licence until the merchantable timber is removed, at which time the land reverts to the Crown. The logger has been treated as a miner, with no choice but to mine his forest. . . .
>
> "We believe that sound forest management integrated with the management of logging can be compatible with good business management. We recommend that it be made possible for the forest owner or operator to bear the responsibility of managing his forest on a permanent basis. . . .
>
> "Our present form of tenure, which is largely timber licence, prohibits us from having any interest in our land after it is logged."

His view-point is undeniably correct and if we are to have a measure of private forestry in this Province whereby large corporations will plant, grow, protect, and conserve their own productive land areas a form of tenure will have to be devised to meet the situation.

LOG EXPORTS.

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 can not 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 provision 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, can not interfere with the export of logs from these areas within this classification. That control, then, lies solely within the competence of the Federal Government.

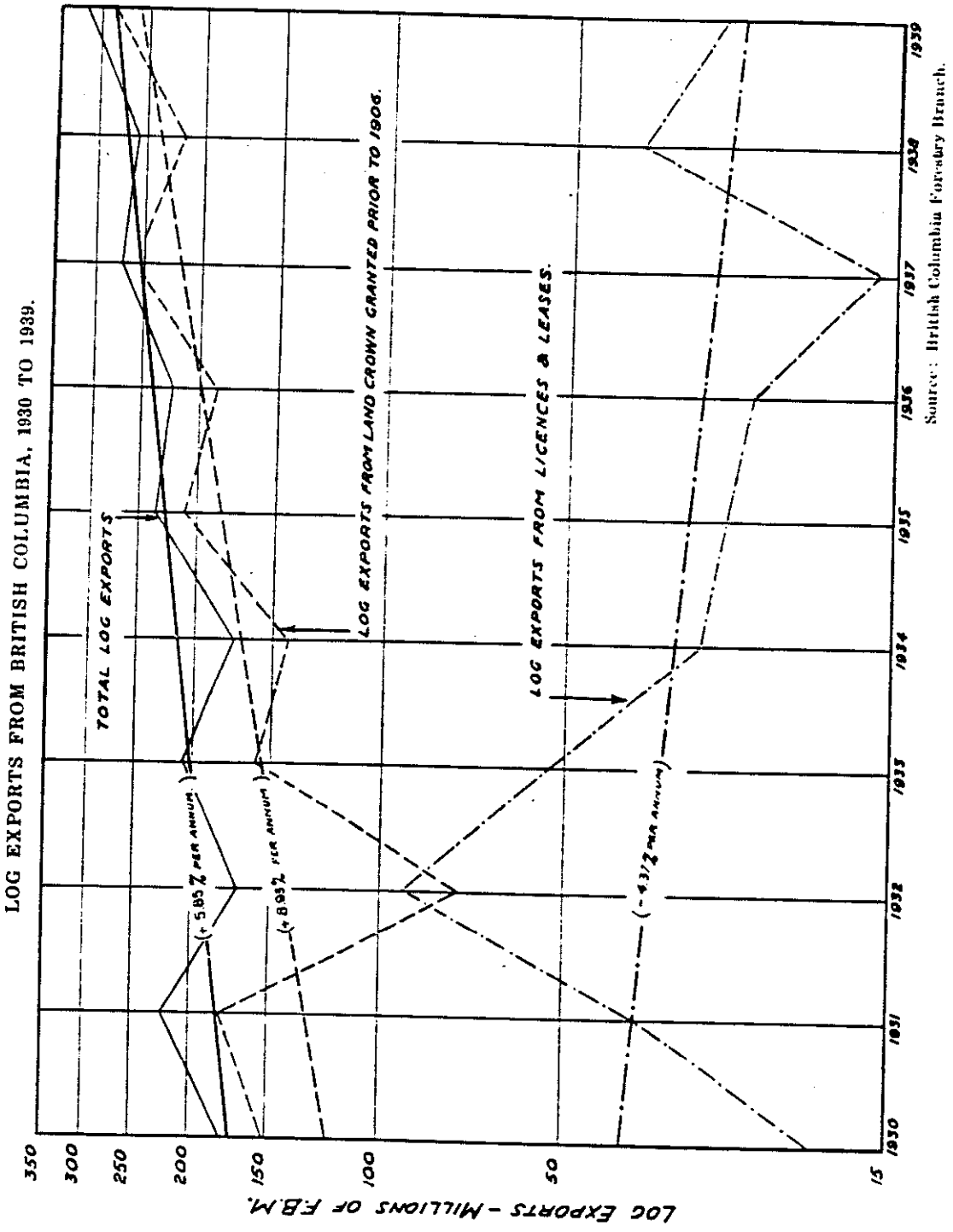
It has sometimes been said that the areas from which the Provincial Government is powerless to prevent the export of logs have an "export privilege." This is a misnomer. It is not a "privilege." The right to export arises from an absence of either contractual or legislative jurisdiction to regulate this 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, consisting of the Minister of Lands and Forests as chairman (represented by the Deputy Minister of Forests) and six other members. Three of these represent the logging operators and three represent the log-buying sawmills of the Province.

The following table, covering the ten-year period 1930–39, shows the total log exports during that period from unrestricted and restricted areas:—

Year.	Exports from Crown Grants (F.B.M.) (unrestricted).	Per Cent. of Total.	Exports from Licences and Leases (F.B.M.) by Permit.	Per Cent. of Total.	Total (F.B.M.).
1930	153,190,000	88.6	19,729,000	11.4	172,191,000
1931	182,787,000	83.0	37,389,000	17.0	220,176,000
1932	73,342,000	44.2	92,423,000	55.8	165,765,000
1933	157,627,000	75.5	51,314,000	24.5	208,941,000
1934	142,232,000	82.3	30,504,000	17.7	172,736,000
1935	207,139,000	88.0	28,153,000	12.0	235,292,000
1936	192,976,000	88.4	25,853,000	11.6	218,829,000
1937	254,596,000	94.1	15,876,000	5.9	270,472,000
1938	220,462,000	84.9	39,211,000	15.1	259,673,000
1939	284,357,000	91.0	28,176,000	9.0	312,733,000
Averages	186,891,000	83.5	36,863,000	16.5	223,754,000

The same information in graphical form is as follows:—



Source: British Columbia Forestry Branch.

It will be noticed that for the entire ten-year period, 83.5 per cent. of export logs originated on Crown-granted lands. In 1939, 91 per cent. of export logs were cut on these lands.

It is interesting to compare the trends of exports from each of the two sources. For the ten-year period, 1930 to 1939, total log exports from both sources increased at a compound rate of 5.86 per cent. per annum. For the same period, log exports from Crown-granted lands (uncontrolled) increased at a compound rate of 8.93 per cent. per annum, while log exports from timber licences and leases (controlled by the Export Advisory Committee) decreased at a compound rate of 4.37 per cent. per annum.

Apparently the Export Advisory Committee has been effective in the limited field over which it has control. The over-all increase in the export of logs must be attributed to the uncontrolled export from the Crown-granted lands.

An analysis of the export of the various species discloses the following figures in terms of relative percentages:—

DOUGLAS FIR.

Year.	Per Cent. of Total Export of all Species.	Per Cent. of Production exported.	Per Cent. Exportable without Permit.	Per Cent. Permit Export.
1933	65.1	15.59	88.67	11.33
1934	61.4	9.14	93.89	6.11
1935	70.5	12.38	89.18	10.82
1936	58.9	8.11	99.34	0.65
1937	56.3	9.41	95.61	4.39
1938	43.1	7.46	98.58	1.42
1939	34.9	6.44	97.59	2.41
1940*	10.9	1.36	98.00	2.00
1941	27.2	4.95	90.08	9.91
1942	1.3	0.15	74.31	25.69
1943	3.3	0.21	93.04	6.96

* All export of Douglas fir logs prohibited as a war measure by Timber Controller as from midnight, July 10th, 1940.

CEDAR.

1933	26.3	14.68	44.36	55.64
1934	19.4	9.96	44.08	55.92
1935	10.6	5.21	81.58	18.42
1936	9.7	3.83	98.11	1.89
1937	8.8	4.11	96.84	3.16
1938	18.7	8.78	83.04	16.96
1939	15.9	7.13	94.13	5.87
1940	11.5	3.77	88.29	11.71
1941	7.6	3.21	98.51	1.49
1942	27.4	7.26	99.57	0.43
1943	58.6	9.01	99.66	0.34

SPRUCE.

Year.	Per Cent. of Total Export of all Species.	Per Cent. of Production exported.	Per Cent. Exportable without Permit.	Per Cent. Permit Export.
1933	0.3	0.73	67.41	32.59
1934	0.9	1.15	14.48	85.52
1935	0.9	1.79	60.53	39.47
1936	2.8	4.06	7.15	92.85
1937	3.3	5.04	35.66	64.34
1938	8.8	14.97	9.07	90.93
1939	8.0	15.55	27.94	72.06
1940	8.4	7.71	8.02	91.98
1941	2.1	2.44	39.84	60.16
1942	1.4	0.79	14.99	85.01
1943	0.6	0.14	51.28	48.72

HEMLOCK.

1933	4.1	3.59	87.97	12.03
1934	13.5	6.87	95.01	4.99
1935	14.7	8.04	89.87	10.13
1936	24.0	11.32	71.79	28.21
1937	27.8	13.08	98.65	1.35
1938	29.9	18.30	88.70	11.30
1939	37.3	21.34	97.04	2.96
1940	57.7	17.48	82.51	17.49
1941	49.9	22.57	87.21	12.79
1942	56.9	15.30	92.68	7.32
1943	31.8	4.24	98.80	1.20

BALSAM.

1933	0.6	1.89	57.33	42.67
1934	1.4	3.19	61.05	38.95
1935	1.0	2.71	79.08	20.92
1936	1.6	4.31	43.54	56.46
1937	1.6	4.58	92.17	7.83
1938	2.3	9.14	89.92	10.08
1939	3.0	10.71	94.88	5.12
1940	10.4	15.00	65.30	34.70
1941	12.5	28.35	71.67	28.33
1942	11.6	13.64	86.05	13.95
1943	5.4	31.45	96.96	3.04

OTHERS.*

1933	3.6	28.80	55.31	44.69
1934	3.4	35.44	67.55	32.45
1935	2.3	28.96	88.11	11.89
1936	3.0	35.29	65.12	34.88
1937	2.1	29.34	77.76	22.24
1938	1.1	15.29	74.17	25.83
1939	0.8	15.79	81.96	18.04
1940	0.9	12.81	72.88	27.12
1941	0.7	11.89	88.11	11.89
1942	1.3	10.65	96.11	3.89
1943	0.3	8.73	100.00	...

* "Others" include yellow pine, white pine, lodgepole pine, larch, cottonwood, and miscellaneous.

The increased exports of the pulp species, hemlock and balsam, since 1933 can not pass unnoticed and accounts for, in part at lease, the flourishing condition of the pulp- and paper-mills of Washington and Oregon. Although the pulp and paper industry did not so request, it seems to me that this industry should be represented on the Export Advisory Committee.

It is my opinion that mills dependent solely, or to a large degree, upon the open log market as the source of their logs will, in the future, suffer from a lack of supply. This condition, in turn, will lead to curtailment of production with consequent reduction in employment in those mills. The extraction of logs for export does provide employment, but a greater degree of manufacture in the Province is directly reflected in a greater number of men gainfully employed in those processes of conversion.

When producing logs for export in an unmanufactured state we are depleting our forests just as fast as if those same logs were processed into manufactured form in this Province. When exporting our logs the ratio of employment to depletion is very low. That ratio increases in direct relation to the degree to which our raw material is manufactured in the Province. In other words, each log which is manufactured in the Province, instead of being exported for manufacture elsewhere, provides an increase in employment and pay-rolls without any corresponding increase in the rate of forest depletion.

The continued export of logs to foreign countries, to be manufactured therein into vendible commodities which, in turn, we probably purchase, will not only affect our employment structure but also leads to loss of indirect income flowing from manufacturing processes, including Government revenue in the form of income tax and such like. The export of 1939 of 313 million feet of logs produced a gross income of $4,784,363. These same logs manufactured into lumber would have produced about another $3,000,000. Turned into doors, sashes, wood pipes, furniture, pulp products, and so on, this material would have created a considerably greater volume of wealth for our own citizens.

In 1942 the export of logs was restricted by the Timber Controller, acting under authority of the Dominion Government; but in 1941, 193 million board-feet of hemlock and balsam were exported. This is enough raw material to supply the needs of two good-sized pulp-mills and is in excess of 50 per cent. of the highest pulp-wood consumption in any year in this Province. During 1941 the Powell River Company was forced to curtail production to four days a week, while the Washington and Oregon plants ran a full seven-day week. In that year 22 per cent. of our hemlock production was exported: 87.21 per cent. thereof came from unrestricted areas and 12.79 per cent. from permit areas. Similarly, 28 per cent. of our balsam production went out to foreign markets, 71.67 per cent thereof exportable without permit. If I am correct in interpreting the evidence to mean that the next thirty years will see the gradual disappearance of Douglas fir on the Coast with resultant heavier depletion in other species —especially hemlock— it seems to me the export of our raw material—

especially hemlock— should not be permitted to continue without regulation from unrestricted areas.

I must emphasize the fact that Crown grantees of areas over which no export control is exercisable by the Province do not enjoy any affirmative rights of export. They are in that preferred position simply because of the constitutional division of legislative authority in Canada which vests control over exports in the Dominion Government. The Dominion Government now exercises that control because of the exigencies of the war years. I see no valid reason why, if the public interest so demands, the extension of the control principle should not continue to be exercised by the Dominion authority in the post-war period of transition to a planned system of Forest Management.

FOREST FINANCE.

The Provincial Government is in receipt of direct and indirect revenue from our forests. What the indirect revenue amounts to is impossible of assessment. It would include income tax collections from secondary industries dependent upon our forest production: revenues from all the various multiple forest uses to which I have made previous mention, such as the benefits derived from watershed protection, the tourist traffic, commercial and sport fishing, and a host of other revenue-producing activities. In 1941, for instance, 181,008 automobiles entered this Province and tourists left with us $15,000,000 of their money. This flow of money into local pockets would not continue long if all we had to offer our visitors was the devastation of logged and burned lands and dismantled scenery.

There can be no doubt of this fact: that the multiplicity of forest functions and the total indirect values derived therefrom bring to the public generally, and the Provincial coffers in particular, far greater sums of money than is realized from measurable direct revenues.

The direct forest revenues are made up of receipts from royalties, timber sales, licences, leases, taxes (i.e., a small fee on export of timber), grazing permit fees, rentals on Dominion timber berths, trespass (i.e., penalties for unauthorized timber cutting), and miscellaneous. Forest expenditures include money spent on salaries of the permanent and temporary staff, expense accounts, reconnaissance (i.e., employment of outside compassmen and cruisers to assist rangers), grants (to the Canadian Forestry Association), forest reserve account, research, reforestation (i.e., nurseries growing young stock and planting costs), park expenditure, fire protection, and grants-in-aid of trade extension up to 1935 when that activity was taken over by the Department of Trade and Industry. (*See* accompanying graphs, pages 105, 106.) The absence of any expenditures for insect-control is to be noted.

Several of these items of expenditure—i.e., Forest Reserve Account, Grazing Range Improvement Account, and Fire Protection Fund—require explanation.

The Forest Reserve Account consists of an annual contribution from the Province in an amount equal to 3 per cent. of the gross receipts of the

DIRECT FOREST REVENUE.

FISCAL YEARS 1933–34 TO 1942–43, INCLUSIVE.

Year.	Total Revenue.	Royalty.	Per Cent. of Total.	Timber Sales.	Per Cent. of Total.	Licences.	Per Cent. of Total.	Leases.	Per Cent. of Total.	Tax.	Per Cent. of Total.	Grazing.	Per Cent. of Total.	Dominion Berths.	Per Cent. of Total.	Trespass.	Per Cent. of Total.	Miscellaneous.	Per Cent. of Total.
1933–34	$1,768,999	$956,618	54.07	$276,435	15.62	$358,725	20.29	$62,045	3.51	$64,081	3.62	$10,064	0.57	$32,949	1.86	$4,358	0.25	$3,724	0.21
1934–35	2,266,710	1,123,788	49.58	315,336	13.91	658,159	29.04	72,952	3.22	41,596	1.83	11,635	0.51	32,998	1.46	7,125	0.31	3,121	0.14
1935–36	2,841,419	1,708,828	60.14	361,069	12.71	621,301	21.87	69,711	2.45	29,796	1.04	13,659	0.48	26,905	0.95	5,567	0.20	4,583	0.16
1936–37	3,001,055	1,803,456	60.10	436,298	14.54	606,369	20.20	58,893	1.96	42,115	1.40	15,509	0.52	28,020	0.93	5,342	0.18	5,053	0.17
1937–38	3,257,525	1,880,592	57.73	597,974	18.36	580,221	17.81	62,722	1.93	64,246	1.97	24,084	0.74	24,438	0.75	19,262	0.59	3,986	0.12
1938–39	2,982,702	1,578,005	52.90	575,229	19.29	636,176	21.02	67,078	2.58	66,316	2.22	16,916	0.57	27,407	0.91	10,333	0.34	5,242	0.17
1939–40	3,236,731	1,915,551	59.18	707,420	21.86	439,386	13.58	51,535	1.59	54,320	1.68	25,682	0.79	23,154	0.71	14,012	0.43	5,671	0.18
1940–41	3,549,932	2,159,597	60.84	769,362	21.68	434,427	12.23	56,828	1.60	50,713	1.43	35,537	1.00	20,751	0.58	16,281	0.46	6,436	0.18
1941–42	4,057,438	2,453,335	60.46	937,050	23.09	459,154	11.31	48,807	1.23	81,624	2.01	30,514	0.75	22,810	0.56	17,549	0.43	6,595	0.16
1942–43	3,519,892	1,928,760	54.80	1,003,160	28.50	414,815	11.78	50,063	1.42	38,409	1.09	28,981	0.82	22,455	0.64	22,816	0.65	10,433	0.30
Ten-year averages	$3,048,240	$1,750,853	57.44	$597,933	19.61	$520,873	17.09	$60,063	1.97	$53,322	1.75	$21,258	0.70	$26,189	0.86	$12,265	0.40	$5,484	0.18

FOREST EXPENDITURES.

FISCAL YEARS 1933–34 TO 1942–43, INCLUSIVE.

	Total Expenditure.	Salaries.	Per Cent. of Total.	Temporary Assistance.	Per Cent. of Total.	Expense Vote.	Per Cent. of Total.	Trade Extension.	Per Cent. of Total.	Reconnaissance.	Per Cent. of Total.	Grants.	Per Cent. of Total.	Forest Reserve Account.	Per Cent. of Total.	Research.	Per Cent. of Total.	Reforestation.	Per Cent. of Total.	Miscellaneous.	Per Cent. of Total.	Grazing Range Improvement Fund.	Per Cent. of Total.	Forest Protection Fund.	Per Cent. of Total.	Provincial Parks.	Per Cent. of Total.
	$420,429	$276,508	65.77	$187	0.04	$78,911	18.77	$19,000	4.52	———	———	$2,000	0.48	$38,261	9.10	———	———	———	———	$558	0.13	$5,004	1.19	———	———	———	———
	643,123	203,205	31.60	———	———	75,058	11.67	53,130	8.26	$1,995	0.31	3,000	0.47	———	———	$1,988	0.30	$1,423	0.22	———	———	3,324	0.52	$300,000	46.65	———	———
	697,798	203,413	29.14	———	———	86,250	12.36	50,000	7.17	1,999	0.29	2,000	0.29	43,927	6.29	2,000	0.29	4,391	0.63	———	———	3,818	0.55	300,000	42.99	———	———
	753,476	226,803	30.10	1,423	0.19	98,041	13.01	50,000	6.64	1,889	0.25	2,000	0.27	62,298	8.27	1,993	0.26	4,384	0.58	289	0.04	4,356	0.58	300,000	39.81	———	———
	911,376	244,241	26.80	812	0.09	108,849	11.94	50,000	5.49	4,963	0.55	4,000	0.44	67,669	7.42	13,331	1.46	12,700	1.39	———	———	4,811	0.53	400,000	43.89	———	———
	935,358	251,674	26.94	967	0.10	118,494	12.66	———	———	9,078	0.97	4,000	0.42	74,908	8.00	14,000	1.50	14,929	1.59	———	———	7,308	0.78	440,000	47.04	———	———
	1,027,862	261,914	25.48	4,211	0.41	119,802	11.66	———	———	9,973	0.97	4,000	0.39	65,388	6.36	13,979	1.36	42,956	4.18	———	———	5,639	0.55	500,000	48.64	———	———
	1,061,609	262,355	24.71	4,491	0.42	117,775	11.10	———	———	9,961	0.94	4,000	0.38	87,812	8.27	13,860	1.30	42,990	4.05	———	———	8,561	0.81	500,000	47.10	$9,803	0.92
	1,187,632	257,344	21.67	12,030	1.01	115,933	9.77	———	———	8,624	0.73	4,000	0.34	103,158	8.68	11,487	0.96	150,759	12.69	———	———	11,846	1.00	500,000	42.10	12,450	1.05
	1,184,121	262,186	22.14	14,190	1.20	182,644	15.42	———	———	8,317	0.70	4,000	0.34	103,158	8.71	9,924	0.84	76,383	6.45	———	———	10,171	0.86	500,000	42.23	13,148	1.11
s	$882,278	$244,964	27.77	$3,831	0.43	$110,176	12.49	$22,213	2.52	$5,680	0.64	$3,300	0.37	$64,658	7.33	$8,256	0.94	$35,091	3.98	$85	———	$6,484	0.74	$374,000	42.39	$3,540	0.40

FOREST REVENUE AND EXPENDITURE BY PROVINCES, 1933–43.

Fiscal Year.	Total Provinces.		Nova Scotia.		New Brunswick.		Quebec.		Ontario.		Manitoba.		Saskatchewan.		Alberta.		British Columbia.	
	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.
1933–34	$6,537,028	$5,121,086	$119,466	$91,547	$455,182	$148,370	$1,789,537	$1,906,170	$1,363,483	$1,337,122	$100,332	$174,639	$126,585	$212,000	$148,403	$189,124	$1,768,999	$420,429
1934–35	6,658,724	4,832,249	134,106	108,321	683,281	246,245	1,718,718	1,385,440	1,562,150	2,057,166	150,955	142,175	109,257	212,600	178,991	179,951	2,266,710	643,123
1935–36	6,859,594	3,579,628	159,060	71,726	565,434	276,559	2,355,034	1,424,770	410,178*	439,322*	201,604	142,757	153,647	203,900	258,764	197,453	2,841,419	697,798
1936–37	10,896,638	4,724,301	181,425	66,890	629,935	191,922	3,581,797	1,361,166	2,603,564	1,721,362	201,416	160,469	217,973	224,200	321,737	160,116	3,001,055	753,476
1937–38	11,956,914	5,599,305	181,425	66,890	957,429	210,000	3,516,001	1,013,692	2,923,380	2,600,136	239,370	176,050	225,414	247,392	345,315	288,374	3,257,525	911,376
Total	$42,899,898	$23,857,069	$775,482	$405,374	$3,291,261	$1,073,596	$12,961,087	$7,091,238	$8,862,755	$8,655,108	$894,177	$796,090	$832,876	$1,100,092	$1,253,210	$1,015,018	$13,135,708	$3,426,201
Five-year averages	8,579,980	4,771,414	155,096	81,075	658,252	214,719	2,592,217	1,418,248	1,772,551	1,731,022	178,835	159,218	166,575	220,018	250,642	203,004	2,627,141	686,240
1938–39	$13,628,865	$6,825,256	$175,640	$90,343	$870,950	$223,097	$4,392,626	$2,217,170	$3,912,072	$2,622,133	$211,086	$175,847	$241,248	$232,307	$298,433	$352,847	$2,982,702	$935,358
1939–40	13,853,550	6,901,900	177,023	113,529	683,587	224,774	6,002,448	2,419,689	3,863,861	2,527,704	231,217	170,815	311,815	235,509	359,786	274,522	3,236,731	1,027,862
1940–41	16,201,366	6,897,603	164,663	105,755	1,051,926	200,998	5,994,046	2,456,758	4,153,237	2,454,495	311,377	202,973	409,721	180,520	612,175	268,162	3,549,931	1,061,609
1941–42	17,526,505	7,396,003	187,950	118,349	1,121,426	283,047	6,313,841	2,651,943	4,264,094	2,267,880	298,597	223,420	550,985	286,862	732,178	458,621	4,057,434	1,187,631
1942–43	17,858,544	7,611,043	201,652	203,153	1,237,703	317,597	6,902,355	2,722,633	4,241,088	2,367,700	314,472	198,549	667,210	283,703	774,172	398,274	3,519,892	1,168,935
Total	$79,068,830	$35,631,805	$906,928	$631,129	$4,965,592	$1,199,513	$29,605,316	$12,468,193	$20,434,352	$12,239,912	$1,336,749	$971,604	$2,180,976	$1,169,001	$2,776,744	$1,752,424	$17,346,690	$5,381,395
Five-year averages	15,813,766	7,126,361	181,385	126,226	993,118	239,902	5,921,063	2,493,638	4,086,870	2,447,982	273,349	195,321	436,195	233,800	555,349	350,485	3,469,338	1,076,279

* Five months.

An analysis of these figures shows that the Provinces rank in the following order in their relation of revenue to expenditure for the ten-year period 1933–42:—

	Per Cent.
Saskatchewan	93.0
Manitoba	80.0
Ontario	79.5
Alberta	72.0
Nova Scotia	62.5
New Brunswick	28.5
British Columbia	28.8
Average of all Provinces	63.5

To discover that in the past ten years this Province has spent, of its direct forest revenue, in the administration, development, and protection of our forests, with their tremendous present and potential values to almost every branch of our Provincial economy, a sum equal in percentage to that spent by New Brunswick, and lower in percentage than that spent by any other Canadian Province is disquieting.

The neighbouring states of Washington and Oregon are divided by the Cascades into divisions generally similar to our Coast and Interior areas. The Douglas fir belt in Federal ownership lying west of the Cascades in those two States is administered by the United States Forest Service as one unit, designated "Region 6." Region 6 contains 23½ million acres of forest land, or about one-third of the area of the productive forest land of this Province. The direct forest revenues from, and expenditures charged against, that Region, 1943–44, were as follows:—

Year.	Revenue.	Expenditure.	Ratio of Expenditure to Revenue.
			Per Cent.
1943	$3,445,732	$7,465,921	216.6
1944	6,156,569	8,803,609	142.9
Totals	$9,602,301	$16,269,530	169.4

Total expenditures chargeable against Region 6 for these two years amounts to $6,667,229 *more* than direct revenues. Fire-protection costs expended by private fire associations are not included in these figures and would add a considerable sum to over-all expenditures in this region.

Total expenditures in this Province for those same two years amounts to $5,610,510 *less* than direct revenue. The comparison speaks for itself.

Only 2 per cent. of the productive land area of British Columbia is arable. To foster agriculture on this land area the Provincial Government spent many times the amount of direct revenue derived therefrom in the years indicated, as follows:—

Year.	Total Expenses.	Revenue.	Ratio of Expenditure to Revenue.
			Per Cent.
1933–34	$281,044	$14,830	1,895.10
1934–35	283,277	14,063	2,014.34
1935–36	295,725	16,402	1,802.98
1936–37	339,412	10,913	3,110.16
1937–38	348,227	18,400	1,892.54
1938–39	347,835	17,678	1,967.62
1939–40	337,830	16,621	2,032.55
1940–41	327,513	15,601	2,099.31
1941–42	359,043	21,517	1,667.11
1942–43	313,734	21,260	1,475.71

My comparison is not intended as a criticism of the amount spent on agricultural development. Indeed, the Department of Agriculture is to be commended for its aggressive policies.

The short-term view apparently motivating forest financing in the past has led us to the stage where the goose which lays the golden eggs is slowly dying of malnutrition and is largely responsible for the present unbalanced state of our forest resource, including the alarming areas of denuded lands which, under a proper policy of forest management, protecting and increasing our growing stock, and regulating our logging industry, would now be growing forests for the future. Public apathy, past governmental inertia, and the natural inclination of the industry to follow the line of least resistance all contribute to our present picture. The Government, at least, is now alive to our need of a new policy as evidenced by this inquiry. Industry also recognizes the simple fact that our forests are not inexhaustible and is now ready, able, and willing to do its part provided, in the new conception of forest management, those burdens of taxation and carrying charges which compel liquidation are dealt with equitably.

Public education is still an essential and the public conscience must be awakened to the fact that forest revenue must be regarded as capital to be ploughed back into the vitally essential business of protecting, conserving, restoring, and managing our forest resources. This requirement may mean less money for social services; it may mean taxation increases in other fields, but the present policy of regarding forest income as general revenue must changed *now* and not in the distant and nebulous future.

The public estate has suffered impairment during the last thirty-five years due to lack of provided funds for essential forest management. The public interest requires that this state of affairs should not continue into the future.

ADMINISTRATION.

Forest administration in this Province is the responsibility of the Department of Lands and Forests. The Forest Service is under the direction of the Deputy Minister of Forests.

The service may be divided into two broad administrative classifications: Head Office and Field Administration. The Head Office administration is divided into the following five divisions: Operations, Management, Economics, Grazing, and Records.

The Operations division is responsible for all forest protection activities, including purchase and maintenance of equipment, hiring and supervision of personnel, and allotment of funds for protection and general expenses. A Senior Forester is in charge.

The Management division, also under a Senior Forester, is responsible for the sale of Crown timber, cutting, marking, and scaling of timber, land classification, silviculture, and field inspection work.

The Economics division, in charge of a Senior Forester, covers forest inventory and surveys, reforestation, forest working plans, forest reserves, forest research, nurseries, and parks.

The Grazing division is responsible for the management of Crown ranges, grazing permits and revenue therefrom, and range improvements. At present the work is being carried on by the field staff.

The Records division is the accounting branch of the service and is in charge of a Chief Accountant.

For field administrative purposes the Province is divided into five forest districts with headquarters at Vancouver, Prince Rupert, Prince George, Kamloops, and Nelson. The accompanying map (*see* page 121) shows the district boundaries and the broad line of division between Coast and Interior forests.

Each district is in the charge of a District Forester, responsible to the Deputy Minister. Each district administration is, in a sense, a smaller edition of Head Office administration with similar allocation of responsibilities.

The forest districts are, in turn, divided into ranger districts, each in the charge of a ranger. He is the man on the ground and is the officer who cruises and appraises timber, inspects cutting and scaling operations, plans protection, and organizes fire-fighting activities. In general, he is in the front line of the service.

Personnel of the service may be divided into three categories: Technical staff, non-technical field staff, office and clerical staff.

The technical staff is made up of men holding a degree in forestry from some recognized university, and of those men who, because of long service and proved abilities, have been promoted to that category.

The non-technical field staff has as its nucleus the rangers and assistant rangers who are appointed solely on the basis of competitive examinations held by the Forest Service as delegate of the Civil Service Commissioner. Senior positions are filled by promotion.

Classification of personnel follows:—

CLASSIFICATION OF PERSONNEL, 1944.

PERMANENT.

Chief Forester,(1) Assistant Chief Forester, and Division Foresters	5
District Foresters and Assistant District Foresters	10
Assistant Foresters	24
Supervisors of Rangers and Fire Inspectors	6*
	5
Rangers	55
	10*
Supervisors of Scalers and Assistants	3
Scalers	26
	1*
Inspectors, Royalty and Export	2
Mechanical, Radio and Engineering Supervisory	4
Surveys and Reconnaissance Assistants	5*
Nursery and Reforestation Assistants	8*
Draughtsmen	6
	6*
Clerks, Stenographers, and Messengers	85
	34*
Mechanics, Carpenters, and Technicians	5
	4*
Launch Crewmen	13
Miscellaneous	1*
Total, permanent personnel	243
	75*

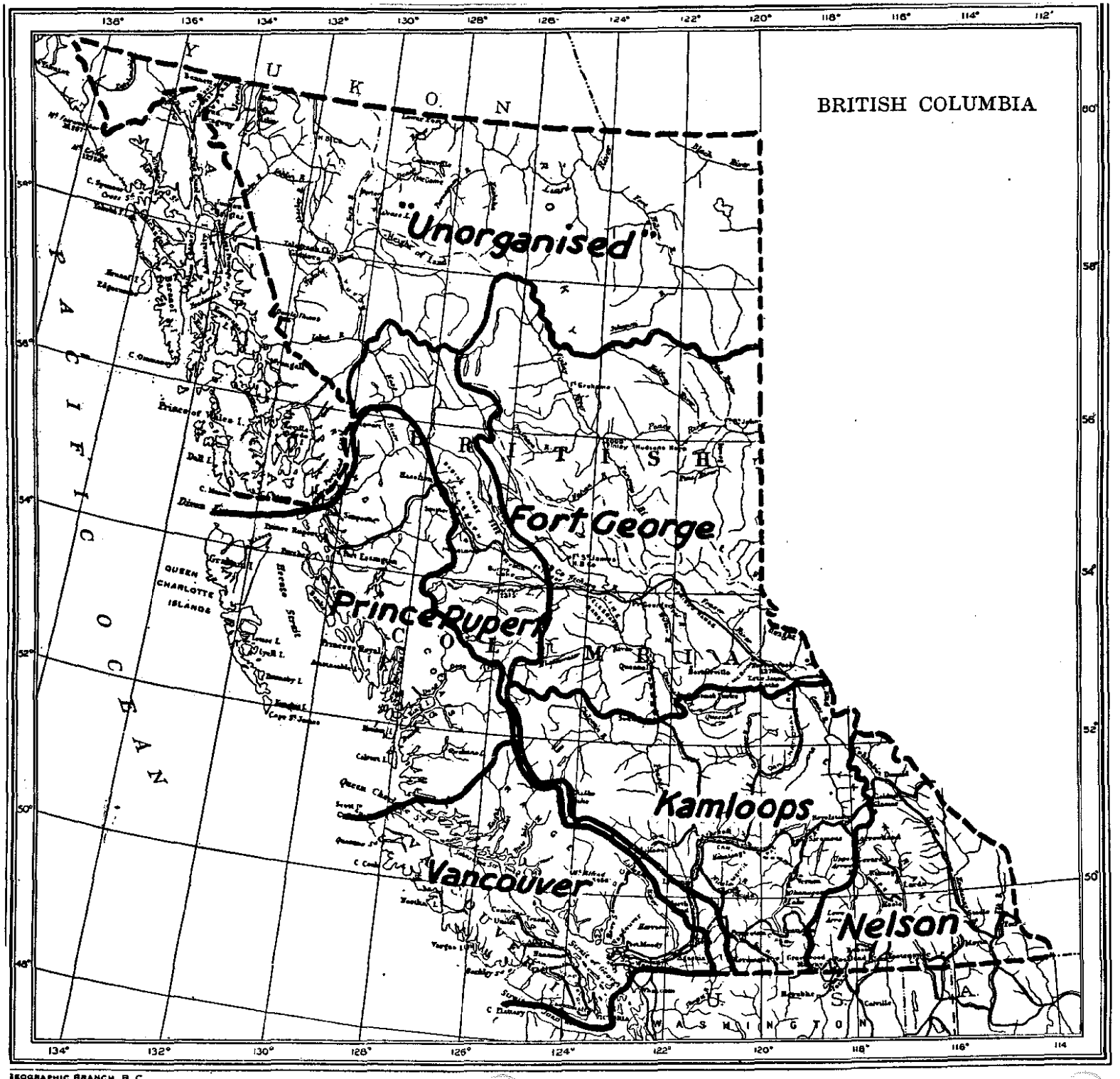
SEASONAL.

Assistant Rangers	111
Patrolmen	48
Lookout-men	74
Dispatchers and Radio Operators	43
Fire Suppression Crewmen	129
Cruisers and Compass-men	5
Miscellaneous	43
Total, seasonal personnel	453
Total, all personnel	696
	75*

NOTE.—Permanent is a tabulation of positions occupied for at least part of the year under voted salaries. Total number of positions occupied December 31st, 1944, was 226.

(1) Prior to 1945 the Forest Administration was a branch of the Lands Department, but in that year it was given the status of a Department and the Chief Forester is now known as the Deputy Minister of Forests.

* Continuously employed but no specific positions or voted salaries for the position.



GEOGRAPHIC BRANCH B. C.

The distribution of personnel, both permanent and temporary, in the various forest districts follows:—

VANCOUVER DISTRICT.
(Productive area, 7,366,900 acres.)

District Forester.
(Assistant District Forester.)
Supervisor of Scalers.
(Assistant Supervisor of Scalers.)
Three Assistant Foresters.
Two Fire Inspectors.
One Export Inspector.
Twenty-six Clerks, Stenographers, etc.
Two Draughtsmen.
Five Mechanics, Boat-builders, etc.
Three Supervisors of Rangers.
Twenty Rangers.
Eight Launch Crewmen.
*Twenty-three Assistant Rangers.
*Sixteen Patrolmen.
*Fourteen Lookout-men.
*Sixteen Dispatchers.
*Twenty Miscellaneous.

PRINCE RUPERT DISTRICT.
(Productive area, 10,228,800 acres.)

District Forester.
(Assistant District Forester.)
Nine Clerks.
Nine Rangers.
Three Launch Crewmen.
*Eight Assistant Rangers.
*Eight Patrolmen.
*Six Lookout-men.
*Five Miscellaneous.

PRINCE GEORGE DISTRICT.
(Productive area, 23,097,800 acres.)

District Forester.
(Assistant District Forester.)
Seven Clerks, Stenographers, etc.
One Supervisor of Rangers.
Nine Rangers.
*Fifteen Assistant Rangers.
*Seven Patrolmen.
*Nine Lookout-men.
*Four Miscellaneous.

KAMLOOPS DISTRICT.
(Productive area, 17,193,200 acres.)

District Forester.
(Assistant District Forester.)
Two Assistant Foresters.
One Supervisor of Scalers.
One Fire Inspector.
Eight Clerks, Stenographers, etc.
One Draughtsman.
Sixteen Rangers.
*Twenty-two Patrolmen.
*Fifteen Lookout-men.
*Thirteen Dispatchers.
*Nine Fire Suppression Crewmen.
*Four Miscellaneous.

NELSON DISTRICT.
(Productive area, 5,980,800 acres.)

District Forester.
(Assistant District Forester.)
Two Assistant Foresters.
One Fire Inspector.
Ten Clerks, Stenographers, etc.
One Draughtsman.
One Supervisor of Rangers.
Eleven Rangers.
*Twenty-five Assistant Rangers.
*Twenty Patrolmen.
*Seventeen Lookout-men.
*Eleven Dispatchers.
*Twelve Fire Suppression Crewmen.
*Ten Miscellaneous.

* Temporary staff during summer fire season.

Upon many of the subjects upon which evidence was adduced before me, witnesses advanced views and expressed opinions difficult of reconciliation, but I am pleased to record that almost without exception representatives of the various forest industries expressed satisfaction with the work accomplished by the Forest Service within the limitations imposed upon its activities by lack of adequate funds for its needs.

The Service needs more money in order to increase the number of its technical personnel, to pay higher salaries, and to permit the training of its non-technical field staff.

The management of our forest areas on a sustained-yield basis will require the services of technically trained foresters in far greater numbers than at present employed. The present staff of thirty-five technical foresters can not hope to cope with future forest management requirements and, for that matter, is below what the present necessities demand. A simple division of the number of trained foresters into the productive land acreage of each district will illustrate my comment. The number of rangers is also below standard, both for present and future administrative needs.

The same observation is equally valid in relation to all other divisions or branches of the Forest Service.

The Deputy Minister of Forests estimates that in order to carry out effectively a programme of planned forest management he requires a permanent staff totalling 689 members instead of the present total of 243. In my opinion, based on the evidence, he must have that staff if our forests in the future are to be properly managed, conserved, regenerated, and protected.

The salaries paid by the Service should be high enough to attract men of ability and to keep them when once employed. For some time past the most promising men, especially in the technical end of the work have been leaving the Service because of the offer of higher paid employment in industry. This is not surprising when technicians can ask and receive from industry twice the salary paid by the Service. The Crown has too valuable an interest in our forest land areas to permit this continual loss of its best men.

The necessity of having a properly trained non-technical field staff should need no elaboration. Ranger schools are needed for this purpose.

It seems to me that consideration should be given to the possibility of increasing the number of Forest Districts with consequent reduction of the size of each administrative unit.

I note that in Sweden, which has a forest land area of about 58 million acres, 76 per cent. of which is privately owned, there are over 100 forest districts, each in charge of a trained forester. Each of these districts therefore averages about 580,000 acres. These districts are again subdivided into 445 ranger districts.

In Central and Western Germany the size of their administrative units ranged from 6,175 to 8,650 acres, and in Prussia averaged 11,360 acres.

Finland, with a productive forest land area of about 65 million acres, is divided into 18 districts each of which is in charge of a Forestry Board.

One member of this Board must have graduated from a university course in forestry. These Boards are charged with the responsibility of regulating private forests within their jurisdiction. Private forests total about 40 million acres. The average acreage, therefore, under each Board is a little over 2 million acres. The State forests of Finland amount to about 25 million acres and are divided into four forest districts, each of which is again subdivided into two or three inspection areas. Each inspection area, in turn, is again divided into an average of eight management districts, each of which is in the charge of a trained forester. As a rough estimate, I would conclude that each ultimate unit administered by a forester is about 250,000 acres.

The acreage figures quoted are not intended to be precisely accurate but are approximations close enough for purposes of comparison.

The total productive forest land area of this Province is 75,022,500 acres. Of this total, 63,867,500 acres are within the five forest districts. The remainder or 11,155,000 acres comprises the northern forest area and is not within any forest district. The average productive acreage, therefore, of each of our forest districts administered by a professional forester is over 12 million acres.

Forest management includes fire-protection measures and the ranger district is the key administrative unit for this purpose. Fires originate and must be fought on land areas unproductive as well as productive. The five forest districts cover a total land area of approximately 165 million acres. There are sixty-five ranger districts, therefore each ranger district averages about 2,500,000 acres or 390 square miles.

While I do not suggest that our forest administration be so intensively organized as that of the European countries, nevertheless the comparisons are not without interest and support my conclusion that our forest districts might well be increased in number and thus decreased in area.

SUMMARY OF PRESENT POSITION.

Up to this stage of the report I have been endeavouring to collect the relevant facts in order to evaluate our present position. I have refrained from a too detailed study of the varied aspects of the subject because I was apprehensive that to do so would result in the main features of concern being buried in an avalanche of relatively unimportant particulars. At this point I consider it politic to pause for a moment and look back over the ground covered to see what factors have emerged. The following are the most prominent:—

(1.) This Province, because of its topography, soil conditions, and climate, is a geographic unit in which the growing of perpetual forest crops is a prime essential if we are to utilize the fertility of the soil for the purpose for which it is suited.

(2.) The forests and industries based, or dependent, upon the extraction processes and conversion of growing trees into consumer products, are of incalculable consequence to the economic and social development of

the Province, both in relation to the direct and indirect benefits flowing therefrom.

(3.) Our Coast forests are in an unbalanced state of growth in that about 78 per cent. of our productive forest land on the Coast is covered by mature and overmature forests, adding little, if any, annual increment.

(4.) The forests and forest reserves are not being managed to ensure their continued productivity, due to lack of adequate funds and personnel necessary to effectuate this purpose.

(5.) The present extent of our denuded land area is a matter of grave concern and it is increasing each year.

(6.) The present area of young-growth forests is inadequate for our future forest needs.

(7.) This young growth is not properly protected from destruction by fire.

(8.) The Coast stands are estimated to contain 180 billion feet of timber which will be accessible when required.

(9.) The Interior stands contain 100 billion feet of accessible timber.

(10.) Annual depletion on the Coast from logging, net fire and insect losses, averages 2,792,467,464 B.F. and depletion in the Interior from these same causes averages 1,083,954,347 B.F. annually.

(11.) Coast depletion far exceeds increment because of the high percentage of forest land adding no increment while Interior increment exceeds depletion because of the large area of immature forests adding increment.

(12.) A sustained-yield programme is not possible on the Coast until the mature forests are replaced by young growing stock.

(13.) Assuming a rotation age of 60 years, the allowable annual cut on the Coast must not exceed 35 billion feet during the next ten years.

(14.) Mature Douglas fir stands on the Coast will be cut out in about thirty years, resulting in a higher production of hemlock and cedar, with consequent effect upon sawmill construction and operation and necessitating increased trade extension activities.

(15.) Hemlock logs should be graded with concomitant increases in royalty rates and custom dry-kilns are needed for treating hemlock for export markets.

(16.) Reduction of logging and sawmill waste and its utilization are economic imperatives.

(17.) Standard sawmills and pulp and paper mills generally are of high standard and are adapting these processes to meet the exigencies of the future. Portable mills should be licensed.

(18.) The export of Douglas fir, balsam, and hemlock logs should be discouraged.

(19.) Forest tenures and carrying charges thereon require revision in so far as the present systems of tenure and charges encourage liquidation and discourage the practice of private forestry.

(20.) The Forest Service is to be commended for the manner in which its head office and field administration is conducted within the limitations imposed upon its activities by lack of funds adequate for its needs.

(21.) It is essential that a Royal Commission, ten years hence, re-examine all aspects of forestry in the light of developments during that ten-year period, in order to determine the validity of the facts presented to this inquiry and my conclusions thereon.

THE OBJECTIVES.

Having reviewed our present position, the next step must be to define our broad future objectives. 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?

THE MEANS TO BE ADOPTED TO ACCOMPLISH THE OBJECTIVE.

That brings us to the third phase of this report. Having reviewed our present position and stated our objective, the next step must be a consideration of the various things that must be done to bring about a sustained-yield policy of forest management with all that is implicit therein. 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.) A commission should be created and charged with the full responsibility for all forestry management during the conversion period.

(7.) A long-term programme of general education in forestry subjects should be inaugurated and there must be an extension and improvement of those existing educational facilities designed to train and graduate professional foresters.

(8.) There must be a more intensified research in and practise of silvicultural methods.

(9.) 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 can not 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. We fail at the threshold if we do not preserve our forests from fire.

FIRE-PROTECTION.

Fire-protection in relation to both personnel and equipment is grossly inadequate. The reason is the usual one: lack of sufficient funds.

It will be remembered the total land area of the Province is 234,403,000 acres, of which 75,023,000 acres are of productive forest land and that 63,867,500 acres of these productive areas lie within the five organized districts and the remainder is in the Northern area not within any district.

Fire-protection can not, however, be restricted to the productive land areas. Fires must be fought and controlled on areas classified as barren, scrub, or farm lands, to prevent their escape to lands containing valuable forest-growth. For the ten-year period, 1935 to 1944, 37.26 per cent. of all fires originated on land classified as other than timber land.

The Forest Service estimates that, of a total area of about 165 million productive and unproductive acres in the five forest districts, at least 100 million acres thereof must be afforded fire-protection in varying degrees of intensity.

As I mentioned before, each Forest Ranger exercises jurisdiction in forest-protection matters over an average of 2,500,000 acres. During the fire season he has a staff of assistants averaging four to each district. The Provincial-wide average, then, is one man to each 500,000 acres. The comparative United States Forest Service average is one man to 22,000 acres.

Throughout the entire Province only sixty-four lookout-sites are equipped and manned.

The Forest Service is well aware of the very valuable aid that may be rendered by aeroplane observation, reconnaissance, and transportation in fire-protection work. This is especially true in a Province of such vast areas and so few access roads. Notwithstanding the urgent necessity for this type of equipment the Forest Service of this Province does not own a single aeroplane.

To protect 100 million acres of land and our forest resource, present and potential, worth untold millions of dollars, the Forest Service is the

proud possessor of 3 fire-line ploughs, 11 bulldozers, and 253 fire-pumps. It must also be recorded that its fire-fighting equipment includes 154 row-boats and canoes, some of which are equipped with outboard motors.

One of the criteria by which the efficiency of any fire-protection organization is judged is expressed in the formula, " Every fire should be out by noon following the day of its occurrence." With one man to every 500,000 acres during the fire season, together with equipment measured in terms of one bulldozer to every 10 million acres, it would seem to me the Forest Service would have to depend upon a good many rain-storms to meet this requirement. May I at once say that this present deplorable state of affairs is not due to any administrative weakness in the Forest Service. If they are furnished the tools I am satisfied they can do the job.

The Government has never refused to pay whatever sums of money were required for fire-fighting once the fight was on. It has been niggardly in its appropriation for pre-suppression expenditures. This policy, if I may say so, with deference, may be expressed in the old saw, " Locking the stable door after the horse is stolen." The more money spent on fire-prevention and quick suppression, the less will be required to be spent on fire-fighting, with consequent reduction also in losses of mature and immature forests.

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."(1)

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.

(1) Colonel William B. Greely.

Fires begin from many causes. Many are preventable, others are not. Lightning, for instance, especially in the Interior, is responsible for starting a great many blazes.

We will always have fires to contend with and the objective must be an organization so equipped and manned that every fire is spotted immediately it starts and is extinguished before it attains a size that will cause serious damage and cost large sums to control. Every holocaustic conflagration is, in its incipiency, small enough to be crushed beneath a man's heel.

It is difficult to assess, to any accurate degree, the amount of money that should be spent on fire-protection in relation to its effectiveness in the prevention of losses. When fires are extinguished the cost of that operation, and damage suffered, is known but there is no way of ascertaining what loss would have resulted if the fire had not been intensively fought.

Experience in the past, however, is some guide and the results of a study conducted by the United States Forest Service into a fire-hazard situation which developed in like degree on the United States and Canadian sides of the border near Creston in 1940 is in point. The following is a brief summary of the facts disclosed in that study:—(1)

	United States.	British Columbia.
Area under review	4,754,000 acres.	5,380,000 acres.
Employed in comparative areas on opposite sides of the line	214 men.	47 men.
Lookouts	90 men.	9 men.
Adequate stocks, tools and equipment		⅓ U.S. standards.
Lightning fires	521 to July 1st.	122 to July 26th.
Burned	5,826 acres.	More than 220,000 acres, several wheat-fields, 3 barns, 1 logging camp. 1 man killed, 3 seriously injured, fires still burning August 20th.
Maximum area burned any one fire	833 acres.	34,680 acres.
Wild life damage		50–100 times that of U.S.
Total damage	$10,000.	On the same basis estimated by U.S.—$415,000.
Cash expenditures plus damages	$207,000.	More than $480,000.

The U.S. Forest Service Study concludes that "On the basis of the ridiculously low damage valuation of only $1.75 per acre the United States Forest policy of fire control appears to have paid a dividend of $273,000 in natural resources saved in one fire season" in the limited areas under review.

(1) "Comparison of Intensive versus Limited Forest Fire Action," by H. T. Gisborne, Northern Rocky Mountain and Range Experiment Station, Missoula, Montana, September, 1940.

We do know, too, that 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[1] 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, but I note that when trained fire-fighting crews on the Coast attended 198 fires, they extinguished 171 of them with an average spread of only 5.2 acres per fire.

Examples could be multiplied to establish what I consider a self-evident truth: adequate fire-protection pays a high dividend. The Deputy Minister of Forests is hopeful that with a yearly expenditure for fire-protection beginning at $1,500,000 and increasing eventually to $2,500,000 as organization of personnel and fire-fighting equipment is progressively stepped up, reasonably satisfactory results may be anticipated. That seems to me a reasonable estimate when compared with the values to be protected.

In Region 6, administered by the United States Forest Service, which comprises about 30 million acres in Washington and Oregon, including scrub and alpine areas, the total cost for all fire-protection items has amounted to about $2,500,000 a year.

It is, I think, of interest to consider, at this juncture, how fire-protection is now financed and where the money is to come from for any increase in present expenditures.

FINANCE.

Fire-prevention and fire-fighting organizations result from the inability of each individual to provide equipment and personnel for the protection of his own property. In our cities the citizens delegate this duty to trained fire-prevention and fire-fighting organizations and contribute by way of taxation to the maintenance thereof. In smaller and less well-organized communities the citizens themselves form their own volunteer fire brigades and their mutual and collective efforts supply the means of combating their neighbours' fires and protecting their own properties from their spread.

Forest fire-protection agencies fall within these general broad classifications with this qualification: that in those jurisdictions in which fire-protection is the responsibility of mutual associations membership therein is compulsory. Washington and Oregon supply an example of this system. In this Province the responsibility of fire prevention and protection is vested in the State.

The moneys required for this purpose are raised by taxing the owner of timber land on a flat acreage basis and by a Crown contribution from the general revenue. These moneys are paid into the Fire Protection Fund.

(1) P.G.E. Railway Resources Survey, 1931.

This fund was first set up in 1912 and the original basis was a tax of 1 cent per acre on timber land plus a contribution from the Crown equal in amount to the tax collected. The tax has gradually increased over the intervening years to its present rate of 6 cents an acre. This tax is assessed on Crown grants, licences, leases, timber berths, and timber sales. With the exception of Crown grants the land covered by these tenures remains in Crown ownership and can not be held by its temporary occupiers once the timber is logged off. In consequence, the tax must decrease as the timber is cut. An illustration of this fact may be found in the diminution of the acreage held under licences. In 1909 licensed areas amounted to over 9,500,000 acres. In 1944 about a million and a half acres held under licences paid the 6-cent tax.

An analysis of the tax collections since 1920 also supports the conclusion that the tax is a diminishing source of revenue. For instance, in 1912 the 1-cent tax amounted to $105,259. In 1920 the tax was doubled and the 2-cent tax brought in $189,817. In 1929, at 2½ cents, $151,632 was collected; while in 1931, at 4 cents, $194,450 was realized. In 1939 the tax was raised to 6 cents, but the revenue therefrom only increased to $224,303.

The tax for the fiscal year 1943–44 on the 6-cent basis amounted to $235,795. It would thus appear that notwithstanding an increase in the tax from 1912 to 1944 of 600 per cent, the revenue therefrom has only increased to a sum just a little more than double the 1912 revenue. This is due solely to the steady shrinkage in the area of timber land paying the tax. Undoubtedly this trend will continue into the future. I expect, however, that some proportion of lands now being logged off will remain in the future in private ownership and continue to be assessed the fire-protection tax. The present trend may therefore, and to this extent, be retarded. It does not seem reasonable, however, to look to any future increase from this source of revenue for greater sums for fire-protection purposes.

The answer seems to be in a larger appropriation of direct forest revenue to meet the needs of the Service in relation to this branch of its work. When the time comes—if it ever does—when direct forest revenue is insufficient for necessary forest expenditures, then the question of increasing the present fire-protection tax on industry may have to be considered.

As I mentioned above, the original scheme was to augment the fund raised by taxation by an equal contribution from general Provincial revenue. This system seems to have been followed until about 1921, at which time the Government contribution took the form of a direct contribution without relation to the amount of the tax. For instance, in 1920–21 the tax amounted to $189,817 and the Crown contribution was for a like amount.

In 1921–22 the tax realized $192,601, while the Crown contribution was increased to $300,000. This was again increased in 1937–38 to $400,000, and again in 1939–40 to $500,000. Since 1939, therefore, the Service has had to budget its administrative costs on the basis of a sum

available from the tax and Crown contribution, amounting to approximately $750,000 a year. While it is true more moneys were advanced by the Crown for actual fire-fighting expenditures and the fund thereby suffers from a "chronic deficit," nevertheless, for the purchase of equipment, building of roads and trails, lookout stations, and such other necessary and related expenditures the Service was confined to its budget. For these purposes, as I mentioned before, the Deputy Minister estimated he would need eventually an additional $1,750,000 a year. The direct forest revenue should be made available to him for that purpose and to the extent required.

In an earlier part of this report I referred to the great volume and value of the products of our forests that were exported to foreign markets, thus creating foreign exchange credits. It will be recalled that the average annual exports for the years 1939–42 amounted to $70,263,461.

There is no doubt that the forests of this Province are of inestimable value to the economy of the whole Dominion, both in the direct and indirect benefits which flow from their existence and use. From the evidence adduced it is shown that the Dominion Government has collected in income taxes from the Forestry Industry of this Province, from 1929 to 1943, the sum of $34,760,289. Dominion expenditures in this Province on forest pathology and insect-control have been relatively insignificant.

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.

The United States Government, since 1924, has recognized its obligation in that regard. Under the provisions of the Clarke-McNary Act the United States Government now contributes $6,500,000 a year toward the protection of State and private forests. From 1945 onward the fund will be increased at the rate of $1,000,000 a year until it totals $9,000,000 a year.

I have indicated two sources from which money for fire-protection could be obtained; i.e., from a greater allocation of direct forest revenue for that purpose, and assistance by way of grant from the Dominion Government. There is yet another avenue of approach to this question. I refer to increased contribution for this purpose from the general Provincial revenue. In other words, the present contribution by the Crown to the Fire Protection Fund should bear a fair relation to the area of Crown-owned timber land requiring protection instead of the present system of a lump sum grant.

There still remains in unalienated Crown ownership 75 per cent. of the 22,656,000 acres of timber land in the Province or about 17,000,000 acres. On the basis of the past contribution of $500,000 per year, this means the Crown has been paying approximately 3 cents an acre for the protection of its acreage of merchantable timber stands. If paying on a parity with private owners, the Crown contribution would amount to a sum in excess of $1,000,000 annually.

The term "Crown ownership" in the final analysis may be defined to mean the ownership by the people of the Province. And I must repeat that the continued existence of the forest resource of this Province is of the greatest importance to almost every branch of our economic life. It therefore follows that the people of this Province should be willing, should occasion arise, to allocate to the perpetuation of this resource, moneys of the general Provincial revenue.

I am also of the opinion that logged-off lands remaining in private ownership or control should continue to pay the fire-protection tax.[1]

While the responsibility for fire-protection has been vested in the State, nevertheless certain obligations in this regard remain with or have been imposed upon private owners. For instance, it is the duty of the occupant of land "diligently to attend to the controlling and extinguishing" of any fires originating on, or coming upon, his land. If the occupant has been paying the fire-protection tax "the total amount expended by such person in controlling and extinguishing the fire shall be borne by the Fire Protection Fund," subject to an adjustment in wage rates.

Operators are obliged to take precautions against fire occurrence and to maintain fire-fighting equipment up to a specified standard. Cost to private owners for fire-protection measures, including fire-fighting, has, over the period 1937–43, averaged about $250,000 a year.[2]

It is the duty of the operators in the Vancouver Forest District (i.e., on the South Mainland Coast and Vancouver Island) to dispose of slash and snags by burning and falling, as the case may be, unless relieved from this obligation by the Deputy Minister of Forests.

On the North Mainland Coast and in the Interior these and other hazards are to be abated as directed by any authorized officer of the service.

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.

It seems to me that the problem and its answer is summed up concisely and accurately in a publication issued by the Oregon State Board of Forestry,[3] wherein it is stated:—

(1) *See infra* under "New Tenure."
(2) Forest Branch Statistics. Industry estimates an average to be $500,000 per annum.
(3) Bulletin No. 10, April, 1944. "Slash Burning in Western Oregon."

> "There are two strongly opposed schools of thought on slash burning. One group believes in hard clean burns as good forest practice. The other group believes that such burning has been very detrimental to future forests, and some of its proponents would eliminate practically all burning. Either policy may prove disastrous. Between these two untenable extremes lies a good deal of ground where common sense application of existing knowledge will result in effective forestry. *What is needed is careful analysis of all the conditions on each individual area, measurement of the evidence, and decision to burn or not to burn according to the evidence.* Failure to burn, where the facts indicate a need for burning, is not good forestry. It is equally poor forestry to burn unless the facts clearly require it." (The italics are mine.)

The Forest Service is not at present, in its administration of the relevant sections of the "Forest Act" (i.e., section 113 (*a*) *et seq.*), insisting upon a rigorous compliance therewith and 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. He should, however, have jurisdiction to impose conditions designed to abate the hazard—such, for example, as the construction of fire-trails.

Slash-disposal in the Interior assumes a somewhat different aspect than on the Coast owing to the smaller sizes of trees, less dense stands, and logging methods pursued. The general trend of the evidence indicated that in the Interior the better method of slash-disposal was by "lopping and scattering." It was emphasized that by this system the young seedlings were afforded shade in the summer and protected from the crushing weight of snow in the winter.

The Forest Service is, and has been, prepared to undertake the responsibility of slash-disposal in the Interior at a reasonable cost, to be added to the timber-sale price. The Interior operators are in general agreement that this system is desirable.

If feasible for the Interior I see no reason why such a system would not also operate effectively on the Coast.

One of the difficulties confronting the Service is the necessity of employing temporary assistance during the fire season. This system of seasonable employment means that men employed on a temporary basis can not be trained properly for their work. Each year a new crew has to be recruited. This difficulty would be solved to a degree if a number of these men could be employed on a permanent basis and slash-disposal by the Service would create the jobs necessary for their employment. They would be given proper training in this regard and thus in the fire season would be skilled in fire-control work. Others could be employed to advantage in trail construction, tree planting, and so on, and changed about from one activity to another would soon become a highly proficient body of men.

In Western Washington and Oregon this principle is now followed. Timber-sale purchasers pay 45 to 70 cents per thousand board-feet of stumpage cut and, in turn, the United States Forest Service covering Region 6 uses the money so raised to treat the slash by burning or by giving it "intensive protection." Incidentally, for fire-protection during the fire season 1,800 men are employed in this region which comprises about 30 million acres.

In Eastern Washington, Northern Idaho, Montana, and Western South Dakota, which areas are within Region 1 of the United States Forest Service and cover about 33 million acres, the responsibility of slash-disposal is accepted by the Forest Service at a cost to the operator somewhat higher than in Region 6.

Witnesses from both those United States Regions commend this system as a means of building up an efficient service. One manifest reason is that the permanent nature of the work tends to attract a better class of men than are available for temporary seasonal employment.

SNAG-FALLING.

Even the most casual observer motoring along the Coast and Vancouver Island highways will notice the thousands upon thousands of dead, white, bare, and gaunt skeletons that once were tall growing trees. These are the snags. Their interior is often an inflammable punk-like powdered wood. When these snags catch fire they become chimneys from which pour incandescent streams of sparks. They are always a potential source of spread of fire and an obligation is put upon the occupier of land to abate this hazard by falling them when they are over 10 feet in height. Ten feet was selected because that appeared to be about the limit of height at which a man shovelling earth could effectively deal with a burning snag. Higher snags would, it was thought, require special appliances to extinguish, such as force-pumps, which are not always available.

Snag-falling costs money. One large operation determined the total cost of snag-falling on 2,000 acres to be $32,000 or $16 an acre. A further analysis of these figures indicated that the cost of falling snags between 10 and 25 feet in height amounted to $8,800, or $4.40 an acre. It was suggested that the protection gained by the falling of snags under 25 feet in height did not justify an expenditure of $4.40 per acre and that that money could be more profitably spent on purchase of equipment, installation of lookout systems, access roads, and other matters essential to a proper system of fire-protection.

Other witnesses thought that the problem of snag-falling, akin to that of slash-burning, could not be compressed into a formula of general application. For instance, on some areas snags 10 feet high should be cut down whereas in other areas it might be safe to leave snags up to 25 feet in height.

In Washington a snag is defined as a tree over 25 feet high and 12 inches in diameter. In Oregon the height is fixed at anything over 15 feet.

I do not think, however, the solution to this question lies in changing the present height over which snags must be felled. The answer seems to me to be in placing the obligation of necessary snag-falling on the Service to be paid for by the owners or occupiers of the land upon which the work is done. The experience already gained by the Service in snag-falling indicates that they can do this work at a much cheaper cost than can industry. For example, the Service felled snags on 20,560 acres at $1.76 per acre; on 6,237 acres the cost on one part of the area amounted to $2.08 and on another at $3.69 per acre. The explanation of this dis-

crepancy in costs incurred by industry and the Service in snag-falling is found in the following excerpt from the evidence of the Deputy Minister:—

> "The logger is pretty well tied down to high-class labour, top-wage labour; and to those men, fallers and buckers, falling of snags is work that they don't like anyway, and they have to be given some kind of premium to induce them to do half a job of it. The logging operator is working against time: They have quotas to fill; one part of the operation has to dovetail into another, so there is always the time-limit there. When we go at it, we are just falling snags. We can use second-grade labour: we can use old worn-out fallers, experienced men who no longer want to work as hard as they used to, and are satisfied to make a pretty fair day's wage and let it go at that. If they do a lot, we don't care, and if they do a little, we don't care; and we can use a type of labour on this kind of work that the logging camps couldn't afford to have around at all."

Another fact which should tend to reduce the cost of snag-falling is that men trained in the use of explosives in demolition-work during the war will be available. Powder should be plentiful and cheap and it would seem to me that this method of knocking down snags would bear investigation and experimentation.

Closures.

During periods of low humidity and after long-continued hot weather the threat of disastrous fires seems to hover over a forest like some sinister, oppressive, and brooding influence. A single spark in this powder-barrel and in a few minutes a whole forest seemingly explodes into roaring flame.

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.

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. Insurance companies now insist upon this precaution as a term of their policies.

As a corollary to forest closures I would recommend that logging or other access roads upon which the Service has expended public money be private and not public highways. This would permit the Service to bar the public from using access roads when at any time it is desirable to discourage travel in the woods.

Probably the main objective of all fire-protection is to reduce the hazard to an insurable risk which, for forests with their long crop rotations, is one-quarter of 1 per cent. per annum.

I have dealt with the question of financing an organization equipped to bring about this result.

Assuming we get the money, how is it to be spent? This question does not present much of a problem. The Service is short of equipment and personnel and has not the means of getting equipment and personnel to where the fires are likely to be. Assuming adequate equipment and enough men to handle it, I think, then, that emphasis should be upon transport. This involves opening up roads into inaccessible areas. Assuming these areas are of good stands in Crown ownership, the cost of the roads could be charged against future stumpage.

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.

What is needed in a Province such as this, with its great distances and difficult terrain, is coverage by aeroplanes from strategically located air strips. 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.

The United States Forest Service has pioneered this work and they have accumulated much data upon which we could draw. In fact, the experience gained by that Service contributed much to the training and equipment of the American paratroopers during the war.

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.

Considerable discussion arose during the inquiry relative to the division of expenditure for fire-protection between Coast and Interior areas. This evidence raises a problem of some nicety, if the Service is to be starved for funds in the future, as it has been in the past.

The method of the allocation of funds presents no difficulty, however, when sufficient moneys are provided to give adequate protection to both the Coast and Interior according to the respective needs of those areas.

Unless the Service is furnished with enough money to create and maintain a proper Province-wide fire-protection organization then all plans for managing our forests for the future might as well be forgotten now for the simple reason such plans, in the absence of proper fire-protection facilities, are foredoomed to failure. I assume, therefore, that the Government will, in the future, see to it that ample funds are made available to the Forest Service for fire-protection purposes throughout the Province.

When there is enough money for both Coast and Interior protection the relative percentage of future allocation of funds to each area becomes irrelevant.

The forest industries " strongly recommend that the Fire Protection Services for the region west of the Cascade Mountains, comprising the Vancouver Forest District, and the Coastal section of the Prince Rupert Forest District, should, at the earliest possible date, be placed in charge of an independent administrative Coast Forest Fire Commission responsible to the Minister of Forests and constituted under suitable legislative enactment by amendment to the ' Forest Act.' "

I consider the underlying reason for this recommendation to be the fear that insufficient funds will be available in the future for adequate protection of the Coast forests. When considering this recommendation I must assume that this report will be implemented. That being so, the fear is groundless and thus the basic reason for the suggested separate Coast Fire Commission disappears.

In any event, I cannot subscribe to any form of organization that will have the effect of dividing the forest administration into independent segments.

I do think, however, that within the framework of the present fire-protection organization some closer integration of this service might well be effected where practicable by freeing men engaged in this work from the burden of other unrelated routine administrative duties, so that they could concentrate their efforts upon what should be their primary responsibility instead of dividing their attention as at present.

Before leaving this subject I would like to emphasize the fact that for the ten-year period 1935–44, fires caused by campers and smokers averaged 15 and 20 per cent. respectively of all forest fires throughout the Province, while industrial operations, which would include logging, were responsible for an average of only 2.6 per cent. of the forest fires during that same period. It is manifest, therefore, that the public must shoulder a considerable share of the blame for our fire losses. Public education is an essential part of fire-protection.

LOGGING METHODS.

I turn now to consider the second step in the formation of a new forest policy—viz., the regulation of logging methods to ensure regeneration of cut-over land.

There are conservationists who consider the preservation of our forests as the only means of preventing their exhaustion. There are operators who regard the forest as a mine to be exploited and abandoned. Both of these extreme philosophies must give way to a proper concept of conservation which provides for the intelligent utilization of our existing resources of virgin timber and the adoption of means to ensure new growth to take the place of the trees that are being harvested.

The logger whose only interest is to "cut out and get out" is an anachronism. He has no place in a planned system of forest management. The future of the logging industry, like almost every other endeavour, belongs to those who plan for it.

Logging operators, then, may be divided into two broad classifications: Those who wish to practise forestry and those who desire to liquidate their holdings with no regard for the future crop on the lands they are logging. It is with this second class that I propose to deal at this juncture.

I am firmly of the opinion that any system of logging which fails to provide for adequate forest reproduction is inimical to the public interest and ought not to be tolerated.

It is impossible to formulate any one specific logging plan that would meet the requirements of every area being logged. The one basic principle, however, that must be insisted upon is that new growth shall follow the harvesting of the old-growth stands. In some locations that objective might be secured by a system of selective logging, in another by the "shelterwood method," in another by clear cutting and replanting, in yet another by leaving seed-trees or blocks. These systems, or a combination of them, will, if wisely planned, ensure regeneration or reforestation of the areas logged.

My recommendation is, then, that the logger who does not wish to retain his lands for the practice of sustained-yield production be given an election to pursue one of two courses: Either he submit his cutting plan to the Forest Service for approval or else deposit whatever sum may be deemed sufficient to plant the acreage logged if the logging methods he chooses to pursue do not result in regeneration. If his cutting plan is approved by the Forest Service his obligation to secure regeneration is thereby fulfilled. When he chooses to cut on an unapproved plan his deposit should be retained for at least eight years and if, at the end of that period, new growth has appeared to a degree satisfactory to the Forest Service his deposit should be refunded. If regeneration is not satisfactorily established then the Forest Service would plant the blanks with the funds deposited. Any surplus moneys should remain the property of the Service to be expended on any areas over which the cost of planting has exceeded the sum of the deposit. In this sense the deposit is to be regarded in the nature of a penalty and forfeited to the Crown.

The Crown has the absolute right to impose such terms as it chooses upon timber-sale purchasers. Lessees and licensees are subject to such terms and conditions as may be fixed or imposed, from time to time, upon them by statute or regulation. Control of methods of logging on these forms of tenure, therefore, is a simple matter of regulation by Order in Council.

Control of logging methods on Crown-granted lands does not, I think, present any real difficulty, notwithstanding the fact that Crown grantees are likely to resent any interference with what they consider to be their private rights on privately owned land.

I pointed out in an earlier part of this report that about 40 per cent. of the total cut comes from Crown-granted lands. From this timber the Crown receives little direct revenue in the form of royalty. The great bulk of logs exported in an unmanufactured form come from these lands.

There comes a time when the public welfare must take precedence over private rights. To permit the owners of Crown-granted lands to log them off and leave them without taking any steps to secure the growth of a new crop is to jeopardize seriously the future development of our logging industry. This, in turn, will lead to unemployment and to the decline of communities to ghost towns.

Regulation of logging methods does not penalize the operator whose system of cutting leaves the land with sufficient seed sources to ensure regeneration, but is directed against those operators whose practices are contrary to the economic and social welfare of the Province. We can not afford to have the best of our forest lands, now producing 40 per cent. of our timber, lying fallow in the future. It is suitable for growing timber and nothing else, therefore it must be kept productive of timber. The fact that such land is privately owned is a mere incident when weighed in the larger scale of public interest and welfare.

The State of Oregon has recognized the paramount public interest in seeing to it that privately owned lands are so logged that regeneration is reasonably certain. It seems to me we must also adopt this policy and I recommend that Crown grantees have the same obligations imposed upon them in that regard and to the same extent as I have suggested be borne by other forms of tenures.

Owners of Crown-granted lands are in a very favoured position in many respects and I see no valid reason why they should cavil at the imposition of simple silvicultural regulations when so much depends upon the continuity of our timber-supply.

Owners of Crown-granted lands whose only interest therein is to liquidate the timber thereon on a "cut out and get out" policy, in most instances, permit the logged-off land to revert to the Crown for non-payment of taxes. Whether the private owner intends the land to revert to the Crown through this channel or whether he intends to retain its ownership should not affect his obligation to so log it that it will continue to produce a forest crop.

PLANTING OF DENUDED AREAS.

The third step toward a sustained-yield production objective is to start new forests growing on our denuded land areas. 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 feet 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.

Some parts of these logged-off and denuded lands are Crown granted and remain in private ownership, but to what extent I am unable to say.

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. Upon his failure to comply with the terms imposed, the Crown should be empowered to expropriate these lands at a nominal cost for replanting.

NEW SYSTEMS OF TENURE.

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 can not 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.

To reduce production in the conversion units to the raw material available on a sustained-yield basis from their present holdings would simply mean that fixed milling costs per M. could not be met. Then, too, even if the logged-off lands are retained by these operators and present lumber production continued from merchantable stands at the present rate their mature timber will be cut out in periods ranging from five to fifty years, depending upon the extent of their present reserve holdings, and the mills would then have to cease operations until the new crop reached maturity.

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

It is undoubtedly in the public interest to maintain our forests on a sustained-yield basis to secure permanency of our forest industries.

Forest industries can be stabilized only if there is a continuity of supply of raw material for those industries. There can be a continuity of supply only if, on the second rotation, the cut does not exceed increment, and the cut must be sufficiently large to ensure production at a rate adequate to maintain a profitable operation. Privately owned timber reserves are inadequate to maintain this programme. Therefore Crown timber must be utilized for this purpose.

The allocation or reserve of Crown timber for units of industry would serve two purposes: First, it would enable the operator to maintain production from the cut of mature Crown timber during the period necessary to restock his own land; secondly, the combined area of the private and Crown acreage should, on the second rotation, produce enough timber on a sustained-yield basis to maintain production of the unit in perpetuity—perhaps not at the peak of capacity, but sufficient to ensure a profitable operation with consequent benefit to those communities dependent upon the permanence of the industry.

The reserve of Crown timber contiguous to, or advantageously located near, privately held lands would present little difficulty. The owner of the private timber lands would acquire these Crown tracts as and when needed at the then prevailing stumpage rates. His logging methods would, as a necessary concomitant, be subject to regulation and on the second rotation he would be limited in his cut to the sustained-yield production of the combined areas.

Some measure of control of the rate of the cut of the mature timber on the private and Crown acreage included in an arrangement of this sort might also be necessary, if circumstances so dictate, to prevent a too-rapid depletion of such timber before the second crop is ready for its harvesting.

If insufficient areas were available to maintain economic production from his conversion unit on the second rotation on the basis outlined, he would then be free to augment his supply of raw material from the open log market or from other private owners of timber who would be willing

to merge their resources with his on a planned management basis during the mature cut and thereafter on a perpetual tenure subject to continuous sustained-yield production.

Inland Coast mills and Interior mills, not having access to the open log market, would simply have to adjust their operations to the available supply and, no doubt, difficult decisions will have to be made by the Forest Administration in those areas in cases when two or more mills are so situate that their own and available Crown timber is sufficient for the permanent operation of only one of them.

For the class of operator with a tide-water mill who has timber of his own that is not, however, situated near a Crown forest the problem can be met in much the same way by the reserve of Crown timber to ensure the permanence of his operation upon the conditions mentioned above.

That leaves for consideration the position of the mill-owner without any timber of his own and the owner of timber without a mill of his own. I will consider these two categories when dealing with the creation of regional working-circles.

Taxation of New Forest Tenures.

The practice of private forestry is not without hazard, but operators with costly conversion plants are willing to embark upon this venture in the belief that the ultimate benefits to be gained by a permanent supply of raw material are worth the risks involved.

Obstacles to the practice of private forestry are, in the main, the uncertainties of future markets, fire risk, and burdensome taxation. Just what future markets there may be for our second-growth crops depends upon a multiplicity of circumstances and I do not feel qualified to make any prediction on that score. The necessity of greatly increased fire-protection is a subject upon which I have recorded my views. Burdensome taxation is, however, a matter that can be alleviated. It seems to me therefore, if private forestry is to be encouraged, as I consider it should to a degree reasonably commensurate with the retention by the Crown of control of the greater part of our productive forest land (but not to any greater degree), then owners of revertible tenures should be permitted to retain these lands, when classified as best suited for the purpose of tree-farming, at a nominal annual licence fee of 1 cent per acre, plus the fire-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.

In this respect I consider the Oregon Reforestation Act a sound precedent to follow, except that in my view the Oregon annual land fee of 5 cents per acre is too high a figure to be assessed in the light of planting and management costs.

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 investments in tree-farms. The essential aim of any tax structure should be simplicity in methods of assessment and collection.

Until such time as the mature timber is logged off the lands included within present tenures I do not recommend any change in the form thereof nor any revision of prevailing carrying charges payable to the Crown thereon except in so far as may be necessary to regulate logging methods to ensure adequate future restocking of these lands.

The forests of the Province are not merely of local concern. They are and should continue to be of great value to the national economy of Canada. I respectfully suggest that the Dominion Government, in formulating taxation policies should not lose sight of this fact. The practice of private forestry is an important step toward the perpetuation of our forests. In my view therefore the Dominion Government should be prepared to facilitate this development by allowing the operator to charge annually current operations with all reasonable costs incurred during that year in the reforestation of logged-off lands under his control or management.

WORKING-CIRCLES.

A sustained-yield programme of forest management has, as I have before stated, several objectives. One is the perpetuation of the forest resource for the support of industry with the consequent development and stability of regional communities dependent upon permanent pay-rolls. The other aspect includes the multiple forest uses of which I have made repeated mention.

One of the steps in the organization of such a programme is the creation of sustained-yield units—the so-called working-circles. These units would apply to all land classified, after survey, as best suited for the production of forest crops.

Having ascertained this fact units may be created to conform to geographical, topographical, or other boundaries. They may be large or small, even ranging from farmers' wood-lots to valleys or vast drainage-basins, and may include all forms of tenures and timber in Crown ownership.

The next step would be to ascertain which of these units should be managed as private or as public working-circles.

Private working-circles would be those areas from which the timber privately owned and in Crown ownership would be utilized, under the conditions I mentioned previously, to supply the needs of some one or more particular conversion units in perpetuity.

Should there be in the area of the private working-circle, designated and reserved for this purpose, owners of mature timber who did not desire to participate in this endeavour when required so to do, then, in that event, I suggest the Crown be empowered to expropriate these holdings at a fair stumpage valuation. The money for this purpose could be raised by the issuance of Government bonds to be retired from the proceeds of this same stumpage when sold by the Crown to the operator of the working-circle. Unless this plan, or some modification thereof, be adopted a few recalcitrant owners might jeopardize the successful management and operation of any private working-circle.

A private working-circle need not be necessarily confined within the boundaries of one area. I see no reason why, for instance, large tidewater conversion plants should not be permitted to enter into an arrange-

ment with the Crown whereby a continuity of supply would be secured on a sustained-yield basis from several distinct areas, provided the over-all cutting plan was properly integrated.

Public working-circles would likely fall into several classifications. The first would be areas from which Crown timber would be sold in accordance with sustained-yield principles and the production from which would be allocated to the open log market or to small millers with little or no timber of their own but whose manufacturing plants are of economic benefit to the inhabitants of local communities.

Another form of public working-circle might result from 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.

Areas of reverted land situated in or near settled communities could also be managed on a sustained-yield basis as public working-circles by municipal authorities, subject to regulations designed to prevent improvident future management and transactions in relation thereto. These community forests, apart from the timber production therefrom, have proven to be of considerable value in the United States as a means of acquainting the public with the benefits to be secured from the practice of sustained-yield forestry, the necessity for fire-protection, and related subjects.

Working-circles created for the perpetuation of the forest-cover for purposes other than production of timber fall into a special category. I refer for instance to watershed protection and other multiple forest uses. A tree is a plant and to secure an economic return from the soil producing its growth the tree must be harvested. At the same time it must be kept in mind that a tree may be of more real value in place in the forest than when converted into lumber. The difficulty lies in striking a balance between these two values.

On a working-circle designed to produce wood for conversion into usable products a balance between cut and increment is the determinant factor. Such, however, should not be, for instance, the test for logging a watershed upon the run-off from which irrigation or other water systems are dependent for their water-supply. Logging of working-circles of this character, especially in the Interior, calls for special study and the application of logging methods best suited to the maintenance of the area for its paramount economic use and value.

As a matter of fact, the creation of working-circles in the Interior for continuous wood-supply also presents special problems, due to the limitations imposed by the necessity of transporting logs by road from the woods to the conversion plants and the absence of any open log market.

While it is true that over-all increment in the Interior exceeds depletion, nevertheless areas near settled communities are being overcut. I refer, for instance, to the area contributory to Cranbrook.

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.

In order to broaden the areas contributory to mills supporting permanent Interior settlements the Crown should build roads to timber stands now inaccessible. The direct and indirect benefits received in return by the Crown should amply repay the expenditures necessary for this purpose. Building roads to open up timber areas essential to the maintenance of a permanent forest industry is of more importance, to my way of thinking, than constructing roads to mining areas. Minerals once extracted from the ground can not be replaced. The forest crop under proper management is a perpetual source of revenue.

The work preparatory to the creation of Coast and Interior working-circles will take considerable time and effort and necessitate the employment of many more trained foresters than are presently in the Service. If a start is made now and region by region throughout the Province organized on the basis I have charted in broad outline, by 1955 (at which time I suggest a Royal Commission be appointed to survey the then situation) we should be well on our way to a planned system of forest management.

I cannot subscribe, with respect, to the suggestion that the entire Coast be treated as one working-circle and that the over-all cut be kept within the sustained-yield capacity of the productive Coast area. This theory overlooks one basic objective of a sustained-yield programme: the permanent support of local communities. If, on the second rotation, the cut from each individual Coast working-circle is kept within the yearly or periodic increment of that production unit then the whole Coast will be on a sustained-yield basis. If, on the other hand, individual working-circles are overcut the Coast will not be on a sustained-yield basis notwithstanding the fact that the over-all Coast production remains within the total Coast increment.

To permit any working-circle to be cut on a liquidation basis would perpetuate to that extent the present system of forest exploitation. Economic and social dislocations in local settlements would inevitably result from such a policy.

Our future cut must come from the interest the forest produces, represented by the increment on an unimpaired forest capital in the form of perpetually producing stock.

At the risk of tiresome repetition, I would repeat here that my concept of a proper system of sustained yield is " a perpetual yield of wood of commercially usable quantity *from regional areas* in yearly or periodic quantities of equal or increasing volume."

FUTURE FOREST ADMINISTRATION.

One of the subjects leading to considerable discussion during the inquiry was what form the future forest administration should take; that is to say, whether the present system of administration should continue, or whether the task of organizing, planning, and carrying out the new concept of sustained-yield forest management should be vested in a Forest Commission.

The evidence indicates that industry is strongly in favour of administration by a Commission.

There was, however, a considerable divergence of opinion as to the future form of this Commission, its personnel, and the manner in which it should function.

It is my opinion that a Forest Commission should be created.

The chief reason compelling me to this conclusion is the long-range planning required, without which it will be impossible to change over from our present system of forest liquidation and depletion to one of sustained-yield management.

We must, in dealing with this problem, project our perspective over the long periods it takes to grow and harvest forest crops. We are called upon to plan, not for to-day nor for to-morrow, but for generations ahead. These plans will not come to fruition until those of us who have had a small part in their early designing have long since passed on our way.

This kind of planning has as its concomitant, long-range financing. The present system of annual appropriations from the general revenue, for which the Forest Service must compete with other spending departments of Government, is subject to vagaries in general business activity, the exigencies of short-term financing, and the uncertainty of money supply due to temporal variations in governmental receipts available for departmental allocation. These factors, coupled with recurrent periods of transitory demands for increased expenditures in social and economic fields, unrelated to forestry, have in the past and will in the future, under the present system, retard if not frustrate any long-term policy of forest management.

As an illustration of how the Forest Service has suffered from this policy of departmental competition for available funds I might mention that in the fiscal years 1933–34 and 1934–35 the Crown did not contribute a cent to the Fire Protection Fund, although forest revenues during those same years totalled over $4,000,000. In the language of one witness, " Forest policy is put in bondage to the system of Treasury control."

By reason of the constitutional limitations imposed upon this Province all public moneys from whatever source of revenue derived must be

paid into the Consolidated Revenue Fund to be appropriated for the public service of the Province as the Legislature may direct.

The only way in which direct Treasury control over departmental appropriations may be avoided is to place the Forest Service under a Commission empowered to collect all direct forest revenue and to expend all or that part thereof as may be necessary to finance adequately its operation.

Then, too, administrative Commissions have been created not only to ensure a more convenient method of handling public finance, which in many instances is a mere incident in the exercise of their powers, but also as a device designed to carry out administrative functions of Government in highly specialized and technical fields of endeavour.

Workmen's Compensation Boards, Health Insurance Commissions, Public Utility Commissions, Liquor Commissions, Unemployment Insurance Commissions, and a host of others are instances of this practice, and all perform a valuable public service.

A Forest Commission would thus have two main purposes: First, to formulate and administer a long-term system of planned forest management and forest industry regulation where essential thereto. Second, to supply the machinery for long-range financing divorced from the system of annual departmental appropriation from general revenue.

The Commission would be charged, therefore, with a very heavy responsibility. It should, in consequence, be vested with jurisdiction wide enough to permit the proper discharge of that responsibility.

Statutes creating Commissions usually fall within one of two classifications: Those in which the powers conferred upon Commissions are defined in minute detail and hedged about with confining restrictions, and those in which a broad governmental policy is delineated and the Commission given wide and exclusive powers to effectuate that policy.

Future forest planning and management, with its concomitant forest industry regulation, will be a complex business calling for the solution of a multiplicity of problems arising from an infinite variety of circumstance.

I therefore recommend that the Commission be not imprisoned within the iron framework of prescribed rules and regulations, but that within its own sphere of activity it be given a free and powerful hand.

Objections have been voiced from time to time to what has been described as "an ever-increasing bureaucracy," but it must be recognized that modern developments in the fields of economics and sociology have thrust upon Governments duties and obligations that are difficult if not impossible of fulfilment by the same departmental processes that were designed to function in the horse and buggy era. Delegation of authority to Commissions in technological fields has been found an effective way of adapting existing processes of government to the requirements of a modern civilization. Our forest problem, it seems to me, can not be met and solved effectively except by this form of administration.

If the Forest Commission is to be vested with the responsibility I recommend it should be, then its jurisdiction must extend over all aspects of forestry within the Province, all extractive operations and conversion

industries, and include as well those multiple forest uses that are an essential part of forest management.

Without limiting the generality of the foregoing statement, I would suggest that its functions include research designed to establish secondary industries manufacturing wood products. This Province needs more secondary manufacturing industries if we are to maintain a stable level of employment.

If my recommendation that the Forest Service be placed under a Forest Commission be acceptable to the Government, then my previous comments concerning the moneys that should be supplied to the Forest Service for forest management and fire-protection must be read *mutatis mutandis*.

COMMISSION FINANCE.

All forms of direct forest revenue should be credited to the Commission, including (inter alia) grants from the Crown, Federal or Provincial, to the Fire Protection Fund. Revenue from the sale of mature Crown timber, representing the depletion of a capital asset, and yield tax from the second rotation, representing the Crown's interest in forest increment, would then be available for expenditures designed to replenish and perpetuate the forest capital.

The Commission should also be given jurisdiction to assess forest industries and collect whatever taxative levies might be found necessary to meet the financial requirements of the Commission should the direct forest revenue prove inadequate and general Provincial revenue be not available for that purpose.

Any surplus of revenue over expenditure, subject to the obligations of long-range financing, should be paid into the general revenue of the Province quinquennially.

COMMISSION PERSONNEL.

The Commission should, in my opinion, consist of not more than five and not less than three members, one of whom shall be Chairman or Chief Commissioner. The Deputy Minister of Forests should be a member, but not the Chairman of the Commission. He would be the liaison officer between the Commission and the Minister of Forests. I am of the firm view that members of the Commission should not be appointed thereto as representatives of any branch of the forest industries. Their duties are bound to compel them from time to time to make far-reaching decisions concerning matters in which private and public interests will be in conflict. They must therefore be in a position to reach their conclusions free from any self-interest and solely on the basis of merit.

It follows in consequence that, in selecting the members of the Commission the Government should seek to appoint those of proven ability, of personal integrity, sound judgment, and with general business experience. There are men of this calibre in many branches of the forest industries and it must not be assumed that I am suggesting they should not be among

those selected. The point I wish to make clear is that if a man is appointed to the Commission from any branch of the forest industries he should not go on the Commission as representative of industry but as a citizen of outstanding qualifications who can be trusted to discharge his duties in the public interest. These same observations apply with equal force to the appointment to the Commission of professional foresters.

I do not agree with the suggestion that the Commission be composed solely of experts in the multifarious sciences relating to forestry or forest economics. The Commission would be exercising a semi-judicial function in many facets of its duties and could be guided to its conclusions by the advice of experts specializing in the subject under review.

In the final analysis the Commission should be composed of reliable men of sound common sense who can accept responsibility and make proper decisions free from any trammelling influences—political or otherwise.

Their appointments should be for at least ten years at salaries commensurate with the responsibilities involved. Salaries should be high enough to make membership on the Commission attractive to men of the required standard of ability.

One of the alternatives suggested to the form of the Commission which I have recommended was that a Forest Board be formed composed of members of the Government, industry, labour, and the forestry professions to act in an advisory capacity to the Government. In addition to this advisory Forest Board there should be, it was suggested, a Forest Commission composed solely of salaried experts drawn from industry and the forest professions and that it be responsible to and under the direction of the Forest Board. This Forest Commission of experts would be charged with the solution of the many practical problems arising out of the adoption of a sustained-yield forest policy to be formulated by the Advisory Board. Administration would remain with the Forest Service as at present.

Superficially considered this suggestion, which was given powerful support by one branch of industry, presents an attractive enough picture, but a closer analysis brings to the surface features which would, in my opinion, render its adoption inimical to the public interest.

The first simple and inescapable fact to emerge is, of course, that such a Forest Board composed of representatives of industry and others could not, in the very nature of things, agree to advise the Government to initiate policies which, although in the public interest, would adversely affect the private interests of industry. That means the advice the Government would get from such a group would not be disinterested. In other words, an Advisory Board of this character would simply become the medium through which to channel to the Government the advisory opinion of industry dictated by and serving the interests of industry.

In support of this view-point I reproduce hereunder an extract from the evidence of the chief witness called to give evidence in relation to this subject:—[1]

(1) Pages 4736-4737.

THE COMMISSIONER: Q.—. . . where you have private industry represented on a Board such as that, no Board is going to present [to the Government] a policy which is directly contrary to the wishes of those representations of industry. That could happen?

A.—It could. I think you have to go on that assumption.

The second fact to emerge from an analysis of this suggested set-up is that the Forest Commission of experts is made subject to the control of the Forest Board. Now see what happens! I quote again from the same witness:—[1]

THE COMMISSIONER: Q.—Then suppose you had a difference of opinion between the experts [i.e., the Forestry Commission] and the Advisory Board: Suppose the experts recommended one policy and the Board thought it would not be in the interests of, say, the Pulp Industry; whose views would govern? Those of the experts or those of the Advisory Board?

A.—I would say the Board would have to govern.

Q.—Your Advisory Board would overrule the experts (the Forestry Commission). So then in effect private industry is overruling the advice of the experts?

A.—Yes.

The witness was frank and honest in his answers, and the only conclusion I can come to is that the adoption of the suggested form of administration would mean, in effect, that future forest planning and management would be dictated and controlled by industry, whereas if the public interest, as well as private enterprise is going to be adequately protected and preserved in the future this direction and control must be vested in the kind of free and independent tribunal which I recommend be created.

A Council consisting of representatives of the various branches of industry, extractive and manufacturing, could exercise a valuable function in advising the Forest Commission of its views upon matters affecting industry. This advice would be tendered and received with the recognization that it was motivated by the self-interest of industry. That seems to me to be a more legitimate process than any disingenuous attempt to set up a medium through which industry would dictate Commission policy, favourable to its own interests, under the imprimatur of an allegedly independent Advisory Board.

THE FOREST SERVICE AND THE COMMISSION.

Jurisdiction now vested in the Forest Service by section 5 of the "Forest Act" should be transferred to and vested in the Forest Commission, and the personnel thereof should be under the direction and control of the Commission, thus supplying the necessary machinery through which the Commission would function.

It seems to me that, logically, the Water Branch and the Game Board should be made responsible to the Commission. If that is not considered desirable (opinion before me was divided on the subject) then certainly there must be the closest integration between these allied and related services. Both water and game are, in a sense, forest by-products and must

(1) Pages 4736–4737.

be administered in harmony with the over-all forest management vested in the Commission.

APPEALS FROM THE COMMISSION.

The decisions of the Commission will involve the determination of questions of fact, or of mixed fact and law, or law alone. In so far as questions of fact, or mixed fact and law, are concerned, I consider the findings of the Commission should be absolute and final.

It has been suggested that appeals on questions of fact should be permitted from the Commission to either the Lieutenant-Governor in Council, a special appeal tribunal created for this purpose, or to the Courts. None of these recommendations appears to me to be sound in principle. In the first place to authorize appeals on fact to the Lieutenant-Governor in Council would mean, in effect, that the Cabinet would have to shoulder the ultimate responsibility for forest planning, management, and finance for the reason that almost every decision by the Commission would be but a step toward the solution of the many related problems that will arise out of the transition from our present unplanned system of forestry to one of sustained-yield production.

There must be a close correlation of all interrelated phases of future forest planning, management, and finance. Thus any piecemeal interference with an over-all plan might seriously affect the whole structure, especially if the compulsion of immediate expediency might be permitted to outweigh the benefits of a long-range policy. Then too, with deference, I do not think that the Lieutenant-Governor in Council would be as qualified as the members of the Commission will become, with experience, to reach decisions on complex forest problems. One of the impelling reasons for the creation of the Commission is to provide the machinery for long-range forest planning by an independent group of men who will become specialists in that field. If their plans relating to management and finance are to be overridden by the Cabinet one of the basic reasons for their existence disappears.

The forest industries recommended the creation of a special appeal tribunal, and while this so-called Forest Appeal Board was to be formed to hear appeals from the decision of the Deputy Minister of Forests, I presume, if a Commission is to be formed, industry would still recommend the same scheme of appeal from decisions of the Commission.

The personnel of this suggested Appeal Board was to consist of a Judge as Chairman and four other members—i.e., the Chairman of the Standing Committee of the Legislature on Forestry, two members representing the forest industries, and one the "general public."

For some years the Chairman of the Standing Committee of the Legislature on Forestry has been a lumberman and selected because of his intimate knowledge of forest problems.

It is a reasonable assumption, I think, that future appointments will likely follow the same precedent. In consequence, on an Appeal Board of five members industry would have three members representing their

interests. The addition of the Judge and the member of "the general public" seems to me, with respect, to be for the purpose of "window-dressing."

I cannot recommend the formation of such an appeal tribunal. The very structure of it would tend to create the impression that its decisions would not be altogether free from bias. Secondly, the comments I made in relation to appeals to the Lieutenant-Governor in Council apply with equal if not greater force to this particular forum.

Turning then to the suggestion that a right of appeal be authorized to the Courts from decisions on fact by the Forest Commission I may say that, in my opinion, several reasons render this form of proceeding objectionable. First, while, unquestionably, any member of the Judiciary would bring to bear upon disputed questions of fact a free and an unprejudiced judgment, nevertheless, with deference to my judicial brethren, I can not agree that a Judge's opinion should be preferred, in matters of this nature, to the considered conclusion of a group of men of long and continuous experience in this particular field and whose determination of any one question of fact is but a step in the progressive development of a long-range and complex plan.

Then, too, if a legalistic system of appeals is to be adopted it must be adopted *in toto*. That means that any finding of a Judge sitting on an appeal from a decision of the Forest Commission must also be subject to review by higher Courts. That would result in appeals to the Court over which I have the honour of presiding, and thence to the Supreme Court of Canada, and in cases involving large sums of money—as many of them undoubtedly will—to the Privy Council in London.

If this sort of procedure is permitted then, in my view, the work of the Forest Commission could be retarded for years—if not entirely frustrated. Further comment is, I think, unnecessary.

So far I have confined myself to appeals on questions of fact. I would apply the same reasoning to appeals on questions of mixed fact and law.

That leaves for consideration appeals on questions of law alone. In my opinion, provision should be made to permit appeals from the Commission to the Courts upon a case stated by the Commission. It should be made obligatory for the Commission to state a case for the opinion of the Court upon the request of any person whose interests are adversely affected by any decision in point of law by the Commission.

EDUCATION.

The development of forest management policies in this Province will require the services of many more trained professional foresters than are presently available to supply the future requirements of the Forest Service and industry. It is therefore of manifest importance that the University of British Columbia should be able to graduate a sufficient number of foresters each year to meet the anticipated demand.

The present situation in that regard is described by Professor John E. Liersch, head of the Forestry Department of the University, as follows:—

Q.—In your opinion are the facilities for training, in forestry, sufficient in this Province?

A.—No. In my opinion they are not; they are very inadequate.

Q.—What improvement would you recommend?

A.—I would recommend a very much extended staff at the University. At present the way the staff is constituted, there are two full-time men there trying to handle fifty-five students through five years of college, and teaching possibly half a dozen different subjects apiece, which is more than can be expected of any man—to do a just and adequate job and produce the properly trained men with the proper background in forestry to promote our industry in our Province here in British Columbia. They are required to do far too much routine work, with the result that the time for research and original investigation in our forestry problems is practically *nil*.

Q.—And do you think a Department of Forestry is sufficient or should be raised to the——

A.—It should be raised to the status of a Faculty.

Upon consideration of the evidence of Professor Liersch and that of other witnesses who testified upon this subject I recommend:—

(*a.*) That the Department of Forestry be raised to the status of a Faculty.

(*b.*) That the teaching staff be increased to the extent required for adequate student instruction.

(*c.*) That as soon as practicable, and when student enrolment justifies the expenditure, a building be erected and properly equipped for this branch of teaching.

(*d.*) That the University curricula provide more intensive training in forestry subjects during the first four years, instead of postponing the study of forest sciences until the fifth year as at present.

(*e.*) That greater use of the Pitt Lake Forest for practical field instruction be encouraged by the erection of suitable buildings and other facilities. Money should also be made available for more intensive silvicultural practices and research in this Forest.

(*f.*) That consideration be given to the suggestions emanating from the Forestry Club of the University, reading as follows:—

> "That it be a requirement of the Faculty that all students must put in at least two summers in forestry work of some sort, such as forest surveying, logging, milling, etc., before being granted a degree of Bachelor of the Science of Forestry, providing economic conditions do not render this impossible."

And

> "That one undergraduate Degree in Forestry be granted—namely, Bachelor of the Science of Forestry—and that opportunity for post-graduate work leading to the Degrees of Master of the Science of Forestry and Doctor of Philosophy be set up."

Our forests are of such importance to the economic life of this Province it is essential that the public generally be acquainted with their growth, uses, and perpetuation. The school children of to-day will become the future custodians of this great resource. It seems to me, therefore, that our young people should receive instruction in matters pertaining to the economic and social values thereof.

At the present time there is very little prescribed study of forestry subjects in the elementary school programme up to Grade VII. What is taught is largely left to the discretion of the individual school teacher who may or may not be " forestry minded." I suggest that courses of study in forestry and its related subjects be formulated and made compulsory in the elementary grades.

The teaching programme for junior and senior high school students does include " units " dealing with our forest resources. In these higher grades, it seems to me, the matter is dealt with in a comprehensive and satisfactory manner.

General public instruction is also an essential requirement in order to create public opinion favourable to the practice of sustained-yield forestry involving, as it will, the expenditure of direct forest revenue upon the perpetuation of our forests to a far greater extent than at present—at least during the transition stage. The public must also learn through suitable media the imperative necessity of keeping our growing stock protected from fire.

RESEARCH.

One of the difficulties I have experienced in reaching conclusions from which recommendations would follow is that no single solution of common forest problems can be compressed into an all-embracing formula. Problems arising in different areas may have a number of factors in common and superficially would appear subject to the same solution, but circumstances differ so widely from area to area that each problem in each area must call for the application of a technique special to that area.

A general over-all scheme or policy may, however, be formulated outlining the external boundaries of that policy within the framework of which, and subject to the purpose of its design, solutions of specific problems may be found from time to time as they arise. I have endeavoured to chart the broad outlines of that policy.

That brings me to another difficulty: A forest policy should be erected upon a solid foundation of factual knowledge. Many questions yet call for an answer, and to-day the information we have concerning basic forest problems is far from complete. In truth, in relation to many subjects the evidence disclosed that the necessary data thereon are unavailable.

A glance at the table of expenditure by the Forest Service discloses that the ten-year outlay on research has averaged 0.94 per cent. of total forest expenditures during that period—which probably explains the absence of this factual information so essential to the formulation of even a broad policy.

In many of the matters under review I have had to rely upon testimony which, to a degree, was based on speculation, conjecture, or just plain guessing. Because of this I have recommended a Royal Commission review the whole subject ten years from now.

In the meantime I can not stress too strongly the necessity of a vigorous programme of research to be undertaken by the Forest Service, either

alone or in conjunction with the Dominion Government and industry. There is much to be learned concerning regeneration, and the logging methods best suited to ensure it, rates of growth or yield on different sites, the effects of intensive silvicultural methods, fire-protection — including slash-burning — utilization, and a host of other related and unrelated subjects.

Although ten years is a very short space of time in forest chronology, nevertheless, with a programme of research adequately financed and with a ten-year dead-line to which to work, I am sure much more information than we now have will be available to guide the conclusions of the Royal Commission sitting in 1955.

District Foresters should be encouraged to engage in research and experimental projects within their own districts.

Forest pathology and the control of insect pests are matters that demand more intensive studies than are at present being conducted. Depletion from these causes—more particularly insect pests—must be considerably reduced by appropriate measures. A closer co-operation between the Forest Service and the officials of the Dominion Government engaged in this work is desirable.

Losses due to insect pests, even in the endemic stage, are serious enough to call for immediate and concerted action, but a graver danger exists in the threat of a widespread and irremediable devastation from insect epidemics that hangs over our mature forests like a sword of Damocles. We are wholly unprepared to combat this ever-present menace should an unfortunate occasion call upon us so to do.

Many valuable studies relating to regeneration, growth rates, and such like have been made by professional foresters in the employ of private industry. These were made available to me, but the areas covered were relatively small in size, and I can draw no significant or general conclusions of Provincial-wide application therefrom. Those industrialists who are carrying on this work are to be highly commended, however, for their efforts in this field.

I have no hesitation in saying that the Forest Service should co-operate in every reasonable way possible with industry in the conduct of these studies.

The results of the Ladysmith experiment indicate how effective this co-operation can be in securing valuable data.

The regulation of the cut—especially during the harvesting of the second rotation crop—depends upon a thorough knowledge of forest increment on sites of various yield quality. That information will not be obtainable except through experimentation and research over a considerable period of time. Much theoretical information has been collected in yield tables prepared by the Forest Service, but what is required is an empirical compilation covering areas in which working-circles eventually will be established. That work should be undertaken as soon as a trained staff is available for that purpose.

THE FOREST-COVER AND WATER RUN-OFF.

I turn now to consider another subject upon which I have been asked to report.

Items 8 and 9 of the Commission direct my attention to:—

> "The relationship of the forest-cover to soil conservation."

And

> "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."

I understand "soil conservation" in Item 8 to refer to the prevention of soil erosion. The two headings may therefore be dealt with as one.

The evidence before me leads to no other conclusion than that the removal of the up-stream forest-cover has a definite effect upon water run-off. I do not have sufficient data upon which to make any finding upon whether the removal of the forest-cover increases or decreases the annual watershed yields. I have read many scientific treatises upon the subject and the general trend of professional opinion seems to indicate, however, that mainly because of the tremendous volume of water drawn from the soil and returned to the atmosphere through transpiration,[1] and by the interception by the trees of rain and snow, thus permitting moisture to evaporate before reaching the ground, the existence of forest-cover decreases the total watershed yield. This conclusion is, I think, acceptable in a general sense, but it seems to me that so many factors enter into the picture influencing total water yield—e.g., the slope of the watershed, topography, density of the forest and vegetation cover, soil conditions, and so on—that what might be true in localities in which studies were conducted, it does not necessarily follow that the conclusions reached therein have a universal validity. In this connection it must also be borne in mind that forested areas receive more precipitation than open country. However that may be, I am on safe ground in saying that, except in exceptional circumstances, run-off distribution is materially affected by removal of the forest-cover.

The effect of forest-cover—trees, vegetation, and humus—is to decrease materially the rapidity with which water flows into its stream and river drainage systems, thus ensuring a continuous and even supply. The removal of the forest-cover leads to an accelerated run-off—the "flash run-off"—with consequent soil deterioration and erosion, and, in the absence of adequate storage facilities, means a plethora of water in the streams one day followed by a scant supply thereafter until the next rain.

Soil erosion results (*inter alia*) in the silting of reservoirs, irrigation systems, and the pollution of water used in processing plants.

The problems of watershed protection and management are of vital interest to many groups in the Interior. The Okanagan fruit and vegetable industry is dependent upon an abundant supply of water for its con-

(1) Zon (see *ubi supra*, p. 20) estimates that the amount of water consumed by a forest is nearly equal to the total annual precipitation and in warm and dry regions somewhat greater.

tinued existence. The stockmen require an adequate water-supply for their grazing ranges.

The Interior fruit and vegetable industry plays an important part in the economic welfare of this Province. Fruit-trees in the Okanagan valley alone cover approximately 24,000 acres, while capital invested in the tree-fruit industry is in excess of $20,000,000. Without water for its irrigation systems this industry would soon disappear.

The value and importance of the stock-raising industry in the Interior is well known and needs no elaboration.

In addition to supplying the essential requirements of these two classes of water-users, the streams, both on the Coast and in the Interior, are the spawning-grounds for salmon and sport fish. The marketed value of salmon processed in this Province averages about $15,000,000 a year.

The Chief Supervisor of Fisheries has, I think, summed up accurately the position in this regard in the following excerpt from his evidence:—

> "Salmon require the gravel-beds in the fresh-water streams for the purpose of spawning. The adults reach the mouths of the streams, commencing the latter part of July and continue, according to species, through to the end of the year, and at times into January. Some varieties, such as the sockeye and springs, proceed as far as the upper water of even the longest streams, such as the Nass, Skeena, and Fraser, hundreds of miles from salt water.
>
> "If conditions in the streams are right at the time of the arrival of the salmon they pass up-stream and express their eggs in the gravel. This process extends over a period of from a few days to several weeks. The period between the time the eggs are deposited in the gravel to the time they are hatched as fry extends from sixty to one hundred and fifty days, depending on the temperature of the water. After the fry are hatched, most varieties proceed to sea in the following spring and summer. The sockeye, however, usually remain in a fresh-water lake for a year before proceeding to salt water, although this is not always so.
>
> "Salmon return again usually to the stream in which they were hatched in from two to seven years, the time varying with the several species. For instance, the sockeye spend from three to four years at sea, springs from three to seven years, cohoes three years, pinks two years, and the chums four and five years. All Pacific Coast salmon die after spawning.
>
> "The removal of the timber and destruction of forest-floor along the streams and around the shores of the lakes causes a quick run-off after each rain instead of the water being absorbed and held to run off gradually, with the result that:—
>
> "(*a.*) As the salmon-eggs of the fall run species are normally deposited in the gravel of the stream-beds during high-water conditions the quick run-off leaves large quantities of them high and dry, resulting in their destruction.
>
> "(*b.*) There is so little water left in the streams that those young salmon which have been successfully hatched are stranded in holes or shallow channels and become an easy prey to their numerous enemies, such as gulls, ducks, and other forms of life, or later perish if the water dries up.
>
> "(*c.*) At the end of the summer when the adult salmon return for spawning purposes they are unable to ascend the streams through lack of water, and either die unspawned in their attempt to reach the

spawning-grounds, or express their eggs in brackish or salt water where they are destroyed.

"(*d.*) There may be a trickle of water in the smaller streams which permits the adult salmon to ascend part way up the streams but the supply is so small as to allow eagles, ducks, gulls, and bears to destroy literally all adult salmon. This is particularly evident in some of the streams along the east coast of the Queen Charlotte Islands."

The forest and water-yield are inseparably linked, thus the maintenance of the forest-cover must have as one objective the continued prosperity and perpetuation of these three manifestly important wealth-producing activities: fruit- and vegetable-farming, stock-raising, and salmon-fisheries.

The maintenance of stream- and river-flow as a source of power producing electric energy is also a vital necessity. The management of watersheds upon which communities depend for their domestic water-supply falls within the same category.

Each watershed presents its own peculiar and complex problems, but there are three broad principles of watershed management that apply to them all: they must be protected from fire, they must be restored, and they must be improved.

I need not again refer to the necessity for adequate fire-protection.

Restoration of a watershed is indicated when logging or fire, or both, have removed the forest-cover to an extent that floods and erosion follow. This can be accomplished by tree planting. Seeding by a suitable grass-cover may also be required.

Watershed improvement may call for silvicultural treatment, such as thinning too dense stands, thus reducing forest water consumption by transpiration and preventing premature evaporation. In some areas which have ample water-storage facilities improvement may extend to the removal of a great part of the non-commercial cover compatible with erosion-control.

The practical application of these fundamentals will necessitate considerable research and experimentation in order to decide, for instance, whether a particular watershed should have a greater or less density of cover. Neither the Forest Service nor the Water Branch have in the past conducted studies of this nature, either general in scope or of particular areas.

The methods to be adopted to ensure a continuous water-supply for any localized area must be determined by a close study of local conditions by men equipped for this work by training and experience.

The control of logging methods and the allowable cut from watersheds must also be governed by local conditions and a careful appraisal of conflicting values.

Where, for instance, the water yield may be collected in reservoirs and flood and erosion damage are not to be anticipated the cut may be as heavy as a sustained-yield policy would permit. If, on the other hand,

regulation of stream-flow is of more importance than total water yield the cut must be light enough to maintain a fairly complete forest canopy.

In areas where by reason of topographical or other contributory causes flood and erosion damage is a definite danger cutting should be kept at a minimum.

All of these matters must, however, be decided according to the circumstances peculiar to the area under review.

The evidence given by witnesses in the Interior stressed the importance of maintaining beaver colonies as a means of water-control.

It seems to me this matter calls for serious consideration by the Forest Service and the Game Board.

Interior trappers requested me to recommend that beaver-pelts be tagged as a means of discouraging poachers and others from the indiscriminate and unlawful killing of beaver. I doubt if the scope of this Inquiry extends that far, but, assuming it does, in my opinion the suggestion is a meritorious one.

PROBLEMS OF THE INTERIOR.

Problems of immediate concern to the people of the Interior of the Province arise from two separate and yet related conditions. The first is the necessity for continuity of supply of raw material for the needs of conversion units, upon the existence of which depends the prosperity of many of the smaller Interior towns and settlements. The second condition is the very close relationship between the forests and the main Interior primary sources of wealth, such as the tree-fruit and small-fruit industry, vegetable-farming, stock-raising, power production, trapping, and so on.

Dealing then with the necessity of perpetuating the Interior forests, I do not think I can add very much to what I have already written on that subject. I may repeat here that the organization of Interior working-circles should have as a primary object the continued existence of present conversion plants.

Many witnesses expressed dissatisfaction with the present practice whereby Crown timber is sold to the highest bidder. It was thought, and with some justification, that an operator who had opened up a tract of timber and had built an expensive road system into the area should not have to face the possibility of another purchaser coming in and outbidding him for Crown timber contiguous to his operation.

The new systems of tenure which I recommended whereby Crown forests would be reserved, under the conditions stipulated, for the ultimate use of any operator desiring to practise sustained-yield forestry, should remove any further fears on this score.

If during the transition period Crown timber is sold for immediate cutting I have no hesitation in recommending that the operator who has pioneered the area and opened it up should, where practical, have the reward for his effort in having allocated to him at a fair price Crown

stumpage on those areas which are contiguous to or advantageously located near his operation.

This same principle should also apply to the Coast where and when circumstances so warrant.

RE 10-PER-CENT. DEPOSIT.

In the Interior the Forest Service has recently inserted in its timber-sale contracts a stipulation that certain areas under such contracts be selectively logged. Under this system the old and matured trees are cut and the young and vigorous growth left standing to mature. (Because of the small tree sizes skidding is done with horses—a practice not yet possible on the Coast, except perhaps in a very few areas.) Approximately 45 per cent. of the trees are cut, yielding about 65 per cent. of the total scale. At some future date the balance of the area is logged.

Interior operators complain that they are forced to pay a 10-per-cent. deposit based on a 100-per-cent. timber cruise, but as they only log 65 per cent. of the cruise estimate they are thus compelled to freeze an unnecessary amount of capital in the unlogged timber for long periods of time.

Ex facie this seems a valid complaint, and I draw it to the attention of the Deputy Minister of Forests for his sympathetic consideration and possible alleviation.

I turn now to the second consideration—i.e., the value of the forests to the economic life of the Interior and the problems relevant thereto.

I have already dealt with one phase of that relationship—viz., watershed protection. That, however, is not the whole story.

RE BOX-SHOOKS.

The Interior orchardists and growers of small fruits and vegetables not only need water on their land, they need wooden containers in which to pack their apples, small fruits, and vegetables for both the export and domestic trade. At times this need is desperate and the crop endangered by lack of suitable boxes and other containers in which to ship the product to consumer markets.

Okanagan apple production alone amounts to about $8,000,000 a year, requiring close to 7,000,000 boxes. Peaches account for another 1,000,000 boxes, and crates, display lugs, and such like containers run into many hundreds of thousands.

Experience has demonstrated that yellow pine is the best box material for packing tree-fruits. Boxes of yellow pine construction, for instance, do not warp in the orchard heat, take nails without splitting, and bear the weight of other boxes without distortion.

The undeniable fact is that yellow pine areas have been overcut, and the species is rapidly disappearing. What is left is far from sufficient to meet the future box requirements.

I must confess I have found this to be a most vexing problem and one in which I have great difficulty in formulating a recommendation that would be of much assistance.

The obvious need is to plant suitable areas with yellow pine seedlings, but that is a long-range solution, and, while the growers of sixty or seventy years hence will no doubt profit thereby, it will bring small comfort to the orchardists of to-day who need a more immediate supply of boxes.

The only present and partial remedy I can suggest is that the remaining and available yellow pine stands in Crown ownership be sold on condition the log production of this species be allocated to the Interior manufacturers of box-shook. Whether this allocation should include all grades is a matter upon which I leave to the Forestry Service for decision.

Yellow pine processed into lumber brings a higher price than when converted into boxes, and it may be that some measure of price regulation might be required with a concomitant system of subsidies which the Timber Controller has found necessary to institute.

Failing a supply of yellow pine the Interior growers must of necessity use other species, such as spruce and fir, and, while the Interior hemlock is unsuitable for box-manufacture, Coast hemlock may be utilized to advantage for this purpose. I do not know whether it would be economically practicable for Coast hemlock millers to ship hemlock sawmill-waste to the Interior for conversion into box-shooks. I did not receive any evidence on this question, but if at all feasible it seems to me it should be done.

Box-shooks manufactured from Coast hemlock are shipped to the Interior when market conditions encourage this practice, but the box-shook manufacturers in the Interior help to support local communities, and their continued existence in this field is a matter calling for consideration.

One fact is basic to a solution of the problems facing the Interior orchardists and farmers, and that is the necessity for correlating any future plan of forest management to the needs of these producers arising out of their dependence upon the products of the forest.

RANGE ENCROACHMENT AND OVERGRAZING.

The stockmen also have another problem in addition to their need for water. Their other problem is the encroachment of the forest on their grazing ranges. Stockmen have been agitating this matter for a number of years, so far without any tangible results. Undoubtedly jack-pine, willow, and alder are steadily reducing available range land. This is due in part to overgrazing, which exposes the mineral soil, thus creating conditions favourable to natural seeding of jack-pine. Alder and willow continue their struggle to cover range land by thrusting up new growth from their root systems.

The attack on this problem of encroachment must therefore be on three fronts: Overgrazing should not be permitted, the present non-commercial cover should be removed, and badly depleted areas should be reseeded with suitable grasses.

Overgrazing has resulted from lack of range reconnaissance, supervision, and inspection by the officials of the Forest Service. This was due to lack of available personnel during war years, but I see no reason why this situation should not be remedied in the near future now that men are, or soon will be, available to undertake the work.

Then, too, overgrazing has a more serious aspect than merely as a cause contributing to forest encroachment. Overgrazing if continued will render the range useless. Nutritional grasses, like trees in a forest, will not perpetuate themselves if the seed sources are destroyed. Hence this question of overgrazing presents a problem of immediate urgency calling for the implementation of regulatory controls.

Seeding of badly depleted areas is necessary for two reasons: As an aid in the prevention of forest encroachment, and, what is of more importance, to ensure a supply of palatable and nourishing forage.

In this connection I strongly recommend that an experimental range station be established, either by the Provincial Government alone or in collaboration with the Dominion Department of Agriculture. It is to be greatly regretted that the Dominion Range Experiment Substation at Tranquille was forced to discontinue its activities in 1940, at a time when after five years of experimental work many major studies relative to range problems were well under way.

Returning to the subject of encroachment, the third requisite is the removal of the forest-cover that has succeeded in establishing itself on former open grass land areas. At this point the subject becomes controversial. The question is to burn or not to burn. The answer to that question must depend upon results achieved by experimental burning on Crown or private lands under the supervision and control of the Forest Service. Stockmen are only too willing—even anxious—to give every assistance to a project of this nature, and I am convinced that no difficulty would be encountered in securing from these men whatever permission might be required to enter upon their land and conduct experimental burning upon such terms as the Forest Service might consider it advisable to impose in order to protect its officers from possible liability arising from unforeseen contingencies.

DECADENT STANDS.

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 when the export of logs is once more permitted by the Timber Controller.

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.

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, but certainly every effort should be made in the Nelson, Revelstoke and Big Bend areas, where most of this decadent hemlock is to be found, to encourage its early removal.

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.

INTERIOR SCALING SYSTEM.

Logs are scaled on the Coast by an independent group of official scalers who are employees of the Government and are members of the Civil Service, although their salaries are paid from the Scaling Fund.

In the Interior scaling is done by scalers authorized by licence or permit to carry on this work, and they are employed and paid by the operator whose logs they scale. In many instances the operator does his own scaling as a licensed or permit scaler.

The purpose of scaling logs is twofold: First, to determine their volume content and grades in order to compute the amount of royalty, taxes, and revenue payable thereon to the Crown. Secondly, to determine the amount payable to the owner of the logs by the purchaser thereof.

In the Interior there is very little timber cut for sale. Millers log their own tracts for their own use. In consequence scaling in the Interior has as its primary and practically sole purpose the protection of the Crown revenue. To leave the computations of the amount owing the Crown in the control of the man who has to pay it, or his employees, does not seem to me to be an efficient system unless effective safeguards are provided to protect the Crown's financial interests.

The Deputy Minister of Forests when asked by me why the Coast scaling system would not be feasible in the Interior stated that " there is not a big enough volume of scaling in any one place to maintain the staff at any price that the operator could pay."[1] The evidence of Interior witnesses supports this view and I accept it as the real explanation of the existence of the present Interior scaling system.

The Deputy Minister instanced several methods by which a check was kept on the activities of the licensed scalers. These were a check scale by the local Ranger, a field examination to determine what is going into the mill, and check of rail shipments from the mill. With deference, I do not consider these safeguards to be as effective as suggested by him.

In the first place the Ranger's so-called check-scale is only made about twice a year in each mill within his district. The purpose of these visits is to see if the scaling regulations are being carried out. In other words, it is for most part a check on the system of scaling and can not test the accuracy of any individual scale-sheet.

(1) Transcript, p. 53.

The field examinations, which would include a stump count, are not carried on as a regular practice but are only done pursuant to a special order of the Supervisor of Scalers for the Interior, or some other official of the Forest Service, who may have cause to suspect that there is a shortage in the scale.

Railway shipment records are examined only in those special cases where the facts would seem to warrant this procedure. The information thus obtained seems of little value in the absence of accurate inventory figures and records of domestic sales—none of which is examined by the investigator.

The Supervisor of Scalers for the Interior recommended the adoption of an additional procedure which he considered would be an efficient check of the operator's scale. He is the man who is more familiar with all aspects of Interior scaling than most officials of the Service, and ought to know what is required. His recommendations—in which I concur—are as follows:—

"The need for more supervision in the scaling in the Interior is apparent because the great number of mills and territory is more than is possible for one man to cover. We leave it entirely to the operator to make returns and unless considerable time is spent in going over the operator's cut, sales, and stocks it is impossible to say whether those returns are correct or not. Then considerable research should be done to find out the average overrun for each mill. A file should be kept in the Supervisor of Scalers' office for each mill with all the details on the file, listing all the equipment in the mill, number of employees, capacity at the time, possible capacity, exact location, log stocks and lumber stocks on hand at the end of each year. The board-feet of lumber cut and the total board-feet of lumber sold should also be listed on the file for each mill for the year, but these last two items should be recorded each month in order to have all that detail at the end of the year. The whole idea is to have a close check on the operators and eliminate any possible chance of improper returns by showing the operators we know what their returns should be and not spend time proving they have made improper returns.

"All this efficiency calls for a staff of check-scalers.

"I would recommend that the original copy of the daily scale be submitted to the Forest Branch district office.

"In the district office two people would receive these daily scales, compute them and enter the totals on a monthly return sheet. At the end of the month this return would be turned over to the district office, with a note attached bearing the amount of stumpage and royalty, so that the district office staff could bill the operator with the charges.

"I would also recommend that a check-scaler work out of each district office in order to check up on the scalers and see that the daily scale is returned to the district office.

"The territory north of the Rocky Mountain Divide, such as the northeast part of the Province and the Peace River, would be classed as a district and a check-scaler along with a computer be stationed in the same office building along with the Ranger for that district.

"The check-scaler for the Interior portion of the Prince Rupert district should look after the scaling in the Atlin district. This check-scaler along with the computer could make their headquarters in Smithers.

"A Supervisor of Scalers, whose duty it would be to supervise the work and hold scalers' examinations would be stationed in Kamloops."

In addition to the above recommendations of the Supervisor of Scalers, I also think that some machinery should be set up whereby a vendor of logs when dissatisfied with the scale thereof, could call for a rescale by an independent scaler either licensed or in the Government Service.

INTERIOR ADMINISTRATION.

The Interior lumbermen consider that their problems are so dissimilar to those of their Coast brethren that there ought to be a separate Forest Act for the Interior, or, failing that, a form of Commission be established to administer the Interior forest resource as a separate unit.

With respect, I cannot accept nor recommend either of these contentions. While it is true that the Coast and Interior forests present wide differences at almost every point of comparison, yet they are both composed of growing trees and both are subject to the same basic principles of forest management. It is in the application of those principles to the two areas that the distinction between them really lies.

A Forestry Commission exercising a Provincial-wide jurisdiction and with a personnel selected as I suggested it should be, would be capable of grappling with and resolving the problems of the Interior just as well as those peculiar to the Coast. In either case it would, of necessity, call for the advice of experts with specialized knowledge of each area under review.

INTERIOR ADVISORY COUNCIL.

The economic stability of the Interior, as I have indicated, depends to a very marked degree upon the full recognition of multiple-forest uses. It seems to me, therefore, that an Interior Advisory Council should be formed composed of representatives of the logging and lumber interests, water-users such as stockmen, farmers, and orchardists, and perhaps trappers. Through an organization of this kind representatives of the varying and sometimes conflicting interests would become familiar with and sympathetic to the difficulties with which each is confronted, and out of this common understanding recommendations formulated in a spirit of mutual co-operation could be presented to the Forestry Commission for its consideration.

MISCELLANEOUS SUBJECTS.

Under this heading I propose to deal with those subjects which did not conveniently fall within any of the other topics previously discussed.

MARKET EXTENSION.

During the inquiry considerable evidence was adduced on this subject, but when the terms of the Commission, which limit the matters into which I am directed to inquire, are examined nothing can be found therein authorizing me to enter upon this field. The reason for not including the question of lumber trade extension activities within the terms of the Commission is probably due to the fact that this subject is not within the jurisdic-

tion of the Minister of Lands and Forests, but is vested in his colleague the Minister of Trade and Industry.

I think I should say, however, that the need for a continuing export market for our lumber—and especially hemlock—is of vital importance to the economic welfare of this Province, and that trade promotion activities ought, in the future, to be again undertaken and vigorously pursued.

SALMON-STREAMS.

The continued prosperity of the salmon industry is of manifest importance to the people of this Province and a subject which needs no elaboration herein.

The continuance of this industry depends upon, first—a sufficient escapement of adult salmon; second—their ability to reach the spawning-beds; third—the hatching of the spawn; fourth—an unimpeded journey down-stream of the fry to the sea.

The question of escapement is not a matter within the scope of this inquiry, but the effect of the forest-cover upon stream-flow is germane thereto, and I have already expressed my views thereon.

That leaves for consideration the effect that logging methods have upon the up-stream travel of the adult salmon, the gravel of the spawning-beds, and the seaward journey of the young fry.

The evidence of the Chief Supervisor of Fisheries on these questions is as follows:—

> "The methods employed in logging operations often result in the tearing-up of roots and lodging them, together with brush and logs, in the salmon-streams, where they form a jam. This has the following results in so far as the salmon are concerned:—
>
> "(*a.*) Often prevents the ascent of the adult salmon to their spawning-grounds.
>
> "(*b.*) Flood-water is held back and the spawning-grounds are covered to a depth which prevents the spawning of the salmon even if they do succeed in passing through the jams.
>
> "(*c.*) The log and brush jams often cause the stream to change its channel, after the salmon-eggs have been deposited in the gravel, leaving large areas of gravel filled with salmon spawn high and dry. These eggs are a total loss.
>
> "In logging operations some operators drag the logs down the beds of the streams as they sometimes find this practice more economical than building a railroad or truck-road, for instance. The results of such operations are:—
>
> "(*a.*) If spawning salmon are in the stream many of them are destroyed.
>
> "(*b.*) If the eggs have been expressed in the gravel by the salmon the logs destroy large quantities of them.
>
> "(*c.*) The logs gouge out the beds of the streams, removing the gravel and so destroying the spawning-beds.
>
> "My Department has records of, and, as a matter of fact, files covering 1,443 salmon-streams in the Province, and undoubtedly there are a good many more small unnamed ones which are not included in this list but which, nevertheless, are important, as most of these provide some spawning facilities for salmon. It will be appreciated that even a little damage to any material percentage of these streams through logging or other operations would undoubt-

[illegible] serious effect on the salmon supplies.

"If the eggs or fish in a stream are all destroyed, in any one season, that stream is ruined as it is a fairly well accepted fact that the adult salmon return to the stream or system in which they were hatched, and none of the particular tribe previously using the stream would be left to return.

"It is a fact that the Federal Fishery Regulations require that in logging operations all streams be kept free of logs and brush, but often the damage is done before the difficulty has been discovered.

"It is not claimed that every salmon-stream has been damaged by logging operations, but it is a fact that many of the smaller ones have been ruined and numbers of the larger ones greatly affected in so far as the salmon-fisheries are concerned.

"The Federal Department of Fisheries has during the past thirteen years spent $21,361 in clearing out streams, in many of which dams had formed and brush and roots collected as a result of logging operations. Some of the damage had been done many years previously and in such instances it is usually impossible to place the responsibility. Where it is possible, however, prosecutions follow.

"In fairness to the timber industry, I would like to say that the head offices of most companies are very co-operative in the effort to protect the salmon, but it has not been found possible to control the men on the ground, who have charge of the logging operations. These men are eager to get out the logs in the quickest possible time, and by the most economical methods, and often show little, if any, regard for the welfare of the salmon-fisheries."

The evidence of the officials of the Fisheries Department, buttressed by photographs of particular streams, supports the general observations of the Chief Supervisor.

In a brief prepared in January of 1945 by the fishing industry of this Province (and endorsed by the United Fisheries Federal Union) for presentation to the Minister of Fisheries for Canada, the following statement appears:—(1)

"Attention is respectfully called to the fact that many streams and spawning-grounds which were formerly prolific producers have now become seriously depleted or completely exhausted. Many others are threatened with the same tragic fate. The facts are not in doubt. Some aspects of the case were summarized by the Chief Supervisor of Fisheries in an admirable brief recently presented by him to . . . [the] Royal Commission of Inquiry into the lumber industry."

Fourteen salmon-fishing and packing companies, and the Union I mentioned above, subscribed to the above statement supporting the evidence given before me by the Chief Supervisor of Fisheries. Their brief contains (inter alia) the following primary recommendation, from which I quote the relevant language:—

"That by preventing logging companies from impeding streams or destroying salmon-beds, by clearing streams of branches and debris, by blasting or cutting log-jams which cause the gouging of river-beds and spawning-grounds and which impede the migration of fish [here follow other matters not within the scope of this inquiry; e.g., the building of dams, etc.] the salmon-fisheries of British Columbia be raised to the status of cultivated fish farms from which ever-increasing returns can be expected with confidence."

As the Chief Supervisor stated in his evidence before me, the Federal Fisheries Regulations vest ample and complete authority in Federal officials to meet this challenge to the perpetuation of the salmon industry.

It is my opinion, however, that the Forest Service should also take a hand in this endeavour.

Salmon are, in one sense, just as much a forest crop as are the trees, for without the forested watersheds there would be no streams capable of supporting the spawning-beds and, in consequence, no salmon. Protection and perpetuation of the salmon run is just another forest use. The stream-flow can be preserved by an intelligent management of the watersheds. The spawning-beds and the streams, as highways from and to the sea, also need protection from that type of individual—fortunately few in number—who considers it a smart trick to haul logs down the bed of a salmon-stream, thus destroying the eggs waiting their hatching period in the gravel-beds. In my opinion the Forest Service should have power to cancel any contract or terminate any form of tenure held by any operator who, or whose employee, is found guilty of this or other practices destructive of the salmon run.

The Chief Supervisor of Fisheries suggested that a half-mile strip of forest be left unlogged along the banks of each salmon-stream and around the edges of the lakes at the head of these streams, as well as the lake tributaries, although he frankly conceded that he fully appreciated the difficulties of, and objections to, such a suggestion. In my view the objections—chiefly financial—outweigh the value of the suggestion.

I do think, however, that the Forest Service should give some consideration as to whether or not it would be practicable to plant hardwood trees on strips of cut-over lands, in selected areas, bordering streams and lakes. The hardwood industry of the Coast consumes about 12 million feet a year in the manufacture of furniture and other hardwood articles. Alder matures in thirty years and will yield over 12 M. feet per acre from trees 8 inches D.B.H. and over. Maple and other hardwoods are of slower growth, but reach maturity at approximately sixty years.

The quick-growing hardwood forest strips would assist to some extent in controlling water run-off and erosion, would furnish shade for sport and commercial fish in the streams, and would do much to beautify lake margins denuded of softwood species.

From my understanding of the matter I believe, if the hardwood strips are not permitted to become too dense, hemlock and other tolerant species would come in and eventually take the place of the hardwood species. If not, the hardwood trees could be selectively logged on a sustained-yield basis. I make the suggestion, in any event, for what it is worth.

Hardwoods are becoming increasingly difficult to log because the existing and easily accessible stands are being cut out. What is left for convenient logging is in small blocks cruising from 60 M. to 500 M. feet board-measure.

The hardwood industry cannot be ignored in any future forest pro-
gramme, and my suggestion may, if found practicable by the Forest Ser-

other indirect benefits which would result from this tree-growth on lake and stream margins.

LOG-SCALE.

Forest measurement or mensuration is a science which deals with the volume computation of stands, trees and logs.

The study, appraisal, purchase, and sale of forests and forest products depends upon the application of those principles of measurement.

The most commonly used units by which forest products are measured are cords, board-feet, and cubic feet.

A " cord " is the description used to designate the space occupied by a pile of wood of specified dimensions. It is a unit of volume adapted to bulk products, such as fuel-wood.

The board-foot is the most commonly used unit of measurement of logs and lumber. In relation to log and tree measurement it is the expression of the probable yield of lumber capable of being sawed from the tree or log into boards 12 inches wide, 1 inch thick, and 12 inches long. Thus a board 12 inches wide, 1 inch thick, and 16 feet long contains 16 board-feet. Lumber, however, is not cut to one standard width, nor length, nor thickness. Hence the board-foot unit is merely the application of a theoretical standard of measurement resulting in a marked difference between the log-scale and mill production. It has, however, been in force for many years in this Province and, subject to certain variations in the mathematical formulæ upon which the computations are based, is also in use in the United States.

These formulæ are used to ascertain the volume of the theoretical end product by arbitrary deductions for manufacturing losses such as saw-kerf, and therefore are not designed to express the entire volume of the wood material in the tree or log, nor what would be actually recoverable in terms of lumber production except in board-feet—i.e., boards $1'' \times 12'' \times 12''$.

The scale of small logs on the basis of the production therefrom in terms of this measurement is manifestly inaccurate and can be regarded only as a convenient symbol upon which to base transactions involving this class of material.

The cubic foot is a unit of measurement that does, however, give the entire volume of wood material within the tree or log, and does not take into account any waste in manufacturing processes.

The Deputy Minister of Forests is of the opinion—in which I concur—that the " Forest Act " should be broadened to permit the use of the cubic-foot scale as well as the board-foot system of measurement.

As methods of extracting and processing (the so-called) logging-waste are developed in the future it seems reasonable to assume that loggers and manufacturers might find it desirable to base their transactions in this class of material upon the cubic system. The implementation of the recommendation of the Deputy Minister would allow this to be done.

I do not agree that the adoption of the cubic-foot scale be made mandatory in computing pulp-wood volume. It seems to me the wisest course to pursue at present is to give statutory recognition to the two systems of measurement, leaving it to industry to adopt which of these is found by future experience the more practicable in the circumstances.

E. & N. LANDS.

In order to understand the questions raised before me relating to the timber lands of the Esquimalt and Nanaimo Railway Company (now controlled by the Canadian Pacific Railway Company), it is necessary to review shortly the history of that undertaking in which is involved, in part at least, the terms under which this Province became part of Canada.

British Columbia was isolated from the Confederacy of 1867 by Ruperts Land, then owned by the Hudson's Bay Company. This area, a practically unknown wilderness, stretching for a distance of 1,200 miles between the Rocky Mountains and Ontario and broken only by one small settlement, Red River, was without railways or roads. Fur brigades traversing this vastness by a series of waterways and overland trails took many months to travel from the East to posts in this Province.

Ordinary travellers wishing to go East from here went by sea to San Francisco and thence by United States railways. Telegraphic communication was also routed through the United States.

The population of British Columbia at this period of its history totalled approximately 40,000 people. Of this number there were about 25,000 Indians, 9,000 whites, and 1,500 Chinese. Over 50 per cent. of this population lived on Vancouver Island.

It is manifest from the resolutions of the Quebec Conference of 1864 and from the inclusion of appropriate provisions in the "British North America Act" of 1867 it was the policy of the Imperial as well as the Canadian authorities that British Columbia should join in the Union of the Provinces. Steps could not be taken, however, to attain this objective until such time as Ruperts Land had been incorporated with the Confederation. This was effected in 1868.

Earl Granville, Secretary for the Colonies, in a dispatch to the newly-appointed Governor Musgrave, dated August 14th, 1869, stated he had been aware that the Imperial Government had previously declined to entertain the question of British Columbia's entry into Confederation until Ruperts Land had been annexed to Canada, but now that that had been accomplished (and I quote his dispatch)—

> "The question therefore presents itself whether a single colony should be excluded from the great body politic which was thus forming itself; on this question the Colony itself does not appear to be unanimous, but, as far as I can judge from the dispatches which have reached me, I should conjecture that the prevailing opinion is in favour of union. I have no hesitation in stating that such is also the opinion of Her Majesty's Government. . . . They anticipate that the interest of other Provinces of British North America

will be more advanced by enabling the wealth, credit, and intelligence as a whole to be brought to bear on every part than by encouraging it in the contracted policy of taking care of itself, possibly at the expense of its neighbour. Most especially as it is true in the case of internal transit, it is evident that the establishment of a British land communication between the Atlantic and the Pacific is far more feasible by the operations of a single government responsible for the progress of both shores of the Continent than by a bargain negotiated between separate—perhaps in some respects rival—governments and legislatures. Her Majesty's Government are aware that the distance between Ottawa and Victoria presents a real difficulty in the way of immediate union; but that difficulty will not be without its advantages if it renders easy communication indispensable and forces onward the operations which are to complete it."

Governor Musgrave, pursuant to this dispatch, framed the terms of the proposed union between British Columbia and Canada and laid them before the Legislative Council of 1870 for consideration. His draft Terms of Union were adopted, after prolonged debate, with slight alteration.

The provision of the proposed Terms of Union relevant to this discussion is as follows:—

"8. Inasmuch as no real Union can subsist between this Colony and Canada without the speedy establishment of communication across the Rocky Mountains by Coach Road and Railway, the Dominion shall, within three years from the date of Union, construct and open for traffic such Coach Road from some point on the line of the Main Trunk Road of this Colony to Fort Garry, of similar character to the said Main Trunk Road; and shall further engage to use all means in her power to complete such Railway communication at the earliest practicable date, and that surveys to determine the proper line for such Railway shall be at once commenced; and that a sum of not less than One Million Dollars shall be expended in every year, from and after three years from the date of Union, in actually constructing the initial sections of such Railway from the Seaboard of British Columbia, to connect with the Railway system of Canada."

On May 10th, 1870, a delegation of three left this Province for Ottawa, by way of San Francisco, to discuss the proposed union with the Dominion Government.

Long before this time Canadian statesmen as well as Imperial authorities had been giving considerable thought to the question of building a transcontinental railway. From the Imperial point of view a railway for transporting goods from Great Britain to China and the Far East was of decided interest. The North-west Passage was to be by rail. Far-sighted Canadians were thinking in terms of a union extending from sea to sea to "round off" Confederation.

When our little delegation reached Ottawa, hoping for a wagon-road, they were therefore agreeably surprised to find waiting for them "a fully matured proposal for a railway" running from the head of the Great Lakes to the Pacific Coast.

For reasons unknown to me, except perhaps that the oratory of Edward Blake, Anglin, and others who were critical of the Terms of Union has lingered down the years, a number of our citizens in Eastern Canada—and some here in the West who ought to be better informed—have been

labouring under the fallacious impression that British Columbia demanded a railway as the price of its entry into the Union. In truth, the facts do not support any such assumption.

Without labouring the subject, I would refer to the following statement of Senator Miller in a speech to the Senate on April 3rd, 1871:—(1)

> "A railway across the Continent on British soil was as much an Imperial as a Dominion necessity. There is no doubt that England so regarded it. The leading minds of the Empire had unmistakably given their opinion on the high national character of the work."

R. E. Gosnell in "The Story of Confederation" says, at page 95, when speaking of Sir John A. Macdonald:—

> "He had inside knowledge of what might lead to annexation to the United States, and there was more danger in the situation than people imagined then or now. Again, at that very time a group of capitalists associated with the Northern Pacific had planned to extend that railway through Manitoba and through the Middle West and British Columbia to and into Alaska (purchased by the United States from Russia in 1867). Sir John realized the danger of such an enterprise in view of the long-dreamed-of Canadian trans-Atlantic railway, and he lost no time in the 'rounding-out of Confederation' in order to forestall any inroads from the United States. The best circumstantial proof of that is that when the delegates from British Columbia arrived at Ottawa, notwithstanding that a railway was considered by them as out of the question, and they had been authorized to ask simply for a wagon-road, much to their surprise they were met by a fully matured proposal for a railway. No wonder the people of British Columbia rejoiced at the unexpected boon to be conferred upon them."

Sir Charles Tupper was Dominion Minister of Railways at the time the Federal Government was discussing terms with the delegation from British Columbia.

He speaks to us from the past with the voice of one who was fully acquainted with the situation, and in his book, "Recollections of Sixty Years in Canada," the following passages appear:—

> "The motives that impelled Sir John A. Macdonald and his colleagues at Ottawa to 'round off' Confederation by adding the Province of British Columbia to the Union after the North-west Territories had been acquired from the Hudson's Bay Company were based on national as well as Imperial considerations.
>
> "What would have been the fate of British Columbia if it had remained isolated from Eastern Canada by an unexplored 'sea of mountains' and vast uninhabited prairies?
>
> "There is no question that it would have inevitably resulted in the absorption of the Crown Colony on the Pacific Coast by the United States. Social and economic forces were working in that direction from the date of the discovery of gold in 1856. Thousands of adventurous American citizens flocked to British Columbia, and between the two countries there was a good deal of intercommunication by land and sea. Sir James Douglas, an ex-Governor, a prominent figure in the early days of the colony, was opposed to Confederation.
>
> "Until his eleventh-hour conversion, ex-Governor Seymour entertained similar views. The appointment of Anthony Musgrave, a pro-Union man,

(1) Parliamentary Debates, p. 797.

in 1869, came at a psychological moment when the Imperial authorities in London were giving their ardent support to the cause dearest to the hearts of Canadian statesmen.

"The *offer* of the Dominion Government to build a railway from the head of the Great Lakes to the Pacific Coast was the chief *inducement* that settled the political destiny of British Columbia. . . . As Minister of Railways at the time, I had something to do with the preliminary negotiations and the carrying-out of the work.

"The Government of Canada, having been successful in acquiring the North-west Territory, felt that the completion of Federation, both for national and Imperial consideration, involved the addition of British Columbia. Sir John A. Macdonald's views in regard to the wisdom of this step were shared just as strongly by every one of his colleagues. They realized that a federation, to be effective for a young nation, must represent a union extending from sea to sea.

"It would have been impossible to retain British Columbia as a Crown Colony if overtures in favour of the Union had not been made by the Dominion. How could it have been expected to remain British when it had no community of interest with the rest of Canada from which its people were separated by two ranges of mountains and the vast prairie? Under the existing circumstances it had no means of advancement except by throwing in its lot with the great nation to the south, with which it had constant communication both by land and sea.

"We all felt that we were bound to make the hazard of incurring the large outlay for a transcontinental railway if Confederation from coast to coast was to be made a reality, and if the sovereignty of Britain was to be retained. Accordingly, negotiations towards the admission of British Columbia were started in real earnest about the end of 1869."

The proposed Terms of Union drawn by Governor Musgrave were amended to meet this offer of the Dominion Government, and for section 8 thereof, which I quoted above, a new section was substituted, reading as follows:—

"11. The Government of the Dominion undertakes to secure the commencement simultaneously, within two years from the date of the Union, of the construction of a railway from the Pacific towards the Rocky Mountains, and from such point as may be selected, east of the Rocky Mountains, towards the Pacific, to connect the seaboard of British Columbia with the railway system of Canada; and, further, to secure the completion of such railway within ten years from the date of the Union.

"And the Government of British Columbia agree to convey to the Dominion Government, in trust, to be appropriated in such manner as the Dominion Government may deem advisable in the furtherance of the construction of the said railway, a similar extent of public lands along the line of railway, throughout its entire length in British Columbia, not to exceed, however, twenty (20) miles on each side of said line, as may be appropriated for the same purpose by the Dominion Government from the public lands of the North-west Territories and the Province of Manitoba: Provided that the quantity of land which may be held under pre-emption right or by Crown grant within the limits of the tract of land in British Columbia to be so conveyed to the Dominion Government shall be made good to the Dominion from contiguous public lands; and provided further that until the commencement, within two years, as aforesaid, from the date of the Union, of the construction of the said railway, the Government of British Columbia shall not sell or alienate any further portions of the public lands of British Columbia in any other way than under right of pre-emption, requiring actual residence of the pre-emptor

on the land claimed by him. In consideration of the land to be so conveyed in aid of the construction of the said railway, the Dominion Government agree to pay to British Columbia, from the date of the Union, the sum of 100,000 dollars per annum, in half-yearly payments in advance."

The British Columbia delegates readily consented to this proposal. Two of them were from Vancouver Island and one from the Cariboo, and a strip of land 40 miles wide on the Mainland in a region concerning which little was known did not seem of much consequence in those days.

On the 20th of July, 1871, British Columbia, pursuant to the final and agreed Terms of Union, became part of the Dominion of Canada.

On the 7th day of June, 1873, by Order of the Governor-General in Council. Esquimalt was fixed as the terminus of the transcontinental railway, and a line of railway was to be located between the Harbour of Esquimalt and Seymour Narrows.

On the 15th day of June, 1873, the Dominion Government requested the British Columbia Government to convey to it, in trust, a strip of land 20 miles in width along the eastern coast of Vancouver Island between Esquimalt and Seymour Narrows in furtherance of the construction of the said railway and pursuant to section 11 of the Terms of Union.

On the 30th day of June, 1873, the Provincial Government, while not acceding to this request, did reserve this area and expressed a willingness to convey the land once the boundaries thereof could be ascertained.

The two-year period for commencing the construction of the railway expired in 1873 without any steps being taken by the Dominion to implement their agreement and a considerable public opinion was aroused critical of the delay. In consequence, in 1874, a delegate was sent from here to London to lay the matter before the Imperial Government.

This journey resulted in the appointment of Lord Carnarvon as mediator, and on the 17th day of November, 1874, he rendered his verdict, stating in effect that a railway should be commenced without delay and completed with all practicable dispatch between Esquimalt and Nanaimo.

In the early part of 1875 the Dominion Government notified the Provincial Government that before it undertook the construction of this railway from Esquimalt to Nanaimo a strip of land 20 miles wide *on each side of the line* must be conveyed to it in trust.

The Provincial Government agreed to this demand, and an Act was passed in April, 1875, implementing this agreement, intituled " An Act to authorize the Grant of certain Public Lands to the Government of Canada for Railway Purposes."

The line was thereupon located and steel rails landed at Nanaimo and Esquimalt.

A few months later—in September of 1875—the Dominion Government, for reasons not entirely clear, offered $750,000 to the Province as compensation for the delay in commencing the work on the transcontinental railway, such sum to be applied by the Province to the building of the Esquimalt and Nanaimo link, or to such other public works as the

Government might consider advantageous, and, in addition, agreed to surrender its claim to the Island Railway lands.

The British Columbia Government refused this offer, and there the matter rested until 1876 when the Legislature strongly urged that Lord Carnarvon's settlement be effectuated. A further memorial was addressed to the Imperial authorities.

In 1878, no construction having been commenced in the interim, the Dominion Government cancelled the Order in Council of June, 1873, designating Esquimalt as the terminus of the transcontinental railway and its request for a conveyance of the Island Railway Belt.

In April of 1879 the Dominion Government annulled the Order in Council of 1878 and revived the original Order in Council of June, 1873, probably because the Provincial Government had inquired if the Dominion Government also wished it to cancel the Mainland reserved areas as well.

In 1880 the Dominion Government requested a conveyance of additional lands in lieu of lands on the Mainland and Island belts believed valueless for agricultural or other economic uses, and to supply the deficiencies in the 40-mile strips caused by the International Boundary on the Mainland and the indentations of the coast-line of Vancouver Island. Notwithstanding the fact that said section 11 did not contain any undertaking on the part of the Province to convey lands in lieu of lands in the Railway Belts not suitable for agricultural purposes, 3,500,000 acres in the Peace River Block were, in 1883, conveyed to the Dominion Government. These lands were returned to the Province in 1930 consequent upon a recommendation of a Royal Commission appointed to inquire into this matter.

In February, 1883, the Provincial Government sent the following note to the Dominion Government:

> "That the land on the east coast of Vancouver Island had been continuously withheld from settlement since July, 1873, up to the present time, and the development of that fertile tract of country, abounding in mineral wealth, had been retarded to an incalculable extent."

And they recommended as a basis of settlement of the railway and railway land questions that the Dominion be urgently requested:

> ". . . to commence to construct the Island railway and to complete it with all practicable dispatch, or by giving such compensation for failure to build it as would enable the Provincial Government to build it as a Provincial work and open the east coast lands for settlement."

Later in 1883 the Dominion Government communicated its desire to the Provincial Government to reach a final adjustment of (*inter alia*) the Island Railway matter.

It suggested that the Provincial Legislature incorporate a company of persons to be designated by the Government of Canada for the purpose of constructing the railway from Esquimalt to Nanaimo, and that it would convey the Island Railway land to this corporation and contribute thereto

the sum of $750,000 in aid of the construction of the said railway, such construction to be completed on or before the 10th day of June, 1887.

The Provincial Government consented to this proposal and the agreement between the two Governments was embodied in two Acts passed in 1883 and 1884, both intituled "An Act relating to the Island Railway, the Graving Dock, and Railway Lands of the Province."

It was by these Acts that the boundaries of the Railway Belt were described,(1) the lieu lands were transferred to the Dominion, and other outstanding disputes and difficulties arising out of the Terms of Union were finally resolved.

In 1884 the Dominion Parliament also passed an Act implementing the agreement with the British Columbia Government. By this Act the Dominion Government was authorized to convey to the Esquimalt and Nanaimo Railway Company the Island Railway Belt, upon completion of the railway to the satisfaction of the Dominion Government, and to pay to that company the sum of $750,000 as a subsidy in aid of the construction of the said railway.

The British Columbia Government by the Acts of 1883–84 constituted the persons to be named by the Governor-General in Council, and such other persons who might become shareholders therein, as a body corporate by the name of "The Esquimalt and Nanaimo Railway Company."

The Governor-General in Council named Robert Dunsmuir, James Dunsmuir, and John Bryden of Nanaimo, and other American associates, as members of the company.

On the 28th of August, 1883, Robert Dunsmuir and his associates entered into a contract with the Dominion Government for the construction of the said railway, and the Dominion Government in consideration thereof agreed to convey and assign the Railway lands to the said contractors, who in turn agreed to assign and transfer the liabilities and benefits under the said contract to The Esquimalt and Nanaimo Railway Company. The Railway Company completed the construction of the line to the satisfaction of the Dominion Government, and on the 21st of April, 1887, the Dominion, by deed, granted and conveyed the Island Railway Belt to the Company.

Neither the Agreement of 1883 between the contractors and the Dominion Government nor the Dominion Statute of 1884 contain any reference to Provincial taxation of the Island Railway lands. There never was any contractual relationship between the Provincial Government and the contractors or the Railway Company in relation to the transfer of the Railway Belt to the Railway Company. The Provincial Acts of 1883–84 do, however, contain the following relevant provision:—

> "22. The lands to be acquired by the Company from the Dominion Government for the construction of the Railway shall not be subject to taxation, unless and until the same are used by the Company for other than railroad purposes, or leased, occupied, sold or alienated."

(1) *See* map on page 181.

Two questions are now before me for consideration:—

First: The right of the Provincial Government to impose a fire protection tax upon unalienated timber lands remaining in the Railway Company; and

Second: The right of the Province to impose a severance tax upon timber cut from these lands after the sale thereof by the Railway Company.

Before the first question can be answered it must be determined if the fire protection tax is, in the strict legal sense, a tax, or a fee or charge for a service rendered by the Crown. If a tax, then certainly it falls within the exemption of section 22 quoted above. If not a tax (although called one) but a charge for a service, then it does not come within that section. It seems to me this question must be determined by the Courts, and, in consequence, I do not wish to express any opinion on the matter.

The question of the imposition of a severance tax on timber cut by purchasers of E. & N. lands presents a problem of some nicety. At the present time E. & N. land now in the hands of private owners is assessed and pays a land tax, and, if timber land, a fire protection tax. The Crown, however, receives no revenue from the timber cut on these alienated areas.

The Deputy Minister of Forests estimates that if the timber cut thereon paid the prevailing royalty rates, averaging $1.10 per M., the Crown would have received therefrom during the last ten years a revenue of between $750,000 and $800,000 a year, and would receive substantial revenues from this source in the future. The average of $1.10 per M. includes royalty on hemlock at 60 cents, and as Douglas fir is the predominant species in the Belt this estimate of revenue is probably conservative.

The question of imposing a severance tax on this timber must, I think, be approached from two avenues: First, is it just and equitable to impose the tax, and, second, is this a matter within the legislative competence of the Province?

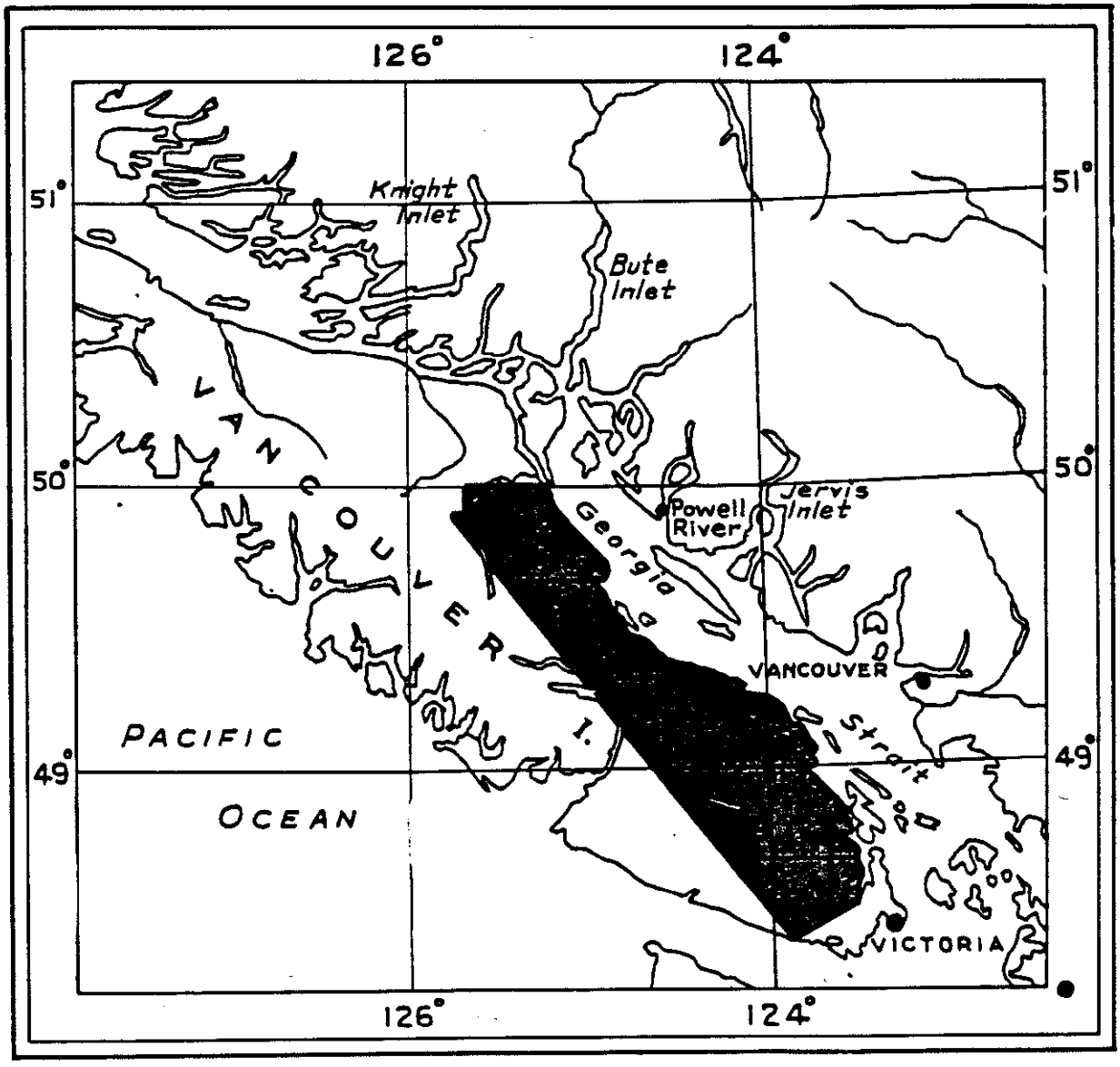
In considering the first question I assume that the imposition of such a tax would tend to reduce the revenue of the Railway Company from the sale of its timber land because purchasers would likely pay less for taxable than non-taxable timber.

In relation to this branch of the subject the historical background I have sketched in is of importance.

It will be remembered that the Island land grant, containing approximately 3,000 square miles, was conveyed by the Province to the Dominion, and by the Dominion to the Railway Company, as an aid in the construction of the line from Esquimalt to Nanaimo. Included in this area were and are large stands of the finest timber remaining on this continent.

The line from Esquimalt to Nanaimo, consisting of 82.9 miles of railway, together with rolling-stock and equipment, cost the Company $3,101,382. Private capital contributed $2,500,000, and the Dominion subsidy of $750,000 made up the balance of the required fund.

ESQUIMALT AND NANAIMO RAILWAY LAND GRANT



Scale÷50 miles to 1 inch

From 1887 to 1897 no records of the sale of timber lands were kept by the Railway Company, but it appears that from 1898 to July 31st, 1944, the Company disposed of 763,565 acres of timber land containing over 7 billion feet of timber, and realized therefrom the sum of $14,814,792.69, or about six times the contractors' investment in the railroad from Esquimalt to Nanaimo. Operation and maintenance costs have been met from operating revenue.

There is remaining in the possession of the Company areas of unalienated timber lands estimated to contain between 5 and 6 billion feet board-measure, which at the conservative figure of $2 per M. would be worth from $10,000,000 to $12,000,000.

The cost of the Alberni and Courtenay extensions have been financed by bond issues and a further grant from the Dominion Government of $770,560.

From the foregoing I am unable to see how it would be unjust and inequitable to impose a severance tax on purchasers of E. & N. timber, even assuming it to be a fact that the Railway Company would not receive quite as high a price for its stumpage on future sales as it has in the past. A return from the sale of timber land alone of approximately $25,000,000 when compared with the original investment of $2,500,000 would appear to most people a reasonably adequate subsidy for the construction of 82 miles of railway. What other amounts have accrued or will accrue to the Company from the mineral wealth of the Belt and from the sale of land, other than timber land, were not disclosed to me.

It has been said that to impose such a tax would be a "breach of the contract between the Province and the Railway Company." There are two obvious answers to that argument. In the first place there is no contract between the Province and the Company. If, on the other hand, the Acts of 1883–84 are assumed to create such a relationship, then the terms of section 22 must govern. That section, it will be recalled, only exempted the Railway lands from taxation until "the same are used for other than railroad purposes, *or leased, occupied, sold or alienated.*"

Counsel for the Railway Company frankly conceded in his argument before me that once the Company had parted with the land any Provincial tax thereon could not be said to be "a breach of the contract."(1) He went on to say, however, that the imposition of such a tax on only one class of Crown grantees would be discriminatory and that it should be applied to all such tenures. With deference, I do not agree with this contention. There is a marked distinction between the grant of the Island Railway Belt and an ordinary Crown grant in which no royalties were reserved to the Crown. In effect, the Crown has said to the Railway Company by section 22: "Your lands will not be taxed while in your ownership. We do not bind ourselves not to tax these after you have sold them to private individuals." On the other hand, it has said in effect to Crown grantees of royalty-free lands: "We grant you these lands without reserving any

(1) Pp. 501, 503, 510, 512, transcript of argument.

interest therein to ourselves. Having parted with possession on those terms we will not impose a royalty on these lands at any future date, whether in your possession or in the possession of any successors of yours to the title thereof. Any attempt to do so would be a clear breach of our contract with you and a violation of the public conscience."

Therein, as I see it, lies the basic distinction between these two classes of Crown grants. Counsel for the Railway Company, as I understood him, also contended that as the tax would be passed back to and borne by the Railway Company it was therefore in effect a form of indirect taxation and, in consequence, *ultra vires* the Provincial Legislature. That is not a matter upon which I wish to express an opinion as Commissioner.

A further alternative contention was advanced that if the severance tax was not an indirect tax in the strict legal sense of the term and the Province had the power to impose it, nevertheless the Act would be subject to disallowance by the Dominion Government because the tax in its incidence would fall upon the Railway Company in derogation of its grant, notwithstanding the fact that it could not be described as a breach of the original contract. I have some difficulty in following this argument. It seems to include two inconsistent submissions. However that may be, in my opinion the simple answer to that question is found in the quoted section 22 and in the basic distinction I made between the Island Railway grant and an ordinary Crown grant.

The Province never at any time agreed by contract or statute or otherwise to treat the E. & N. lands as tax free when sold to third persons. The Railway Company assumed title to these lands on the terms set out in said section 22 and cannot now complain of the basis on which its title rests.

Then, too, if the Railway Company had received a Crown grant of the Railway Belt direct from the Province on April 21st, 1887, instead of from the Dominion Government, these lands would have been subject to royalty because granted subsequent to April 7th, 1887.

To sum up, then, in my opinion it is in the public interest that a severance tax be imposed upon all timber cut upon lands of the Railway Company after the same are sold or otherwise alienated by it. I do not recommend that this tax apply to lands already sold by the Company. The amount of the tax should, I think, approximate prevailing rates of royalty.

As I previously made mention, counsel for the Railway Company called into question the competence of the Provincial Legislature to impose such a tax. I cannot decide that question as Commissioner, and therefore recommend that appropriate steps be taken by the Crown to have this matter determined by the Courts. If it is decided that the imposition of a severance tax on timber cut by purchasers of E. & N. timber land is *ultra vires* the Province that ends the matter. If the decision is that the tax is *intra vires*, then, as I have said, in my view it ought, in the public interest, to be imposed on future alienations.

PARKS ADMINISTRATION.

By Item 7 of the Commission I am directed to inquire into:—

> "The use and management of forest and wild lands for parks . . . in relation to forest administration."

Just what limitation is imposed upon me by the restrictive phrase "in relation to forest administration" I am not able to say with certainty, except that my inquiry into this question is not to be at large.

In the Province there are fifty-two parks totalling in area 10,823,130 acres or 16,901 square miles.

Probably the more accurate description to be applied would be "park areas" instead of "parks," for with few exceptions these areas are of the forest primeval without roads, trails, or other organized park developments.

Parks are created in three ways: by the Lieutenant-Governor in Council under the "Forest Act," by the Lieutenant-Governor in Council under section 94 of the "Land Act," and by Special Acts of the Legislature.

Parks constituted under the relevant provisions of the "Forest Act" fall into three classifications: "A," "B," and "C."

Lands included in Classes "A" and "C" are reserved from pre-emption, sale, lease, or licence under the "Land Act," and certain restrictions are also imposed on the holders of mineral claims located in these areas.

The Crown timber on any Class "A" park is reserved from cutting or sale, except as such cutting and incidental sale may, in the opinion of the Deputy Minister of Forests, be necessary and advantageous in developing or improving the park, or protecting and preserving the major forest values of the park for the enjoyment of the public. In other words, no timber can be sold from Class "A" park areas for the primary object of obtaining revenue therefrom.

Crown timber on areas within Class "B" parks may be sold except where, in the opinion of the Deputy Minister of Forests, disposal of such timber would be detrimental to the recreational value of the area.

Class "C" parks are very small areas and for the main part are set aside for children's playgrounds and such like.

The following is a list of Provincial parks, with relevant information relating thereto:—

Name of Park.	Date created.	Acreage.	Park Class.	Forest District.
Beatton	14-9-34	770.10	C	Fort George.
Brentwood Bay	19-5-38	1.40	C	Vancouver.
Chasm	17-5-40	315.00	A	Kamloops.
Clearwater	14-12-38	260.00	C	Kamloops.
Crescent Beach	4-11-38	237.00	C	Vancouver.
Darke Lake	29-6-43	5,472.00	A	Kamloops.
Dead Man's Island	31-10-33	1.00	C	Prince Rupert.
Elk Falls	20-12-40	2,810.00	A	Vancouver.
Elk River	24-11-39	10.40	C	Nelson.
Englishman River Falls	20-12-40	240.00	A	Vancouver.
Garibaldi(1)	————	622,720.00	Special	Vancouver.
Hamber	16-9-41	2,431,960.00	A	Fort George.
Inonoaklin	15-11-29	5.50	C	Nelson.
John Dean	9-12-21	98.37	A	Vancouver.
Keremeos Columns	31-7-31	720.00	A	Kamloops.
King George VI.	3-5-37	50.00	C	Nelson.
Kokanee Glacier	6-2-22	64,000.00	A	Nelson.
Liard River(2)	4-2-44	1,802,240.00	Sec. 94, "Land Act"	Fort George.
Little Qualicum Falls	20-12-40	130.30	A	Vancouver.
Lockhart Beach	13-10-33	4.90	C	Nelson.
Manitou	26-7-40	2.50	C	Kamloops.
Manning	17-6-41	171,500.00	A	Kamloops.
Mara Recreation	31-5-33	14.60	C	Kamloops.
Medicine Bowls	20-12-40	30.30	C	Vancouver.
Mount Assiniboine	6-2-22	12,800.00	A	Nelson.
Mount Bruce	31-12-38	480.00	C	Vancouver.
Mount Maxwell	21-10-38	472.00	C	Vancouver.
Mount Robson(1)	————	513,920.00	Special	Fort George.
Mount Seymour	31-1-36	8,480.00	A	Vancouver.
Nakusp Hot Springs	15-6-25	127.00	C	Nelson.
Nakusp Recreation	24-4-31	91.00	C	Nelson.
Oliver	6-1-37	21.45	C	Kamloops.
Osoyoos	25-1-39	7.28	C	Kamloops.
Peace Arch	7-11-39	16.15	A	Vancouver.
Premier Lake	26-4-40	165.00	C	Nelson.
Princeton	22-2-28	341.12	C	Kamloops.
Salt Lake	15-8-25	87.10	C	Prince Rupert.
Silver Star	17-5-40	21,887.50	A	Kamloops.
Sir Alexander McKenzie	10-2-26	13.00	A	Prince Rupert.
Sooke Mountain	25-6-28	1,446.00	B	Vancouver.
Stamp Falls	20-12-40	323.33	A	Vancouver.
Strathcona(1)	————	529,920.00	Special	Vancouver.
Strombeck	20-10-33	0.685	C	Prince Rupert.
Summit Lake(2)	23-9-42	7,200.00	Sec. 94, "Land Act"	Fort George.
Swan Lake	19-6-18	166.00	C	Fort George.
Testalinda	19-8-39	4.80	C	Kamloops.
Tweedsmuir	21-5-38	3,456,000.00	B	Prince Rupert.
Wells Gray	28-11-39	1,164,800.00	B	Kamloops.
Wendle	17-4-41	640.00	C	Fort George.
Westbank	3-5-37	2.00	C	Kamloops.
Westview	19-8-31	10.21	C	Vancouver.
White Rock	12-30-30	114.80	C	Vancouver.

Totals—	Parks.	Acres.
Class "A"	16	2,720,771
Class "B"	3	4,622,246
Class "C"	28	4,113
Special	3	1,666,560
Sec. 94, "Land Act"	2	1,809,440
Totals	52	10,823,130 (16,901 square miles)

(1) Not strictly "Provincial parks"—administered under separate Acts.

Parks constituted under the "Forest Act" are administered by the Forest Service and provision is made in that statute for the appointment by the Minister of Lands and Forests of an Advisory Board for any such park falling within Categories "A" and "B." The Deputy Minister of Forests is under statutory direction to consult from time to time with such Board. For any Class "C" parks the Minister may appoint a Park Board with power to manage, administer, and regulate that park.

The "Land Act" neither contains any provision relating to the administration of parks constituted under section 94 of that Act, nor is there any apparent power to pass regulations governing timber uses in these park areas, although the area included therein totals 1,809,440 acres. In my view these parks should be classified and administered by the Forest Service under the relevant provisions of the "Forest Act."

Each park created by a Special Act such as Garibaldi, Mount Robson, and Strathcona is, by the terms of its own statute, to be administered by Park Boards to be appointed by the Lieutenant-Governor in Council.

The Act creating the Strathcona Park was passed in 1911, and that constituting Mount Robson Park in 1913. Thus far no Park Board for either of these parks has been appointed. These areas are presently administered by the Lands Branch of the Department of Lands and Forests, and no regulations, so far as I can find, have been issued in relation to the timber therein.

The combined area of these two parks covers over 1,000,000 acres.

Garibaldi Park is administered by a Park Board which is without funds either to conserve and protect the large timber resources of this park or to carry out any programme of park improvement and development.

No policy in relation to forest administration has as yet been formulated by the Garibaldi Park Board.

This park's original area was, as shown on the table, 622,720 acres. In March of 1943, 10,105 acres thereof were excluded from the park area and leased to the University of British Columbia as a demonstration forest for the use of forestry students.

Considerable support was given by a group of witnesses to the proposed creation of an autonomous Provincial Parks Board which would assume responsibility for park selection, planning, development, and general administration of Provincial park areas. With deference, I cannot concur in this recommendation. In my opinion parks should be administered by a Parks Branch of the Forest Service staffed by a selected personnel especially trained in this type of administration. By this form of control a close integration between all forest uses in park areas may be anticipated.

UNIFORMS FOR FOREST SERVICE.

No evidence was introduced on this subject but I think it is one to which serious consideration should be given by the Minister. Appropriate uniforms similar in design to those now worn by the Provincial Police and the Game Branch would tend to smarten up the Service and give its field officers an outward sign of authority now lacking.

FINIS.

With that comment I complete this Report, but before writing a final "30" I would record my appreciation of the careful and thorough manner in which H. W. Davey, Esq., K.C., counsel to the Commission, collected and presented before me the great volume of evidence from which I have drawn the conclusions expressed herein.

To the many witnesses, within and without the Forest Service, who gave so freely of their time, talent, and money in the preparation of their evidence covering the many and varied problems involved in the inquiry, I am deeply grateful.

To counsel for private interests and to lay representatives of various professional and other groups, I express my thanks for their valuable assistance.

The officials of the United States Forest Service furnished us with much data and their evidence was found informative and useful. I am appreciative of their very kind co-operation.

And, finally, I wish to acknowledge the great service the secretary to the Commissioner—Mr. Watson—rendered in preparing an index of the evidence for me, and the many courtesies he extended in smoothing the way for us all during these long months of association.

APPENDIX.

IDENTIFICATION OF WITNESSES.

Abrahamson, John Albert, Revelstoke Board of Trade.
Aitkenhead, K. F., Secretary-Treasurer, Lawrence Manufacturing Company, Limited.
Allen, Robert Emmett, District Forester of the Nelson Forest District.
Allison, A. P., President of the Allison Logging Company: President and Manager of the Lions Gate Lumber Company.
Andrews, I. H., Technical Director of the Powell River Pulp and Paper Company.
Andrews, L. R., Forest Engineer, British Columbia Lumber and Shingle Manufacturers' Association.
Angle, W. N., Interior British Columbia Resort Owners' Association.
Applewhaite, John Hay, Forest Ranger at Invermere.
Arbuthnot, Mrs. Lillian, Victoria.
Bain, Peter, A. B. Burns Lumber Mill: National Spruce Sawmill: Princeton Trail Sawmill.
Baker, D. H., Chemical Engineer.
Barnes, Frances, Lumberman.
Barnes, G. H., Professor of Forestry, Corvallis, Oregon.
Barclay, S. W., Royalty Inspector, Forestry Department.
Barrett, J. R., Steel Foreman, Burrard Dry Docks, North Vancouver.
Barton, Eric W., Secretary, Kelowna Board of Trade.
Bassett, H. V., Statistician, Bureau of Economics and Statistics, Department of Labour.
Becker, Frank F., Secretary-Treasurer, Pioneer Sash and Door Company, Limited.
Bell, F. O., Member of the Garibaldi Park Board.
Bell-Irving, R., Vice-President of the Powell River Pulp and Paper Company.
Bennett, Walter, President, Vernon Board of Trade.
Bentley, L. L. G., Vice-President of Canadian Forest Products, Limited.
Bier, J. E., Forest Pathologist.
Bickell, L. K., Chief Chemist, British Columbia Pulp and Paper Company.
Biker, Walter J. E., Civil Engineer.
Bird, W. H., Brotherhood of Railway Trainmen.
Bissett, Cleophas, Mill Operator, Kamloops Co-operative Association.
Blake, J. O., President of the Metchosin Farmers' Institute.
Borup, Helge, Logging Operator.
Bourque, Edward W., Regional Wood Fuel Officer, Department of Munitions and Supplies.
Bowman, Henry Robson, Manager of Colonization for the Canadian National Railway.
Bradley, T. J., Organizer and Representative of the Canadian Congress of Labour.
Browne, Adolphus, Fruit and Vegetable Packer and Shipper.
Brown, D. C., Vancouver Parks Board.
Brown, Rosco, Dominion Forest Laboratory.
Buck, G. A., President of the Malahat Logging Company, Vancouver.
Buckley, F. L., Lumber-manufacturer and Box-manufacturer.
Bulman, Thomas A., Cattle-rancher.
Bulman, Thomas Ralph, Bulman's, Limited.
Burns, Gordon K., Burns Lumber Company.

Burns, Harry, Nelson Board of Trade.
Burns, Richard Ronald, Advisory Board, King George VI. Park.
Butler, F. R., British Columbia Game Commissioner.
Caine, Martin Surrey, President of the Northern Interior Lumbermen's Association.
Cameron, Colin, Member of the Legislative Assembly.
Cameron, D. O., Director, Cameron Lumber Company.
Cameron, D. T., Dominion Fisheries Inspector.
Cameron, Robert, Forest Ranger.
Cameron, Thomas Gray, Cranbrook Farmers' Institute.
Cameron, William Tupper, Chairman, Vernon Local of the British Columbia Fruit-growers' Association.
Capostinski, Frank, Logging Superintendent for the Swanson Logging Company, Limited.
Chapman, D. D., Reeve of the Municipality of North Cowichan.
Charlesworth, E. A., Supervisor of Scalers for the Interior of British Columbia.
Clare, Cecil Thomas, Northern Interior Lumbermen's Association.
Clark, J. T., Surveyor of Taxes.
Cleasby, Henry S., Secretary of the Nicola Stock-breeders' Association.
Cleveland, B. C., Chief Commissioner of the Greater Vancouver Water Board.
Cole, Thomas, Surveyor of Taxes.
Collett, Horace C. S., Association of British Columbia Irrigation Districts.
Collett, John Henry, British Columbia Stock-growers' Association.
Collier, Eric, The British Columbia Registered Trappers' Association.
Constable, Guy, Creston Dyking Company, Limited.
Cooper, Edward, Associated Rod and Gun Club of East Kootenay.
Cosins, Edward Bruce, Alderman of the City of Vernon.
Cowan, C. S., Chief Fire Warden for the Washington Forest Fire Association.
Cowan, Samuel, Western Lumber Manufacturers' Association of Canada.
Crickmay, James, Industrial Timber Mills, Limited.
Crow, Robert J., Rancher.
Cutler, C. J., Hammond Cedar Company; Industrial Timber Mills at Youbou.
Dallimore, W., Farmer.
Davis, E. F., Controller of Water Rights for the Province of British Columbia.
Davison, Edward Sumner, Forester; Fernie Farmers' Institute.
Dawson, Howard D., Nelson City Engineer.
DeLand, A. M., Forest Manager for the Powell River Pulp and Paper Company.
DesBrisay, Albert G., President of the British Columbia Fruit-growers' Association.
Dillman, Martin, Tie and Lumber Mill Operator.
Dixon, L. B., Chief Inspector for the British Columbia Lumber and Shingles Manufacturers' Association.
Dorman, J. G., Manager of Bones Bay Cannery.
Drummond, George F., Professor of Economics. University of British Columbia.
Dumont, Michael, Michael Dumont Mill.
Duncan, K. F., Duncan Chamber of Commerce.
Elder, Dalton, Elder Logging Company.
English, H. O., Teacher, Provincial Normal School.
Ericson, O. F., Assistant Regional Forester.
Fairbairn, W. H., Dominion Fisheries Inspector.
Fairweather, Harold E., Manager, Oliver Mills.
Farstad, Alfred, Director, Cranbrook Sawmills: Creston Sawmills. Limited.
Field, L. L., Farmer.
Field, C. D., Farmer.

Filberg, Robert, Vice-President, Comox Logging Company, Limited.
Finlaison, George, Sawmill Operator.
Fjelstad, Anders, Delegate to Dumbarton Oaks for the Norwegian Government for Agricultural Affairs in Foreign Countries.
Flavelle, Aird, President, Thurston-Flavelle, Limited.
Foley, H. S., President of the Powell River Pulp and Paper Company.
Fraser, Douglas P., Secretary of the Osoyoos Local, British Columbia Fruitgrowers' Association.
Fraser, K. F., Manager of the Fraser River Branch of British Columbia Packers, Limited.
Fraser, W. E., Malahat Board of Trade.
Freeman, Stephen, District " G " Farmers' Institute.
French, Percival E., President of the British Columbia Federation of Agriculture.
Fry, Julian E., Rancher.
Gardom, Basil, President, Independent Milk Producers' Co-operative Association.
Gerhardi, Thomas Edward, Fort Fraser Farmers' Institute.
Gibbs, P. A., Chartered Accountant.
Gibson, J. G., W. F. Gibson and Sons, Limited; Gibson Brothers, Limited.
Gibson, Thomas Morden, Superintendent of West Canadian Hydro Electric Corporation, Limited.
Gilmour, J. D., Forester for the H. R. MacMillan Export Company, Limited.
Gilroy, William Daniel, President, Cranbrook Board of Trade.
Glaspie, E. S., Glaspie Lumber Company.
Gordon, D. M., Barrister-at-law.
Granley, John D., Automobile Dealer.
Greeley, W. B., Secretary-Manager of the Washington Western Lumbermen's Association.
Greenley, Everett, President of District " H " Farmers' Institute.
Gregor, Robert D., District Forester, Fort George Forest District.
Griffith, W. B., Assistant Professional Forester, University of British Columbia.
Groves, J. D., Associated Boards of Trade of Vancouver Island.
Guichon, Lawrence Peter, Rancher.
Halksworth, Samuel E., President, Okanagan Valley Co-operative Creamery Association.
Hanbury, Wilfred, Ponderosa Pine Lumber Company, Limited.
Harris, Ormand S., President, Interior Lumber Manufacturers' Association.
Harrison, William, President, Sheep-breeders' Association.
Hart, Ellen, Secretary of the Society for the Preservation of Native Plants.
Hatcher, G. T., Research Staff, Bureau of Economics and Statistics.
Hayden, Charles Albert, British Columbia Federation of Agriculture.
Hazbrook, Elliott A., Timber and Log Broker.
Herridge, Herbert W., Member of the Provincial Legislature.
Hetherington, H. H., A. H., & R., Company, Limited.
Hibberson, R. W., Timber-cruiser, Forest Surveyor, and Timber-broker.
Hodgins, Hugh John, Forester, Pacific Mills, Limited.
Hodgins, Stanley, District Forester for the Western Pine Association.
Holland, R. R., Board of Park Commissioners.
Holmes, C. F., Supervisor, British Columbia Forest Branch.
Hommersham, Robert B., Secretary, Heffley Irrigation District.
Hoover, George Adam, President, Nelson Board of Trade.
Hopp, Henry, Farmer.
Hopping, G. R., Entomologist, Dominion Insect Laboratory, Vernon.
Hopkins, Samuel, Agriculturist, Consolidated Mining & Smelting Lands Company.

Horton, R. Elmer, Manager of the W. W. Powell Company, Limited, Nelson.
Howe, Charles B., Superintendent, Penticton Municipality.
Huddlestone, Cecil G., Reeve of Summerland Municipality.
Humber, John, Director of the Victoria Lumber Company, Limited.
Hunt, G. W., Civil Engineer.
Hunter, H. M., President, Lake Logging Lumber Company, Limited.
Hurt, Charles John, Alderman, Vernon Municipality.
Irwin, G. M., Water Commissioner for the City of Victoria.
Irwin, H. S., Chairman of the British Columbia Loggers' Association.
Ivens, Joseph, British Columbia Fruit-growers' Association (Okanagan, Mission, and Kelowna Locals).
Jackson, G. W., Burns & Jackson Logging Company, Limited.
Jarvis, R. I., Secretary to the Columbia Contracting Company.
Johnson, J. V., President of the Victoria Chamber of Commerce.
Johnson, J. W., Revelstoke Board of Trade.
Johnstone, David B., Kamloops Board of Trade.
Jostad, O., Cranbrook Cartage and Transfer Company, Limited.
Kappel, Frank, Secretary-Treasurer of the R. W. Bruhn Lumber Company.
Kaun, Frederick B., Manager of the Frank Knight Lumber Company.
Kelly, E. W., Regional Forester of the Northern Region, United States Forest Service.
Keate, W. L. (Jr.), Manager, Fort Neville Logging Company.
Kennelly, Martin, Barr & Kennelly Company.
Kerr, A. S., Timber Inspector for the British Columbia Pulp and Paper Company, Limited.
Killam, L., President of the British Columbia Pulp and Paper Company, Limited.
King, E. C., Secretary-Treasurer of the Western Lumber Manufacturers' Association.
Kirby, Judson O. C., Secretary of the Princeton Board of Trade.
Knapp, F. M., Associate Professor of the Department of Forestry at the University of British Columbia.
Knowles, R. A., Forest Club of the University of British Columbia.
Koerner, L. J., President of the Alaska Pine Company, Limited.
Lambert, Arthur A., Civil Engineer, West Kootenay Power and Light Company.
Lambert, A. M., Mohawk Handle Company, Limited; Columbia Hardwoods, Limited.
Lambert, W. G., President, Mohawk Handle Company, Limited; Columbia Hardwoods, Limited.
Leary, Charles S., Interior Lumbermen's Association; Chairman of the Standing Committee on Forestry, British Columbia Legislature.
Lee, Norman, Business Counsellor.
Leir, Hugh, Manager of the Penticton Sawmills.
Leuthold, Walter L., Lumberman.
Liersch, J. E., Head of the Forestry Department, University of British Columbia; Production Manager, Aero Timber Products.
Long, Kenneth A. W., Long Brothers' Sawmill; Southern Interior Lumbermen's Association.
Longacre, L. A., Director of the L.M. & N. Logging Company, Limited.
Lloyd, Arthur G., British Columbia Tree Fruits, Limited.
Lundbom, Victor A., Crow's Nest Pass Lumber Company.
Lyndh, Harold O., United States Forest Service, Region 6.
Lytton, L. C., Assistant Land Agent of the Esquimalt & Nanaimo Railway Company.
McBain, C. W., Land Agent of the Esquimalt & Nanaimo Railway Company.
McBean, A. P., Assistant Forester.

McCannel, Kenneth C., Assistant District Forester, Nelson Forest District.
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MacDonald, A., Dominion Fisheries Inspector.
McDonald, J. H., British Columbia Manufacturing Company: Westminster Shook Mills; Maple Ridge Lumber Company.
MacDonald, John A., Waldo Stock-breeders' Association.
McDougall, Dougald, Secretary, Rutland Co-operative Society.
McEwan, Joseph J., West Kootenay Rod and Gun Club.
McGinnis, John, Prince George Board of Trade.
McGinnis, O. A., Superintendent of Columbia Valley Irrigation Company.
McKee, Robert G., Assistant District Forester for Kamloops Forest District.
McKee, R., President, Pioneer Timber Company, Limited.
MacKenzie, Mrs. E. C., Society for the Preservation of Native Plants.
McKenzie, M. G., Trade Assistant in the Bureau of Economics.
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Mackin, Keith, Operations Superintendent of the East Kootenay Power Company, Limited.
MacKinnon, Charles E., Mechanical Engineer.
McKinnon, F. S., Economics Department of the Forestry Branch.
McLean, Sinclair, Northern Interior Lumbermen's Association.
McLennan, D. C., Shipwright.
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McMinn, Cecil G., Boundary Sawmills, Limited.
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Manning, F. A. E., President, British Columbia Lumber and Shingles Manufacturers' Association; President, Manning Lumber Mills, Limited.
Matthews, W. J., Cannery Manager.
Melrose, G. P., Assistant Chief Forester.
Mercer, W. M., Research Department of the Bureau of Economics.
Miller, Albert, Fruit-grower.
Miller, G., Secretary-Manager of the Canadian Forestry Association of British Columbia.
Mills, J. R., Manager, Canadian Forest Products, Limited.
Morgan, Granville, Penticton and District Fish, Game, and Forest Protective Association.
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Motherwell, J. A., Chief Supervisor of Fisheries for British Columbia (Federal Government).
Mottishaw, J. S., Forester for Bloedel, Stewart & Welch.
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Palmer, J. D., Cattle Producer.
Palmer, W. F., District "D" Central Farmers' Institute.
Parlow, A. H., District Forester for the Kamloops Forest District.
Patterson, A. M., Mayor of Prince George.

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Penfold, D. K., Engineer of the Water Rights Branch, Kelowna.
Perrin, Charles, Forest Ranger.
Perry, George, Manager for the Summerland Box Company.
Phillips, W. C., Forester, British Columbia Forest Service.
Popoff, Mrs. E. D., Slocan City Women's Institute.
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Proppe, Leonard, Northern Interior Lumbermen's Association.
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Raphael, G. S., Secretary-Manager, Consolidated Red Cedar Shingle Association; Secretary, Red Cedar Shingle Association of Canada, British Columbia Division.
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Rodgers, L. C., Logger.
Rodgers, N. S., Oregon State Forester.
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Rowebottom, E. G., Deputy Minister of Trade and Industry; Tourist Trade Bureau.
Scott, L. G., Building Contractor.
Segur, Vincent, Member of the Provincial Legislature.
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Shearer, F. J., President of the Prince George Board of Trade.
Shipmaker, Henry R., Farmer and part-time Logger.
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Stevens, Thomas, Chartered Accountant, Price, Waterhouse & Company.
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Strother, James G., Vice-President of the Interior Lumbermen's Association; Chairman of the Interior Box Manufacturers' Association.
Sutton, Frederick N., Director of the Cariboo Cattlemen's Association.
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Tait, J. F., Supervisor of Fisheries, District No. 3, British Columbia, for the Dominion Government.
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Thacker, T. L., Retired Rancher and Accountant.
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Toombs, Gordon, President, British Columbia Interior Fish, Game, and Forest Protection Society.
Turnley, Francis Ronald, Writer.
Turner, Harry, Kamloops Lumber Company—Interior Lumber Manufacturers' Association.
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Wellburn, G. E., President and Manager, Wellburn Timbers, Limited.
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Wilson, John H., Peachland Municipality; Peachland Rod and Gun Club; Peachland Fruit-growers' Association.
Wimster, Herbert M., Commissioner of Parks.
Wood, John R., Cranbrook Farmers' Institute.
Wright, H. N., Deputy Minister of Finance, Provincial Government.
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Young, J. A., Vice-President and Treasurer, Pacific Mills, Limited.

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